**SPECIFICATION FOR MODEL 828 (-E, -H or -M variant) SHALLOW MOUNT VEHICLE BARRICADE**

## PART I - GENERAL

**1.1 WORK INCLUDED IN THIS SECTION**

1. Furnish labor, materials, inspections, supervision, etc., necessary for the complete installation and operation of vehicle wedge barrier(s) as shown on the plans and specified herein. Work includes furnishing all items and accessories required or necessary for the correct operation of the vehicle wedge barrier(s) as shown on plans and/or specified herein.

**1.2** **QUALITY ASSURANCE**

1. The Company shall specialize in manufacturing of the type barriers specified, with a minimum ten (10) years’ experience.
2. The installer shall have a minimum five (5) years installation experience of similar equipment.

**1.3** **SUBMITTALS**

1. Submittals shall contain sufficient plans, elevations, sections, and schematics to clearly describe the apparatus. All conduit runs, controls and similar drawings shall be included.
2. Submittals shall include (but not necessarily limited to) the following:
3. Excavation, foundation dimensions and/or mounting locations, in addition to, requirements and specifications for soil conditions, mounting material and material grade.
4. All high/low voltage and signal conduit runs.
5. Gravity and secondary sump pump drains.
6. Hydraulic line conduit and locations.
7. Details of electronic equipment, electrical equipment or any other apparatus deemed necessary by the Owner or Owners representative.
8. Finish details for apparatus color, appearance and orientation.
9. Installer shall provide two (2) copies of submittal packages.

**1.4** **INSPECTIONS**

Procure all the necessary and usual inspections and certificates for all work to be installed. Deliver same to the Owner/Owners representative before final acceptance.

**PART II – PRODUCTS**

**2.1 SHALLOW MOUNT WEDGE BARRIER**

1. **Application**
	1. The barrier shall consist of a shallow, steel, below-grade vault assembly that can be cast in a concrete foundation not exceeding 19 inches (482.6 mm) in depth. The assembly shall contain multiple, engineered heavy steel weldments, connected by an attack plate, capable of being rotated to an above grade position. When in the deployed, above grade raised position, the barrier shall present an obstacle to approaching vehicles. Upon impact, forces shall be first absorbed by the engineered steel weldments and then transmitted to the foundation of the unit.
2. **Features**
	1. Height of the barricade shall be 38 inches (965.2 mm) as measured from the top of the foundation frame to the top of the barrier inclusive of the attack plate.
	2. The barrier width shall cover a true clear opening from 96 inches (2.43 M) to 192 inches (4.88 m). The barrier width shall range from 106.5 inches (2.70 M) to 202.5 inches (5.14 M).
	3. The foundation depth of the barrier frame shall not exceed 19 inches (482.6 mm).
	4. The barrier vault assembly shall consist of an engineered watertight base, with a natural gravity drain, to remove water from the foundation. A drain and sump pump connection opening shall be supplied in the bulkhead of the watertight base.
	5. When the barrier is in the retracted position, there is no weight limit for vehicles.
	6. Barrier shall not use springs, cable tensioners or any other mechanical means to obtain an Emergency Fast Operation (EFO) state. Emergency Fast Operation shall be obtained only through the use of the supplied actuator and drive system.
	7. The barrier vault assembly, engineered weldments, attack plate, linkages and road plates shall be hot-dip galvanized for superior rust protection.
	8. All engineered weldments, linkages and attack plate components shall be painted in accordance with project requirements using a semi-gloss outdoor compatible Macropoxy 646 epoxy overlaid with a semi-gloss outdoor compatible Acrolon 218 acrylic polyurethane. Anti-slip aggregate shall be included on the road surface side of the weldments.

Exposed serviceability plates shall be painted a standard Galvano color using an outdoor compatible semi-gloss outdoor compatible Macropoxy 646 epoxy overlaid with a semi-gloss outdoor compatible Acrolon 218 acrylic polyurethane and contain an anti-slip aggregate surface.

High Intensity reflective tape shall be installed on the secure and attack side of the attack plate. Tape shall alternate project specified colors on a 6 inch (152.4 mm) horizontal pattern across the attack plate. Optional color and striping options shall be available.

* 1. The barrier shall contain serviceability plates that allow access to electrical, hydraulic, sump, bearings, pins or other serviceable items without removable of the attack weldment. Service access shall be available in both the deployed and retracted positions.
	2. The barrier shall incorporate a maintenance lock position necessary to hold the barrier in the deployed position during service. One (1) maintenance lock bar (MLB) shall be provided to positively mechanically lock a linkage in the deployed state.
	3. Safety LED Lights shall be an available option for installation. Standard option LED lights shall install horizontally and run in project defined segments on the attack side of the barrier. Additionally optional, light segments shall be installed on both the attack and secure side of the barrier attack plate, providing a visible indication the barrier is deployed. Lights shall be 12 volt DC, of type LED and red in color.
1. **Functional Specifications**

**828-E: Electric Servo actuated unit.**

1. Unit shall consist of an electro servo actuator controlled by a solid state EPU (Electric Power Unit). The system shall be designed for the actuator to push/pull the barrier when an up or down signal command is given. A gravity down design shall not be allowed. The electric control circuit shall include all necessary control logic, hardware, connections and power supplies to operate the barrier in a normal and EFO (Emergency Fast Operation) condition.
	1. The barrier shall be operated by an Allen Bradley compatible actuator with Servo Drive. The actuator shall be operable while submerged in less than 1 ft. of water. The actuator shall be sized and capable of deploying the barrier in less than 1 second during EFO operation.
	2. The actuator shall be equipped with a manual override in the event of primary power loss. The manual override shall be capable of deploying or retracting the barrier by use of a power drill and socket.
	3. Primary actuator shall be connected to the EPU (Electric Power Unit) with no more than two (2) liquid tight connectors, composed of power and signal connections.
2. Power System
	1. The servo drive and actuator motor shall operate on primary 120–208/240VAC single phase (three wire) 50/60 Hz power.
	2. The PLC control circuit shall operate from the same 120–208/240VAC single phase (three wire) 50/60 Hz primary power as the servo drive and actuator.
	3. Optional battery back-up system can provide over 400 continuous cycles in event of primary power loss. Control of the barrier is through normal operating controls.
	4. Barrier heat trace can be up to 5000 Watts on primary power circuit.
3. Control Circuitry

The following circuits and controls shall be furnished:

* 1. A built-in Allen Bradley PLC controller, supporting Modbus, shall interface between the barrier control stations and the actuator unit. The PLC shall include all necessary inputs, outputs, timers and logic necessary for barrier operation. Relays or proprietary control boards shall not be acceptable. All outputs for traffic lights, barrier gate arms or other devices shall be solid-state.
	2. Each PLC control circuit shall have time-based or event triggered data logging capability.
	3. The EPU (Electric Power Unit) control circuit shall be mounted in a general-purpose NEMA 4 metal enclosure. All device interconnect lines shall be run to terminal strips. An optional NEMA 4X stainless steel metal enclosure shall be available.
	4. Barrier Control station consoles shall operate on 120VAC single phase 50/60 Hz. An optional 24VDC circuit shall be available. Barrier Control station consoles shall be of type push-button control or optional touch screen.
	5. All Barrier Control station consoles shall contain an EFO (Emergency Fast Operation) button or command.
	6. A four port Ethernet switch shall be standard with a fiber switch available as optional equipment.
	7. Four (4) analog solid state proportional inputs shall be available for pedestrian and object detection.

**828-H: Hydraulically actuated unit.**

1. Unit shall consist of an electrically driven hydraulic pump which shall pressurize a high pressure manifold connected to a hydraulic type accumulator. Electrically actuated valves shall be installed on the manifold to allow oil to be driven to the up side of a double acting hydraulic cylinder to raise the barricade. The system shall be designed to allow gravity to lower the barrier when a down command is given. The hydraulic circuit shall include all necessary control logic, interconnect lines and valves to override and lock out the normal speed control valve for emergency fast operation of the barricade.
	1. The accumulator shall be sized to allow operation of the barricades in the event of a power outage. The bi-directional control valves shall be manually operable in the event of a power outage.
	2. A hand pump shall be furnished to allow the barricades to be raised manually in the event of a power failure.
	3. Hydraulic cylinder and hoses shall not be visible in either the raised or lowered positions. The hydraulic cylinder shall be accessible through the service panel located on the back of the barrier frame.
	4. A lockable weather resistant enclosure shall be provided for the hydraulic pumping unit. The design shall provide for easy access to the HPU for maintenance and emergency operation of the hydraulic system. Enclosure shall have a powder coat finish. The hydraulic pumping unit shall have 3 lockable easy access side panels and a removable lockable top panel for maintenance.
2. Power System
	1. The electric motor shall be capable of producing a minimum 3 horsepower.
	2. The unit shall be made available as 208/230 single phase or 208/230/460 three-phase AC voltage. The motor shall be of high starting torque, continuous duty, and industrial type, protected by either a thermal or current sensing overload device.
3. Control Circuitry
	1. A built-in PLC controller shall interface between the barrier control stations and the hydraulic power unit. The PLC shall include all necessary inputs, outputs, timers and logic necessary for barrier operation. Relays or proprietary control boards shall not be acceptable.
	2. The control circuit inputs shall operate from a 24 volts DC. An internal transformer and rectifier shall provide 24 volts DC for the control panel and customer dry contacts.
	3. There shall be 120 volts AC power available in the control cabinet for accessories requiring 120 volts.
	4. The control circuit shall be mounted in an enclosure with the hydraulic pumping unit. The enclosure shall be of sufficient size and rating to accommodate accessory devices. All accessory device wiring shall connect to the included terminal strips.
	5. The PLC is designed to accept dry contact inputs from various types of devices.

**828-M: Manually actuated unit.**

1. Unit shall consist of a manually driven rotary gear actuator. The system shall be designed to allow a person to drive the attack assembly up for deployment and down for retraction. Access to the drive system shall be obtained through a supplied port opening in a top service plate.
	1. The manually driven actuator shall be operable while submerged in less than 1 ft. of water.
	2. EFO (Emergency Fast Operation) is not included with the –M Series manually operated unit.
	3. A hand operated speed crank shall be furnished.
2. Control Circuitry
3. No control circuitry shall be included. Any controls for warning lights, traffic lights or other electronic devices shall be external to the barrier.

**2.2 CONTROL PANELS**

*(Any or all of the following control panels may be specified)*

1. **Remote Control Panel**
2. A remote control panel shall be supplied to control the barricade operation. This panel shall have a key lockable main switch with "main power on" and "panel on" lights. Buttons to raise or lower each barricade shall be provided. ‘Up” and “down” indicator lights shall be included for each barricade. The Emergency Fast Operation (EFO) feature shall be operated from a larger push button designated as EFO. The EFO shall also be furnished with EFO active light and reset switch.
	* + 1. The remote control panel shall operate on 24 volts.
			2. The remote control station shall be a standard 19 inch electronics rack type surface mount panel or desktop console type with all devices wired to a terminal strip on the back.
3. **Remote Control Master Panel**
4. A remote control master panel shall be supplied to control barricade operation. This panel shall have a key lockable main switch with "main power on" and "panel on" lights. Buttons to raise and lower each barricade shall be provided. “Up" and "down" indicator lights shall be included for each barricade. The Emergency Fast Operate circuit (EFO) feature shall be operated from a larger push button designated as EFO. The EFO shall be furnished with an active light and reset switch. The remote control master panel shall have a switch to arm or disarm the remote slave panel. An indicator light shall show if the slave panel is armed.
	1. The remote control panel shall operate on 24 volts.
	2. The remote control station shall be a standard 19 inch electronics rack type surface mount panel or desktop console type with all devices wired to a terminal strip on the back.
5. **Remote Control Slave Panel**
6. A remote control slave panel shall also be supplied to control barricade operation. This panel shall have a "panel on" light that is lit when enabled by a switch on the remote control master panel. Buttons to raise or lower each barricade shall be provided. Barricade "up" and "down" indicator lights shall be included for each barricade. The Emergency Fast Operate (EFO) feature shall be operated from a larger push button designated as EFO. When the slave panel EFO is pushed, an EFO "active" lamp will light and operation of the barricade will not be possible until reset at the master panel.
	1. The remote control panel shall operate on 24 volts.
	2. The remote control station shall be a standard 19 inch electronics rack type surface mount panel or desktop console type with all devices wired to a terminal strip on the back.

**2.3** **ACCESSORY DEVICES**

*(Any or all of the following may be specified)*

1. **Electro-Mechanical Barrier Gate**
2. An electrically operated wood or aluminum arm barrier gate shall be supplied to alert vehicles of the barricade position. The gate operator shall interface with the barricade control circuitry. The barrier gate shall close when the barricade "up" command is engaged and remain closed until the barricades are fully lowered. The gate assembly shall be mounted directly to the roadway surface.
3. **Traffic Signals**
4. 8 inch traffic lights shall be supplied to alert vehicles of the barricade position. The (specify color) light shall indicate that the barricade is fully down. All other positions shall cause the light to show (specify color). The traffic lights shall be supplied with a 6 foot tall 3.5 inch OD mounting post. The operating voltage shall be 24 volt DC and the lights shall be of type LED.
5. **Sump Pump**
6. A self priming sump pump shall be supplied to drain water collected in the engineered base. The pump shall feed to customer supplied discharge drain and shall pass through the bulkhead opening in the base. Pump operating voltage shall be 120 VAC.
7. **Vehicle Detection Loop**
8. A vehicle loop detector shall be supplied to prevent the barricade from being raised under an authorized vehicle. The detector shall utilize digital logic have fully automatic tuning for stable and accurate long term reliability. The detector shall delay any barricade raise signal (except for EFO command) when a vehicle is over the loop.

**2.4 PERFORMANCE**

* 1. **Testing**
1. Barrier design shall have successfully passed actual full scale crash tests conducted by a qualified independent agency.
2. Engineered data and/or computer models shall not be recognized.
3. Testing results shall be posted on the manufacture’s website clearly identifying manufacturer’s name, model number, independent agency name, test standard and results indicated by appropriate persons.
	1. **Evaluation**
4. The barrier shall contain an impact rating of P1 at the M50 test level as defined by ASTM F-2656-15 standard method of test. The test shall be conducted by a reputable independent Engineering Firm with a minimum of fifteen (15) years’ experience in performing such tests.
	1. **Stopping Capacity**
5. The barrier system shall be designed to impede a vehicle approaching from one direction.
6. The barrier system shall be capable of stopping a vehicle weighing 15,000 pounds (6,803 kg) traveling at 50 mph (80 km/hr) with less than 1 meter of measureable penetration.
	1. **Normal Operating Speed**
7. Barrier shall be capable of being raised or lowered in 3 to 15 seconds under normal operating conditions (excluding –M variants). All controls system (excluding –M variants) shall be equipped with field adjustable speed controls and allow speed adjustment to meet the application requirements.
	1. **Emergency Fast Operation**
8. Barricade shall rise to the full up position from fully down position in less than one (1) second when the Emergency Fast Operation button is depressed, provided the system has not previously been exhausted by manual operation or high speed cycle rates. Barricade shall remain in the up and locked position. Normal up/down buttons shall remain inoperable until the EFO has been reset.

**2.5 QUALITY ASSURANCE**

* 1. **Factory Testing**
1. Upon completion, the barricade system will be fully tested for proper operation by manufacturer prior to shipment. A nameplate with manufacturer's name, model number, and serial number shall be located within the hydraulic pumping unit.
2. All critical dimensions shall be checked for accuracy against customer approved shop drawings.

**2.6 PROCUREMENT SOURCE**

The barrier system shall be model 828-X as manufactured by **B&B ARMR (800-367-0387), 5900 South Lake Forest Drive, Suite 230, McKinney, Texas 75070.**

**PART III – EXECUTION**

**3.1 INSTALLATION**

1. Installation shall be performed according to the manufacturer’s instructions. Verify all component locations with contract drawings and shop drawings.
2. Any disagreement between the Plans, Specifications, and Ordinances, must be called to same before signing of the shop drawings. After the shop drawings have been signed, the Contractor is responsible for having all work meet requirements of the governing ordinances.