

**Texas Department of Transportation
Book 2 - Technical Provisions**

IH 35E Managed Lanes Project

Attachment 17-2

**Modifications to Special Specifications
SS2055 and SS2056**

ATTACHMENT 17-2

2055

Automated Barricade Gate

For this project, Item 2055, “Automated Barricade Gate” is hereby amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed hereby.

Article 2055.2. Materials, A. General Requirements. The following is to be included at the end of this section:

Automated Barricade Gate base is anchored on top of and must not exceed the width of concrete safety barrier. Gates shall not be operated wirelessly unless approved by TxDOT. Developer shall embed the conduits for the Automated Barricade Gates’ communication and power within the concrete safety barrier. Gates shall follow the direction of traffic when opening.

Automated Barricade Gates shall be located on managed lane entrance points, on managed lane auxiliary lanes, or for merging purposes as provided below.

1. Automated Barricade Gate Placement on Auxiliary Lane:

When an auxiliary lane is located between a managed lane entrance and exit ramps, gates shall be used to discourage opposing traffic from using the lane to pass. Begin gate placement on the painted nose of the managed lane entrance physical gore. Continue spacing the gates on a tangent throughout the auxiliary lane until the painted nose of the exit physical gore is reached. Do not place gates on the exit ramp.

The gate housing shall be located on top of the adjacent concrete barrier. Gate spacing shall be in accordance with suggested spacings provided in the latest Texas MUTCD’s Table 6C-4 Merging Taper Lengths and Spacing of Channelizing Devices.

2. Automated Barricade Gate Placement for Merging Purposes:

When a merged condition is required to merge traffic into one lane before reaching a closed managed lane entrance ramp, place gates on the taper that will merge lanes prior to reaching the area of concern. After the merging taper is completed, place a minimum of two additional gates on a tangent so that a buffer is created between the closed managed lane entrance ramp and the merging taper. The last gate shall be placed at the end of the physical gore on the managed lanes side of the managed lane entrance ramp.

The gate housing shall be located on top of the adjacent concrete barrier. Gate shall be in accordance with suggested spacings provided in the latest Texas MUTCD’s Table 6C-4 Merging Taper Lengths and Spacing of Channelizing Devices.

3. Automated Barricade Gate Placement on Managed Lane Entrance Ramps:

Begin placing the gates on a taper where the managed lane entrance alignment deters from the main lane alignment. Place a gate at the beginning of the managed lane entrance ramp physical gore. A minimum of three gates shall be placed throughout the physical gore, with the last gate located at the end of the gore. The end of the gore shall be considered to be where the concrete safety barrier begins between the managed lane entrance location and the general purpose lane. The last gate arm length shall not exceed the width of the managed lane entrance ramp and its shoulders.

A second set of gates shall be placed in a similar manner on the opposite end of the managed lane entrance point, where the managed lane entrance ramp alignment deters from the managed lane alignment. The gates shall channel traffic away from the managed lane entrance point, which shall be closed via a Vehicle Arresting Barrier.

The gate housing shall be located on the adjacent concrete barrier. Gate spacing shall be in accordance with suggested spacings provided in the latest Texas MUTCD's Table 6C-4 Merging Taper Lengths and Spacing of Channelizing Devices.

If the suggested spacing cannot be met or the design of the corridor has changed, the Developer must first obtain approval from the TxDOT prior to placing gates.

Article 2055.2. Materials, B. Functional Requirements. The following is to be added before the fifth paragraph:

The Automated Barricade Gates shall be configured to primarily operate using existing or planned master controllers located at DalTrans Transportation Management Center and may be converted for field use via the Gate Control Panel. Field operator must first obtain approval from TxDOT prior to switching to manual control. It shall operate in conjunction with Item 2056 "Vehicle Arresting Barrier" (VAB) and any other ITS devices used to control access, such as Single Line Dynamic Message Sign Systems, via an integration software to be provided by the Developer. The Automated Barricade Gates shall not operate independently of the Vehicle Arresting Barrier or Dynamic Message Sign unless specifically authorized by TxDOT.

The lanes must be closed down completely, and verification via field presence or CCTV must be completed to ensure that the lanes are rid of any traffic, including stalled vehicles, prior to opening the lanes in the opposite direction. Prior to acceptance of this project, the Developer shall demonstrate complete operability of all Automatic Barricade Gates installed on this project at the DalTrans Transportation Management Center.

Article 2055.2. Materials, C. Electrical Requirements, 2. Actuator Control Circuits and Accessories. The last electrical component is to be voided and replaced by the following:

- RF control system for communication with the control panel and other Automated Barricade Gates. The placement between each gate must not be farther than the distance required by the manufacturer or up to $\frac{3}{4}$ mile, whichever is less.

Article 2055.2. Materials, C. Electrical Requirements, 3. Control Panels. The section is voided and replaced by the following:

The Developer must provide a Gate Control Panel which is used to control a specified number of gates. The Gate Control Panel interconnects via TxDOT's ITS network.

The Developer must provide a Gate HOV Lane Control Panel that controls individual gates. Mount the Gate HOV Lane Control Panel on the Gate Control Panel. The Gate Control Panel shall be placed on the concrete barrier widening at the VAB locations and shall be accessed from the managed lanes. Final placement of Gate Control Panels shall be determined in the field and approved by TxDOT prior to construction.

Article 2055.2. Materials, C. Electrical Requirements, 3. Control Panels, a. Gate Control Panel. The first paragraph is voided and replaced by the following:

Provide a Gate Control Panel for each system. A system consists of a series of gates used to manage traffic at an managed lane entrance point. The gate control panel is not to be microprocessor based.

Article 2055.2. Materials, C. Electrical Requirements, 3. Control Panels, a. Gate Control Panel. The three modes are voided and replaced by the following:

- (1) Remote Control Mode – The gate shall be controlled primarily under remote control mode via the integration software. Use of other modes must first be approved by TxDOT prior to switching from this mode. Remote control mode is locked while in Local or HOV Lane control mode.
- (2) HOV Lane Mode – The gate shall be controlled locally by the Gate HOV Lane Control Panel, described in the next section. Use of HOV Lane Mode must be authorized by TxDOT prior to operating.
- (3) Local Mode – A series of gates shall be controlled locally by the use of switches on the Gate Control Panel. Use of Local Mode must be authorized by TxDOT prior to operating.

Article 2055.2. Materials, D. Mechanical Requirements, 1. Gate Construction. The following is to be added to the end of the third paragraph:

The actuator can be operated manually or with a power drill.

Article 2055.2. Materials, D. Mechanical Requirements, 3. Swing Gates. The second paragraph is voided and replaced by the following:

Gate arms are white and covered on one side with 16-inch alternating red and white engineering grade reflectorized sheeting, sloped downward at a 45 degree angle toward the gate extremity, in accordance with Section 2B.68 “Gates” of the TMUTCD or as approved by the Engineer. The reflectorized sheeting shall face oncoming traffic.

Article 2055.2. Materials, D. Mechanical Requirements, 3. Swing Gates. The fourth paragraph is voided and replaced by the following:

4. Chevron Panel. Install a chevron panel on the gate extremity. The panel sheeting shall be in accordance with DMS-8300. The appearance of the color, size, and symbol of the sign can be found in the Standard Highway Sign Designs for Texas. A red flashing LED arrow shall be fitted on the chevron panel for additional road user’s visibility and safety. The arrow must be turned on or off as specified in 2B.68 “Gates” of the TMUTCD.

Length of gate arm and chevron panel must allow for a minimum of 2’ clearance between the edge of travel way and the edge of the chevron panel. Gate, chevron, and LED arrow shall be easily replaceable in case of permanent damage. Gate housing and chevron shall be able to withstand multiple nuisance impacts and only suffer visual damage.

Article 2055.2. Materials, D. Mechanical Requirements, 6. Power. The following is to be added to the end of the first paragraph:

The equipment shall be capable of using a generator in the event of power failure.

Article 2055.2. Materials, D. Mechanical Requirements, 8. Protection. The following is to be added to the end of the first paragraph:

Equipment shall also be equipped with surge protectors.

ATTACHMENT 17-2

2056

Vehicle Arresting Barrier

For this project, Item 2056, "Vehicle Arresting Barrier" is hereby amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed hereby.

Article 2056.1. Description. This section shall be replaced in its entirety with the following:

This Item governs for the furnishing and installation of Vehicle Arresting Barriers at Managed Lane entrance ramps between the inside and outside concrete traffic barriers at the Managed Lane entrance ramps. A minimum of 200 feet of concrete traffic barrier, on each side of the traffic lane, shall be placed on each side, in advance and behind the Vehicle Arresting Barrier.

Article 2056.2. Materials, A. General Requirements. An additional paragraph is to be added to the bottom of this section.

The Vehicle Arresting Barrier (VAB) shall be configured to primarily operate using the existing or planned master controllers located at DalTrans Transportation Management Center and may be converted for field use via the VAB control panel. Field operator must first obtain approval from TxDOT prior to switching to manual control. The VAB shall be locked for use by DalTrans while the VAB Control Panel is operated manually. The VAB shall not be operated wirelessly unless approved by TxDOT. Developer shall embed the conduits for the VAB's communication and power within the concrete safety barrier.

The VAB shall operate in conjunction with Item 2055 "Automated Barricade Gates" and any other ITS devices used to control access, such as Single Line Dynamic Message Sign Systems (SDMS) via an integration software to be provided by the Developer. The VAB shall not operate independently of the Automated Barricade Gates or SDMS unless specifically authorized by TxDOT.

The lanes must be closed down completely, and verification via field presence or CCTV must be completed to ensure that the lanes are rid of any traffic, including stalled vehicles, prior to opening the lanes in the opposite direction. At any time the VAB net is raised or lowered, it shall also be verified via field presence or CCTV that all three systems, automated barricade gates, VAB, and SDMS, are interconnecting properly.

Developer shall embed the conduits for the VABs' communication and power within the concrete safety barrier.

Prior to completion of this project, the Contractor shall demonstrate complete operability of all VAB systems installed on this project at the DalTrans Traffic Management Center.

Article 2056.2. Materials, B. Functional Requirements. The second paragraph is to be voided and replaced by the following:

The roadway barrier must be widened to a minimum of four feet, from toe to toe, or as required by the manufacturer to protect the towers. A barrier gap between the towers shall be provided to allow the restraining net to raise and lower properly. Developer must provide a method of protecting the gap while the restraining net is raised.

The structure used to support the restraining and lifting-lowering mechanisms must be capable of withstanding all operating loads placed upon them, to include load transferred by the impact and deceleration of a bus, by the lifting-lowering mechanism, and by loads generated by environmental conditions.

The VAB structure location shown on the plans may be adjusted to fit field conditions if approved by TxDOT. Each structure is secured at its base to a reinforced concrete foundation. Prior to fabrication, the Developer shall determine the limiting elevation at the centerline of the VAB's structural frame. This elevation shall be used to calculate the exact height for fabrication. The structure must allow for a minimum of 17'-6" of vertical clearance between the roadway and the bottom of the overhead section of the VAB when the restraining mechanism is in the raised position.

Article 2056.2. Materials, B. Functional Requirements. The following is to be added to the end of this section.

The VAB shall be capable of using a portable generator in the event of power failure. Developer shall provide one portable generator that meets the requirements of the VAB for the entire corridor.

Article 2056.2. Materials, C. Electrical Requirements. The following is to be added to this section.

The VAB and control panel shall be equipped with an electrical surge protector.

Article 2056.2. Materials, C. Electrical Requirements, 2. Vehicle Arresting Barrier Local Control Panel. The following is to be added to the bottom of this section.

The VAB Control Panel shall be placed on the concrete barrier widening at the VAB location and shall be accessible from the managed lanes. Final placement of the VAB Control Panel shall be determined in the field and approved by TxDOT prior to construction.

Article 2056.3. Construction, A. General. The following is to be added to the bottom of this section.

- a. Submit VAB shop drawings meeting or exceeding the design criteria provided in the plans for review and approval. Drawings must bear the seal of a licensed professional engineer. Include details on shape, dimensions, and material type of structural frame and

foundation; restraining mechanism; raising and lowering hardware; and any additional necessary details.

- b. Submit VAB electrical drawings detailing the interconnectivity between the VAB Control Panel and DalTrans as well as connectivity between the VAB and the VAB control panel. Include VAB control panel details, showing proper dimensions and typical placement within the widened barrier, and remote control details.
- c. Include applicable calculations and summary of design parameters, such as design speed, wind loads, material types, and design vehicle.