SPECIAL SPECIFICATION

5272

Automated Barrier Gate

1. Description. This Item governs for the furnishing and installation of automated barrier gates in designated field locations as shown on the plans and as detailed in the Specifications.


A. General Requirements. All materials furnished, assembled, fabricated, or installed under this Item must be new, corrosion resistant, and in strict accordance with the details shown on the plans and in the Specifications.

The automated barrier gate includes, but is not limited to the following:

* Gate foundation and pedestal

* Horizontal swing gate:
  - Gate operator housing for the control components
    - Motor and the associated mechanical equipment
  - Electrical components and associated equipment
    - Control relays and limit switches
    - Local Control Switches and push buttons
  - Gate Arm

* Pushbutton Control Panel

B. Functional Requirements. The barrier gate is horizontal swing type, motor-operated and gear driven. The length of the gate must be sufficient to span the roadway as indicated on the plans, in the range of about 16 to 24 ft.

The barrier gate must withstand a wind speed of 80 MPH.

The design of the entire gate assembly and the driving mechanism must meet the requirements of all codes applicable to this type of equipment.

Limit switches are provided to restrict the movement of the gate only in the designated range.
The gate must have a travel range of 90 to 180 degrees as indicated on the plans. The entire 90 degree travel of the gate is accomplished in less than 12 seconds. For 180 degree travel, the time is less than 20 seconds.

Motor burn-out protection is provided to protect the motor when the gate meets an obstruction.

Operations Mode select switches are provided for field personnel to override the satellite control function and to operate the gate with pushbuttons.

A handcrank is furnished for each gate for manual operation. Insertion of the handcrank automatically disables the control circuit to the motor-reversing contactor and releases the magnetic brake. Manual operation may be accomplished from outside of the housing by inserting the handcrank through the top.

C. Electrical Requirements.

1. **Drive Motor.** The motor must be totally enclosed, non-ventilated, ball-bearing, and instant-reversing type. It operates from single phase 240 VAC, 60 Hz and the power rating is sized according to the manufacturer recommend for the gate arm length and the requirements specified herein, but must be 1/2 hp minimum.

2. **Motor Control Circuits and Accessories.** A NEMA I electrical compartment is provided to contain the following electrical components, which is provided as part of this bid item:
   - Reversing motor starter with thermal overloads
   - Breaker for motor disconnect
   - Breaker for control and accessories
   - Panel for local circuits
   - Terminal blocks with identification strips
   - Thermostat and heater mounted in bottom
   - Dual receptacle
   - Lamp outlet
   - Limit switches

3. **Control Panels.** The Contractor must provide a Gate Control Panel which is used to control a specified number of gates. The Gate Control Panel interconnects with the LCU HOV backpanel.

   The Gate manufacturer must provide an HOV Lane Control Panel that controls individual gates. The HOV Lane Control Panel is mounted on the gate cabinet.

   a. **Gate Control Panel.** The Gate Control Panel controls the specified number of gates at each specified location. The gate control panel is not be microprocessor based.

   The gate control panel provides the gates with any one of the three (3) selectable modes of operation.
(1). Remote Control Mode - The gate is controlled remotely via the fiber optic communications network and the LCU. Remote control is locked out when in Local mode or HOV Lane mode.

(2). HOV Lane Mode - The gate is controlled locally by the use of switches on the HOV Lane Control Panel located on the gate housing.

(3). Local Mode - The gate is controlled locally by the use of switches on the gate control panel located in the satellite building.

The gate control panel has the following clearly labeled waterproof switches and indicators.

- Operations Mode Select Switch - This switch in conjunction with the Gate Control Panel mode switch controls the mode of operation of the gates. The positions of this switch are Local and Remote. Only one position can be selected at one time. The relation of the mode of operations to the switch positions are explained in Paragraph 2.3.3.2.

- Gate Position Indicators - Light emitting diodes (LED) mounted on the Gate Control Panel and clearly labeled are provided to show the gate positions, either open or closed. The LED's reflect the status of the signal confirms described below:

<table>
<thead>
<tr>
<th>COMMANDS</th>
<th>CONFIRMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Open</td>
<td>1. Open</td>
</tr>
<tr>
<td>2. Close</td>
<td>2. Closed</td>
</tr>
<tr>
<td>3. Local Control</td>
<td></td>
</tr>
</tbody>
</table>

A true "local control confirm" indicates that the operations mode select switch is in the local position. A true "open confirm" indicates that the gate is fully open. A true "closed confirm" indicates that the gate is fully closed. Both "open confirm" and "closed confirm" are false when the gate is not fully open or fully closed.

A true "open command" (0 VDC) from the local control unit to the local control panel for greater than .5 to 5 seconds adjustable in .5 second intervals simultaneous with a false "close command" causes the local control panel to send a 120 VAC "open" signal to the gate.

A true "close command" (0 VDC) from the local control unit to the local control panel for greater than .5 to 5 seconds adjustable in .5 second intervals simultaneous with a false "open command" causes the local control panel to send a 120 VAC "close" signal to the gate.

Invalid conditions are not acted upon by the local control panel, including:
- Valid command of less than .5 seconds in duration.
- Simultaneous true "open command" and "close command".
- Simultaneous false "open command" and "close command".

The gate while in motion, responds to a valid command requesting a change of direction, without harm to the gate or its drive mechanism.

b. **HOV Lane Control Panel.** An HOV Lane control panel is provided and installed in the gate operator housing. The HOV lane control panel cabinet is equipped with a number 2 Corbin lock and is accessible without accessing the gate operating mechanisms. The front panel of the HOV Lane Control Panel has the following clearly labelled waterproof switches:

Gate Open - Push button switch to control opening of the gate.

Gate Close - Push button switch to control closing of the gate.

Operation Mode Select - Two position switch used in conjunction with the Gate Control Panel as described in Section 2.3.3.1 to determine mode of operation. The positions of this switch are HOV Lane and Remote. The way in which they interact is shown below:

<table>
<thead>
<tr>
<th>HOV Lane Control Panel</th>
<th>Gate Control Panel</th>
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</thead>
<tbody>
<tr>
<td>Mode Switch</td>
<td>Mode Switch</td>
</tr>
<tr>
<td>HOV Lane</td>
<td>Local</td>
</tr>
<tr>
<td>HOV Lane</td>
<td>Remote</td>
</tr>
<tr>
<td>Remote</td>
<td>Local</td>
</tr>
<tr>
<td>Remote</td>
<td>Remote</td>
</tr>
</tbody>
</table>

4. **Limit Switches.** The gate operator limit switch is a unit assembly containing 8 individual switches having one set of normally open and one set of normally closed contacts each. Contacts are totally enclosed and have a U.L. Rating of not less than 15 amperes at 220 VAC. Each individual switch is controlled by an independent cam, which is adjustable with a single set screw. The limit switch body, cams and shafts are of corrosion resistant non-ferrous materials.

The load switches are capable of operation at 10 amperes of tungsten lamp load over the specified temperature range.

5. **Wiring.** Wires exiting and entering the gate housing is via terminal blocks in the housing and through openings in the concrete foundation or pedestal. Gate housing shall be properly grounded.

All wiring must meet the requirements of the National Electric Code. All wires are cut to proper length before assembled. No wire is be doubled back to take up slack. Wires are neatly laced into cables with nylon lacing or plastic straps. Cables are secured with clamps.
Service loops are provided to facilitate the removal and replacement of assemblies, panels, and modules for maintenance.

6. **Power Requirements.** The automated barrier gate and the associated equipment operate from 240 plus or minus 40 VAC, 60 Hz plus or minus 3 Hz. The equipment operation is not affected by transient voltages, surges, and sags normally experienced on commercial power lines. The Contractor must check the local power service to determine if any special design is needed for the equipment. The extra cost, if required, is included in the bid price of the automatic gate.

7. **Transient Suppression.** All DC relays, solenoids and holding coils have diodes across the coils for transient suppression. All AC contactors have snubbers.

8. **Protection.** The equipment contains readily accessible, manually resettable, or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection.

   Circuit breakers or fuses are provided and sized such that no wire, component, connector, PC board or assembly is subject to sustained current in excess of their respective design limits upon the failure of any single circuit element or wiring.

9. **Fail Safe.** The equipment is designed such that the failure of the equipment does not cause the failure of any other unit of equipment.

D. **Mechanical Requirements.**

1. **Gate Construction.** Gate transmission is gear-driven, with no belts or chains. The drive train is connected to the arm shaft with a connecting rod having self-aligning ball ends. The connecting rod is constructed of ASTM A311 class B high strength stress proof steel. The transmission mechanism is a removable single unit. Each transmission sub-assembly is interchangeable with all other units.

   A solenoid release, automatic motor brake is furnished as part of the gate drive mechanism. The brake automatically releases when the hand crank is inserted to manually operate the gate.

   A hand crank and drill crank are included with each gate to operate the gate during power failure. An automatic safety switch is also included to disconnect the control circuit power when the top is remove/opened to allow for manual operation.

   Lubrication is not required at any point more often than once every 12 months. All gears, motor pinions, and similar mechanical parts are enclosed and running in oil, with the exception of the limit switch drive chain and sprocket, where silicon lubricant is used.

2. **Gate Housing.** Housing - The gate housing is fabricated from 1/2", 1/4" and 10 gauge galvanized steel to form a strong welded unit. The housing is hot dipped galvanized after fabrication and receives a finish coat of aluminum paint. The housing base provides four 5/8 inch holes for mounting to the foundation. Anchor bolts and templet
are supplied by the gate manufacturer. Standard anchor bolt size is 1/2-13x12 with a 4" leg, hot dip galvanized. All external fasteners 1/2" or less are of stainless steel.

Doors - Removable access doors are provided on each side of the main housing. Doors are fabricated from the same material as the housing and equipped with bronze hinges having stainless steel hinge pins. Each door is equipped with a three-point vault-type stainless steel handle and index plate. The handle, spindle and index plate are locked in position with a bronze cylinder lock. Each gate is supplied with two keys and all locks are keyed alike. Each door is provided with a louvered and screened vent at the top and at the bottom.

Capstan - The capstan column is rigidly attached to the main frame through heavy bearings on each end to prevent the transmission from being subjected to strain originating from the arm or panel assembly. The rotating main shaft is not less than 2-1/2 inches in diameter and is journaled in radial and thrust bearings of self-lubricating, oil-impregnated bronze. A shear pin is included as an integral part of the main shaft assembly to minimize damage to the gate operating mechanism and the vehicle in the event of a collision.

Arm mounting bracket - A heavy steel arm mounting bracket is provided to allow positioning of the arm at any point in the 180 degree circular pattern and is clamped to the main shaft.

3. Gate Arms. The gate arms are fabricated from aluminum and fiberglass tubes. This arm is fabricated from special high strength rectangular fiberglass and 6061-T6 rectangular aluminum tubing. All bolts, nuts, washers, braces, and brackets are stainless steel or aluminum. Nails are not permitted. Bolt holes in the fiberglass parts of the gates are drilled as necessary and all edges are sanded smooth. The length of the gate arms is as shown on the plans.

Gate arms are covered on both sides with 16-inch alternating red and white engineering grade reflectorized sheeting.

Gate arms are the "breakway" type with shear pins as shown on the plans. When excessive force is applied to the gate arm the pin shears. The arm is then swing 45 degrees horizontally and drop free of the gate operator, minimizing damage to the vehicle and the gate.

E. Environmental Design Requirements. The barrier gate and its associated equipment must meet all of its specified requirements during and after subjecting to any combination of the following conditions:

- Ambient temperature range of 0 F to 140 F.
- Temperature shock not to exceed 30 F per hour, during which the relative humidity shall not exceed 95%.
- Relative humidity range not to exceed 95% over the temperature range of 40 F to 110 F.
- Moisture condensation on all surfaces caused by temperature changes.
3. Construction.

A. **General.** The Automated Barrier Gate design and construction must utilize the latest available techniques with a minimum number of parts, subassemblies, circuits, cards, and modules to maximize standardization and commonality.

   The equipment are designed for ease of maintenance. All component parts are readily accessible for inspection and maintenance. Test points are provided for checking essential voltages and waveforms.

B. **Electronic Components.** All electronic components must comply with Special Specification Item, "Electronic Components" included.

C. **Mechanical Components.** All external screws, nuts, and locking washers are stainless steel; no self-tapping screws are used unless specifically approved by the Engineer.

   All parts are made of corrosion resistant material, such as plastic, stainless steel, anodized aluminum or brass.

   All materials used in construction are protected from fungus growth and moisture deterioration.

   Dissimilar metals are separated by an inert dielectric material.

D. **Testing, Training, Documentation, Final Acceptance And Warranty.** Testing of the Automated Barrier Gate must comply with Section 2.0 of Special Specification, "Testing, Training, Documentation, Final Acceptance and Warranty".

   Training for the Automated Barrier Gate must comply with Section 3.0 of Special Specification, "Testing, Training, Documentation, Final Acceptance and Warranty".

   Documentation for the Automated Barrier Gate must comply with Section 4.0 of Special Specification, "Testing, Training, Documentation, Final Acceptance and Warranty".

   Final Acceptance for the Automated Barrier Gate must comply with Section 5.0 of Special Specification, "Testing, Training, Documentation, Final Acceptance and Warranty".

   Warranty for the Automated Barrier Gate must comply with Section 6.0 of Special Specification, "Testing, Training, Documentation, Final Acceptance and Warranty".

4. **Measurement.** This Item will be measured as each unit furnished, installed, made fully operational and tested in accordance with these Special Specifications.

5. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Automated Barrier Gate". This price is full compensation for all equipment described under this Item with all cables and connectors; all documentation and testing, and furnishing all labor, materials, training, equipment, and incidentals.