**AMERISTAR® PERIMETER SECURITY USA INC.**

**Model 303 M30 Security Bollard**

**CONSTRUCTION SPECIFICATION - SECTION 32 41 00**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

The contractor shall provide all labor, materials and appurtenances necessary for the Installation of the impact tested M30 vehicle barrier system defined herein at (Specify Project/Site Name).

**1.02 RELATED WORK**

Section 31 \_\_ \_\_ - Earthwork

Section 03 \_\_ \_\_ - Concrete

Section 26 \_\_ \_\_ - Electrical

**1.03 SYSTEM DESCRIPTION**

The manufacturer shall supply a total vehicle barrier system of the Ameristar® 303 M30 Bollard system. The303 Bollard shall be tested and certified according to ASTM F2656-20. The 303 M30 Bollard was tested as a single bollard installation and certified to M30/P1. The system shall include all components (i.e., barrier, control system, operator panels, “as tested” drawing package, etc.) required for installation. High Security Bollard arrays are certified as a system provided the as tested foundation is repeated and continuous AND the maximum clear opening between bollards in an array does not exceed 48”.

**1.04 QUALITY ASSURANCE**

The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

**1.05 REFERENCES**

* ASTM A106 – Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service
* ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
* ASTM F2656-20– Standard Test Method for Vehicle Crash Testing of Perimeter Barriers

**1.06 SUBMITTAL**

The manufacturer’s literature shall be submitted prior to installation. The submittal package shall include at minimum, the as tested foundation drawings, control schematics, general system layout drawings, recommended maintenance intervals, spare parts, and standard manufacturer’s warranty for specified barrier system.

**1.07 PRODUCT HANDLING AND STORAGE**

Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism, and theft.

**PART 2 - MATERIALS**

**2.01 MANUFACTURER**

**A.**  The hydraulic bollard system shall be Model 303 M30 security bollard as manufactured by Ameristar Perimeter Security USA INC. (888-333- 3422), 1555 N. Mingo Rd. Tulsa, Ok. 74055.

**B.** Substitutions not permitted without prior approval. Substitutions must be approved 10 days prior to bid date to be considered “as equal” products. Any product proposed as an alternate shall be identical to a crash tested and certified as required for above specified project, engineered substitutions will not be allowed.

**C.** Application - bollard shall be a below grade assembly containing a heavy steel cylindrical weldment capable of being raised hydraulically above grade. The raised position shall block approaching vehicles. Upon impact, forces shall be first absorbed by the weldment and then transferred to the foundation of the unit.

**D.** Height of the bollard shall be no less than 40-inches (1016 mm) as measured from the top of the foundation to the top of the bollard. Bollard pipe structure shall be 8-inches nominal (219 mm) in diameter.

**E.** Each array of bollards can be operated independently or as a multi-zone array.

**F.** Optional stainless-steel sleeves and custom RAL colors are available.

**G.** The roadway cover plates shall be coated stainless steel when stainless steel sleeve is specified, or coated carbon steel when coated finish is specified.

**H.** Hydraulic actuator shall be double acting and provide power up and power down operation. Single acting cylinders which provide power up and GRAVITY down shall not be accepted.

**I.** Manufacturer supplied “Lost” bollard casing shall be cast in place prior to bollard assembly installation for ease of installation, maintenance, or replacement. Bollards which require structural components cast in concrete shall not be acceptable.

* 1. **MATERIAL**

**A.** HPU & Hydraulics - Hydraulic Power Unit (HPU) shall be provided to supply hydraulic pressure to operate the bollards.

The HPU shall be remotely located at a standard maximum distance of 50 feet (15.24 meters) from the bollards. Any distance greater than 50 feet (15.24 meters) must be approved by the manufacturer.

1. Installer shall provide hydraulic hoses between the HPU and between each bollard manifold. Due to the uncertainties in exact hose length, the installer shall supply the hoses rather than the bollard manufacturer, to the site-specific requirements.
2. Hydraulic hoses shall be rated to no less than 3000 PSIG (20.7 Mpa) by the hose manufacturer. The hose manufacturer’s factor of safety shall be no less than 4:1 for this rating, with a burst pressure of at least 12,000 PSIG (82.8 Mpa).
3. Hydraulic component connections shall utilize O-ring boss (ORB) seal connections and fittings where possible to reduce potential for hydraulic system leaks. Hydraulic Hose connections shall utilize JIC fittings. The HPU shall use SAE Straight Thread, O-ring boss (ORB) seals for tubing connections, to minimize hydraulic fluid leakage. HPU and hydraulic circuit shall use an environmentally friendly biodegradable vegetable based hydraulic fluid.
4. The HPU reservoir shall be a standard reservoir design conforming to hydraulic industry standards and be fitted with a filler breather cap and lift off lid for maintenance. Based on number of bollards, expected cycle rate, and sequence of operations, the manufacturer shall determine the proper HPU configuration and tank size.
5. The HPU shall use standard industrial components, which conform to hydraulic industry standards, and have interchangeable mounting dimensions.
6. Hydraulic components shall be manifold mounted where possible to minimize connection points, hydraulic leakage and permit component replacement without requiring the removal of other hydraulic components. The pump/motor connection will utilize Lovejoy type couplings and be mounted independently of the HPU oil reservoir.
7. The HPU shall be covered with a weather resistant enclosure or placed in a facility equipment room. The HPU weather resistant enclosure shall be a powder coated sheet metal with locking hinged door for maintenance and service access.
8. Optional HPU enclosure features; tamper switches, strobe light and horn, custom paint, convenience light, and AC unit. Optional low voltage and full-scale battery backups are available.
9. The HPU electrical motors driving the hydraulic pumps shall run at speed of no more than 1800 RPM, for lower noise emission, and longer pump/motor life. The HPU electrical motors shall have a sufficient horsepower rating to operate the hydraulic pump at the combined full rated flow and pressure. Standard HPU horsepower configuration shall be 5hp. Optional motor/pump configurations are also available to meet site specific requirements.
10. Control valves for bollard operation shall be provided with industry standard sealed DIN connectors, on flexible cable assemblies. Solenoid coil wiring shall be configured so that the connection does not need to be unwired when replacing a valve. Solder connections, crimped ring lugs and wire nuts shall not be permitted. Bollard manifolds shall be fitted with EFO (optional) poppet valve HPU manifold shall be fitted with detent directional control valves. Hydraulic lines shall be configured so that they do not need to be removed when replacing a valve.
11. Provided with electrical surge suppression at the solenoid coils, for long term reliability of electrical switching controls (contacts). Provided with LED indicators at the valve, to indicate if the solenoid is energized or de-energized, to assist during troubleshooting and diagnostics.
12. HPU shall have manual secure/unsecure valve overrides.
13. HPU’s with accumulators shall have capacity to operate a single manual reserve cycle during site power loss.
14. HPU shall include a manual pump for operation during loss of site power.
15. Hydraulic reservoir heater is standard.
16. HPU monitoring, indication and shutdown shall be provided for Low hydraulic fluid level to indicate insufficient hydraulic fluid in the reservoir. Hydraulic fluid temperature switch to indicate a hydraulic fluid over temperature condition.

**B.** Electrical - The model 303 vehicle barrier system shall operate on a standard 208‑240 VAC, single phase, 60 Hertz electrical power feed. When the standard electrical power feed is not available, the Buyer will specify an alternate electrical power feed to the manufacturer at the time of ordering.

1. The site facility shall provide a main power disconnect, circuit protection (such as a circuit breaker or fusible disconnect) and additional utility electrical power feed wiring, for connection to the Model 303 vehicle barrier system HPU electrical enclosure, external sump pumps, heat trace cable and/or other equipment as required.
2. All voltages required by electrical circuits other than the main electrical power feed, shall be provided by additional electrical circuit components, such as control transformers and DC power supplies.
3. Standard HPU is equipped with high/low voltage circuit protection.
4. The main incoming electrical power feed shall be provided with a circuit breaker. BY SITE INSTALLERS.
5. Each motor starter shall be provided with overload relays.
6. Electrical controls shall be provided integral to the HPU, with self-contained wiring to all mounted components. Field wiring requirements shall be minimized.
7. Electrical controls shall be enclosed in an integral, sealed, NEMA 4 (or IP 65 equivalent) enclosure, for protection of electrical switchgear from moisture and weather conditions.
8. Electrical controls such as circuit breakers, fuses, terminal blocks, power supply, motor starter, relays shall be DIN rail mounted for ease of replacement.
9. The electrical enclosure shall be mounted integral to the HPU and accessible from the weatherproof enclosure hinged maintenance access door.
10. The enclosure internal wiring shall be provided in easy to access wiring raceways, with removable raceway covers.
11. The electrical enclosure shall have additional space inside for DIN rail mounted accessories, such as traffic light relays, and vehicle loop detector modules.
12. All high voltage electrical switchgear shall be mounted inside the electrical enclosure (including, but not limited to motor starters, circuit breakers, transformers, etc.).
13. Electrical switchgear components shall be either UL and/or CE labeled.
14. When site ambient operating temperatures will be below 50°F (10°C), the Buyer will specify “cold weather kit” to manufacturer at time of ordering. When cold temperature operation is specified by the Buyer, the manufacturer shall then provide HPU enclosure and/or oil reservoir heaters as required.
15. When site ambient operating temperatures will exceed 120°F (48°C) requiring high temperature operation, the Buyer will specify “hot weather kit” to manufacturer at the time of ordering. When high temperature operation is specified by the Buyer, the manufacturer shall then provide an air-conditioning unit or exhaust fan/vent to maintain enclosure temperatures within specified operating range of electrical components.

**C.** Control System - Shall utilize a ruggedized, industrial type Programmable Logic Controller (PLC).

1. The PLC shall be a standard commercially available PLC.
2. The PLC shall be microprocessor based, to permit programming of the vehicle barrier system control and monitoring functions.
3. Control and monitoring functions for the control circuit shall function through the PLC.
4. Shall have Color Touch Screen HMI integrated into the PLC.
5. Shall be NEMA 4 and mounted on the electrical enclosure panel door.
6. Shall be equipped with standard features including selectable loop programming, maintenance operation controls, user defined programmable inputs and outputs for accessories and other access control devices.
7. Have easy to replace expansion modules. Modules shall utilize removable terminal strips and be capable of replacement without disturbing wiring. The PLC shall utilize I/O module slots for expandable I/O if necessary.
8. The PLC programming shall allow simplified configuration of controls and monitoring to meet site specific requirements. Hard wired control relays alone shall not be used.
9. The PLC shall be capable of being field reprogrammed on site, utilizing a standard laptop PC, with Windows based programming software or a preloaded SD memory card. Software shall be in an industry standard programming format. A proprietary programming language or use of machine code shall not be used.
10. The PLC programming code and configuration for the vehicle barrier control system shall be capable of being stored as an electronic file for re load of the microprocessor in the future.
11. The laptop computer, programming cable and programming software are not deliverable items with the vehicle barrier system.
12. Shall utilize Terminal blocks.
13. Shall be PCB Style with screw terminations.
14. PCBs shall be for hardware specific terminations (i.e. 3 wires of the down sensor)

**D.** General - All control and monitoring circuits, including signals, shall use 24 Volt DC for safety outside of the main electrical enclosure. To minimize the possibility of electrical noise, AC voltage signals shall not be used (PLC Only). This requirement is not applicable to the electric motor power.

1. The control circuit shall have additional optional interfaces for auxiliary equipment control and monitoring such as: card readers, loop detectors, traffic lights, etc. made possible through connection to a main terminal strip.
2. Proximity switches shall be provided for monitoring the bollard position. The proximity switches shall be:
3. Shock resistant, and use an electronic, solid-state construction. The non-contact type sensor shall have no moving parts and shall not be sensitive to adjustment and/or affected due to the bollard movement or stopping.
4. Resistant to water and shall be capable of being submerged (i.e. due to rainwater, melting snow, wash down, etc.).
5. Provided with a connector, so that the switch can be easily disconnected, without requiring the removal of wiring.
6. Provided with an LED indicator, to provide a visual indication of the switch status to assist during adjusting, and troubleshooting. LEDs shall be visible from any angle.

**E.** Operator Control Panels - Operator control panels and associated control circuit shall be provided to interface between all bollard locations, operator control panels and the HPU.

1. The Main Operator Control Panel shall be physically located at the site (such as a security room) to allow operation of all bollards.
2. The Remote Operator Control Panels shall be physically located near each set of bollards, (such as a guard booth).
3. All operator control panels shall be mounted in an indoor, covered environment, and shall not be exposed to weather and environmental conditions.
4. All operator control panels will be mounted in such way that the operator always has visual (eye or camera) supervision on the barrier, when operating the barrier.
5. The control circuit shall be part of the PLC and associated equipment, integral with the HPU electrical enclosure.
6. The control circuit functions, and monitoring shall be programmed into the PLC.
7. The operator control panel switches and indicators shall interface with the PLC Inputs/Outputs.
8. All operator control panel switches and indicators shall be prewired to wiring terminal strips. The terminal strips shall provide an interconnection side to allow connection of site field wiring.
9. All operator control panel circuits, including signals, shall operate using low voltage, +24 VDC for safety.
10. A Main Operator Control Panel shall be supplied for control and indication of all vehicle barrier system functions. The Default Main Operator Control Panel shall have:
11. A key lockable main Power On/Off switch (key switch), with an associated green color main power On/Off indicator light.
12. A set of illuminated pushbuttons for Up/Down control, to raise and lower each set of bollards.
13. A set of Open/Close indicator lights for indicating the position of each set of bollards when in the full Open or full Closed position. The Closed-indicator lights shall be red, and the Open indicator lights shall be green. The indicator lights shall be provided integral to the Open/Close illuminated pushbuttons switches.
14. A key lockable Arm/Disable switch to permit operation of each of the Remote Operator Control Panels in the vehicle barrier system.
15. A red color illuminated switch for (Optional) Emergency Fast Operate (EFO) to rapidly raise all bollards in the vehicle barrier system. The EFO switch shall be provided with a transparent flip cover.
16. Reset: A keyed switch for EFO Reset, to restore the vehicle barrier system to normal operation after activating the EFO function.
17. Reset: A keyed switch for emergency stop Reset, to restore the vehicle barrier system to normal operation after activating the emergency stop function.
18. A red color Check Oil indicator light for indicating a low level in the reservoir, or a hydraulic fluid over temperature condition.
19. Custom Master Control panels can be built to conform to all site requirements.
20. One or more Remote Operator Control Panels shall be provided for control and indication of each set of bollards within the overall vehicle barrier system. Each Default Remote Operator Control Panel shall have:
21. A green color panel on indicator light for indicating the panel has been enabled for operation by the remote armed key switch on the Main Operator Control Panel.
22. A set of illuminated pushbuttons for Open/Close control, to raise and lower each set of bollards.
23. A set of Open/Close indicator lights for indicating the position of each set of bollards when in the full Up or full down position. The Up-indicator lights shall be red, and the down indicator lights shall be green. The indicators lights shall be provided integral to the Open/Close illuminated pushbuttons switches.
24. A key lockable Arm/Disable switch to permit operation of each of the Remote Operator Control Panels in the vehicle barrier system.
25. A red color illuminated switch for (Optional) Emergency Fast Operate (EFO) to rapidly raise all bollards in the vehicle barrier system. The EFO switch shall be provided with a transparent flip cover.
26. Reset: A keyed switch for EFO Reset, to restore the vehicle barrier system to normal operation after activating the EFO function.
27. A red color Check Oil indicator light for indicating a low level in the reservoir, or a hydraulic fluid over temperature condition.
28. Custom Remote, Overwatch, or Local controls panels can be built to conform to all site requirements.
29. Operator control panel labeling shall use both text and graphic elements. A clear plastic overlay shall be provided to protect the panel surface and labeling from normal usage, and occasional panel cleaning.
30. Operator control panels shall be provided as a standard sloped, electrical enclosure console, suitable for countertop mounting. When alternate industry standard 19-inch (483 mm) rack mount panels are required in lieu of the console, the Buyer will specify the use of 19-inch (483 mm) panels to the manufacturer at the time of ordering. Note: Only the panels are provided (i.e. the rack enclosure is excluded).
31. The operator control panels shall use electrical industry standard, industrial grade, electrical components. Switches and indicators shall be no less than the 0.89-inch (22.5 mm) switch industry standard size.
32. Electrical switch and indicator components shall be either UL and/or CE labeled.
33. Electrical switch and indicator components shall be mounted in a sealed, NEMA 1, 3 or 12 (or IP 64 equivalent) enclosure, for protection against moisture and weather conditions, excluding the 19-inch (483 mm) panels.
34. All wiring to operator control panel components shall be terminated at terminal blocks, for ease of on-site field interconnection with other vehicle barrier system equipment and accessories.
35. Control options include master control panel – pushbutton, remote control panel – pushbutton, master control panel – touchscreen, remote control panel – touchscreen and radio controls.

**PART 3 - EXECUTION**

**3.01 PREPARATION**

**A.** Verify existing conditions before starting work. Do not proceed until unsatisfactory conditions are corrected in an acceptable manner.

**B.** Verify that foundation, applied finishes and adjacent construction are ready to receive vehicle barrier systems and are within tolerances acceptable to manufacturer.

**C.** Verify that required services and utilities are in correct location and are of correct capacities for specified products.

**D.** If preparation and condition is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

**E.** Prepare the grade and remove surface irregularities, if any, which may cause interference with the installation of vehicle barriers.

**3.02 INSTALLATION**

**A.** Install vehicle barrier systems in accordance with manufacturer's instructions, as tested drawings and the authorities having jurisdiction over the project.

**B.** Provide all related materials for the vehicle barrier system installation, including, but not limited to underground conduit, piping, interconnection wire, lubricants, and other materials required for the complete and functional installation of the vehicle barrier system.

1. Install as tested concrete foundation and coordinate with Cast-In-Place concrete specified in Section
2. 03 30 00 - Cast-in-Place Concrete. Refer to as tested foundation drawings for concrete and rebar details.
3. Coordinate with Security Access and Surveillance connection specified in Section 28 10 00 - Access Control
4. Coordinate with Electrical services and connections specified in Section 26 00 00- Electrical.
5. Coordinate with Paving specified in Section 32 10 00 - Bases, Ballasts, and Paving.
6. Ensure that all vehicle barrier system equipment to be installed is properly located at the site.
7. Provide electrical underground conduit runs for interconnecting wiring between equipment locations, including any accessories.
8. Install and interconnect the hydraulic power unit (HPU) and associated wiring to the barrier equipment provided with a weatherproof enclosure.
9. Install, mount and terminate the Main Operator Control Panel, and Remote Operator Control Panels, and interconnect to the barrier equipment.
10. Install, mount and wire accessory equipment and sensors, and interconnect to the barrier equipment.
11. Terminate the facility electrical power feed to the HPU disconnect switch
12. Install and terminate the roadway vehicle loop detector wiring if required, and interconnect to the HPU.

**3.03 FIELD TESTING AND COMMISSIONING**

**A.** General: Vehicle barrier system shall be initially started and commissioned by a certified manufacturer-authorized field service technician. Perform tests in accordance with the manufacturer's instructions.

**B.** Facility Electrical Power: Verify all wiring terminations before turning on electrical power. Verify voltage from facility electrical power feed.

**C.** Hydraulic Power Unit (HPU) Start-up: Prepare for initial start-up by a factory-trained, manufacturer-authorized field service technician.

1. Pump/motor shall be jog started (but not run) to verify the correct direction of electric motor rotation.
2. Perform Pre-Operation checks in accordance with the manufacturer's Operation and Maintenance manual.

**D.** Initial Barrier Operation: Cycle vehicle barrier to raise and lower the barrier and ensure proper, smooth operation.

1. Correct and repair operational anomalies, failures, malfunctions and/or other equipment trouble for proper operation.
2. Make adjustments required for the proper operation of the overall vehicle barrier system specific to site conditions.
3. Verify all functions, control, monitoring, indications of all integrated equipment are properly operating as a system.
4. Verify electrical circuits and connections to ensure that they are tightly connected and correct any loose or compromised connections found.

**3.04 CLEANING**

**A.** Leave immediate work area neat at end of each workday.

**B.** Clean surfaces with mild household detergent and clean water, rinse well. Concrete should be removed from exposed surfaces.

**C.** Touch up scratched surfaces using materials recommended by manufacturer. Match touchup paint color to finish.

**3.05 FIELD TESTING**

**A.** Upon completion of installation and commissioning perform a site field test on each equipment piece and the overall vehicle barrier system.

1. Notify the Architect 72 hours prior to the start of field-testing.
2. The vehicle barrier system shall not be tested until the system is commissioned, and operational.

**B.** Test shall include:

1. Raising and lowering the equipment, both electrically and manually, through their complete range of operation.
2. Verify the amount of time to raise and lower the barrier.
3. Cycle each bollard array using the specified duty cycle for not less than 30 minutes, to test for heat build-up in the electrical system.
4. Verify the use of all operator control panel functions and indicators.
5. Verify operation of any installed equipment directly operated by the vehicle barrier system, including accessories.

**C.** During testing, any PLC programming changes that deviate from the original specified or manufacturer's default program shall be submitted to the manufacturer as a written change request that defines the changes for any programming changes.

**D.** Notify the Architect and manufacturer of any equipment failures and/or malfunctions during field-testing.

Submit a Test Report with test data verified by the manufacturer to the Architect after completion of field-testing.

**E.** Manufacturer strongly encourages collecting an oil sample prior to releasing the barrier system into service.

1. Sample should be collected from the oil after it has been filtered prior to filling the reservoir in order to establish a baseline analysis.
2. Additional samples should be collected during maintenance, Oil changes, etc. to determine degradation.
3. Oil analysis should be used to create service intervals and reduce downtime.

**3.06 FIELD TRAINING**

**A.** Installer shall provide manufacturer's on-site field training for up to five designated Owner/Operator supervisors, operators and service technicians. Field training shall include:

1. No less than 8 hours of training during the normal working day.
2. Training shall commence after the vehicle barrier system is functionally complete and operational, but prior to final acceptance tests.
3. Cover all aspects of safely operating the vehicle barrier system.
4. Cover all the items contained in the Operation and Maintenance manual.

**3.07 MAINTENANCE SERVICE**

**A.** Installer to furnish service and maintenance for vehicle barrier systems and components for the following period from date of substantial completion. (choose one following or remove sections) 12 months, 18 months, or 24 months.

**B.** Maintenance program shall include periodic examination, adjustment, and lubrication of vehicle barrier equipment based on the manufacturer’s recommended maintenance and service intervals.

1. Repair or replace parts whenever required.
2. Replacement parts should be OEM and supplied by the manufacturer of original barrier system.

**C.** Provide emergency call back service for this maintenance period.

**D.** Barrier system service and maintenance shall only be performed by qualified personnel approved by manufacturer and specializing in vehicle barrier systems of similar type.

**3.08 PROTECTION**

**A.** Protect installed products until completion of project.

**B.** Touch-up, repair or replace damaged products before Substantial Completion.