

Whipps, inc.

Water Control Gates

Product Quality and Craftsmanship



Stainless Steel Gates

Series 900 AWWA® C561 Compliant

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Introduction

Series 900 stainless steel gates are engineered for robust performance and extended lifespans, suitable for various mounting configurations and flow conditions. These gates feature rugged, reinforced stainless steel construction complemented by durable and flexible ultra-high molecular weight polyethylene (UHMW) seat/seals, ensuring a heavy-duty assembly. A resilient bottom seal enables a secure flush bottom closure. Whipps, Inc. offers rapid and cost-effective production of both standard gates and customized solutions for unique applications.

Advantages: Stainless Steel vs. Cast Iron

Superior Performance: Whipps, Inc. provides a leakage guarantee that surpasses the specifications outlined in AWWA C-501 for Cast Iron Sluice Gates or the most recent revision of AWWA C-560 for Cast Iron Slide Gates. Our commitment ensures leakage rates not exceeding 0.05 gpm/ft of seal perimeter under both seating head and unseating head conditions, even in high head service scenarios.

Cost: Fabricated stainless steel gates typically offer a cost advantage over cast iron gates. The manufacturing process for cast iron gates, which involves casting and subsequent machining, is more expensive. Consequently, as gate size increases, the price difference also increases.

Strength: Stainless steel boasts an ultimate strength that is more than twice that of cast iron. Additionally, stainless steel possesses approximately double the modulus of elasticity compared to cast iron.

Durability: Stainless steel exhibits superior corrosion resistance compared to cast iron. Our stainless steel gates feature UV-stabilized UHMW seat/seals, which are field proven to maintain shape and integrity in challenging applications. Whipps, Inc. conducted rigorous testing on UHMW seat/seals. Subjecting them to 25,000 gate open/close cycles in an abrasive media to validate their ability to withstand continuous operation with minimal wear. (Test results available upon request.)

Reliability: Unlike cast iron gates, the slide will not 'freeze' to the frame after extended periods of inactivity. This is achieved through the inclusion of UHMW seat/seals, which effectively eliminate metal-to-metal contact between the slide and the frame.

Delivery: The fabrication process of crafting a stainless steel gate from raw materials is faster compared to the casting and machining process required for creating a cast iron gate.

Self-Adjusting Seals: Our stainless steel gates feature a self-adjusting seal system that eliminates the need for field adjustments, recognizing that many gates are installed in locations where such adjustments are impractical or unfeasible. This advanced system cannot be replicated by the imprecise method of adjusting wedges, which can lead to increased leakage, localized stress, and difficulty during gate operation. Our self-adjusting seal system combines durable UHMW seat/seals, contoured to reduce friction while maintaining a secure seal with the slide, along with a resilient static spring/seal. This spring/seal functions as a bulb seal between the frame and UHMW seat/seals, maintaining continuous pressure for consistent contact. Furthermore, the static spring/seal is safeguarded against wear or damage from the movable slide, thanks to the UHMW seat/seals. (Wedges can be provided, but highly discouraged.)

Low Maintenance: Stainless steel gates do not necessitate regular painting and demand less operator attention when compared to cast iron gates.

Ease of Repair: In the rare event of damage to the seat/seals, they can be easily replaced in the field using common tools, without the need to remove the gate from the wall. In contrast, if the seating surface of a cast iron gate is damaged, it necessitates the removal of the gate from the wall and shipping it back to the manufacturer for re-manufacturing.

Range of Sizes: The process of designing and manufacturing fabricated gates offers the flexibility of producing a wide range of sizes, nearly without limits. In contrast, cast iron gates require the creation of new patterns or modifications to existing patterns to accommodate uncommon sizes.

Mounting Configurations: Gate frames can be either embedded in channel walls or mounted to a wall, pipe flange, or wall thimble. Wall thimbles are recommended for applications with high unseating head conditions. We offer flanged frames or flat frames for gates designed to cover square, rectangular, or round openings in concrete structures.



Design Features

The chart below displays the gate features associated with each model number. These models encompass the most frequently utilized configurations. For applications that fall outside the scope of these standard models, we offer additional arrangements.

Table 1: Features vs Model Number (Model Number Key)

Gate Features		Gate Model Numbers							
		921	923	923-C	923-D	923-D-I	924	925	925-I
		931	933	933-C	933-D	933-D-I	934	935	935-I
		951	953	953-C	953-D	953-D-I	954	955	955-I
Guide Frame Style	Embedded	X							
	Wall Mounted		X		X	X	X	X	X
	Channel Mounted			X					
Seals	Slide & Invert	X	X	X	X	X			
	Slide, Invert, & Top						X	X	X
Actuator Mounting	Yoke	X	X	X	X	X	X		
	Pedestal							X	X

Optional Features

The gate configuration required for each application is determined by gate size and service conditions. The overall gate widths, side frame sections, and invert sections depicted in this literature showcase only a few examples of the numerous configurations available.

Downward Opening: Many gate models can be configured for downward opening service by simply adding a 'D' to the model number. These gates are ideal for situations with limited clearance where an upward opening gate is impractical, or when the gate is intended for use as an overflow weir. Downward opening gates may be supplied with or without a top seal.

Interconnected Actuators: All models can be equipped with two interconnected actuators by adding an 'I' to the model number. This setup is typically advisable for gates wider than 72" and with a width exceeding twice the height.

Non-Rising Stem: All models can be configured with non-rising stems by adding a 'N' to the model number. This operating stem arrangement is typically chosen for installations with limited headroom.

Wall Thimbles: All models equipped with top seals can be configured for wall thimble mounting. Wall thimbles are typically required only for applications with high unseating heads.

Gate Selection Criteria

Gate Size: In water and wastewater treatment plants, gates are typically sized to match pre-designed structures. In this respect, Whipps, Inc. stainless steel gates provide exceptional flexibility to accommodate any round, square, or rectangular opening.

Gate Mounting: Series 900 gate frames may be embedded in channel walls, mounted on the face of a wall, mounted inside of an existing channel, installed on a wall thimble, or affixed to a pipe flange.

Gate Material: Series 900 gates are typically constructed from either 304/304L or 316/316L stainless steel. Type 304/304L, being more cost-effective, can be specified for water or wastewater applications when

residual chlorine levels are 2mg/l or lower. Type 316/316L is a more conservative choice, offering enhanced resistance to pitting and crevice corrosion. In both cases, the low carbon 'L' grade is recommended for welded components to minimize carbon precipitation in the welds. Various other alloys are also available.

Actuator Selection: The different types of actuators are detailed in the actuator section (page 50-52). Operating loads are calculated as illustrated in Figure 1 below. Manual operators are chosen to guarantee that operating the handwheel or hand crank requires no more than 40 pounds of effort. For information regarding the selection of powered actuators, consult the factory.

ENGLISH UNITS	METRIC UNITS
1. $P_1 = 35 h$ where P_1 = operating load (pounds) h = gate height (inches)	$P_1 = 6129 h$ where P_1 = operating load (pounds) h = gate height (inches)
2. $P_2 = 12.48 * A * H$ where P_2 = operating load (pounds) A = area of opening (sq. feet) H = head on gate centerline (feet)	$P_2 = 1961 * A * H$ where P_2 = operating load (pounds) A = area of opening (sq. feet) H = head on gate centerline (feet)

Figure 1: Operating Load Formula

Note: Maximum operating loads occur in the initial few inches of gate travel during opening and the final few inches during gate closure. Loads diminish quickly from these extremes.

Actuator Loads Transmitted to Structures: On non-self-contained gates, pedestal mounted actuators transmit stem thrust to the structure supporting the gate and actuator. The structure must be constructed to withstand the actuator's maximum output (e.g. electric actuator at motor stall) which is necessarily greater than the operating load, sometimes significantly so. Powered actuators employ various mechanisms to restrict maximum output. However, manual actuators have their maximum output limited by the operating personnel's effort.

Application Chart

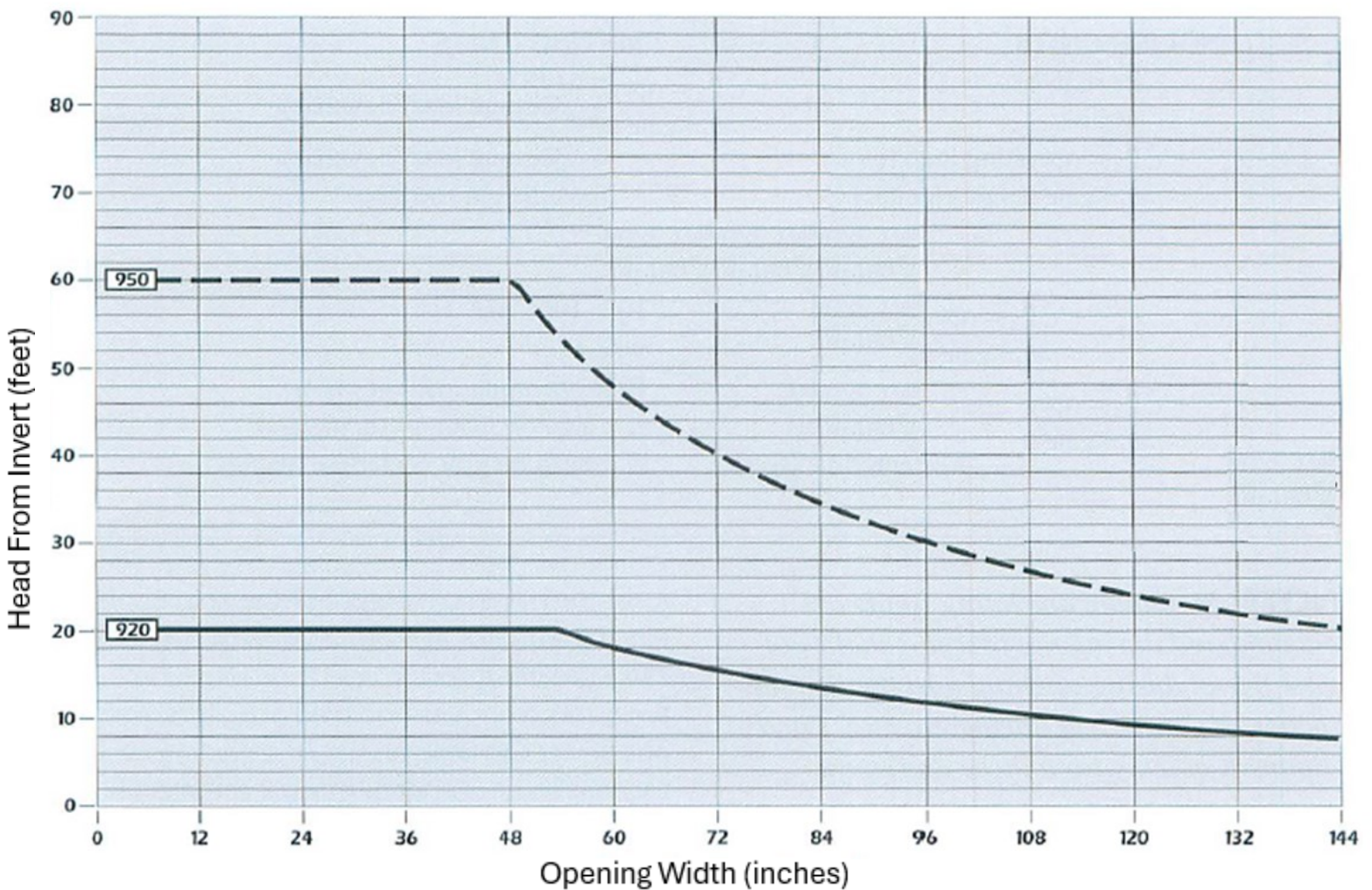


Figure 2: Seating and Unseating Head Limits

Note: The chart above illustrates the typical maximum range of each stainless steel gate series. If higher ratings are required, please contact the factory for additional details.

Sluice Gate Mounting

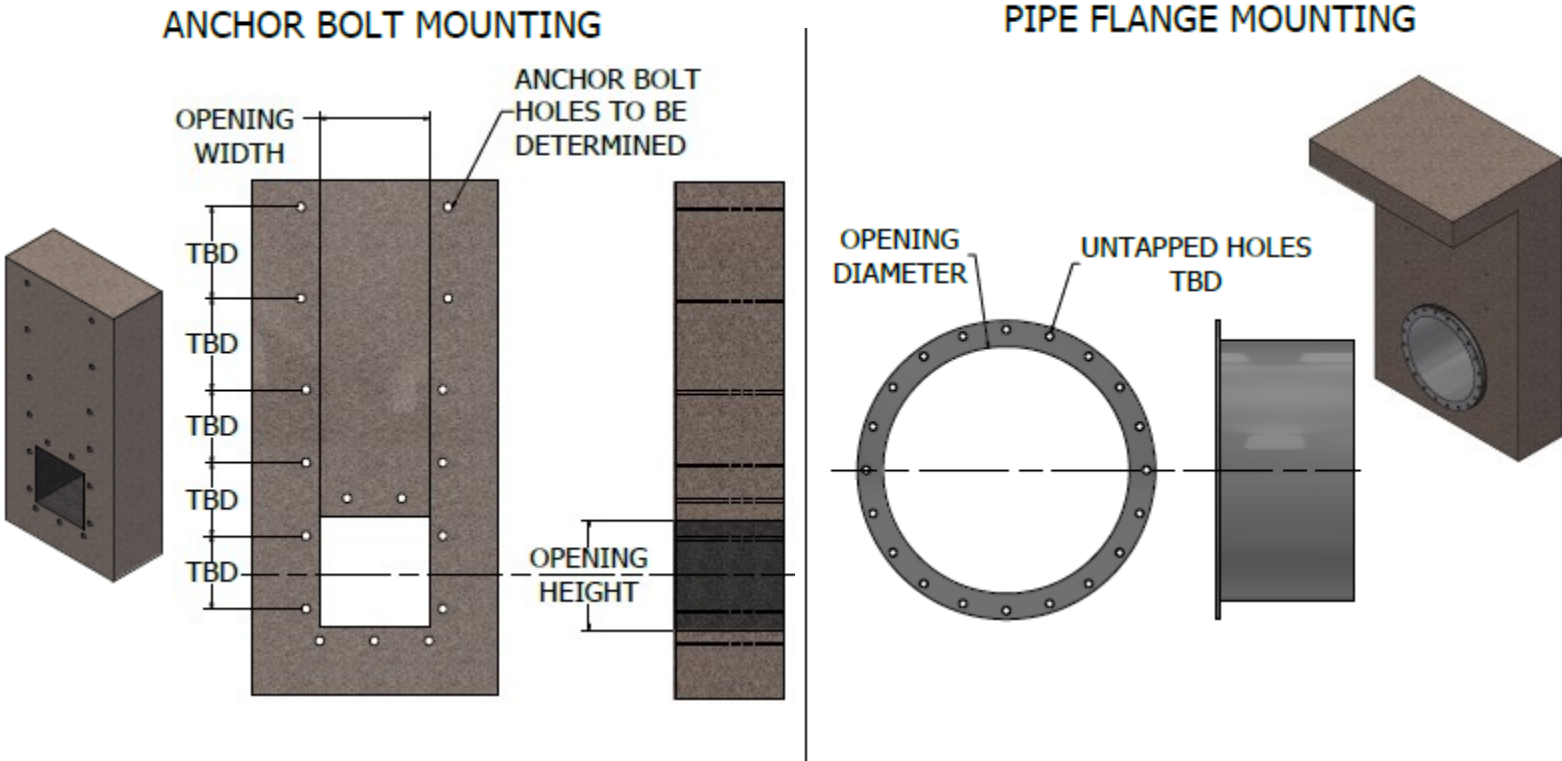


Figure 3: Wall and Pipe Flange Mounting Details

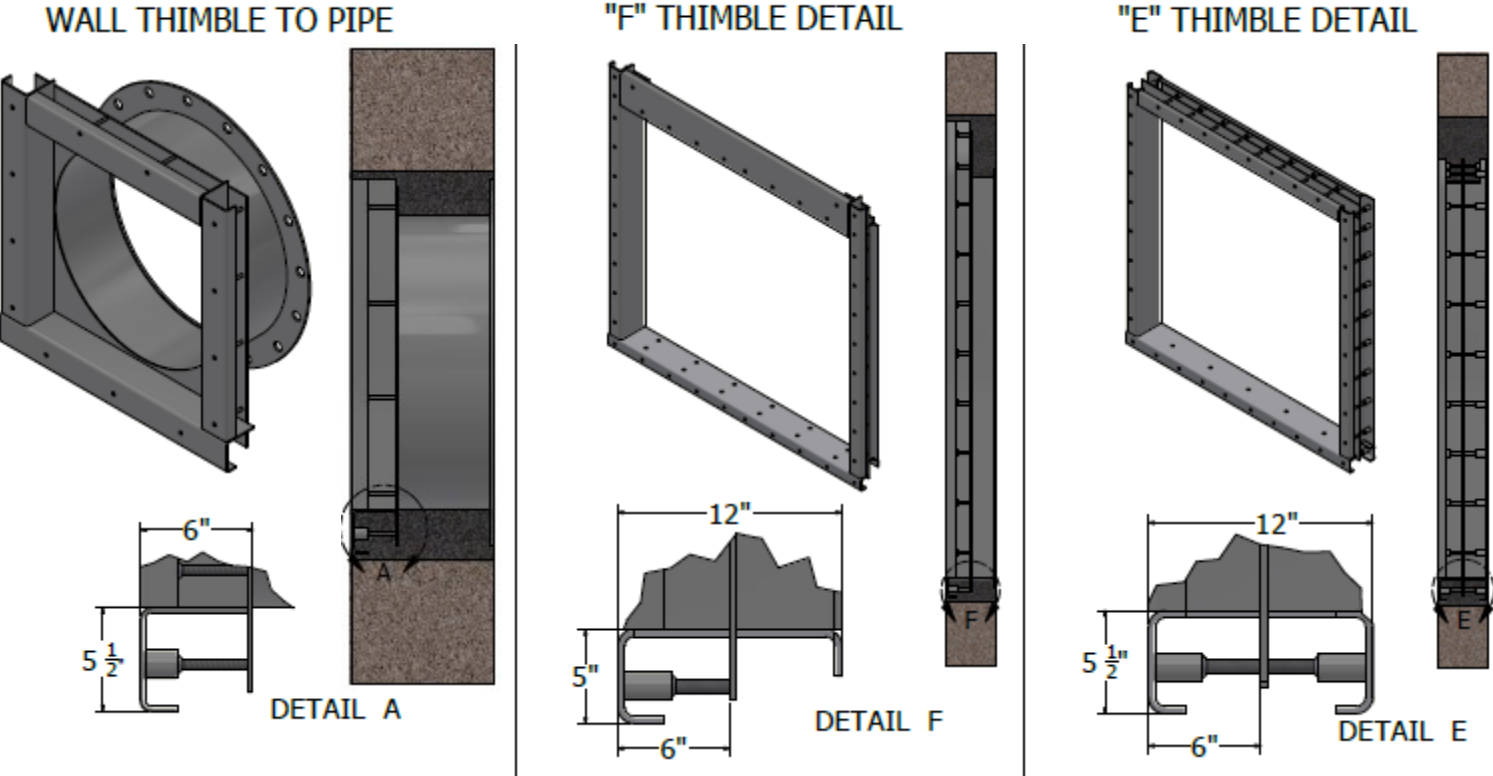
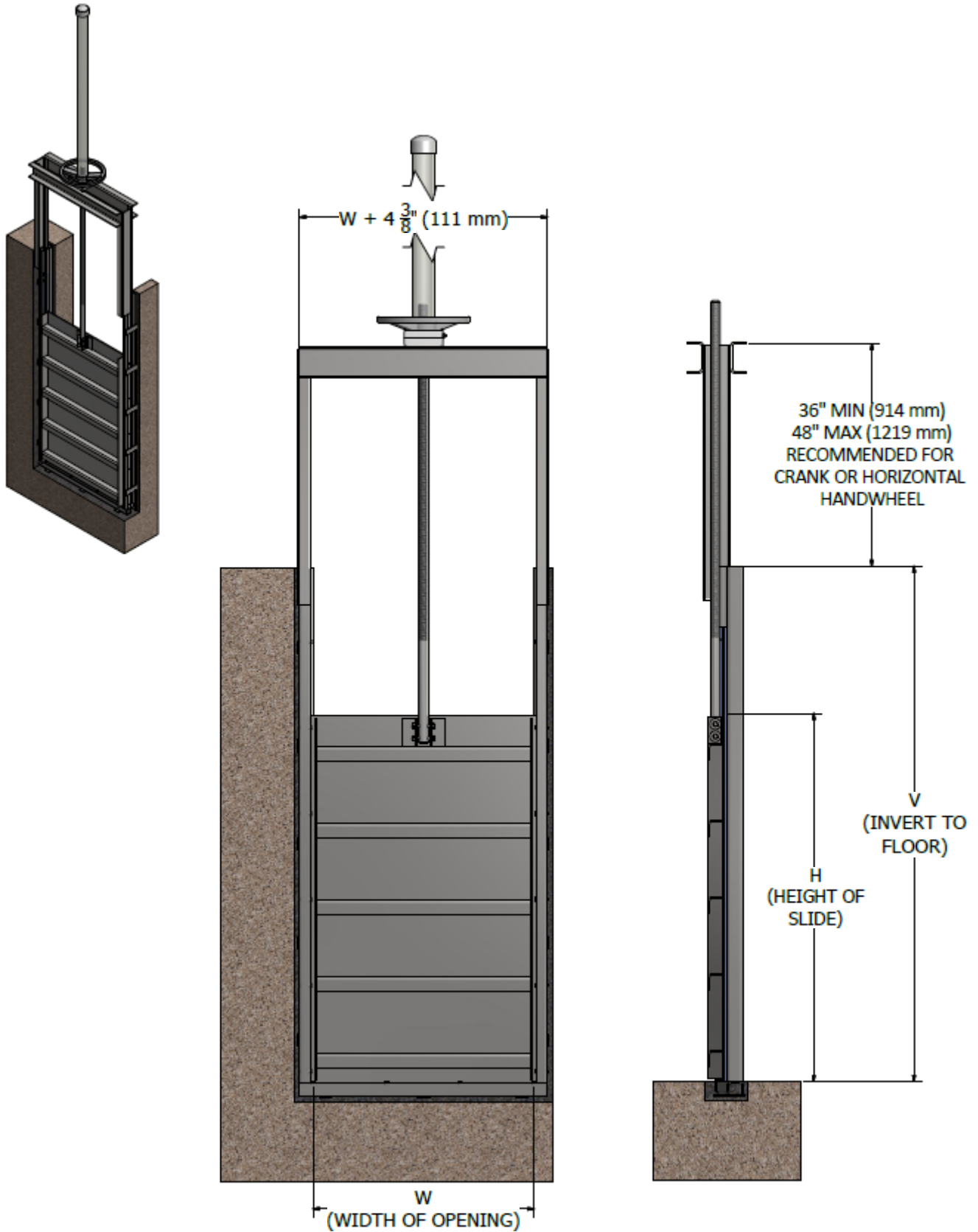


Figure 4: Wall Thimble Mounting Details

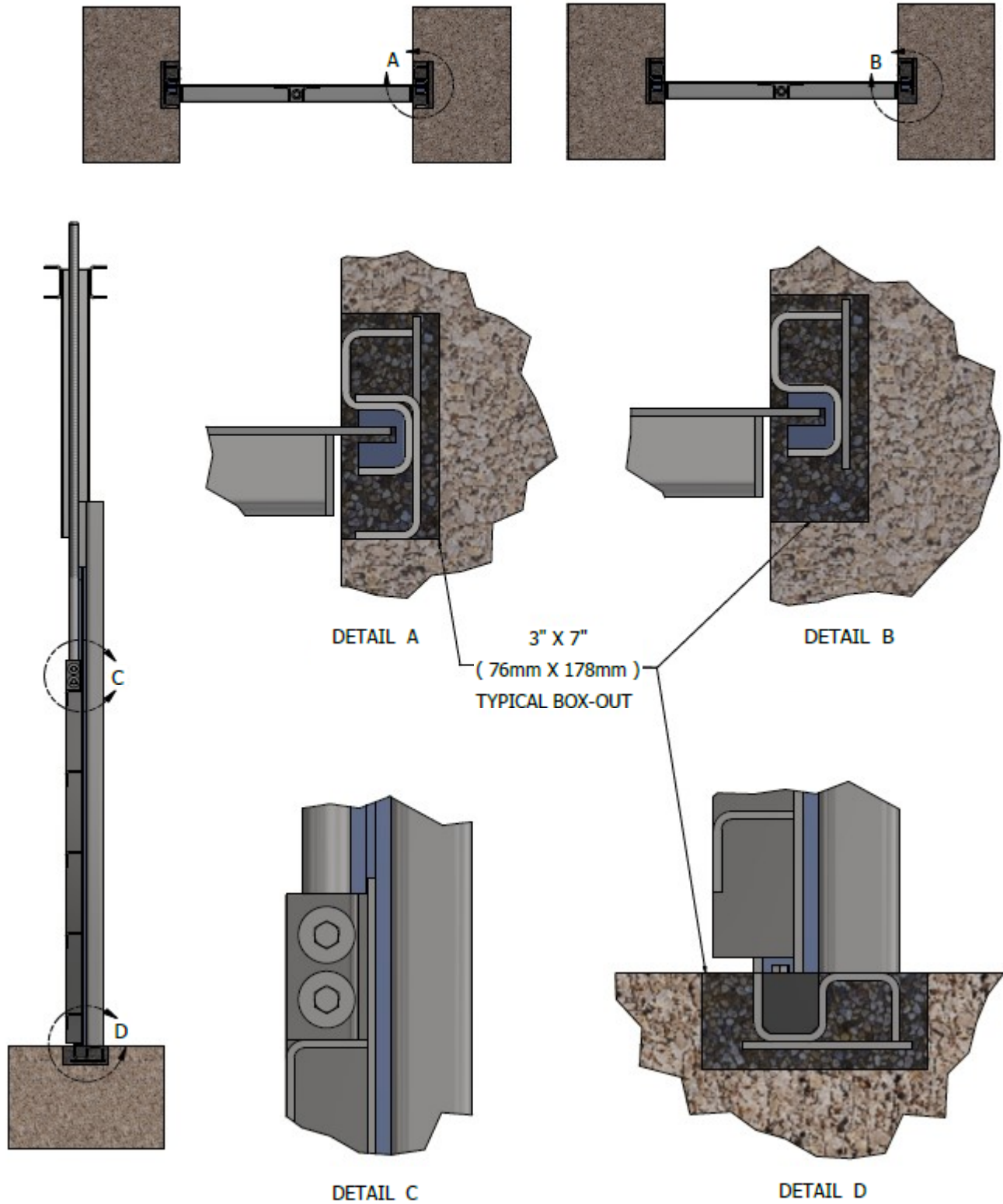
Model 921 Slide Gate



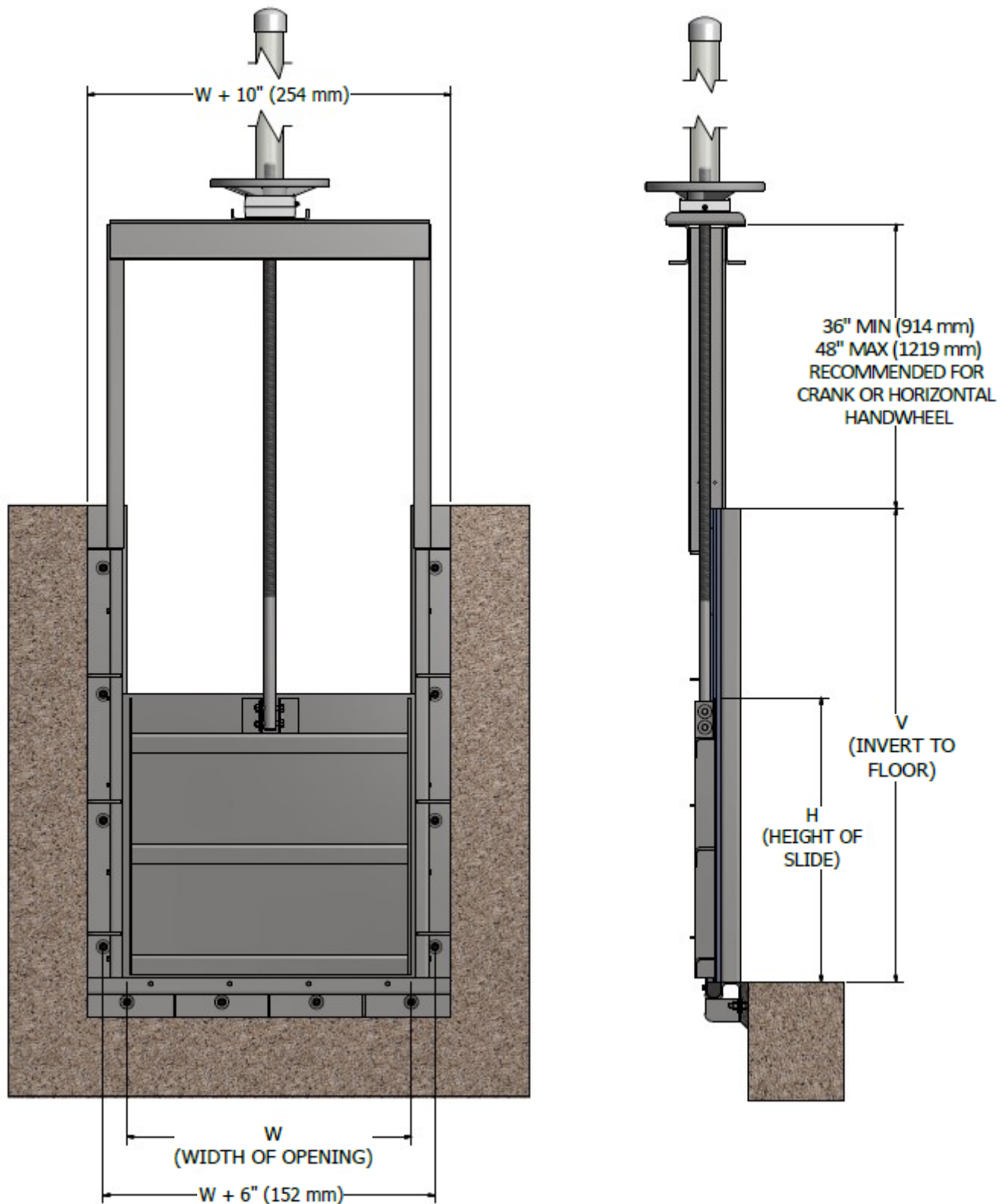
GATE ILLUSTRATED: 36" (W) x 96" (H) x 84" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 921 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °EMBEDDED FRAMES
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATOR
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



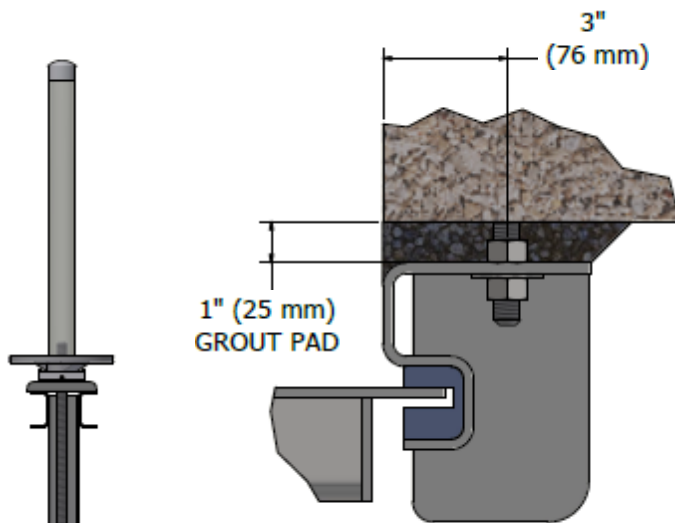
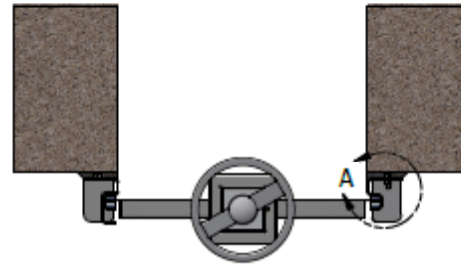
Model 923 Slide Gate



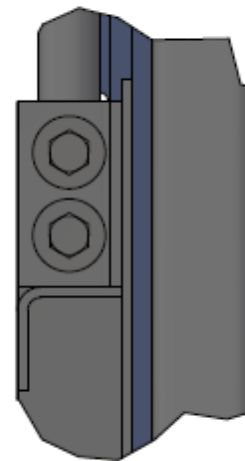
GATE ILLUSTRATED: 36" (W) x 36" (H) x 60" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 923 Features

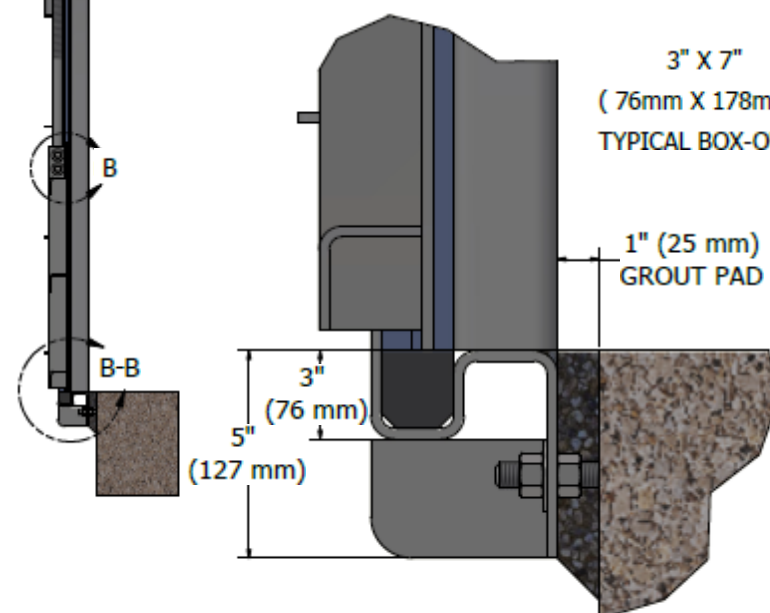
- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATORS
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



DETAIL A

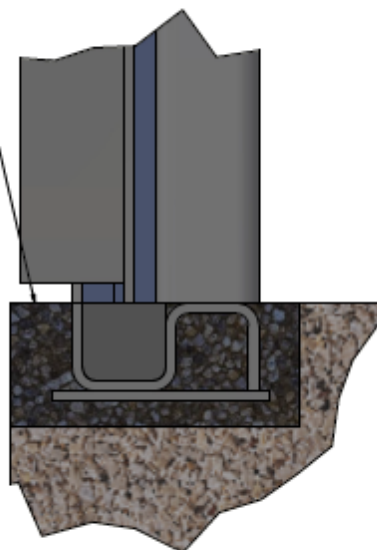


DETAIL B



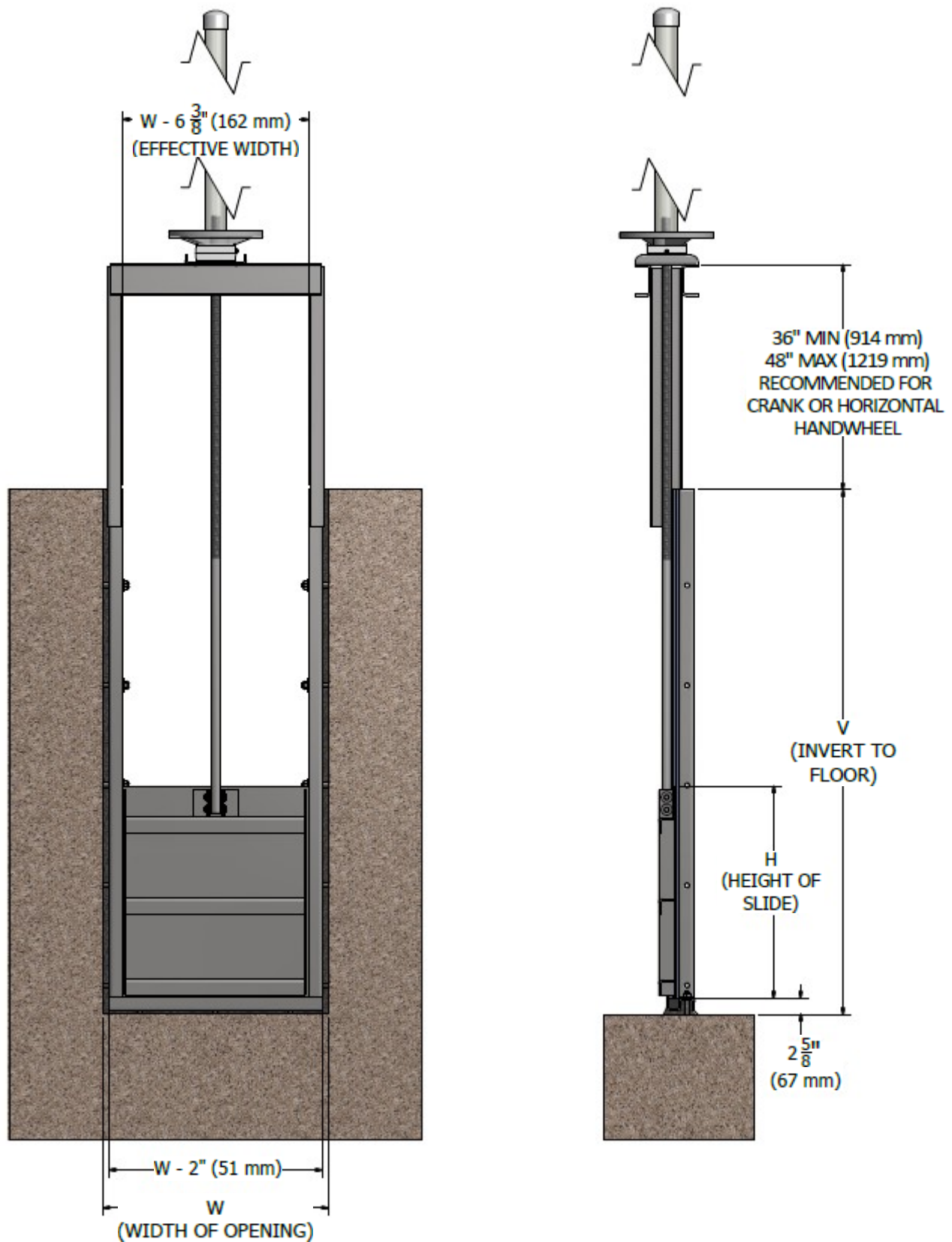
DETAIL B-B

3" X 7"
(76mm X 178mm)
TYPICAL BOX-OUT



DETAIL B-B
EMBEDDED OPTION

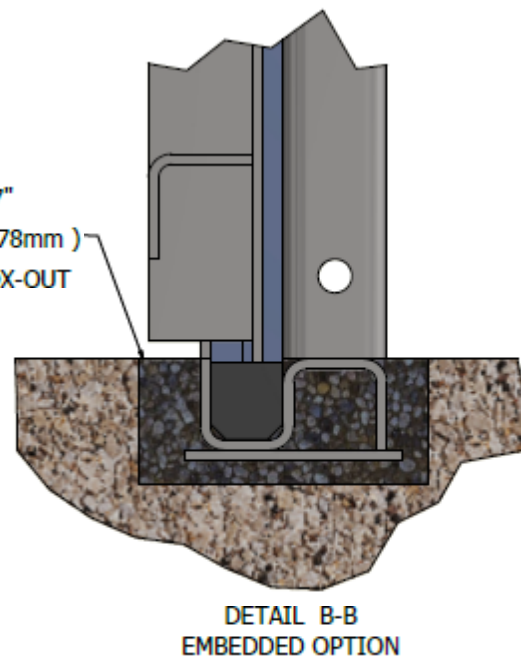
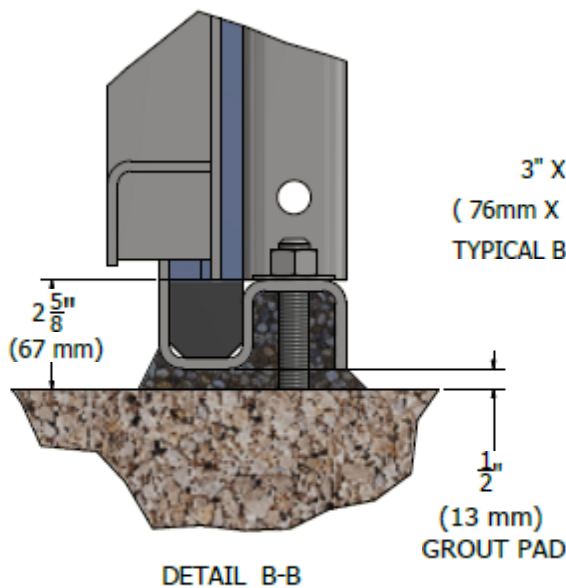
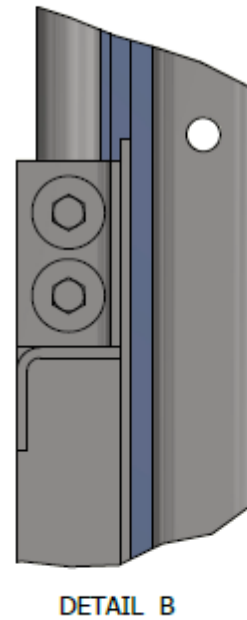
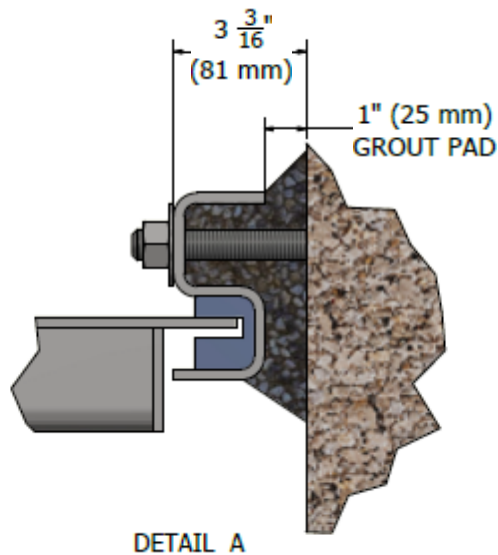
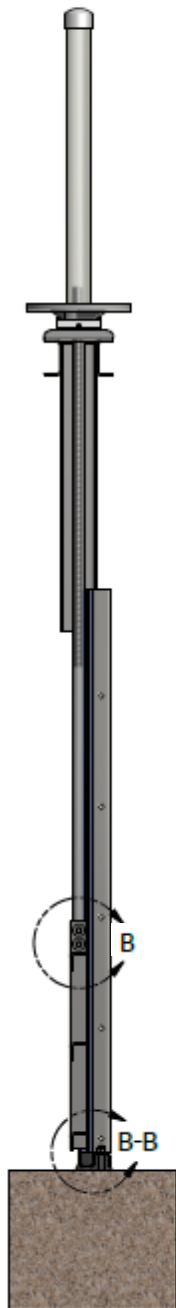
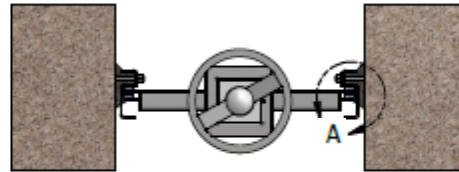
Model 923-C Slide Gate



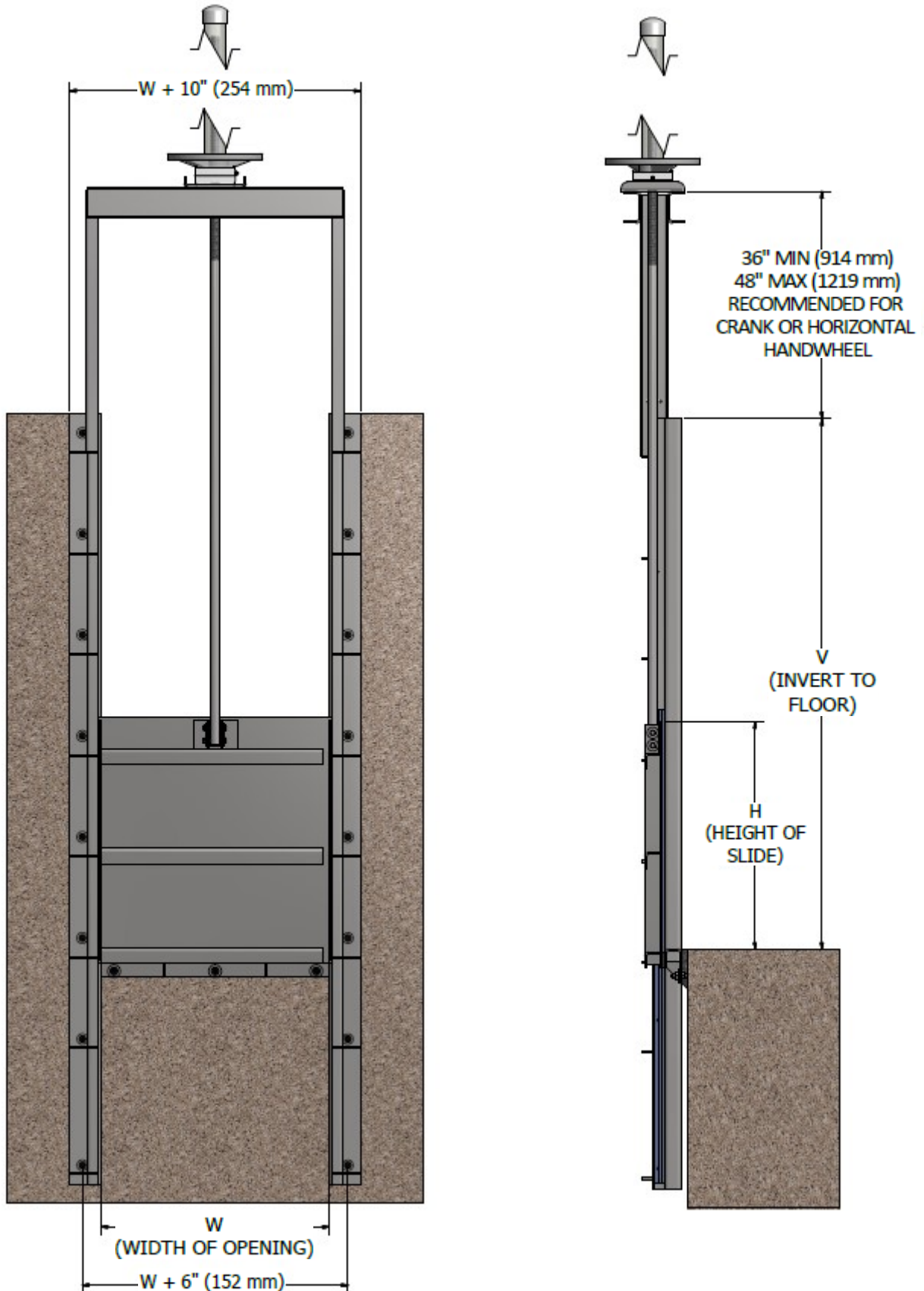
GATE ILLUSTRATED: 36" (W) x 36" (H) x 84" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 923-C Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °FRAME MOUNTS IN EXISTING CHANNEL
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATOR



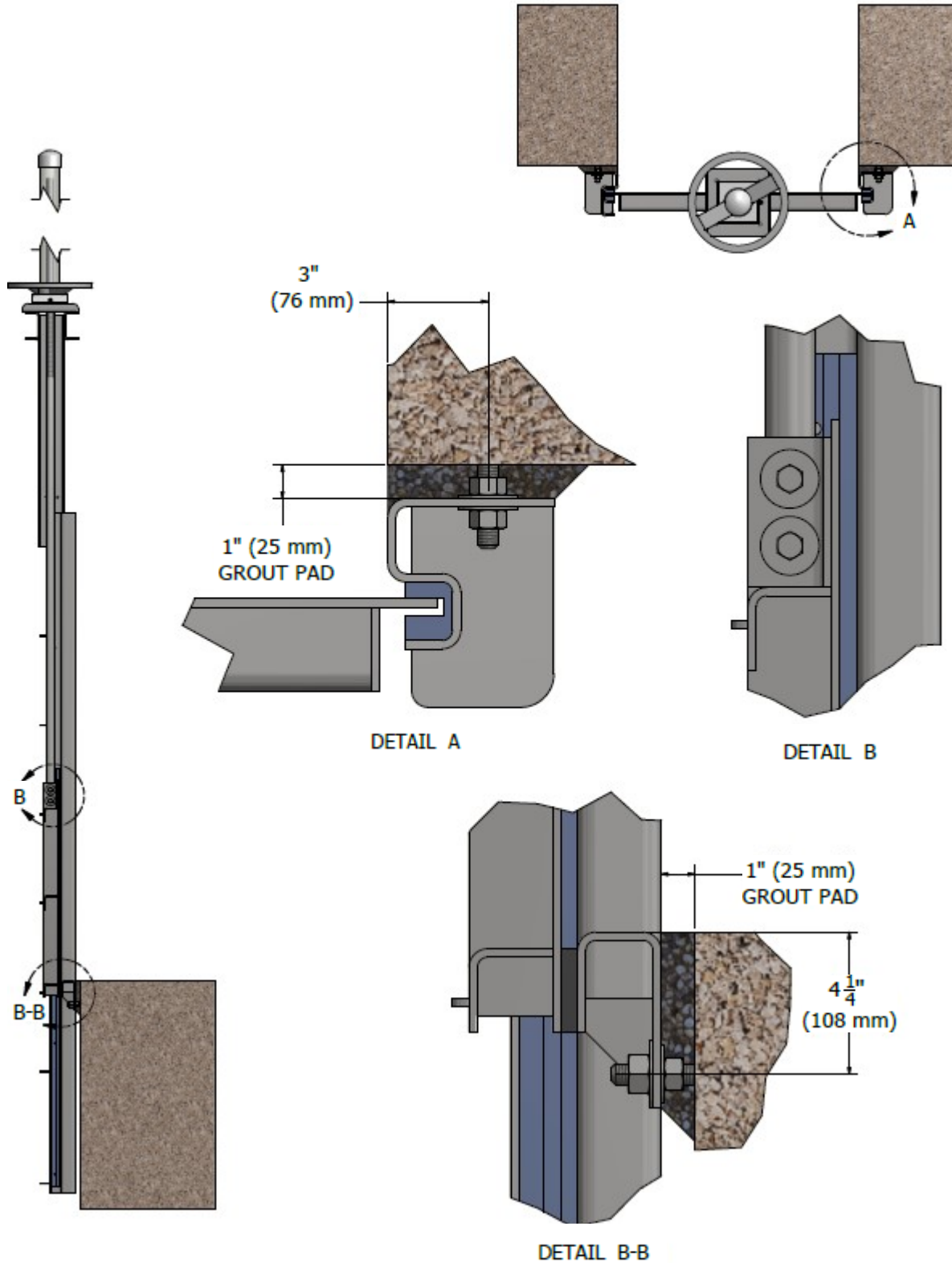
Model 923-D Slide Gate



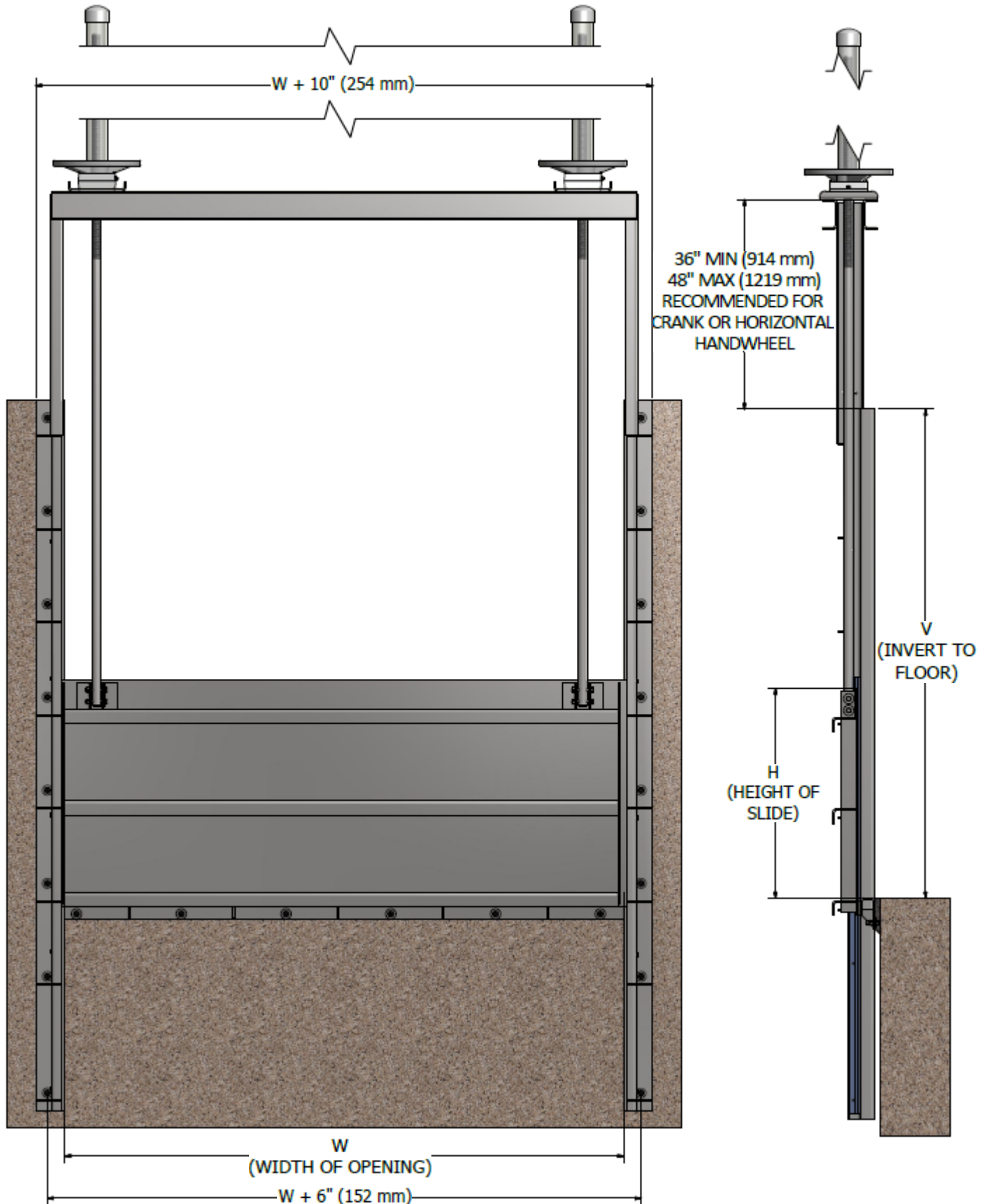
GATE ILLUSTRATED: 36" (W) x 36" (H) x 84" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 923-D Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °DOWNWARD OPENING
- °OPEN CHANNEL - OPTIONAL TOP SEAL
- °YOKE MOUNTED INTERCONNECTED ACTUATORS



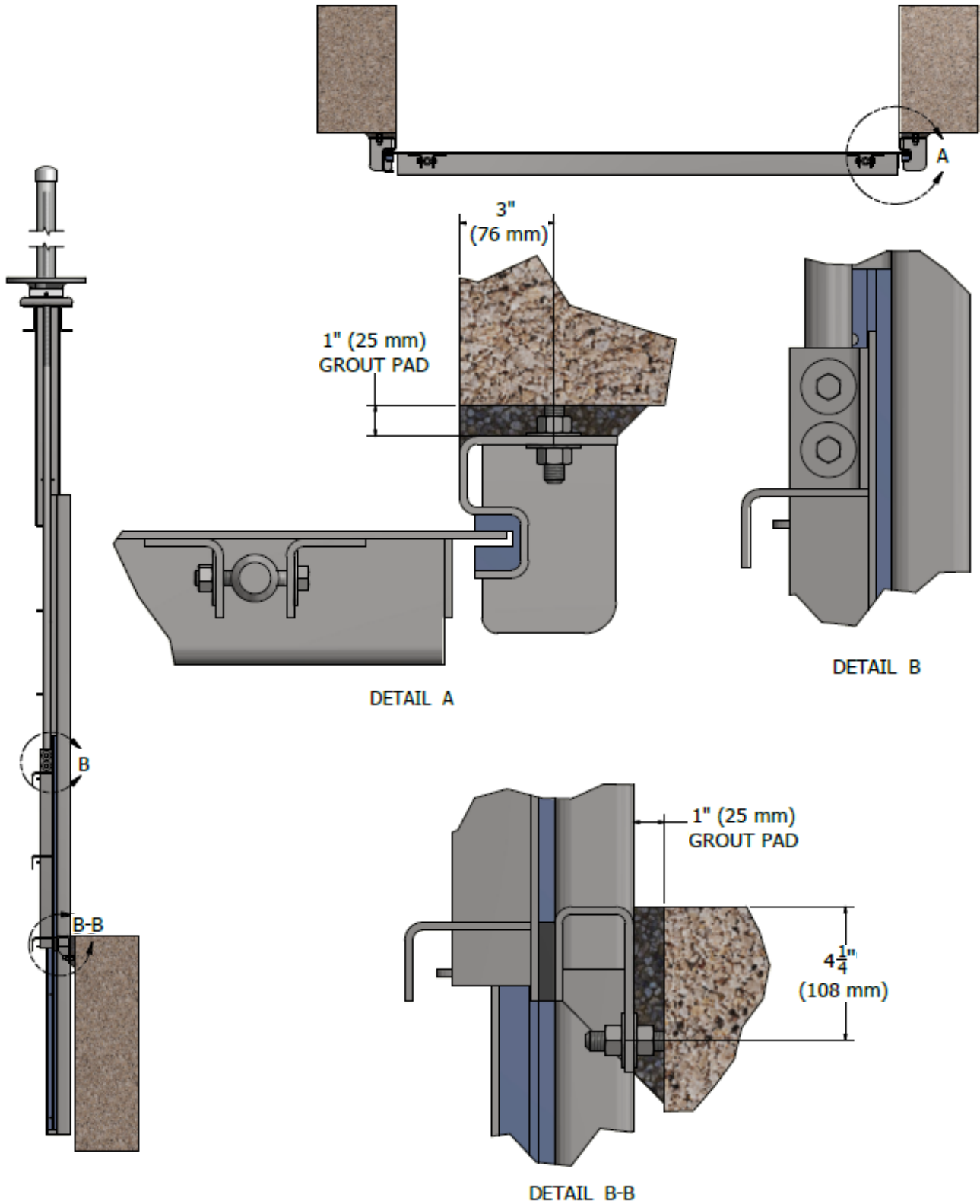
Model 923-D-I Slide Gate



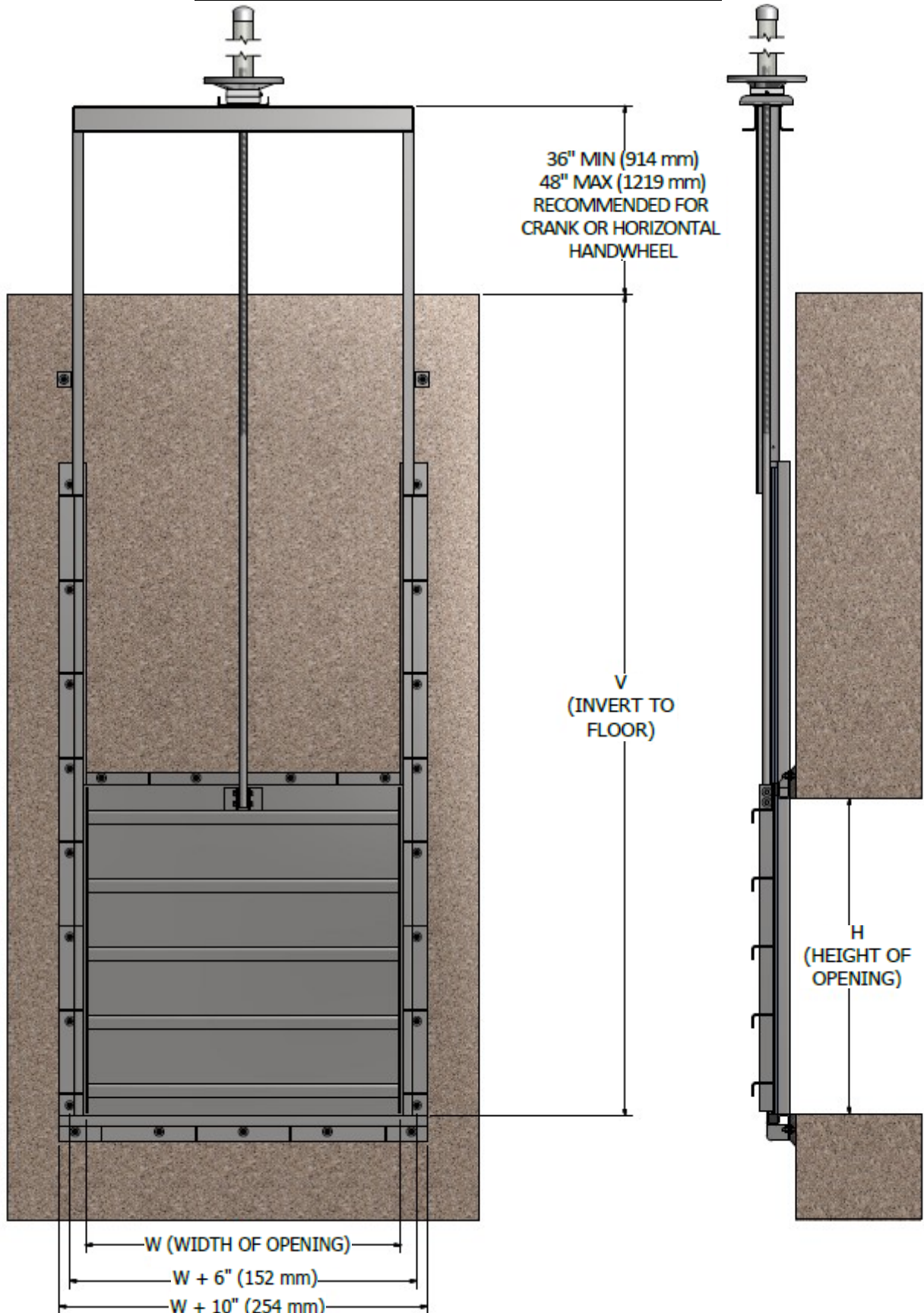
GATE ILLUSTRATED: 96" (W) x 36" (H) x 84" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 923-D-I Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °DOWNWARD OPENING
- °OPEN CHANNEL - OPTIONAL TOP SEAL
- °YOKE MOUNTED INTERCONNECTED ACTUATORS



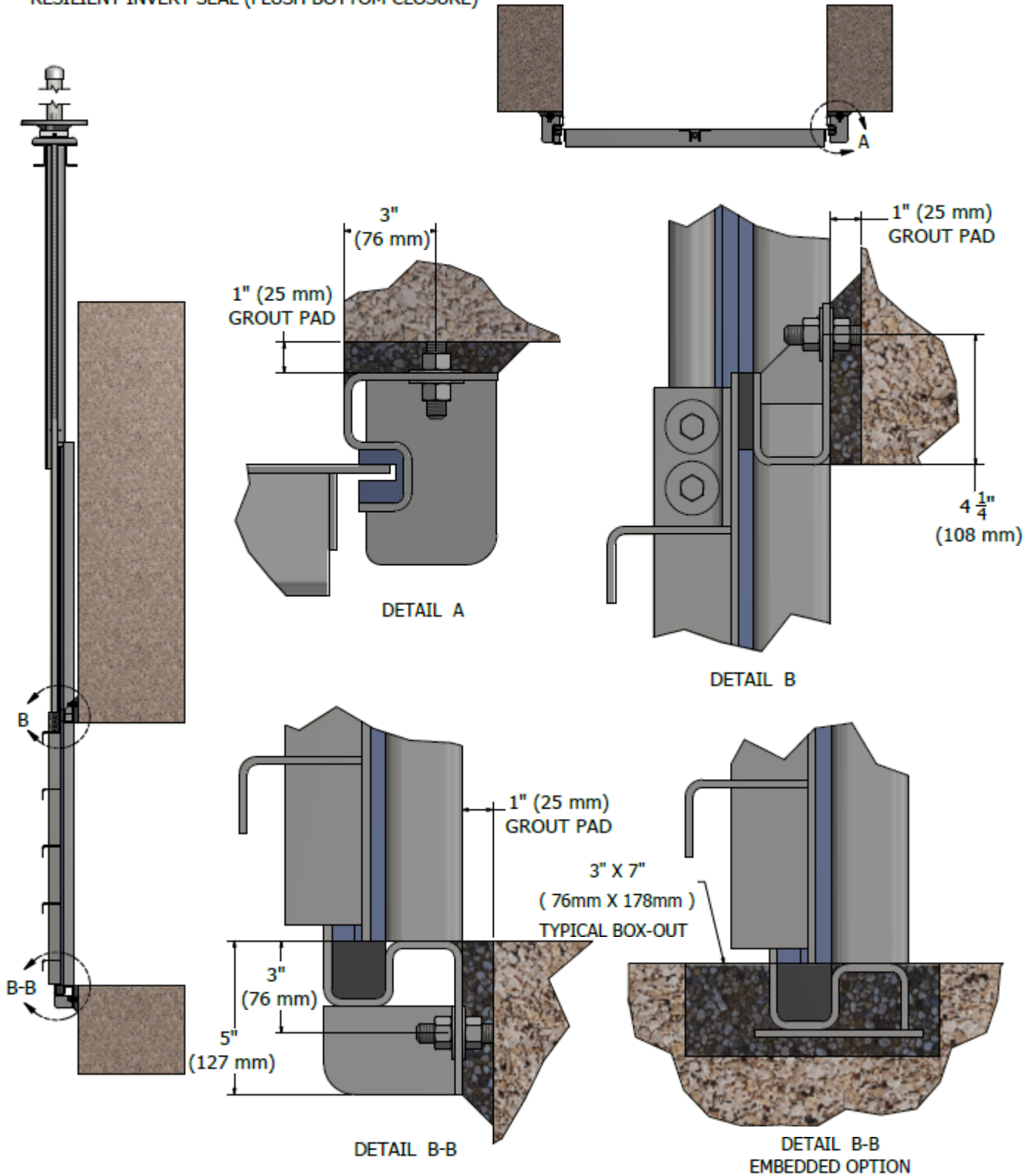
Model 924 Sluice Gate



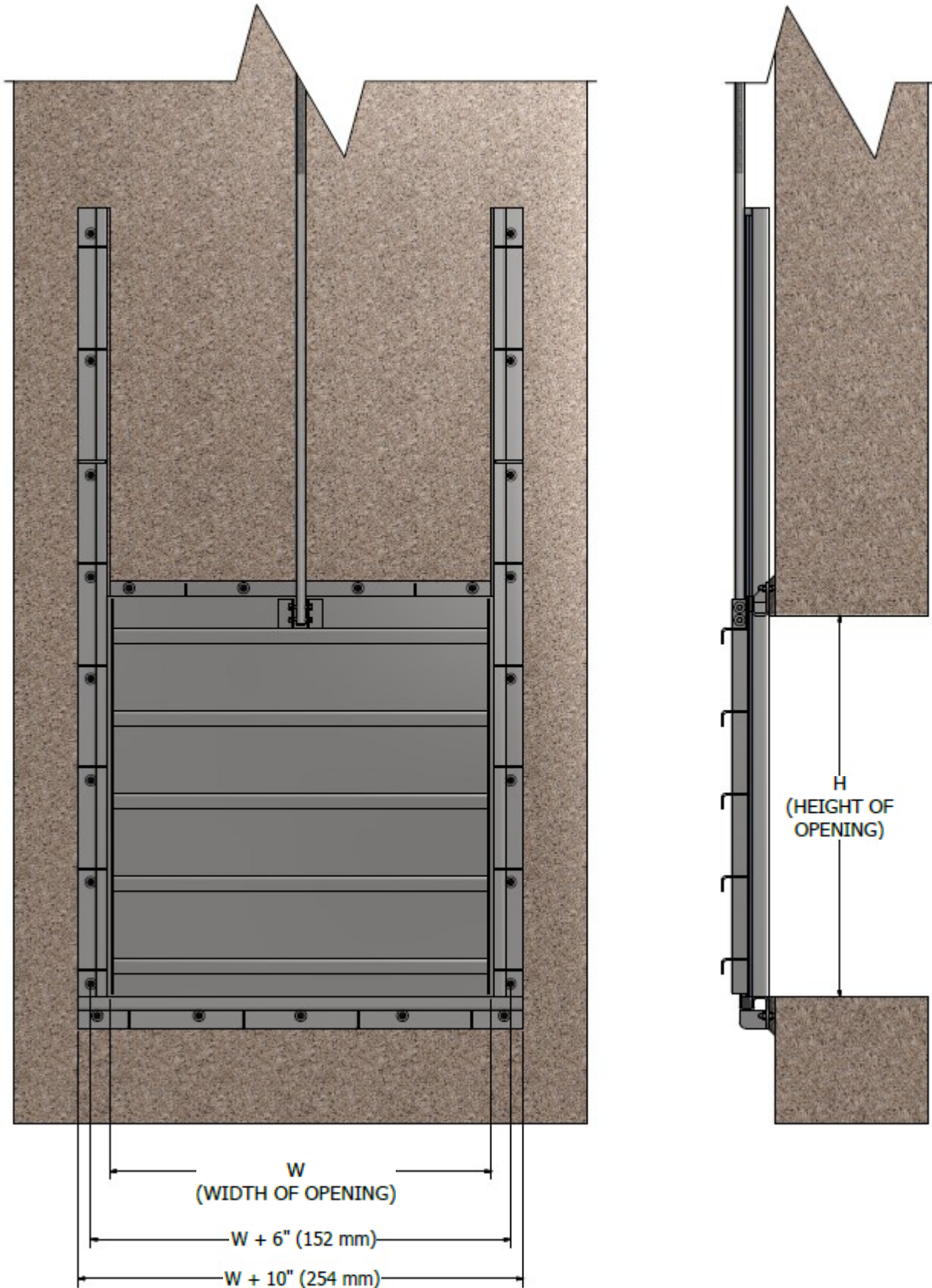
GATE ILLUSTRATED: 60" (W) x 60" (H) x 156" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 924 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °FULL APERTURE SEALING
- °YOKE MOUNTED ACTUATORS
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



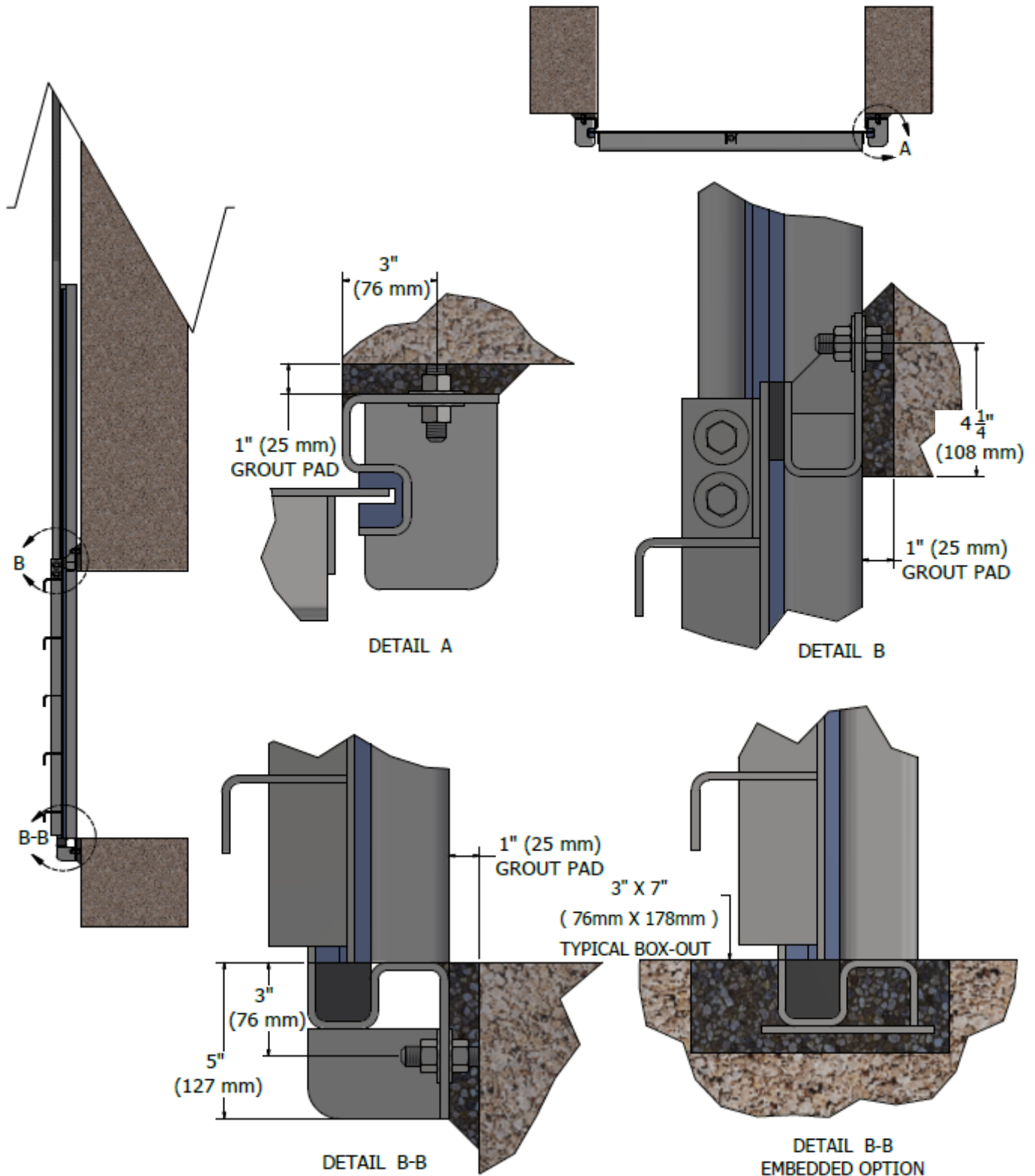
Model 925 Sluice Gate



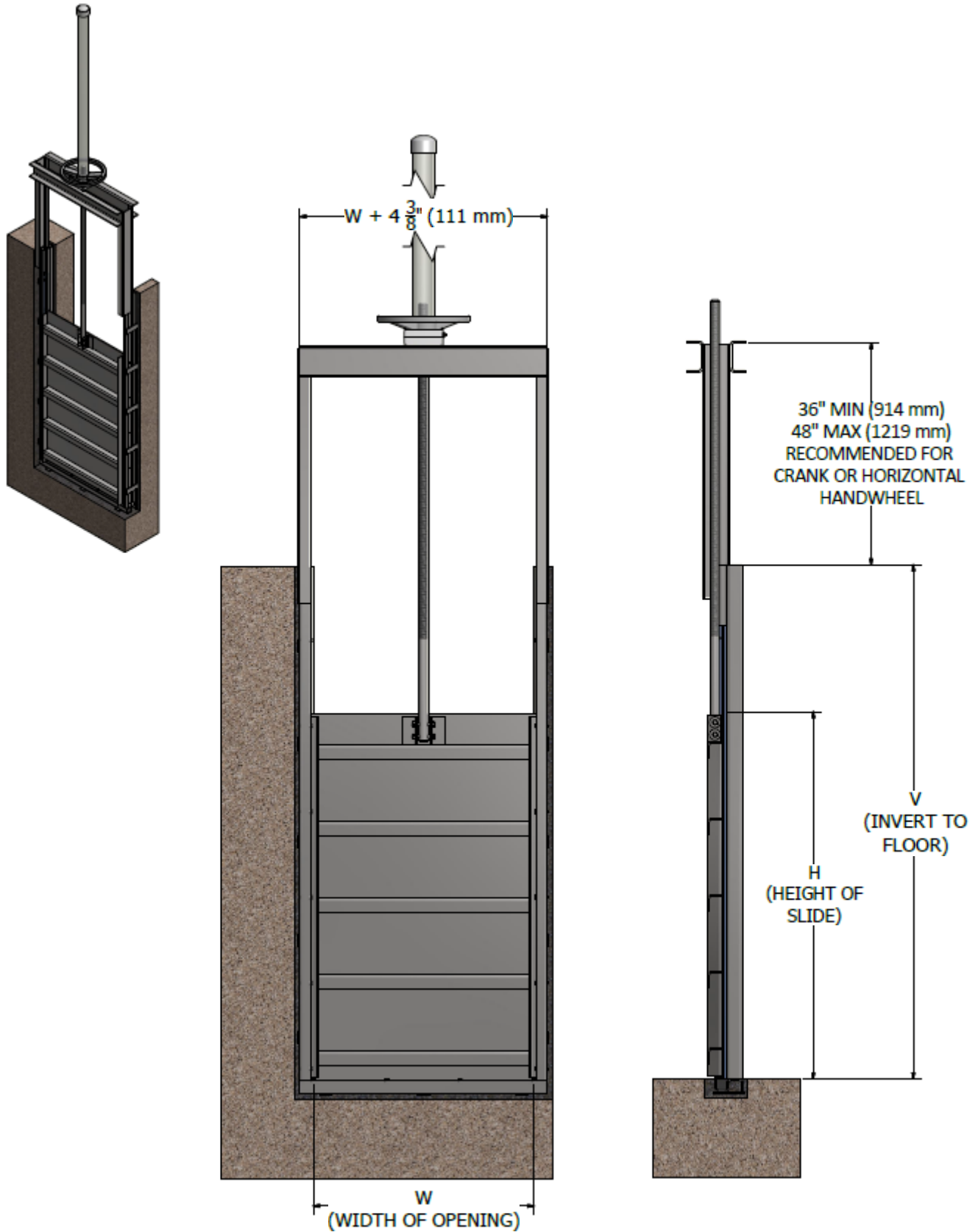
GATE ILLUSTRATED: 60" (W) x 60" (H)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 925 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °FULL APERTURE SEALING
- °PEDESTAL, WALL BRACKET OR FLOOR BOX MOUNTED ACTUATOR
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



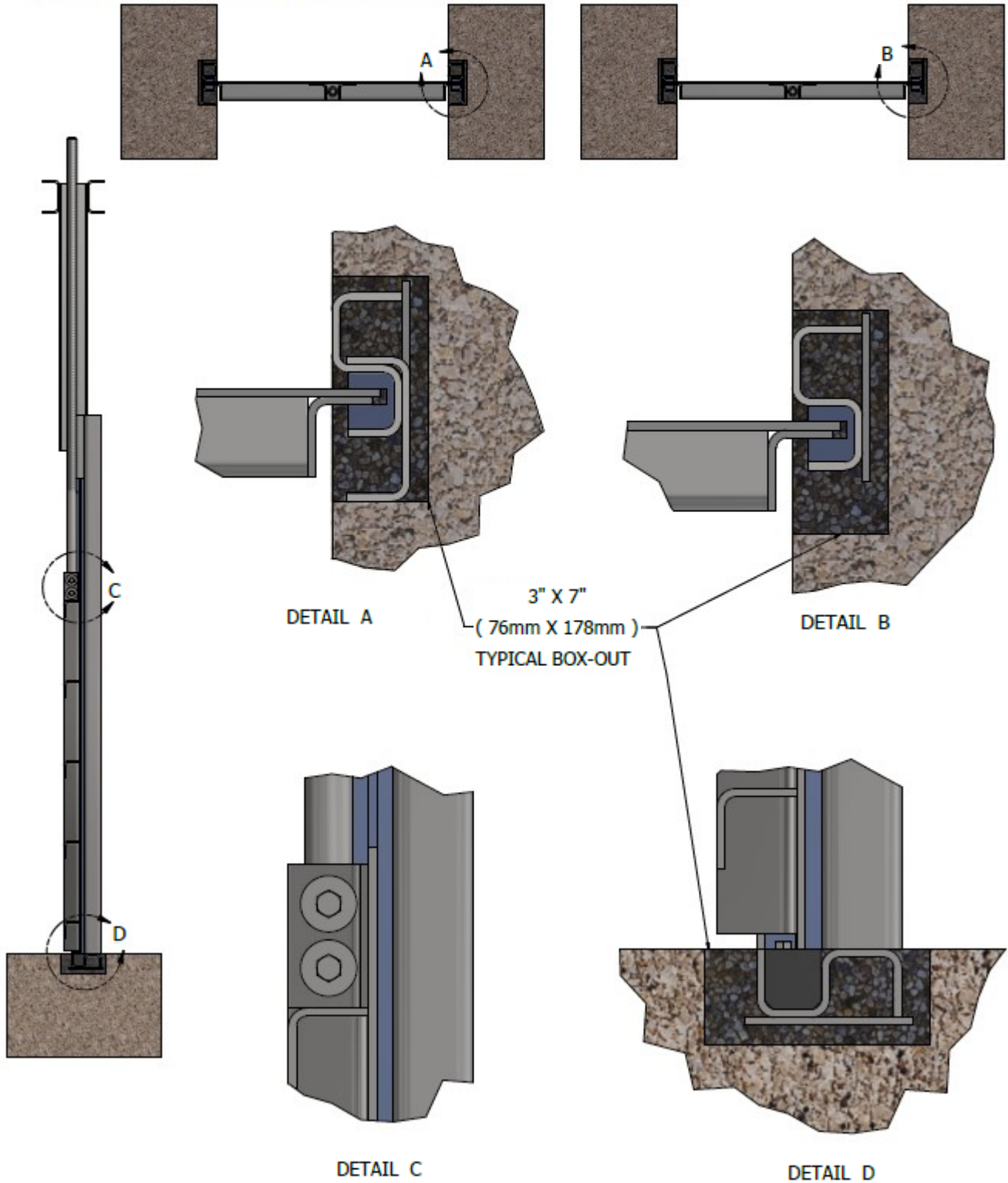
Model 931 Slide Gate



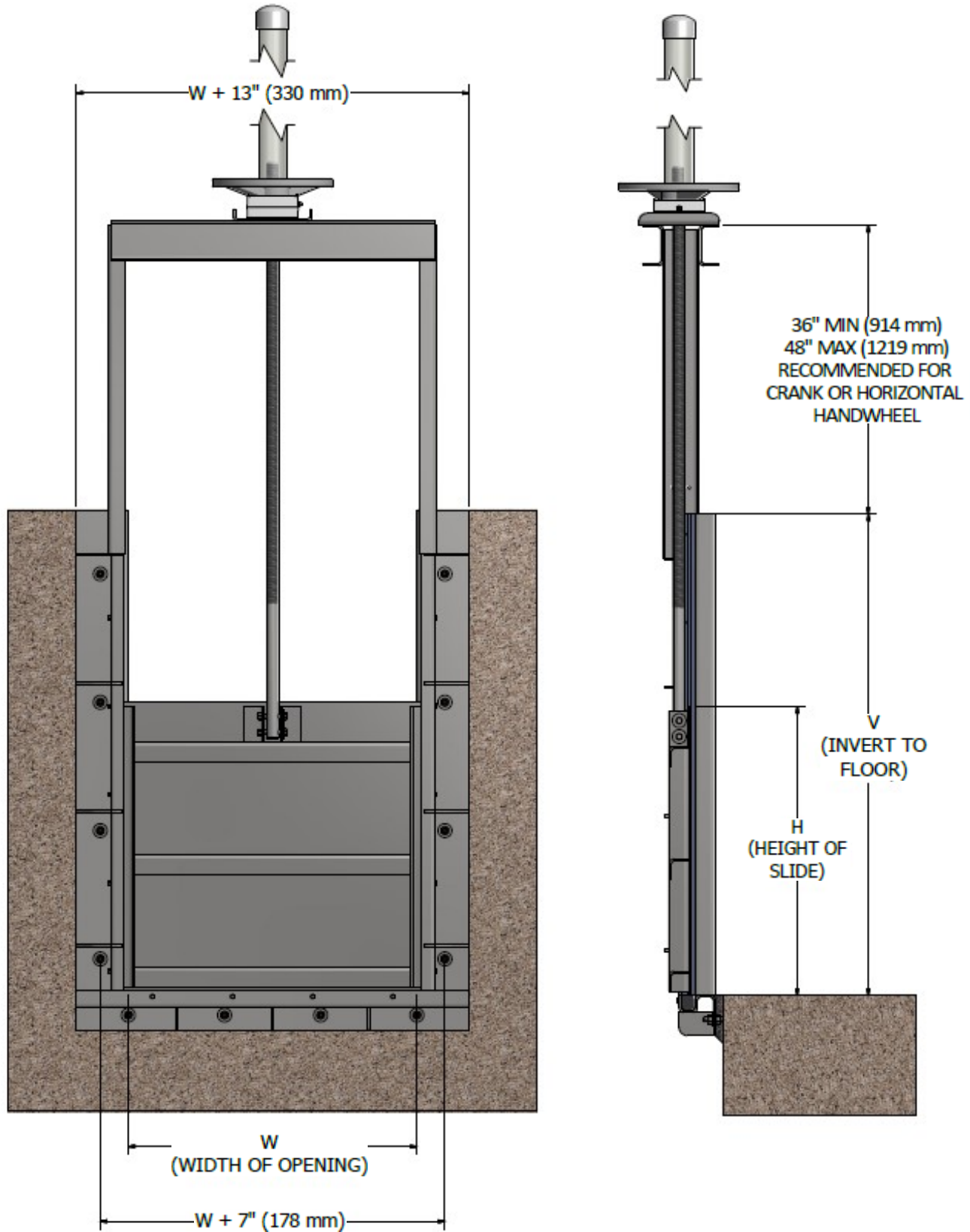
GATE ILLUSTRATED: 36" (W) x 96" (H) x 84" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 931 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °EMBEDDED FRAMES
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATOR
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



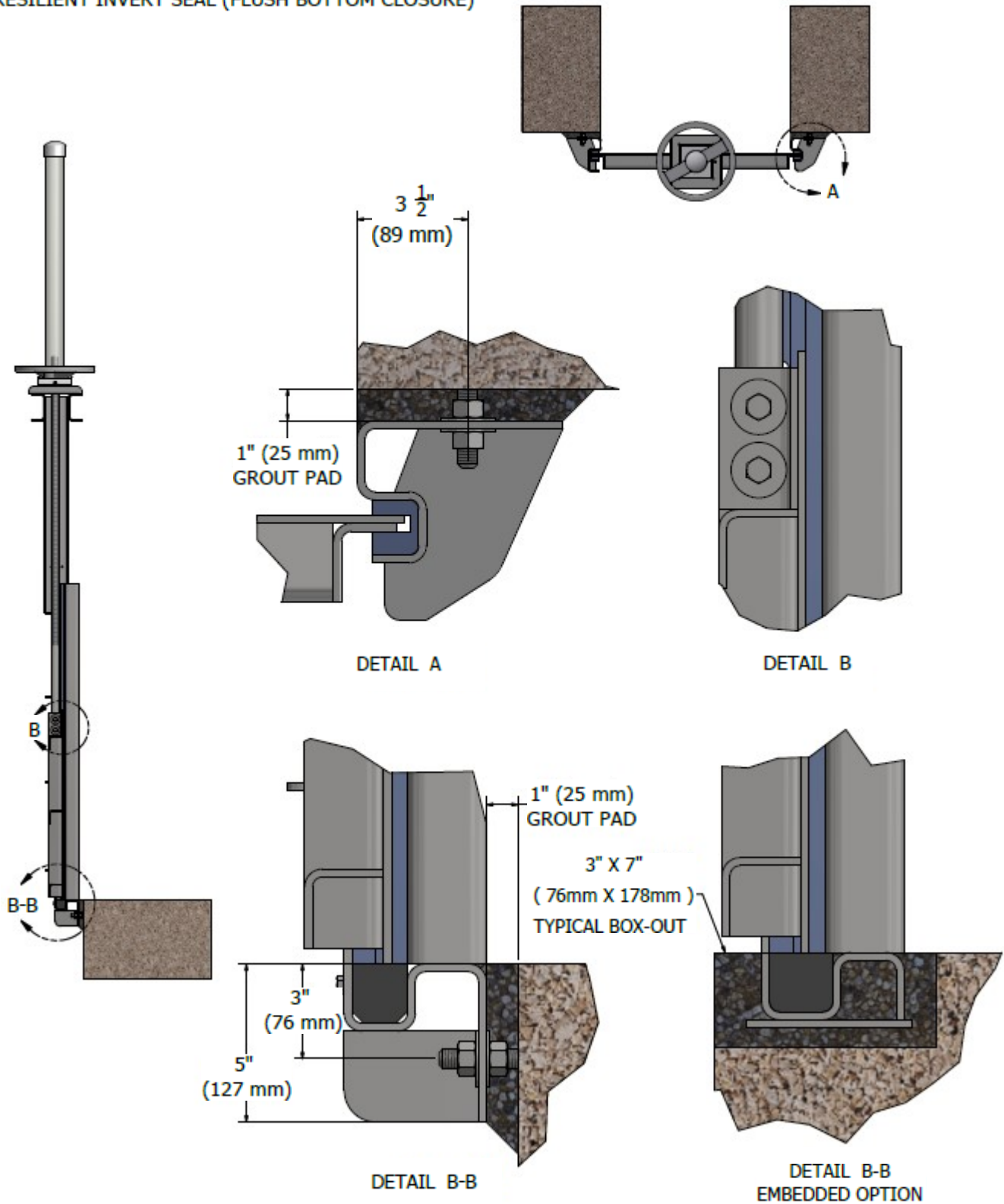
Model 933 Slide Gate



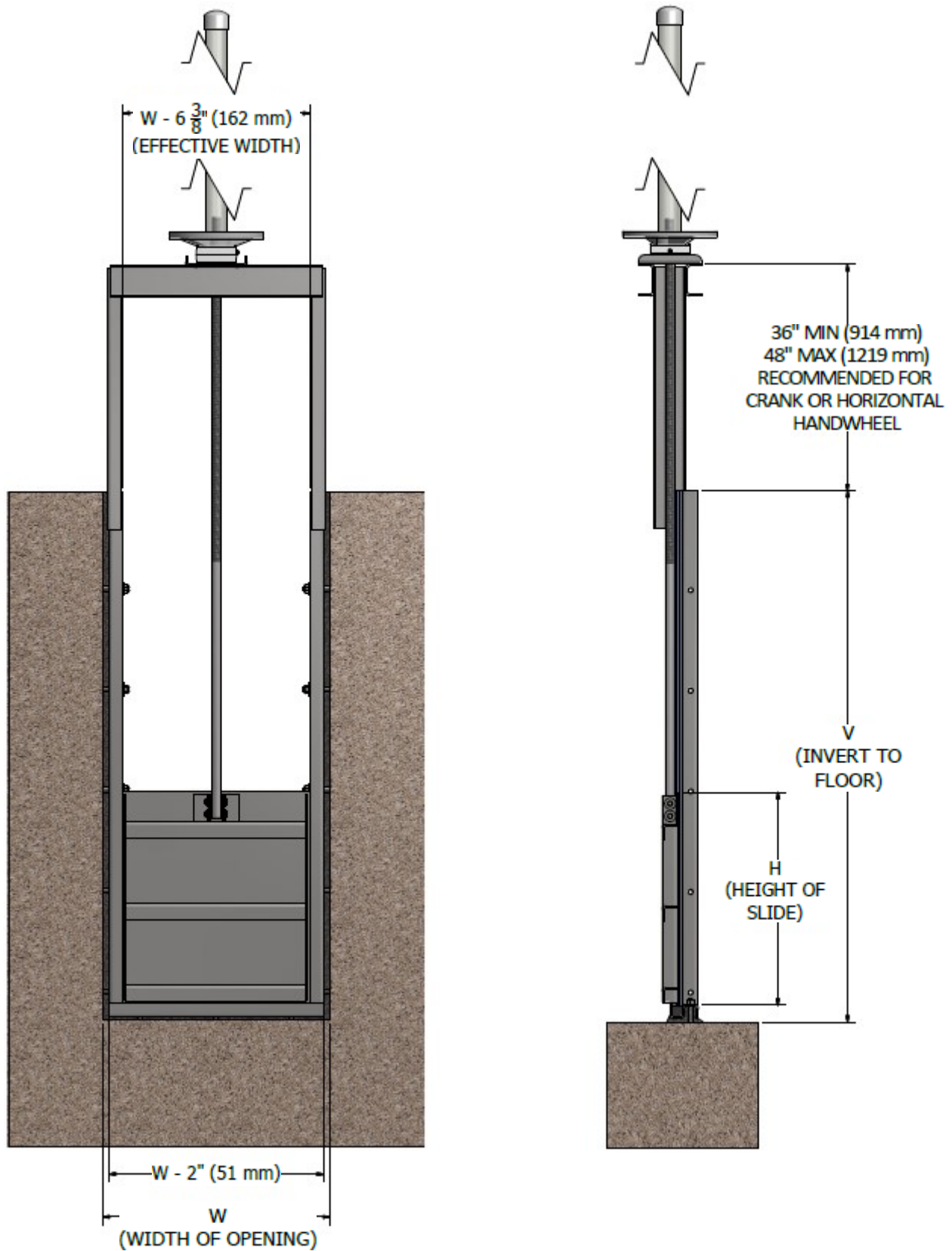
GATE ILLUSTRATED: 36" (W) x 36" (H) x 60" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 933 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATORS
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



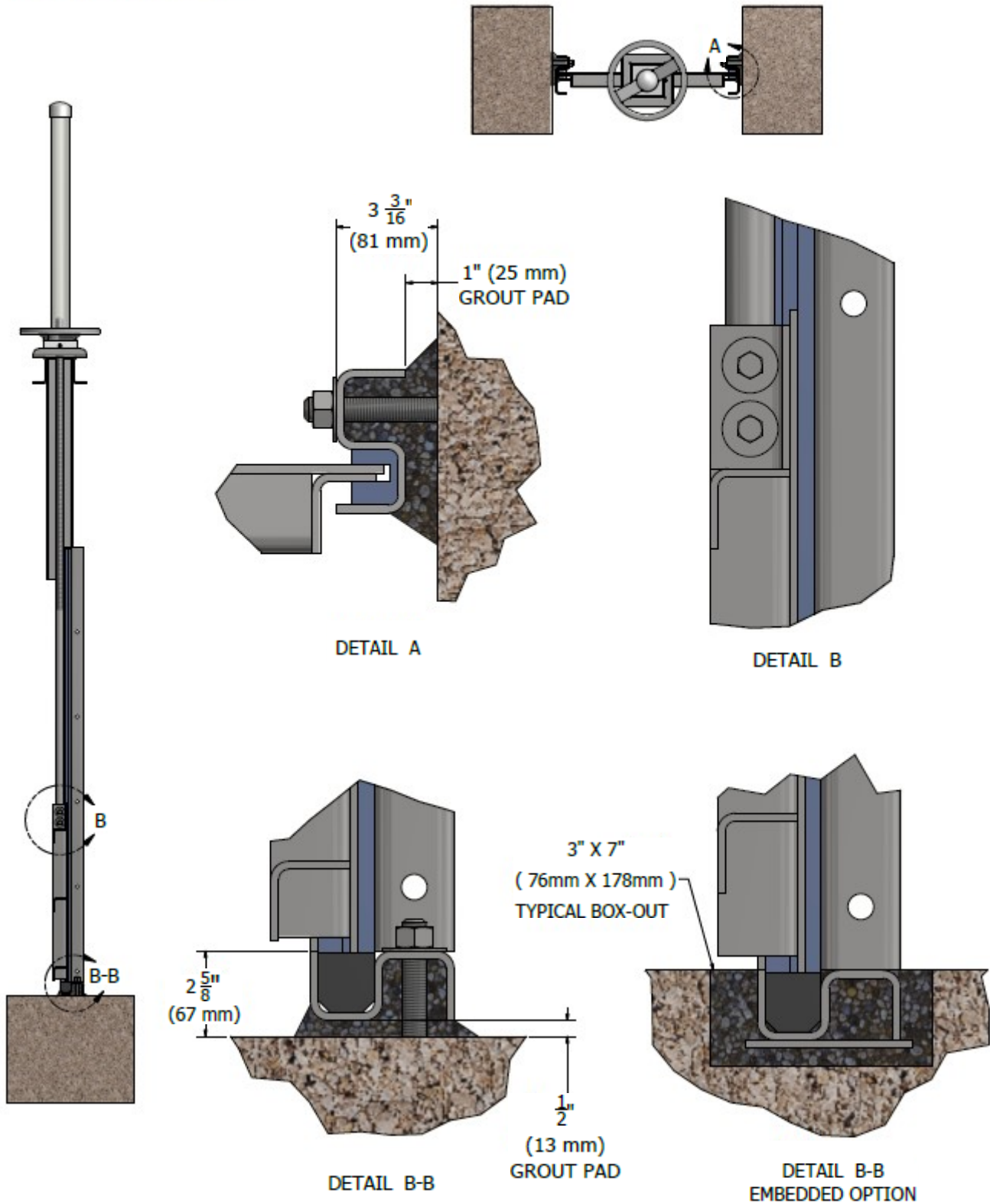
Model 933-C Slide Gate



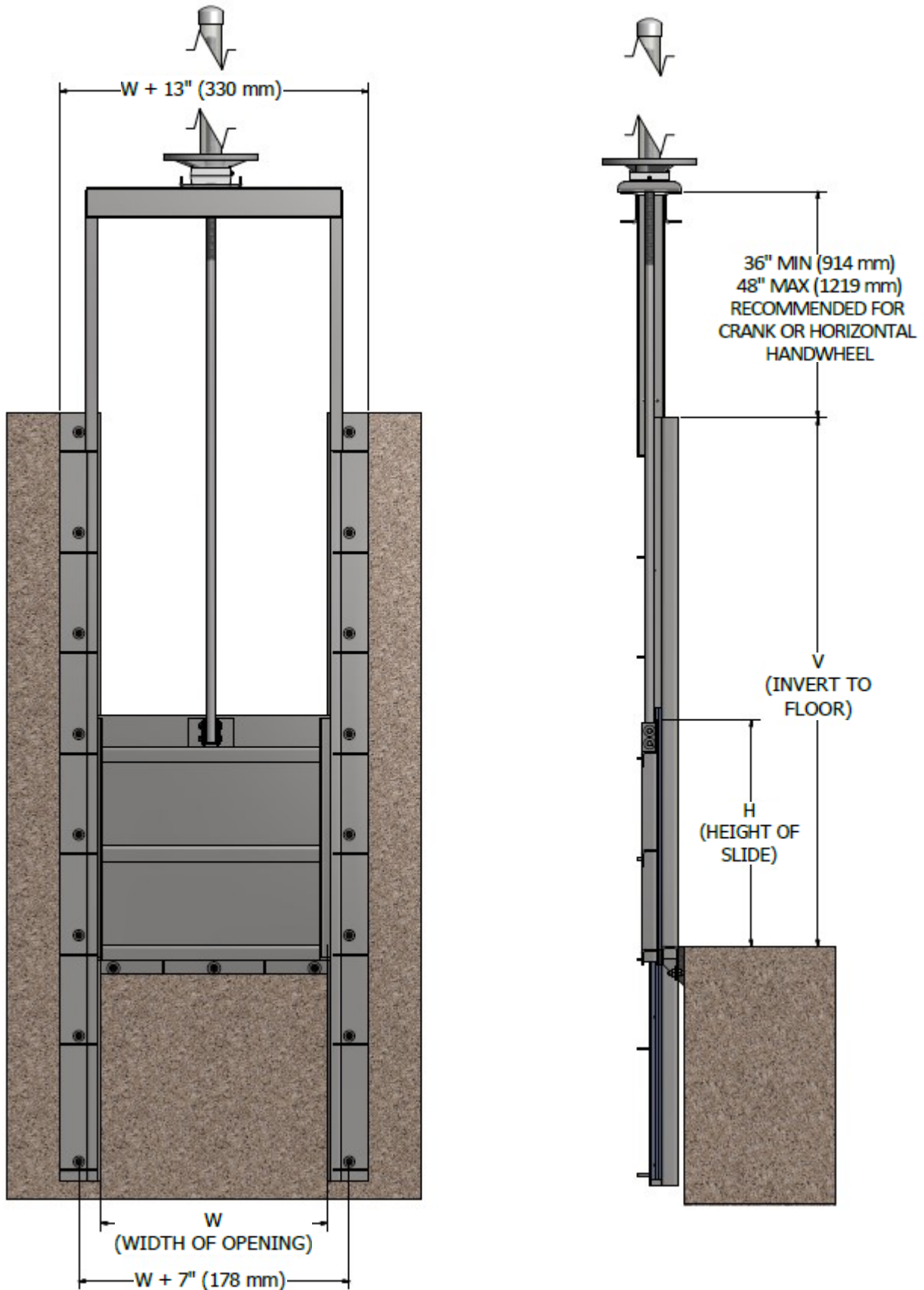
GATE ILLUSTRATED: 36" (W) x 36" (H) x 84" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 933-C Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °FRAME MOUNTS IN EXISTING CHANNEL
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATOR



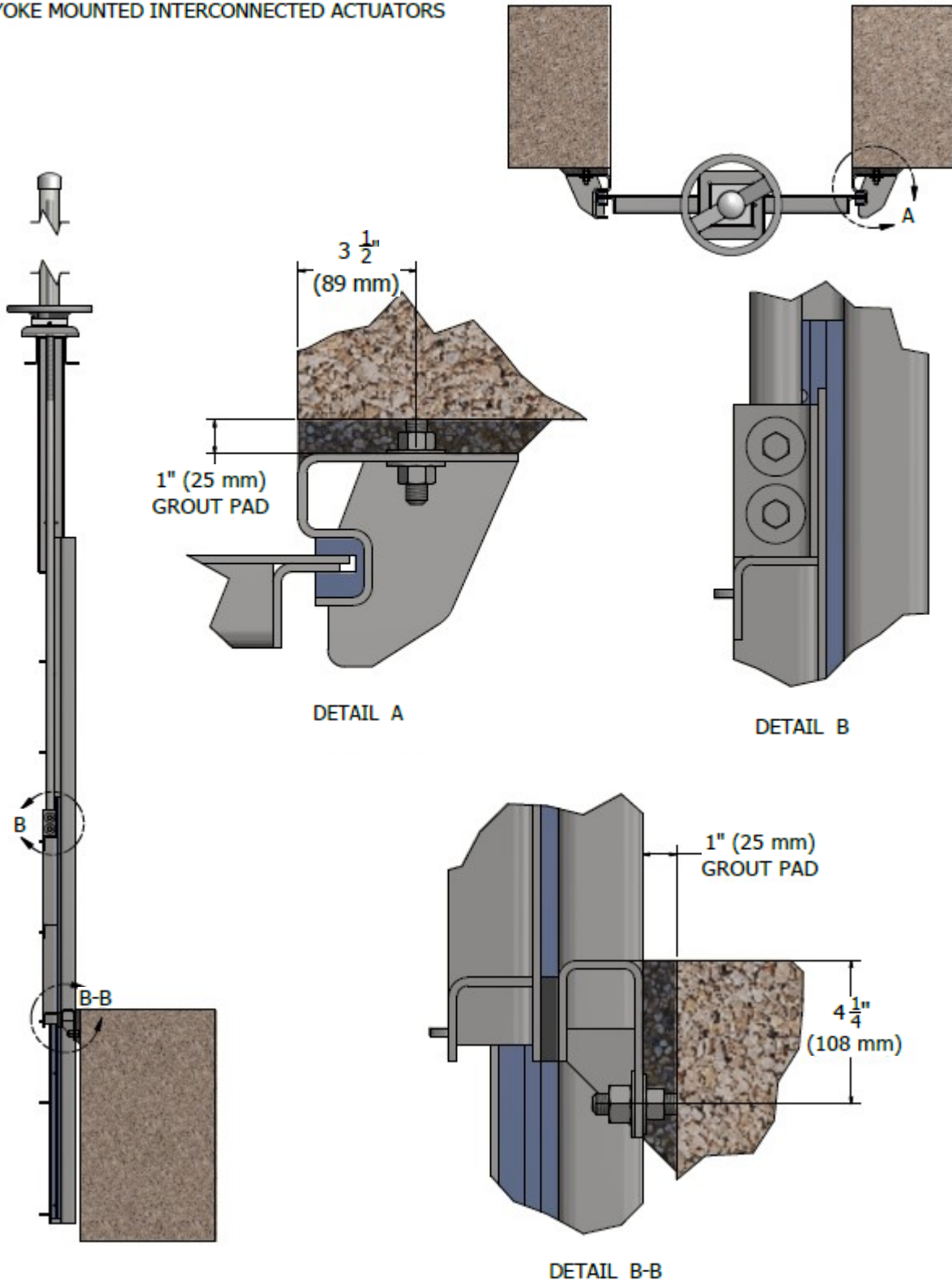
Model 933-D Slide Gate



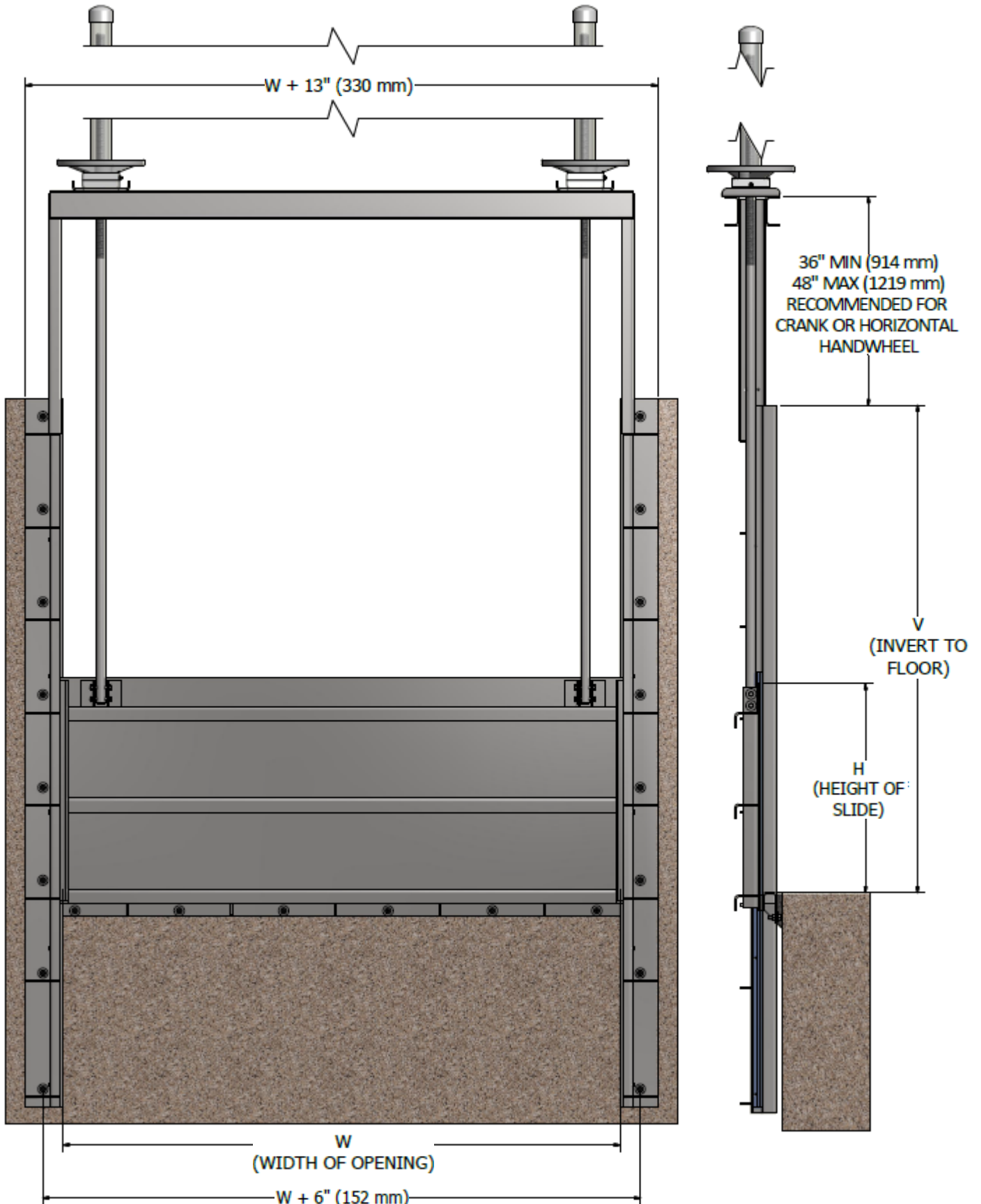
GATE ILLUSTRATED: 36" (W) x 36" (H) x 84" (V)
 SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 933-D Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °DOWNWARD OPENING
- °OPEN CHANNEL - OPTIONAL TOP SEAL
- °YOKE MOUNTED INTERCONNECTED ACTUATORS



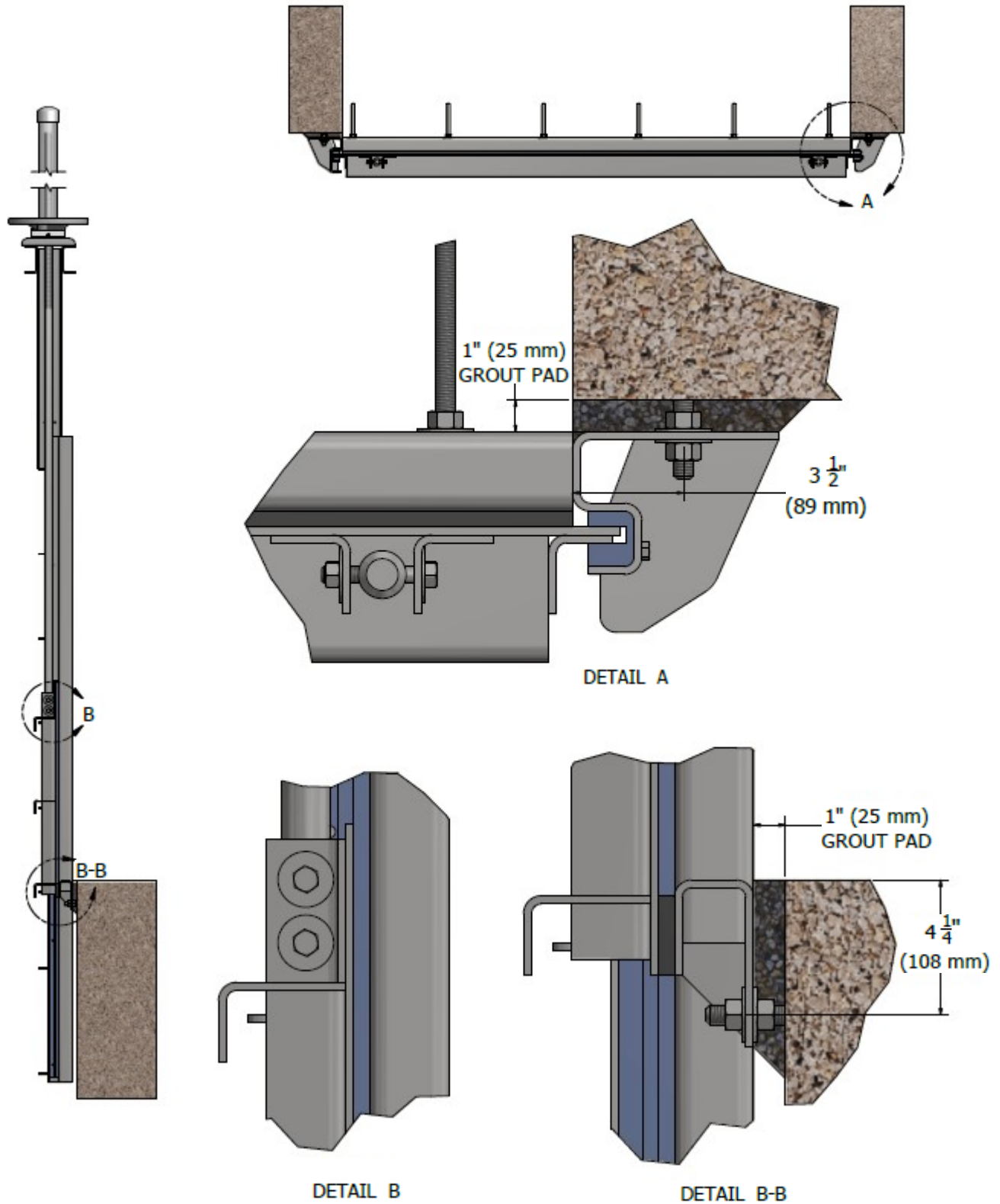
Model 933-D-I Slide Gate



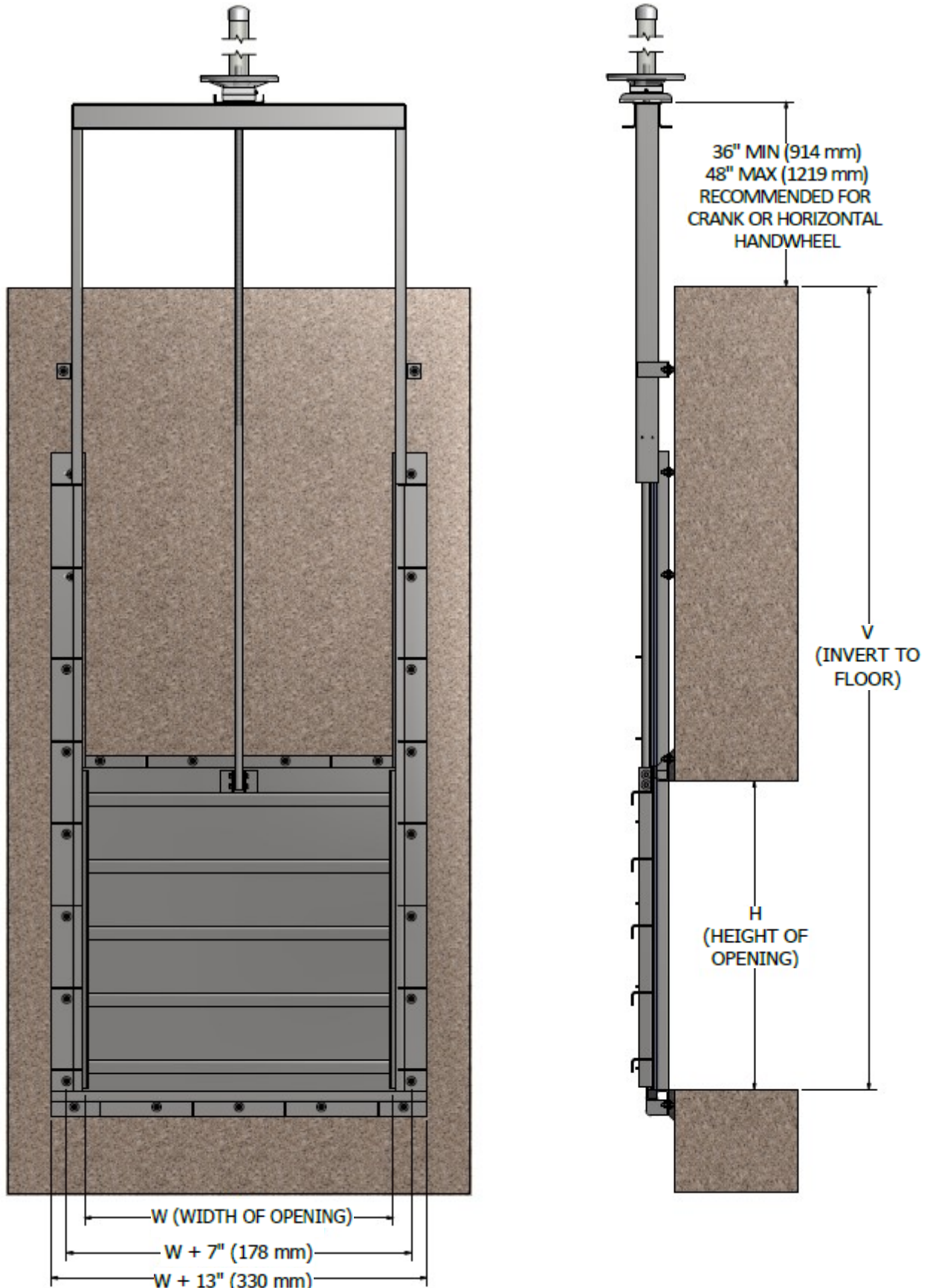
GATE ILLUSTRATED: 96" (W) x 36" (H) x 84" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 933-D-I Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °DOWNWARD OPENING
- °OPEN CHANNEL - OPTIONAL TOP SEAL
- °YOKE MOUNTED INTERCONNECTED ACTUATORS



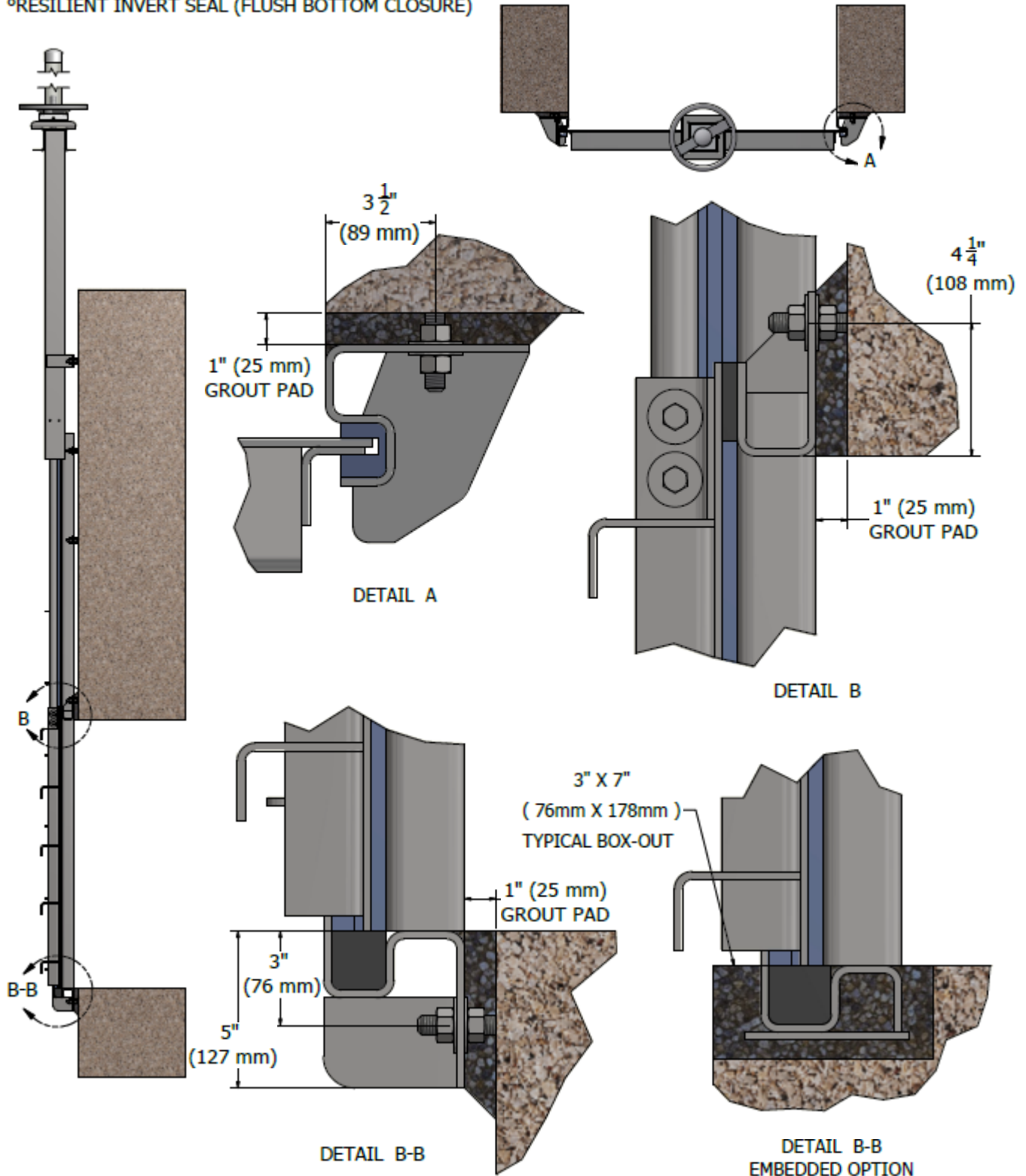
Model 934 Sluice Gate



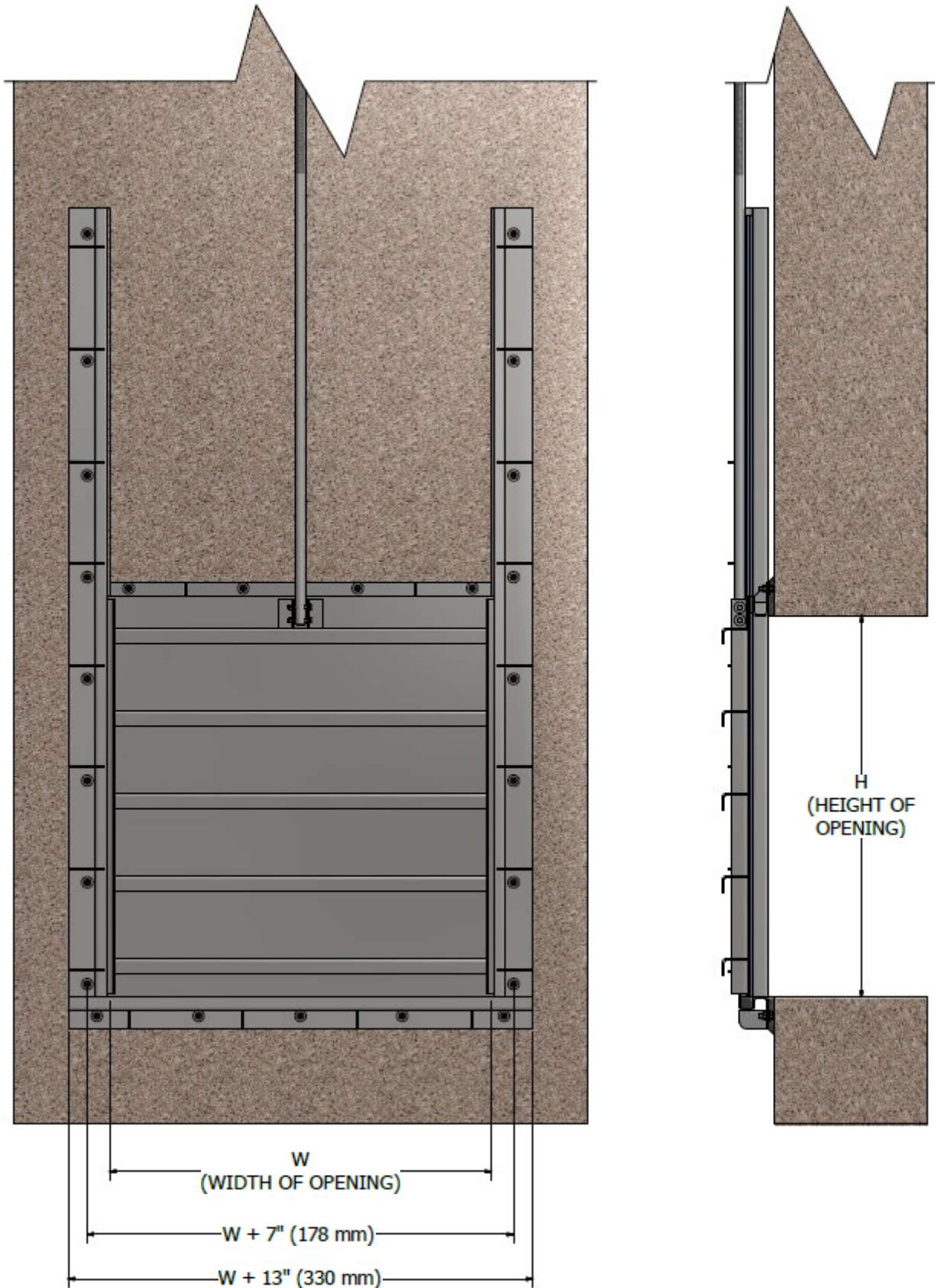
GATE ILLUSTRATED: 60" (W) x 60" (H) x 156" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 934 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °FULL APERTURE SEALING
- °YOKE MOUNTED ACTUATORS
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



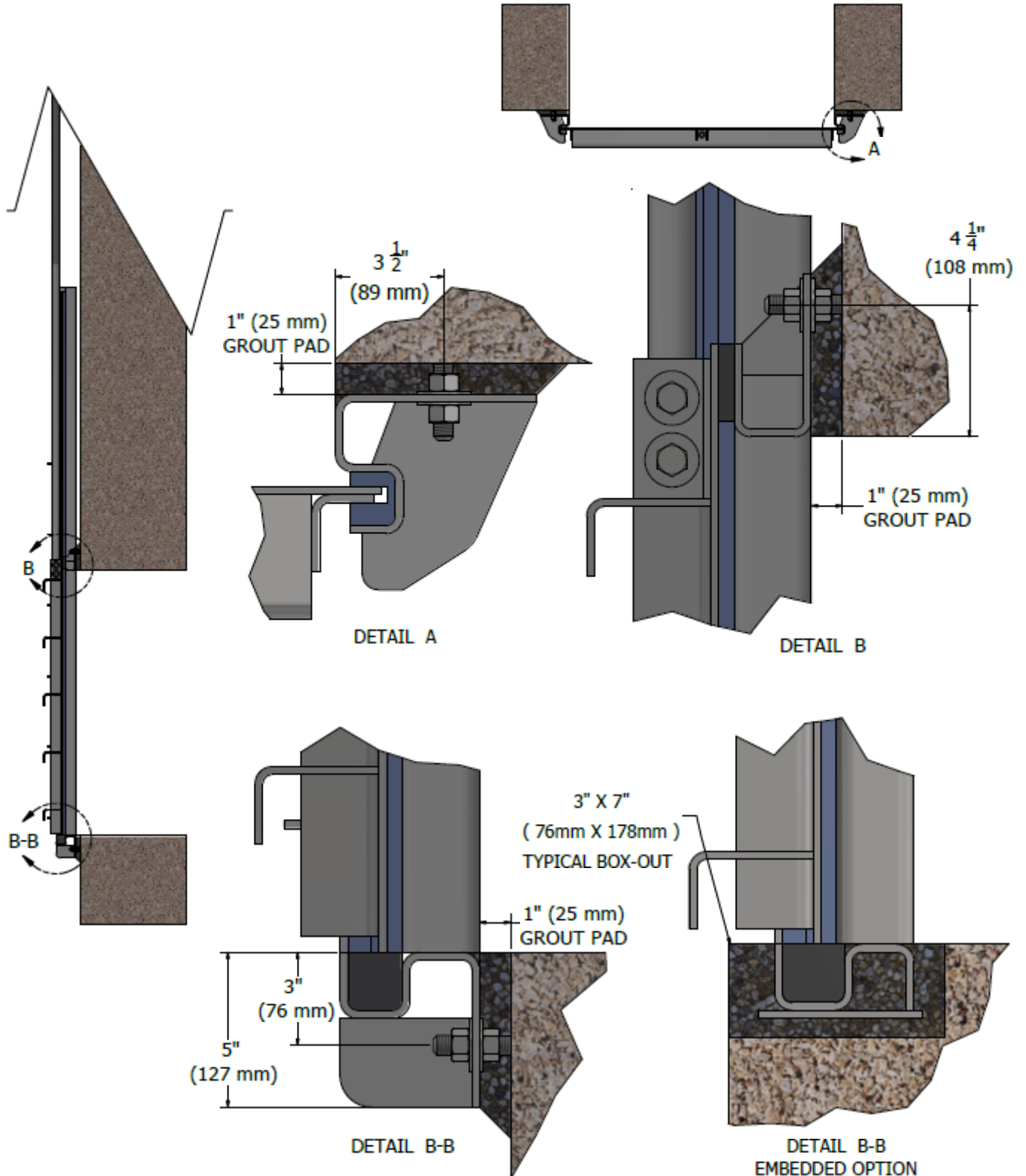
Model 935 Sluice Gate



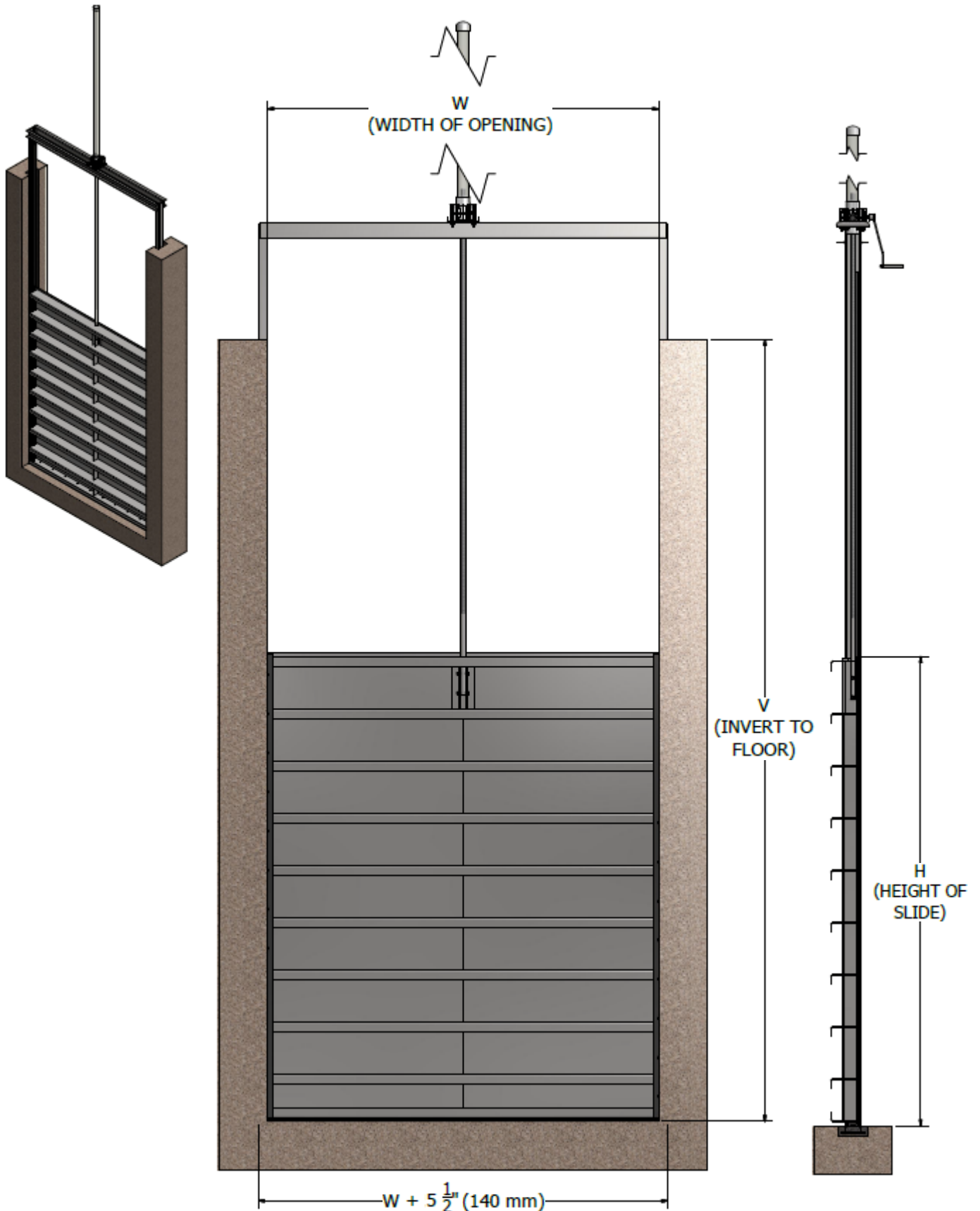
GATE ILLUSTRATED: 60" (W) x 60" (H)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 935 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °FULL APERTURE SEALING
- °PEDESTAL, WALL BRACKET OR FLOOR BOX MOUNTED ACTUATOR
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



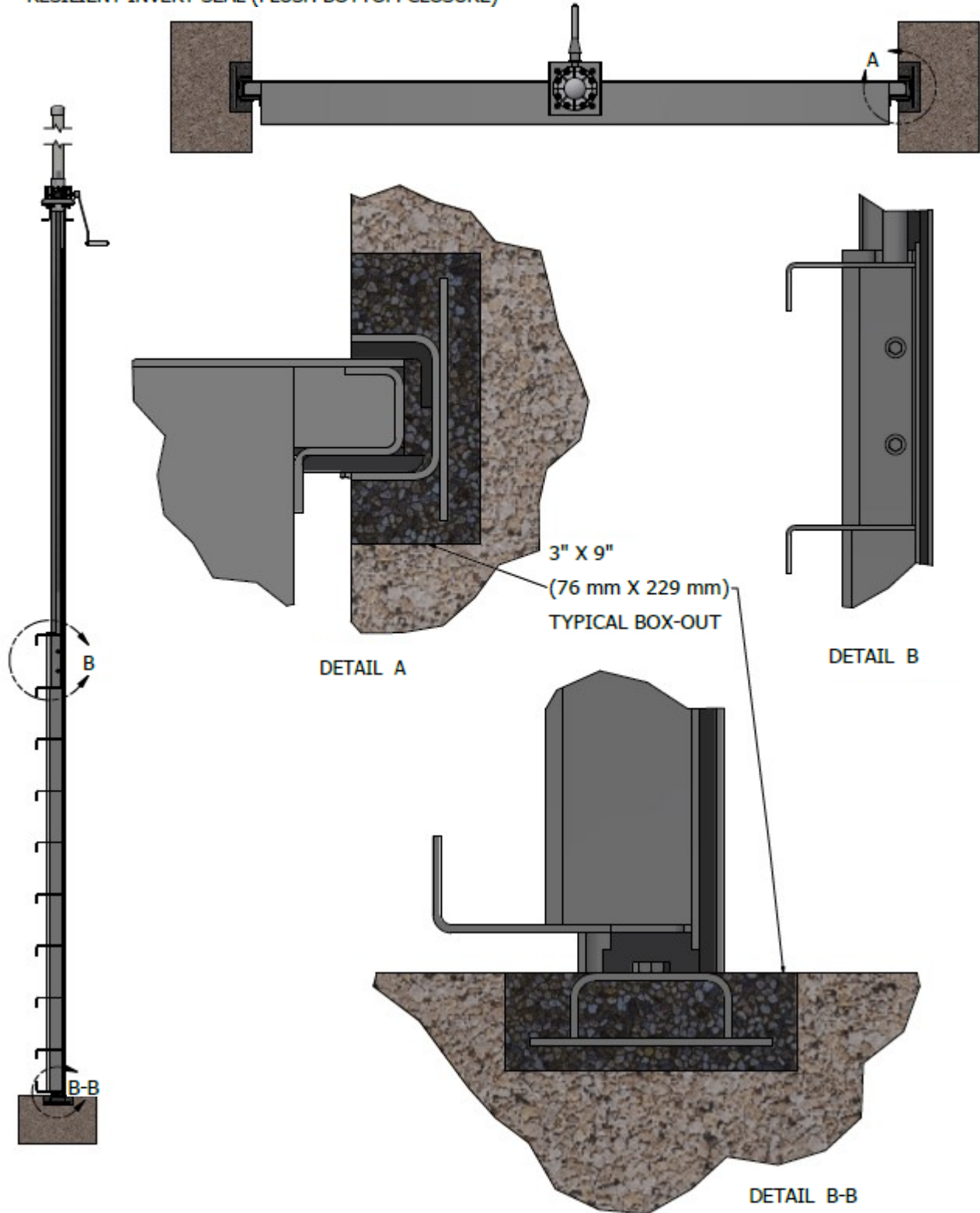
Model 951 Slide Gate



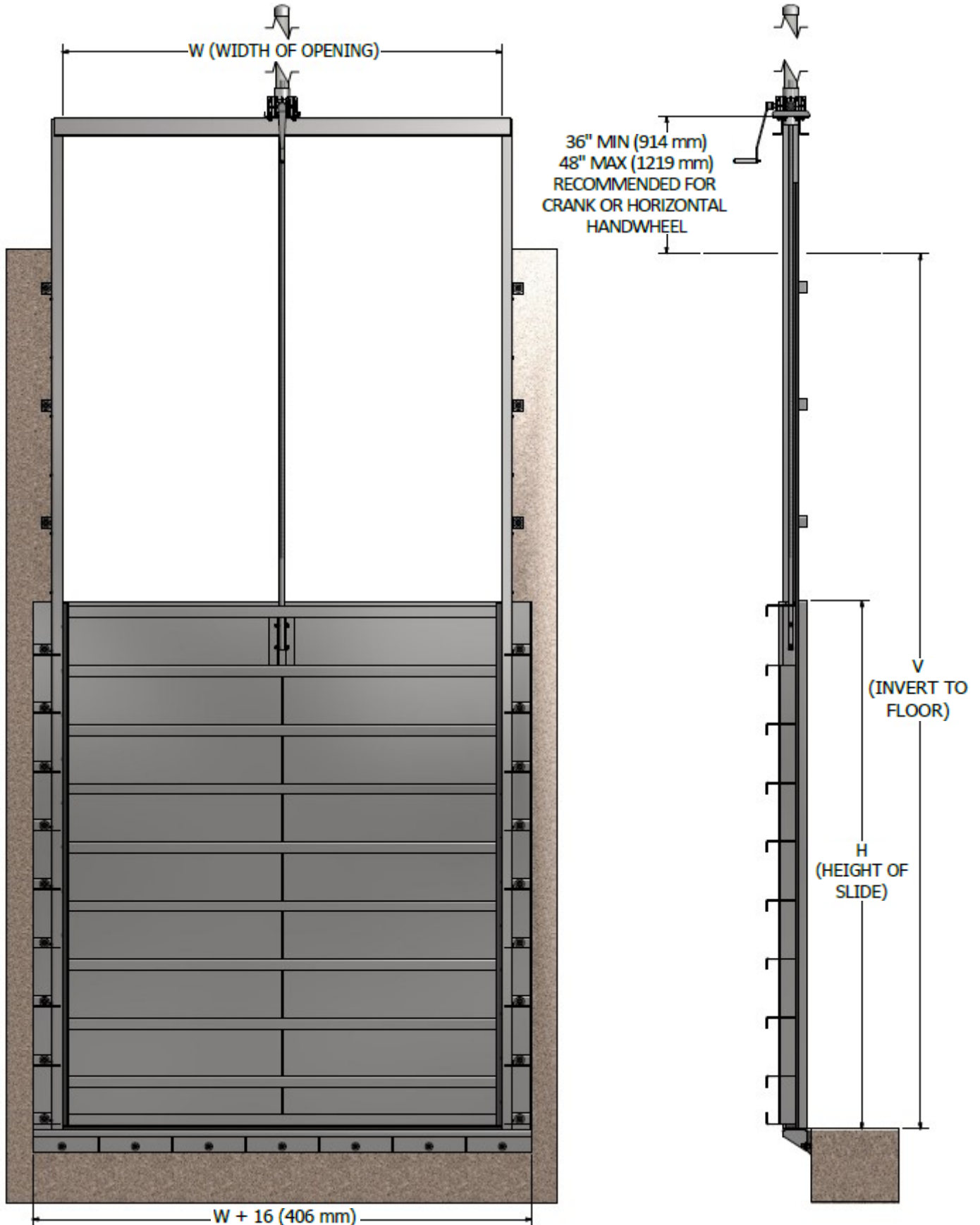
GATE ILLUSTRATED: 120" (W) x 144" (H) x 240" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 951 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °EMBEDDED FRAMES
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATOR
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



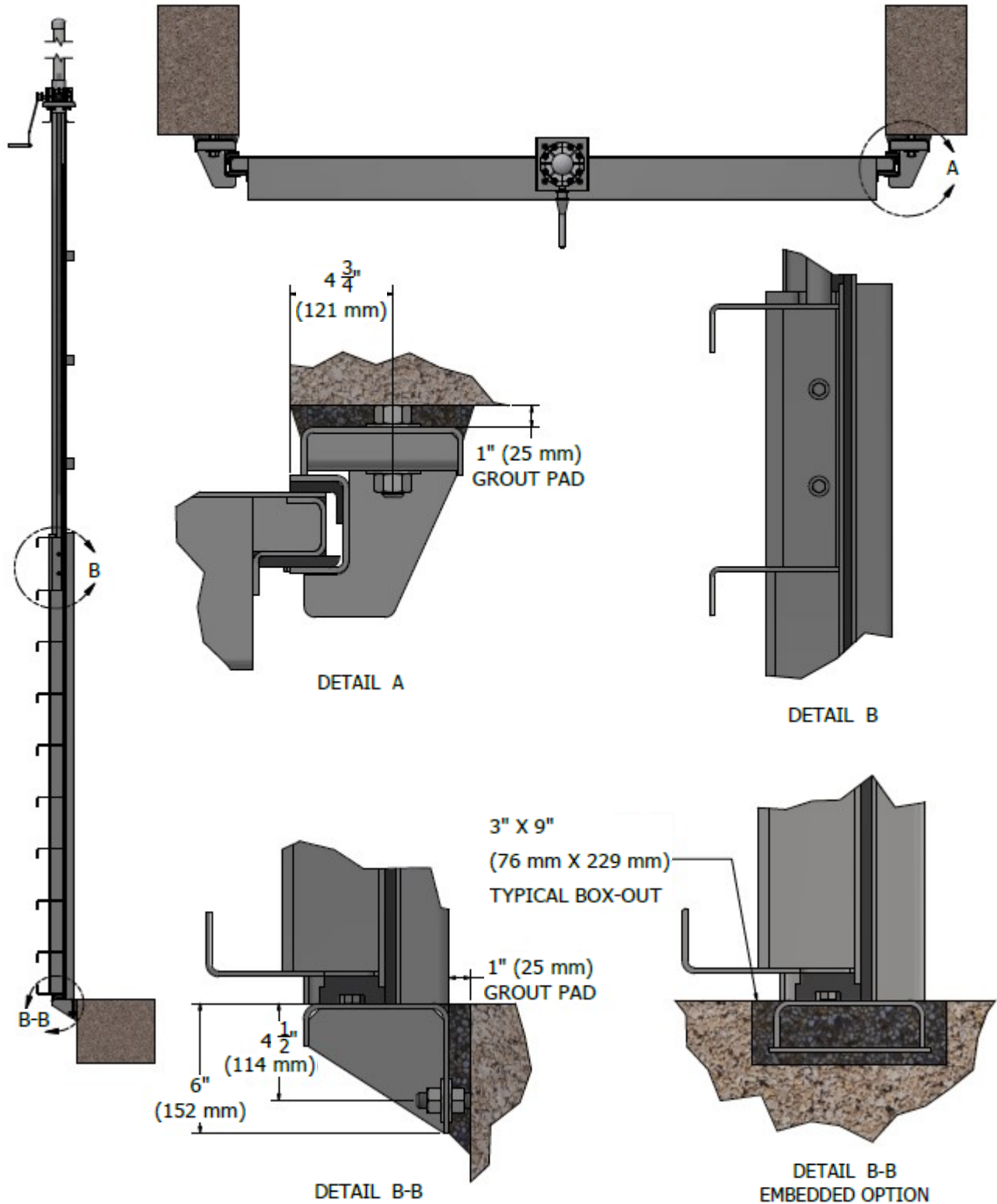
Model 953 Slide Gate



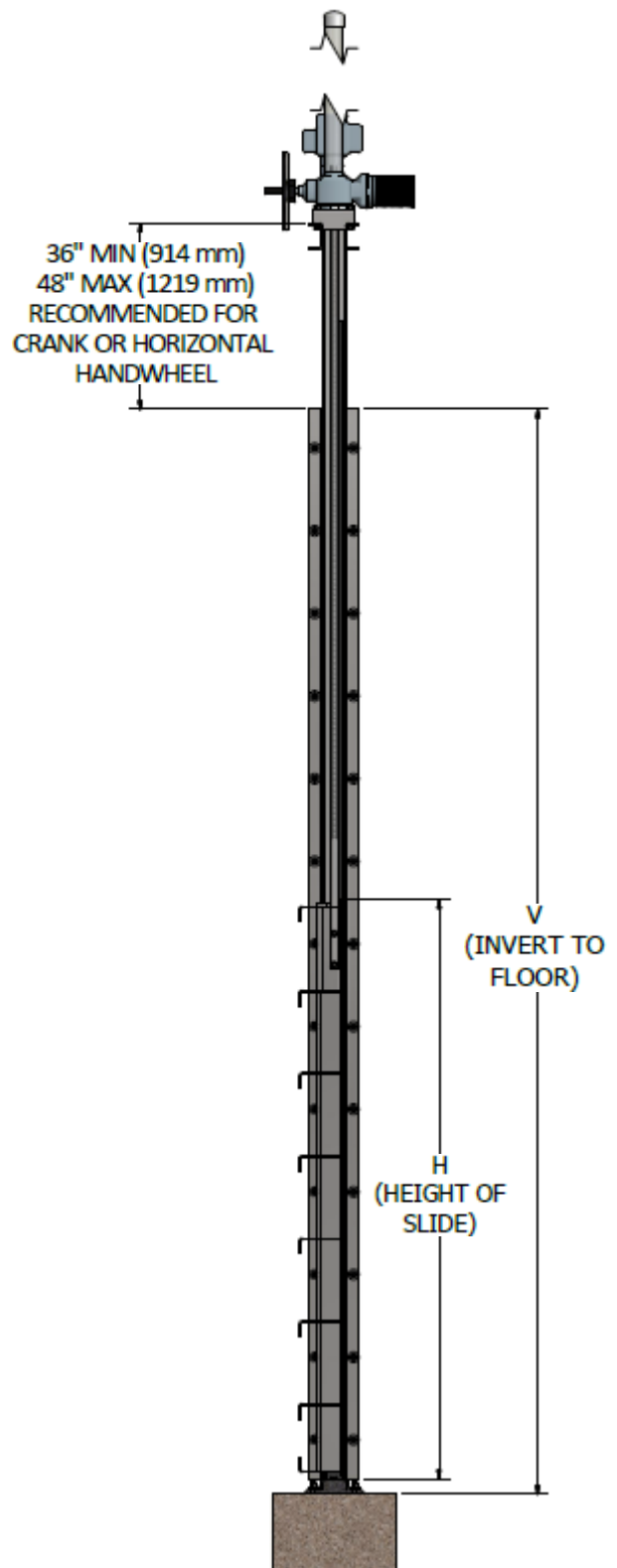
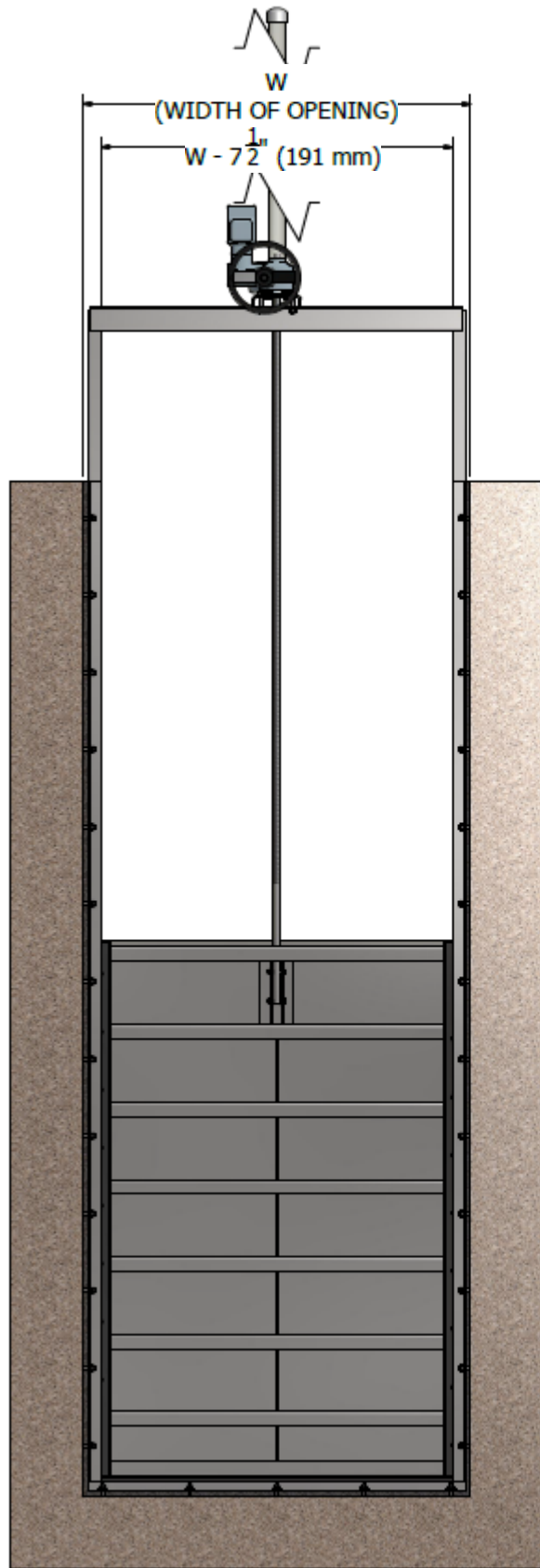
GATE ILLUSTRATED: 120" (W) x 144" (H) x 240" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 953 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATORS
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



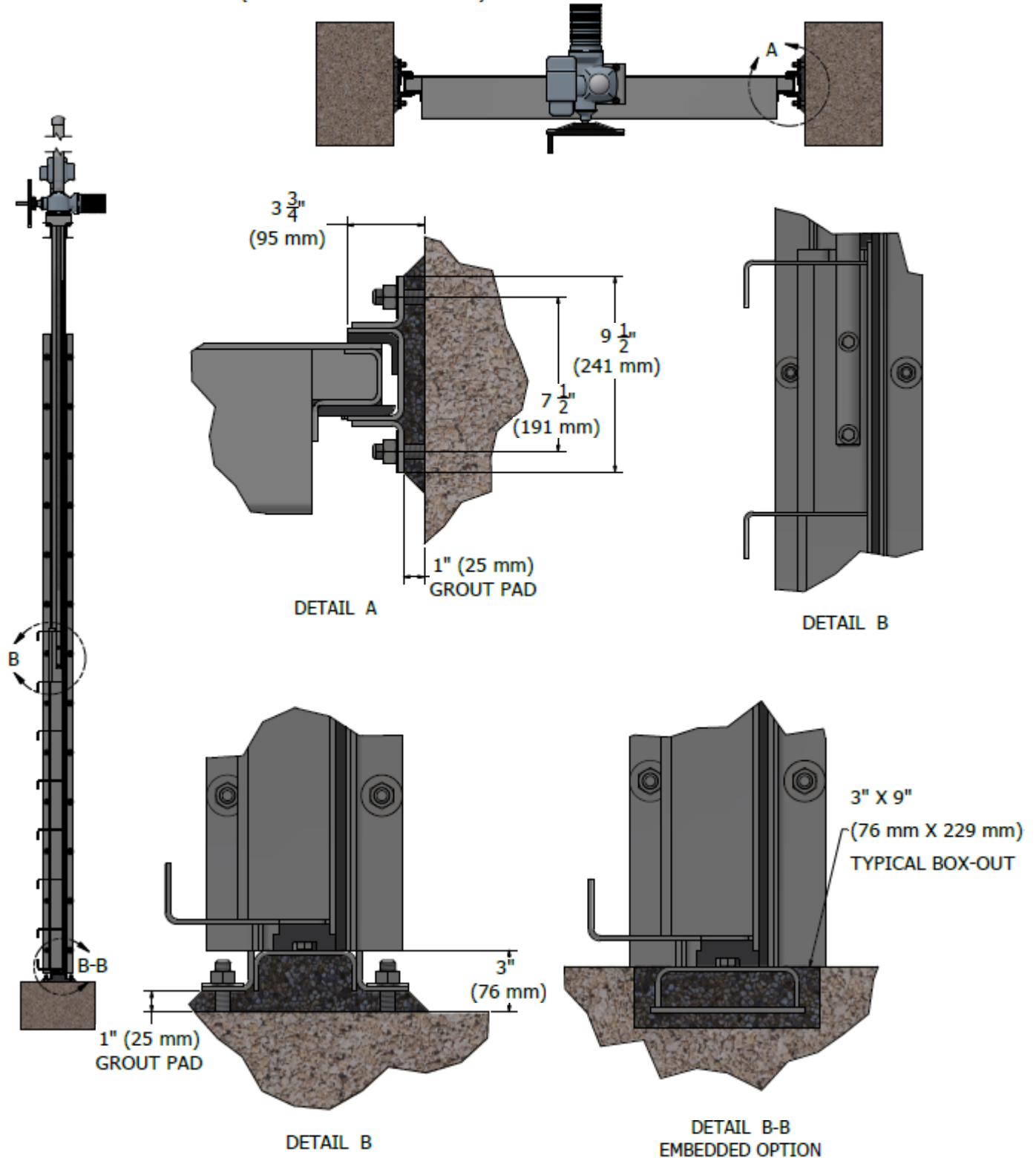
Model 953-C Slide Gate



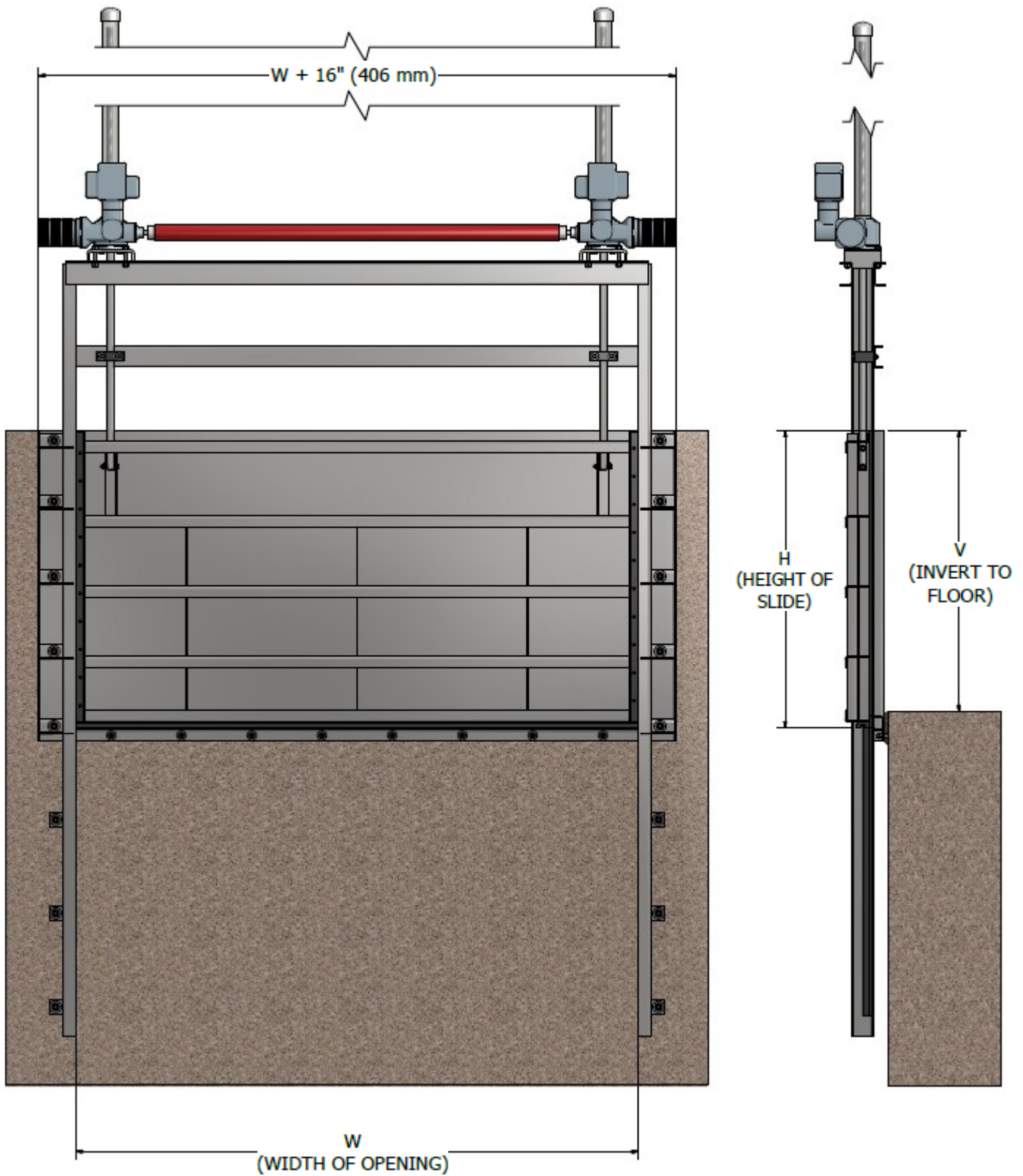
GATE ILLUSTRATED: 80" (W) x 112" (H) x 210" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 953-C Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATORS
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



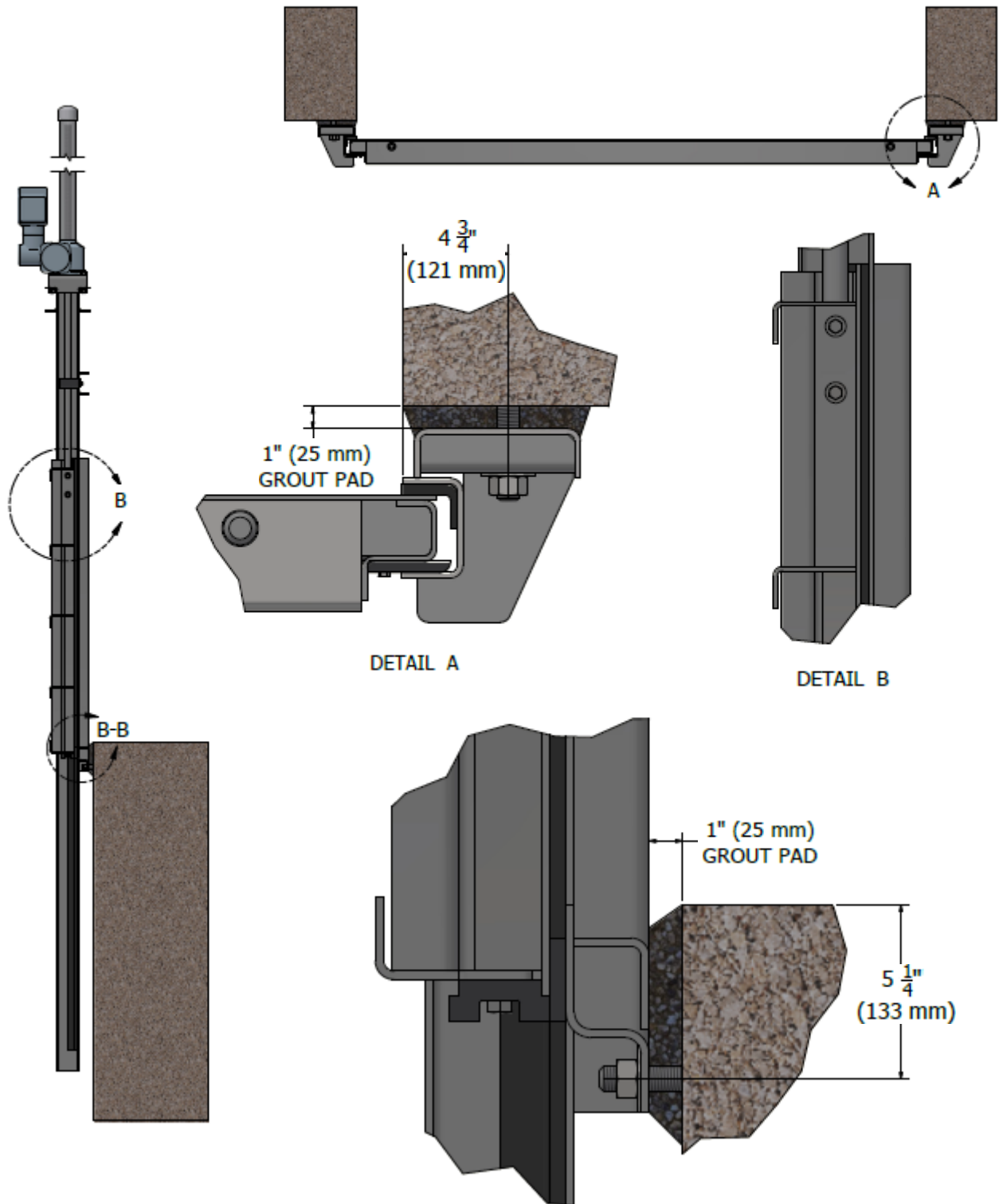
Model 953-D-I Slide Gate



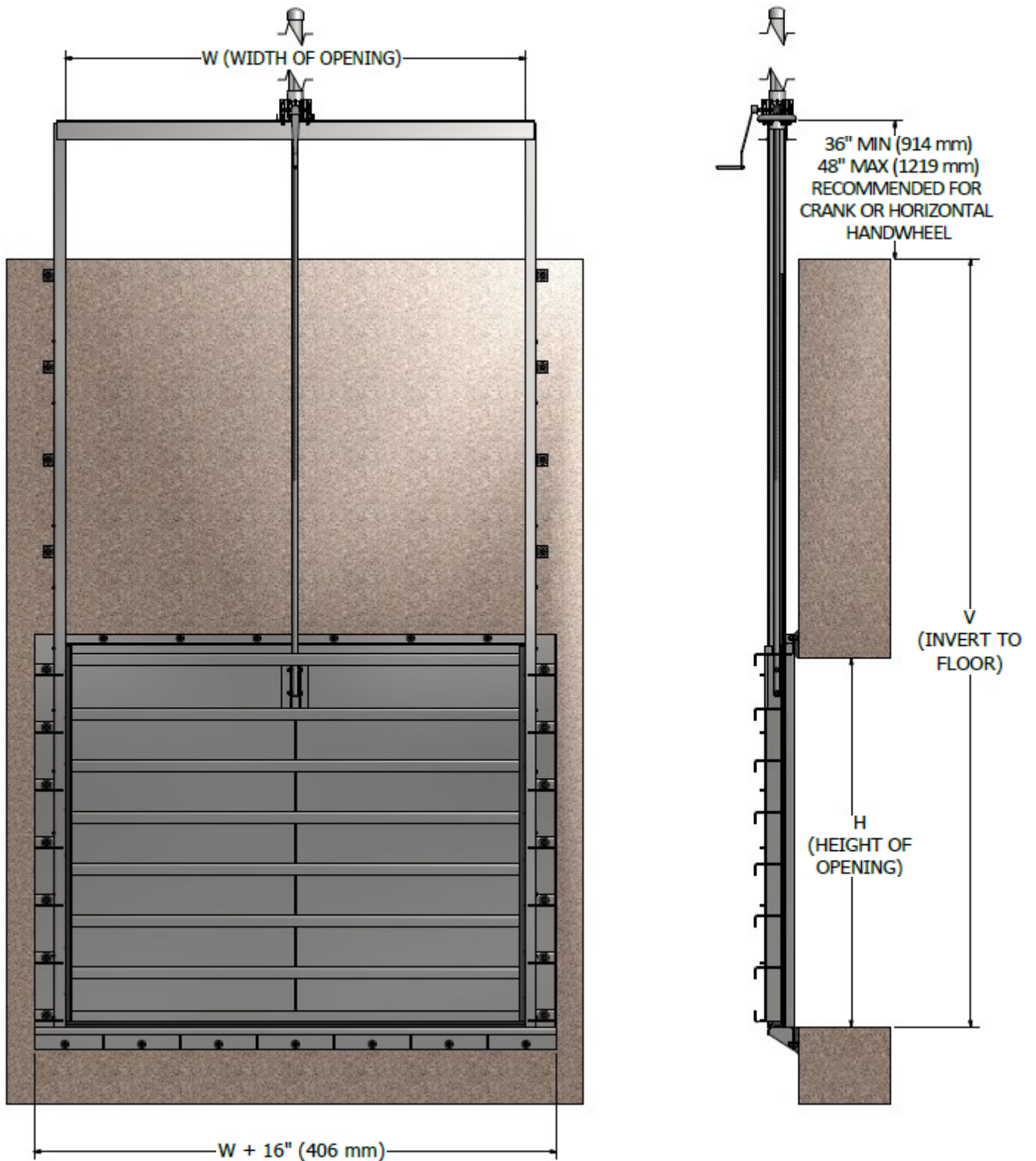
GATE ILLUSTRATED: $120'' (W) \times 63 \frac{1}{2}'' (H) \times 60'' (V)$
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 953-D-I Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °DOWNWARD OPENING
- °OPEN CHANNEL - OPTIONAL TOP SEAL
- °YOKE MOUNTED INTERCONNECTED ACTUATORS



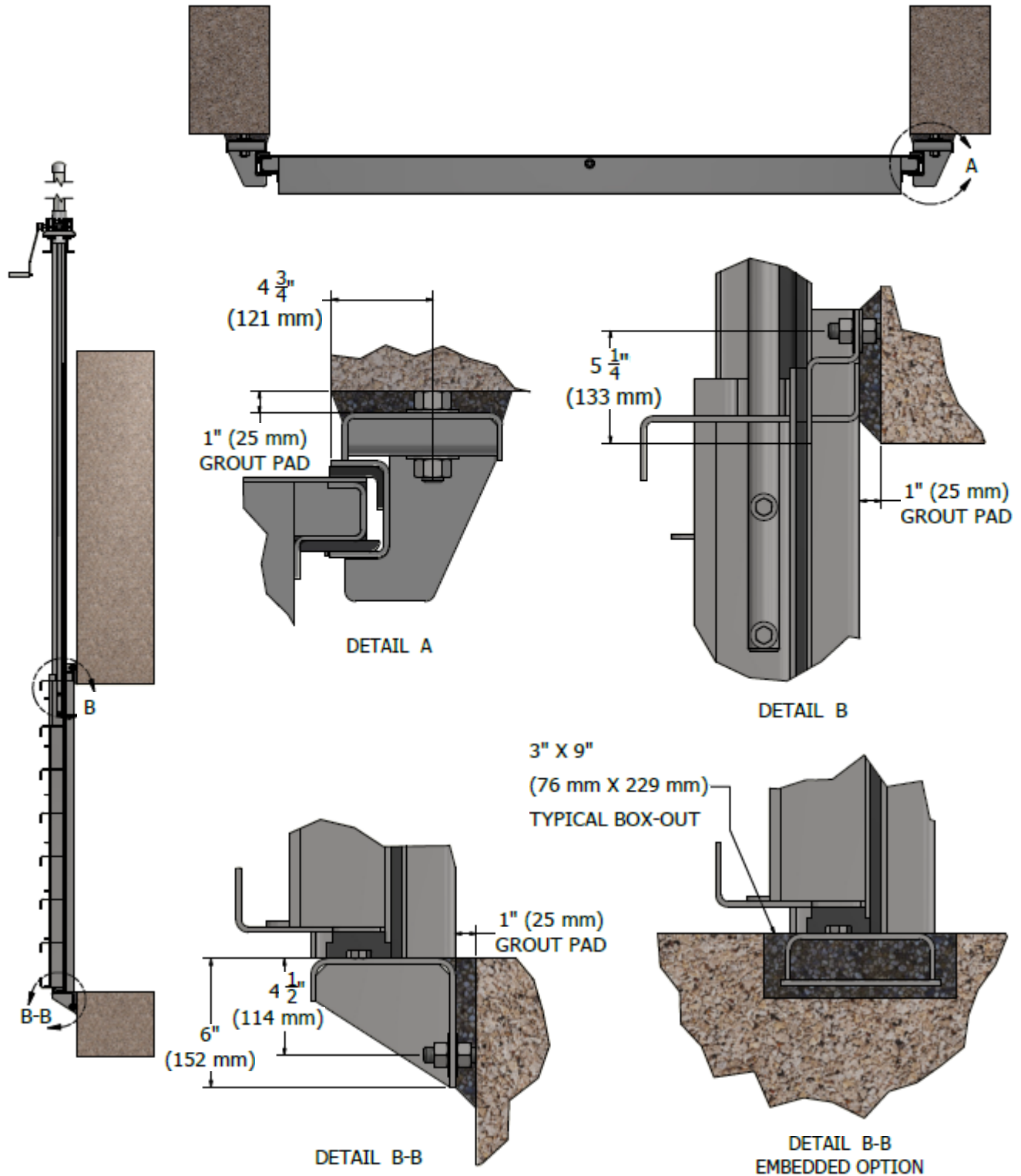
Model 954 Sluice Gate



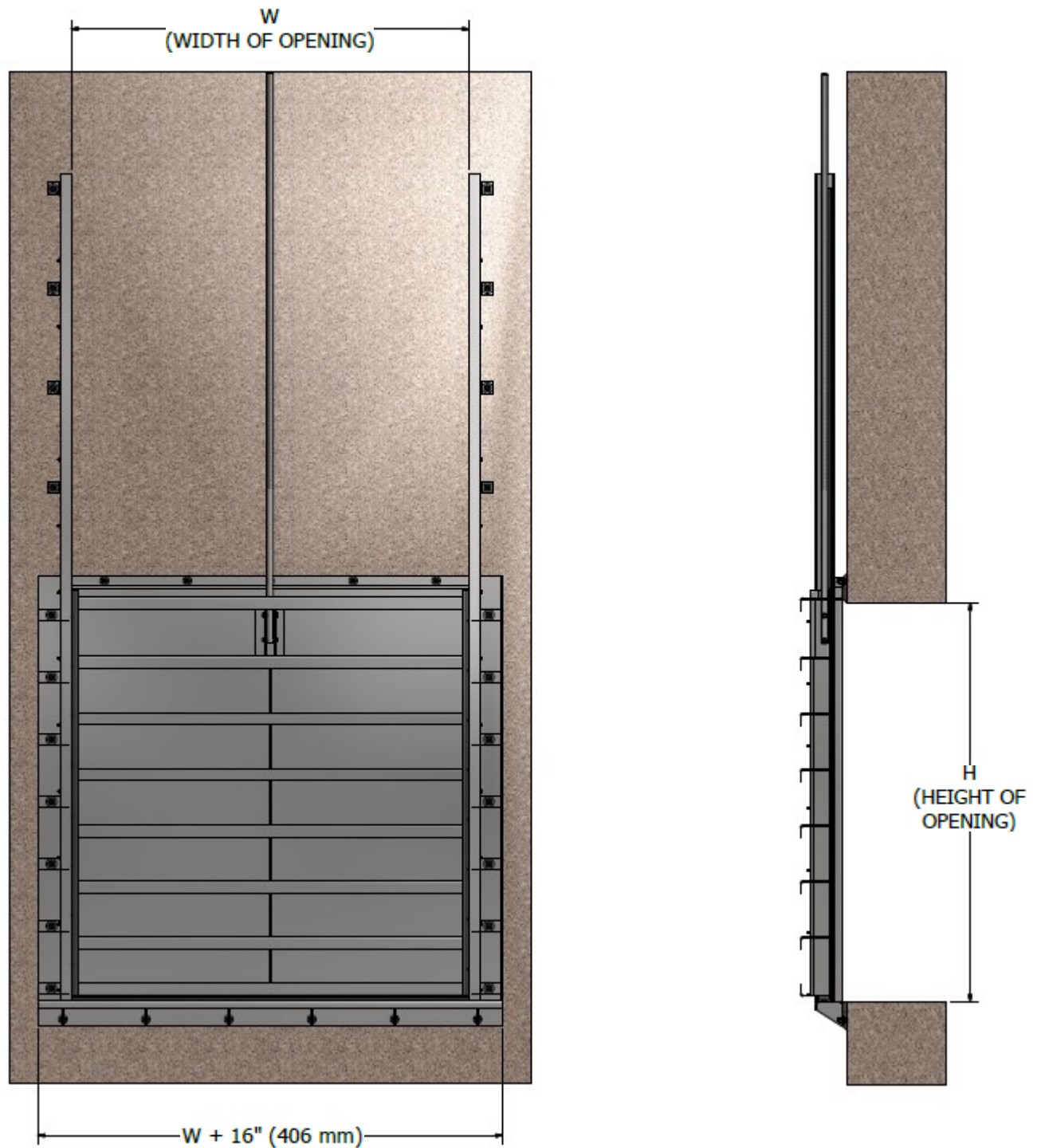
GATE ILLUSTRATED: 120" (W) x 96" (H) x 200" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 954 Features

- ° UHMW SEAT/SEALS
- ° LEAKAGE 1/2 OF AWWA C-561
- ° WALL MOUNTED SIDE FRAMES
- ° FULL APERTURE SEALING
- ° YOKE MOUNTED ACTUATORS
- ° RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



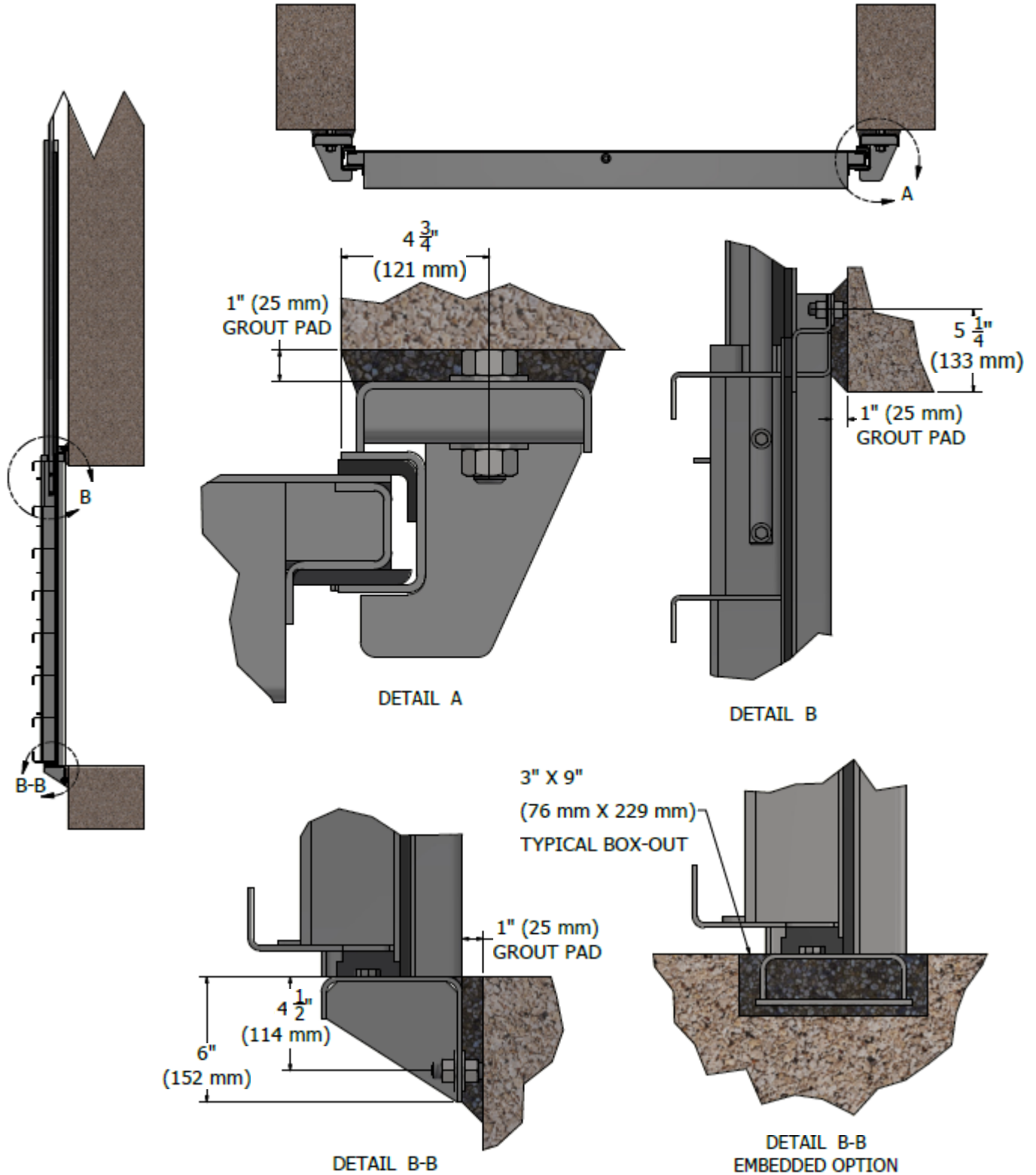
Model 955 Sluice Gate



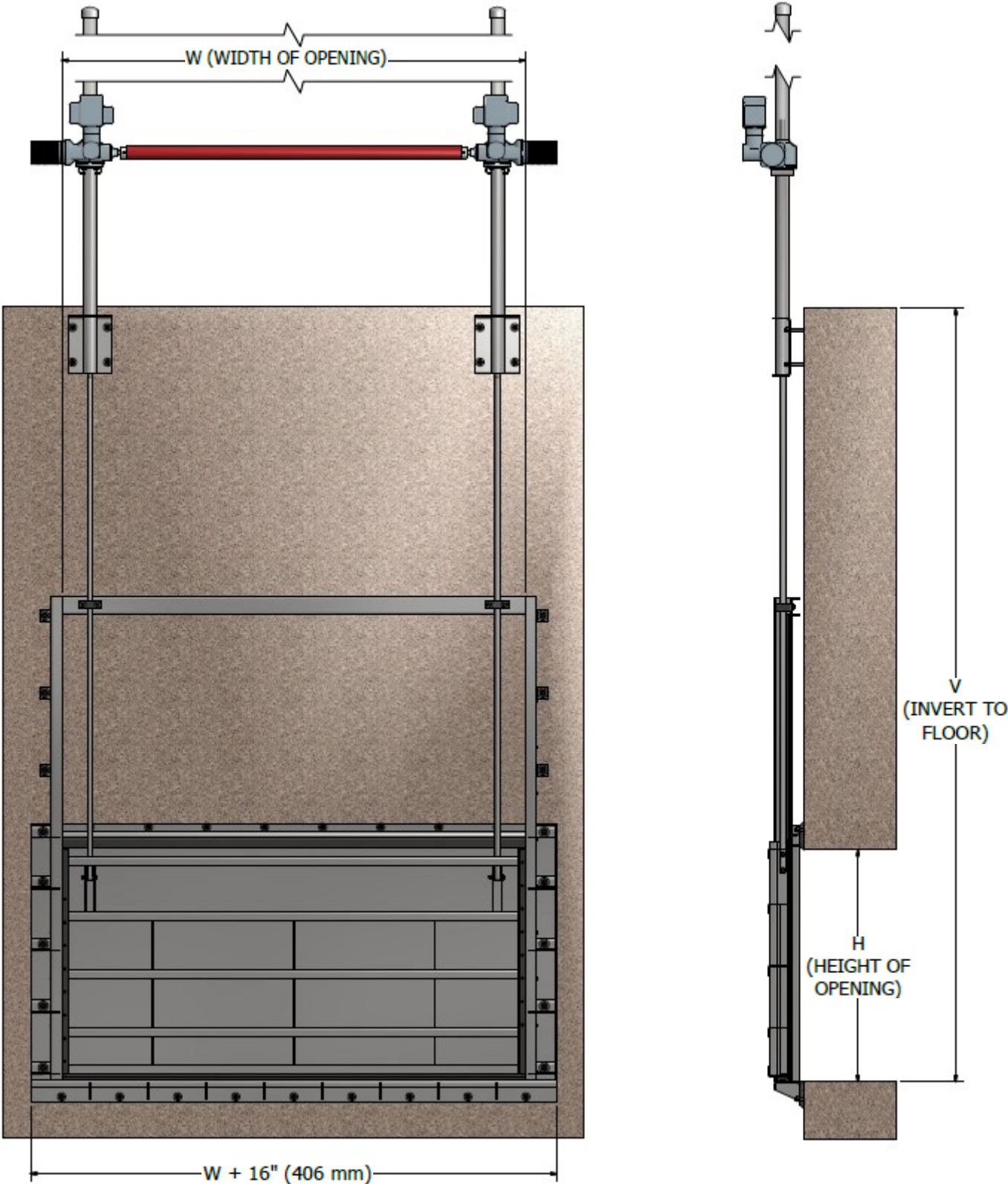
GATE ILLUSTRATED: 96" (W) x 96" (H)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 955 Features

- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °FULL APERTURE SEALING
- °PEDESTAL, WALL BRACKET OR FLOOR BOX MOUNTED ACTUATORS
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



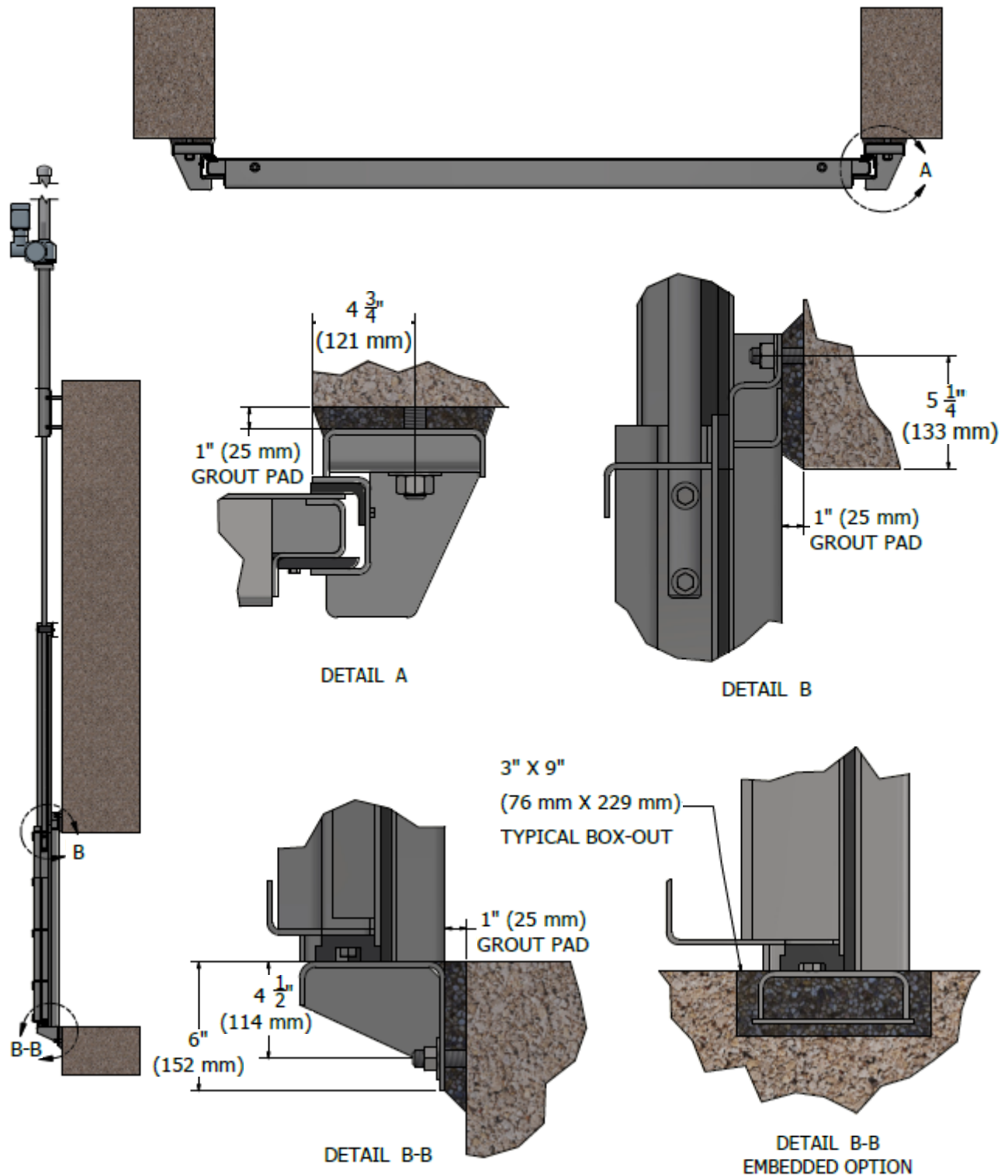
Model 955-I Sluice Gate



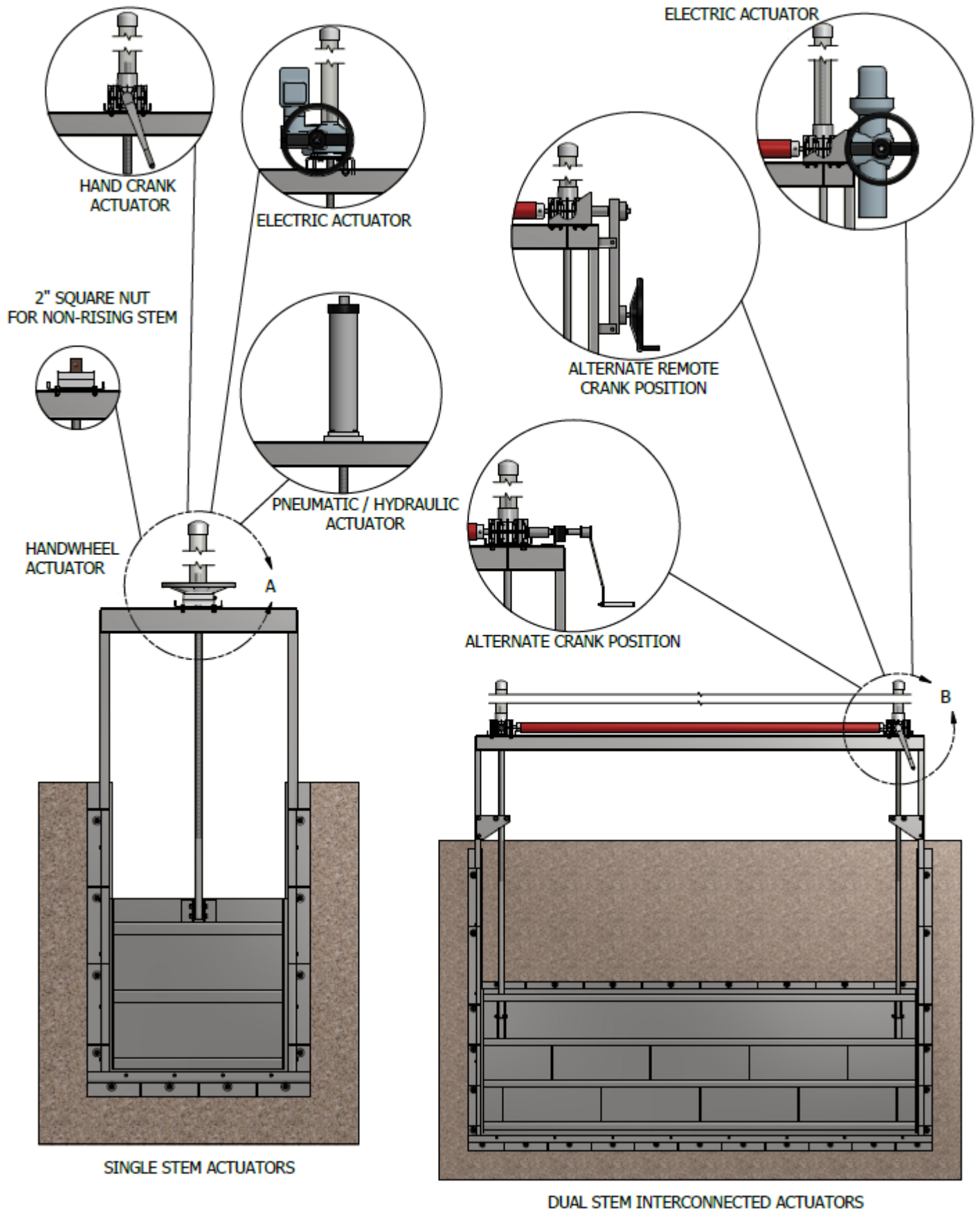
GATE ILLUSTRATED: 120" (W) x 60" (H) x 200" (V)
SEE ACTUATORS SECTION FOR OTHER ARRANGEMENTS

Model 955-I Features

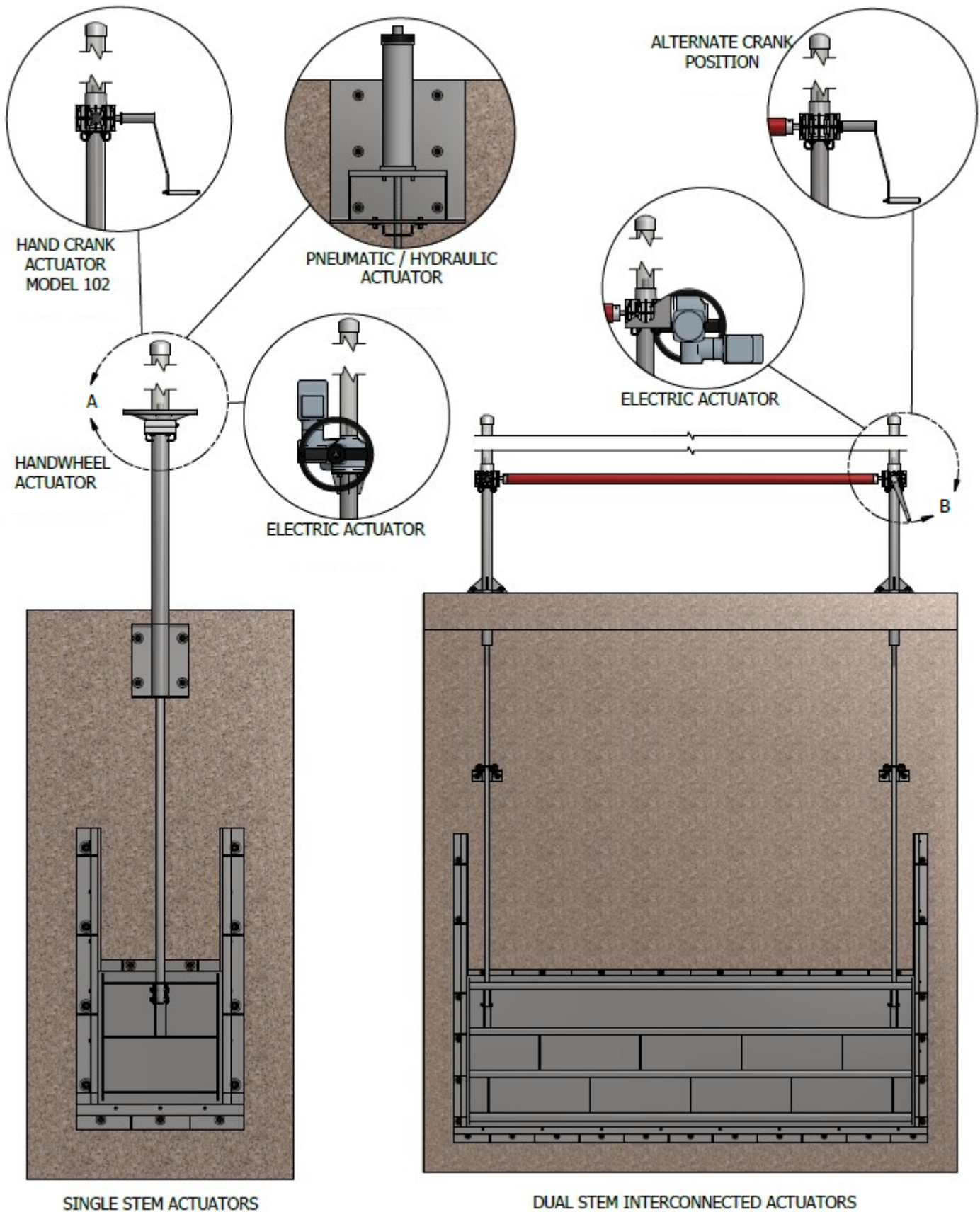
- °UHMW SEAT/SEALS
- °LEAKAGE 1/2 OF AWWA C-561
- °WALL MOUNTED SIDE FRAMES
- °OPEN CHANNEL - NO TOP SEAL
- °YOKE MOUNTED ACTUATORS
- °RESILIENT INVERT SEAL (FLUSH BOTTOM CLOSURE)



Actuators: Self Contained Gates



Actuators: Non-Self Contained Gates



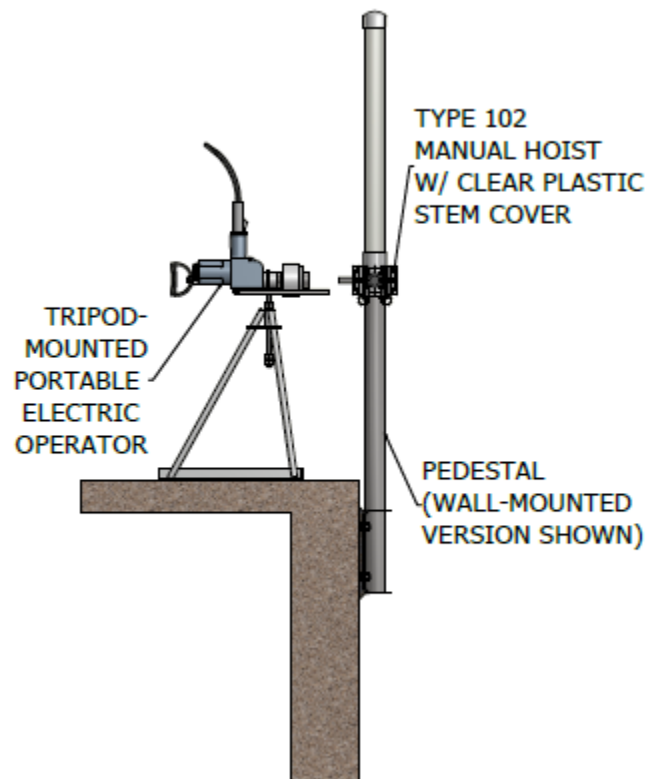
Actuators: General Information

Manual Actuators: Handwheel or hand crank actuators are appropriate when operating loads are relatively low, operation is infrequent, or electric power is unavailable. A handwheel actuator has a handwheel directly attached to the operating nut, concentric to the stem, providing a 1:1 drive ratio. Hand crank actuators have a horizontal input shaft that drives the operating nut through a right-angle gear set. Various drive ratios are available to operate virtually any gate. For high ratios (greater than 8:1), manually operating a large gate can be time-consuming and physically demanding. When hand crank manual actuators will be frequently used, or when they require numerous turns for full gate travel, portable operators should be considered.

Interconnected Actuators: For gates with a width significantly greater than their height, which is often the case with overflow weirs, interconnected crank actuators with a standard input provide accurate positioning and smooth operation. These assemblies may be operated manually or powered electrically.

Portable Operators: Portable operators powered by electricity or gasoline, available in various configurations, can be supplied to operate crank actuators. For further information, please contact the factory.

Electric Actuators: For increased loads, higher operating speeds (12" – 24" per minute), or gates that require frequent operation, electric actuators offer remote control of gate position and seamless integration into automatic control systems.



Hydraulic Cylinder Actuators: Hydraulic cylinders offer smooth and rapid operation, making them well suited for automatic control systems that require frequent gate cycling. They can also be designed to provide automatic gate positioning in the event of an electric power failure.