

## VR-7 VERTICAL RESISTANCE BARRIER Specifications

**GENERAL:** The resistance barrier shall be Model VR-7, as manufactured by B&B Roadway, (888) 560-2060.



**APPLICATIONS:** The barrier shall be designed for use as a penetration resistance barrier and shall be suitable for use as a warning barrier for wide spans. The barrier shall be explicitly designed for traffic control on movable bridges, as required by AASHTO's current Standard Specifications for Movable Highway Bridges, and shall be suitable for similar applications as well.

**HOUSING:** The operating mechanism and main control components shall be contained in a weatherproof housing. The housing shall be constructed of .375" (9.5mm) carbon steel, hot dip galvanized after fabrication. Exterior surfaces shall be painted aluminum. All external fasteners shall be corrosion resistant. Arm shaft openings shall incorporate O-ring seals.

**OPERATING MECHANISM:** The barrier arm shall pivot in the vertical plane via a mechanical 4-bar linkage. The linkage shall utilize cranks keyed to the main arm shaft and transmission shaft and an adjustable connecting rod between a pair of self-aligning spherical rod ends. The connecting rod shall be 1.25" (32mm) diameter AISI 4140 alloy steel. An auxiliary crank shall be used, paired with the transmission crank, to reduce the load on the transmission and to better balance and stabilize the load on the housing and mounting structure. The auxiliary crank shall be mounted in a permanently lubricated bronze bearing. The velocity of the arm shall follow a sinusoidal pattern to provide smooth operation. The arm shall begin and end its full motion path with zero velocity and accelerate smoothly to maximum velocity at mid-travel.

**TRANSMISSION:** The mechanism linkage shall be driven by a fully enclosed, double-enveloping worm gear, double reduction speed reducer. The transmission shall have a rated capacity of not less than 23,000 inch-pounds, continuous duty, with an occasional momentary peak load rating of not less than 69,000 inch-pounds. The output shaft shall be 2.5" (63mm) diameter. Gear ratio used shall produce an operation time of approximately 16 seconds. *[Option: Contact factory for other speed options.]*

**TORQUE LIMITER:** A heavy duty torque limiter shall be provided to limit torque transmitted to the operating mechanism in the event of excessive winds or a physical obstruction to the arm that could damage the mechanism during operation. The torque limiter shall be capable of being set anywhere within a range of 10,000 to 75,000 in-lbs torque. Each torque limiter shall be factory set for the load recommended by the manufacturer, based on installation requirements. Each torque limiter shall be adjusted and tested at the factory, under over-load condition, for a minimum of 5 minutes to verify the setting. The gate limit switch assembly shall be driven from the output side of the torque limiter so that slippage of the torque limiter will have no effect upon the limit switch settings.

**MOTOR:** The motor voltage and phase shall be as specified by the customer. The motor horsepower shall be as recommended by the barrier manufacturer to suit the installation, from 1 to 2 hp. The motor shall be a C-face design and shall be mounted directly to the transmission. The motor shall be instantly reversing and overload protected.

**LIMIT SWITCH:** The barrier limit switch assembly shall be a self-contained unit. The standard assembly shall provide 8 independent SPDT control switches. *[Option: A 10 circuit or a 12 circuit limit switch assembly shall be provided when specified.]* Switches shall be rated for 15 amps, 480 VAC. Switches shall be controlled by individually adjustable cams. The limit switch assembly design shall permit adjustment of all cams with the barrier in any position. The limit switch assembly shall have a removable cover to help prevent accidental contact with switch terminals. Shaft, cams, bushings and housing pieces shall be of non-ferrous corrosion resistant materials.

**BRAKING MECHANISM:** The motor shall be equipped with a solenoid-release, automatic brake. The brake shall have a manual release lever to permit manual operation of the barrier during setup or emergencies.

**ARM SHAFT:** The main arm shaft shall be 2.5" (63mm) diameter AISI 4140 high strength alloy steel with a minimum tensile strength of 140,000 psi. The shaft shall be mounted in heavy duty relubricable ball bearings.

**DOORS:** Front and rear access doors shall be mounted on strap hinges. Hinges shall be of the slip-off type and shall have stainless steel pins. A stop shall be mounted inside the door to secure the door from being raised off the hinges in the closed position. Door latches, two per door, shall use a vise action to compress a neoprene bulb-type gasket to seal the door openings. *[Option: Door latches shall be of stainless steel and shall be tamper-resistant.]* *[Option: A stainless steel strap shall extend across each door and fit over a heavy hasp to permit use of a padlock. Strap and hasp shall be designed to fit both standard style heavy-duty padlocks and high security shackless ("hockey puck" style) padlocks. Padlocks shall be provided by others, keyed alike.]*

**ARM MOUNTING TUBES:** A pair of carbon steel rectangular tubes, hot dip galvanized after fabrication, painted aluminum, shall be rigidly affixed to the ends of the main arm shaft. The tubes shall be offset to locate the arm centerline at the height specified above the housing base. The tubes and a steel cross-member shall provide a sturdy mount for the arm and counterweights. The tubes shall have provision for easily adjusting the counterweight offset so the arm can be properly balanced in all positions.

**COUNTERWEIGHTS:** Hot dip galvanized steel counterweights shall be mounted at the rear of the side arm tubes to balance the arm. Counterweights shall be sectional and shall be balanced at the factory.

**ARM:** The barrier arm design shall be double rail aluminum tube (maximum 50'). *[Option: Arm shall be tapered aluminum pole, or trussed tri-rail aluminum tube (consult factory for specific design and maximum arm length).]* Arm length shall be measured from the centerline of the housing. Stainless steel truss cables and a roadway type bumper rod shall be furnished with longer arms at the discretion of the manufacturer. Front and rear arm surfaces shall be covered with alternating red and white high intensity reflective sheeting. Striping shall be 16" (406mm) wide and vertical according to MUTCD. Remaining exposed surfaces shall be painted white.

**ENERGY ABSORPTION CABLES:** The barrier shall utilize 6x19 classification, 300-series stainless steel, annealed energy absorption cables to assist in diffusing the kinetic energy of an impacting vehicle. Cables shall be annealed in a coil not less than 42" diameter. Consult factory for barrier resistance capacity which shall necessarily depend on project specific conditions.

- Double rail aluminum tube arms shall use three .50" (12mm) cables, one inside each tube, and one along the center of the arm.
- Tapered pole arms shall use three .50" (12mm) cables, one inside the pole and one above and one below the pole.
- Tri-rail arms shall use three .50" (12mm) cables, one inside each tube facing traffic and one between these tubes.

**SIDE ARM LOCKS:** The energy absorption cables shall be anchored at both ends of the span in the closed to traffic position. At the housing, heavy duty side arm locks shall be mechanically linked to the operating mechanism to automatically engage and lock the side arm tubes into a rigid configuration when the arm is lowered, to assist in transferring the load into the housing in the event of an impact. This will minimize the chance of damage to the internal operating mechanism.

**ARM END LOCK:** The energy absorption cables shall be anchored at the tip end of the arm in the closed to traffic position. A passive end lock mounted on the arm tip shall engage a rigidly mounted and anchored socket on or in a wall or post for independent barriers. For paired barriers, on-coming barrier shall be fitted with a bar and anchor nut while off-going barrier shall be fitted with a yoke. On-coming barriers shall be sequenced to close first and open last. The yoke on the off-going traffic barrier shall fit over the anchor nut in the closed to traffic position. The end lock system shall be designed so that the yoke will engage the anchor nut in a collision to connect the two barriers into a continuous unit. End locks shall not require powered actuation for proper engagement.

**MOUNTING:** The barrier shall be fixed to a suitable foundation, as specified by the project engineer, using eight 1" (25mm) diameter anchor bolts. The barrier housing base shall provide 1.25" (32mm) mounting holes.

**HANDCRANK:** Both a handcrank and a drill crank shall be provided with each barrier to facilitate manual operation.

**SAFETY SWITCHES, TERMINAL BLOCKS AND WIRING:** A manual disconnect switch shall be provided, pre-wired at the factory to break the main motor leads, to protect personnel during service. A handcrank safety switch shall be

provided to prevent automatic actuation of the barrier during manual operation. Additionally, safety switches shall be installed and set at the factory to break the control circuit when either access door is opened. Door safety switches shall have a pull-to-override feature for test operation and shall automatically reset when doors are closed. Control components and terminal blocks shall be mounted inside an electrical enclosure, which shall be mounted inside the operator housing, with roadway side access, except where customer requirements prevent this arrangement. Pressure-type, modular terminal blocks shall be fully labeled and clearly coded to wiring diagrams. All control wiring shall be clearly coded to wiring diagrams and shall terminate at the terminal block. Connections to screw-type terminals shall have lugs. Conductors shall be type XHHW #14 AWG stranded, minimum.

**OPTION: CABLE ANCHORAGE SYSTEM:** [OPTION IN LIEU OF SIDE ARM LOCKS: The energy absorption cables shall be anchored at both ends of the span in the closed to traffic position. A cable anchorage system shall be used at the housing or base end of the arm to absorb loads during an impact. Details of the cable anchorage system shall be coordinated with the manufacturer to suit installation requirements.]

**OPTION: ARM END LOCK ENGAGEMENT INDICATION LIMIT SWITCH:** [Option: The arm end lock shall be equipped with an extended range proximity switch to indicate correct engagement of the end lock. The mechanism shall be mounted on the arm end lock and send a confirmation signal only when the end lock is properly engaged. The mechanism shall be fully adjustable and preset at the factory.]

**ACCESSORIES AND MODIFICATIONS:** All common accessories and modifications shall be available. Custom modifications and accessories shall be available through coordination with manufacturer.

**WARRANTY:** A warranty shall cover the barrier and related equipment against defective material and components for 1 year from date of shipment from manufacturer. Manufacturer shall furnish replacement parts for a minimum of 10 years. Replacement parts for most components shall normally be available in 1 working day. Lamps, fuses and other components designed for a life less than 1 year shall be covered for the rated life of the component or the warranty period of the component manufacturer.

**PARTIAL LIST OF ADDITIONAL OPTIONS** (contact factory for detailed specifications):

Stainless Housing	Arm Finishes, Striping Materials and Colors
Anchor Bolts (provided by manufacturer)	Alternate Arm Designs
Mounting Template	Arm Lights
Alternate Door Latch Styles	Flasher
Door Strap with Integral Heavy Duty Padlock Hasp	Reflective Button Delineator
Stainless, Tamper-Resistant Door Latches	Gong or Vibrating Bell

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