BARRIER TRANSFER MACHINE DETAILS

The Moveable Barrier Transfer Machine is a patented product and shall be obtained from Barrier Systems, Inc. (BSI),

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Rio Vista, California
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1.0 This specification describes a Moveable Barrier Transfer Machine (MBTM) used to reposition continuous segments of Quickchange Movable Concrete Barrier (QMB) elements including Variable Length Barriers (VLB's), from a set position to a lateral and approximate parallel position a distance that may be varied during the transfer operation between 10.0' and 24.0', by means of a roller transfer system. The machine shall safely operate in all circumstances of weather, except untreated ice; and shall safely operate on variable surfaces such as concrete and asphalt. The machine shall not encroach upon adjacent travel lanes while making a lateral transfer of the QMB of more than 11.0' and must be able to reposition QMB when a deflection occurs due to normal impacts. The machine shall be equipped with two (2) fully enclosed operator's stations (cabs), one (1) located at each end of the machine. The machine shall be equipped with any special provisions required to actuate tether points or gates. The minimum service life of the machine shall be not less than 10 years. The machine must operate in both forward and reverse direction in order to reposition the QMB without turning the machine around. The machine shall be able to position the QMB to within 3inches of existing permanent barriers. The machine must accomplish a continuous lateral transfer of the QMB at a working speed of at least 5-10 mph depending on factors such as grade, road surface conditions, weather and other factors. Top travel speed of the machine when unloaded shall not be less than 20 mph. Machine(s) furnished to these specifications must meet or exceed all requirements herein.

2.0 LIQUID-COOLED DIESEL ENGINE: The machine shall be equipped with a liquid cooled, turbo-charged, diesel-powered engine meeting, but not limited to, the following:

2.1 Minimum 200 SAE HP at governed RPM.

2.2 Minimum six (6) cylinders.

2.3 Twelve (12) volt electrical system consisting of a minimum 160-ampere alternator, electric starter, total minimum battery rating of at least 1,825 cold cranking amperes (CCA) at 0°F with a reserve capacity of 425 minutes at 80°F.

2.4 Ignition switch at engine shall be keyed with a safety device to prevent engine starting when transmission is in gear.

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2.5 Diesel engine fuel filtration system to include a screen at the fuel tank or transfer pump and at least two (2) stages of filtration. Filter stages may consist of a primary and secondary filter or a two (2) stage filter in a common housing. At least one (1) drain shall be provided in the system to prevent water damage to the injection system. All items to be factory approved and factory installed.

2.6 Full-flow oil filtration system with replaceable filter and provision for bypassing oil to the engine as the filter becomes clogged.

2.7 Dry type air cleaner, including a primary element, a safety element, an internal or external precleaner and a restriction (service) indicator.

2.7.1 Air cleaner and connections shall be waterproof and dust proof and mounted in such a manner so as to withstand abrasions, wear and vibrations.

2.7.2 The air cleaner assembly shall not extend above the roof of the machine.

2.8 The radiator shall be suitable for ambient temperatures up to 110° F.

2.9 Cooling system with anti-freeze protection to at least minus 30°F.

2.9.1 Screw-on type water (coolant) filter.

2.10 All cooling system hoses including heater hoses shall be silicone type, if available.

2.11 Hour meter.

2.12 Positive crankcase ventilation

2.13 Drip pan mounted directly underneath engine with drain plug.

2.14 Engine shall be completely housed with louvered access panels for servicing and ventilation.

2.15 Manufacturer's standard fuel tank, minimum 50-gallon capacity.

2.16 Exhaust muffler, and vertical exhaust pipe with rain cap to exhaust fumes through roof and above machine.

3.0 MACHINE FRAME, DIMENSIONS AND CAPACITY: Machine shall meet the following requirements:

3.1 MACHINE FRAME: The machine frame shall be constructed of steel and have front, rear, and side structural members for impact protection.

3.2 MACHINE DIMENSIONS: The overall machine dimensions shall not exceed the following:

3.2.1 Width – 142 inches

3.2.2 Length – 798 inches

3.2.3 Height – 143 inches

3.3 MACHINE CAPACITY: The maximum unloaded weight of the machine shall not exceed 80,000 pounds. The loaded weight (when moving barrier segments) shall not exceed 100,000 pounds. The capacity rating shall be 36,320 kg at the machine's top travel speed of 20 mph and 100,000 pounds at the working speed of at least 5 – 10 mph depending on factors such as grade, road surface conditions, weather and other factors.

4.0 CABS: The machine shall be equipped with a fully enclosed, all-metal machine cab at each operator station. The cabs shall be equipped with, but not limited to, the following:

4.1 Cab grab handles.

4.2 Access steps or ladder.

4.3 Lockable access door.

4.4 Roll-down or sliding window.

4.5 Windshield and side windows, shall be tinted shatterproof automotive type glass or Lexan.

4.6 Fresh air heater ventilation and windshield defroster.

4.7 Dome light.

4.8 Windshield washer, and two (2) speed or variable-speed electric windshield wiper.

4.9 Air conditioner.

4.10 Headliner, cab insulation and rubber floor mats.

4.11 Operator's seat, cushioned, adjustable type, with padded backrest and armrests, and seat belt.

4.12 All machine controls shall be mounted in the cab and conveniently located at the operator's station.

4.13 Operator's station shall be located next to roller transfer system inlet.

4.14 Electric horn.

4.15 Access door to mid section in each cab.

5.0 INSTRUMENTATION: Each machine cab shall be equipped with, but not limited to, the following gauges or indicators that must be easily visible to the operator and shall have non-glare light(s) for night time visibility:

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5.1 Speedometer.

5.2 Odometer

5.3 Tachometer.

5.4 Engine coolant temperature gauge.

5.5 Engine oil pressure gauge.

5.6 Hydraulic oil temperature gauge.

5.7 Hydraulic oil pressure gauges.

5.8 Voltmeter.

5.9 Fuel quantity gauge.

5.10 Audible alarm and warning light for the following engine conditions:

5.10.1 High engine temperature.

5.10.2 Low engine oil pressure.

6.0 STEERING AND GUIDANCE SYSTEM

6.1 STEERING

6.1.1 The machine shall be equipped with a hydraulic, power-assist primary steering system on each axle.

6.1.2 Backup gasoline-powered, hydraulic pump system shall be provided to supply power for steering in the event the primary power system fails.

6.1.3 Control of steering for each axle shall be in the corresponding operator station performing the barrier transfer.

6.2 GUIDANCE SYSTEM

6.2.1 The machine shall be equipped with a guidance system to automatically guide the machine for pick-up and placement of the movable concrete barrier to within plus or minus 2 inches.

6.2.2 When the machine is being operated in auto guidance mode three (3) small lights shall be provided in each cab to indicate if the machine is traveling on or to the right or left of the nominal position.

6.2.3 The system shall have an override feature to allow the machine to be steered manually.

6.2.4 The guidance line, magnetic devices or wire in or on the road surface and any electrical wiring, power systems, cabinetry and non-machine mounted

peripheral items are the responsibility of the Contractor. The Supplier shall be responsible for all guidance equipment on the Moveable Barrier Transfer Machine.

7.0 TRANSMISSION

7.1 The machine shall be equipped with a continuously variable, reversible hydrostatic drive system.

7.2 Drive system to provide forward and reverse working speed of at least 5 mph for transfer of barrier and a top travel speed of 20 mph, in either direction.

8.0 WHEELS, TIRES AND AXLES

8.1 WHEELS

8.1.1 The machine shall be equipped with a minimum of four (4) steel disc wheels suitable for use with pneumatic, foam filled or solid rubber tires.

8.1.2 All wheels of the same size shall have the same bolt-hole pattern.

8.2 TIRES

8.2.1 The machine shall be equipped with a minimum of four tires approved for the application by their manufacturers.

8.2.2 The total combined load rating of the tires and wheels shall exceed the gross machine weight rating (GVWR) of the machine. Load ratings shall be determined by the tire and wheel manufacturers.

8.3 AXLES

8.3.1 The machine shall be equipped with running gear of sufficient capacity to support the fully loaded weight of the machine.

8.3.2 Tractive power shall be provided to at least 2 wheels.

8.3.3 Vertical height adjustments shall be made with shims at the axles or by hydraulic cylinders, or other means.

9.0 BRAKES

9.1 In addition to the dynamic braking of the hydrostatic drive system, the machine shall be equipped with a spring applied fail safe emergency/parking brake system.

9.2 Brakes must be operable from both operator cabs.

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9.3 Brakes shall be capable of holding the empty or loaded machine on 15 percent grade.

9.4 Emergency/parking brake system must be capable of being released for emergency towing purposes.

10.0 HYDRAULIC SYSTEM: System(s) as normally provided by the manufacturer shall be of a size, type and capacity to perform all required operations.

10.1 System shall be sealed against all contaminants and any necessary air vents shall be filtered.

10.2 A means shall be provided to maintain hydraulic oil at satisfactory operating temperatures with ambient temperatures of up to 110°F.

10.3 Adjustable-pressure relief valve(s) shall be installed and preset as recommended by the manufacturer to provide overload protection to the hydraulic system.

10.4 Hydraulic reservoir shall have a minimum capacity of 60-gallon and be properly baffled.

10.5 A ten (10) micron filter (or finer) will be provided in the return line circuit with a by-pass valve to prevent restricted flow and be of a canister type design for easy servicing and replacement.

10.6 A valve shall be provided in the inlet and/or outlet lines to the filter housing in order to minimize hydraulic fluid loss when filter is being changed.

10.7 Hydraulic reservoir shall be equipped with a sight level gauge.

11.0 TRANSFER AND CAPSTAN SYSTEM

11.1 Transfer System

11.1.1 The machine shall be equipped with a roller transfer system which is capable of laterally transferring the QMB a distance between 10 feet and 24 feet.

11.1.2 Roller transfer system shall lift the QMB approximately 4 inches off the road surface, pass the barrier diagonally through the intermediate roller section of the machine to the opposite side, and lower the barrier to the road surface a predetermined lateral distance.

11.1.3 No power, other than that provided by the machine, shall be required to transfer the movable barrier.

11.2 Capstan System

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11.2.1 The machine shall be equipped with a multi-wheeled capstan system capable of maintaining the longitudinal position of the QMB wall within 12 to 18 inches of the specified deployment location.

11.2.2 The capstan system shall be hydraulically powered and shall be automatically or manually adjustable. If automatic controls are used there shall be manual override capability.

11.2.3 The capstan system shall maintain full capability at all allowed transfer speeds and shall be capable of imparting a longitudinal push or pull in either direction of machine travel.

12.0 MIDSECTION

12.1 The mid section shall be enclosed on the top and sides.

12.2 The engine shall be housed, skid mounted and approximately centered in the mid section of the machine with a walkway around both sides of the engine.

12.3 The floor shall be skid resistant grating.

12.4 Vertical distance between floor and roof shall be nominally 6 feet.

12.5 A watertight top access panel shall be provided for vertical removal of engine.

12.6 Top access panel shall have four (4) lifting eyes, one (1) at each corner.

13.0 LIGHTING AND ACCESSORIES

13.1 LIGHTING: Each cab to have separate lighting controls for headlights, turn signals, rear brake and tail lamps. Both ends of the machine shall be equipped as follows:

13.1.1 Red tail lamp, red stop lamp, turn indicator and red reflector on each side. The lamps and/or reflectors may be combined, and shall be screw or bolt mounted at the same level and as widely spaced laterally as practicable. The lamps shall be located at a height of not less than 15 inches or more than 72 inches above the ground.

13.1.2 Two (2) white, halogen sealed beam headlights, located at a height of not more than 54 inches or less than 24 inches above the road surface.

13.1.3 Switchable amber and red clearance lamps shall be provided to indicate the extreme length and width of the machine.

13.1.4 Turn signal controls in each cab shall be 4-way flasher type for off, flash left, flash right and flash both lights.

13.1.5 Clearance and side marker lamps may be mounted in combination.

13.1.7 All electrical wiring shall be insulated and enclosed to maximum extent practical for protection from external damage and short circuits. Wiring shall be securely fastened at sufficient intervals to prevent sagging and insure clearance of mechanical parts. Routing of the wiring through the sub-frame, deck or the like shall be in such a manner so as not to interfere with normal operation and use or present a safety hazard. A sealed, splice-free modular wiring harness is acceptable. Rubber grommets shall be used wherever wires or harness pass through metal.

13.2 ACCESSORY LIGHTING: The machine shall be equipped with the following:

13.2.1 Flashing amber warning lights shall be mounted on top of the machine on each corner to be clearly visible from all directions.

13.2.2 The machine shall be equipped with at least two (2) work lights at each end of the machine. On/off switch shall be convenient to the operator.

14.0 SAFETY AND SPECIAL EQUIPMENT

14.1 SAFETY: The machine shall be equipped with the following safety items:

14.1.1 A backup alarm system located at each end of the machine, distinguishable from the surrounding noise levels. Backup alarm system shall be activated when the machine is put in reverse from either operator station.

14.1.2 All rotating or reciprocating parts and all parts subject to high temperature, that are of such nature or so located as to become a hazard to operating personnel, shall be insulated, fully enclosed or properly guarded.

14.2 SPECIAL EQUIPMENT: The machine shall be equipped or provided with the following special equipment:

14.2.1 Tow hooks, one (1) set for each end.

14.2.2 Communication system to allow operators to communicate internally between both cabs.

14.2.3 Spare drive wheel and tire.

15.0 INSTRUCTION ON SAFETY, OPERATION AND PREVENTIVE MAINTENANCE: The successful bidder shall provide the NYCDOT representative a minimum 30 continuous days of instruction on safety, operation and preventive maintenance of the machine by factory-trained personnel after the machine has been delivered and is ready for operation. This training shall be concurrent with other equipment training to the maximum extent possible.

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16.0 SAFETY PLAQUES OR DECALS: Safety plaques or decals shall be furnished and affixed at the operator's station and at any hazardous area. Plaques or decals shall include necessary warnings and precautions.

17.0 SERVICE POINT ACCESSIBILITY: All lubrication and frequent service items must be readily and easily accessible to the operator/technician.

18.0 PAINTING: The exterior of the machine shall be painted a manufacturer's approved standard color, except for glass, rubber and those metallic accessories or fixtures constructed of rust-resistant or plated material not normally painted. Lead-free paint will be accepted. All interior compartment surfaces shall be painted a light green or light grey non-glare color.

19.0 MANUALS: Manual(s) containing illustrated parts list(s) and operating and service instructions for the machine and engine(s) shall be delivered with each machine.

19.1 Manual(s) shall be as detailed as possible outlining all necessary service and operating instructions for each machine delivered. Parts list(s) shall cover all components of the machine. Each part shall be identified by part number, description and component location. Necessary warnings and safety precautions shall be included.

19.2 The following additional information shall be provided by the vendor at time of delivery if it is not included in the manuals required above.

19.2.1 Manufacturer's recommended service/preventive maintenance intervals.

19.2.2 Recommended fluids, lubricants and their SAE/API equivalents.

20.0 MANUFACTURER'S STATEMENT OF ORIGIN (MSO):
Vendor shall furnish an MSO with each machine at time of delivery.