



The American  
Institute  
of Architects

# **Selection of Gates & Gate Automation**

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# Learning Objectives

- Learning Objective #1: How to select the appropriate type of gate for your site to ensure safety, ergonomics and aesthetics.
- Learning Objective #2: How to select the appropriate automation to ensure safety and sustainability.
- Learning Objective #3: How to select the appropriate access control devices to provide ease of use, control and ergonomics.
- Learning Objective #4: How to select the appropriate obstruction devices and design parameters to insure a safe automated gate.



# **Learning Objective #1**

How to select the appropriate type of gate for your site to ensure safety, ergonomics and aesthetics.

# Gate Types

Single Swing



Double Drive Swing



Rolling / Slide



Cantilever



Overhead Slide



Vertical Lift



Vertical Pivot



Box Cantilever



# Single Swing Gate

- One gate leaf engineered to cover the entire opening regardless of size.
- Solid reliable latching from gate leaf to static latch post.
- Few moving parts with only two hinges and one latch.
- Large opening require consideration for gate sweep.
- Large openings require consideration for gate storage in open position.

# Single Swing Gate

## PROS

- A single swing gate is secured, locked, to a positive immovable latch post set into a concrete footing. This makes the single swing gate more secure than other gates.
- Single swing gates will not use as many hinges, bolts, etc. as other gates use during installation, this helps lower the cost.
- Single swing gates have the least amount of moving parts compared to other gate types. This allows single swing gates to require less maintenance and repair over time.
- Single swing gates are the easiest and most economical gate to install.

## CONS

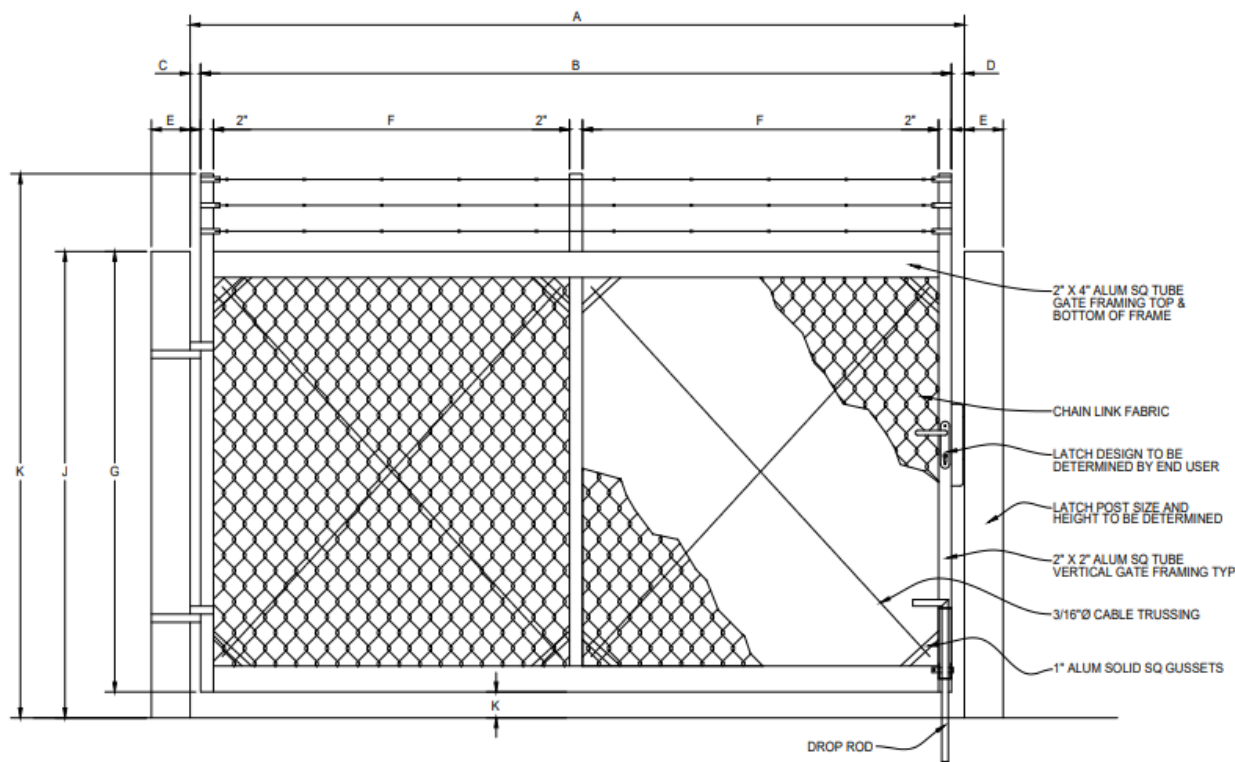
- A 12ft single swing gate will need 12ft of space behind the gate to swing open freely.
- Due to the long sweep of the gate, it could swing into a drive lane or parking stall.
- Single swing gates need a stronger more expensive post to hold the weight of one large leaf.
- Single swing gates will open slower in comparison to a double swing gate that splits the size of the opening.



# Single Swing Gate Examples



# Single Swing Gate CAD Drawing



## ELEVATION VIEW ALUMINUM SWING GATE

NOTE:  
 1) GATE SHOWN WITH OPTIONAL BARB ARMS AND BARBED WIRE  
 2) OTHER GATE AND POST SIZES AVAILABLE UPON REQUEST

"A" INSIDE TO INSIDE CLEAR OPENING	10'-0"
"B" LEAF WIDTH	
"C" HINGE GAP	
HINGE STYLE?	
HINGE PROVIDED BY?	
"D" LATCH GAP	
LATCH STYLE?	
LATCH PROVIDED BY?	
"E" POST SIZE	
POST PROVIDED BY?	
PLATED OR EMBEDDED?	
PLATE SIZE / EMBED DEPTH?	
"F" PICKET INSIDE TO INSIDE SPACING	
"G" GATE LEAF HEIGHT	
"H" CLEARANCE GAP	
"J" GRADE TO TOP HEIGHT	
"K" FINIAL HEIGHT	
GATE SWINGS OUT AS SHOWN?	
COLOR/FINISH?	
MATERIAL?	
ADDITIONAL INFORMATION:	

# Double Swing Gates

- A double swing gate should be used when there is too much slope under the gate and there is a gap at the bottom of the gate that is greater than six inches. The double gate will divide the gap between the two leaves.
- The inverse of the above situation also requires a double swing gate. To prevent the gate from bottoming out on an uneven surface when swung.
- A double drive swing gate is secured at the end of the two panels where these meet in the middle.
- A double drive swing gate uses a drop rod assembly that is installed between the two leaves and pins the gate leaves to the ground.
- Double swing gates will require two gate operators that must communicate with one another to open and close simultaneously.
- When installing a double swing gate, review that you are not hanging the gate on the wrong side of the opening.
- Make sure the gate is swinging the correct direction.

# Double Swing Gate

## PROS

- Shorter swing due to the gate opening being split between two leaves. This increases the open and close speed.
- Can accommodate wider driveway openings easier than a large single swing gate.
- Double swing gates look more traditional as they open from the center in unison.

## CONS

- Require two gate operators that must communicate with one another.
- More expensive compared to single swing gates (more components, hardware, etc.).
- Not as secure as automated slide gate.
- Not as reliable as a sliding gate.



# Double Drive Swing Gate Examples



# Double Drive Swing CAD Drawing

A detailed CAD drawing of a double drive swing gate. The drawing shows two gate leaves, each with a curved top and vertical pickets. Dimensions are indicated by leader lines and labels: A (inside to inside clear opening), B (leaf width), C (hinge gap), D (latch gap), E (post size), F (picket size), G (picket inside to inside spacing), H (gate leaf height), J (clearance gap), K (grade to top height), L (frame top member size), M (frame latch side member size), N (frame hinge side member size), P (frame bottom member size), Q (scallop height), R (finial height), J (height), I (height), and M (height). The drawing is a technical line drawing with no shading.

*A* INSIDE TO INSIDE CLEAR OPENING	
*B* LEAF WIDTH	
*C* HINGE GAP	
HINGE STYLE?	
HINGE PROVIDED BY?	
*D* LATCH GAP	
LATCH STYLE?	
LATCH PROVIDED BY?	
*E* POST SIZE	
POST PROVIDED BY?	
PLATED OR EMBEDDED?	
PLATE SIZE / EMBED DEPTH?	
*F* PICKET SIZE	
*G* PICKET INSIDE TO INSIDE SPACING	
*H* GATE LEAF HEIGHT	
*J* CLEARANCE GAP	
*K* GRADE TO TOP HEIGHT	
*L* FRAME TOP MEMBER SIZE	
*M* FRAME LATCH SIDE MEMBER SIZE	
*N* FRAME HINGE SIDE MEMBER SIZE	
*P* FRAME BOTTOM MEMBER SIZE	
*Q* SCALLOP HEIGHT	
*R* FINIAL HEIGHT	
GATE SWINGS OUT AS SHOWN?	
COLOR/FINISH?	
MATERIAL?	
ADDITIONAL INFORMATION:	

# Rolling / Slide Gates

- If your opening is sloped or if you have a changing elevation on the side of the gate opening, where the gate is to be stored; your best option is a rolling slide gate.
- Rolling gates use rear guide wheels attached to the gate that run on a track attached to the adjoining fence or series of support posts. The track will follow the slope or rising elevation thus the gate will also follow this slope as it travels along the track.
- Rolling gates use a wide range of hardware that include a front wheel assembly or double wheel carrier, locking device, rear wheel assemblies and track brackets.
- Must have a smooth surface to roll the gates from ground wheels along the opening.

# Rolling/ Slide Gates

## PROS

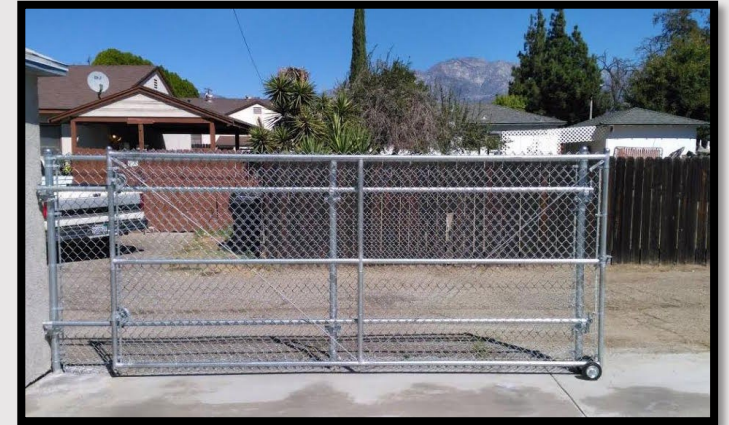
- Surface does not have to be perfectly level.
- Positioned on wheels, thus the bottom of the gate does not become damaged from contact with the ground.
- Fast opening and closing.
- Best option for tight/compact spaces where swinging isn't possible.

## CONS

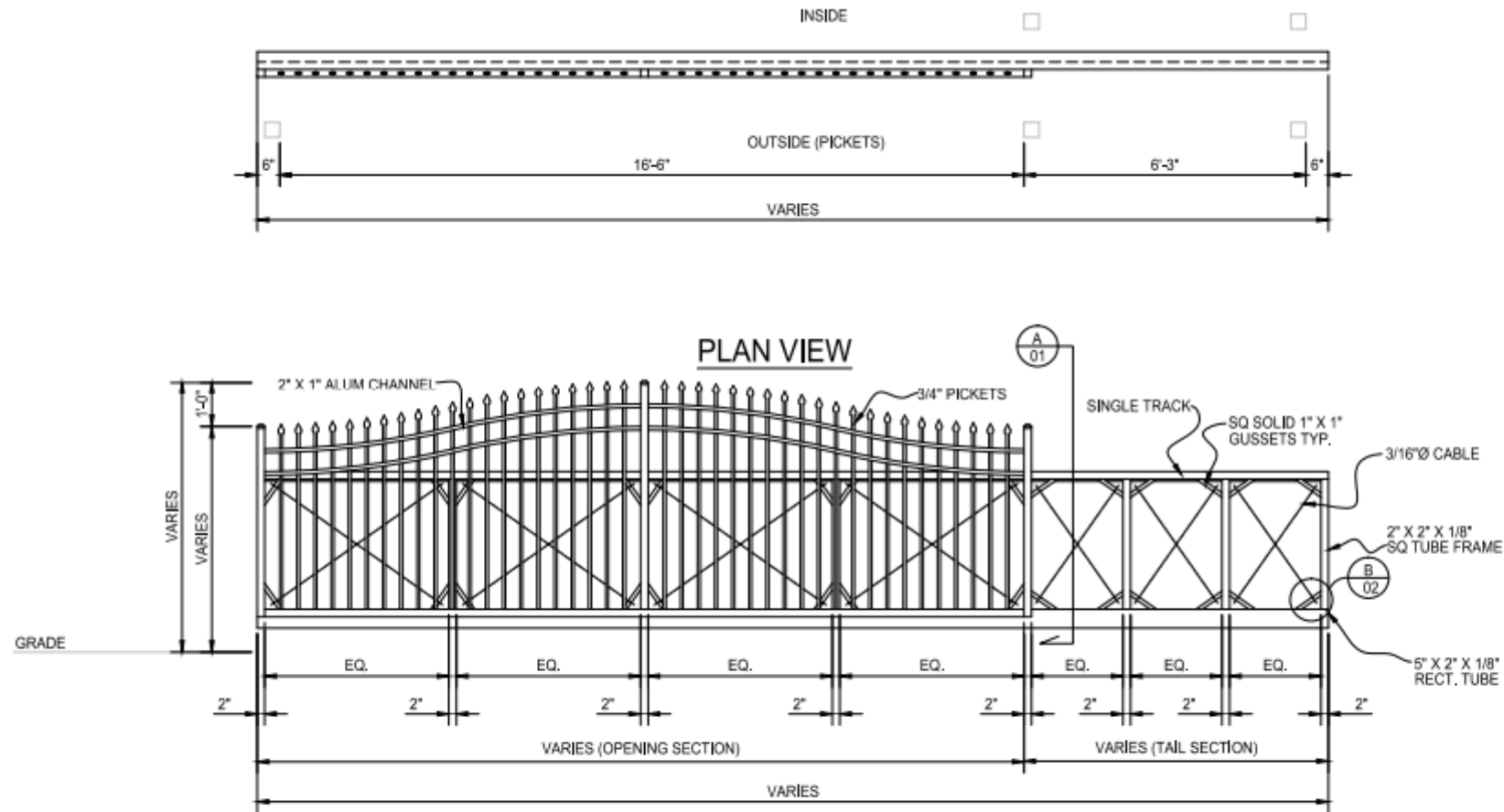
- Not a good option for automation.
- Severe weather can affect the gates ability to slide, especially on an incline.
- Installation and the cost of the hardware make a rolling gate more expensive than other gates.



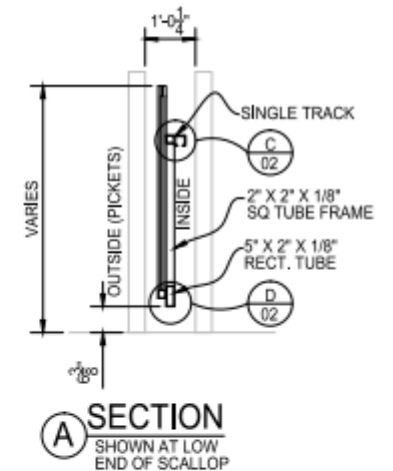
# Rolling / Slide Gates Examples



# Rolling / Slide CAD Drawing



**ELEVATION VIEW ALUMINUM CANTILEVER GATE**  
**OUTSIDE LOOKING IN**  
TRACK FAR SIDE





# Cantilever Gates

- Uses sealed bearing rollers that are fastened to four inch diameter support posts with no wheels touching the ground.
- Perfect option for electric automation.
- Does not come in direct contact with ground and operates easily under adverse weather and heavy snow conditions.
- Not a good option for rising slopes and valleys.
- A cantilever gate is suspended above the ground thus there is no concerns regarding terrain, road conditions or adverse weather.
- Cantilever gates are excellent for storage issues. The gate takes-up very little space as it stores up against an adjoining fence line.
- If the elevations at any point of the travel of the slide gate are greater than the elevation at the gate support posts; the gate must be raised to maintain a level installation and not bottom-out during travel.
- When installing, measure from inside to inside of the latch posts to the first gate / roller post. This would be the gate post closest to the opening. Then, measure from outside to outside of gate / roller gate posts.
- A cantilever gate should be installed on a level plane so that the gate can roll in both directions without having additional gravitational pull as a result of the weight of the gate.

# Cantilever Gates

## PROS

- A cantilever gate is suspended above the ground thus there is no concerns regarding terrain, road conditions or adverse weather.
- Long lifespan as there is no damage done to the gate from touching the ground compared to a sliding gate.
- Cantilever gates are excellent for storage issues. The gate takes-up very little space as it stores up against an adjoining fence line.
- Self-locking motors make break-ins more challenging.

## CONS

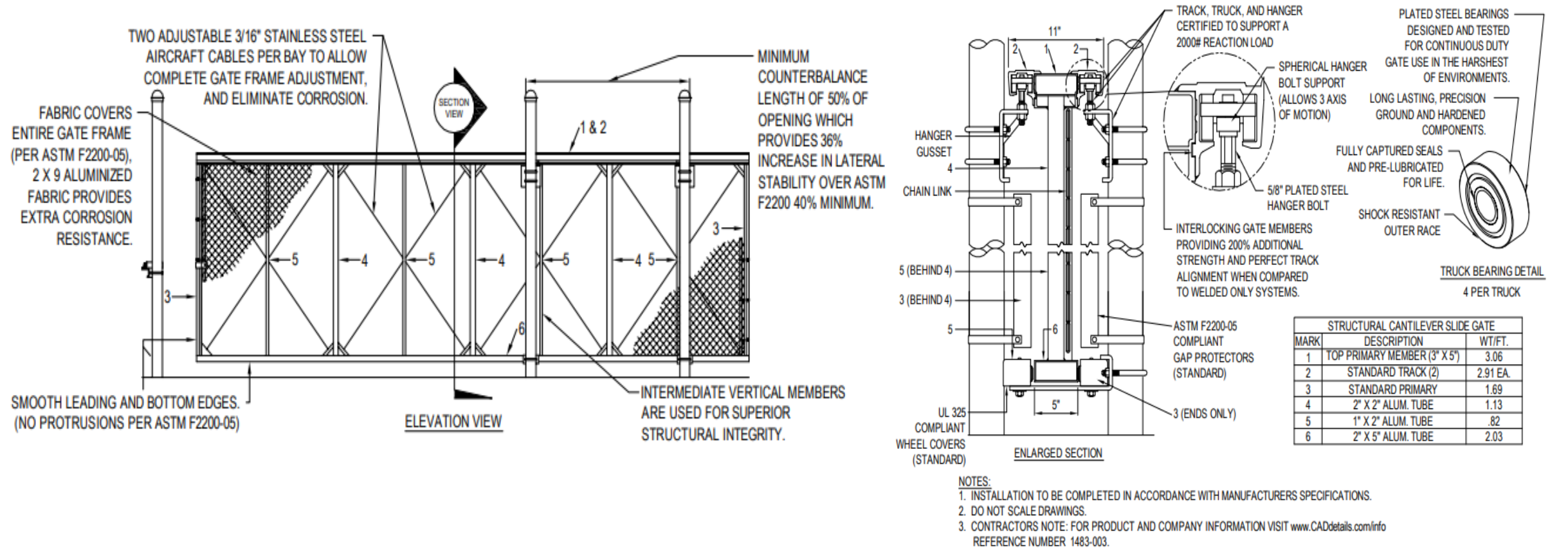
- Must be installed perfectly level. Slopes can cause the gate to roll downhill.
- Installation and the cost of the hardware make a cantilever gate more expensive.
- No part of the gate will come in contact with the ground as its lowered. This means the gate needs to be constructed carefully and will need to withstand wind and gravity.
- The gate itself will be on average 50% larger than the respective opening.



# Cantilever Gates Examples



# Cantilever CAD Drawing



# Overhead Slide Gates

- Use when you have a heavy use facility entrance and need a highly reliable slide gate.
- Large overhead slide gates are an excellent choice for high-speed automation needed in secure facilities and airports.
- With the large rigid track extended above and through the opening, this prevents the gate from bouncing up and down due to the torque of the gate operator.
- These gates use a large 6" or 8" I-Beam that spans over the opening and travels long enough to support the gate in the full opening.
- Gate frame may be aluminum or steel.
- The gate panel is typically the same height as the adjoining fence.
- The rear of the gate must be slightly extended if the gate is to be automated.

# Overhead Slide Gates

## PROS

- Do not require a counter balance like a cantilever slide gate so less storage space is required when the gate is in open position.
- Strong continuous duty compared to a cantilever slide gate as there is not cantilevered section that places considerable stress on the gate and the gate hardware. The only resistance is the weight of the gate.
- Industrial grade hardware similar to what is used in heavy material handling. I-beam rail and heavy-duty trolley systems.
- Best option for automation as the operation of the gate places very little load on gate operator.
- Manual operation for large overhead track gates is accepted as these gates generally operate easily.

## CONS

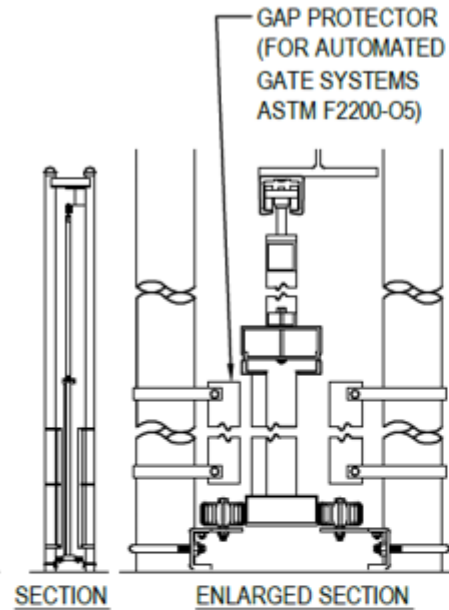
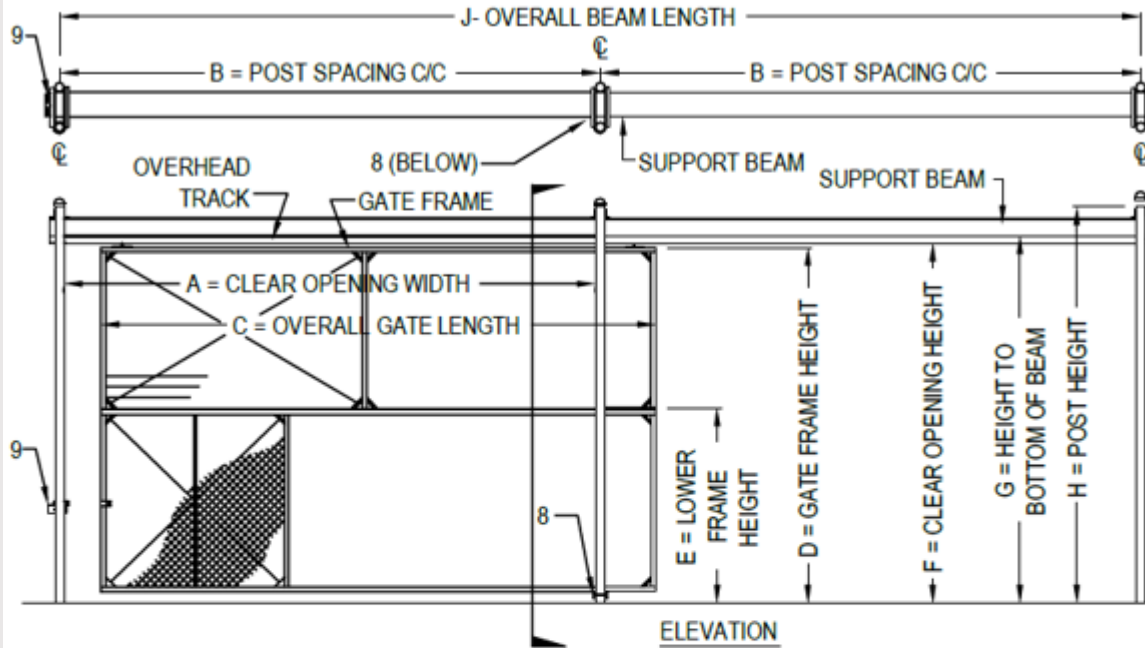
- These gates are generally more expensive than like-kind cantilever slide gate.
- Considerably more complicated installation requiring experienced installer.
- Limited vehicle access height due to continuous overhead I-beam.
- May be unsightly for high profile sites due to tall post assemblies supporting continuous I-beam.



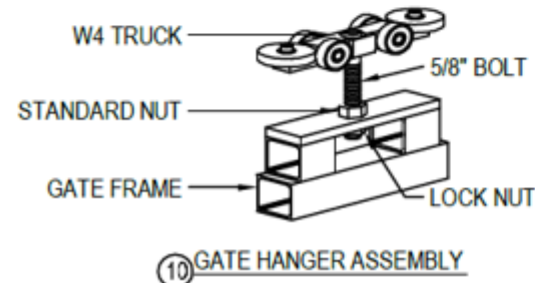
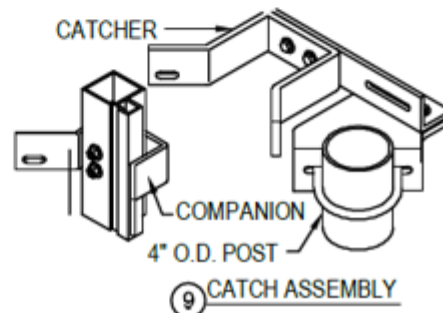
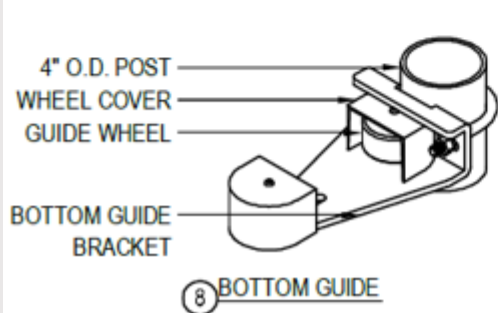
# Overhead Slide Gate Examples



# Overhead Slide CAD Drawing



BOX FRAME CANTILEVER SLIDE GATE			
MARK	DESCRIPTION	FORMULA	DIMENSION
A	CLEAR OPENING	A	-
B	POST SPACING C/C	B	-
C	OVERALL GATE LENGTH	$A + 1' 4"$	-
D	GATE FRAME HEIGHT	$F - 3"$	-
E	LOWER FRAME HEIGHT	E	-
F	CLEAR OPENING HEIGHT	F	-
G	HEIGHT TO BOTTOM OF BEAM	G	-
H	POST HEIGHT	H	-
I	FABRIC HEIGHT	$E - 1'$	-
J	OVERALL BEAM LENGTH	$A \times 2 + 1'$	-



# Vertical Lift Gates

- Vertical lift gates are used in situations that do not allow enough room for a simple slide or swing gate installation.
- Many federal, State and Local governments use this form of entry gate systems at mini-storage facilities, residential estates and gate communities.
- Vertical lift gates can be constructed from ornamental iron, aluminum or chain link.
- Railroad tracks are placed on a thick base of ballast. This creates a very convex and irregular contour through the gate opening. Vertical lift gates have been fabricated to not only mirror the ballast but to work in and over the tracks, leaving less than a four inch gap.

# Vertical Lift Gates

## PROS

- Fast opening and closing compared to slide gates.
- May be modified to close-up sloped openings.
- No storage required as gate stores vertically above opening.
- Strong continuous duty compared to cantilever slide gate as there is no cantilevered section.
- Industrial grade hardware designed for long-term use.

## CONS

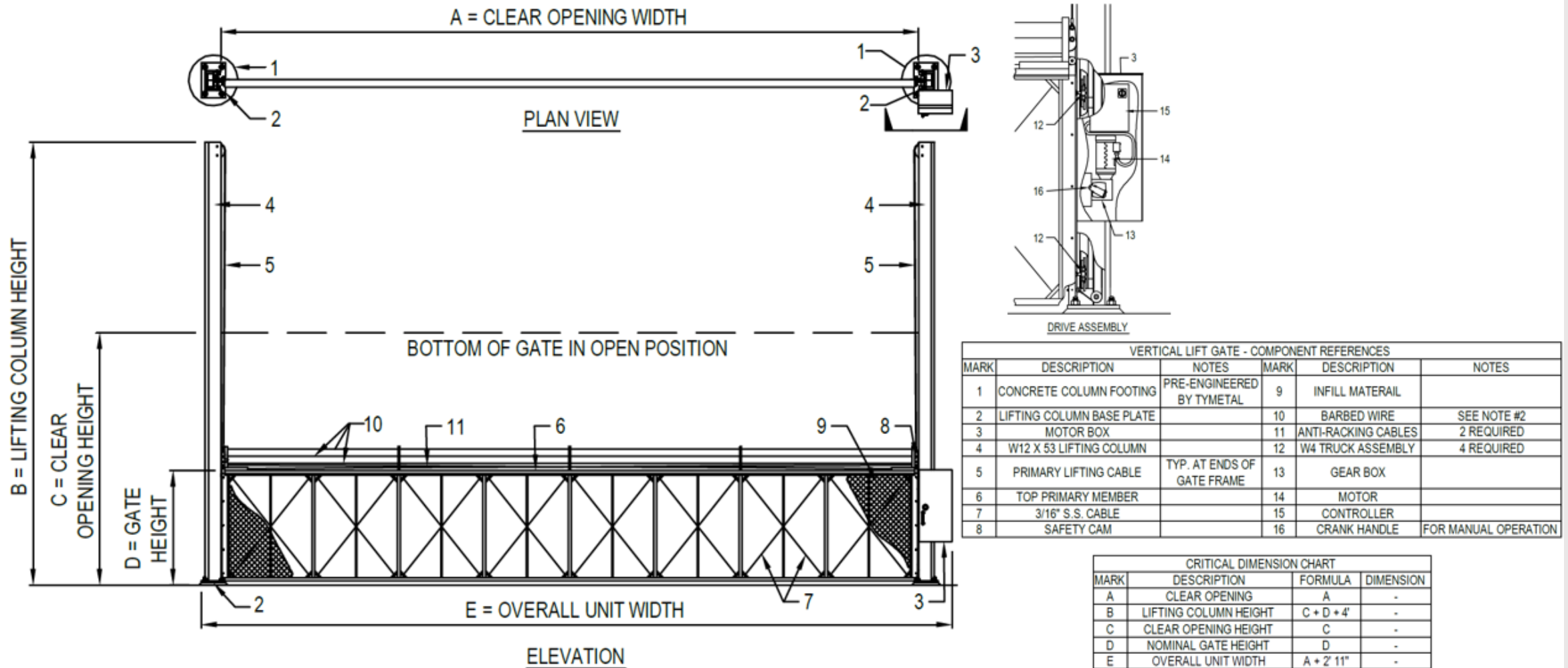
- Very expensive compared to slide gate options.
- Manual operation is limited and slow.
- Installation is complicated and requires experienced installers.
- Service work must be performed by qualified representative.
- May be unsightly for high profile sites.



# Vertical Lift Gates Examples



# Vertical Lift CAD Drawing



# Vertical Pivot Gates

- The gate pivots by lifting and vertically spinning on a single pivot point located at the base of the opening.
- Requires a gate operator.
- Removes gaps at the bottom of the gate.
- Requires less space than a rolling, cantilever or swing gate.
- Because vertical pivot gates practically lift straight up, the gate frame can be designed to meet the terrain of the ground below the gate. This makes these gates very popular with installations that require one hundred percent closure or no gaps such as airports and military bases.
- The gate operator uses a highly tensioned spring and hydraulic cylinder to open the gate.
- When closing, the cylinder pushes up and forward, tensioning the spring.

# Vertical Pivot Gates

## PROS

- Gate frame may be modified to meet openings with slope or varies like raised train tracks.
- Fast opening and closing speed.
- Installation is simple based on manufacturer.
- Very little storage space is required.

## CONS

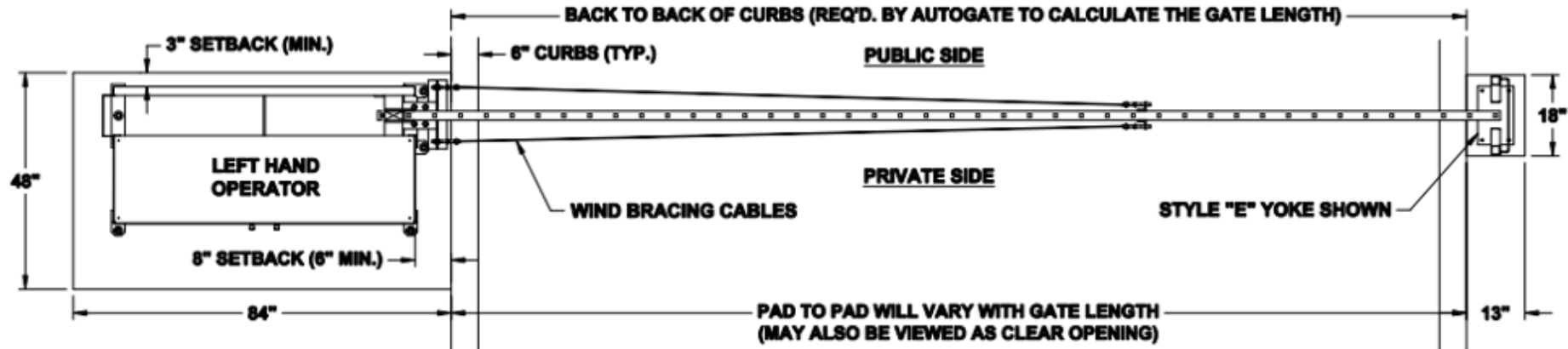
- Expensive compared to slide gate options.
- Manual operation is limited and slow.
- Requires considerable footing for large operator.
- High wind loads may have long-term effects.
- May be unsightly for high profile sites.



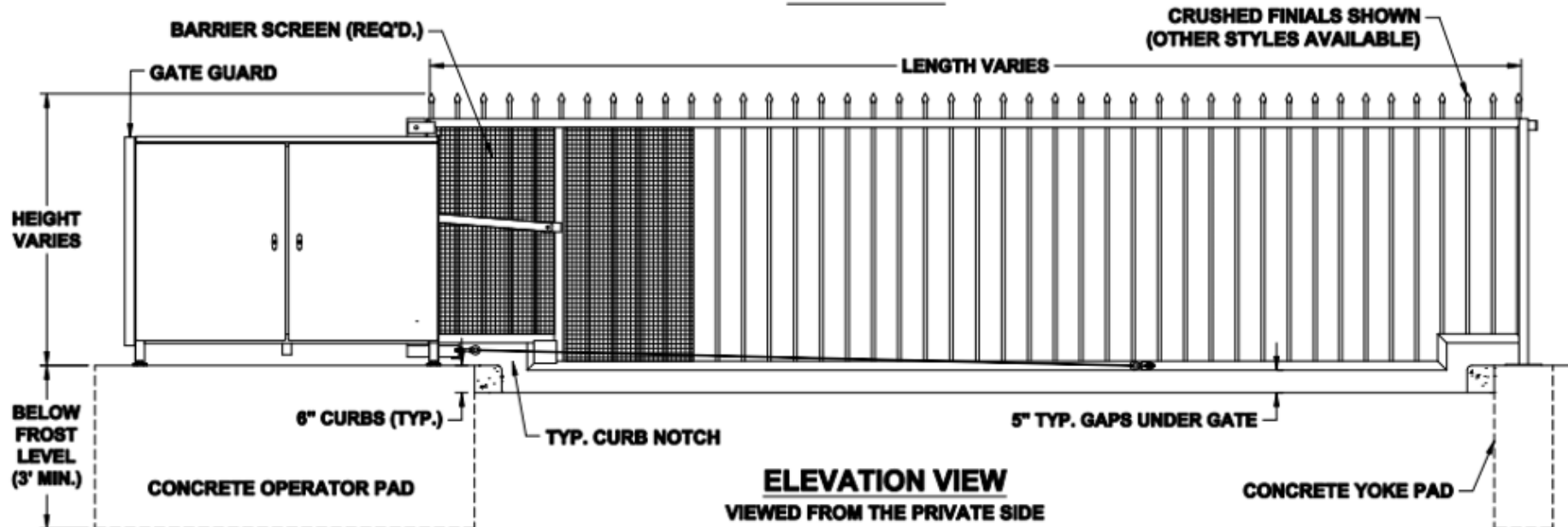
# Vertical Pivot Gates Examples



# Vertical Pivot CAD Drawing



**PLAN VIEW**



**ELEVATION VIEW**  
VIEWED FROM THE PRIVATE SIDE

# Box Cantilever Gate

- Gate option for openings in excess of 60'.
- A box framed cantilever gate design is rooted in the simple engineering design elements of a standard truss system.
- A box cantilever gate is basically two cantilever gates that form a mirror image of one another spaced approximately 24" apart.
- The distance between the gate frames may be engineered based on the size of opening or demand for support under heavy winds.
- A series of truss members are placed between the two gate panels to form a pattern of diagonal trusses.
- Much like a steel building ceiling truss, a box cantilever gate uses four truss systems to create a very rigid overall framework under high winds and/or a heavy load.

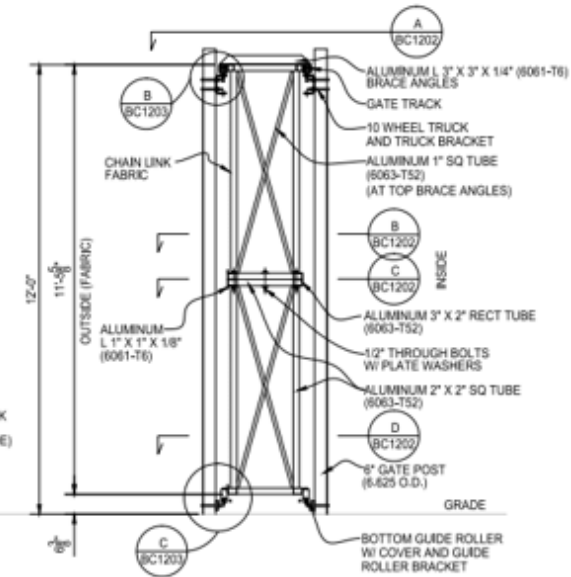
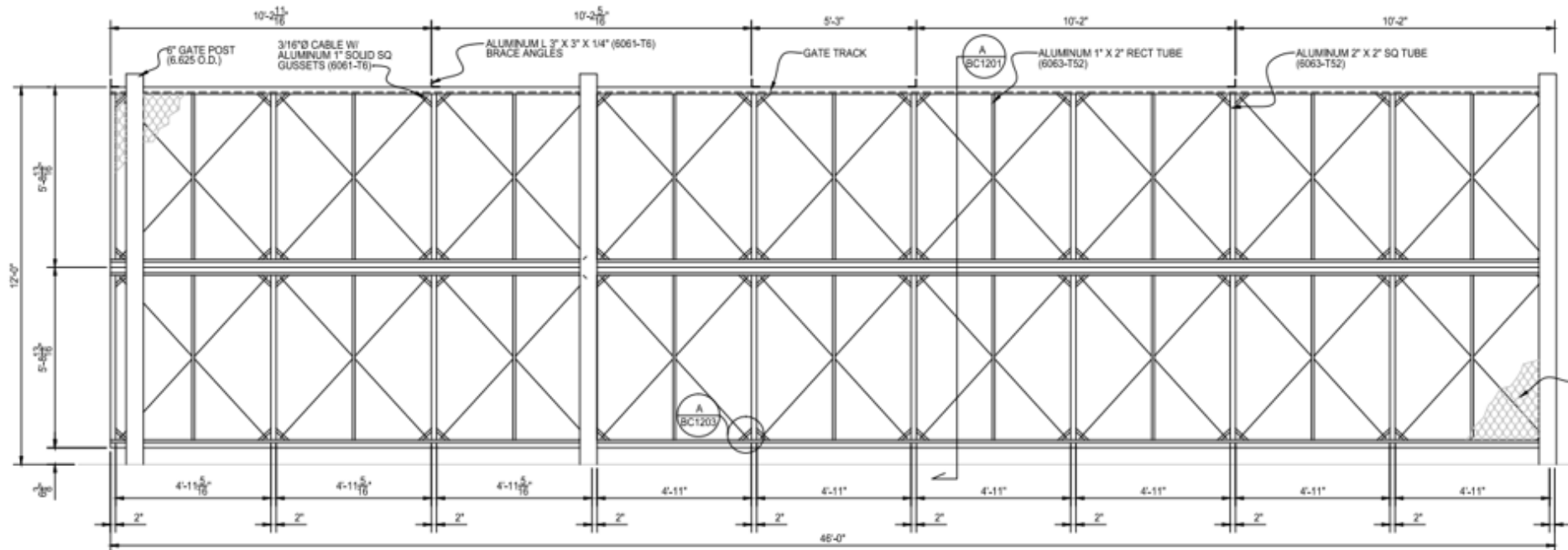
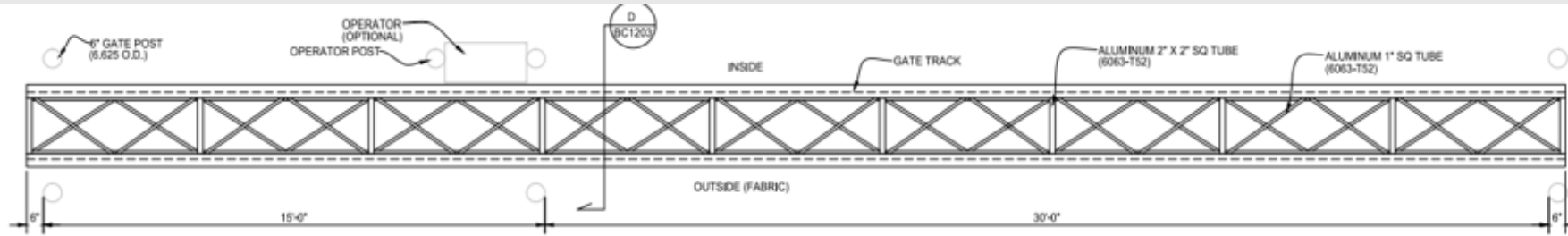


# Box Cantilever Gate Examples





# Box Cantilever CAD Drawing



# Box Cantilever Gates Pros and Cons

## PROS

- The best choice for openings greater than 50'.
- The best choice for solid surface screening applied to the larger gates.
- Engineered based on solid engineering trussing principles.
- The most reliable solution for heavy gates with double the gate hardware.

## CONS

- May be very expensive compared to other slide gates due to structure.
- Requires a much larger footprint both in the opening and closed position.
- Requires twice the number of support posts and footings.
- Heavy equipment required for installation and removal for repairs.

## **Learning Objective #2**

How to select the appropriate automation to ensure safety and sustainability.

# Selecting your gate operator

- Gate operators are designed to move gates in two directions. This requires an electric gate motor.
- The bigger the gate, the more powerful the gate motor.
- Gate operators are manufactured to meet specific gate design characteristics. These include gate size, weight, wind loading and frequency of use.
- Each gate opener manufacturer provides an easy to use chart that assists you in selecting your gate opener based on four key characteristics:





# Gate operator characteristics

## Size

- The overall size of the gate is generally the leading characteristic in determining your gate operator selection for both swing and slide gates.



## Weight

- Unless you have a very custom ornamental gate with a lot of heavy infill, you will rarely weight-out your gate before you size it out.



# Gate operator characteristics

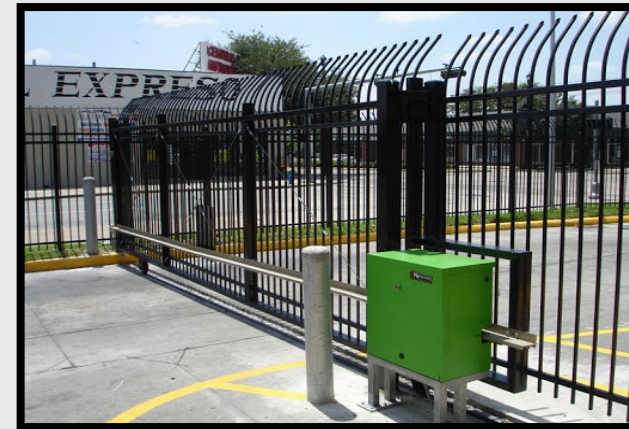
## Wind Loading

- Wind loading is rarely addressed by manufacturers but it is a real concern. If your gate is a solid opaque surface that receives heavy winds, rain or snow, you may want to contact your local gate operator installer for recommendations on oversizing your gate operator.



## Frequency of use

- Most gate operators today are continuous duty operators. However, some DC versions have limited use due to battery life.



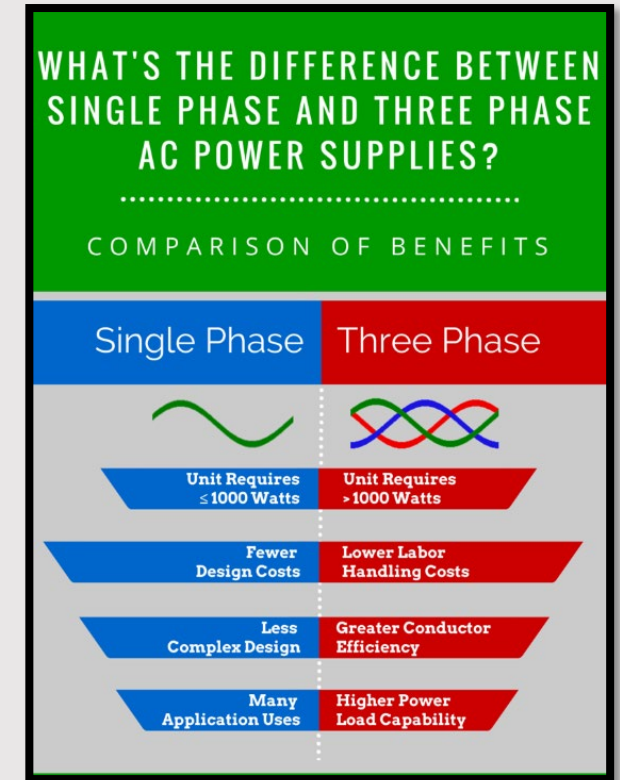
# Gate operator power

- Next, you must select your operator on three more important electrical criteria. Before doing so, you should identify where you are going to pull power for your gate operator.
- Gate operators require a dedicated circuit and required number of amps. Do not attempt to daisy chain your gate operator into other applications. The amount of start-up power for an electric motor is substantial so it may easily trip the breaker when combined with other usage.



# Gate operator power

- Gate operators are available in single and three phase power. Three phase power is preferred because it is a more efficient and consistent form of power. Your facility may have three phase power but not in the front of the building where the administrative offices are located. Thus, you may have to pull this power from the rear of the property where it is located to power machinery.
- Single phase power has one hot and a neutral whereas three phase has three hots and a neutral. Thus three phase wire is expensive.
- Gate operators are available in a range of common voltages. 120, 240, 208 & 460. You should always make sure your circuit is designated within 10% of the gate operators rated voltage.



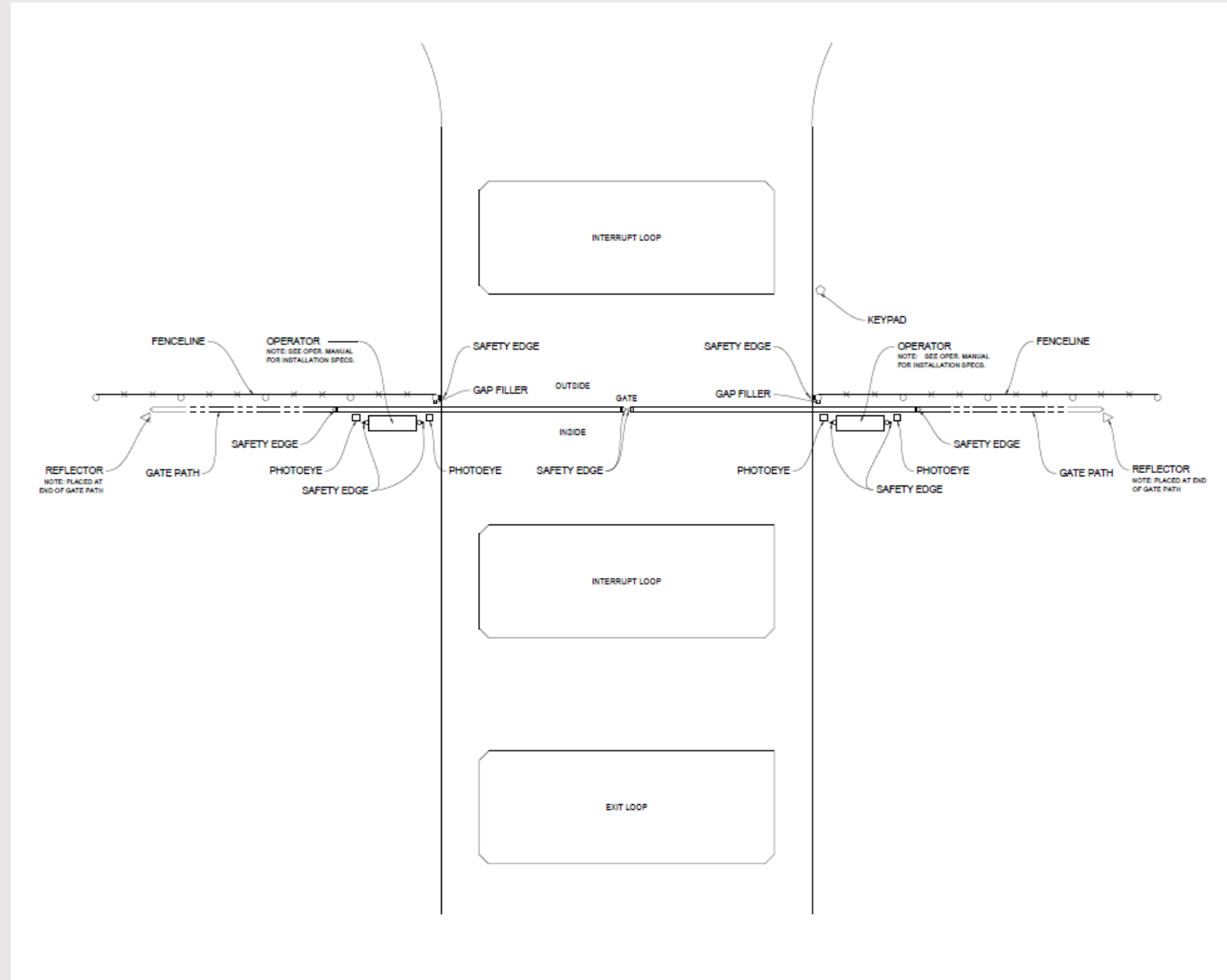


# Gate operator installation

- Now you have selected your gate opener based on the performance characteristics and electrical requirements. Closely follow the manufacturer's recommendations for installation.
- Gate operators require proper anchoring, footings, and mechanical connections. Please consider using a professional installer to set and connect your gate operator.
- The location of the gate operator relative to the gate is critical. Closely follow the manufacturer's recommendations for these dimensions. Even the slightest variation may result in operator failure and create a safety concern.



- Only use a licensed electrician for bringing power to the gate operator.
- Like any piece of motorized equipment with circuitry, gate operators are very fickle about meeting the required number of amps and voltage. Too little or too much may cause you to quickly blow a circuit board or motor.
- Electricity drops-off when traveling long distances. Since most gate operators are located several meters from the power source, a licensed electrician will help evaluate and provide the proper wire size and starting voltage for the distance traveled.



- Gate operators require inherent and external safety devices. The operator will not function unless these devices are properly installed.
- Gate operators require programming prior to operation. Follow the manufacturer's step-by-step procedure in properly programming the gate operator.
- Today's gate operators are sophisticated pieces of equipment. However, this equipment will not operate without additional external control devices that are not included with the gate operator.



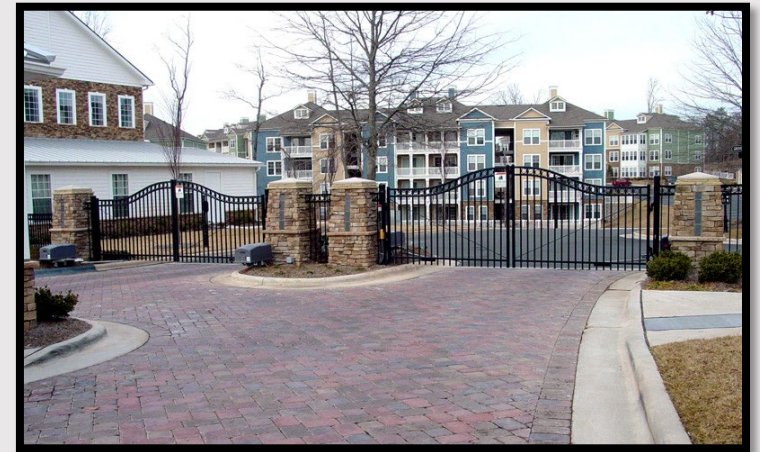
## **Learning Objective #3**

How to select the appropriate access control devices to provide ease of use, control and ergonomics.



# Selecting gate operator components

- There is a wide range of automatic gate components. To help you narrow down your selection specific to your project, you should consider the following approach in the design of your system.
- The first item to consider is if your gate will be secured during business hours. Regardless if the project is residential or commercial, you must decide if your gate will be open or closed during the day.
- “Day” in this instance can be defined as business hours or that period of time when you would reasonably expect non-family members to need access through your gate. This may appear to be an unusual place to start the decision-making process, but it is a critical first fork in the road in selecting your automated gate devices.



- Automated gate control systems that are closed during the day or business hours will typically require some form of point of elevated entry communication device that communicates with others via cell phone, landline or intercom. In addition to the ability to communicate, these devices will also include point of entry access via keypad, remote or card reader. These devices include telephone entry devices, intercoms and computerized devices.
- If your gate is open during the day, you may consider basic access control devices that do not communicate with others. These devices may be standalone keypads, key entry, push button and card readers.



# Who will have gate access?

- The next consideration is the type of individuals who will require access through your gate while it is closed. Please consider if you need access for the following individuals.
- Family members or key employees. These are typically individuals who are given full 24/7 access through the gate.
- Regular salaried or hourly employees. These are individuals who are given restricted access based on scheduled regular time periods.
- Scheduled services. These are individuals who are given a limited number of access attempts for limited access periods. These may include cleaning services and the infrequent repair events. The individuals are limited to use the access code for a specific number of usages.
- Guests and non-scheduled services. These may include one-time guests who may or may not have scheduled a visit, postal delivery, food delivery, etc.



# Gate accessibility

- The next step in the selection of your electric gate devices is that entry and exit are reviewed separately. In other words, how each individual gains access to enter the property may vary from how they exit the property.
- Exiting the gate may not require the same level of scrutiny in deciding if the individual can open the gate. This will save greatly on costs and time.





# Automated gate device types

## Standalone devices:

- Standalone devices are not connected to other devices. These devices typically are used to control a single gate.
- Standalone devices are typically more cost competitive but also very limited in programming options and generating any reporting. Most standalone devices are programmed at the unit. Most importantly, standalone devices rarely have the ability to be tied to a single user and are not given a user ID.
- A standalone keypad is connected directly to the gate operator. The most common applications are single family dwellings and business with limited after-hours access.



# Automated gate device types

## Computerized Programmable devices:

- Computerized devices typically communicate and are connected to a master controller. These devices can be connected to multiple other devices and gates. These devices may be programmed via personal computer connected to the master controller via the internet.
- Multiple users may be set-up in the master controller to have defined levels of access by gate and time zone. These computerized devices will also have a reporting mechanism where the controller is saving every entry and exit by each user. Often, these reports can be formulated by user, time zones, and gate.
- The most common applications are apartment complexes and gated communities.



# Transmitter and Receiver

- The most widely used access control device is the gate transmitter and receiver. The transmitter comes in a wide variety of options.
- Most commonly known as a “garage door opener,” the transmitter is typically a small gate remote that clips to the visor. One push and it sends a radio signal to a receiver in the gate operator. Once the signal is received and verified, the receiver sends a message to the operator to open and/or close the gate.
- Gate transmitters can be single channel or multichannel to control several devices. Many of today’s automobiles are equipped with a “HomeLink” transmitter system that may be programmed to open your gate operator. There is even a hands-free device that automatically opens the gate when you approach without having to push any buttons.



# Keypad

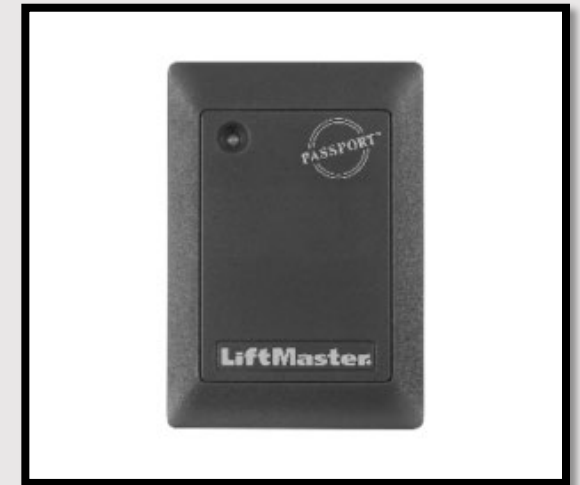
- Another widely used gate device is the pedestal mounted keypad.
- As a standalone device or computer programmable, the keypad requires a 3-5 digit code to access the gate. A single code may be used for all access attempts or individualized codes may be programmed to provide better security.
- The downside to a keypad is that codes may be shared with no limitations. A programmable keypad can track these codes and respective entry attempts.





# Proximity card reader

- For greater security, a popular option is a proximity card reader.
- As a standalone device or computer programmable, the card reader requires cards be given to those that require entry. You simply swipe the card in front of the pedestal mounted reader device. Once the card is verified, the gate can be accessed.
- Individualized programmable cards and card readers better control access and track access attempts.



# Standalone key switch

- A simple gate solution is a standalone key switch. Those that require access will be provided with a key.
- A momentary contact key switch will require you to twist the key, release and remove. A signal will be sent to the gate operator to open or close the gate.
- A constant contact key switch will require you to twist the key to an open or closed position and then remove. This will send a constant contact to the gate to open and keep the gate open until the key switch has been returned to the closed position.
- Lost or stolen keys will require you to rekey the device.



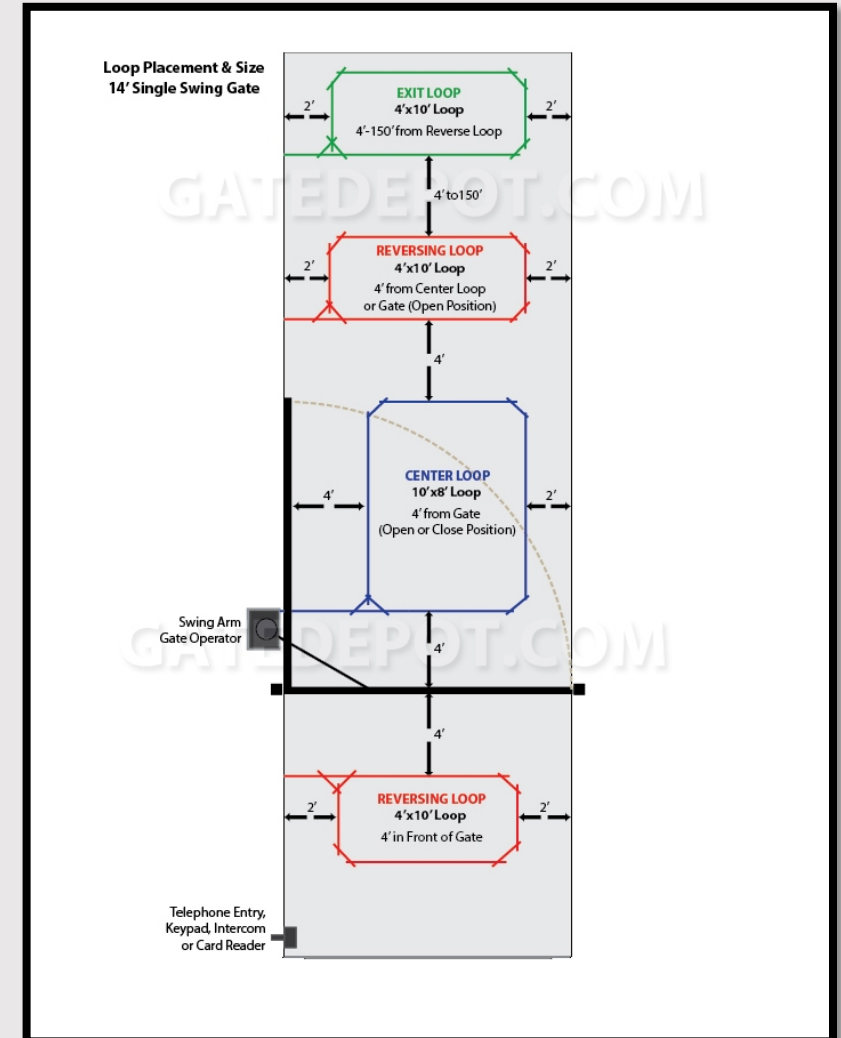
# Push button

- For those not necessarily concerned about security but want a gate that is closed to keep pedestrians from making a wrong turn, a simple push button may be enough.
- Push buttons are available in a single button to open and close the gate.
- A two-button device with one button to open and one to close.
- A three-button device with one button to open, one to close and one to stop the gate. All of these button devices are available with a lock-out key device. Often times these button devices are placed out of sight.



# Ground loops

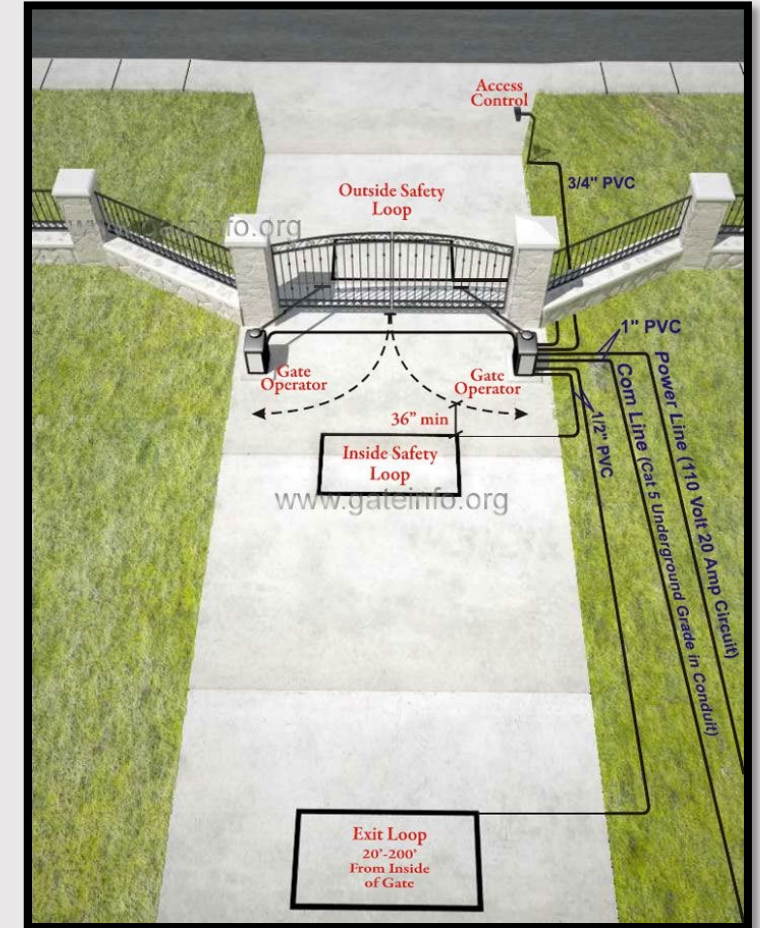
- Ground loops are an excellent hands-free means to opening and closing gates. More than likely, these loops are placed on the inside of the gate. This allows for vehicles to pull-up on the loop to signal the gate to open. These interior loops used to open a gate are called “free exit” loops.
- Another option is to tie a loop to another access control device. This requires that a vehicle must be sitting on top of the loop for the access control device to be enabled to open the gate. These loops are called “presence loops.”
- A third type of loop is used to keep an open gate open and reverse a closing gate to the fully open position. These loops are called “obstruction loops” and are most commonly used to prevent a gate from closing on a vehicle.





# Ground Loops

- A fourth type of loop is a “shadow loop.” These loops keep an open swing gate open or prevent the gate from opening. Shadow loops are not operational as the gate passes over the loop, thus not sensing the gate and reversing.
- Loops are formed with a continuous wire that is in the shape of a loop in the ground. The loop wire is energized thus creating a magnetic field. When the magnetic field is interrupted by a large mass of metal, its detector sends a message to the gate to open, close, stop or whatever function you select.



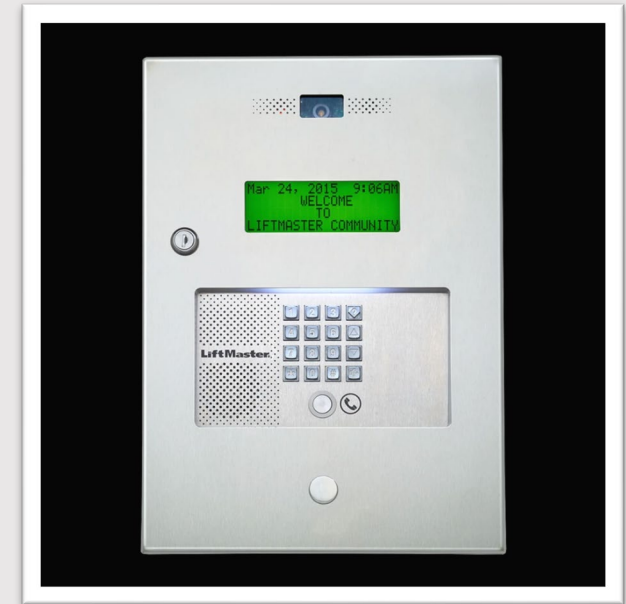
# Intercom systems

- If your gate is closed during business hours, you may need the basic ability for point of entry communication with those inside the facility that can open the gate. The most basic approach to this entry situation is an intercom system.
- Gate intercoms may be hardwired, radio frequency or Wi-Fi enabled. Basic intercoms will include the ability to not only communicate with those at the gate but a call button to initiate the conversation from the gate and a button to open the gate from within the facility.
- Intercom systems will include at least two components; one component installed at the gate and another unit installed within the facility.



# Telephone entry system

- The next level up from the basic intercom is the telephone entry system for your gate. This system is advanced beyond the intercom system in its ability to connect point of entry communications with others via a phone number.
- Telephone entry systems include a component installed at the gate. This unit may be connected with a dedicated phone line, shared phone line or Wi-Fi enabled.
- The unit will include a “call button” that is programmed to call those authorized to open the gate. Those at the gate will communicate with others from the unit over the phone. Those on the phone will select one of the numbers on their keypad to open the gate.
- Telephone entry systems will also include a keypad for entrants to use a code to open the gate or select alternate authorized phone numbers. Telephone entry systems will typically also include some advanced features such as call waiting, call forwarding, one-time programmable entry codes, programmable time zones for the gate to be open, etc.



# Computerized entry system

- The most advanced access control device is a computerized entry system.
- Computerized entry systems will include a primary unit that includes the circuitry for processing and storing information. Connected to this primary unit may be multiple secondary units that utilize the primary unit for validation and recording entry requests.
- Computerized entry systems will be connected via a data line or Wi-Fi. Programming may be completed remotely or at the unit via a laptop. Computerized entry systems allow you to control multiple points of entry that can include gates and doors. The system allows you to program each point of entry parameters and individual user parameters.
- Computerized entry systems will often have the same appearance and functionality as a telephone entry system but will also include more specific point of entry and user parameters, and high-level reporting functionality.





## **Learning Objective #4**

How to select the appropriate obstruction devices and design parameters to insure a safe automated gate.

# UL 325 standard

- The automated gate industry has a long history of addressing safety as it pertains to automated access gates and operators. The industry has teamed with Underwriters Laboratories to provide a standard for all installations. This standard is UL325. The new UL325 standard is the standard for door, drapery, gate, louver and window operators. The standard was created by industry leaders working with Underwriters Laboratories back in 2000.
- To cover all access control operations, the UL 325 standard was divided into four classifications. Each grouping is based on a unique type of access control system and provides safety requirements specific to each grouping.



# UL 325 standard

Usage Class	Horizontal Slide, Vertical Lift, and Vertical Pivot		Swing and Vertical Barrier (Arm)	
	Primary Type	Secondary Type	Primary Type	Secondary Type
Vehicular I and II	A	B1, B2, or D	A or C	A, B1, B2, C, or D
Vehicular III	A, B1, or B2	A, B1, B2, D, or E	A, B1, B2, or C	A, B1, B2, C, D, or E
Vehicular IV	A, B1, B2, or D	A, B1, B2, D, or E	A, B1, B2, C, or D	A, B1, B2, C, D, or E

**Type A** - Inherent entrapment protection system (typically built-in)

**Type B1** - Non-contact sensor (photoelectric sensor or the equivalent)

**Type B2** - Contact sensor (edge device or the equivalent)

**Type C** - Inherent force limiting, inherent adjustable clutch or inherent pressure relief device

**Type D** - Actuating device requiring continuous pressure to maintain opening or closing motion for the gate

**Type E** - An audio alarm

- This table summarizes the entrapment device options for different classes of operators of the various types of gates included in the standard. Refer to the table as you read about the provisions that are described.

## **Class I – Residential Vehicular Operator**

- A vehicular gate operator system intended for use in a single-family dwelling or related parking garage or parking area.



## **Class II – Commercial / General Access Vehicular Gate Operator**

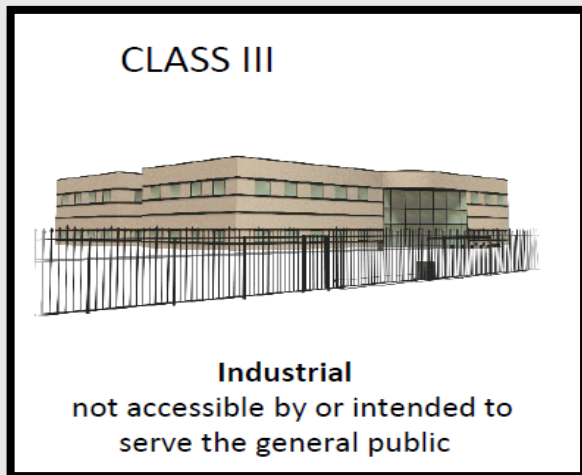
- A vehicular gate operator system intended for use in a commercial application that includes multi-family housing, hotel, garages, retail store, or other building servicing the general public.





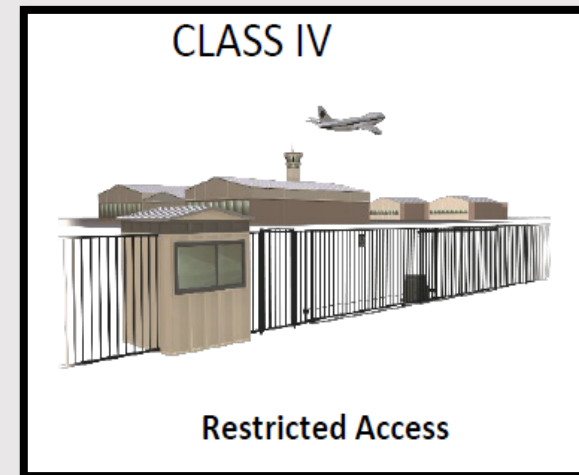
## Class III - Industrial/Limited Access Vehicular Gate Operator

- A vehicular gate operator system intended for an industrial application or building, manufacturing, loading dock area or other locations not intended for the general public.



## Class IV - Restricted Access Vehicular Gate Operator

- A vehicular gate operator system intended for a guarded industrial operation, correctional facility, airport or other restricted access not servicing the public. Unauthorized access is prevented and the operation is under direct supervision by security personnel.



# UL 325 Standard

Usage Class	Horizontal Slide, Vertical Lift, and Vertical Pivot		Swing and Vertical Barrier (Arm)	
	Primary Type	Secondary Type	Primary Type	Secondary Type
Vehicular I and II	A	B1, B2, or D	A or C	A, B1, B2, C, or D
Vehicular III	A, B1, or B2	A, B1, B2, D, or E	A, B1, B2, or C	A, B1, B2, C, D, or E
Vehicular IV	A, B1, B2, or D	A, B1, B2, D, or E	A, B1, B2, C, or D	A, B1, B2, C, D, or E

**Type A** - Inherent entrapment protection system (typically built-in)

**Type B1** - Non-contact sensor (photoelectric sensor or the equivalent)

**Type B2** - Contact sensor (edge device or the equivalent)

**Type C** - Inherent force limiting, inherent adjustable clutch or inherent pressure relief device

**Type D** - Actuating device requiring continuous pressure to maintain opening or closing motion for the gate

**Type E** - An audio alarm

- Note - The same type of device shall not be utilized for both the primary and the secondary entrapment protection means. Use of a single device to cover both the opening and closing directions is in accordance with the requirement; however, a single device is not required to cover both directions.
- A combination of one Type B1 for one direction and one Type B2 for the other direction is the equivalent of one device for the purpose of complying with the requirements of either the primary or secondary entrapment protection means.

# Gate Definition and Types

- UL 325 defines a gate as “a moving barrier such as a swinging, sliding, raising, lowering, rolling, or the like, barrier that is a stand-alone passage barrier or is that portion of a wall or fence system that controls entrance and/or egress by persons or vehicles and completes the perimeter of a defined area.”
- The main types of gate operators/systems addressed in UL 325 are barrier, vertical pivot gate, horizontal slide gate, swing gate and vertical slide gate. It is important to note that all gates included in UL 325 are defined as vehicular gates and NOT PEDESTRIAN GATES.
- Property owners are expected to provide a separate entrance for pedestrian access.



UL 325 defines the allowable entrapment protection options for each class as follows:

- Each class must have primary and secondary entrapment provisions;
- Each class must have different types of protection for the different classes of operators as well as for the different categories of operators; and
- The same type of device cannot be used for both primary and secondary protection.

An exception to compliance with the provisions of the table has also been noted in the standard. An operator considered exempt would require all of the following:

- Operates a vehicular barrier (arm) that is not intended to move toward a rigid object closer than 2 feet;
- Does not have a pinch point between moving parts by virtue of the operator's design or complying installation; and
- Is not required to be provided with means to protect against entrapment.



# Provisions of note regarding gate operators

- Class I and Class II operators must have an audio alarm which shall function if 2 sequential activations of the entrapment protection device occur. The “2 sequential activations” is noteworthy in that it is hoped that “nuisance” alarms will be kept to a minimum while still enhancing safe operation.
- Class I and Class II slide gate operators shall not exceed a speed of 1 foot per second when the operator is pulling 75 pounds or more. Since both classes listed involve general public usage, this maximum established speed strikes a balance between any perceived security issue (a person immediately following the party controlling the gate) and any danger from a person being struck by a gate.
- A Type B1 or B2 device serving as a Primary Safety Device shall be monitored for the presence and correct operation of the device, including the wiring to it, at least once during each open and close cycle. This requirement is included because these types of safety devices are often used as backup safety devices.
- Manufacturers will be required to specify a brand and model number of external sensors compatible for connection to an operator. This provision arose from concern over the gate operator external devices acting in tandem as a system, with a fault rate of 6 failures in 1 million hours of use (which equates to 115 years of continuous operation).

# Provisions of note regarding gate operators

- *After sensing an obstruction, reversing must begin within 2 seconds.* This requirement is intended to keep a person from being entrapped in a stationary position by the gate system. After the first contact the gate must reverse and travel a minimum of 2 inches. If there is a second contact, the gate must stop, and requires a wired device to reset the operator.
- *After any obstruction reversal by either an A or B2 device, the timer-to-close is disabled until reset.* Both A and B2 devices sense direct gate contact with an obstruction, and the devices must perform their intended function without interference from a timer-to-close action.
- *Stop the gate upon sensing a second sequential obstruction, and then not operate until an intended hard wired input is received in most situations, depending upon the combination of types of primary and secondary entrapment protection devices that are used..* A person within the line of sight of the gate must see what has caused the second sequential obstruction and must resolve this obstruction before operating the gate.
- *If a Type C device is chosen, swing gates must not exert more than 40 pounds of force after initial start-up.* The reasoning here is similar to the reasoning given for the speed limitation for horizontal slide gates.

# Effect of Installations

The new provisions will have several effects on gate and fence dealers:

- Gate and fence dealers should look for an indication of the Class of each operator, which will be specified by the gate operator manufacturer.
- Fence dealer sales personnel must match the site application with the Class of operator. The gate operator manufacturer should be contacted if there is any question about the site application.
- Both primary and secondary safety devices must be provided and matched to both the operator and site conditions. Although the gate operator manufacturer will either provide or specify these devices, the gate/fence dealer should insure that they are installed and correctly matched. Any questions should again be directed to the gate operator manufacturer.
- Warning signs must be permanently affixed to the gate panel. UL 325 includes specific requirements on the format, content, and placement of these signs.

# Factors related to gate construction and installation

- Vehicular gate operators should ONLY be used on vehicular gates and never pedestrian gates.
- Adequate clearance should be provided between a swinging gate and adjacent structures to reduce risk of entrapment.
- A sliding gate should work smoothly with easy rolling/movement in both directions, prior to the installation of the operator.
- Controls should be as far away from the gate as possible, at least 6 feet from the gate, to prevent “reach-through” occurrences.
- Warning signs and placards must be installed and be visible in the area of the gate.

*See DASMA TDS-370 for information about gate construction and ASTM F2200, Standard Specification for Automated Vehicular Gate Construction.*



# Device-specific installation instructions

- There are also specific installation requirements for certain types of entrapment protection devices. These specific requirements emphasize the care and attention that each device must be given prior to and during installation.
- For gate operators utilizing non-contact sensor devices (Type B1), instructions should be consulted for placement for each application, care should be exercised to reduce the risk of nuisance tripping, and one or more of these devices must be installed where the risk of entrapment or obstruction exists.
- For gate operators utilizing contact sensor devices (Type B2), several requirements are spelled out in UL 325.
- One or more contact sensors shall be located at the leading edge, the trailing edge, and also post mounted both inside and outside of, a vehicular horizontal slide gate; at the bottom edge of a vehicular vertical slide gate; and at the entrapment point of a vehicular vertical pivot gate.
- A wired contact sensor shall be located, and its wiring arranged, so that communication between sensor and gate operator is not subjected to mechanical damage. A wireless contact sensor shall be located where the transmission of the signals is not obstructed or impeded by building structures, natural landscaping or similar obstructions, and shall function under the intended end use conditions.
- For gate operators utilizing a continuous pressure activating device (Type D), controls must be placed so that user has full view of the gate area when the gate is moving. A placard must be placed adjacent to the controls and no other activation device shall be connected. Most importantly, an automatic closing device shall not be employed.

# Statements in Manufacturer's Instructions Concerning Installation

Gate and fence dealers can expect to see in gate operator instructions the following statements:

- The operator must be appropriate for the construction of the gate and the usage class of the gate. The appropriate primary and secondary safety devices to be used are a major consideration to support this requirement.
- All openings of a horizontal slide gate, and the portion of the fence where the slide gate passes, must be guarded or screened. These specific requirements in UL 325 that govern this provision were developed to address “reach-through” occurrences. For example, slide gates must have a protective cover 48 inches in height extending from the bottom of the gate/fence panel.
- All exposed entrapment points must be eliminated or guarded. It is up to individual gate and fence dealers to identify these points on a product-by-product basis, or on a job-by-job basis.
- Guarding must be supplied for exposed rollers. Exposed rollers are regarded as potential pinch points