CBG-100/120/140/160/180

SYSTEM MANUAL

Automated Motorized Hydraulic Traffic Controller

Spike Systems

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This manual describes the operational requirements of the CBG Hydraulic Traffic Control System as it is normally configured on site.

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Section 1 - Pre-Installation Planning and Considerations

1.1 WARNINGS AND NOTICES

The Spike Systems Hydraulic Crash Barrier Gate (CBG) is designed to regulate the flow of traffic through a secure control point. The CBG is also designed and manufactured to ensure personnel safety when the equipment is operated properly and all safety precautions are strictly followed.

Persons responsible for the operation and field maintenance of the sytem should read this manual carefully before attempting to operate the equipment or perform any service or adjustment procedures.

The Warnings, Cautions, and Notes in this manual represent the following information:

- A WARNING is an operation, procedure or condition that can cause injury or death.
- A CAUTION is an operation, procedure or condition that can cause damage to the equipment.
- A NOTE provides helpful information.

The warnings and cautions that follow apply to all parts of this manual.

WARNING:	**POTENTIALLY LIFE-THREATENING HAZARDS MAY EXIST DURING EQUIPMENT OPERATION. ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO OPERATE, SERVICE OR MAKE ADJUSTMENTS TO THE HYDRAULIC TRAFFIC CONTROL SYSTEM EQUIPMENT.**
WARNING:	**FOLLOW THE PRECAUTIONARY INSTRUCTIONS EXACTLY. DO NOT TAKE SHORTCUTS. DO NOT ASSUME THAT SOMEONE ELSE HAS ACTED ON YOUR BEHALF. IF ANY RULE OR PRECAUTION IS NOT CLEAR TO YOU, SEE YOUR SUPERVISOR BEFORE USING THE MACHINE.**
WARNING:	**THIS UNIT CONTAINS A THERMALLY FUSED ELECTRIC MOTOR. IF THE MOTOR STOPS, DO NOT ASSUME POWER IS NOT PRESENT. UNEXPECTED MOTOR START-UP IS POSSIBLE AFTER THE PROTECTOR TRIPS. DISCONNECT POWER FROM CIRCUIT BEFORE PERFORMING ANY SERVICE TO THE MOTOR. WHEN POWER IS RECONNECTED, RESET PROTECTOR BEFORE ACTIVATING SYSTEM.**
WARNING:	**TO AVOID PERSONAL INJURY, BE AWARE THAT VOLTAGES ARE PRESENT IN THE HYDRAULIC TRAFFIC CONTROL SYSTEM. VOLTAGES AS LOW AS 28 VOLTS CAN CAUSE SERIOUS INJURY UNDER SOME CONDITIONS. DO NOT BE MISLED BY THE TERM LOW VOLTAGE.**

NOTE: Spike Systems assumes no liability for accident or injury incurred through improper use of this equipment.

1.2 Product Model Numbers

The CBG-100/120/140/160 and /180 are available with clear widths of 10, 12, 14, 16 and 18 feet, respectively, as shown in the table below.

Model Number Guide	Spike CBG System	Clear Width
	CBG-100	10’
	CBG-120	12’
	CBG-140	14’
	CBG-160	16’
	CBG-180	18’

1.3 Product Family Description and Specifications

The CBG family is an automated hydraulic Crash Barrier Gate that is surface mounted. The product line is designed primarily to prevent against unauthorized vehicles from either entering or exiting a secured control point. Using hydraulic and solid state components, and with it’s customizable control logic, it can easily be adapted to variety of uses, for example, revenue control, rental car agency, security checkpoints, and others.

Operating Time:	Cycle to lower barrier 3 seconds
	Cycle to raise barrier 3 seconds
Drive Configuration:	Automated hydraulic control power unit, with tie-rod Hydraulic Cylinders
Power Requirements:	1-1/2 HP, 110V Single-phase 18A. The unit can be built to meet any local power requirement as to voltage, frequency and phase
Finish:	Powder Coat (Red or Yellow)
Control Circuit:	The system is completely pre-wired requiring only the connection of the power feed and the control circuits. The circuits and power connections are terminated at the wire connector strips in the electrical control box located in the locked hydraulic Control Cabinet. The controls are pre-wired to accommodate a wide range of control options including: remote open and close from multiple locations; radio open and close; open by card reader, key switch or vehicle detector.
Options:	Radio Receiver-Remote Radio Control, High Security Card Readers, Key Lock Switch, Directional Indication System

1.4 Right or Left Side Configuration

All CBG system configurations are shipped from the factory as either a right or left hand control, depending on the specific installation requirements. For the purposes of this manual, all

drawings depict a left hand control. However, all installation steps are the same regardless of orientation of the Barrier Gate and control.

Spike CBG systems ship to the installation location with all possible assembly and installation steps pre-performed by the factory. Each system is specifically configured to match and address each sales order prior to shipment to the installation location.

The client is responsible for running necessary power to the installation location(s) with separate conduit for low voltage controls. These controls often connect between the Control Cabinet and a guard shack, but optionally can also attach to card readers and other optional system inputs. Prior to commencing any installation steps, the installer should ensure that all power and data connections have been properly installed, connected and configured.

1.5 Spike Systems Crash Barrier Gate (CBG) Product Family Overview

1.5.1 CBG-100 As Installed and Dimensions for Installation Planning

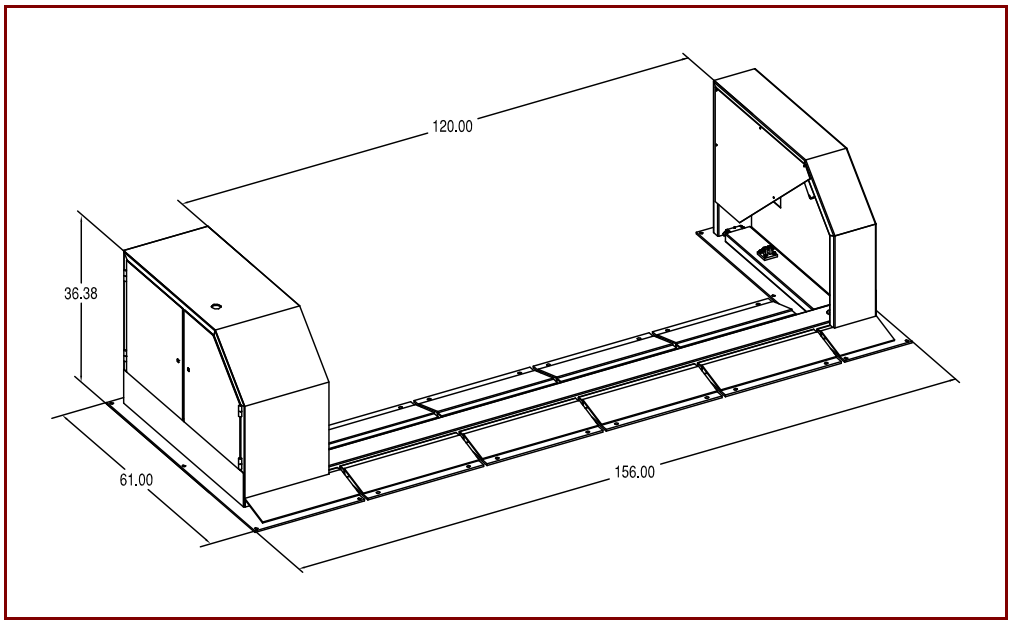


Figure 1 -- CBG-100 As Installed and Dimensions for Installation Planning

CBG-100	Overall Width	Depth	Clear Width
	156”	61”	10’ (120”)

1.5.2 CBG-120 As Installed and Dimensions for Installation Planning

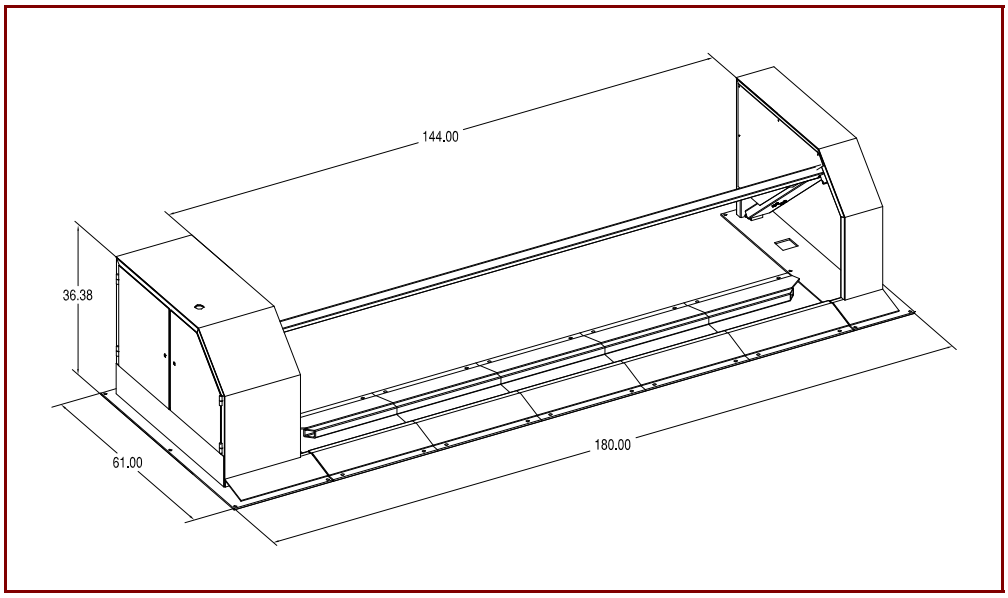


Figure 2 -- CBG-120 As Installed and Dimensions for Installation Planning

CBG-120	Overall Width	Depth	Clear Width
	180”	61”	12’ (144”)

1.5.3 CBG-140 As Installed and Dimensions for Installation Planning

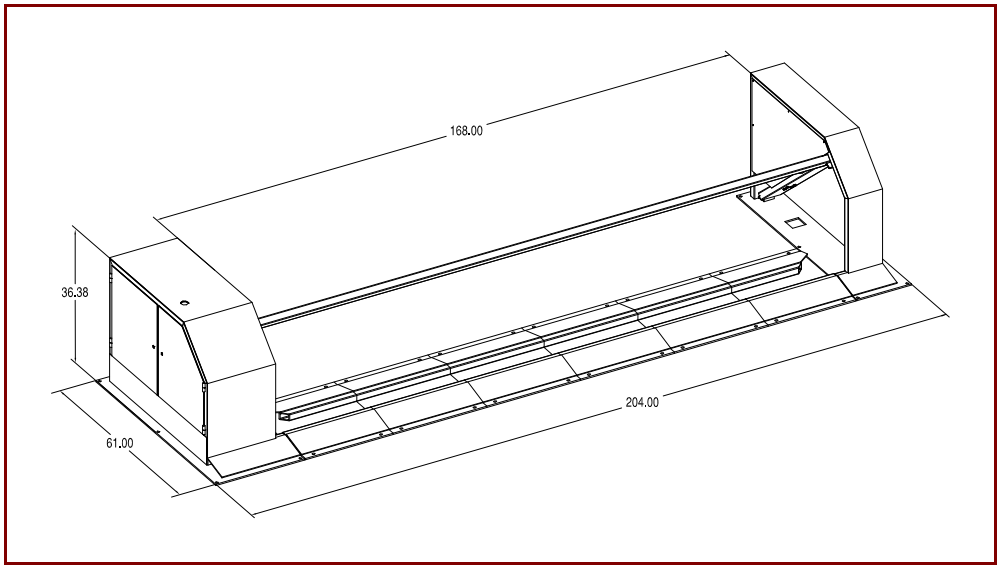


Figure 3 -- CBG-140 As Installed and Dimensions for Installation Planning

CBG-140	Overall Width	Depth	Clear Width
	204”	61”	14’ (168”)

1.5.4 CBG-160 As Installed and Dimensions for Installation Planning

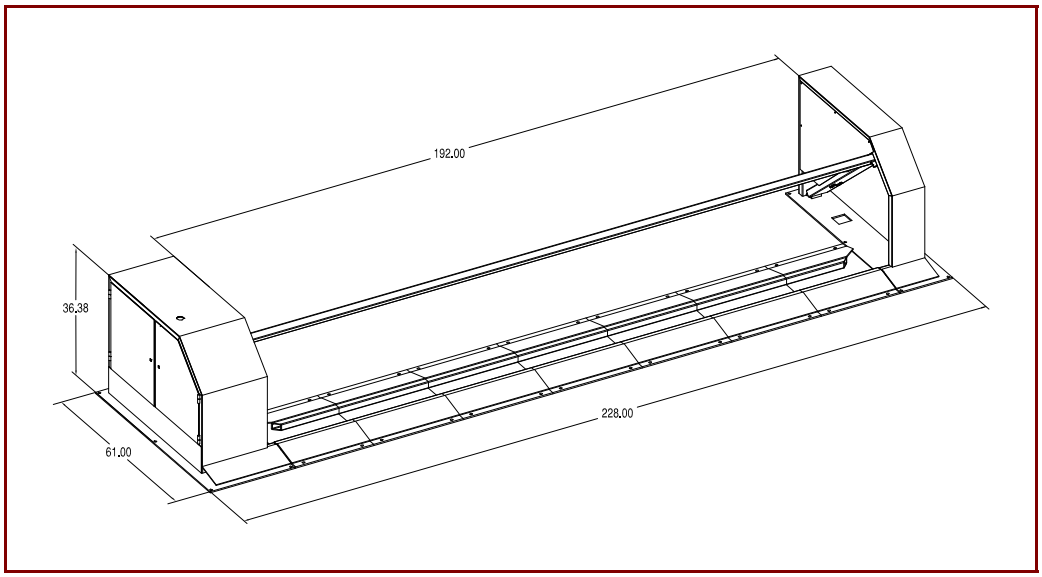


Figure 4 -- CBG-160 As Installed and Dimensions for Installation Planning

CBG-160	Overall Width	Depth	Clear Width
	228”	61”	16’ (192”)

1.5.5 CBG-180 As Installed and Dimensions for Installation Planning

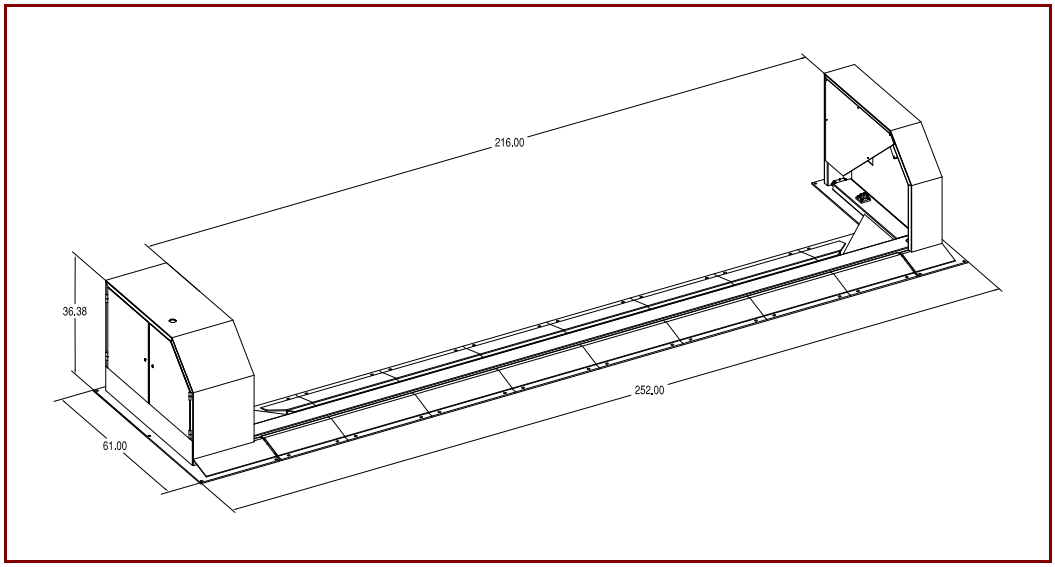


Figure 5 -- CBG-180 As Installed and Dimensions for Installation Planning

CBG-180	Overall Width	Depth	Clear Width
	252”	61”	18’ (216”)

Section 2 – Physical Installation

2.1 Installation Preparation: System Unpacking

All CBG systems are shipped to the installation site on custom designed pallets. An example is shown below.

NOTE – Use a forklift or a sufficient number of laborers to lift the shipped pallets, the Control Cabinet (shown on the left), the Non-Control Cabinet (shown on the right), the Crash Barrier Gate assembly (not pictured) and the pallet with ramp segments (not pictured). The use of safety gloves is advised whenever lifting or handling CBG cabinets and components. Unbolt the Control and Non-Control Cabinets from the custom pallet using a 1/2“ wrench or ratcheting socket.

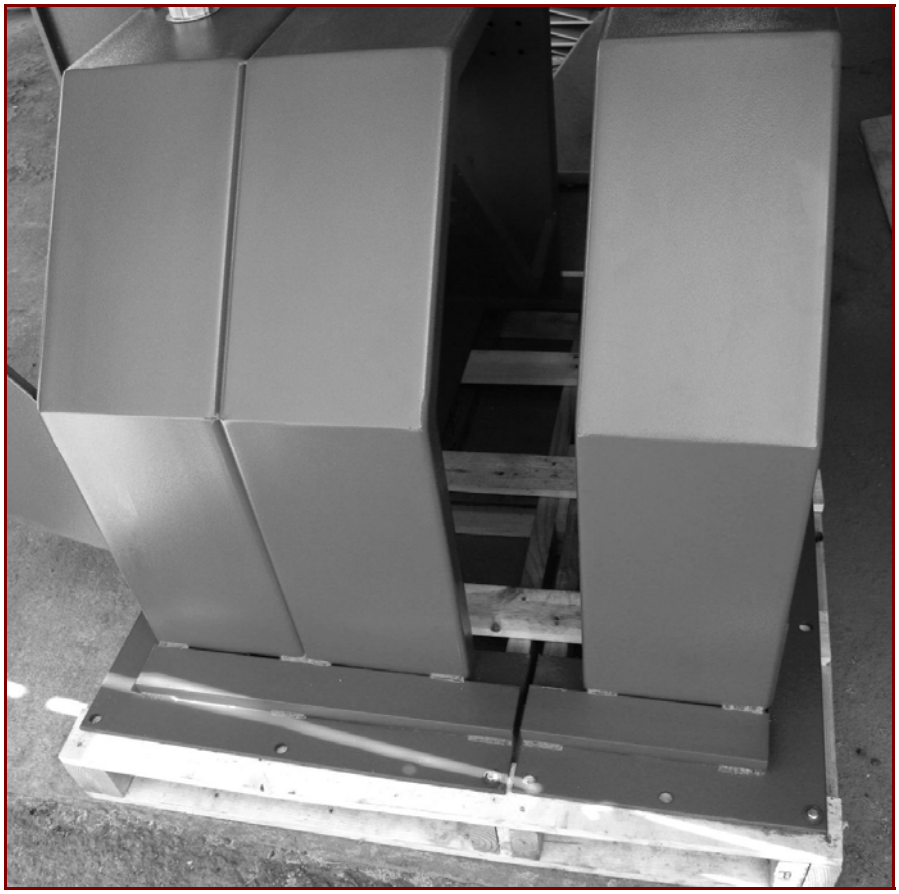


Figure 6 -- Control and Non-Control Cabinets Secured to Shipping Pallet

Tool Required	Tool Type	Tool Specification
	½” Wrench/Socket	To remove hardware securing system components to pallets
	Safety Gloves	

2.2 Crash Barrier Gate Component Weights

Component(s) Weights	Component(s)	Weight (pounds)
	Cabinets	
	Pallet with Control and Non-Control Cabinet	1,030
	Control Cabinet	545
	Non-Control Cabinet	445
	Gate Arms	
	CBG-100 Gate	200
	CBG-120 Gate	230
	CBG-140 Gate	260
	CBG-160 Gate	290
	CBG-180 Gate	350
	Ramps	
	CBG-100 Ramp Set	568
	CBG-120 Ramp Set	706
	CBG-140 Ramp Set	842
	CBG-160 Ramp Set	982
	CBG-180 Ramp Set	1,120
	Individual Ramp (all CBGs)	138

All weights are approximate and may vary or change without notification.

Gate Widths	Component(s)	Actual Width of Gate
	Gate Arms	
	CBG-100 Gate	11’
	CBG-120 Gate	13’
	CBG-140 Gate	15’
	CBG-160 Gate	17’
	CBG-180 Gate	19’

Prior to any installation process, ensure that the area where the Spike System is to be installed is free of any debris to ensure that all components rest squarely on the ground.

Tool Required	Tool Type	Tool Specification
	Broom and dust pan or vacuum cleaner	As available to clean surface where system is to be installed

2.3 Crash Barrier Gate (CBG) System Installation

For ease of installation, it is recommended that the inner panels be removed from the Control and Non-Control Cabinet assemblies. The illustration below shows both inner panels exploded from the assembly view of a CBG-100.

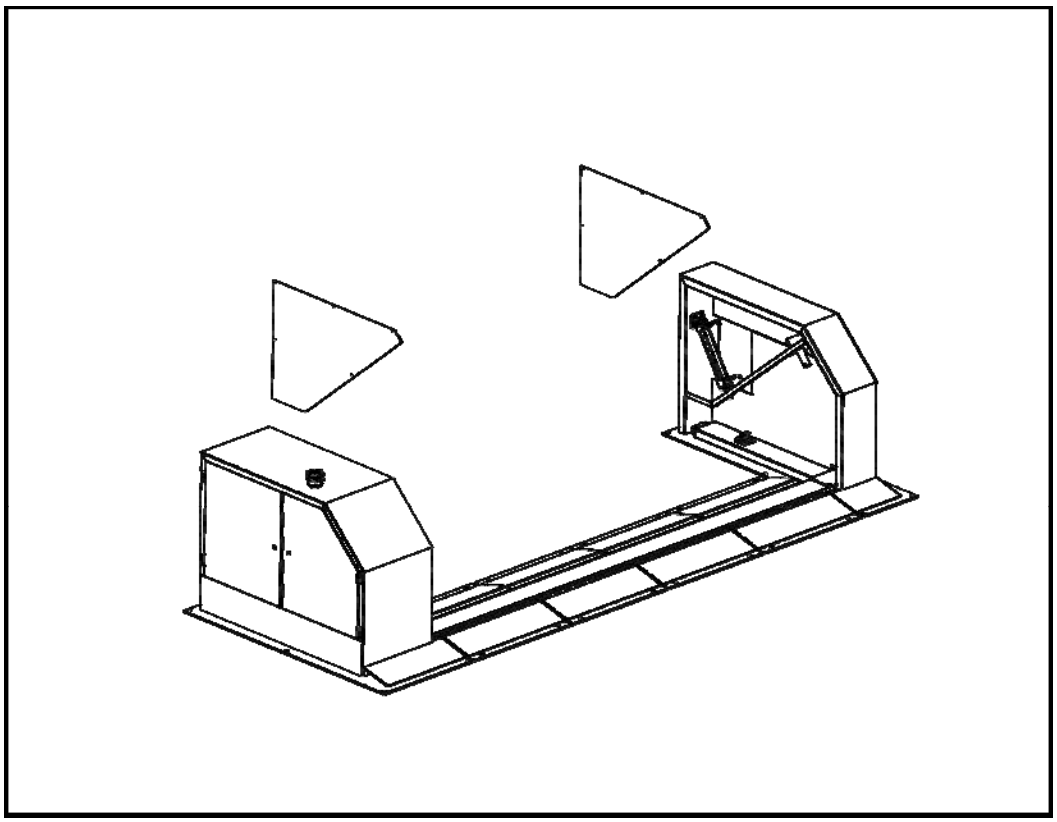


Figure 7 – Inner Panel Removal from Control and Non-Control Cabinets

Tool Required	Tool Type	Tool Specification
	Wrench/Socket	7/16”

2.4 Pre-Installation Considerations: Ensure Power and Data Conduits are Properly in Place

Verify that the client-supplied power conduit and any low voltage data connections, for example to a guard shack for a control switch, are properly installed beneath where the Control Cabinet will be secured.

Any other options to be installed, for example cabling for an electronic card reader, should have the conduit run to the Control Cabinet prior to positioning the Control Cabinet in place. Once the Control Cabinet has been anchored to the ground, it is very difficult to route any cabling into the unit. (Drilling into the side of the unit is not recommended.) For this reason it is imperative to ensure that all power and control data wiring be properly installed prior to installation. Cabling for control data must always be run in a separate conduit from power.

2.5 Pre-Installation Considerations: Optional Inductive Loop Vehicle Detector (Saw Cut Control Loop)

The figure below depicts a CBG-100 with an optional Inductive Loop Vehicle Detector or saw cut control loop. The rectangular loop should be cut and prepared prior to the system installation process.

IMPORTANT NOTE -- the cut that leads from the loop to the area under the Control Cabinet must be cut and extended under the base of the cabinet prior to any other installation steps.

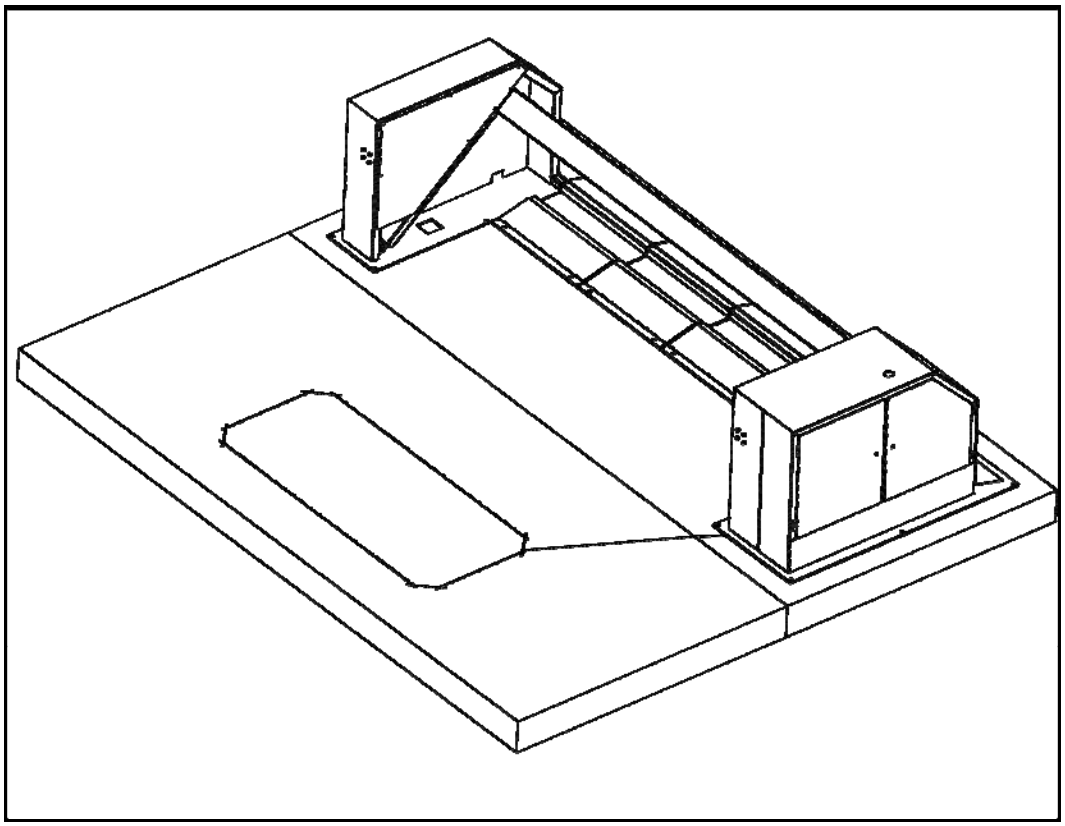


Figure 8 – Inductive Loop Vehicle Detector (Saw Cut Loop) Planning

Tool Required	Tool Type	Tool Specification
	Concrete Saw	3/16" Blade depth set to 2", unless otherwise specified
	Inductive Loop Vehicle Detector or Saw Cut Control Module (option)	As supplied by factory
	Broom or vacuum	To clean debris after saw cut is performed
	Pizza wheel, putty knife or screwdriver	To place wires into cut groves evenly
	Sealant for Inductive Loop Vehicle Detector or saw cut loop	Self-leveling concrete (Sikaflex SL or similar)

2.6 Saw Cut Inductive Loop Vehicle Detector as Preparation for Installation

If the installation is to include an Inductive Loop Vehicle Detector (saw cut control loop), follow the instructions precisely as defined by the option's manufacturer.

To prepare the installation for a saw cut loop, first place Control Cabinet in desired location for temporary positioning only.

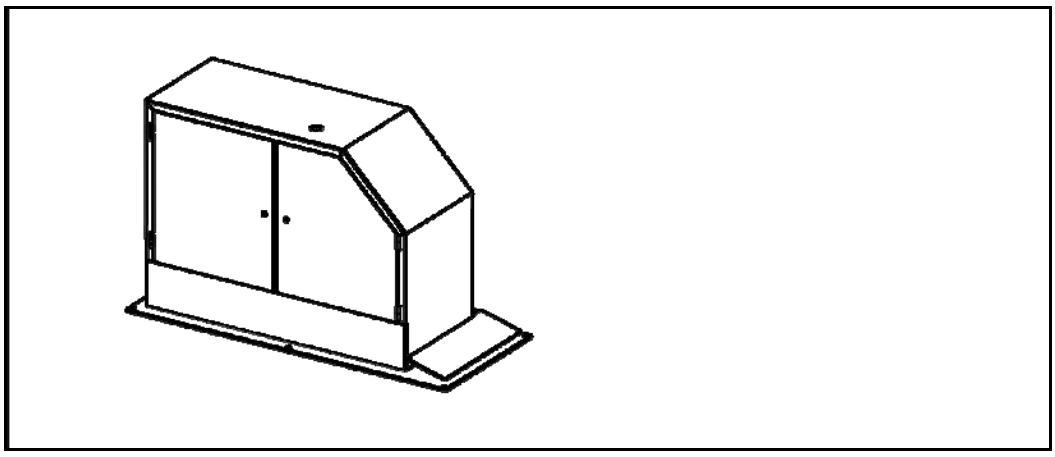


Figure 9 – Temporary Placement of Control Cabinet to Mark Location of Saw Cut Beneath the Control Cabinet

Tool Required	Tool Type	Tool Specification
	Forklift for unit placement	If a forklift is not available, use sufficient labor to lift and place the Control Cabinet in position

Mark the path for saw cut underneath where cabinet will be installed. The location of where the Inductive Loop Vehicle Detector wires should be routed out of the saw cut loop will be near where power and other data conduit will be located under the Control Cabinet

Once the path for the saw cut control wires has been established, remove the cabinet from its temporary installation position to gain access to the ground beneath.

Saw cut the path under where Control Cabinet will be located.

The hidden line figure below shows the extension of the cut to the proper approximate location beneath the Control Cabinet.

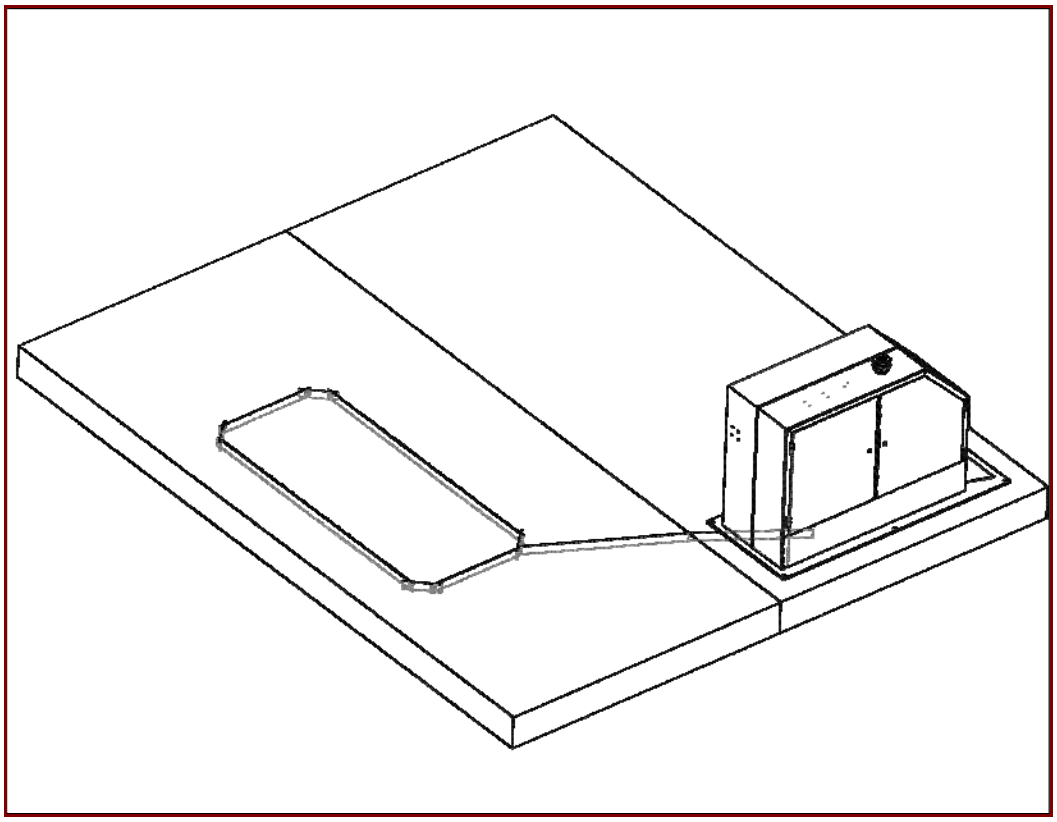


Figure 10 – Inductive Loop Vehicle Detector (Saw Cut Loop) Beneath Cabinet

Refer to Appendix B for further information on the Optional Inductive Vehicle Detector installation. Note -- Ensure there is enough spare loop wire to reach the control panel, leaving at least 12 inches of slack (beyond what is required to reach the control panel termination point) as a service loop.

2.7 Permanent Control Cabinet Placement (Left Hand Configuration Shown)

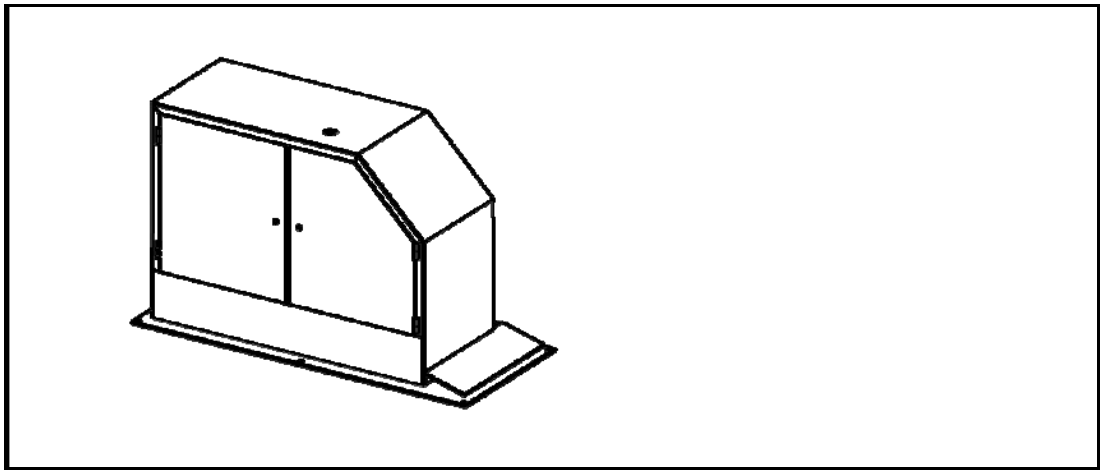


Figure 11 – Placement of Control Cabinet

When the optional saw cut loop cut has been installed and sealed, and all power and data condiut has been verified to be in proper location, place the Control Cabinet in its permanent installation location.

It is adviseable to place two anchors in opposite corners of the Cabinet base to secure the Control Cabinet at this time. This will ensure that the Cabinet does not shift while other components are placed into installation position. Please refer to section 2.11 for information on anchor installation.

Tool Required	Tool Type	Tool Specification
	Forklift for unit placement	If a forklift is not available, use sufficient labor to lift and place the Control Cabinet in position

Place the Non-Control Cabinet in approximate location across from the Control Cabinet as shown below. **Do NOT anchor the Non-Control Cabinet at this time.**

Note that it will be necessary to leave ample room so the control arm Barrier Gate can be placed in location after the ramps have been installed and before the Barrier Gate is attached to the hinges and Hydraulic Cylinders.

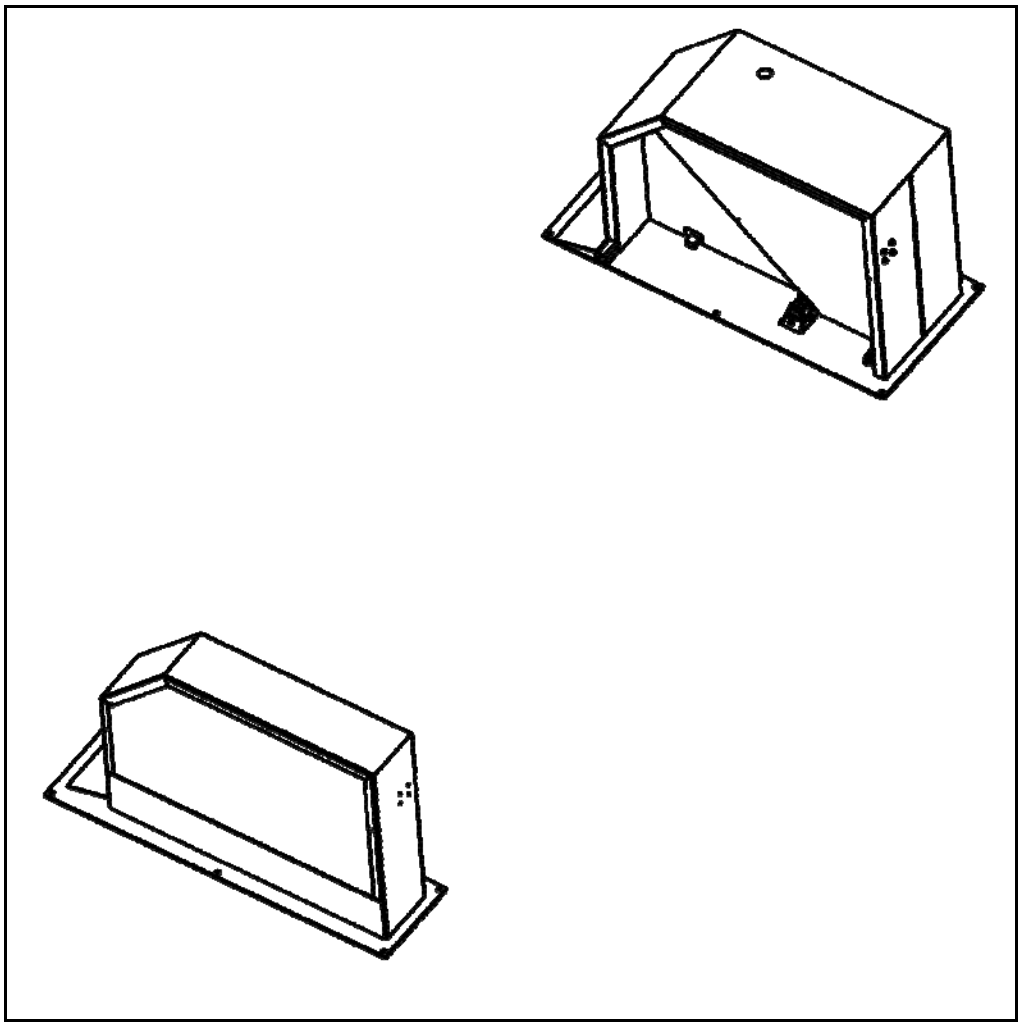


Figure 12 – Placement of Non-Control Cabinet

Tool Required	Tool Type	Tool Specification
	Forklift for unit placement	If a forklift is not available, use sufficient labor to lift and place the cabinets in position

2.8 Ramp Installation Instructions

The following information in this document section is inclusive of all steps required to install CBG-100 ramps. Please follow the steps in this section for all CBG models, then use the table below to reference the specific subsection where additional ramp installation information can be found, based on the Spike System being installed.

Ramp Installation Steps	Spike Systems Model	Installation Data
	CBG-100 Gate	This Section
	CBG-120 Gate	This Section + Section 2.8.1
	CBG-140 Gate	This Section + Section 2.8.2
	CBG-160 Gate	This Section + Section 2.8.3
	CBG-180 Gate	This Section + Section 2.8.4

Starting with the Control Cabinet side first, place the first ramp in place as shown below. The first ramp segment is numbered with a marker as number “1”.

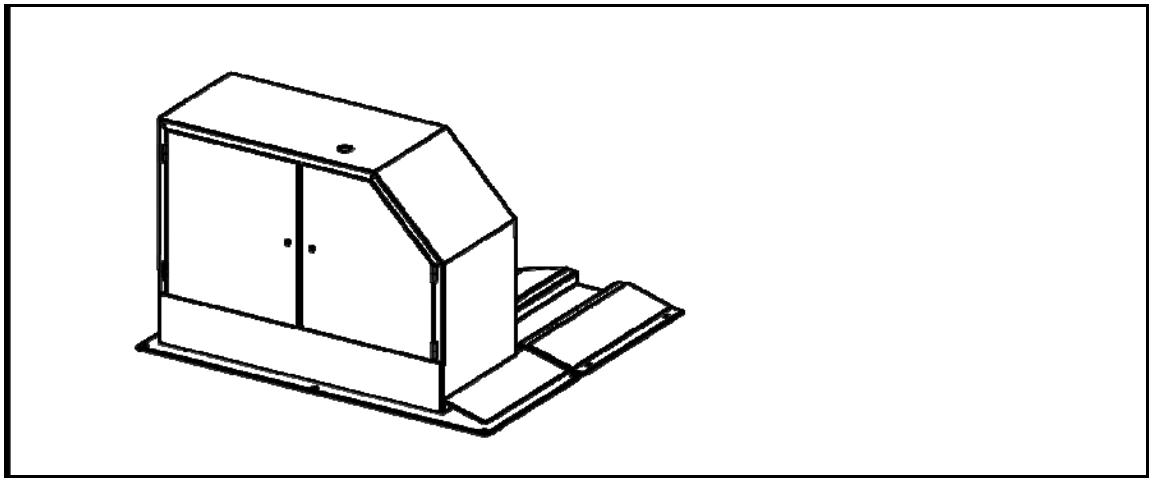


Figure 13 – CBG-100 Placement of First Ramp Segment

There is a small punch on the ramp segment that indicates the side of the ramp of that corresponds to traffic direction. It is essential that the ramps be placed correctly with the punch oriented closest to where traffic will approach the Barrier Gate. The first gate segment is placed in position starting from the Control Cabinet side, and additional ramps will be placed sequentially in the direction of the Non-Control Cabinet.

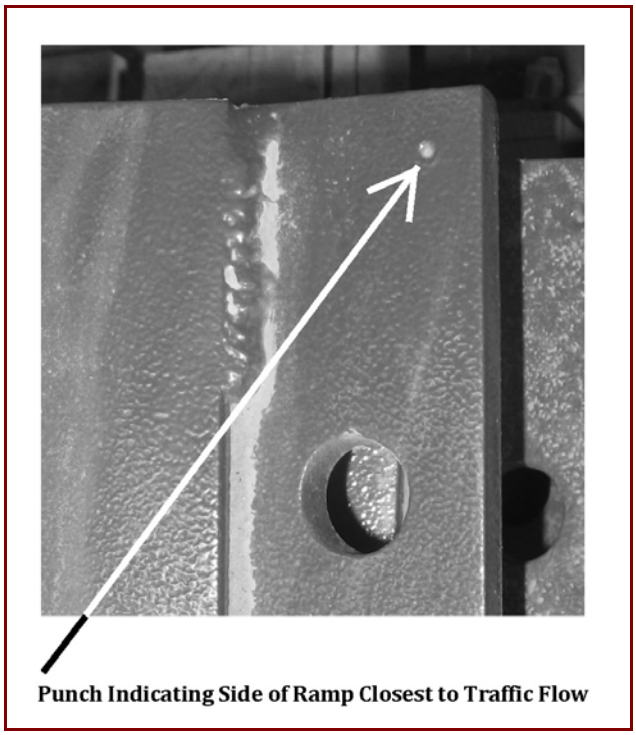


Figure 14 – Punch on Ramp Segment Indicating Traffic Flow Direction

NOTE -- DO NOT anchor or secure any ramp segments until all ramps have been placed, the Non-Control Cabinet has been placed in position, the Barrier Gate has been positioned and secured to both cabinets and the proper travel of the Barrier Gate up and down has been verified.

Place the second ramp segment in place as shown below. *Do not anchor any ramp segments at this time.*

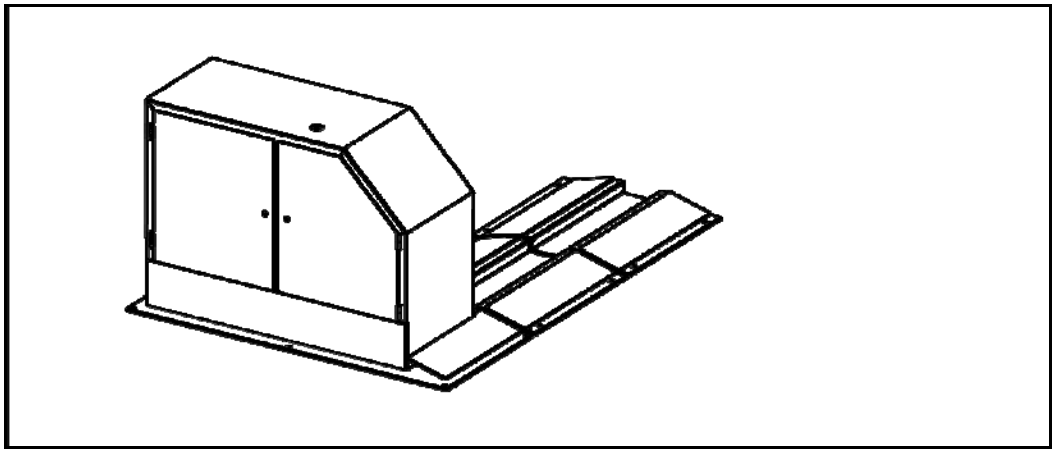


Figure 15 – CBG-100 Placement of Second Ramp Segment

Place the third ramp segment in place as shown below. *Do not anchor any ramp segments at this time.*

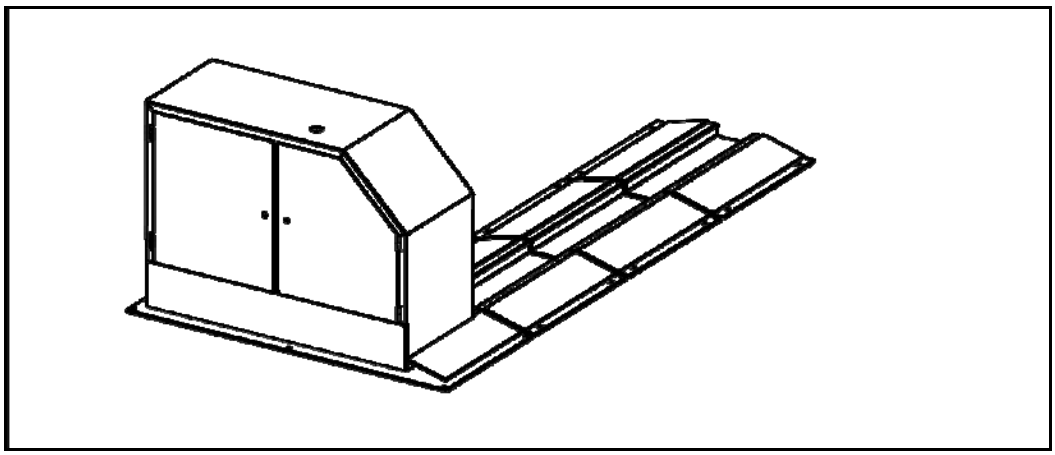


Figure 16 – CBG-100 Placement of Third Ramp Segment

Place the forth ramp segment in place as shown below. *Do not anchor any ramp segments at this time.*

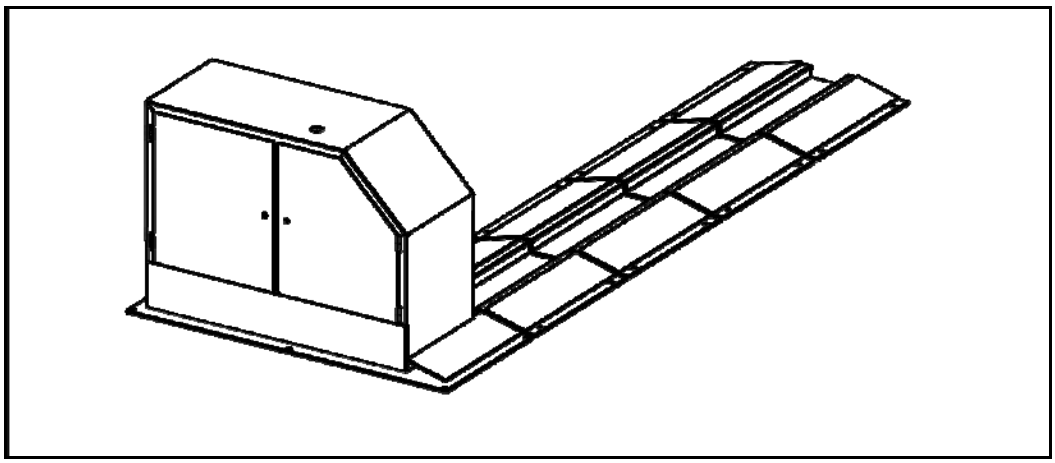


Figure 17 – CBG-100 Placement of Fourth Ramp Segment

Lay the Barrier Gate in position within the ramps. Use pry bar or crowbar to adjust alignment of each ramp so Barrier Gate travels into the opening without obstruction.

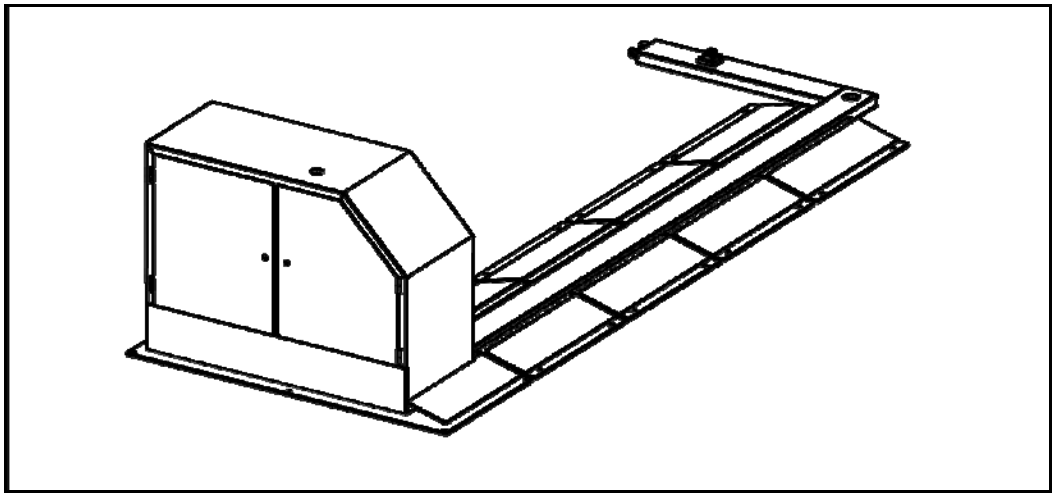


Figure 18 – CBG-100 Placement of Gate Into Ramp Segments to Verify Alignment

Tool Required	Tool Type	Tool Specification
	Pry Bar or Crowbar	To adjust ramp segment locations as required for Barrier Gate clearance

If installing a CBG-100, proceed to Section 2.9 "Barrier Gate Hinge Bolt Installation" after the steps above have been performed.

Otherwise, refer to the specific subsection for additional installation steps for the product being installed.

Ramp Installation Steps	Spike Systems Model	Installation Data
	CBG-120 Gate	Section 2.8.1
	CBG-140 Gate	Section 2.8.2
	CBG-160 Gate	Section 2.8.3
	CBG-180 Gate	Section 2.8.4

2.8.1 Additional Ramp Installation Instructions, CBG-120

Continuing from the CBG-100 ramp installation process (Section 2.8), for the CBG-120 place the fifth ramp segment in place as shown below. DO NOT anchor or secure any ramp until all ramps have been placed, the Non-Control Cabinet has been placed in position and the proper travel of the Barrier Gate up and down has been verified.

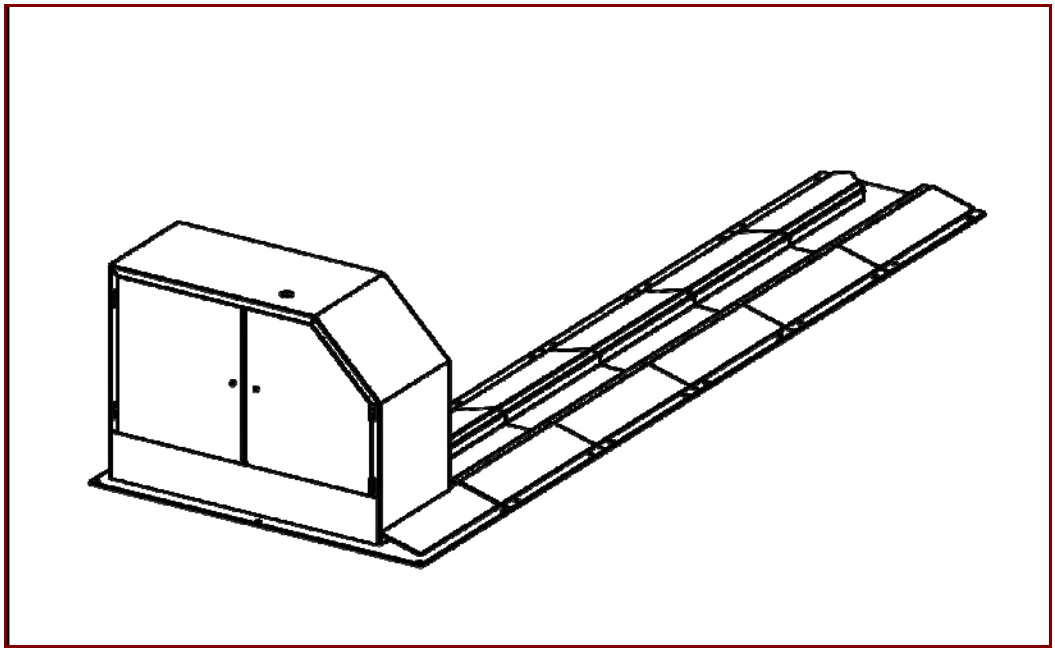


Figure 19 – CBG-120 Placement of Fifth Ramp Segment

Lay the Barrier Gate in position within the ramps. Use a pry bar or crowbar to adjust alignment of each ramp so the Barrier Gate travels into the ramp opening without obstruction.

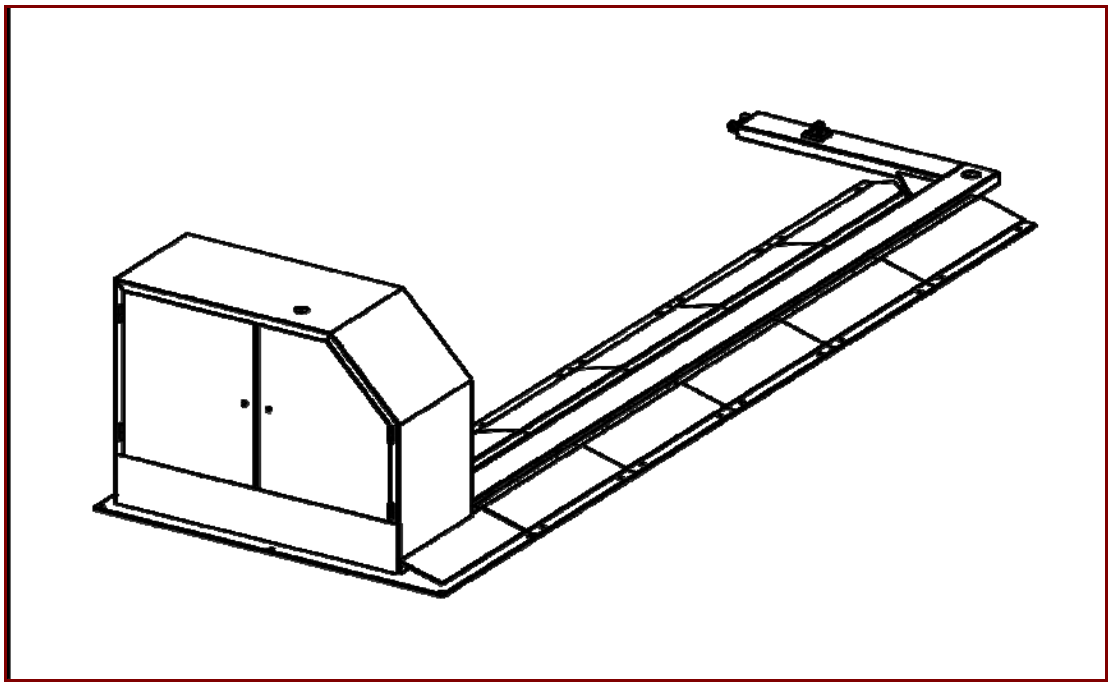


Figure 20 – CBG-120 Placement of Gate Into Ramp Segments to Verify Alignment

Tool Required	Tool Type	Tool Specification
	Pry Bar or Crowbar	To adjust ramp segment locations as required for Barrier Gate clearance

If installing a CBG-120, proceed to Section 2.9 "Barrier Gate Hinge Bolt Installation" after the steps above have been performed.

2.8.2 Additional Ramp Installation Instructions, CBG-140

Continuing from the CBG-100 ramp installation process (Section 2.8), for the CBG-140 place the fifth ramp segment in place as shown below. DO NOT anchor or secure any ramp until all ramps have been placed, the Non-Control Cabinet has been placed in position and the proper travel of the Barrier Gate up and down has been verified.

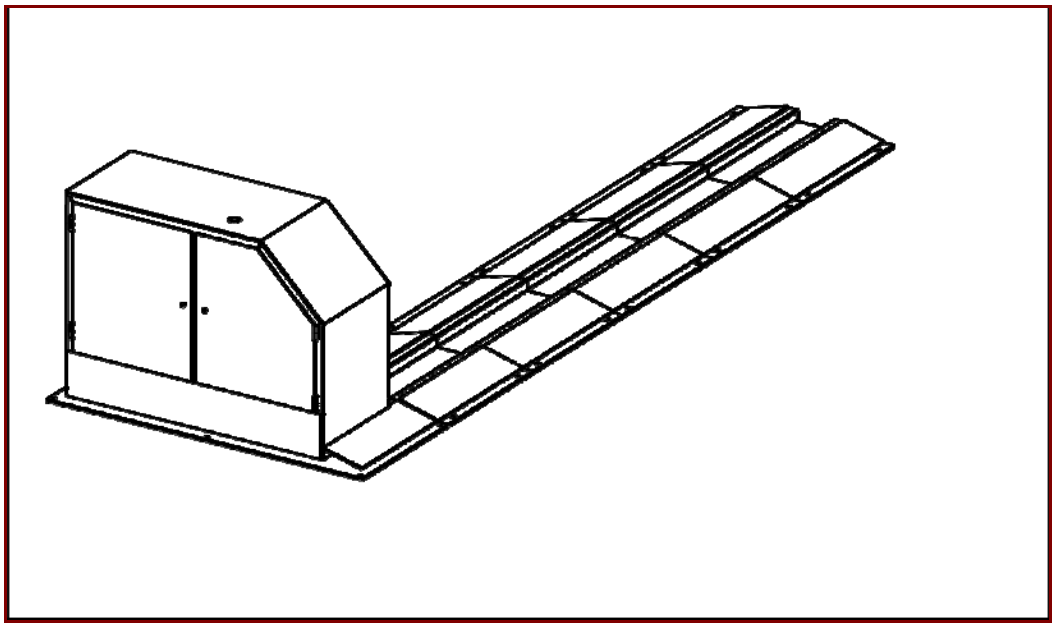


Figure 21 – CBG-140 Placement of Fifth Ramp Segment

Place the sixth ramp segment in place as shown below. *Do not anchor any ramp segments at this time.*

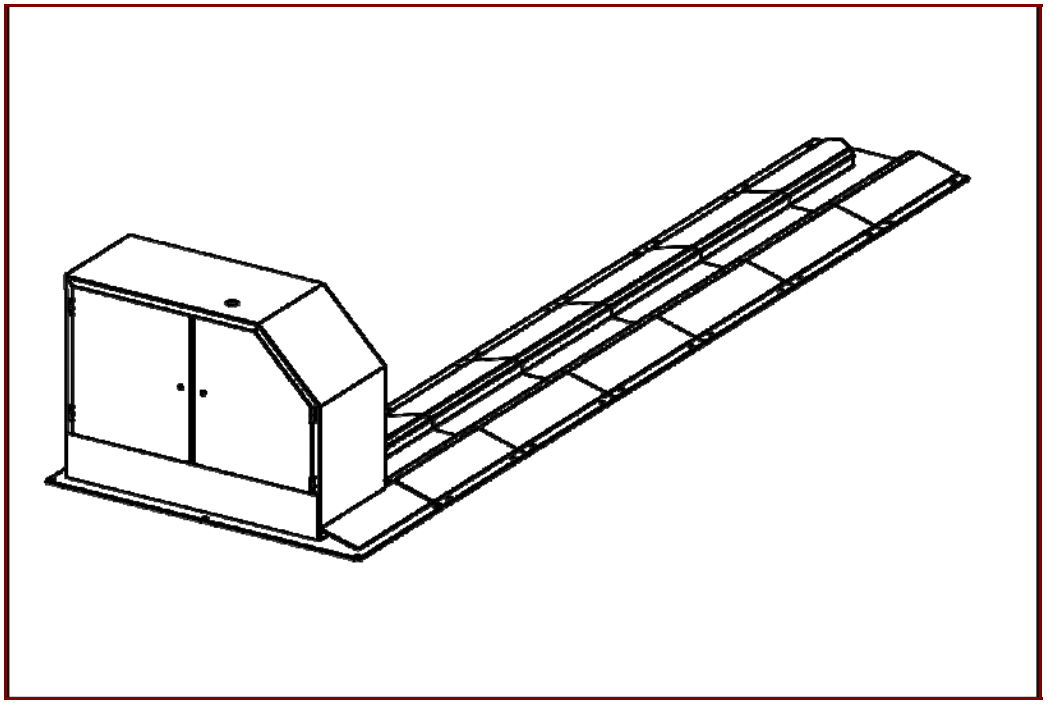


Figure 22 – CBG-140 Placement of Sixth Ramp Segment

Lay the Barrier Gate in position within the ramps. Use a pry bar or crowbar to adjust alignment of each ramp so the Barrier Gate travels into the ramp opening without obstruction.

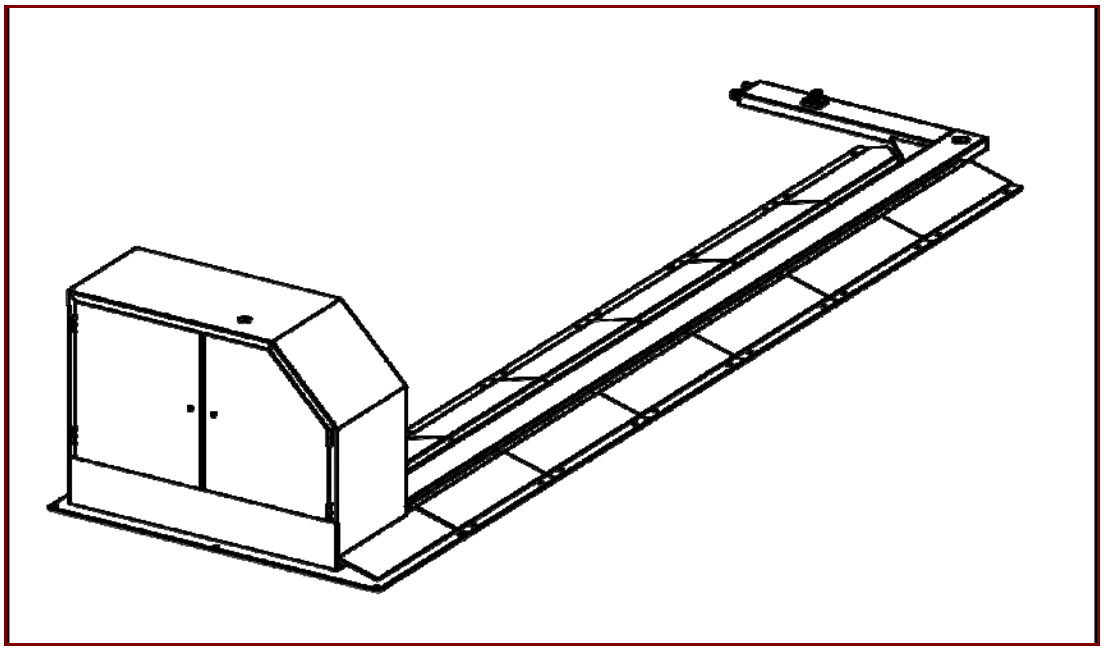


Figure 23 – CBG-140 Placement of Gate Into Ramp Segments to Verify Alignment

Tool Required	Tool Type	Tool Specification
	Pry Bar or Crowbar	To adjust ramp segment locations as required for Barrier Gate clearance

If installing a CBG-140, proceed to Section 2.9 "Barrier Gate Hinge Bolt Installation" after the steps above have been performed.

2.8.3 Additional Ramp Installation Instructions, CBG-160

Continuing from the CBG-100 ramp installation process (Section 2.8), for the CBG-160 place the fifth ramp segment in place as shown below. DO NOT anchor or secure any ramp until all ramps have been placed, the Non-Control Cabinet has been placed in position and the proper travel of the Barrier Gate up and down has been verified.

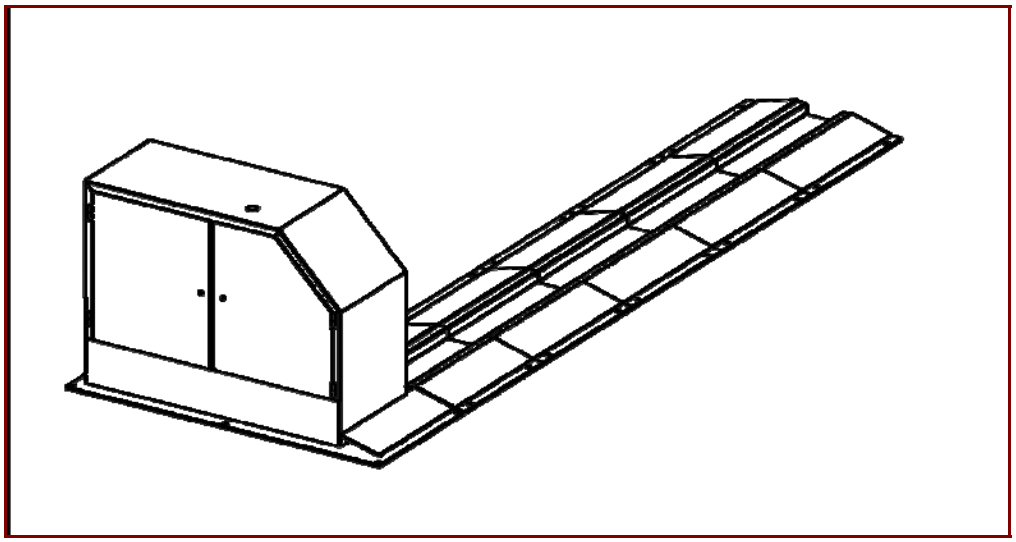


Figure 24 – CBG-160 Placement of Fifth Ramp Segment

Place the sixth ramp segment in place as shown below. *Do not anchor any ramp segments at this time.*

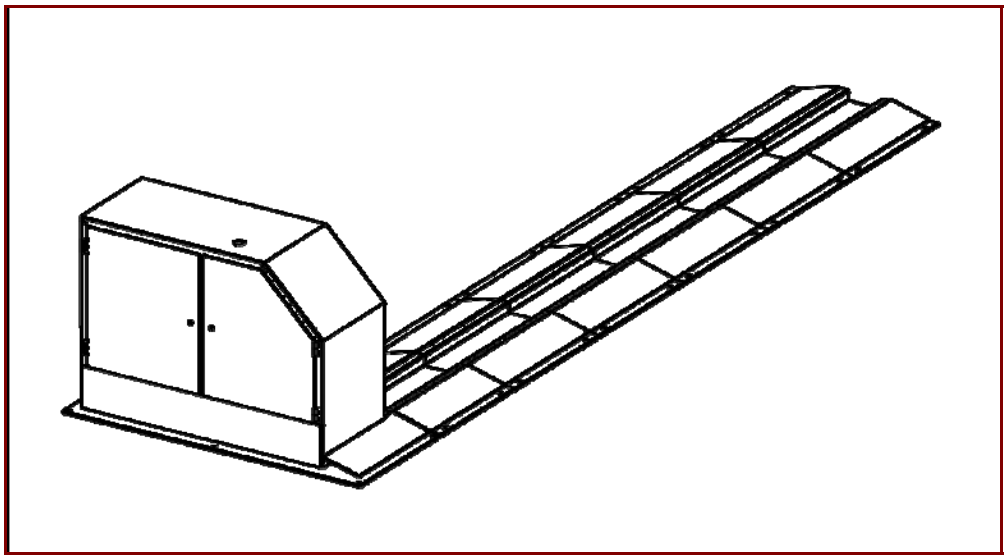


Figure 25 – CBG-160 Placement of Sixth Ramp Segment

Place the seventh ramp segment in place as shown below. *Do not anchor any ramp segments at this time.*

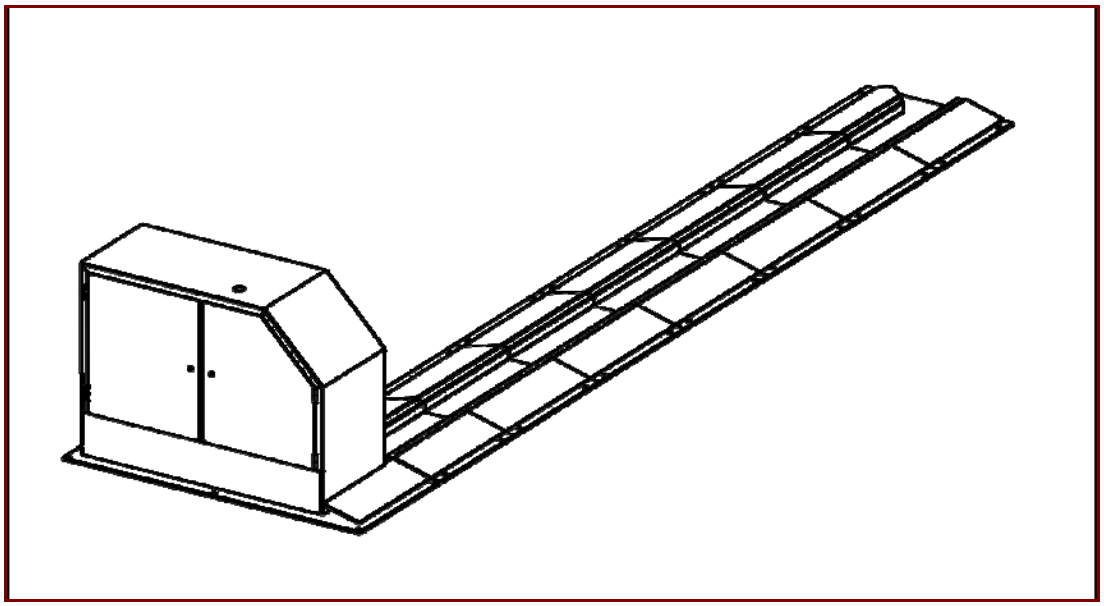


Figure 26 – CBG-160 Placement of Seventh Ramp Segment

Lay the Barrier Gate in position within the ramps. Use a pry bar or crowbar to adjust alignment of each ramp so the Barrier Gate travels into the ramp opening without obstruction.

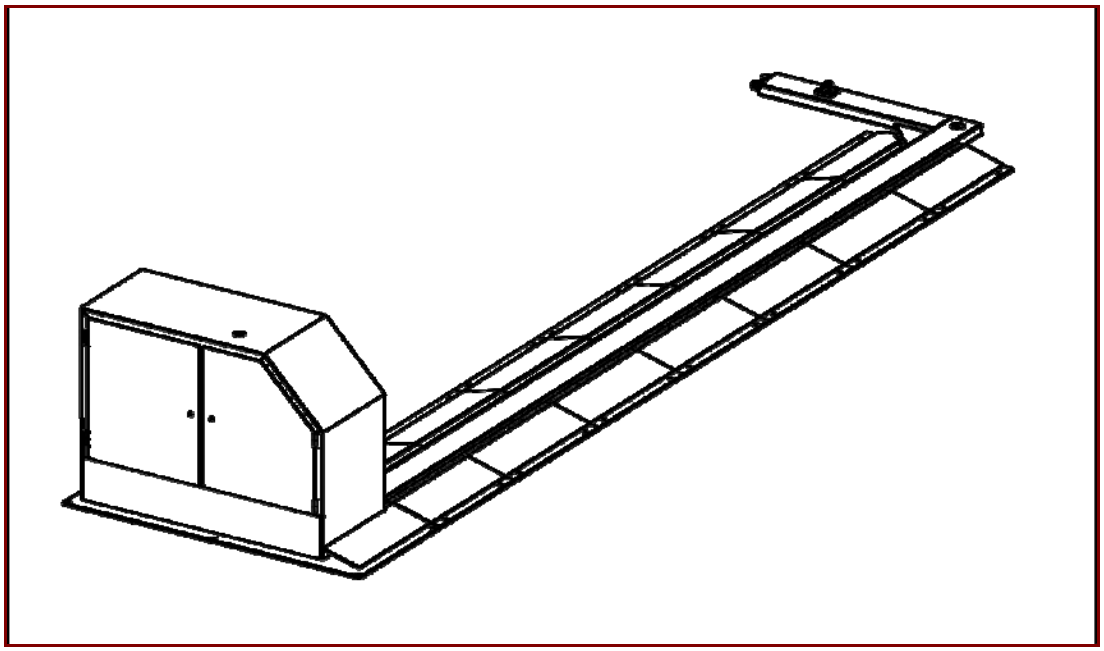


Figure 27 – CBG-160 Placement of Gate Into Ramp Segments to Verify Alignment

Tool Required	Tool Type	Tool Specification
	Pry Bar or Crowbar	To adjust ramp segment locations as required for Barrier Gate clearance

If installing a CBG-160, proceed to Section 2.9 "Barrier Gate Hinge Bolt Installation" after the steps above have been performed.

2.8.4 Additional Ramp Installation Instructions, CBG-180

Continuing from the CBG-100 ramp installation process (Section 2.8), for the CBG-180 place the fifth ramp segment in place as shown below. DO NOT anchor or secure any ramp until all ramps have been placed, the Non-Control Cabinet has been placed in position and the proper travel of the Barrier Gate up and down has been verified.

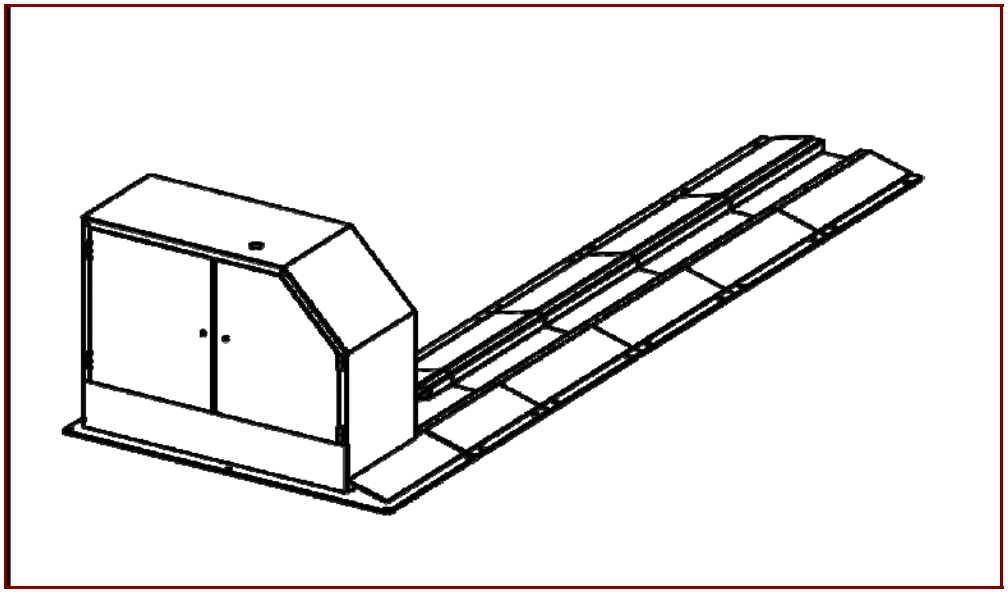


Figure 28 – CBG-180 Placement of Fifth Ramp Segment

Place the sixth ramp segment in place as shown below. *Do not anchor any ramp segments at this time.*

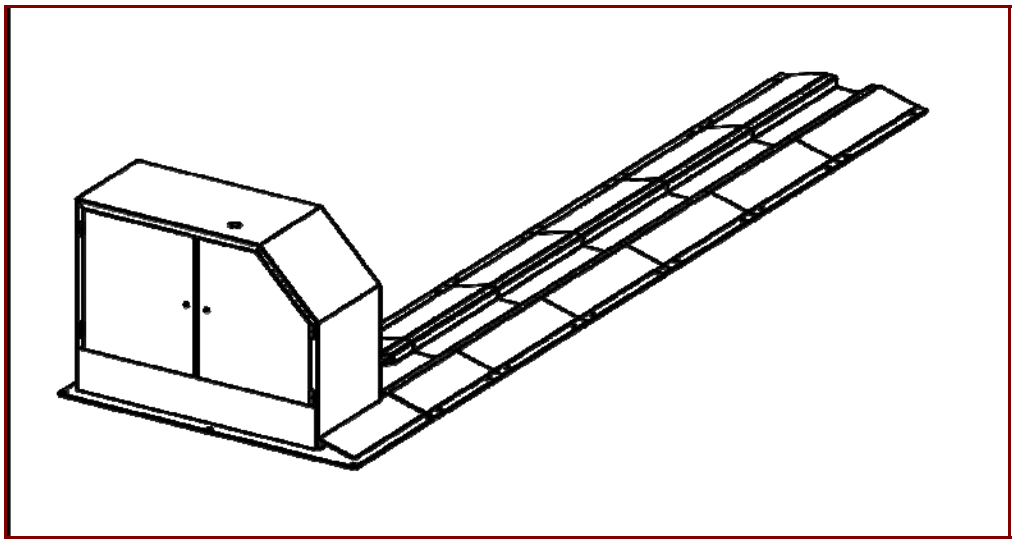


Figure 29 – CBG-180 Placement of Sixth Ramp Segment

Place the seventh ramp segment in place as shown below. *Do not anchor any ramp segments at this time.*

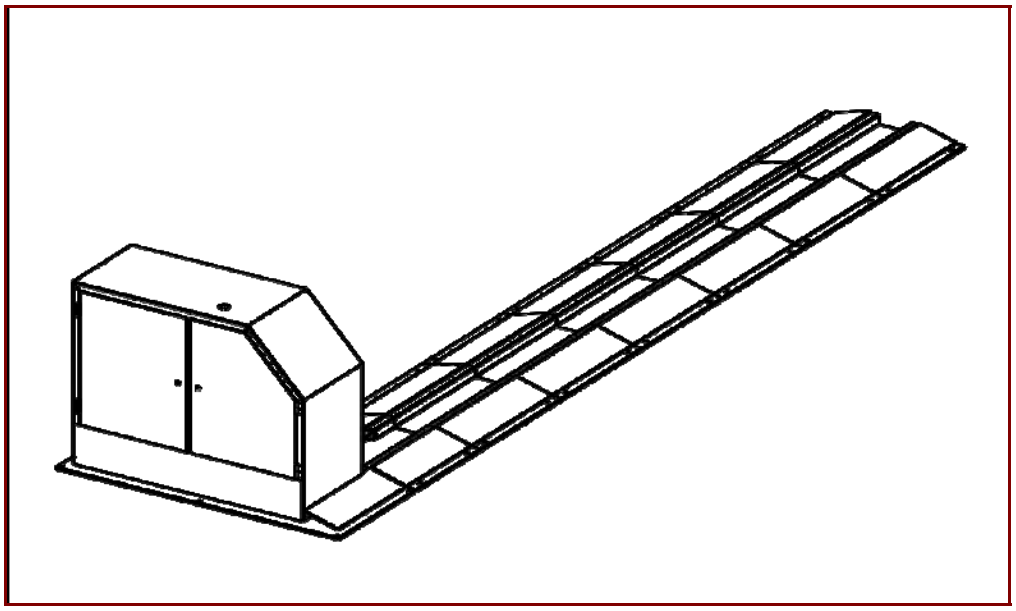


Figure 30 – CBG-180 Placement of Seventh Ramp Segment

Lay the Barrier Gate in position within the ramps. Use a pry bar or crowbar to adjust alignment of each ramp so the Barrier Gate travels into the ramp opening without obstruction.

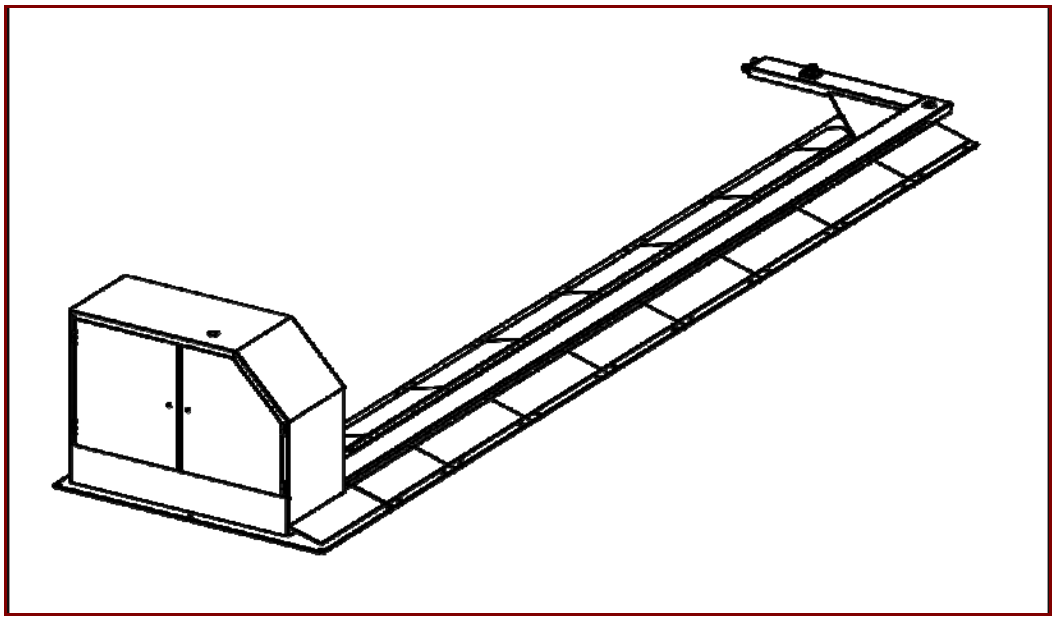


Figure 31 – CBG-180 Placement of Barrier Gate Into Ramp Segments to Verify Alignment

Tool Required	Tool Type	Tool Specification
	Pry Bar or Crowbar	To adjust ramp segment locations as required for Barrier Gate clearance

If installing a CBG-180, proceed to Section 2.9 "Barrier Gate Hinge Bolt Installation" after the steps above have been performed.

2.9 Barrier Gate Hinge Bolt Installation

Remove the bolts, washers, bearings and nuts from both the Control Cabinet and Non-Control Cabinet Barrier Gate hinges using a ¾" wrench.

Place the Non-Cabinet in final installation position, so the Barrier Gate fits properly into the hinge locations in both the Control and Non-Control Cabinet.

> **NOTE** -- ensure that ramp segments are properly aligned for clear and unobstructed travel of the Barrier Gate up and down. It may be necessary to make small adjustments to the position of any component to ensure proper alignment and movement of the Barrier Gate prior to final anchoring.

Install Control Cabinet hinge bolts to Barrier Gate using ¾" wrench, as shown below.

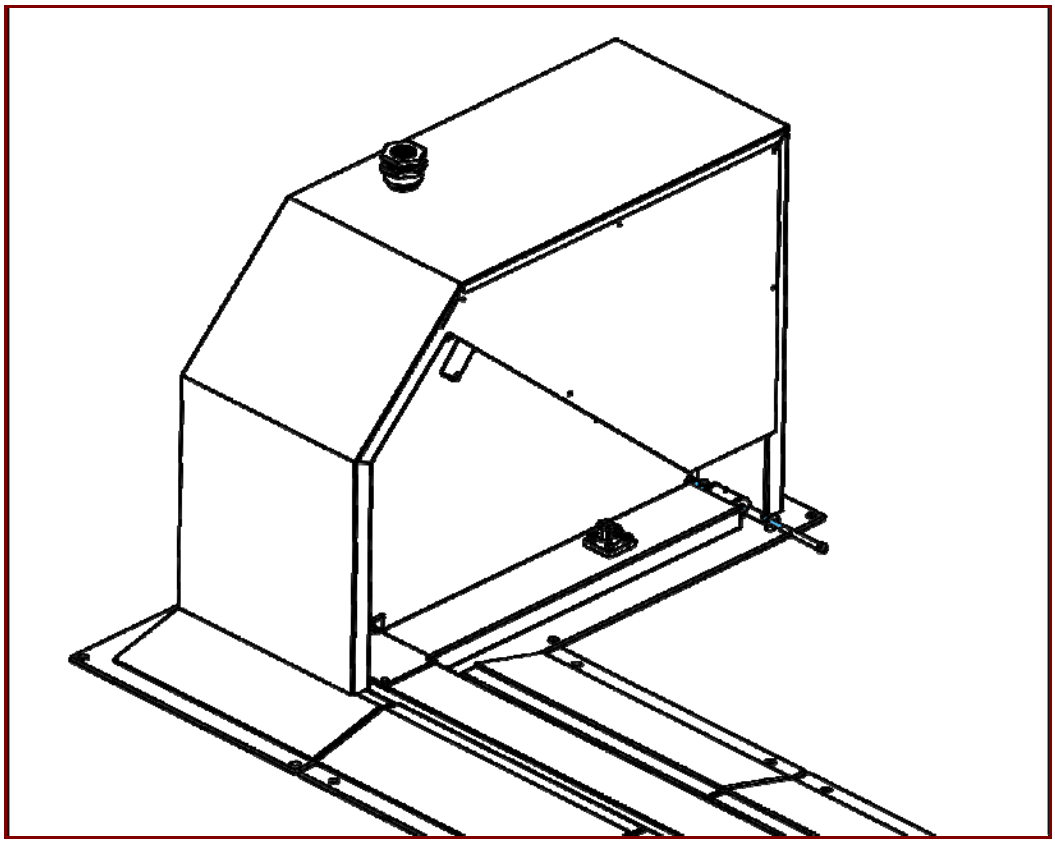


Figure 32 – Gate Hinge Installation, Control Cabinet

Tool Required	Tool Type	Tool Specification
	Wrench/Socket	¾"

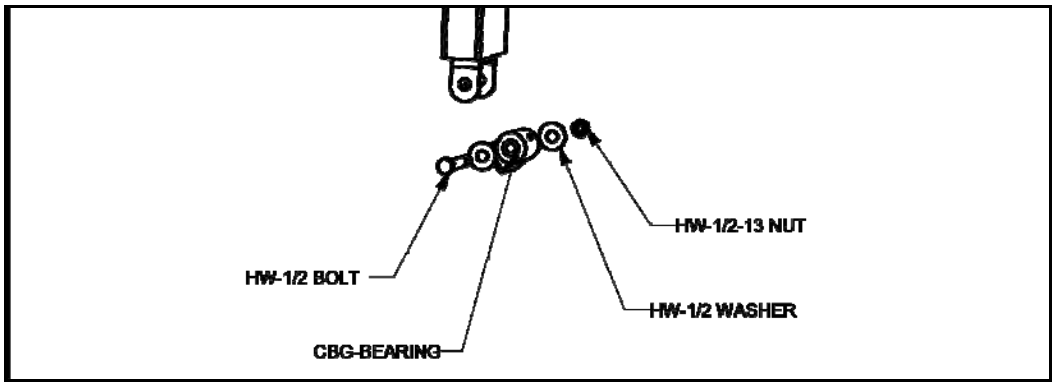


Figure 33 – Detailed Gate Hinge Installation, Control Cabinet

Install Non-Control Cabinet hinge bolts to Barrier Gate using ¾" wrench, as shown below.

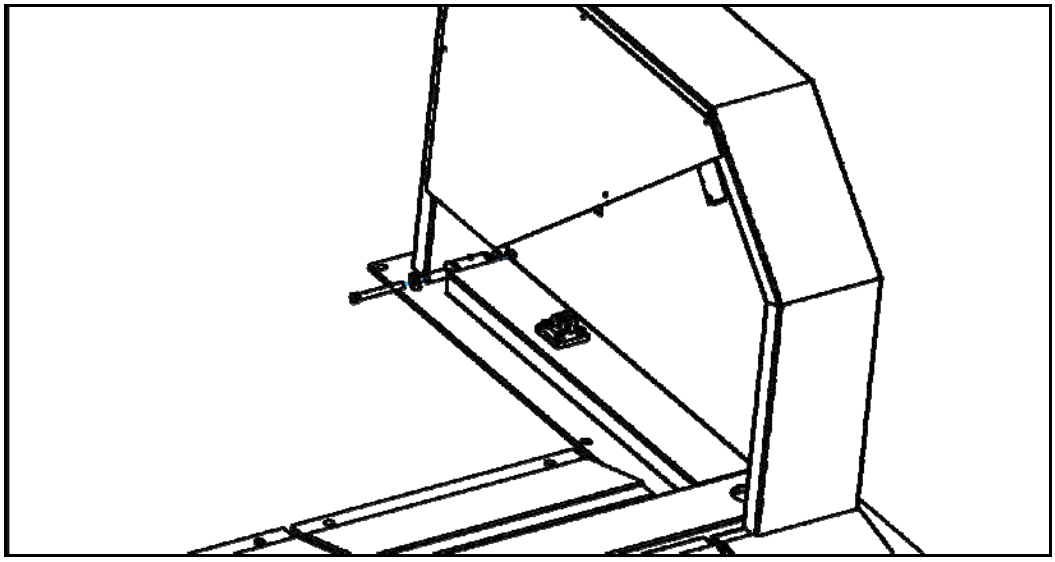


Figure 34 – Gate Hinge Installation, Non-Control Cabinet

Tool Required	Tool Type	Tool Specification
	Wrench/Socket	¾"

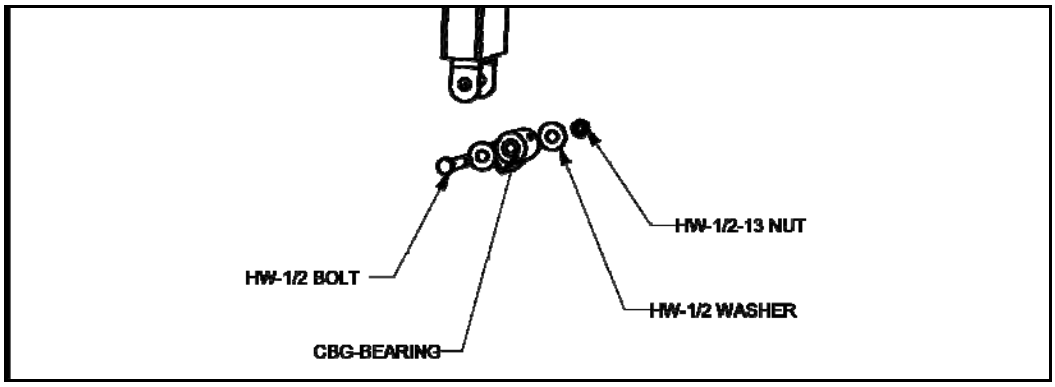


Figure 35 – Detailed Gate Hinge Installation, Non-Control Cabinet

Important – When the hinge bolts have been secured to both the Control and Non-Control Cabinets, verify the clear and unobstructed travel of the Barrier Gate up and down, in and out of the ramps. Adjust any ramp segments with a crowbar or pry bar, if necessary.

When the Barrier Gate is in position and secured in both Gate Hinges, it is advisable to verify the proper alignment of the Barrier Gate with a measuring tape. As shown in the figure below, the distance from the Barrier Gate (in the down position) to the end of both cabinet bases should be exactly three inches. Adjust the position of the Non-Control Barrier Gate as needed to ensure that all four measurements are three inches, and that the Barrier Gate enters and exits the recesses of the ramp segments without any obstruction.

Tool Required	Tool Type	Tool Specification
	Tape Measure	To verify 3” distance from the Barrier Gate (in down position) to the end of the base of both Cabinets.

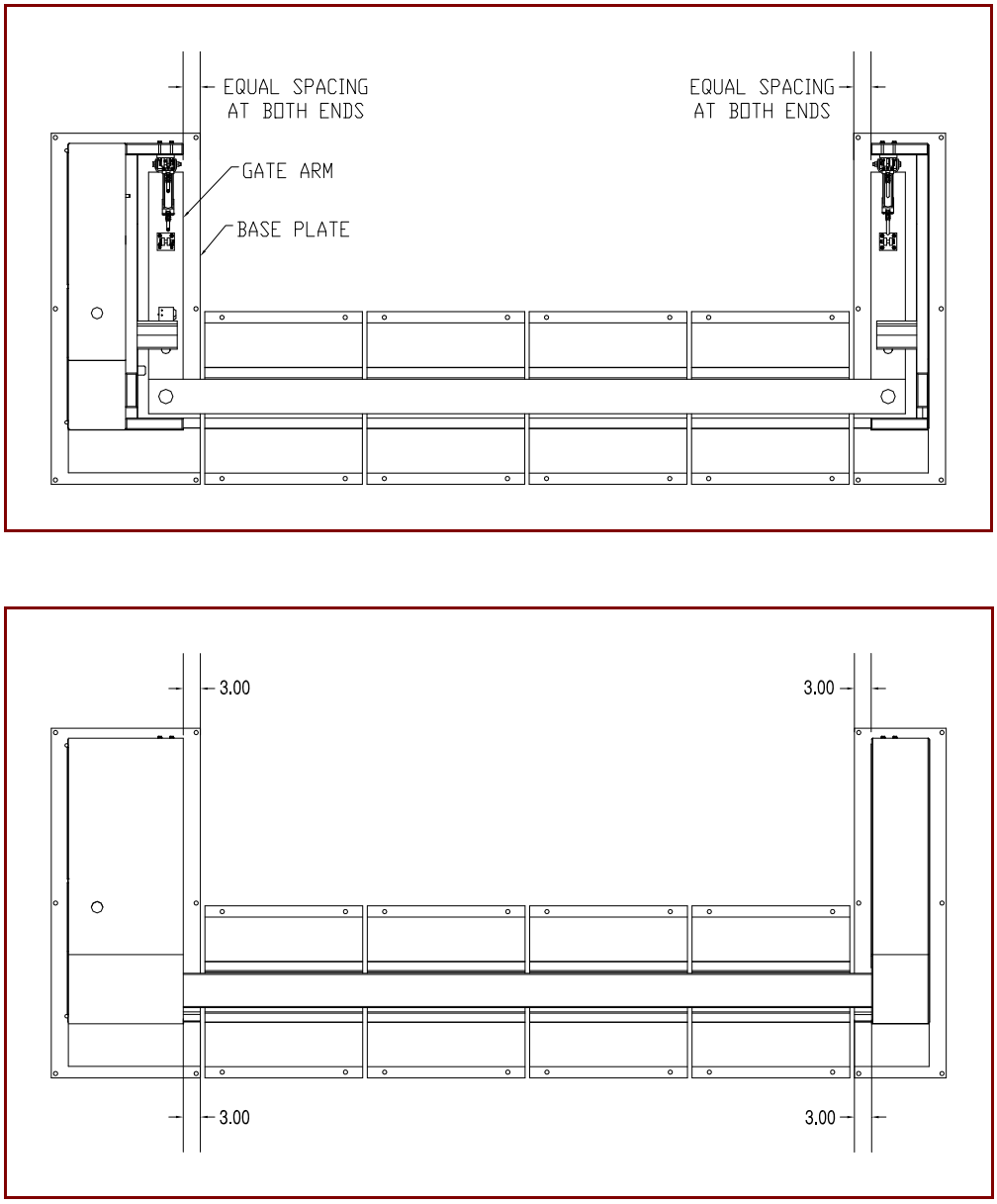


Figure 36 – Measurements to Ensure Proper Component Alignment

2.10 Hydraulic Cylinder Bolt Installation

NOTE – In order to install the Hydraulic Cylinders to the Barrier Gate (while the Barrier Gate is in the down position), it will be necessary to open the upper bleeder valve on the Hydraulic Cylinder in order to pull the shaft outward for connection to the Barrier Gate. This process may cause air to enter the system. Ensure that the bleeder valve is closed after the shaft has been extended and secured to the Barrier Gate. After the hydraulic hoses have been installed to the Non-Control Cabinet Hydraulic Cylinder, it will be necessary to bleed the system as documented later.

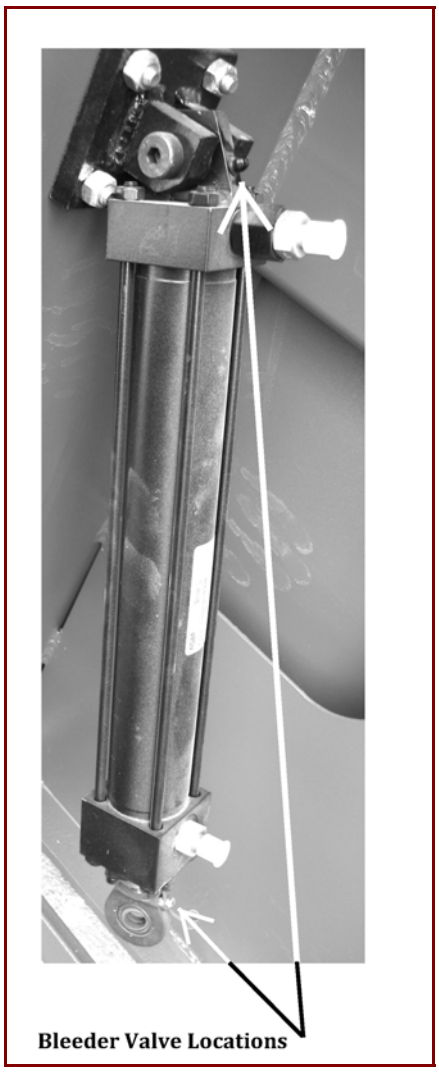


Figure 37 – Hydraulic Cylinder Bleeder Valve Locations

Tool Required	Tool Type	Tool Specification
	Wrench	3/8”

Install Hydraulic Cylinder bolts on the Non-Control Cabinet side using ¾" wrench as shown below.

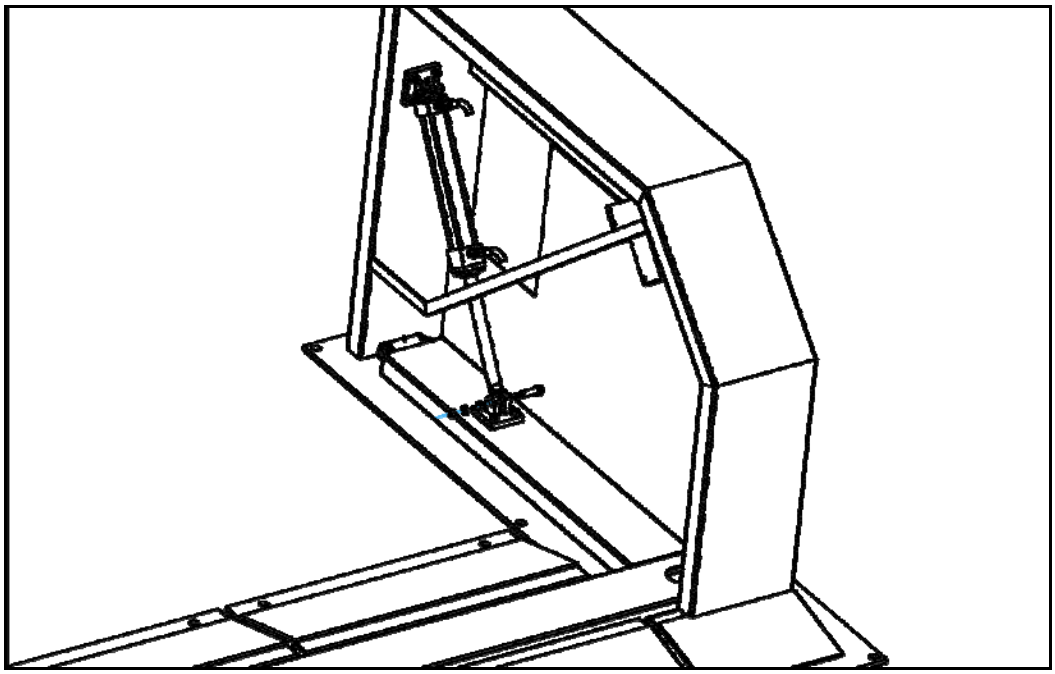


Figure 38 – Hydraulic Cylinder Bolt Installation, Non-Control Cabinet

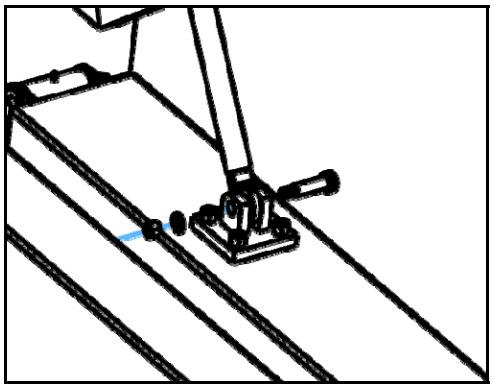


Figure 39 – Detail View - Hydraulic Cylinder Bolt Installation, Non-Control Cabinet

Tool Required	Tool Type	Tool Specification
	Wrench/Socket	¾"

Install Hydraulic Cylinder bolts on the Control Cabinet side using ¾" wrench as shown below.

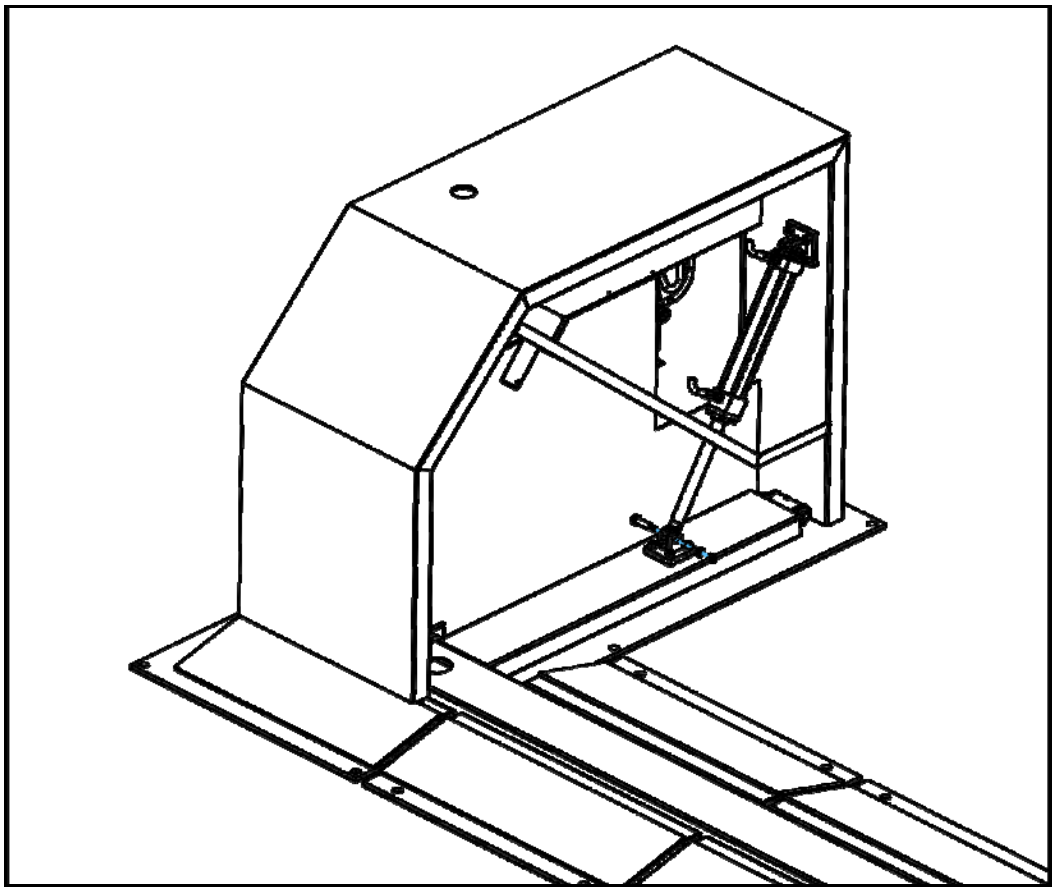


Figure 40 – Hydraulic Cylinder Bolt Installation, Control Cabinet

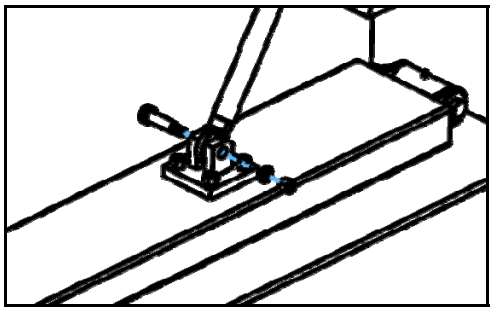


Figure 41 – Detailed View - Hydraulic Cylinder Bolt Installation Control Cabinet

Tool Required	Tool Type	Tool Specification
	Wrench/Socket	¾"

2.11 Installation of Concrete Anchors

2.11.1 System View Prior to Anchor Installation

Before concrete anchors are installed, the CBG system should resemble the figure below.

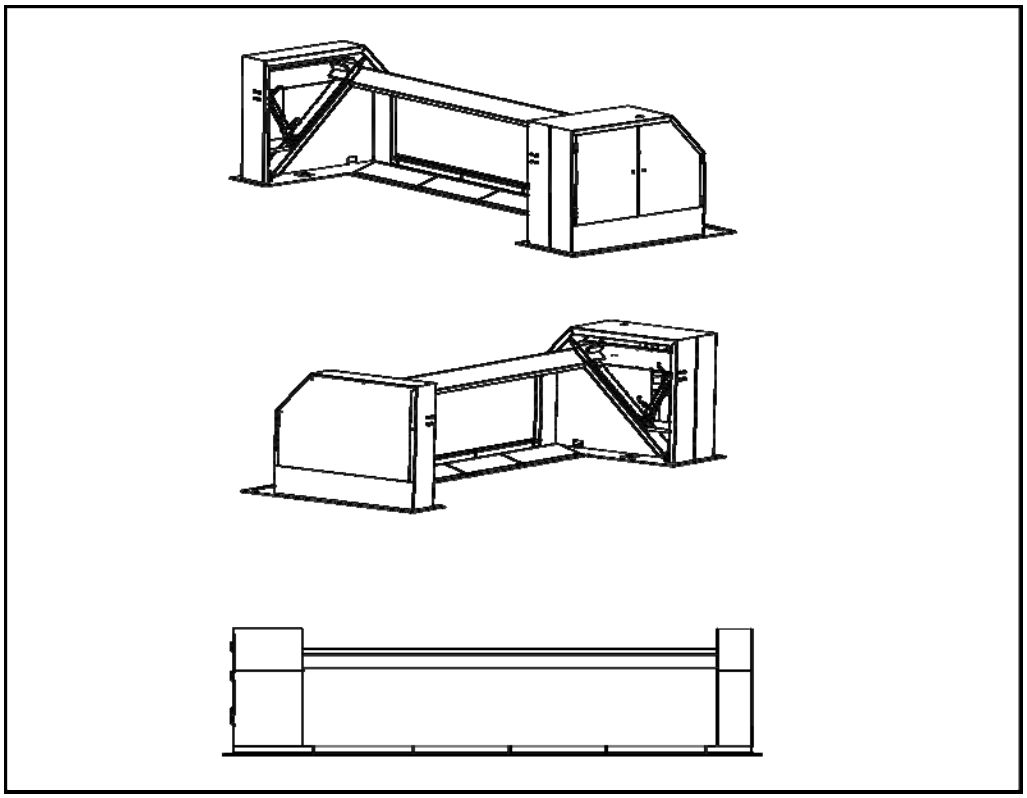


Figure 42 – System View Prior to Anchor Installation

To ensure that the gate is properly positioned between the Control and Non-Control Cabinets, it is advisable to measure the distance from the gate (in the down position) to the bottom of the Cabinet base plates in four locations. All four measurements should be exactly the same as shown in the following figure.

Tool Required	Tool Type	Tool Specification
	Tape Measure	To ensure the distance from the lowered gate to the base of the Cabinets is the same in 4 locations.

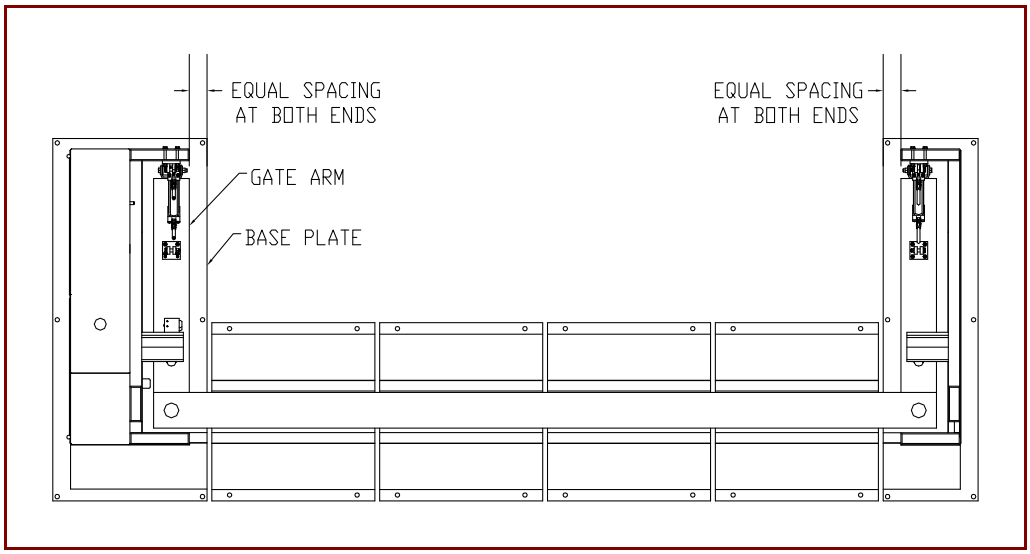


Figure 43 – General Measuring Guideline to Ensure Component Alignment

Specifically, the gate to base plate measurement should be 3" in all four locations. If this is NOT the case, make minor adjustments to the Non-Control Cabinet position and re-measure.

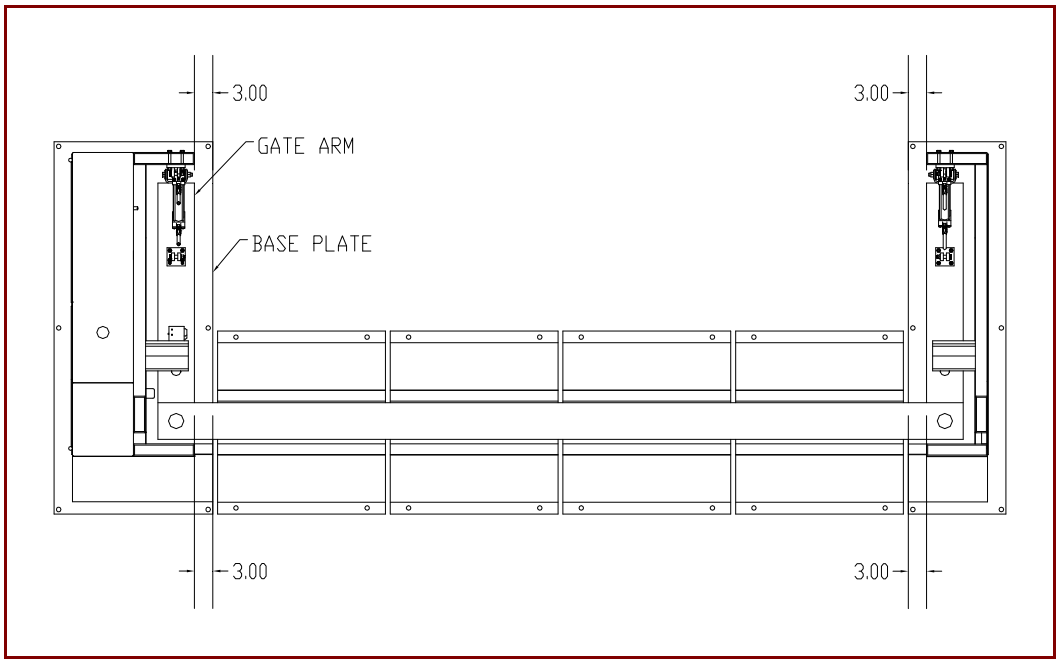


Figure 44 – Specific Measuring Guideline to Ensure Component Alignment

When the Barrier Gate has been secured to the hinges on both the Control and Non-Control Cabinets, and to the Hydraulic Cylinders, verify the proper travel of the Barrier Gate in both the

up and down directions. When settling into the down position, the Barrier Gate should clear the ramp modules without obstruction. If necessary, use a pry bar to adjust the location of any ramp module that prevents clear travel of the Barrier Gate into the ramp recess. It is essential that the travel of the Barrier Gate be verified prior to the installation of any anchor bolts. When Gate travel has been confirmed, insert anchor bolts in Control Cabinet, all ramp segments, and the Non-Control Cabinet. Ensure that anchors are installed in all locations of all components.

Figure 45 – Titen Head Anchor Bolt

Tool Required	Tool Type	Tool Specification
	Hammer Drill or similar for concrete drilling	
	Concrete Bit	5/8” masonry bit. Drill a minimum depth of 4”
	Air Compressor or similar	To remove dust and debris from drilling
	Wrench/Socket	15/16”
	Concrete Anchors	5/8” x 4” Titen Head Screw Anchor Zinc, Part Number THD62400H

Section 3 – Hydraulic, Electrical, and Control Installation

3.1 Hydraulic Hose Installation

The factory pre-installs a set of hydraulic hoses to the Hydraulic Cylinder in the Control Cabinet. After the Barrier Gate ramps have been installed, adjusted and anchored, the two hydraulic hoses are threaded from the Control Cabinet through the ramps to the Non-Control Cabinet. Once routed through the ramps, the two hoses are attached to the Hydraulic Cylinder in the Non-Control Cabinet.

The two hoses that are to be threaded through the ramp are coiled up in the Control Cabinet as shown below. Start this portion of the installation by uncoiling the hydraulic hoses and extending them fully to ensure that there are no kinks or bends in the hoses.

Figure 46 – Hydraulic Hose Location, As Shipped, Inside Control Cabinet

To connect the hydraulic hoses to the Hydraulic Cylinder in the Non-Control Cabinet, extend a fish tape through the recess of the ramps from the Non-Control Cabinet side to the Control Cabinet side. Carefully attach the hydraulic hoses to the fish tape using electrical or other strong tape. From the Non-Control Cabinet side, carefully pull the fish tape and hydraulic hoses through the ramp assemblies as shown below. When the hoses have been fully extended, remove the fish tape from the hydraulic hoses.

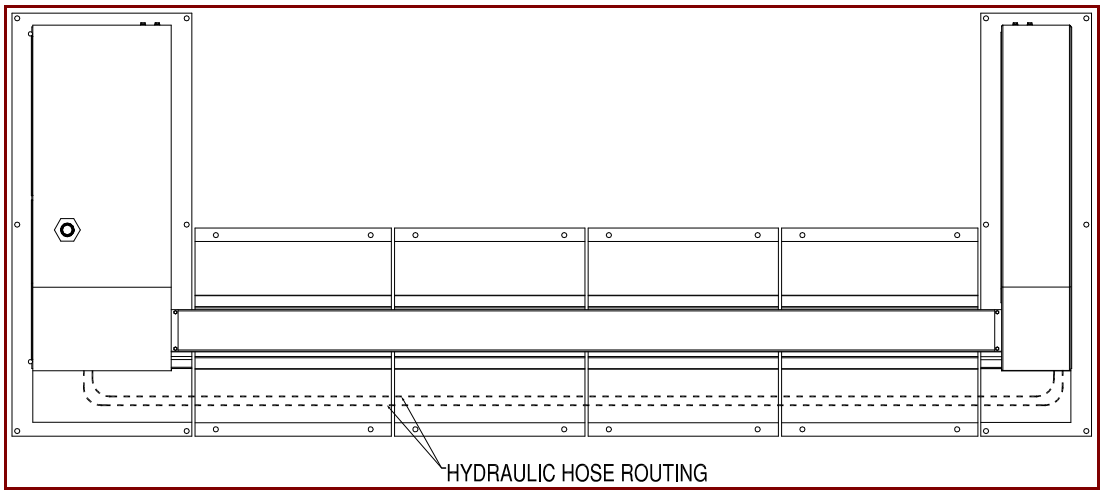


Figure 47 – Two Hydraulic Hoses Routed Through Ramp Gates to Non-Control Cabinet

Tool Required	Tool Type	Tool Specification
	Fish Tape	15’ minimum for CBG-100, up to 25’ for CBG-180
	Tape (Electric or other)	Electric or other strong tape to attach 2 hydraulic hoses to fish tape

When the hoses have been extended through the ramps to the Non-Control Cabinet, carefully route the hoses to the location of the Hydraulic Cylinder ensuring that there are no kinks or sharp bends in the hydraulic hoses.

Attach the hydraulic hoses to the Hydraulic Cylinder in two locations as shown below.

NOTE – Both hydraulic hoses are color coded to correspond to color codes on the hydraulic cylinder. Ensure that the RED coded hose is attached to the RED coded location on the hydraulic cylinder in the Non-Control Cabinet. In a similar fashion, ensure that the GREEN coded hose is attached to the GREEN coded location on the hydraulic cylinder in the Non-Control Cabinet.

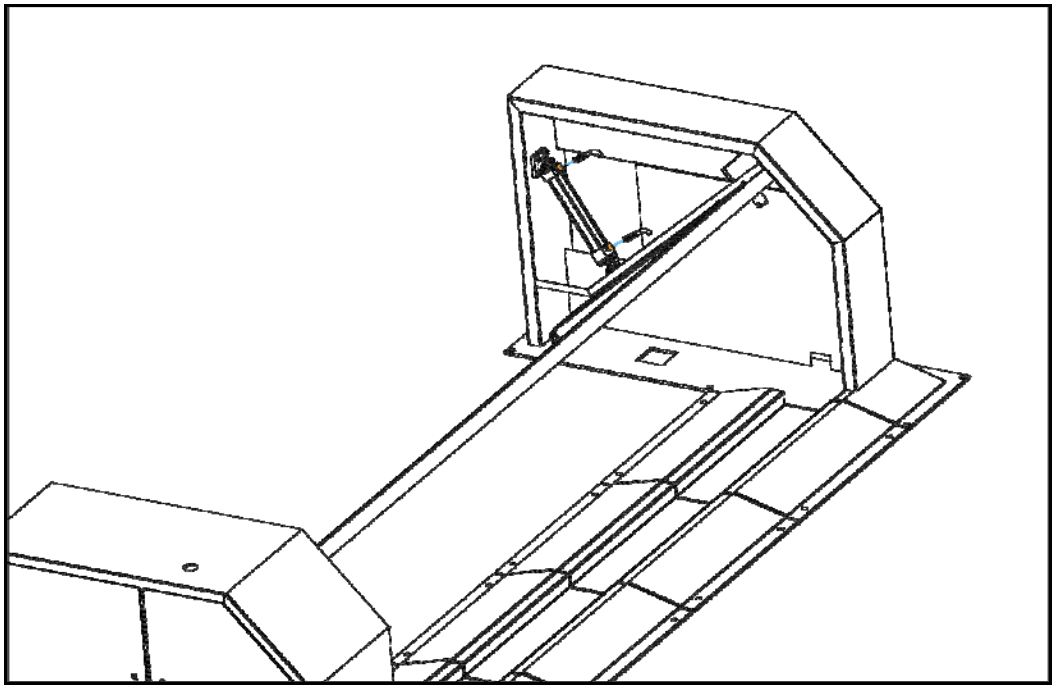


Figure 48 – Hydraulic Hose Connection, Non-Control Cabinet

Tool Required	Tool Type	Tool Specification
	Wrench	9/16" to attach Hydraulic Hoses, 2 locations

3.2 Hydraulic System Bleeding

NOTE – When the Hydraulic Cylinder has been attached to the Barrier Gate, and the two hydraulic hoses have been attached to the cylinder on the Non-Control Cabinet, it is necessary to bleed hydraulic system to ensure air has been evacuated from the lines and the system.

The Spike Systems CBG family removes air from the hydraulic lines through normal use of the system. However, after installing the hydraulic hoses and cylinders, it is often advisable to manually bleed or purge air from the system. To do this, place a 3/8” drain hose on the upper bleeder valve in the Non-Control Cabinet, place the other end of the bleeder hose in a waste container, open the bleeder valve and operate the Barrier Gate up and down (manually) until air no longer comes through the bleeder tube. To avoid performing this step manually, which requires the lifting and lowering of the Barrier Gate, hydraulic system bleeding can be performed after the installation is complete by using AC power to lift and lower the Barrier Gate.

WARNING -- Use extreme caution to avoid injury if using AC power to raise and lower the Barrier Gate when performing hydraulic system bleeding.

When air has been purged from the hydraulic system, retighten the bleeder valves, remove the drain hose and clean any hydraulic fluid that may have dripped inside either Cabinet.

Tool Required	Tool Type	Tool Specification
	Wrench	3/8”
	3/8” Rubber Hose	To attach to the bleeder valve for bleeding air from hydraulic system
	Disposable container	To capture hydraulic fluid that may be released while bleeding
	Rag	To clean area inside cabinets of any hydraulic fluid

3.3 Verify Proper Alignment of Upper Limit Switch within Control Cabinet

Verify that the Barrier Gate, when elevated, makes proper contact with upper limit switch in the Control Cabinet. (Note that the Non-Control Cabinet does not have limit switches.)

It may be necessary to make a slight adjustment to the upper control limit switch location by bending the bracket slightly to ensure proper contact with the Barrier Gate arm in the raised position.

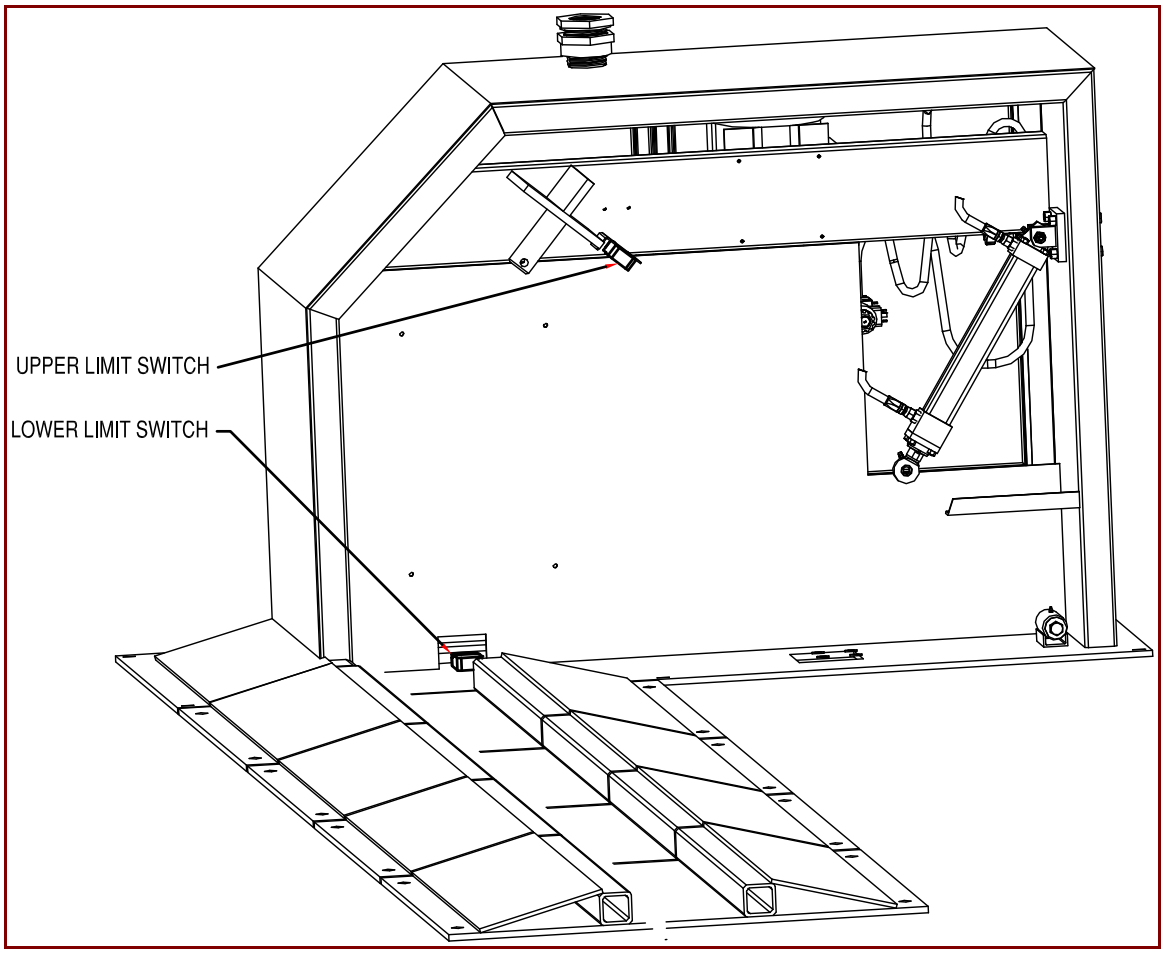


Figure 49 – View of Upper and Lower Limit Switches, Control Cabinet

Figure 50 – Location of Upper Limit Switch, Control Cabinet

Figure 51 – Location of Lower Limit Switch, Control Cabinet, Reference Only

3.4 Replace Inside Panels for Control and Non-Control Cabinets

At this time, replace the inner panels of both the Control and Non-Control Cabinets as shown in the figure below.

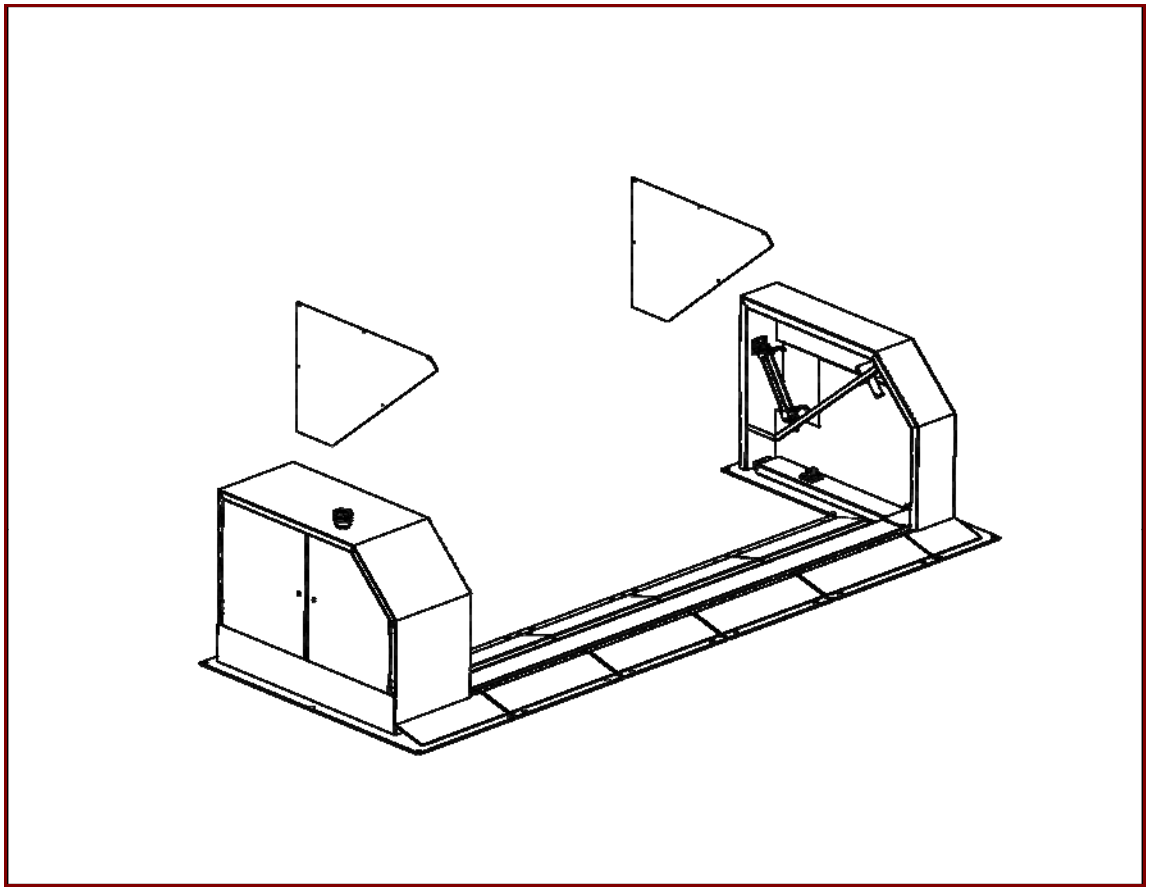


Figure 52 – Replacement of Inner Panels Control and Non-Control Cabinets

Tool Required	Tool Type	Tool Specification
	Wrench/Socket	7/16 “

3.5 Reflective Tape Installation on Barrier Gate

With a lint-free cloth, carefully clean the area of the Barrier Gate where the reflective adhesive tape will be applied.

Starting from the Control Cabinet side, peal off the backing of the adhesive tape and secure the tape to the Barrier Gate squarely and evenly. Ensure that no air bubbles are present as the tape is applied. If needed, trim any excess reflective tape on the Non-Control Cabinet side of the Barrier Gate.

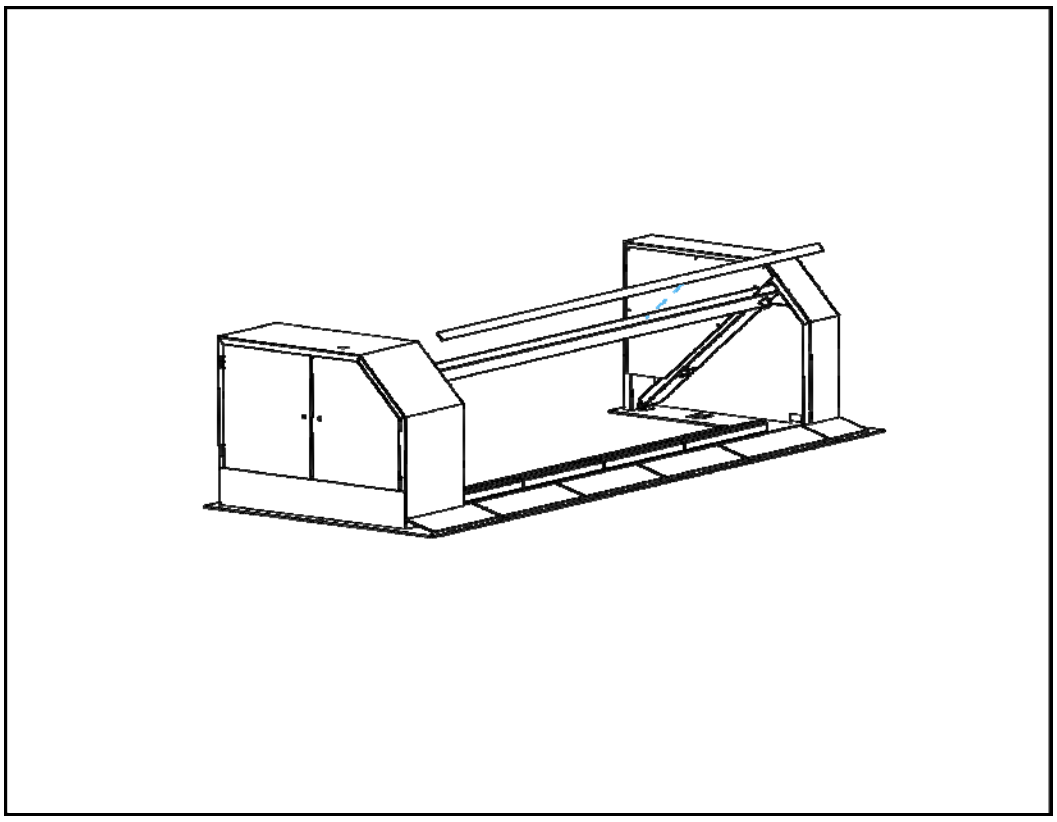


Figure 53 – Reflective Tape Application, Crash Barrier Gate

Tool Required	Tool Type	Tool Specification
	Lint Free Cloth	To clean and prepare surface where tape to be applied
	Razor or Scissors	To trim safety tape, if required
	Reflective Tape	Provided

3.6 AC Power Connection

The client-supplied power is to be connected to the 4-gang junction box via flexible conduit. The flexible conduit and power wires are to be routed through the bottom of the junction box in the location shown in the photo below. Local code may require that a licensed electrical contractor perform this step.

NOTE – The Switch on the 4-gang junction box, when switched to the ON position, allows power to flow to the Spike system from the AC power source.

WARNING -- When servicing the system, this switch should be placed in the OFF position and the power going to the junction box should be shut off at the breaker box. When AC power is OFF at this switch and breaker box, voltages may still be present within the Spike System Control Box. Use caution.

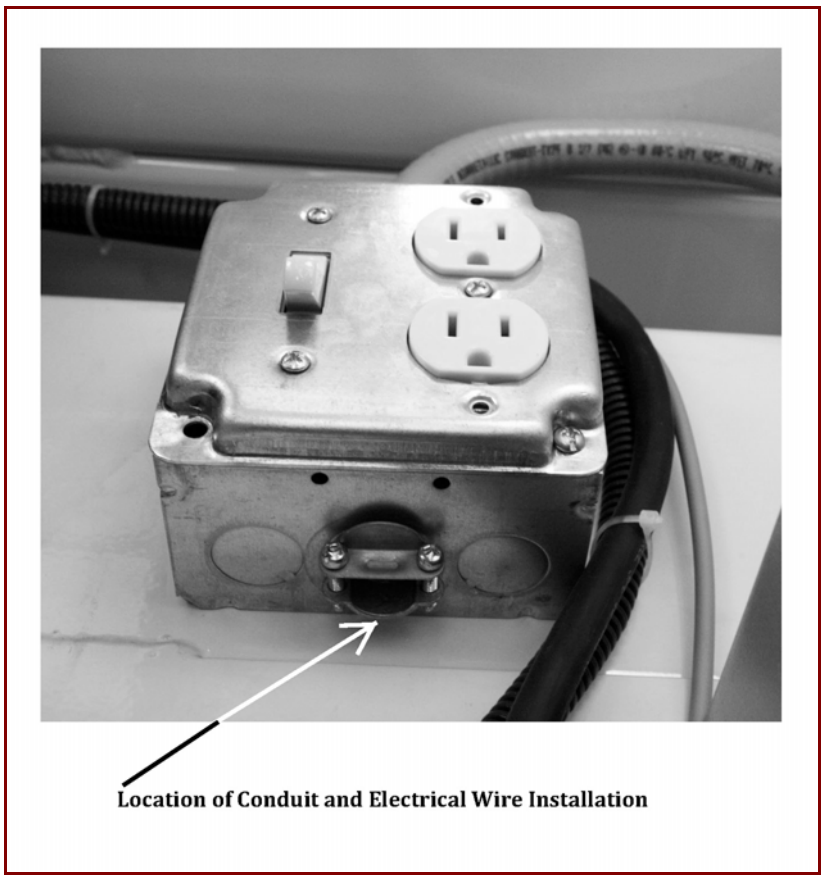


Figure 54 – AC Power Junction Box Inside Control Cabinet

Tool Required	Tool Type	Tool Specification
	Flexible Conduit	To connect power conduit stub-up to 4 gang box
	Conduit Fitting	To connect flexible conduit to client-installed rigid conduit
	Flat Blade Screw Driver	To open junction box and terminate power cables
	Wire Strippers	To make electrical connection (Licensed contractor)

The figure below shows a typical routing of the flexible conduit that will provide power to the CBG system. A locally licensed electrical contractor should perform electrical power connection to the Spike System.

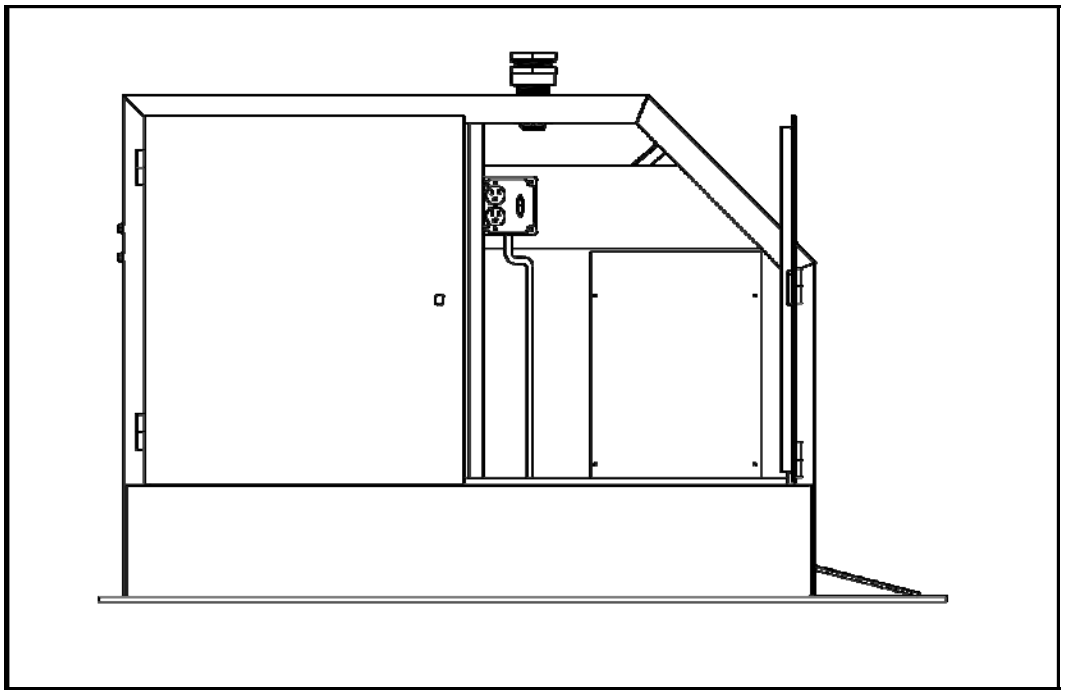


Figure 55 – Location of Flexible Conduit Installation to AC Junction Box, Control Cabinet

3.7 Traffic Control Signal Mounting

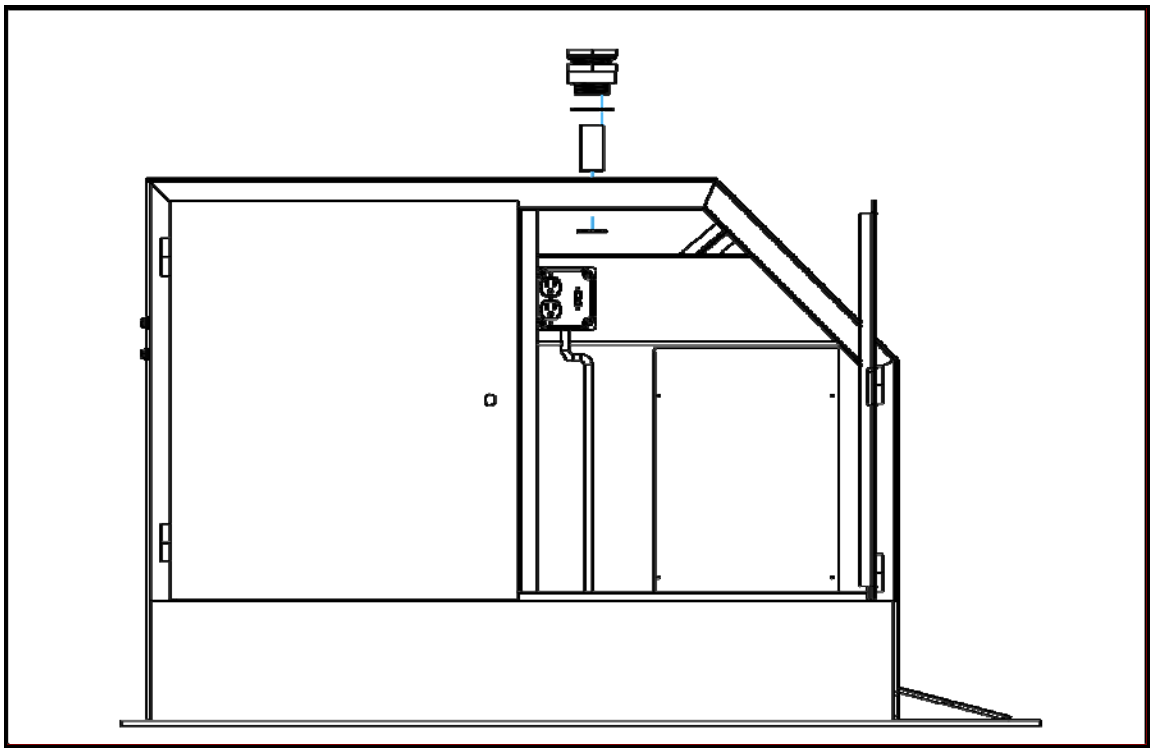


Figure 56 – Location of Traffic Control Mounting Adapter, Control Cabinet

Install the traffic control light fixture as shown in the figure above. This step is often performed at the factory. However, field installers should ensure that the flange is sealed with UV resistant silicon or other method to ensure that moisture does not enter the Control Cabinet. Thread the wires for the signal through the pole and flange for attachment at the control panel.

Tool Required	Tool Type	Tool Specification
	Channel Locks	Large size to secure mounting hardware
	Silicon UV-Resistant Sealant/Caulk	To ensure tight, water-resistant coupling

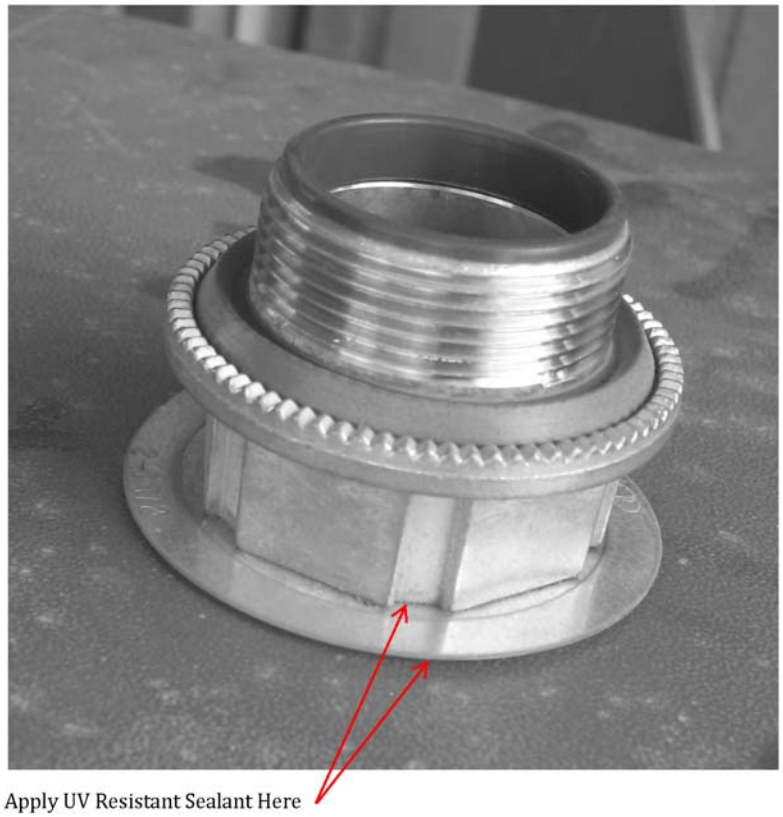


Figure 57 – Sealant Locations for Traffic Control Mounting Adapter, Control Cabinet

3.7.1 Wiring for Traffic Control Signal

As shown in the figure below, the wiring for the traffic control signal terminates on TB2 (terminal block on right side). The yellow light signal connects to terminal 9, the red light signal wire connects to terminal 10, and the common wire connects to terminal 47.

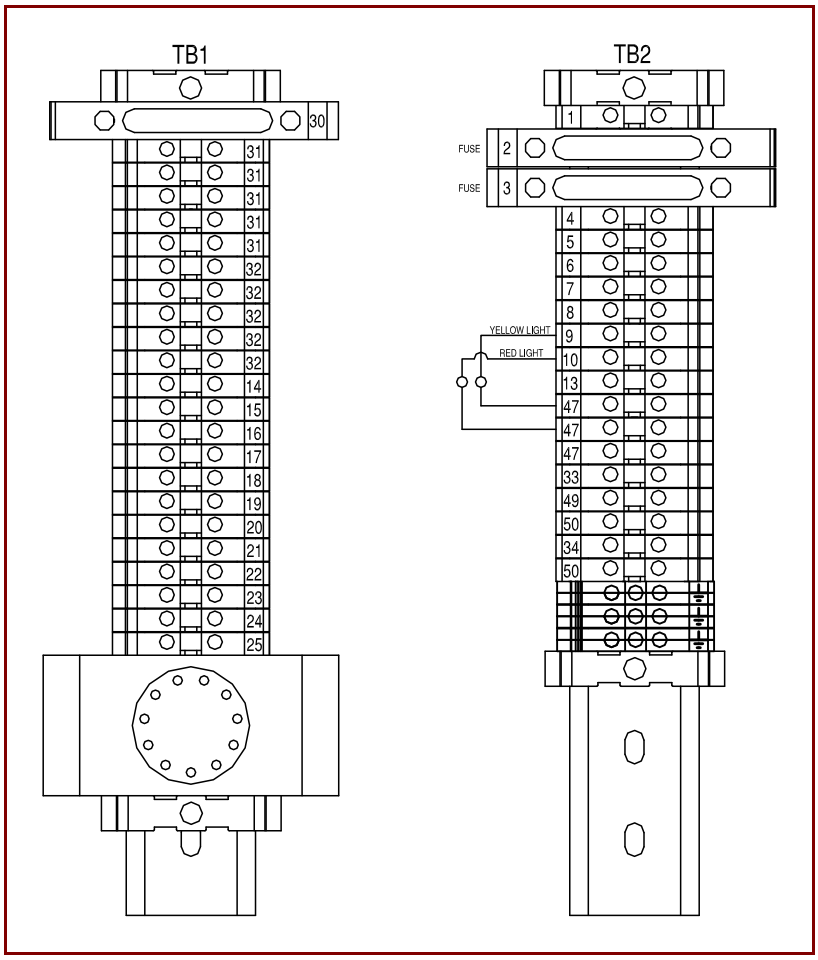


Figure 58 – Traffic Control Signal Wiring

Tool Required	Tool Type	Tool Specification
	Screw Driver	Flat, Small
	Wire Strippers	If required for cable connection

3.8 Wiring for Remote Operating Switch (Guard Shack, Typically)

As indicated in the figure below, a field connection barrier operated switch or control is wired to TB2. The Common wire is attached to terminal 4, the Open wire is attached to terminal 5, and the Close wire is attached to terminal 6.

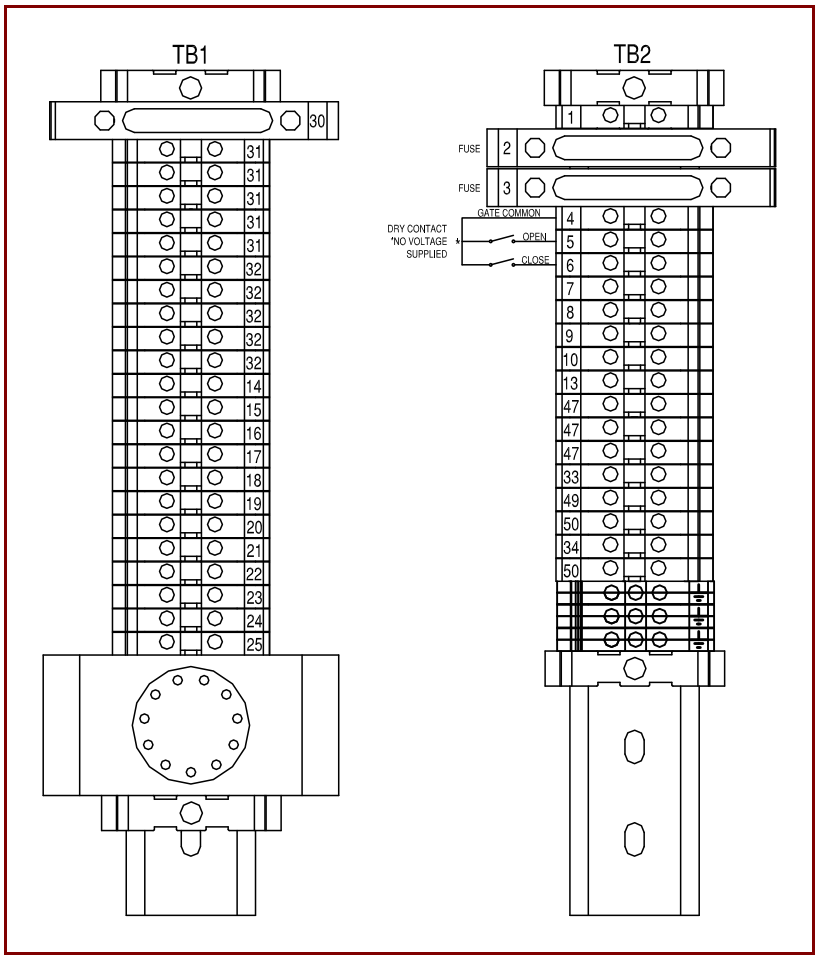


Figure 59 – Installation Location of Field Connection Barrier Operator

Tool Required	Tool Type	Tool Specification
	Screw Driver	Flat, Small
	Wire Strippers	If required for cable connection

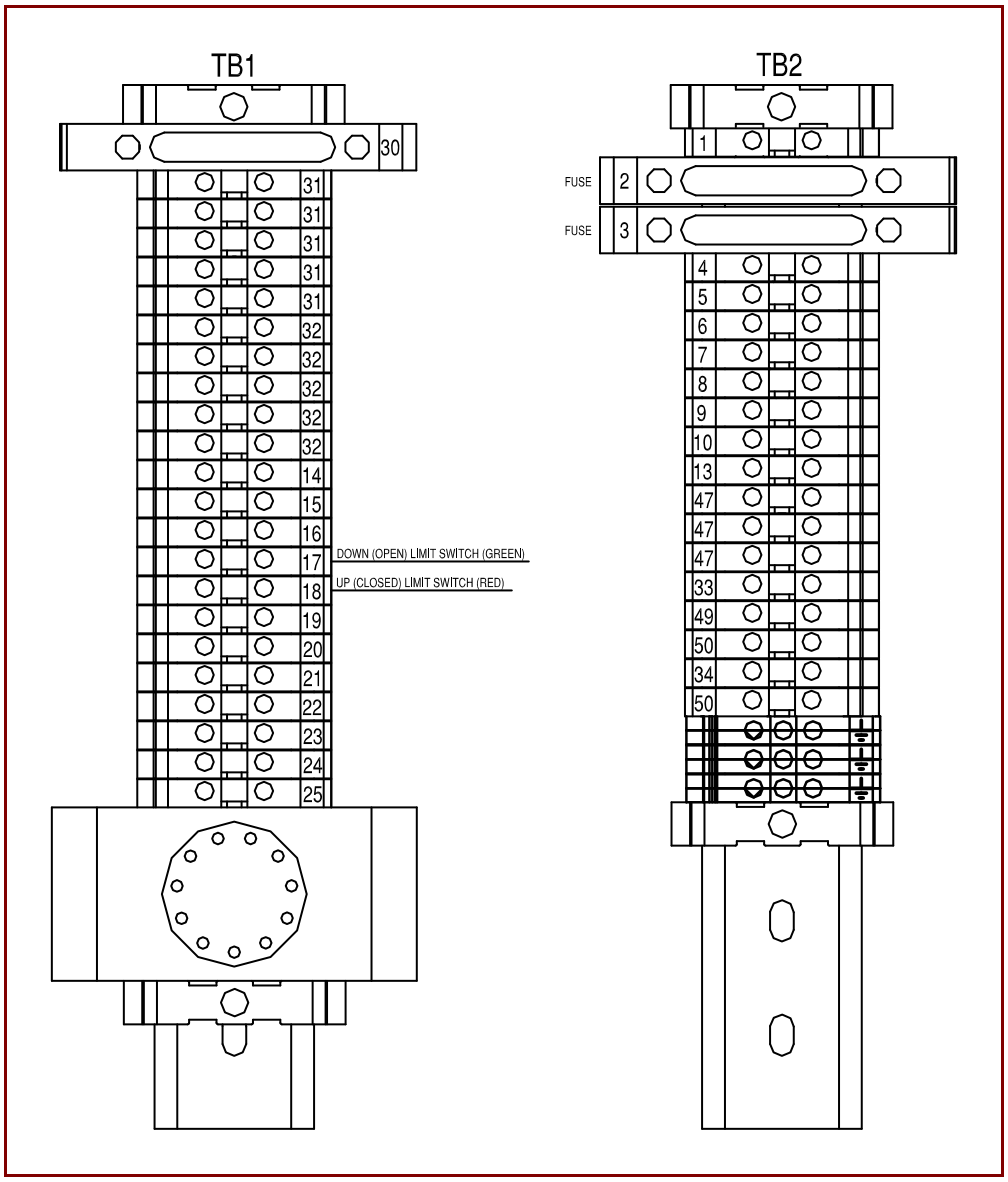
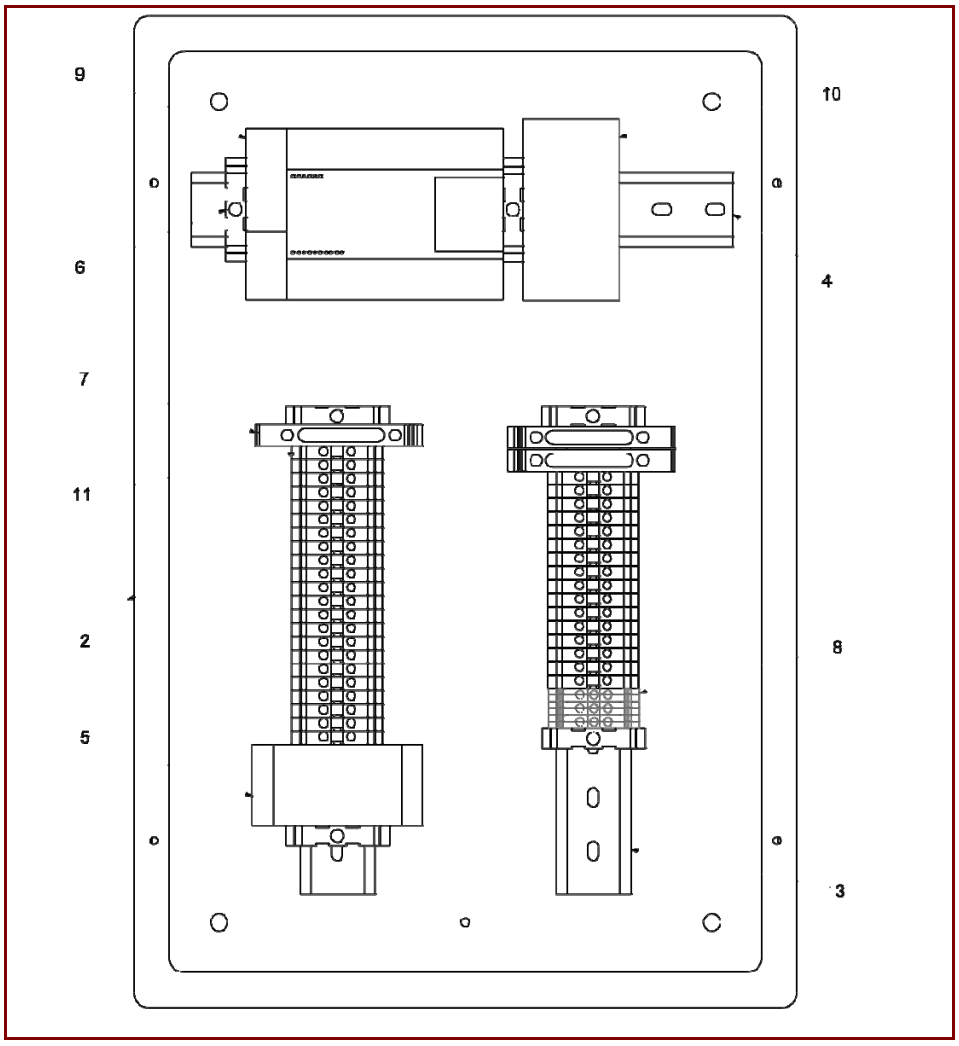


Figure 60 – Limit Switch Wiring (Usually Performed at Factory)

3.9 Installation Electrical Reference Information



11	38	PHOENIX CONTACT 3044102	TERMINAL BLOCK
10	1	SIEMENS 3RT1024-1A	SIRIUS CONTACTOR
9	1	SIEMENS S7-200	MICRO PLC
8	3	PHOENIX CONTACT 3044128	GROUND BLOCK
7	3	PHOENIX CONTACT 3004100	FUSE BLOCK
6	6	PHOENIX CONTACT 0800886	END STOP
5	1	RELECO S2-S	C2 RELAY
4	1	PHOENIX CONTACT S400201	10 IN. DIN RAIL
3	2	PHOENIX CONTACT S400201	9 IN. DIN RAIL
2	1	PIN XXXX	CONTROLLER BOX
1	1	CONTROLLER	CONTROLLER

Figure 61 – Electronic Control Panel Components, Control Cabinet

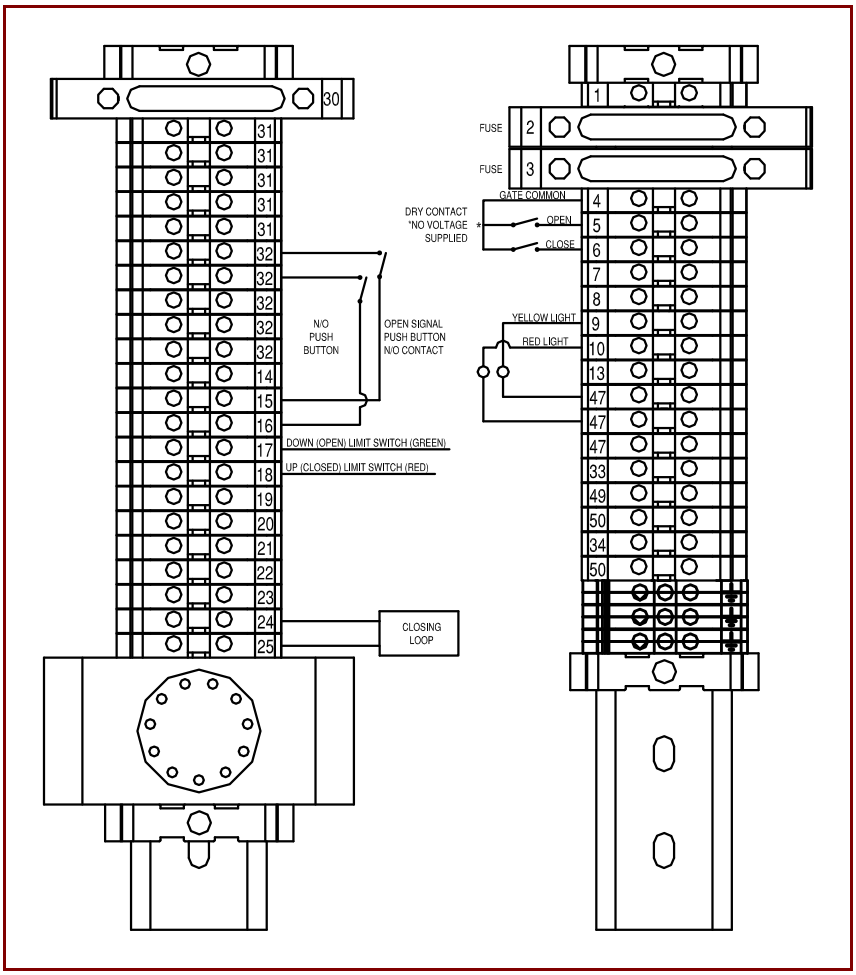


Figure 62 – Electronic Control Panel Terminal Blocks, Control Cabinet

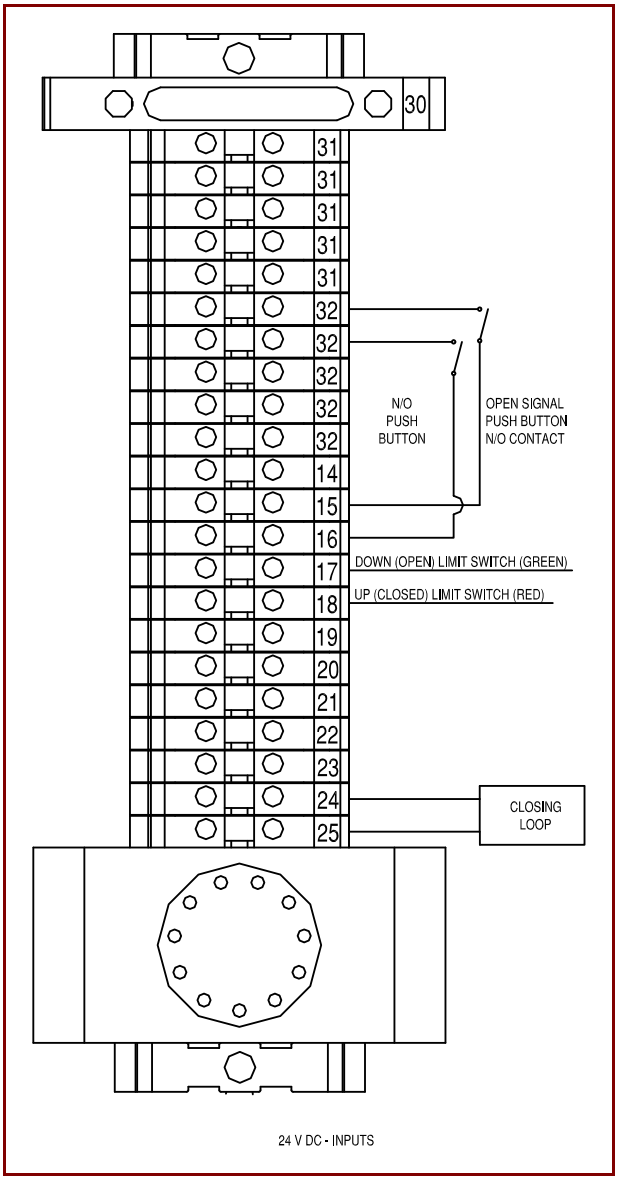


Figure 63 – 24 VDC Wiring Diagram, Control Cabinet

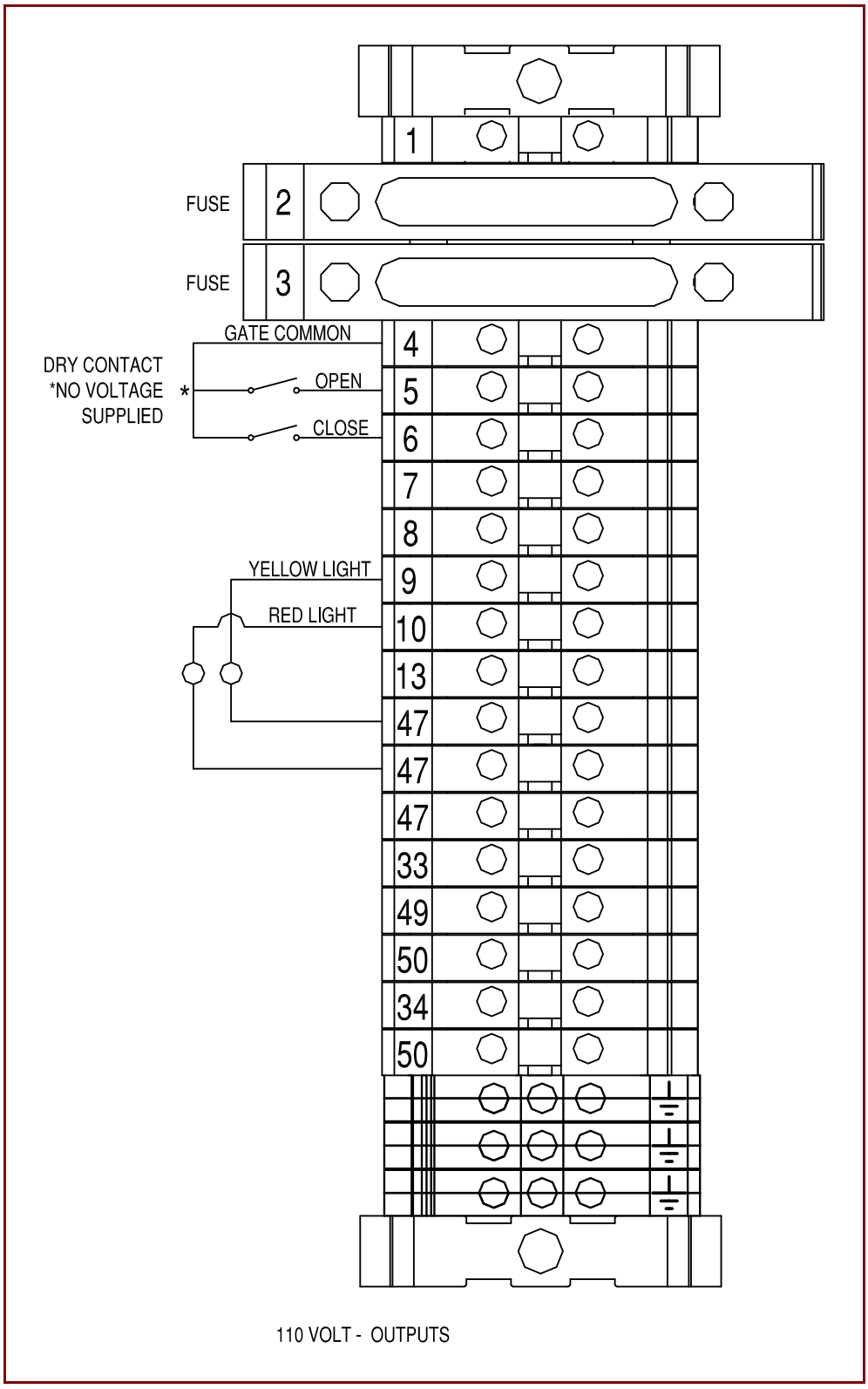


Figure 64 – 110 VAC Wiring Diagram, Control Cabinet

Section 4 - System Operation and Maintenance

4.1 Barrier Gate Manual Operation

When all electrical connections have been made for the system, including all options, apply power to the system via the AC circuit breaker. Next, ensure that the power switch on the 4-gang electrical junction box is placed in the ON position.

Before testing the remote access devices (for example from a control shack), it is recommended that the system operation be tested using the manual operating switch, located on the outside of the electronic control compartment within the Control Cabinet. This switch is identified in the figure below. When system functionality has been verified from the manual operating switch, verify all other system controls.

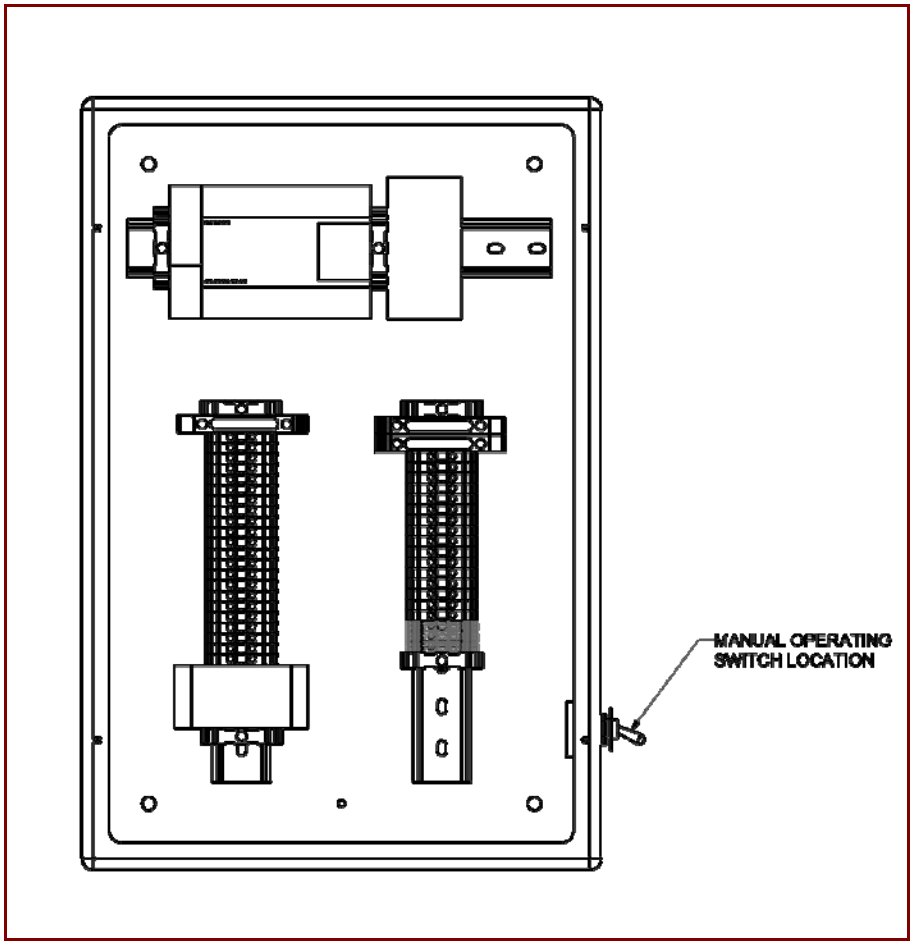


Figure 65 – Manual Operating Switch Location

4.2 Barrier Gate Emergency Operation: Manual Gate Lowering

If it ever becomes necessary to lower a Barrier Gate manually, for example in the event of power loss or other unusual situation, open the locking door on the Control Cabinet to gain access to the system hydraulic pump. As pictured below, turning the pump release valve in the clockwise direction will allow the gate to go down manually. Ensure that this valve is turned in the opposite direction (counter-clockwise) once system operation has been restored.

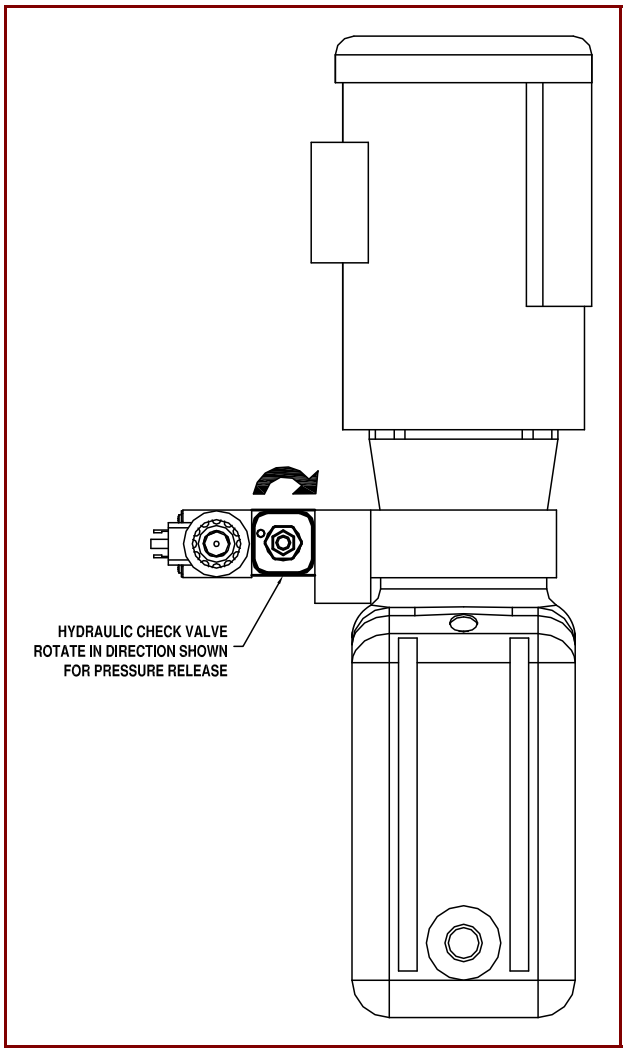


Figure 66 – Manual Gate Lowering in Case of Power Loss or Other Unusual Event

4.3 Important Hydraulic Power Unit (Pump) Information Observations and Recommendations

When connecting AC current, please observe the indicated rotation of the electric motor. Running the motor in the opposite direction of the indication will result in

shaft seal damage. All electric connections should be done according to local standards. Failure to comply with local standards **and use of non-certified components may result in injury**. All hydraulic connections should be made, and the proper fluid should be present in the reservoir before, running the Hydraulic pump.

Seal Kits and Components

To obtain a seal kit, the model number and serial number of the powerpack is needed. Most parts are available separately, however the pump is only replaced in whole and separate trust-plates or loose shafts cannot be obtained. In order to ensure the quality and performance of our product, all Hydraulic pumps are tested for performance at the factory.

Connections

Hoses and fittings connected to the pump should be clean and free of any burs, oxidation and carbon deposits. The hydraulic connections must be of adequate pressure rating, and should be inspected on a regular basis to avoid leakage or possible bursting due to high pressure. The size of the hydraulic connections must be determined with the oil flow of the hydraulic pump in mind (1000 PSI) to avoid back-pressure in the system. This could create unwanted heat buildup. **The fluid level in the reservoir should be monitored at regular intervals.** A fluid level below the intake strainer will cause damage to the pump due to cavitations of the pump. The hydraulic pump is designed to stand vertically.

Adjustments

Since the hydraulic pump has a fixed displacement pump installed, oil flow is constant and determined by the speed of the electric motor. Therefore, the pump flow cannot be adjusted. The adjustment for the pressure relief valve will adjust pressure only. It will not increase pump flow. The relief valve is set to a pressure specified when the hydraulic pump was tested. The specified pressure applies to the specific system in which it is installed. The setting can be changed in the field and should be as close as possible to the maximum working pressure of the system. The standard pressure relief valve protects the pump; it should only be adjusted if the pressure reaches an unwanted high level. It is an emergency valve only. It should not be blocked off or turned in completely to avoid bursting of components. Adjustments are made by first removing the cap nut and loosening the lock nut. A clockwise rotation of the adjustment stem increases the pressure and a counter-clockwise rotation decreases pressure. The lock nut should be tightened after adjustment, and the cap nut should be re-installed to avoid changing the setting by vibration and to avoid hydraulic fluid leakage.

Please contact the factory if you have any questions or concerns relating to your hydraulic pump.

4.4 Barrier Gate Cable Maintenance Considerations

When new systems are shipped to an installation site, the security cable is already in place inside the Barrier Gate, and the access plates are secured. For a new installation, it is not necessary to modify the security cable in any way.

From a maintenance perspective, if a vehicle contacts the Barrier Gate and bends or distorts the Barrier Gate, replacement of the Barrier Gate is required. When this occurs, the security cable can be removed from the damaged Barrier Gate and installed within the replacement Barrier Gate.

To remove a security cable from a damaged Barrier Gate, remove both square access plates (right and left) from the Barrier Gate assembly using a ½" wrench or socket. It may be necessary to use a flat blade screwdriver to pry the cable loop off of the circular internal support on both sides. Pull the cable through the damaged Barrier Gate from either side.

To install a security cable inside a Spike Systems Gate, ensure that both access plates (left and right) have been removed from the replacement Barrier Gate using a ½" wrench or socket. From either side of the Barrier Gate, thread the cable through the Barrier Gate and place the loop of the cable over the circular support on each side of the Barrier Gate. Once the cable is placed over both circular supports, replace the right and left access plates.

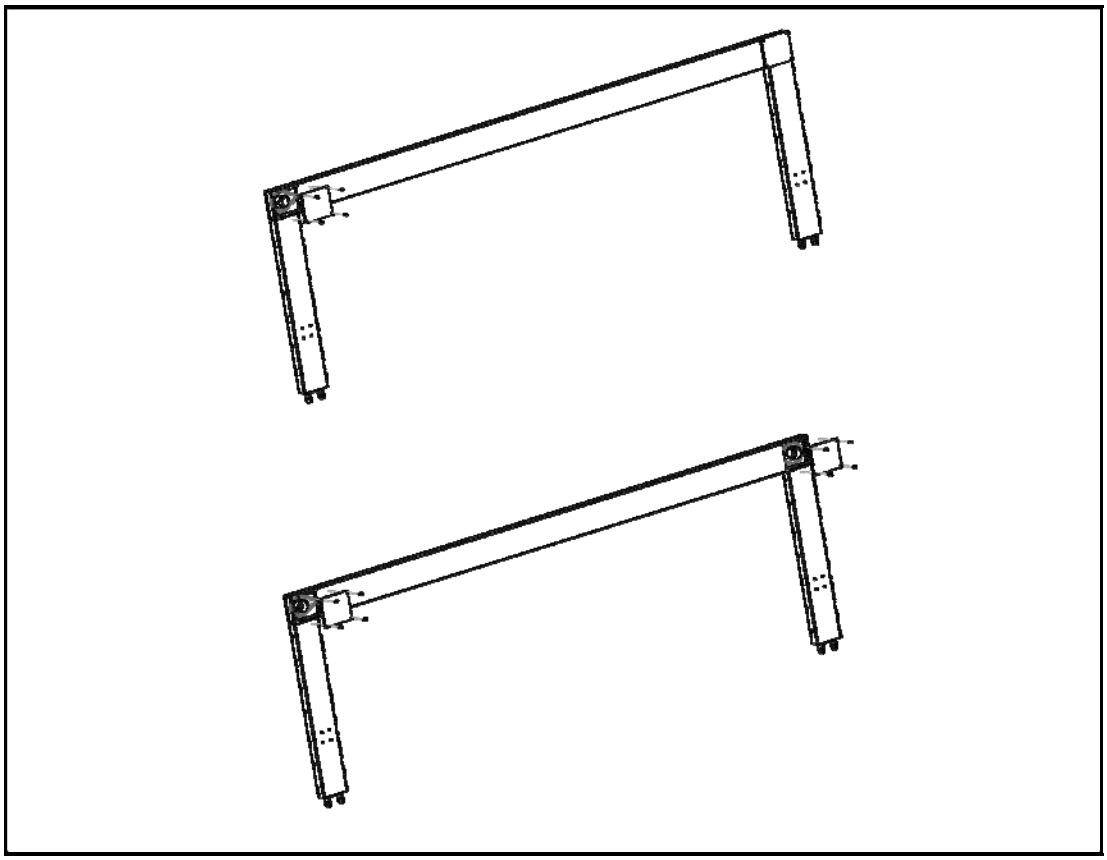


Figure 67 – Barrier Gate Cable Access Panel Removal, Maintenance Only

Tool Required	Tool Type	Tool Specification
	Wrench/Socket	½" to open remove safety cable cover plate
	Flat blade screw driver	To pry cable loop from circular internal support

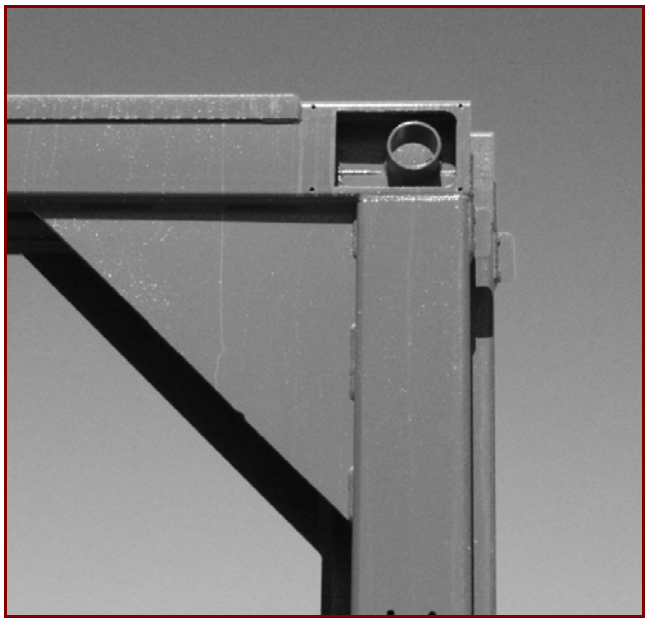


Figure 68 – View Behind Gate Access Plate for Security Cable Removal and Replacement (Right Side Shown)

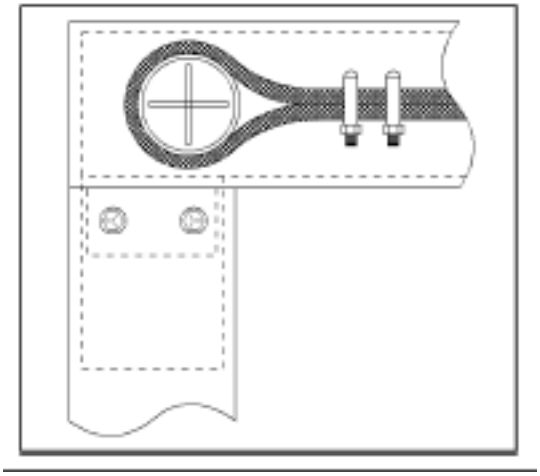


Figure 69 – View of Security Cable as Connected inside Barrier Gate (Left Side Shown)

4.5 On-Going Maintenance Tasks

WARNING: BEFORE YOU USE A MATERIAL, REFER TO THE MANUFACTURES' MATERIAL SAFETY DATA SHEETS FOR SAFETY INFORMATION. SOME MATERIALS CAN BE DANGEROUS.

Scheduled Maintenance

Period	Maintenance
Daily	Check HPU manifold for leakage.
Weekly	Check HPU reservoir fluid level.
Semi-Annually	Change hydraulic fluid (heavy use).
Annually	Change hydraulic fluid (moderate use).

Material Part Numbers

Description	Brand	Part No.	Quantity
Hydraulic Fluid	DEXRON III ATF Fluid	HO-2	3 Liters

4.6 Maintenance Reference Information

4.6.1 Hydraulic Control Unit Wiring

Gate Access Controller I/O

Terminal No.	PLC Address	Description	Voltage	Notes
L1	X	Main Power Terminal Block	110 VAC	
1	X	Switched Power Terminal Block	110 VAC	
2	X	PLC Fuse Block	110 VAC	Fuse size 1A
3	X	PLC Output Fuse Block	110 VAC	Fuse size 8A ***
47	X	Neutral	110 VAC	
49	X	Pump Neutral	110 VAC	Pump Terminal
50	X	Pump Power	110 VAC	

Gate Access Controller Input 24 VDC

Terminal No.	PLC Address	Description	Voltage	Notes
30	X	Fuse block F4 +24 VDC fusing PLC power supply	+24 VDC	Fuse size 500mA ***
31	X	-24 VDC PLC sensor power return	-24 VDC	
32	X	Fused from F4 +24 VDC fusing PLC sensor power supply	+24 VDC	Fused @ 500mA ***
15	I0.0	Trip signal (OPEN)	Sinking 24 VDC	
16	I0.1	Retract signal (CLOSE)		
17	I0.2	Limit switch signal (Down position)	Sinking 24 VDC	
18	I0.3	Limit switch signal (Up position)	Sinking 24 VDC	
19	-	-	-	
20	-	-	-	
21	-	-	-	
22	-	-	-	
23	-	-	-	
24	-	Loop Wire	-	
25	-	Loop Wire	-	

Gate Access Controller Output

Terminal No.	PLC Address	Description	Voltage	Notes
4	3L	Gate arm controller signal common	N/A	No power from controller
5	Q 0.7	Gate arm controller signal open dry contact	N/A	No power from controller
6	Q 1.0	Gate arm controller signal closed dry contact	N/A	No power from controller
7	Q 0.0	Solenoid Control Valve (down/open)	120 VAC	
8	Q 0.1	Solenoid Control Valve (up/close)	120 VAC	
9	Q 0.3	Green / Yellow light	120 VAC	
10	Q 0.4	Red light	120 VAC	
11	-	-	-	
12	-	-	-	
13	Q 0.2	Pump contactor	120 VAC	

Terminal Board 1

From	To
30	PLC L (24 VDC+)
31	PLC M (24VDC -)
22	PLC 1.5
21	PLC 1.4
20	PLC 1.0
19	PLC 0.7
23	PLC 0.4
18	PLC 0.3
17	PLC 0.2
16	PLC 0.1
15	PLC 0.0
-	PLC 1M
32 jumper to 30	
23	SIRIUS 3R, 2-T1
14	Inductive Loop Detector 5
32	SIRIUS 3R, 1-L1

Terminal Board 2

From	To
-	Siemens 1L loop 2L
-	7 0.0
Jumper 1 to 2	-
Jumper 3 to 4	-
1	SIRIUS 3R, 5L3
4	3L
5	Q 0.7
6	Q 1.0
7	Q 0.0
8	Q 0.1
9	Q 0.3
10	Q 0.4
13	Q 0.2
-	Q 0.2 to SIRIUS 3R, A1
N-PLC	Siemens N
N-CR-A2	SIRIUS 3R, A2
Terminal Ground	Siemens GRD
7 (GRN)	Solenoid Control Valve UP
8 (RED)	Solenoid Control Valve Down
47	Solenoid Control Valve UP
48	Solenoid Control Valve Down
49 (White)	Hydraulic Motor
50 (Black)	SIRIUS 3R, 6-T3
49	Jumper from input power source
50	Jumper from input power source

Inductive Loop Vehicle Detector Model LMA-1150-HV

1	AC Line 120V
2	AC Neutral
3	NC
4	NC
5	Output Relay, Common
6	Output Relay, Normally Open (Closes for DETECT)
7	Loop Input
8	Loop Input
9	NC
10	Output Relay, Normally Closed (Opens for DETECT)
11	NC

SIRIUS 3R

(Relay)	
A1	Siemens PLC Q 0.2
A2	TB2-N-CR
1 L1	TB1-32
2 T1	TB1-23
5L3	TB2-1
6T3	TB2-50

Manual Override Switch (Wired at Factory)

Up	TB1-15
Center	TB1-32
Down	TB1-16

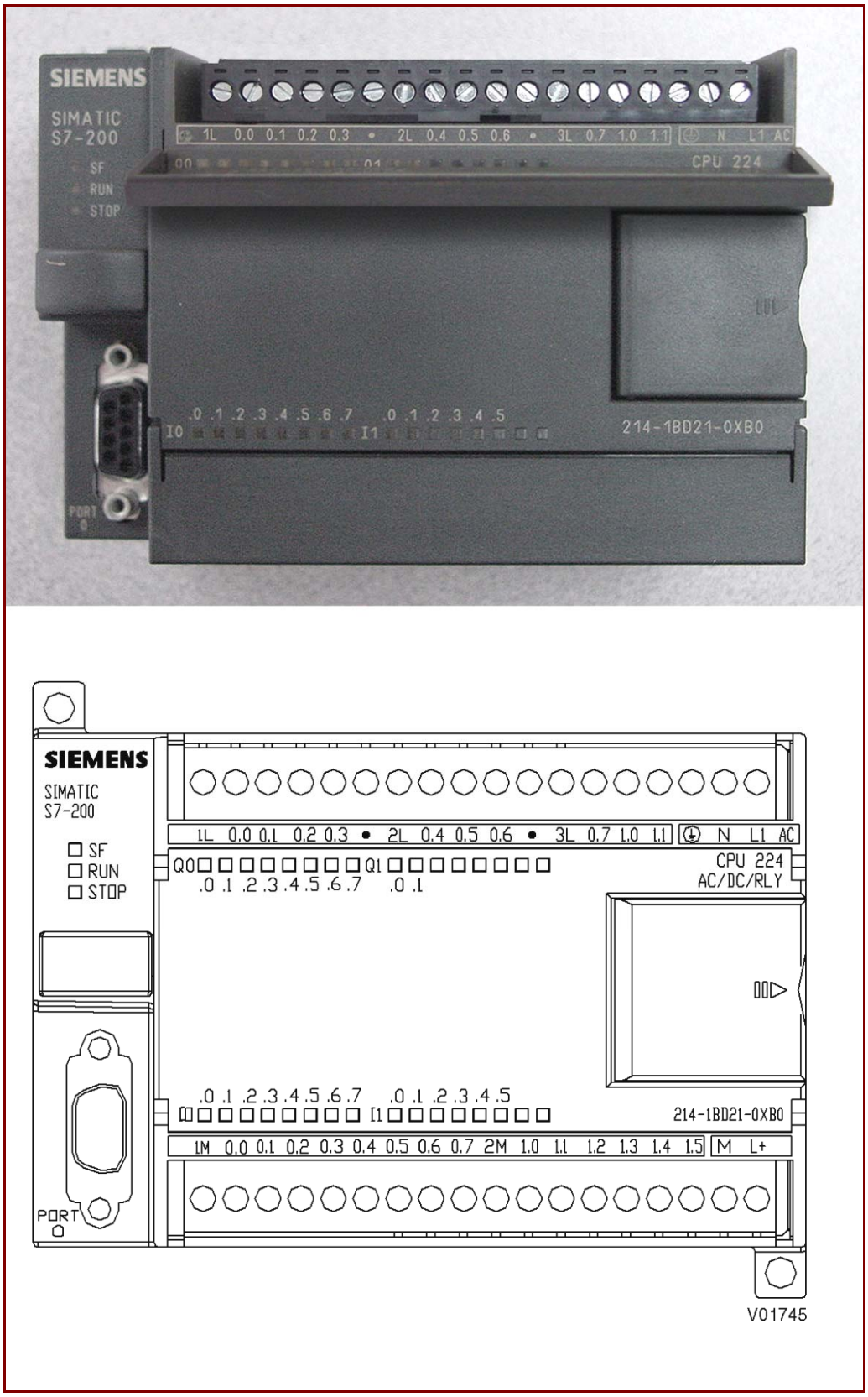


Figure 70 – Programmable Logic Controller

Appendix A - Warranty

SPIKE SYSTEMS, Inc., hereinafter referred to as **Spike Systems**, warrants it's products will be free from defects in workmanship and materials when installed, and used and serviced as intended, for a period of one (1) year from date of original invoice**.**

CBG – Automated Hydraulic Crash Barrier Gate

Model Numbers – CBG-100/-120/-140/-160/-180

Spike Systems agrees to repair or replace, at **Spike Systems** choice and expense, any defective product at no additional charge. This warranty extends only to the original Purchaser. It is not transferable to anyone who subsequently purchases, leases, or otherwise obtains the Product from the original Purchaser. This warranty does not cover road surfaces, concrete or other structures, underground equipment or fittings, repair labor, travel time, mileage, shipping, or freight charges, taxes, preventive maintenance and inspections or the replacement of items that are by nature, consumable. No allowance for damages to equipment due to power fluctuations will be considered; a clean power supply is the responsibility of the customer. The warranty is voided if any modifications, changes or additions to the equipment are performed without written approval from **Spike Systems**. In addition, this warranty may be voided or further limited if required and or recommended repairs, maintenance, or inspections are not carried out as specified, or if defect is due to normal wear, misuse, abuse, accident, installation not in accordance with instructions or applicable codes, unauthorized repair or incidents commonly referred to as Acts of God. **Spike Systems** retains the right to the final determination as to the cause of any defect.

Except for the warranties set forth herein, **Spike Systems** disclaims all other warranties, expressed or implied or statutory, including but not limited to the implied warranties of merchantability, or fitness or suitability for any particular purpose, activity or location.

Spike Systems will in no event be liable for any loss of business, profits, data or use, or any direct, indirect, incidental or consequential damages resulting from any such defect in materials or workmanship. You agree that repair, replacement or refund, as applicable, under this warranty described herein is your sole and exclusive remedy with respect to any breach of the **Spike Systems** Limited warranty set forth herein.

Appendix B – Optional Inductive Loop Vehicle Detector Installation

For Specific Installation Instructions, Refer to Manufacturer's Documentation

Cut the rectangle for Inductive Loop Vehicle Detector per manufacturer's instructions and ensure that the loop makes proper connection to the cut that runs under the Control Cabinet. Ensure there is enough spare loop wire to reach the control panel, leaving at least 12 inches of slack (beyond what is required to reach the control panel termination point) as a service loop.

Specific installation instructions can be found at the following Internet sites.

http://www.editraffic.com/

http://www.renoae.com

B.1 Inductive Loop Vehicle Detector (Saw Cut Control Loop) General Guidelines

Use the table below as a guideline for cutting the saw cut loop to correspond with the Spike Systems CBG system being installed.

Saw Cut Guideline	Spike Systems Model	Saw Cut Rectangle Dimensions
	CBG-100 Gate (10')	2' x 6'
	CBG-120 Gate (12')	2' x 6'
	CBG-140 Gate (14')	2 ' x 6' or custom size (Note 1)
	CBG-160 Gate (16')	2 ' x 6' or custom size (Note 1)
	CBG-180 Gate (18')	2 ' x 6' or custom size (Note 1)

Note 1 – All systems that include an Inductive Loop Vehicle Detector option ship with sufficient material for a 2' x 6' saw cut loop. It may be advisable to create a custom saw cut loop for 14', 16' and 18' Barrier Gates. To do this, locally acquire sufficient lengths of 18 or 16 gauge wire (14 gauge is acceptable if 16 or 18 gauge are not available). Hand-twist the locally acquired wire per manufacturer's specification for twists per foot. Install the module within Control Cabinet as per normal instructions.

When all saw cuts have been made, blow out any debris and moisture from the sawed area with an air compressor or similar device.

Place Inductive Loop Vehicle Detector wires in place by positioning the wires over the cuts, ensuring the proper twists per foot per manufacturer instructions. Standard 2' x 6' loops are shipped with proper wire twists in place.

Using a pizza wheel, putty knife or screwdriver, carefully press wires into cut groves.

When the wires are in place, seal the grove that runs beneath where the Control Cabinet will be installed. Once all wires are in place, seal the cut groves with self-leveling concrete or Sikaflex SL Self-Leveling Sealant or similar.

B.2 Inductive Loop Vehicle Detector (Saw Cut Control Loop) Relay Connection

The figure below indicates the location where the Inductive Vehicle Loop Detection module is to be attached within the electronic control panel. The pins on this device are keyed so that there is only one correct way to plug in the module. Attach the loop wires to pins 24 and 25 on the Terminal Block marked TB1. Note – TB1 is the vertical terminal on the left in the figure below, and TB2 is on the right.

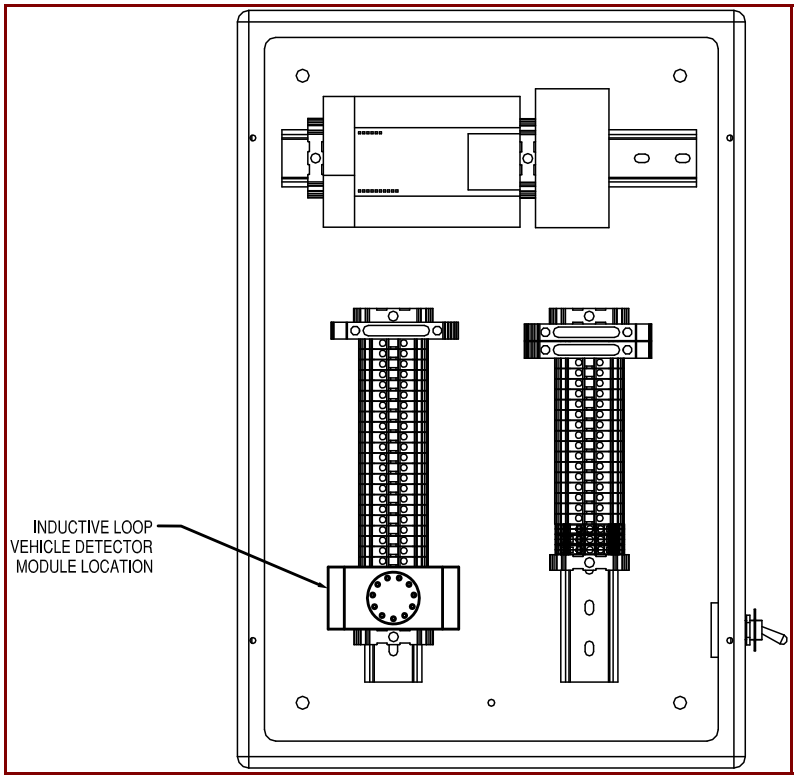


Figure 71 – Installation Location of Optional Inductive Vehicle Detection Module (Saw Cut Control), Control Cabinet

Figure 72 – Typical Inductive Vehicle Detection Module (Saw Cut Control)

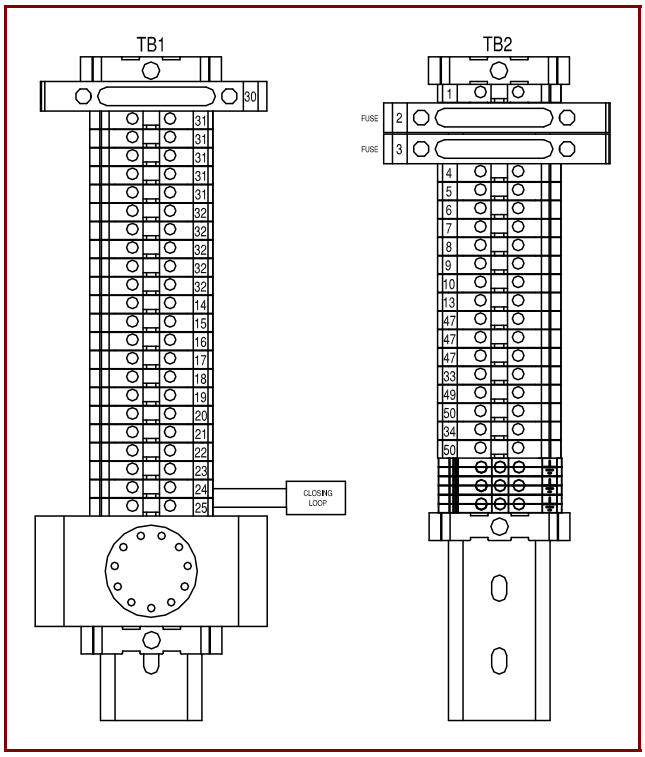


Figure 73 – Wiring of Optional Inductive Vehicle Detection Module (Saw Cut Control), Control Cabinet

Tool Required	Tool Type	Tool Specification
	Screw Driver	Flat, Small
	Wire Strippers	If required for cable connection

Appendix C - General Safety

The following safety instructions, and any/all applicable local, city, state and fereral regulations/laws/codes are to be observed for the installation and operation of this barricade.

1. Locate the barrier away from pedestrian traffic and restrict all pedestrian traffic away from the barricade.
2. Locate the barricade far enough from the street so an exiting or entering vehicle can clear the barricade completely while waiting to pull into or out into traffic.
3. The closing and opening actions must be observed. The mounting of operating switches or signals outside the field of direct view is not permiossible; there must be a line of site between the barrier and the control switches.
4. It is forbidden for person or goods to be anywhere within the swing zone or the barrier while in operation. Severe damage. injury or loss of life may occor.
5. Provide adequate nighttime illumination of the unit and signs warning of it's presence.

SWITCHED JUNCTION BOX

CUSTOMER SUPPLIED 1Ø 120V 60Hz 40A w/ GND
MIN 10 AWG UL LISTED 90°C COPPER WIRE
LARGEST MOTOR: 1Ø 120V 60Hz 40FLA
BRANCH CIRCUIT PROTECTION & DISCONNECT
TO BE PROVIDED BY INSTALLER

AC L1 — TB2 34 — 34-5L3
AC N — TB2 33
GND — TB2 GND

03-9
03-9

TB2 47 — TB2 GND

TB2 2 — 1-2, 2-3 — Littelfuse 0217001.HXP 1 A — 5x20mm — 2-L1

TB2 3 — 2-3 — Littelfuse 0312008.HXP 8 A — 6.3x32mm — 3-1L

TB2 1 — 1-2 — 1-5L3 — 1-5L3, 34-5L3 — CR1 5/L3 6/T3 — TB2 50 — 50-6/T3 — PUMP — PUMP RETURN — TB2 49

TB1 32 — 30-32 — TB1 30 — 30-L+
Littelfuse 0217.500HXP 800 mA — 5x20mm

TB1 32 — SW/C-32 — SW/C-32 23 — SS1 UP/DOWN — 24 15 — TB1 15 — 15
SS1.UP

SW/C-32 14 — 13 16 — TB1 16 — 16 — 16-6
SS1.DOWN

03-13
03-13

TB2 35 — 35-1
TB2 47 — 47-2

3TX71444E3
LOOP DETECTOR SOCKET

35-1 1 — 47-2 2 — 6 16-6 — TB1 24 — 8 24-8 — TB1 25 — 7 25-7

LOOP WIRE

TB1 32 — 32-19 — 32-5 — 32-5 5

TB1 31

DOWN LIMIT SWITCH
BRN — BLK — BLU

UP LIMIT SWITCH
BRN — BLK — BLU

TB1 31 — 31-M — 31-M
TB1 31 — 31-1M — 31-1M
TB1 15 — 15-a.0 — 15-a.0
TB1 16 — 16-a.1 — 16-a.1
TB1 17 — 17-a.2 — 17-a.2
TB1 18 — 18-a.3 — 18-a.3
TB1 19 — 19-a.4 — 19-a.4
TB1 20 — 20-a.7 — 20-a.7

S7-1200 CPU 1214C AC/DC/Relay
2-L1 L1
N
PE
30-L+ L+
31-M M
1M
DI a.0
DI a.1
DI a.2
DI a.3
DI a.4
DI a.5
DI a.6
DI a.7
DI b.0
DI b.1
DI b.2
DI b.3
DI b.4
DI b.5
PLC Siemens 6ES72141BG400XB0

S7-1200 CPU 1214C AC/DC/Relay
2M
AI 0
AI 1
1L — 3-1L
DQ a.0 — 7-a.0
DQ a.1 — 8-a.1
DQ a.2 — A1-a.2
DQ a.3 — 9-a.3
DQ a.4 — 10-a.4
2L — 4-2L
DQ a.5
DQ a.6
DQ a.7 — 5-a.7
DQ b.0 — 6-b.0
DQ b.1
PLC Siemens 6ES72141BG400XB0

DIRECTIONAL CONTROL VALVE
TB2 7 — 7-a.0 — EXTEND — EXT RETURN — TB2 47
TB2 8 — 8-a.1 — RETRACT — RET RETURN — TB2 47

CR1
A1-a.2 — A1 — A2

TRAFFIC SIGNAL
TB2 9 — 9-a.3 — YELLOW LIGHT — NEUTRAL — TB2 47
TB2 10 — 10-a.4 — RED LIGHT

BARRIER OPERATOR
TB2 4 — 4-2L — COMMON
TB2 5 — 5-a.7 — OPEN
TB2 6 — 6-b.0 — CLOSE

LAST MODIFIED: 4/28/2017
CREATED: 1/9/2017

1	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18	20	21	22	23	24			

HEITEK AUTOMATION
2102 W. Quail Ave. Ste. 4
PHOENIX, ARIZONA 85027
PH 602.269.7931 FX 602.269.8037
www.heitek.com | info@heitek.com

CONTRACT N° : HTA-SSS-091615-000-00

Spike Systems
3623 S 7th Street
Phoenix, AZ 85040

LOCATION: L1

Spike System Control Panel

Schematic

APPROVED BY: shillmeyer
APPROVED DATE: 4/3/2017

REV.	DATE	NAME	CHANGES
B	4/28/2017	shillmeyer	New enclosure and jumper
A	1/9/2017	shillmeyer	

DRAWN BY: shillmeyer
DATE: 1/9/2017

CHECKED BY: shillmeyer
CHECKED DATE: 4/3/2017

REVISION

SHEET: 03
OF: 11