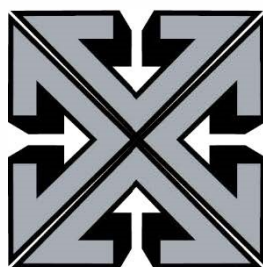


SoftStop® System

End Terminal

Product Manual



INGAL
CIVIL PRODUCTS
A valmont  COMPANY

SoftStop® System

Tangent End Terminal

The SoftStop® System Tangent End Terminal (“SoftStop® System”) has been tested to American Association of State and Highway Transportation Officials (“AASHTO”) Manual For Assessing Safety Hardware (“MASH”) criteria, as a Test Level 1, 2, & 3 guardrail end terminal.

Product Description

Assembly Manual



40 Tironui Road,
Takanini, Auckland 2112



Important: These instructions are to be used only in conjunction with the assembly, maintenance, and repair of the SoftStop® System. These instructions are for standard assemblies specified by the appropriate highway authority only. In the event the specified system assembly, maintenance, or repair would require a deviation from standard assembly parameters, contact the appropriate highway authority engineer. This system is fully approved for use on the NZTA roads network. Ingal Civil Products representatives are available for consultation if required.

This Manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Ingal Civil Products directly on (0212) 464 997 or visiting www.ingalcivil.co.nz.

The instructions contained in this Manual supersede all previous information and Manuals. All information, illustrations, and specifications in this Manual are based on the latest SoftStop® System information available from the designers of the System to Ingal Civil Products at the time of printing. We reserve the right to make changes to this Manual at any time. Please contact Ingal Civil Products to confirm that you are referring to the most current instructions.

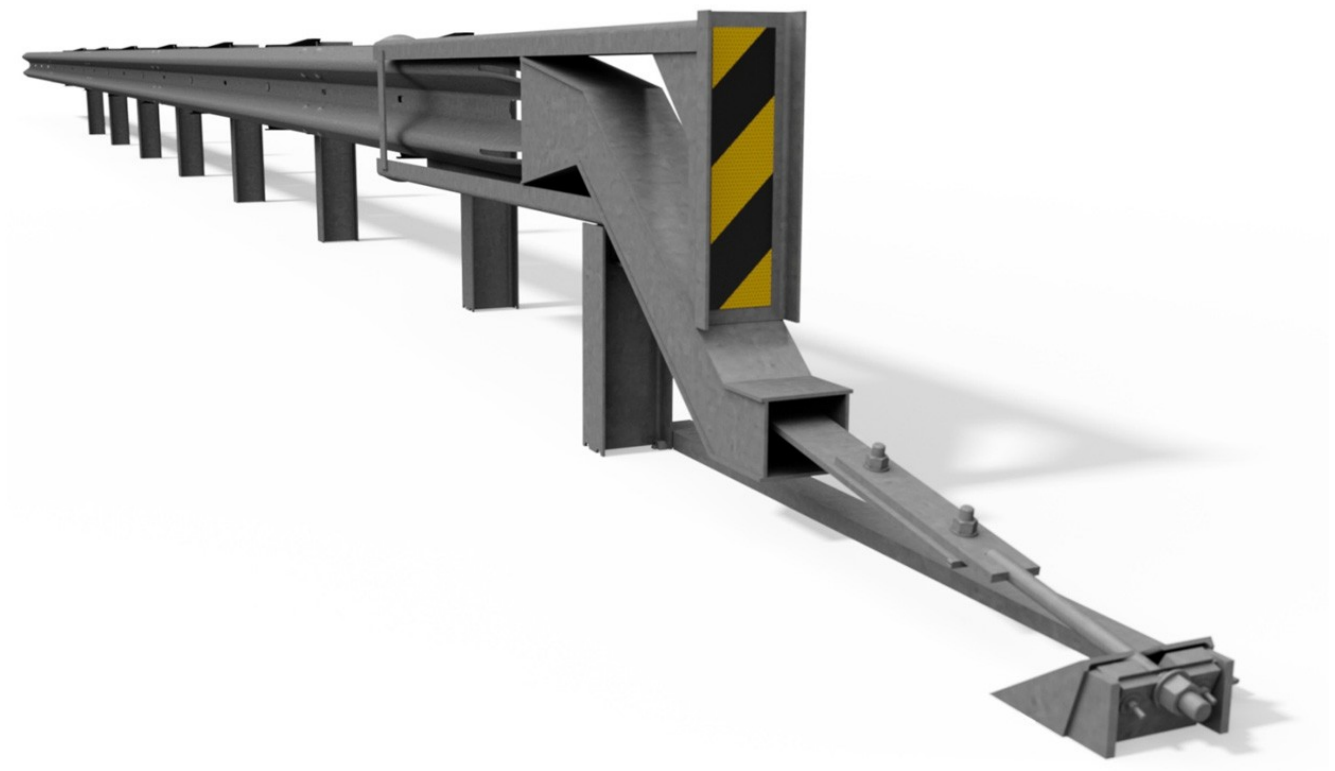


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Customer Service Contacts

Ingal Civil Products is committed to the highest level of customer service. Feedback regarding the SoftStop™ End Terminal, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

Ingal Civil Products Corporate Contacts:

Telephone:	09 295 1444 (NZ Calls) +64 9295 1444 (International Calls)
E-mail:	sales@ingalcivil.co.nz
Internet: Ingal Civil Products	http://www.ingalcivil.co.nz

Regional Telephone Contacts:

Christchurch	0211 983 311
Sydney, Australia	+61 2 9827 3333

Limitations and Warnings

Trinity Highway, in compliance with AASHTO MASH, contracts with FHWA approved testing facilities to perform crash tests, evaluate tests, and submit the test results to the FHWA for review.

The SoftStop® System has been deemed eligible for reimbursement by FHWA as meeting the requirements and guidelines of MASH. A component of MASH eligibility requirements include a variety of crash tests to evaluate product performance by simulating certain impact conditions involving lightweight cars (approx. 1100 kg [2420 lb.]) and full size pickup trucks (approx. 2270 kg [5000 lb.]).

The SoftStop® System is eligible for reimbursement at the following test levels:

MASH Test Level 1: 50 km/h [31 mph]

MASH Test Level 2: 70 km/h [44 mph]

MASH Test Level 3: 100 km/h [62 mph]

The SoftStop® System is tested pursuant to the test matrix criteria of MASH as designated by AASHTO and FHWA. The FHWA AASHTO tests are not intended to represent the performance of systems when impacted by every vehicle type or in every impact condition existing on the roadway. Every departure from the roadway is a unique event.

Trinity Highway expressly disclaims any warranty or liability for injury or damage to persons or property resulting from any impact, collision or harmful contact with its products, other vehicles, or nearby hazards or objects by any vehicle, object or person, whether or not the products were assembled in consultation with Trinity Highway or by third parties.

The SoftStop® System is intended to be assembled, delineated, and maintained in accordance with specific state and federal guidelines. It is the responsibility of the highway authority specifying the use of a highway product to select the most appropriate product configuration for its site specifications. A highway authority's careful evaluation of the site layout, vehicle population type and speed, traffic direction, and visibility are some of the elements that require evaluation in the selection of a highway product. For example, curbs could cause an untested effect on an impacting vehicle.

After an impact occurs, the debris from the impact must be removed from the area immediately and the specified highway product must be evaluated and restored to its original specified condition or replaced as the highway authority determines as soon as possible. Product selection, approval, proper installation, and maintenance of any highway product is the sole responsibility of the specifying highway authority and the state DOT.



Safety Alert Symbols appear throughout this manual and indicate **Danger, Warning, Important or Caution**. Failure to read and follow these warnings could result in serious injury or death.

WARNING: Do not assemble, maintain, or repair the SoftStop® System until you have read this Manual thoroughly and completely understand it. Ensure that all Danger, Warning, Caution, and Important statements within the Manual are completely followed. Please call Ingal Civil Products on (0212) 464 997 if you do not understand any portion of these instructions or this manual.

WARNING: Safety measures incorporating appropriate traffic control devices and personal protective equipment (PPE) specified by the highway authority must be used to protect all personnel while at the assembly, maintenance, or repair site.

WARNING: Ensure that your assembly meets all appropriate Manual on Uniform Traffic Control Devices ("MUTCD") and local standards.

WARNING: Use only Trinity Highway parts that are specified by Trinity Highway for use with the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. Do not utilize or otherwise combine parts from other systems even if those systems are other Trinity Highway systems. Such configurations have not been tested, nor have they been approved for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact with such an UNACCEPTED system.

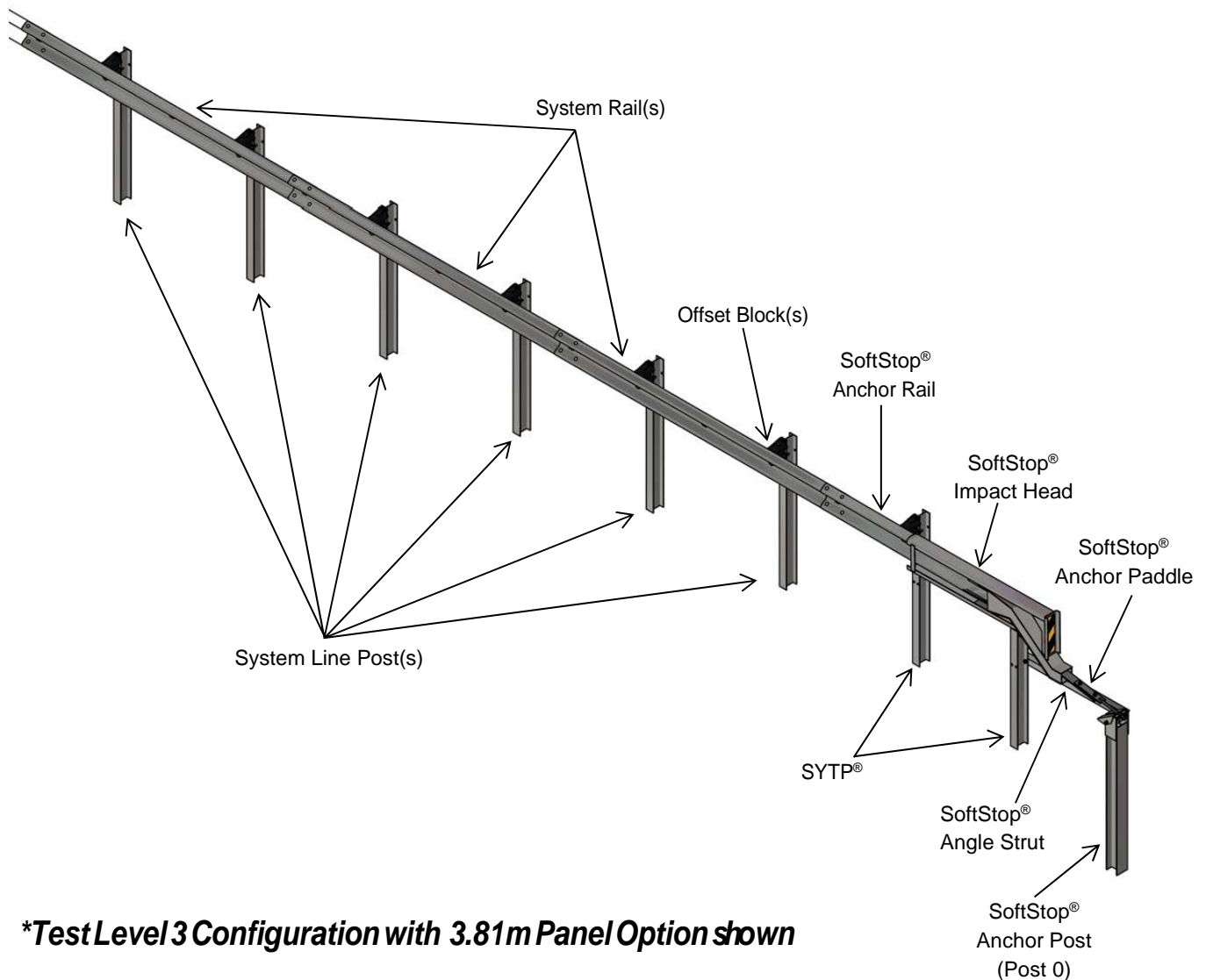
WARNING: Do NOT modify the SoftStop® System in any way.

IMPORTANT: Trinity Highway makes no recommendation whether use or reuse of any part of the SoftStop® System is appropriate or acceptable following an impact. It is the sole responsibility of the local highway authority and its engineers to make that determination. It is critical that you inspect the SoftStop® System after assembly is complete to make certain that the instructions provided in this Manual have been strictly followed.

SoftStop® System Overview

The SoftStop® System is a tangent, single-sided, energy-absorbing, redirective and gating end terminal system. The SoftStop® System is the first end terminal to meet the evaluation criteria set forth in the AASHTO MASH. The SoftStop® System is a 787 mm high (measured from top of rail to finished grade) end terminal used to shield 787 mm high strong post w-beam guardrail. The SoftStop® System may be used to terminate strong post W-beam guardrail measuring between 705 mm to 787 mm with state approved transition (see Appendix for example).

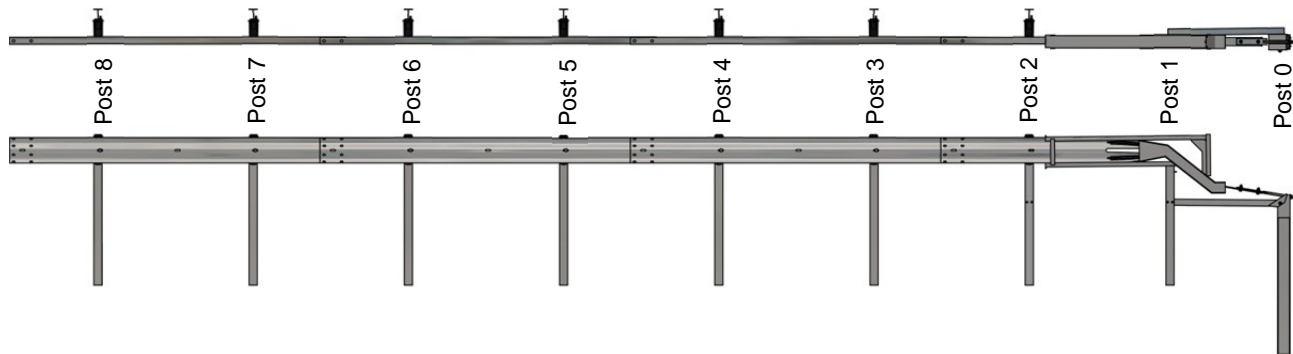
The SoftStop® System contains a SoftStop® Impact Head, SoftStop® Anchor Rail, SoftStop® Anchor Post (Post 0), SoftStop® Angle Strut, two (2) Steel Yielding Terminal Posts ("SYTP") (Posts 1 & 2) and required hardware accessories. The remaining length of the system beyond Post 2 uses System Line Posts, Offset Blocks and System Rail.



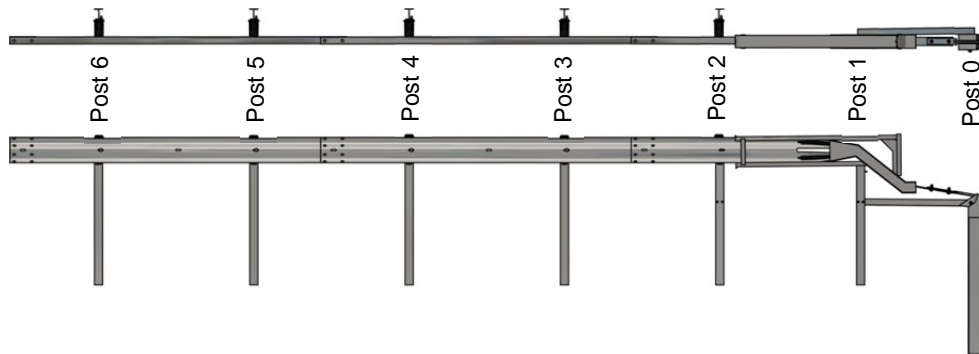
The SoftStop® System can be assembled in a MASH Test Level 1, Test Level 2 or Test Level 3 configuration.

Test Level	Design Speed	Required System Length	Posts
Test Level 3	100 km/h	15.48 m	Posts 0-8
Test Level 2	70 km/h	11.67 m	Posts 0-6
Test Level 1	50 km/h	7.86 m	Posts 0-4

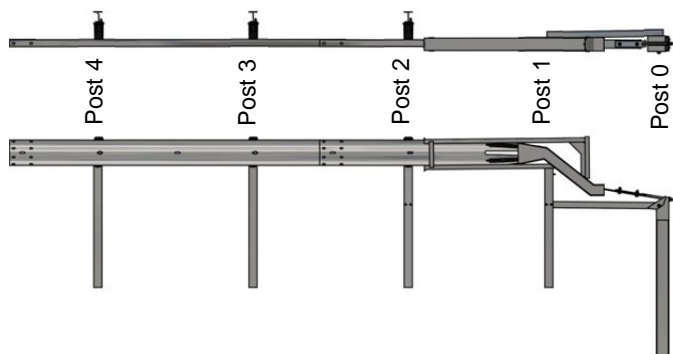
Test Level 3 - 15.48 m



Test Level 2 - 11.67 m



Test Level 1 - 7.86 m



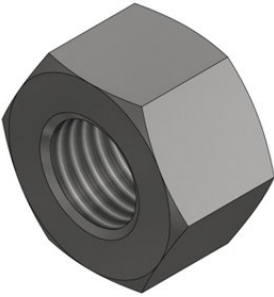
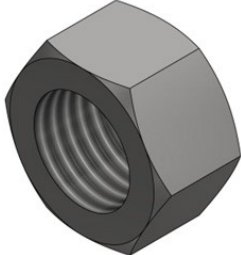
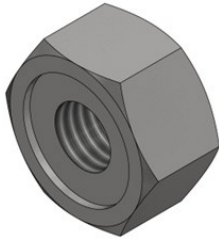
Inspect Shipment

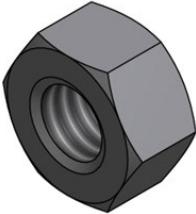
Before assembling the SoftStop® System, carefully unpack and inspect all components for signs of damage. Check the received parts against the packing list supplied with the system to verify that all parts were received. If parts are damaged or missing from the shipment or unspecified parts were part of the shipment, do not attempt to assemble the system; contact Trinity Highway immediately.

ID	COMPONENT	PN	TL-3 QTY	TL-2 QTY	TL-1 QTY
A	SoftStop® Impact Head	15208A	1	1	1
B	SoftStop® Anchor Rail 3.810 m	15200G	1	1	1
C	System Rail 3.810 m	11G	3	2	1
D	SoftStop® Anchor Post (Post 0)	15205A	1	1	1
E	SoftStop® SYTP® 1460 mm	15203G	1	1	1
F	SYTP® Post 1830 mm	15000G	1	1	1
G	System Line Post 1830 mm	533G	6	4	2
H	Offset Block	6777B	7	5	3
I	SoftStop® Anchor Paddle	15204A	1	1	1
K	SoftStop® Keeper Plate	15207G	1	1	1
L	SoftStop® Plate Washer	15206G	1	1	1
M	SoftStop® Anchor Angle	15201G	2	2	2
N	SoftStop® Angle Strut	15202G	1	1	1
O	5/16" x 2.5" Hex Bolt	105285G	2	2	2
P	5/16" x 1.5" Hex Bolt	105286G	1	1	1
Q	3/4" x 2.5" Hex Bolt	3717G	2	2	2
R	5/8" x 9" Hex Bolt	4489G	1	1	1
S	5/8" x 1.75" Hex Bolt	3391G	1	1	1
T	5/8" x 10" GR Bolt	3500G	7	5	3
U	5/8" x 1.25" GR Bolt	3360G	32	24	16
V	1" Round Washer	4902G	1	1	1
W	3/4" Round Washer	3701G	4	4	4
X	5/8" Round Washer	4372G	4	4	4
Y	5/16" Round Washer Wide	3240G	6	6	6
Z	1" Heavy Hex Nut	3908G	1	1	1
AA	3/4" Heavy Hex Nut	3704G	2	2	2
BB	5/8" GR Hex Nut	3340G	41	31	21
CC	5/16" Hex Nut	3245G	3	3	3

ID: A	PN: 15208A	ID: B	PN: 15200G	ID: C	PN: 11G
		  (Slotted End Shown For Detail)			
SoftStop® Impact Head		SoftStop® Anchor Rail 3.810 m		System Rail 3.810 m	
ID: D	PN: 15205A	ID: E	PN: 15203G	ID: F	PN: 15000G
					
SoftStop® Anchor Post		SoftStop® SYTP 1460 mm		SYTP® 1830 mm Post	
ID: G	PN: 533G	ID: H	PN: 6777B	ID: I	PN: 15204A
					
System Line Post 1830 mm		Offset Block		SoftStop® Anchor Paddle	
ID: K	PN: 15207G	ID: L	PN: 15206G	ID: M	PN: 15201G
					
SoftStop® Keeper Plate		SoftStop® Plate Washer		SoftStop® Anchor Angle	

ID: N	PN: 15202G	ID: O	PN: 105285G	ID: P	PN: 105286G
					
SoftStop® Angle Strut		5/16" x 2.5" Hex Bolt		5/16" x 1.5" Hex Bolt	
ID: Q	PN: 3717G	ID: R	PN: 4489G	ID: S	PN: 3391G
					
3/4" x 2.5" Hex Bolt		5/8" x 9" Hex Bolt		5/8" x 1.75" Hex Bolt	
ID: T	PN: 3500G	ID: U	PN: 3360G	ID: V	PN: 4902G
					
5/8" x 10" GR Bolt		5/8" x 1.25" GR Bolt		1" Round Washer	
ID: W	PN: 3701G	ID: X	PN: 4372G	ID: Y	PN: 3240G
					
3/4" Round Washer		5/8" Round Washer		5/16" Round Washer Wide	

ID: Z	PN: 3908G	ID: AA	PN: 3704G	ID: BB	PN: 3340G
					
1" Heavy Hex Nut		3/4" Heavy HexNut		5/8" GR Hex Nut	

ID: CC	PN: 3245G
	
5/16" Hex Nut	

Recommended Tools

Documentation

- Assembly Manual (Most Current Version)
- System Drawing (Most Current Version)

Personal protective equipment (PPE)

- Safety Glasses
- Work Gloves
- Safety-Toe Shoes
- Back Protection
- Hard Hat
- Reflective Vest

Miscellaneous

- Traffic Control Equipment
- SAE Combination Wrench Set
- Socket Set & Socket Wrench
- Hammer
- Chalk Line
- Tape Measure
- Marking Paint and Pen
- Straight Edge
- Level
- Plumb Line
- Post Pounder (commonly used for driving posts)
- Auger
- Soil Tamper
- Come-Along Puller
- 5/8" Alignment Tool (Drift Pin)
- Cutting Device
- Locking Pliers
- C-Clamps

Note: The above list of tools is a general recommendation only and should not be considered an exhaustive list. Depending on specific site conditions and the complexity of the assembly (or repair) specified by the appropriate highway authority, additional or fewer tools may be required. Decisions as to what tools are needed to perform the job are entirely within the discretion of the specifying highway authority and the authority's selected contractor performing the assembly of the system at the authority's specified site.

SoftStop® System Site Preparation

The SoftStop® System is a tangent, single-sided, energy-absorbing, redirective and gating end terminal system that state/specifying agency specify for use as specified by the appropriate state/specifying authority in conjunction with strong post W-beam guardrail on the shoulder or median of a roadway. The decision to specify the SoftStop® System for a particular project is the responsibility of the state/specifying agency design engineer who must ensure that the most appropriate end terminal has been selected for the specific site conditions.



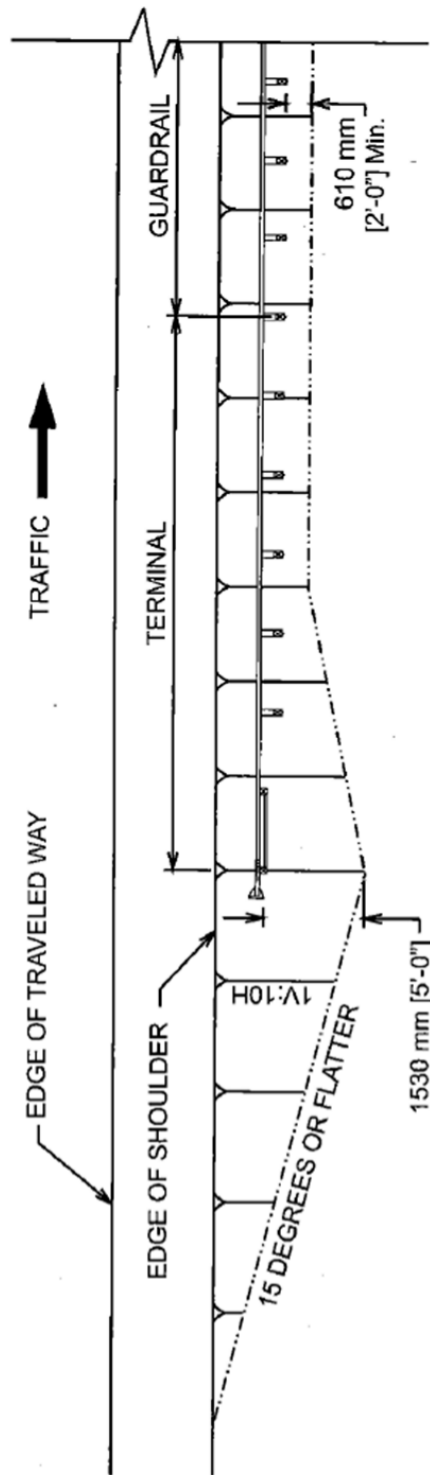
Important: Do not attach the SoftStop® System directly to a rigid barrier (i.e. concrete barrier, wall or bridge pier) without the use of a state/specifying agency approved transition.



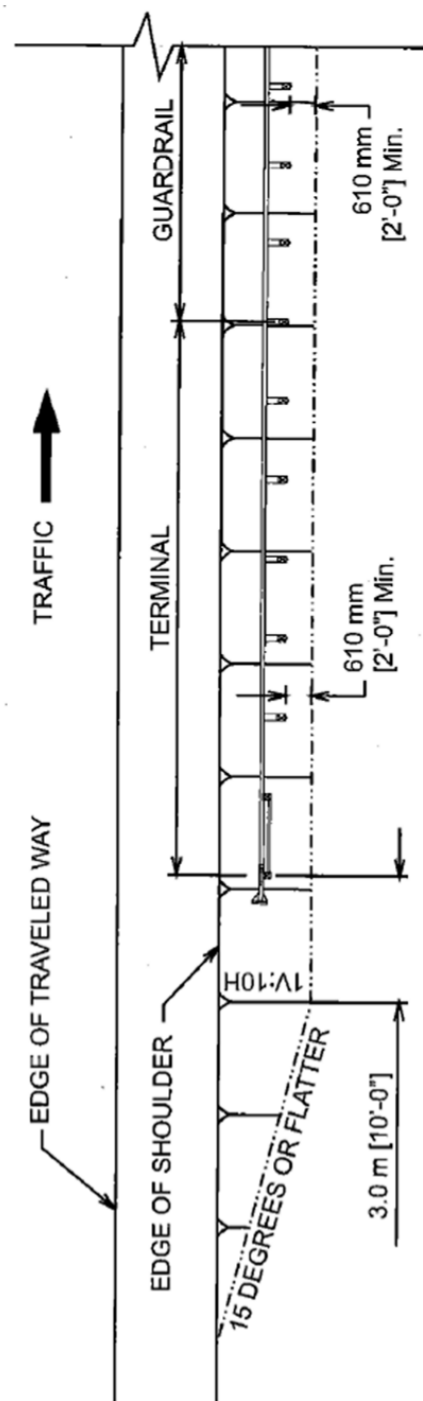
Important: Ensure that the SoftStop® System assembly conforms to the local road design standards.



Important: Ingal Civil Products does not direct grading. Proper site grading must be accomplished before assembly of the SoftStop® System in accordance with local specifying agency guidelines and the NZTA requirements. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact or collision.



PREFERRED GRADING



ALTERNATIVE GRADING

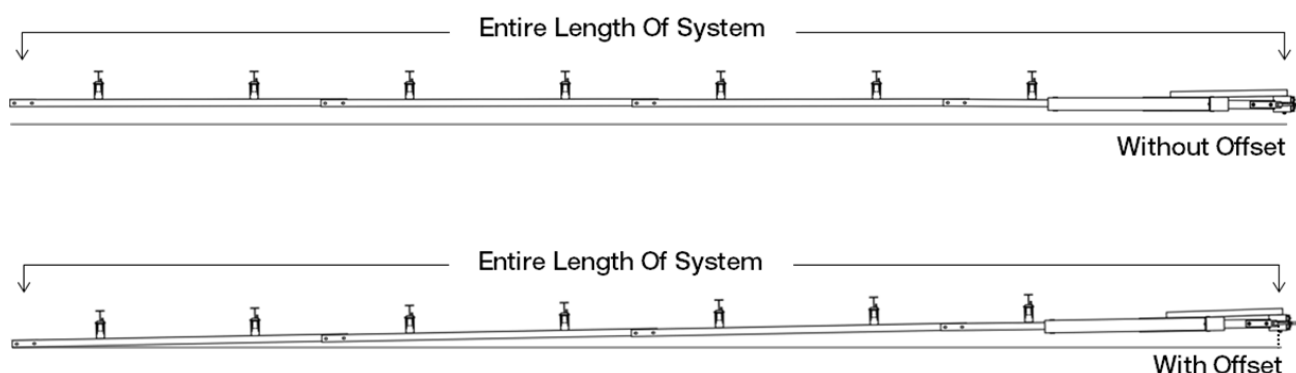
NOT TO SCALE

Drawing Source: AASHTO Roadside Design Guide, 4th Edition 2011

SoftStop® System Offset Requirements

The SoftStop® System is a tangent guardrail end treatment that is assembled parallel to the edge of shoulder. At the sole discretion of the state/specifying agency design engineer, the SoftStop® System may be offset away from the shoulder over the length of the entire system (from center of last splice location of SoftStop® System to center of Post 0) per the following designer approved offsets:

Test Level 1 (TL-1)	Test Level 2 (TL-2)	Test Level 3 (TL-3)
152 mm Maximum	304 mm Maximum	609 mm Maximum



Caution: Under no circumstances shall the rail within the SoftStop® System be curved.

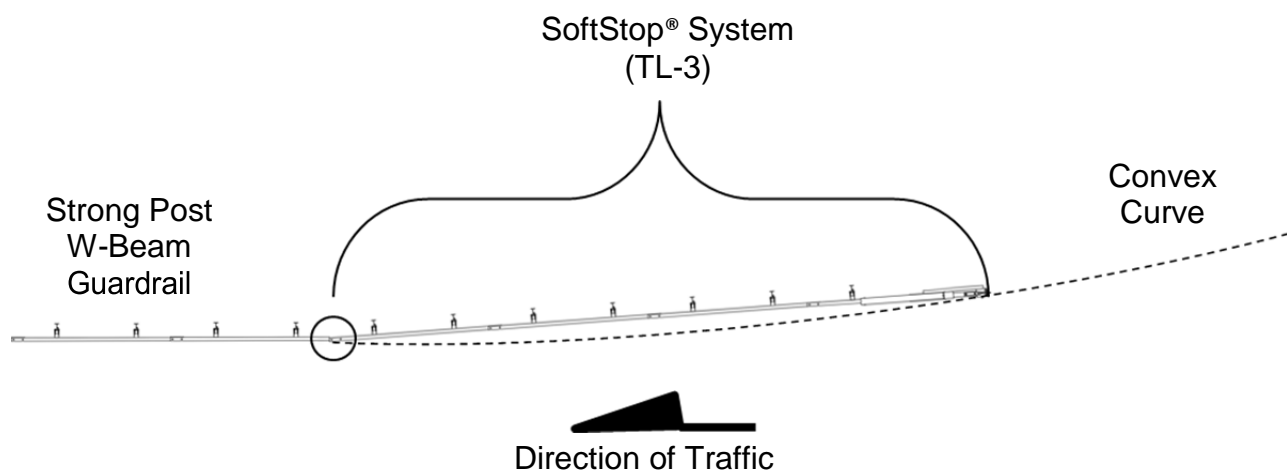
Offset Requirements Within A Curve

When the guardrail is terminated within a curve (convex or concave) and a SoftStop® System is attached, the following instructions must be followed to ensure proper offset requirements within a curve for the SoftStop® System are met. If the conditions below cannot be achieved, it is recommended that the guardrail be extended past the curve until the conditions can be met. The offset requirements in a curve are calculated for the TL-3 SoftStop® System. If assembling a TL-1 or TL-2 SoftStop® System, an overall straight length of 15.48 m must be obtained (SoftStop® System + Strong Post W-Beam Guardrail) for calculating offset requirements in a curve.

Note: Using an offset closer to 0 m on tighter curves (radii) will cause the terminal to encroach onto the shoulder.

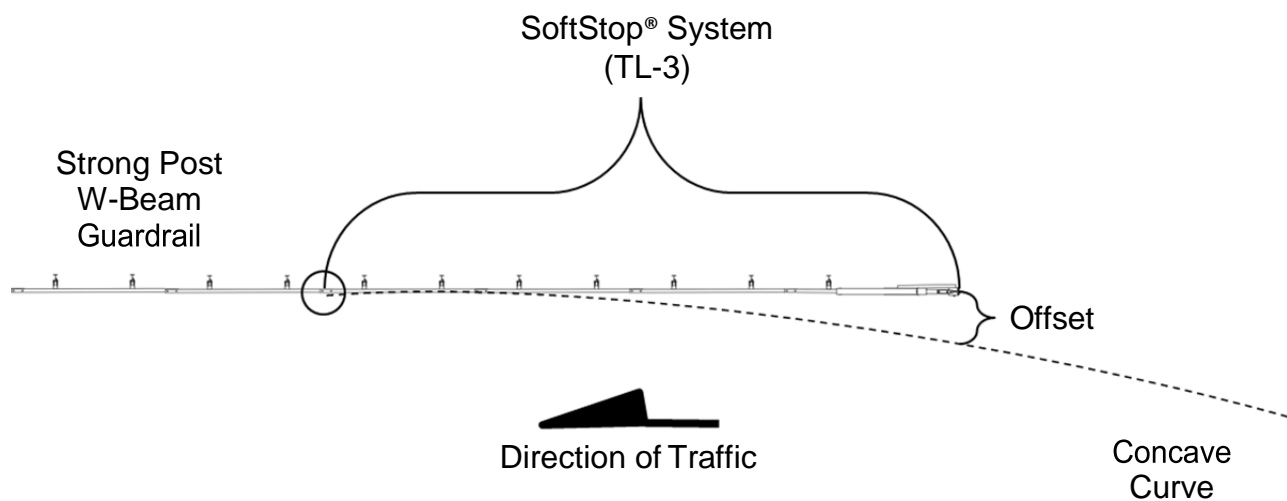
Convex Curve

For radii of 198 m or greater (flatter), the offset is 0 m to 609 mm.



Concave Curve

For radii between 152 m and 228 m, the offset is 0 m to 457 mm. For radii greater (flatter) than 228 m, the offset is 0 m to 609 mm.



SoftStop® System Post Placement

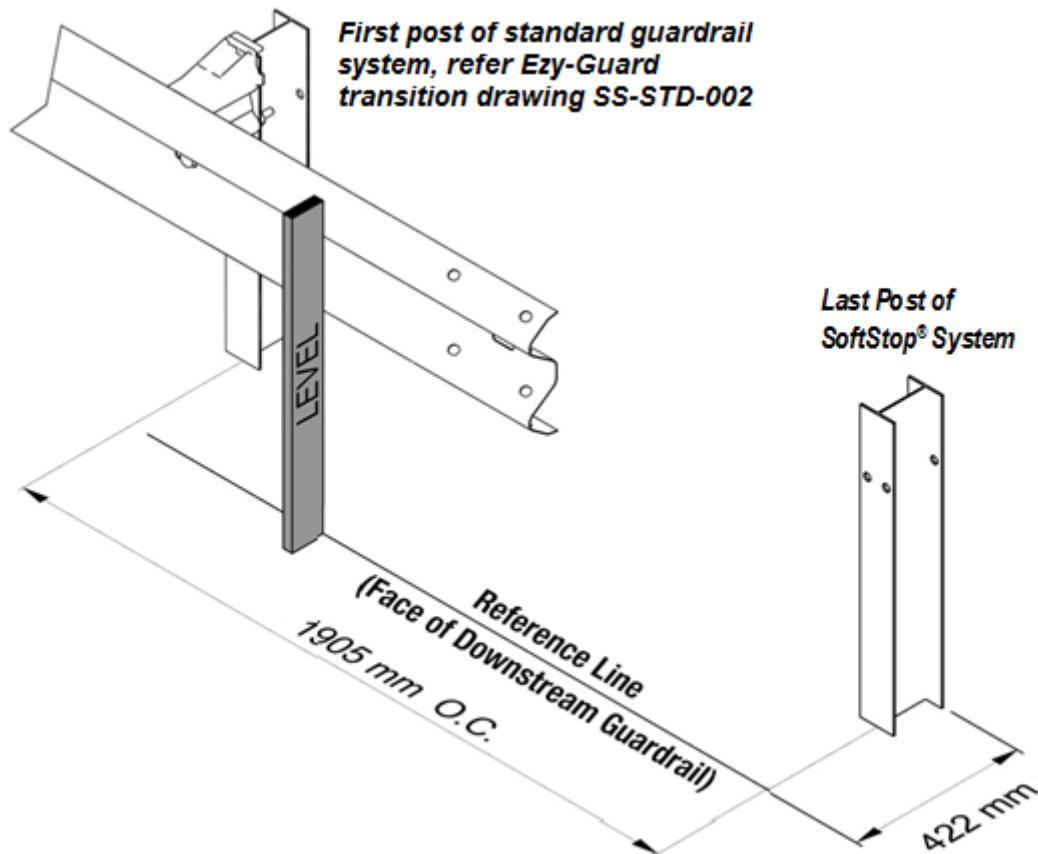


Danger: Ensure all above & below ground utilities are located, marked, and identified prior to using auger or post driving equipment in accordance with local specifying agency guidelines. Failure to follow this warning could result in serious injury or death.

Determine Post Locations

Place a level or straight edge on the face of downstream guardrail (i.e. traffic side) to the finished grade to create a reference line for face of guardrail. The reference line will be used to determine post location for the last post of the SoftStop® System.

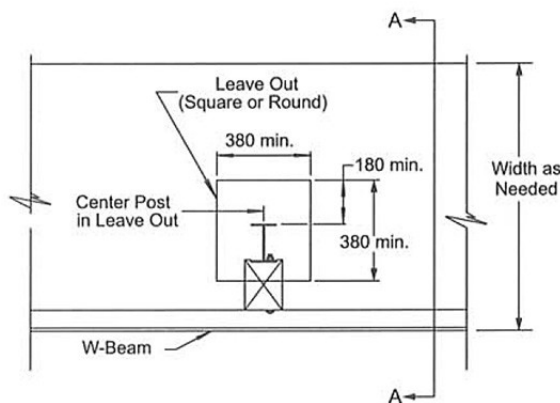
The last post of the SoftStop® System will be located 422 mm from face of downstream guardrail to back of the last post of the SoftStop® System to accommodate an 190mm offset block and be spaced 1905 mm (typical) on center from the first post of the strong post w-beam system (see drawing below). Refer to the post placement diagrams in this manual for remaining post locations.



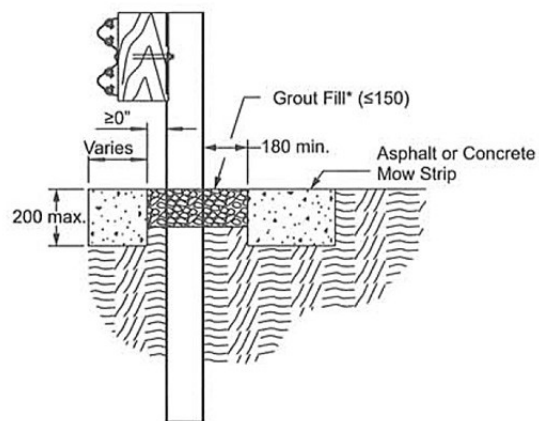
The SoftStop® System posts may be inserted into the soil using an auger or post pounding equipment used for the placement of guardrail posts. If an auger is used, ensure diameter is large enough to allow for proper compaction of state/specifying agency approved fill material. All SoftStop® System posts are to be assembled plumb. Proper compaction must be accomplished for all posts in accordance with state/specifying agency guidelines.

If rock is encountered at post locations 2-8, refer to the local specifying agency guidelines and the AASHTO Roadside Design Guide for requirements for embedment depth into the rock and size of the hole. If rock is encountered at post locations 0-1, auger a hole in the rock large enough for full post embedment and proper compaction of approved fill material.

If rigid pavement (e.g. concrete or asphalt) of any thickness is encountered at post locations 0-8, ensure a proper “leave-out” area (the specified size of open space as defined in the AASHTO Roadside Design Guide) is provided around the posts and filled with state/specifying agency approved backfill material.



Steel Post Detail

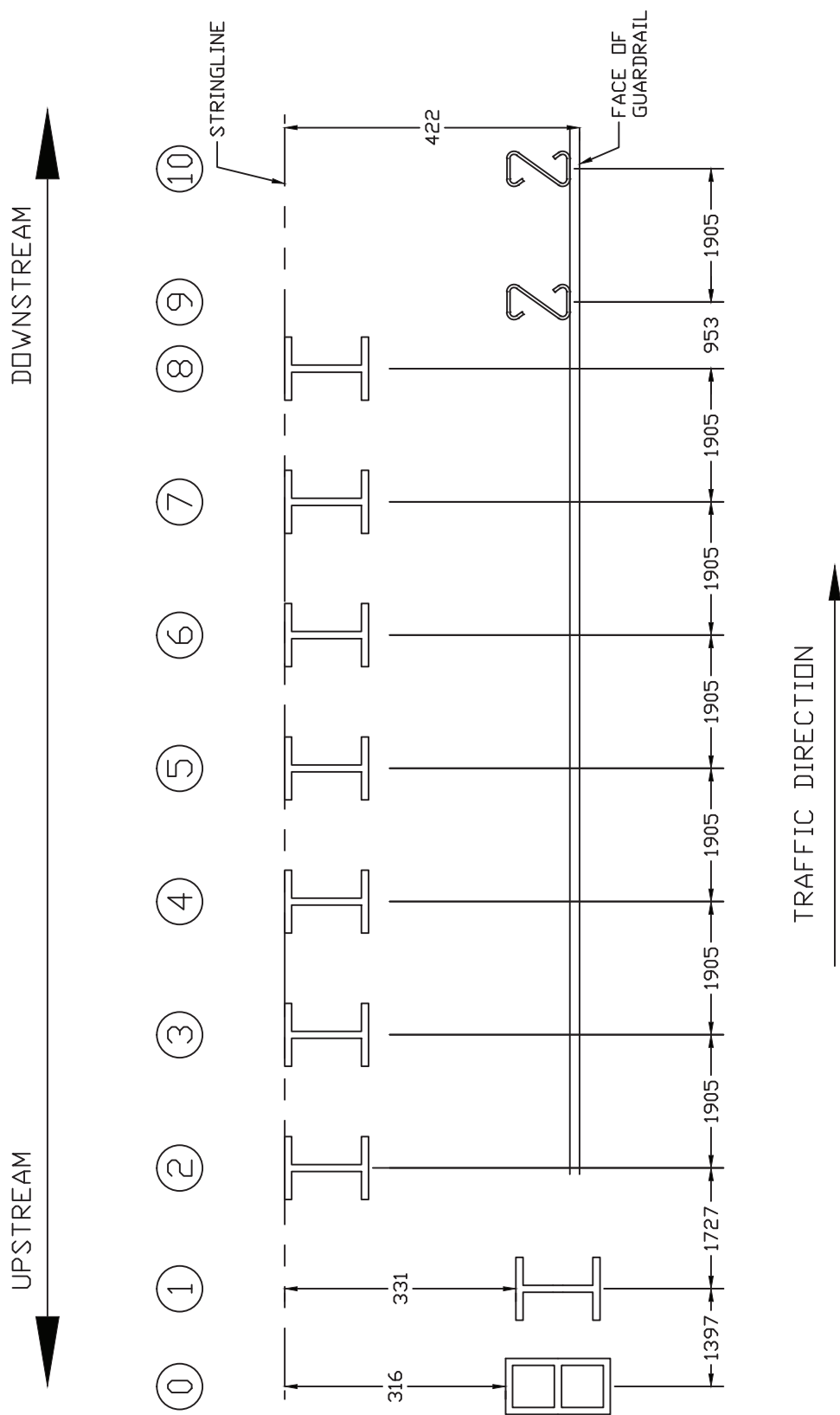


Section A-A

*Grout fill material must have a 28-day compressive strength of 120 psi (0.85 MPa) or less.

Drawing Source: AASHTO Roadside Design Guide, 4th Edition 2011

SoftStop® System (Test Level 3) - Post Placement Diagram

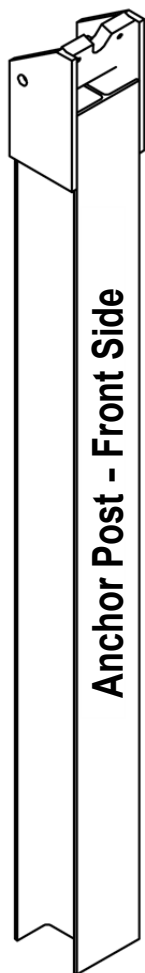


- NOTES:
- 1. Post 0-8 part of SoftStop® System TL3
 - 2. Post 9 is first post of longitudinal w-beam system (not included with SoftStop® System)
 - 3. Spacing between posts is on centre as shown
 - 4. All SoftStop® System posts must be installed plumb
 - 5. Guardrail splice joint located at Post 9

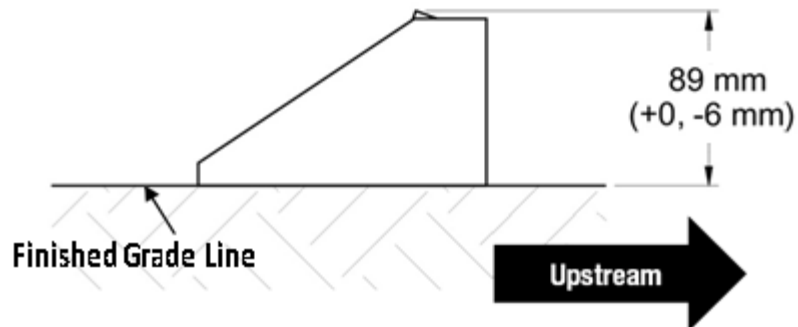
SoftStop® System Anchor Post (Post 0) Placement

The SoftStop® System Anchor Post (15205A) is the first post of the SoftStop® System and is designated as Post 0. The SoftStop® System Anchor Post is to be assembled plumb and oriented with the front side of post facing towards the upstream end.

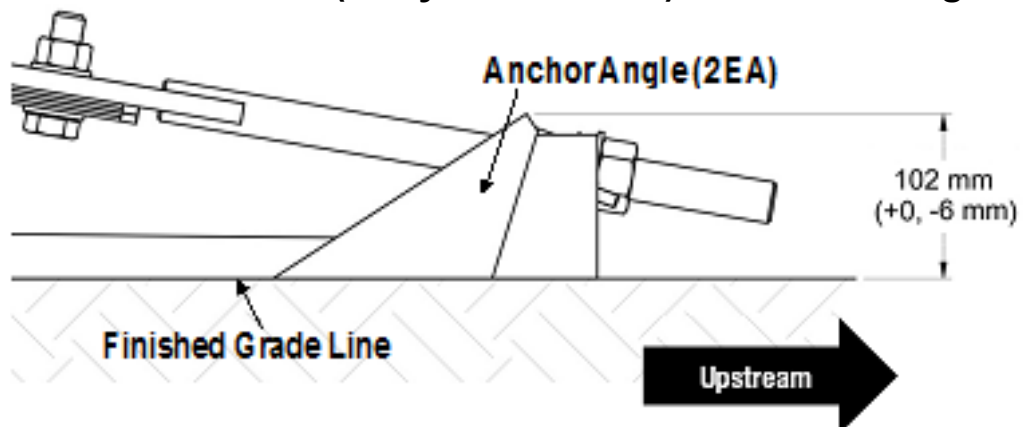
- A. When assembled to the correct depth, the SoftStop® System Anchor Post stub will protrude 89 mm above the finished grade line (see Step 2 of this Assembly Manual).
- B. When fully assembled, the SoftStop® System Anchor Post (with Anchor Angles) will protrude 102 mm above the finished grade line (see Step 12 of this Assembly Manual).



A. Anchor Post Stub at Correct Height



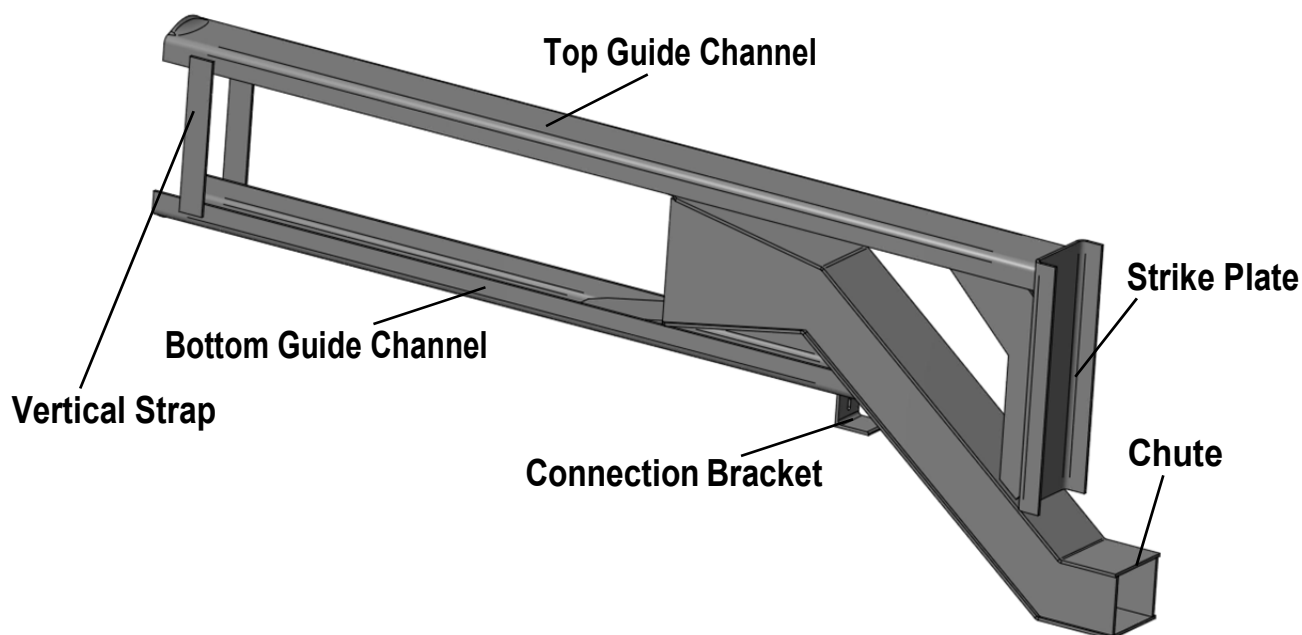
B. Anchor Post (Fully Assembled) at Correct Height



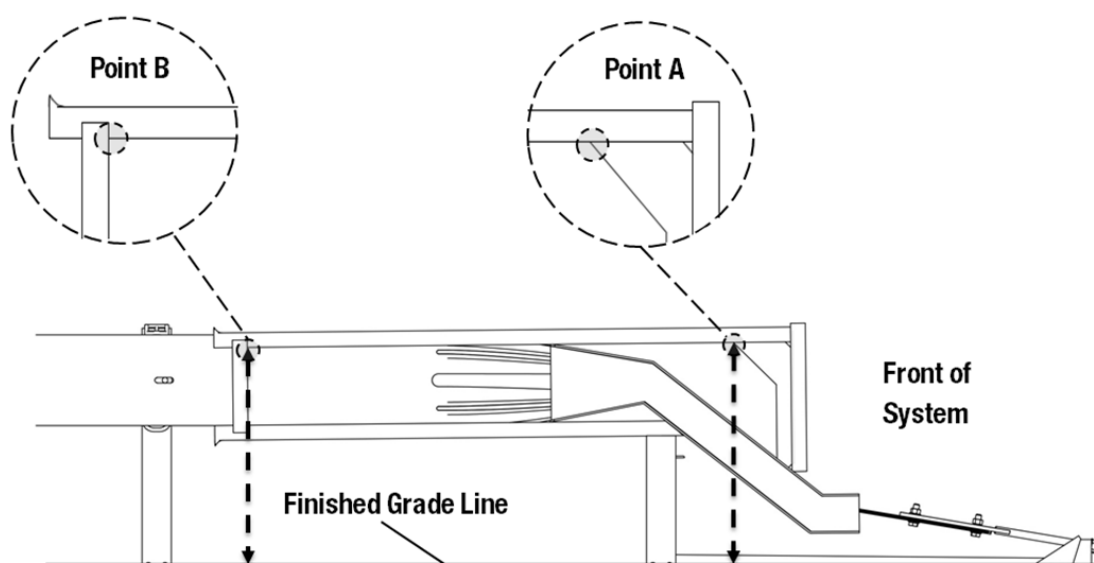
Caution: Ensure the SoftStop® System Anchor Post is assembled in the orientation shown above. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact or collision with the system.

SoftStop® System Impact Head

The SoftStop® Impact Head (15208A) component is symmetrical and can be assembled on the left or right shoulder. The diagram below lists some of the subcomponents of the Impact Head.

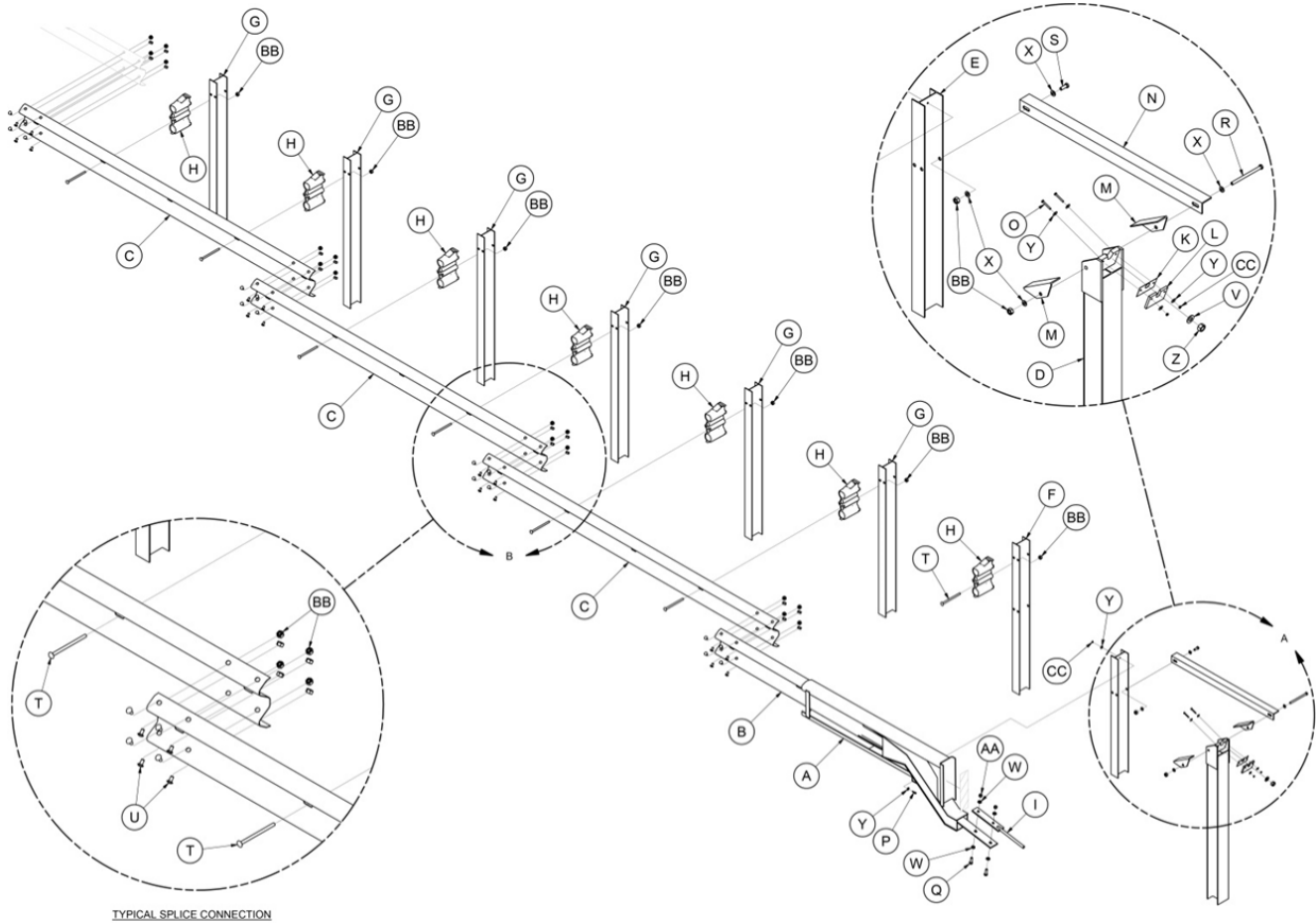


When properly assembled, the SoftStop® Impact Head shall only be assembled parallel to the finished grade line or have an upward tilt (towards front of the system). The elevation of the Impact Head can vary a maximum of 58 mm higher at Point A relative to Point B. Point A is measured from the finished grade line to where the corner of the side plate connects with the top guide channel and Point B is measured from the finished grade line to where the inside corner of the vertical strap connects with the top guide channel.



TESTLEVEL3

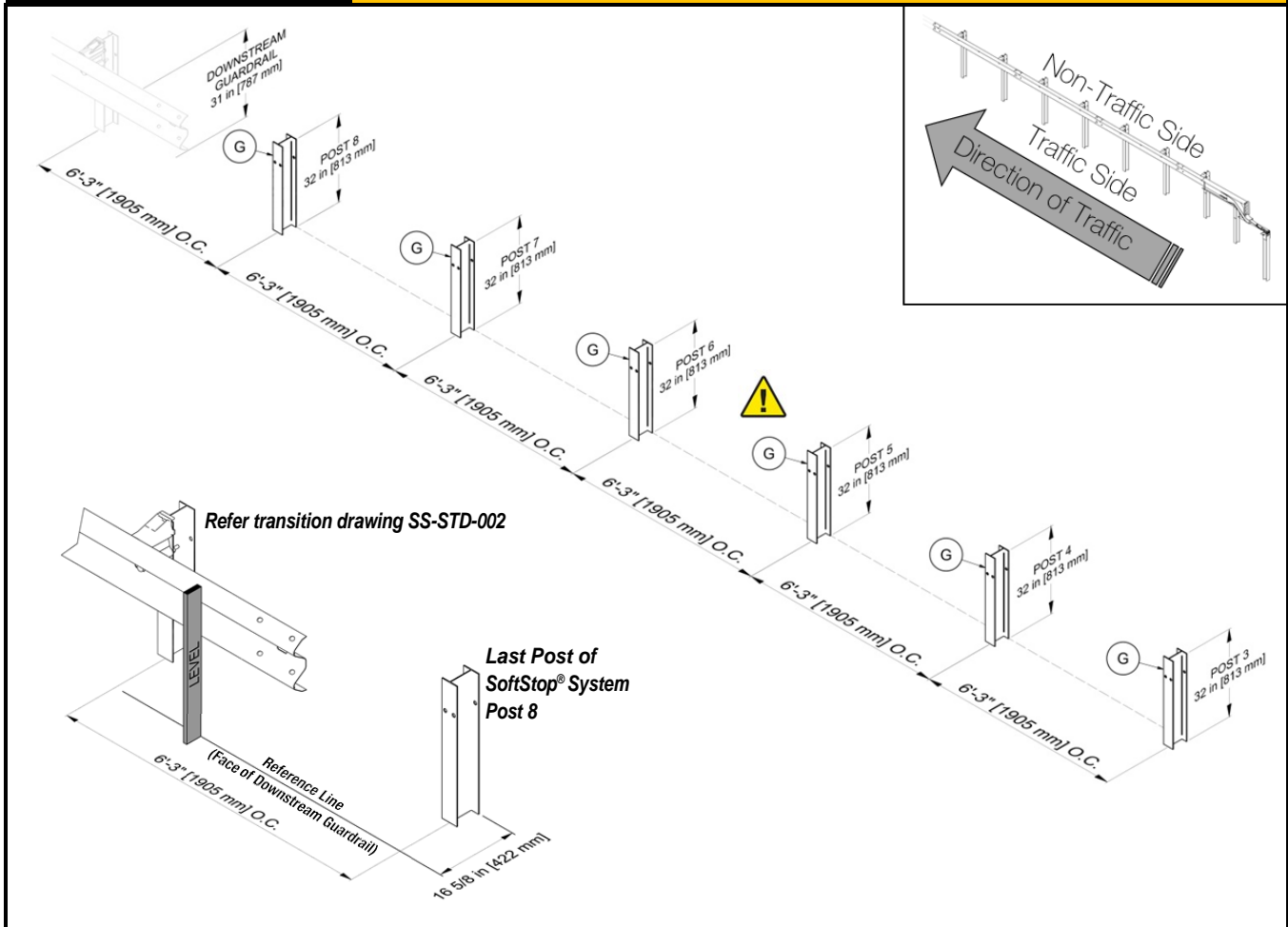
ASSEMBLY STEPS




Important: Always use safety precautions when performing assembly, maintenance, repair and/or moving heaving equipment. Ensure proper personal protective equipment (PPE) is worn. Failure to follow this warning could result in serious injury or death.

STEP 1

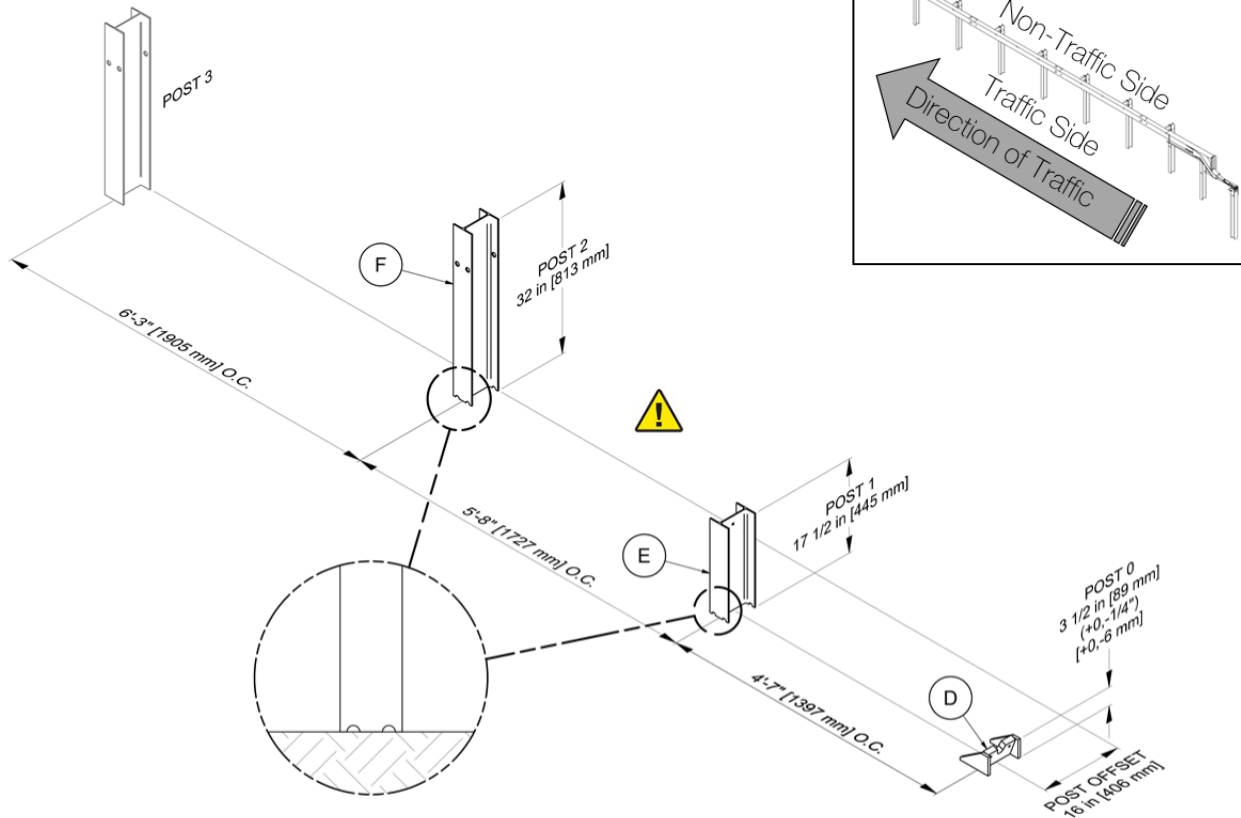
System Line Post Assembly (Posts 3-8)



PARTS			INSTRUCTIONS
G	533G	6 EA	<ol style="list-style-type: none"> 1. Assemble all parts in the configuration & orientation as shown in the above diagram. 2. The SoftStop® System must be attached to strong post w-beam guardrail that has been properly transitioned to 787 mm rail height per state/specifying agency (see Appendix for transition drawing example). 3. Establish the location of the last post of the SoftStop® System (Post 8) by placing a level on the face of downstream guardrail to the finished grade and applying offset and post spacing requirements shown above. 4. Ensure proper post spacing and post height is achieved for Posts 3-8 (Part G) per shown dimensions above.
Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise comingle parts from other systems even if those systems are Trinity Highway systems.</u>			WARNINGS
			 <p>Proper site grading must be accomplished in accordance with local specifying agency guidelines. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact or collision with the system.</p>

STEP 2

Post Assembly (Posts 0-2)



PARTS

F	15000G	1 EA
E	15203G	1 EA
D	15205A	1 EA

INSTRUCTIONS

1. Assemble all parts in the configuration & orientation shown above.
2. Ensure proper offset for Post 0 (Part D) & Post 1 (Part E) is obtained per shown dimension above (offset measured from back of Post 2 (Part F) to center of Post 0 & 1).
3. Ensure center of yielding holes for Post 1 & 2 are approximately at finished grade, as shown.
4. Ensure Post 0 stub height does not exceed 89 mm above finished grade.
5. Ensure proper post spacing and post height is achieved per shown dimensions above.

WARNINGS

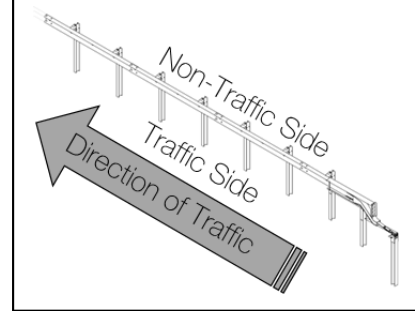
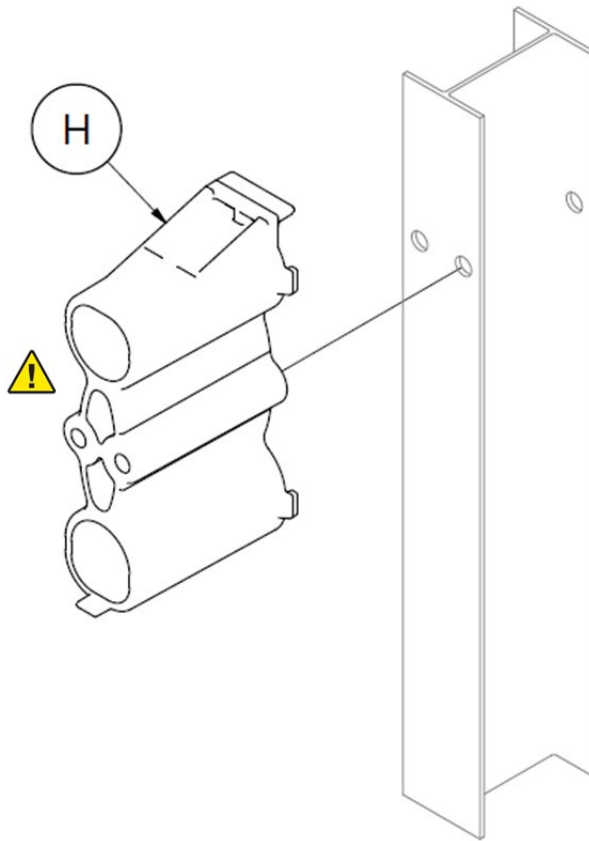



Proper site grading must be accomplished in accordance with local specifying agency guidelines. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact or collision with the system.

Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. Do not utilize or otherwise combine parts from other systems even if those systems are Trinity Highway systems.

STEP 3

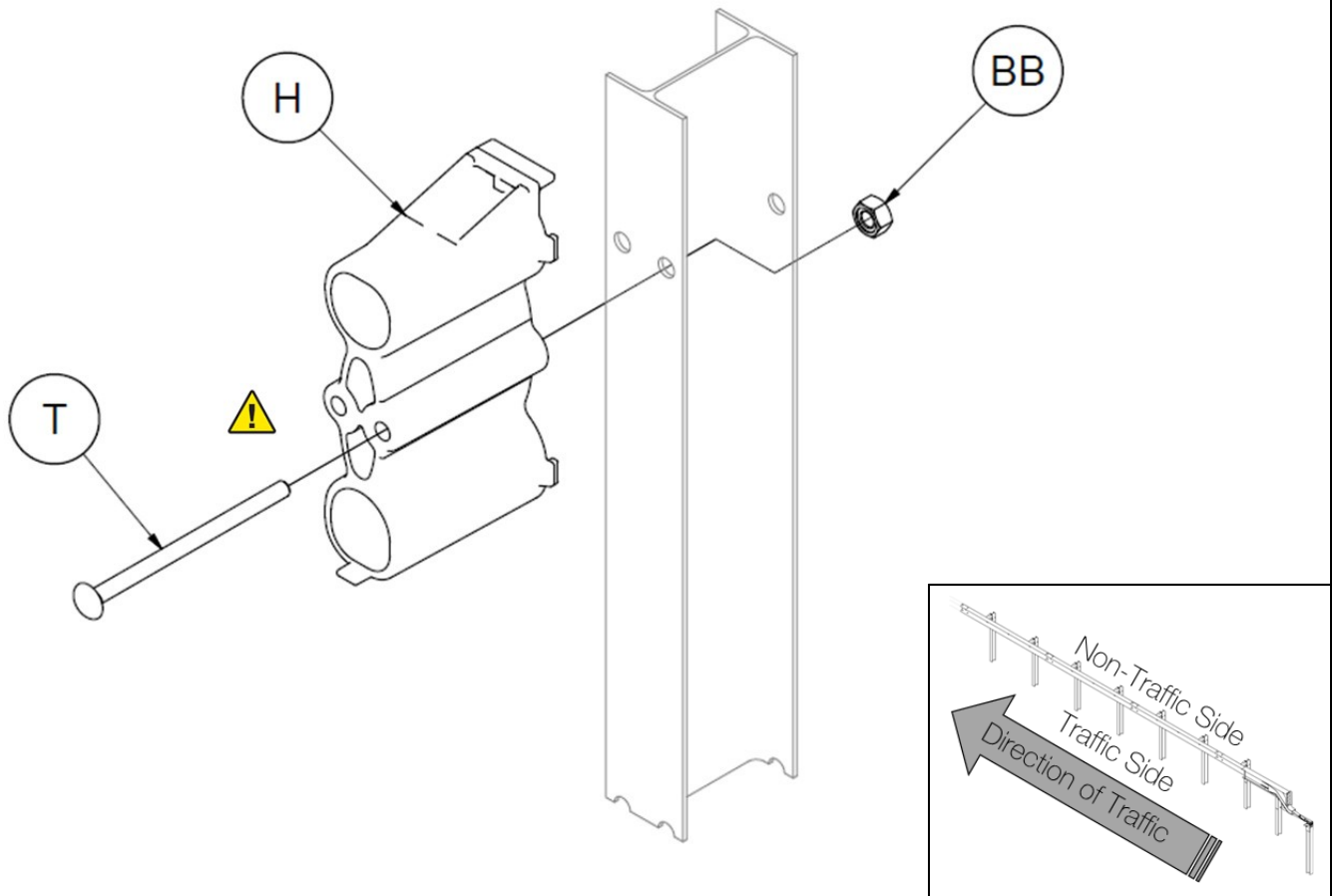
Offset Block Assembly (Posts 3-8)




PARTS			INSTRUCTIONS
H	6777B	6 EA	<div>1. Assemble all parts in the configuration & orientation shown above.</div> <div>2. Attach (1 EA) Offset Block (Part H) on traffic side of Posts 3-8. The Offset Block is equipped with a self-hanging mounting tab.</div>
<div>Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise combine parts from other systems even if those systems are Trinity Highway systems.</u></div>			<div>WARNINGS</div> <div><div></div><div><div>Do not use any Offset Block (Part H) if they show signs of damage. Seek replacement from Ingal Civil Products prior to assembly.</div></div></div>

STEP 4

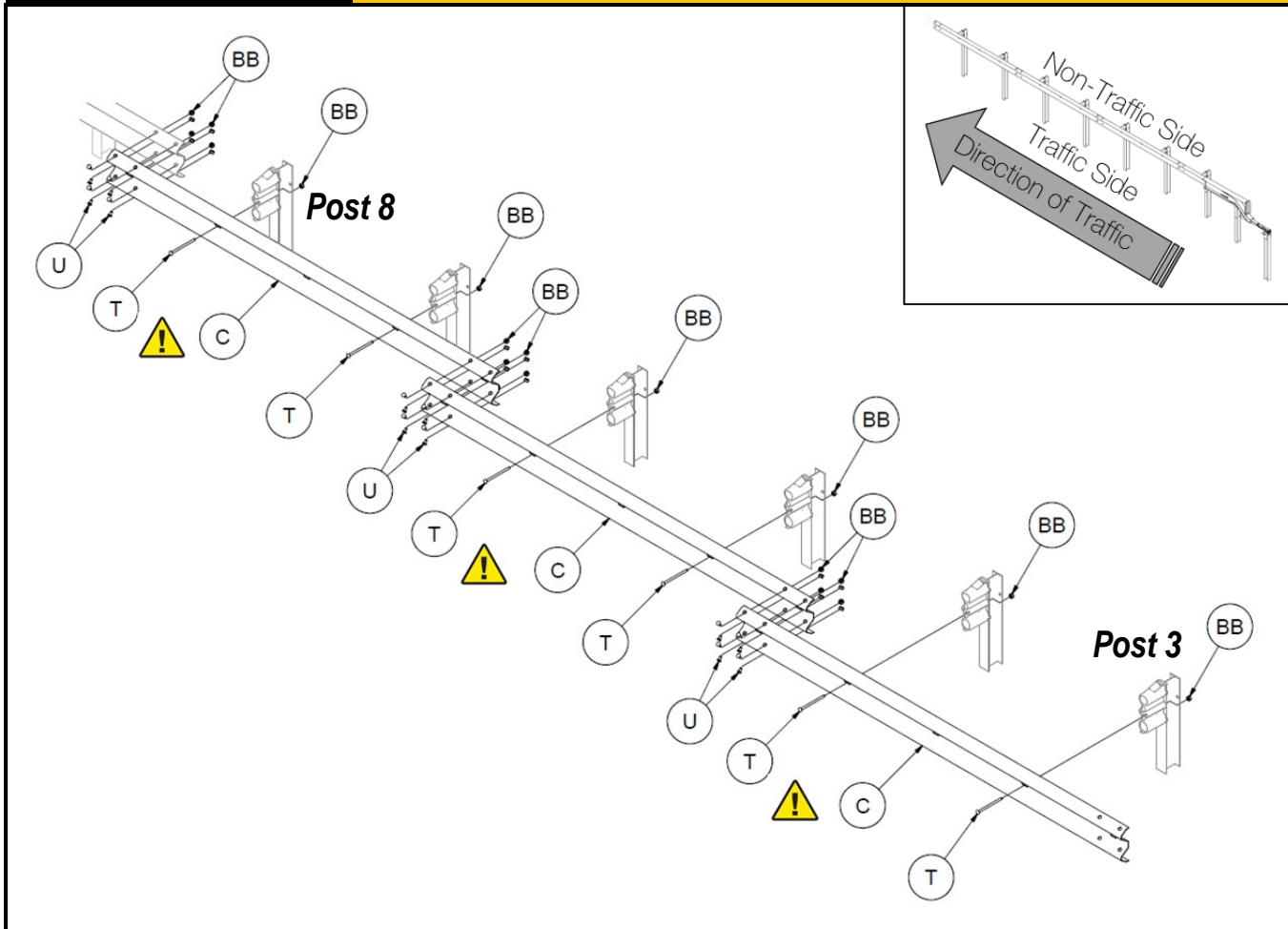
Offset Block Assembly (Post 2)




PARTS			INSTRUCTIONS
H	6777B	1 EA	<ol style="list-style-type: none"> 1. Assemble all parts in the configuration & orientation shown above. 2. Attach (1 EA) Offset Block (Part H) on traffic side of Post 2. The Offset Block is equipped with a self-hanging mounting tab. 3. Secure Offset Block to post with shown hardware. 4. Tighten all threaded hardware to a snug position with an appropriately sized wrench or socket.
T	3500G	1 EA	
BB	3340G	1 EA	
<p>Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise comingle parts from other systems even if those systems are Trinity Highway systems.</u></p>			WARNINGS
			 <p>Do not use any Offset Block (Part H) if they show signs of damage. See replacement from Ingal Civil Products prior to assembly.</p>

STEP 5

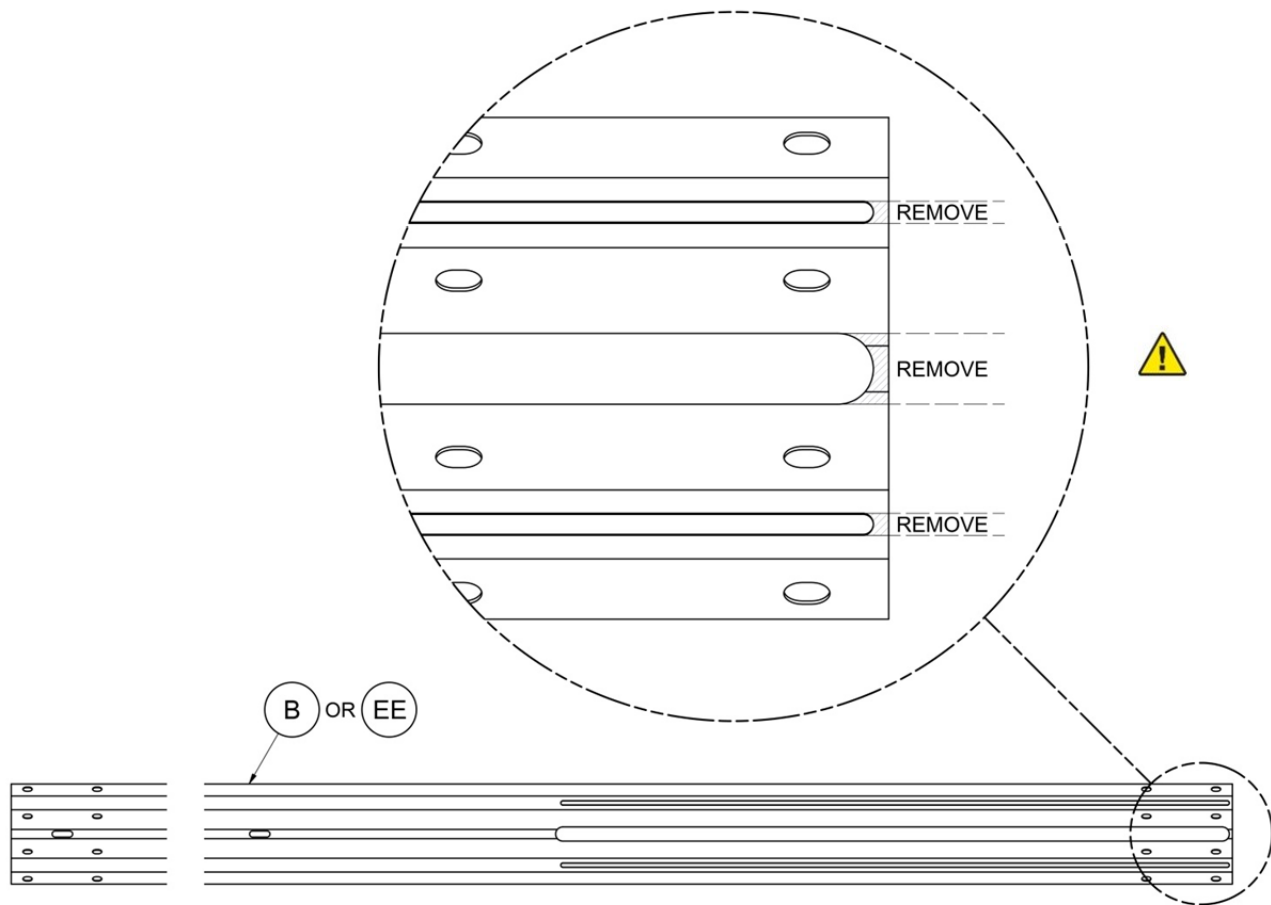
3.81m System Rail Assembly (Post3-8)




PARTS			INSTRUCTIONS
C	11G	3 EA	<ol style="list-style-type: none"> 1. Assemble all parts in the configuration & orientation shown above. 2. Place all System Rail panels (Part C) on the traffic side of the posts and lap all System Rail panels in the direction of traffic as shown above using shown hardware. 3. Tighten all threaded hardware to a snug position with an appropriately sized wrench or socket.
T	3500G	6 EA	
U	3360G	24 EA	
BB	3340G	30 EA	
			WARNINGS
Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise comingle parts from other systems even if those systems are Trinity Highway systems.</u>			 <p>Do not place anything between any post bolt head and the SoftStop® System Rail that would prevent the bolt from pulling through (i.e. no rectangular washers or delineators). Failure to follow this warning could result in serious injury or death in the event of a collision.</p>

STEP 6

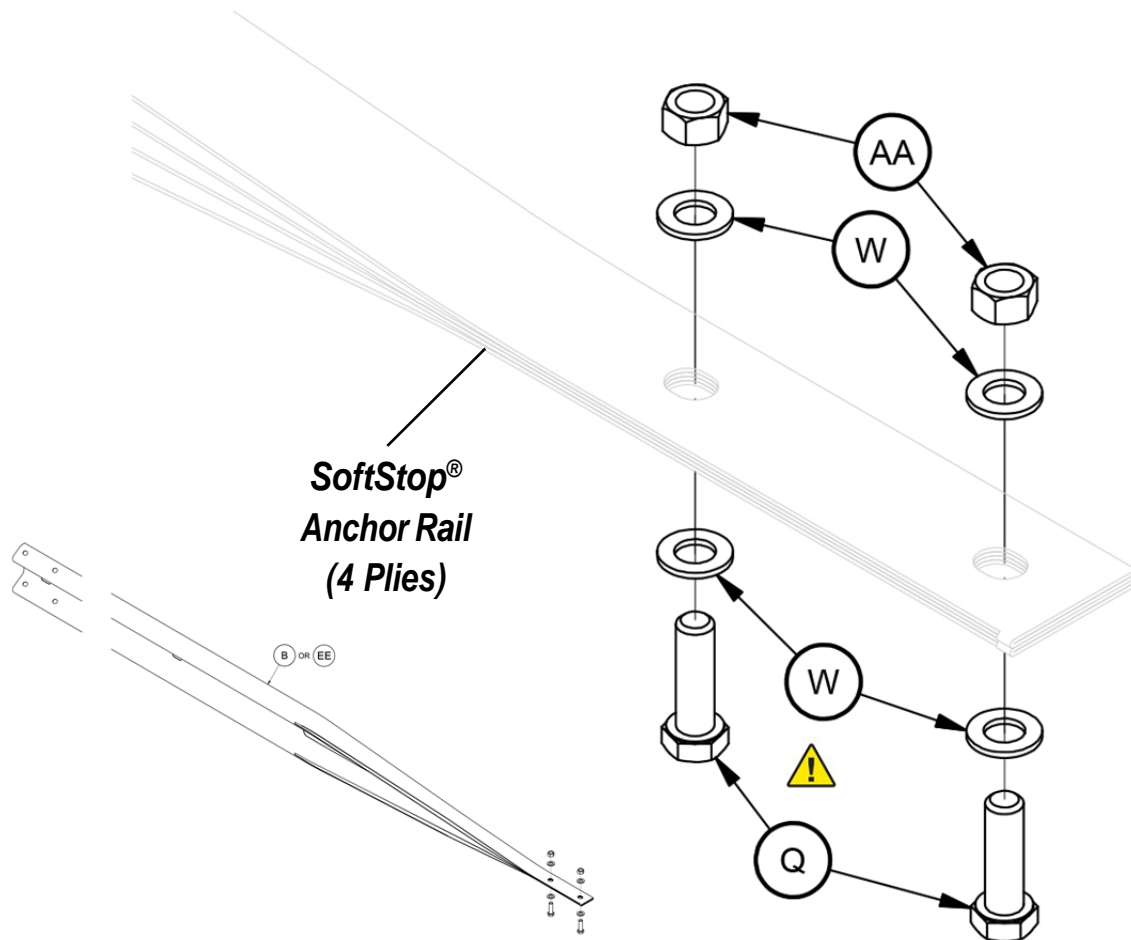
Anchor Rail Shipping Tabs Removal




PARTS			INSTRUCTIONS
B	15200G	1 EA	<p>1. The SoftStop® Anchor Rail is manufactured with three (3) shipping tabs. These shipping tabs shall be removed with a cutting device to assist in the assembly process.</p> <p>Note: Only one (1) SoftStop® Anchor Rail is used per assembly.</p>
EE	15215G	1 EA	
<p>Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise comeingle parts from other systems even if those systems are Trinity Highway systems.</u></p>			WARNINGS
			 <p>Keep body parts clear of cutting device. Ensure proper personal protective equipment (PPE) is worn. Failure to follow this warning could result in serious injury or death.</p>

STEP 7

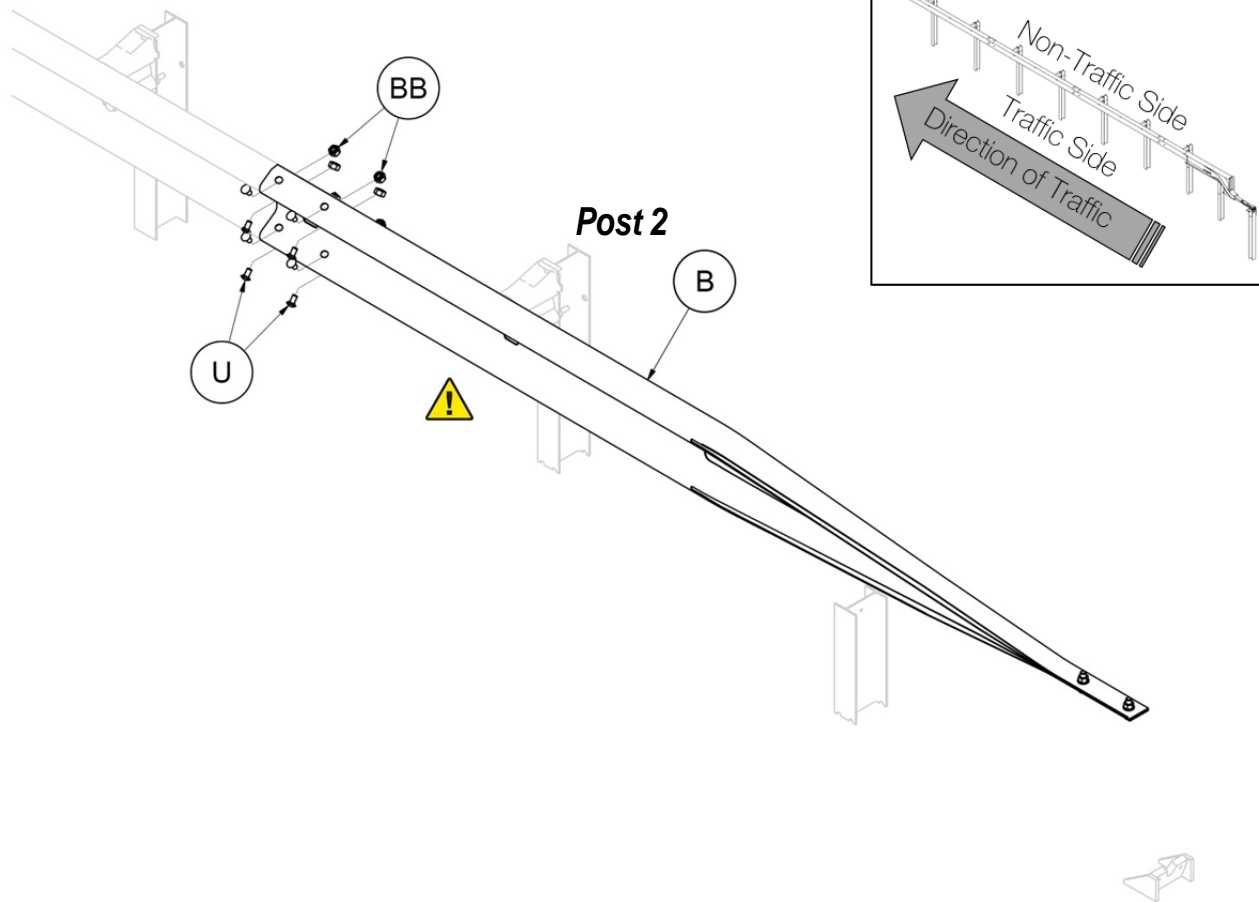
Anchor Rail Hardware Assembly




PARTS			INSTRUCTIONS
B	15200G	1 EA	<ol style="list-style-type: none"> 1. Assemble all parts in the configuration & orientation shown above. 2. Insert both hex bolts (Part Q) through the bottom side of the four (4) plies of the SoftStop® Anchor Rail (Part B or Part EE). The bottom side is determined by the final assembled position on the SoftStop® System. The use of locking pliers or c-clamps will aid the assembly process. 3. Tighten all threaded hardware to a snug position with an appropriately sized wrench or socket.
Q	3717G	2 EA	
W	3701G	4 EA	
AA	3704G	2 EA	
EE	15215G	1 EA	
			Note: Only one (1) SoftStop® Anchor Rail is used per assembly.
			WARNINGS
Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise comingle parts from other systems even if those systems are Trinity Highway systems.</u>			 <p>Insert the SoftStop® Anchor Paddle Bolts (Part Q) from the bottom of the SoftStop® Anchor Rail. Failure to follow this warning could result in serious injury or death in the event of a collision.</p>

STEP 8

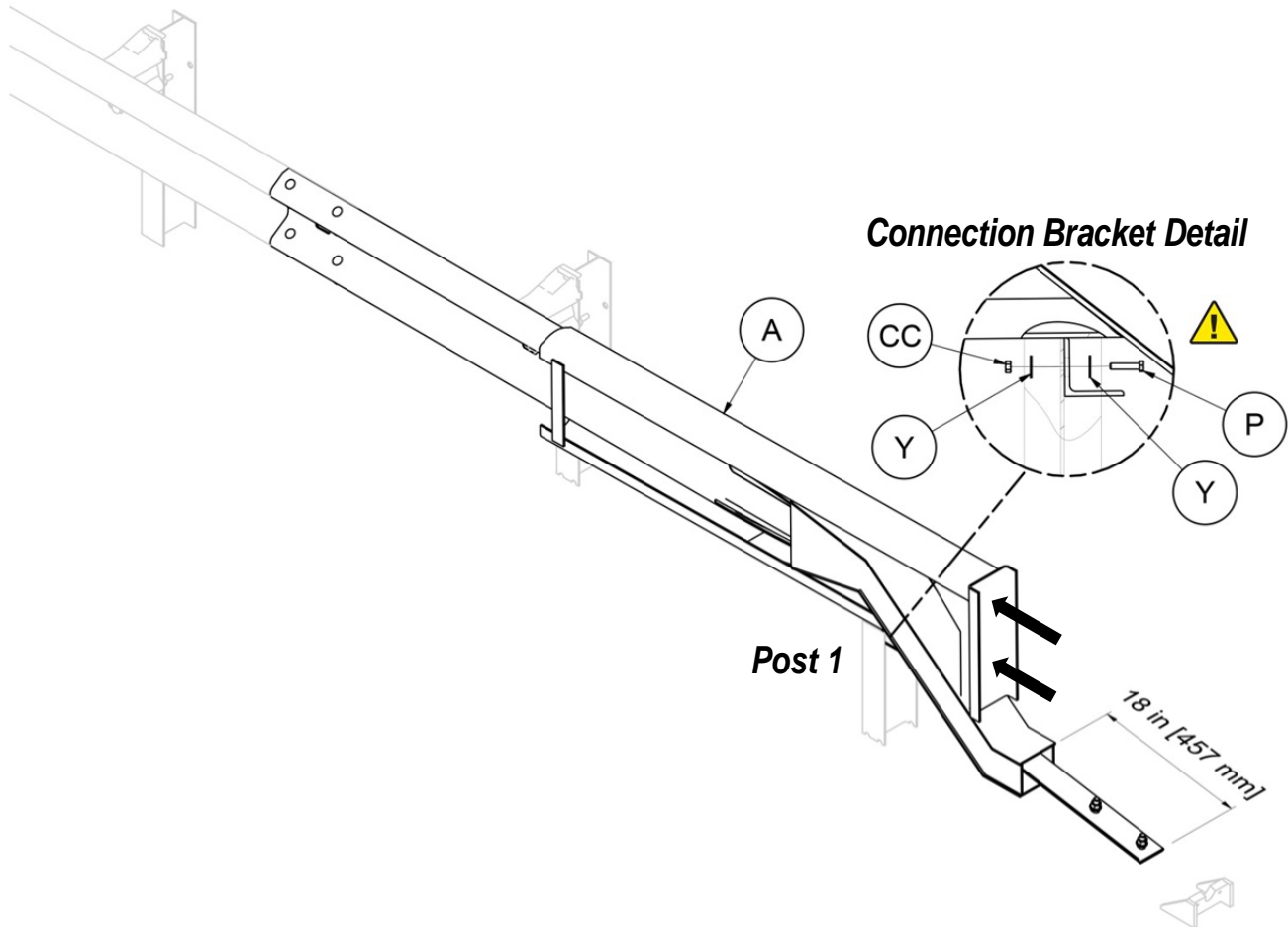
Anchor Rail Assembly




PARTS			INSTRUCTIONS
B	15200G	1 EA	<ol style="list-style-type: none"> 1. Assemble all parts in the configuration & orientation shown above. 2. Place SoftStop® Anchor Rail (Part B) on the traffic side and lap in the direction of traffic as shown above using shown hardware. 3. Tighten all threaded hardware to a snug position with an appropriately sized wrench or socket.
U	3360G	8 EA	
BB	3340G	8 EA	
<p>Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise comingle parts from other systems even if those systems are Trinity Highway systems.</u></p>			WARNINGS
			 <p>Do not bolt the SoftStop® Anchor Rail to Post 2. Failure to follow this warning could result in serious injury or death in the event of a collision.</p>

STEP 9

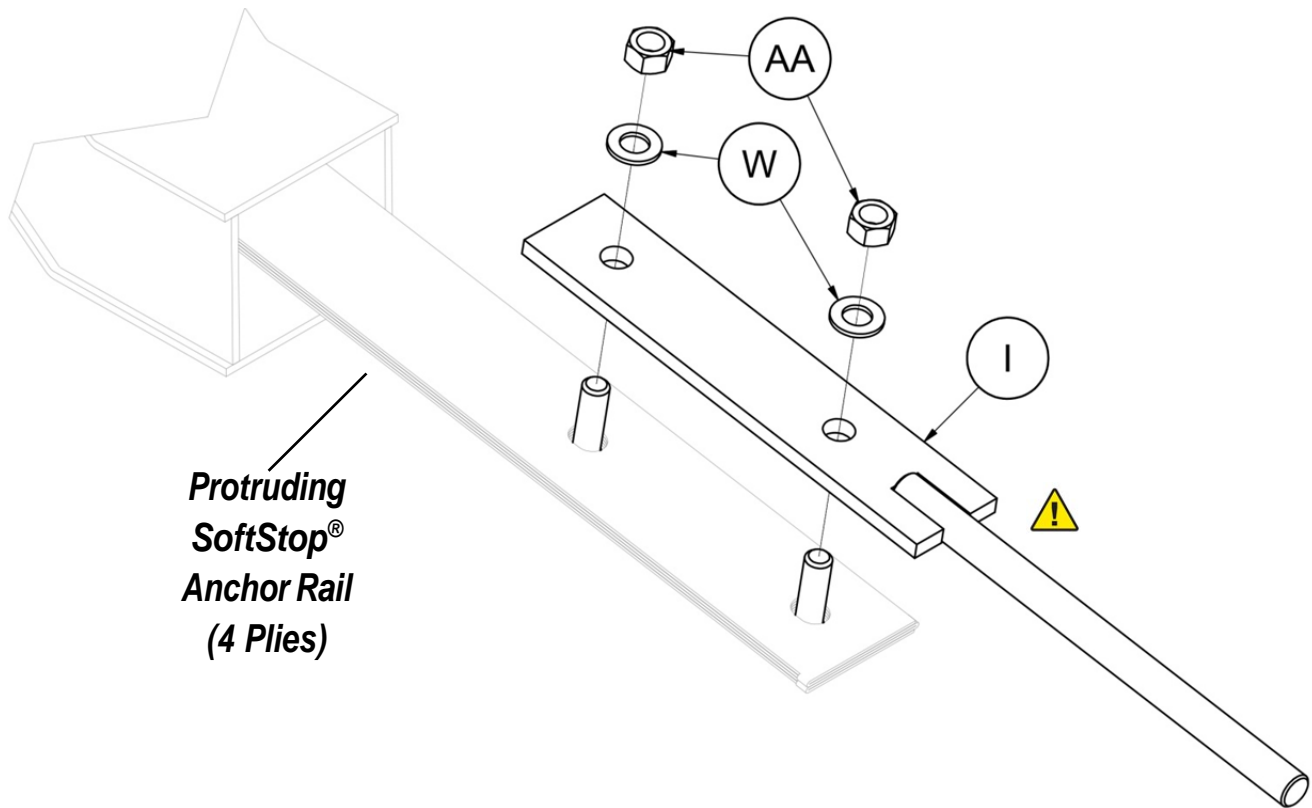
Impact Head Assembly




PARTS			INSTRUCTIONS
A	15208A	1 EA	<ol style="list-style-type: none"> 1. Assemble all parts in the configuration & orientation shown above. 2. Mechanically push the SoftStop® Impact Head (Part A) until its Connection Bracket rests against Post 1 and a minimum 457 mm of the SoftStop® Anchor Rail is protruding out the Chute. 3. Fasten Post 1 and the Connection Bracket together with shown hardware (Parts P, Y, & CC). See Connection Bracket detail. 4. Tighten all threaded hardware to a snug position with an appropriately sized wrench or socket.
P	105286G	1 EA	
Y	3240G	2 EA	
CC	3245G	1 EA	
WARNINGS			
Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise comingle parts from other systems even if those systems are Trinity Highway systems.</u>			 <p>The SoftStop® Impact Head Connection Bracket must rest against the front side of Post #1 (between Posts 0-1) as shown in the Connection Bracket Detail above.</p>

STEP 10

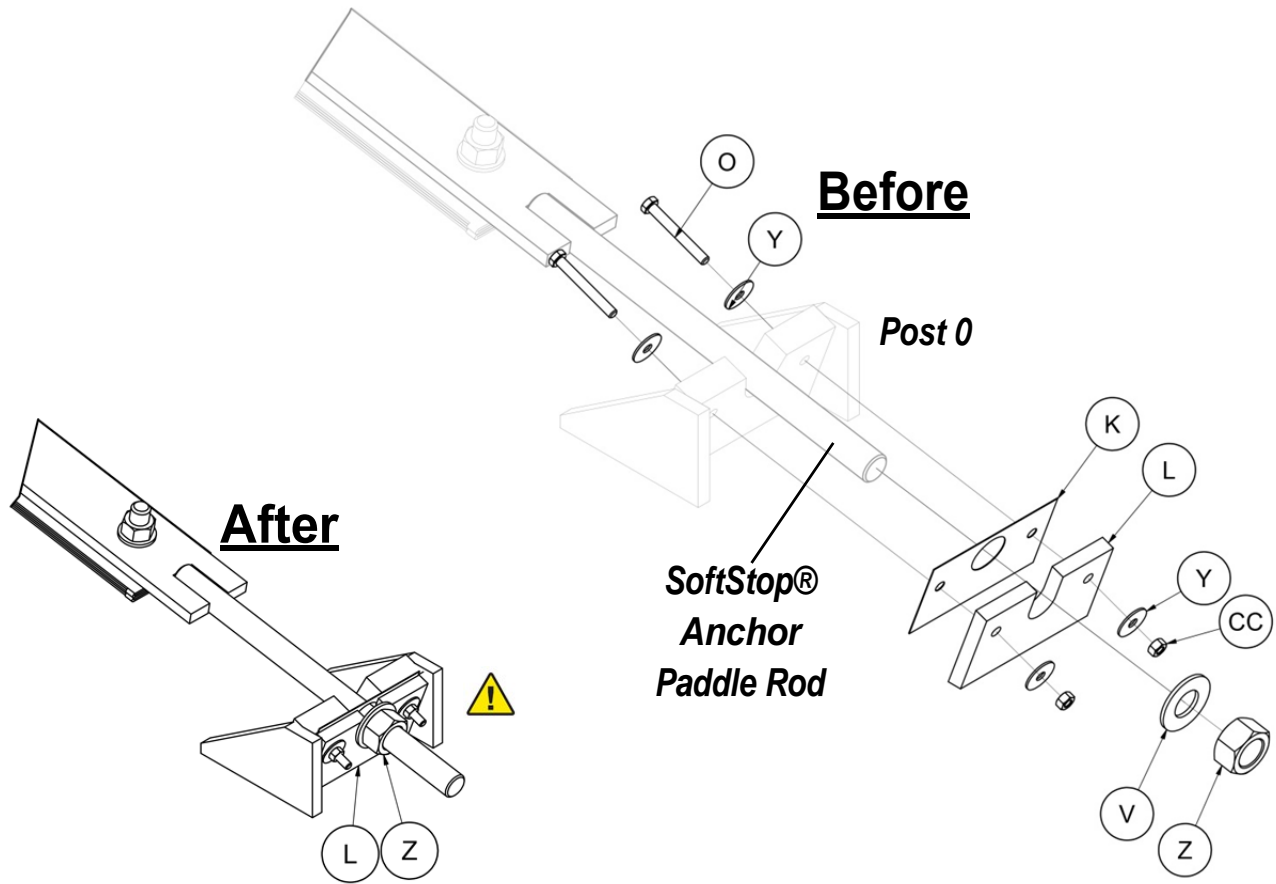
Anchor Paddle Assembly




PARTS			INSTRUCTIONS
I	15204A	1 EA	<ol style="list-style-type: none"> 1. Assemble all parts in the configuration & orientation shown above. 2. Remove the nuts (Part AA) and top washers (Part W) and place the SoftStop® Anchor Paddle (Part I) onto the hex bolts. The SoftStop® Anchor Paddle is assembled on the top side of the four (4) plies of the protruding SoftStop® Anchor Rail. Reassemble the top washers and nuts onto the hex bolt as shown above. The use of locking pliers or c-clamps will aid the assembly process. 3. Tighten all threaded hardware to a snug position with an appropriately sized wrench or socket.
W	3701G	2 EA	
AA	3704G	2 EA	
Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise combine parts from other systems even if those systems are Trinity Highway systems.</u>			WARNINGS
			 <p>The SoftStop® Anchor Paddle (Part I) must be placed on the topside of the SoftStop® Anchor Rail. Failure to follow this warning could result in serious injury or death in the event of a collision.</p>

STEP 11

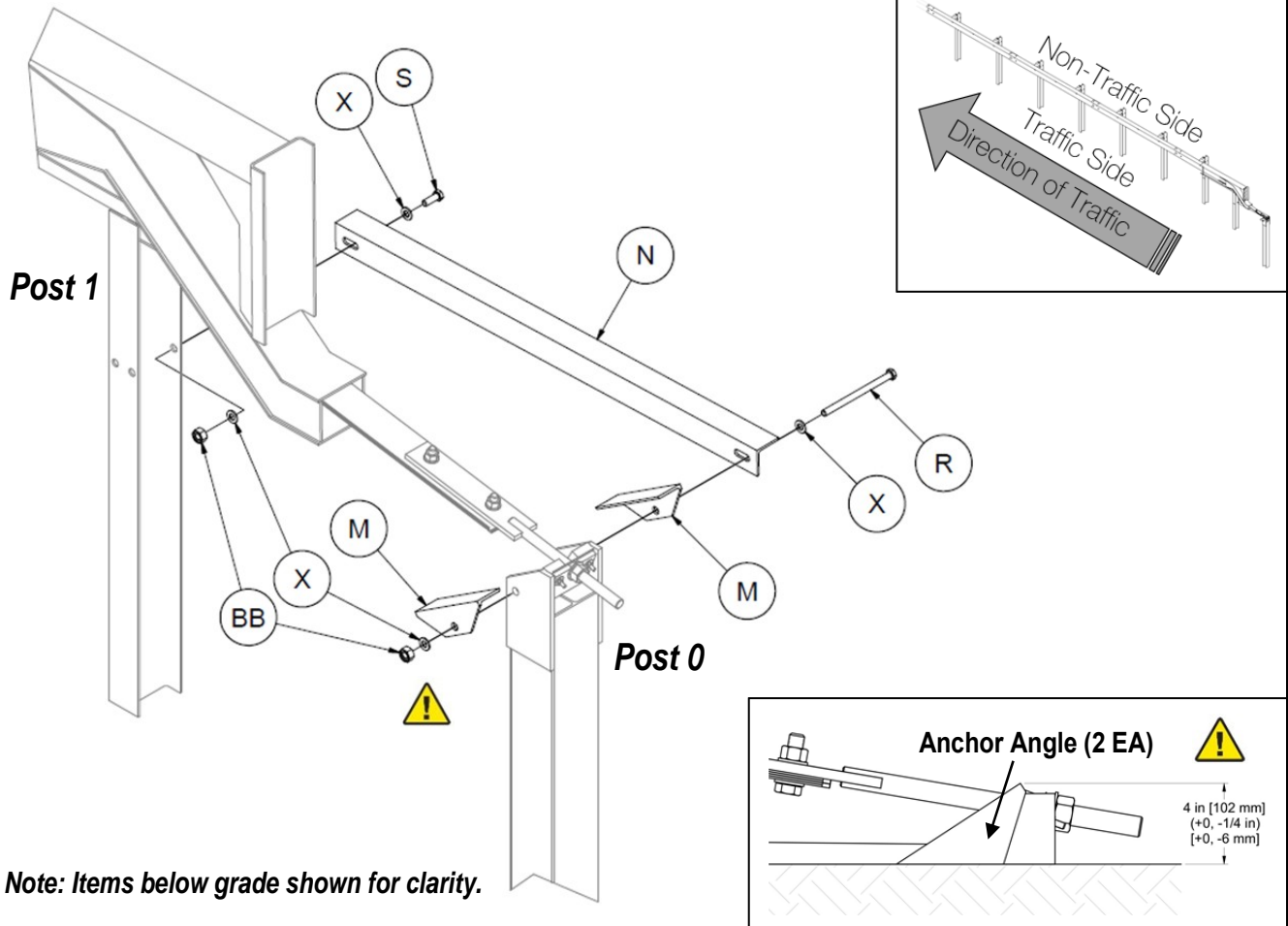
Anchor Post Assembly (Post 0)




PARTS			INSTRUCTIONS
Y	3240G	4 EA	<ol style="list-style-type: none"> 1. Assemble all parts in the configuration & orientation shown above. 2. Place the rod portion of the SoftStop® Anchor Paddle in the notch of Post 0. 3. Place the SoftStop® Keeper Plate (Part K) and SoftStop® Plate Washer (Part L) onto the SoftStop® Anchor Paddle Rod and fasten to Post 0 using shown hardware (Part O, Y, CC). 4. Place washer (Part V) then nut (Part Z) on the SoftStop® Anchor Paddle Rod. 5. Tighten all threaded hardware to a snug position with an appropriately sized wrench or socket.
CC	3245G	2 EA	
Z	3908G	1 EA	
V	4902G	1 EA	
L	15206G	1 EA	
K	15207G	1 EA	WARNINGS
O	105285G	2 EA	
<p>Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise combine parts from other systems even if those systems are Trinity Highway systems.</u></p>			 <p>Ensure the 1" Hex Nut (Part Z) has been fully tightened against the SoftStop® Plate Washer (Part L). Failure to follow this warning could result in serious injury or death in the event of a collision.</p>

STEP 12

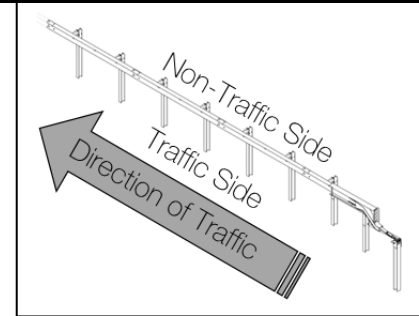
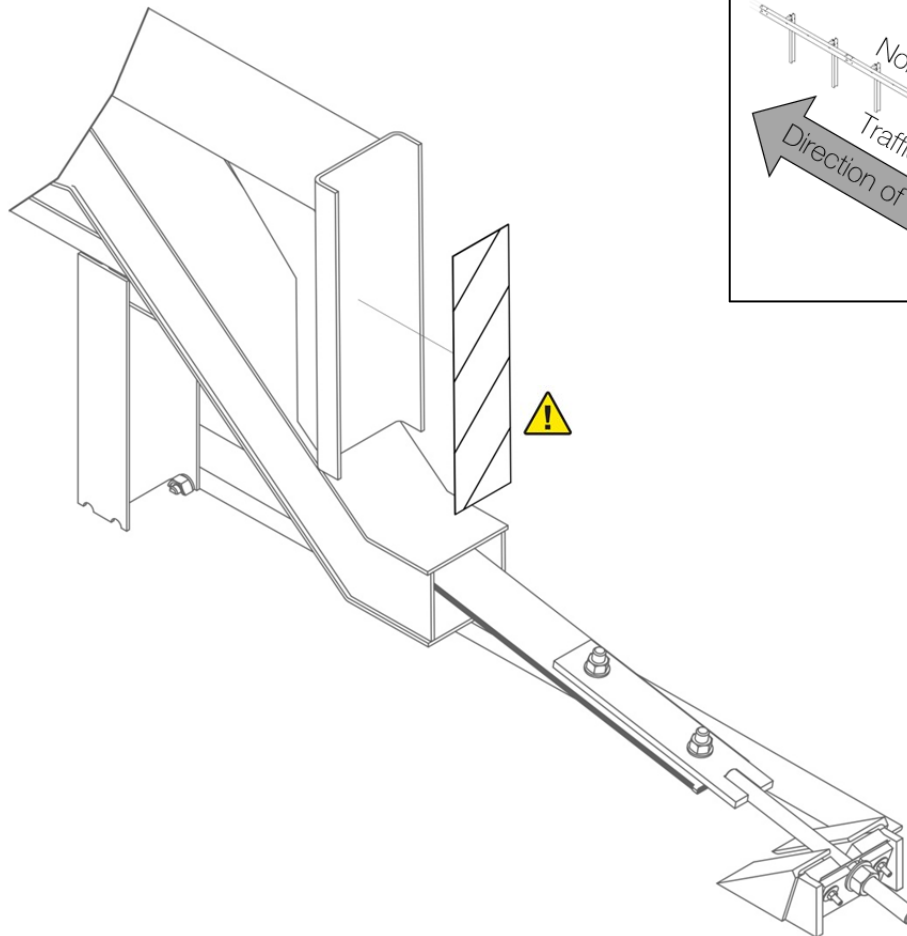
Angle Strut Assembly (Posts 0-1)




PARTS			INSTRUCTIONS
BB	3340G	2 EA	<div>1. Assemble all parts in the configuration & orientation shown above.</div> <div>2. It will be necessary to make a shallow valley/trough between Post 0 & 1 for the SoftStop® Angle Strut (Part N) and SoftStop® Anchor Angles (Part M), since a portion will be below the finished grade.</div> <div>3. Position the SoftStop® Anchor Angles (Part M) onto Post 0 and place SoftStop® Angle Strut on the non-traffic side with short leg down and fasten to Post 0 & 1 using shown hardware (Part R, S, X, BB).</div> <div>4. Tighten all threaded hardware to a snug position with an appropriately sized wrench or socket.</div>
X	4372G	4 EA	
R	4489G	1 EA	
M	15201G	2 EA	
N	15202G	1 EA	
S	3391G	1 EA	
<div>Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise comingle parts from other systems even if those systems are Trinity Highway systems.</u></div>			<div>WARNINGS</div> <div><div></div><div><div>Ensure fully assembled SoftStop® Anchor Post height (with SoftStop® Anchor Angles) does not exceed 102mm above finished grade line.</div></div></div>

STEP 13

Delineation Assembly



PARTS			INSTRUCTIONS
	By Others		<p>1. Assemble all parts in the configuration & orientation shown above.</p> <p>Note: Manufacturer suggests that user provide delineation (reflective sheeting) of the terminal.</p>
			WARNINGS
<p>Use only Trinity Highway parts that are specified herein for the SoftStop® System for assembling, maintaining, or repairing the SoftStop® System. <u>Do not utilize or otherwise comingle parts from other systems even if those systems are Trinity Highway systems.</u></p>			<div>  <p>Ensure delineation (reflective sheeting) used on SoftStop® System meets state/specifying agency's MUTCD for proper delineation. Use of steel delineator posts are not permitted within 3'-0" of the SoftStop® System.</p> </div>

SoftStop

Guardrail End Terminal

SoftStop Installation Checklist

Customer:

Project:

Barrier ID:

Terminal Type: ☐ MASH TL2 ☐ MASH TL3

Checked By:

Signed:

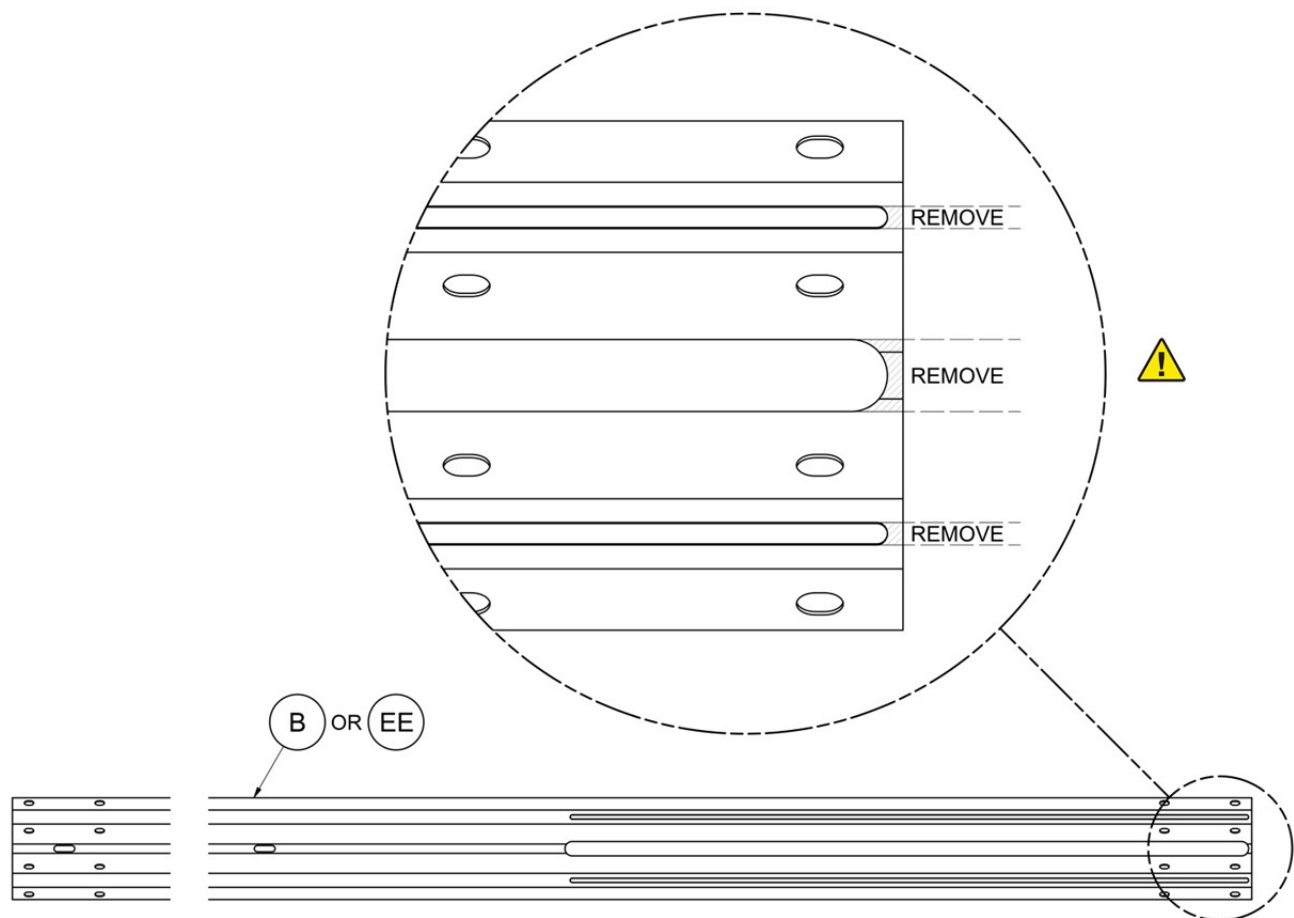
Date:

Is the assembled Anchor post installed in the correct orientation with the sloped side facing the terminal and within tolerance (102 +0/-6 mm)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is Anchor Keeper Plate installed in correct configuration on Anchor post (Detail A on drawing SS-STD-001)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have Anchor post Angles been correctly bolted to the Anchor post (Detail A on drawing SS-STD-001)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the Ground Strut bolted to the Anchor post and post 1 (Detail B on drawing SSSTD-001)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
The SoftStop head is bolted to post 1 (as per Detail D on drawing SS-STD-001)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are SYT posts positioned at locations 1 & 2, with yield holes approximately centred at finished grade line	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are posts 2 through 8 at the correct height of 813mm \pm 20mm above ground level	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the rails secured to posts 3 through 8 (posts 3 and 4 for the TL2 configuration)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Ensure first rail is NOT secured to post at location 2	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have the rails been joined with M16x32mm splice head bolts	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are all splice bolts, post bolts and other fasteners snug tight	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do the standard W-Beam rails form a smooth line vertically and horizontally when viewed along the system, with no curved rails	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is all back-filled material around each post suitably compacted	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is the area below the guardrails free from hazards so that the SoftStop head can travel freely upon impact	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Ensure any minor damage been repaired using two coats of an organic zinc rich paint	<input type="checkbox"/> Yes	<input type="checkbox"/> No
When installed on a flare, ensure flare rate is no greater than 1:25 (610mm offset from straight barrier over full length for TL3 configuration, 305mm for TL2 configuration)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Ensure SoftStop impact head has no more than 58mm of upward tilt, measured over length of impact head (refer Note 5 on drawing SS-STD-001)	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Appendix

Offsite Anchor Rail Pre-Assembly Method

Step A: The SoftStop® Anchor Rail is manufactured with three (3) shipping tabs. These shipping tabs shall be removed with a cutting device to assist in the assembly process. The SoftStop® Anchor Rail is available in two lengths: 12'-6" (Part B) or 25'-0" (Part EE).

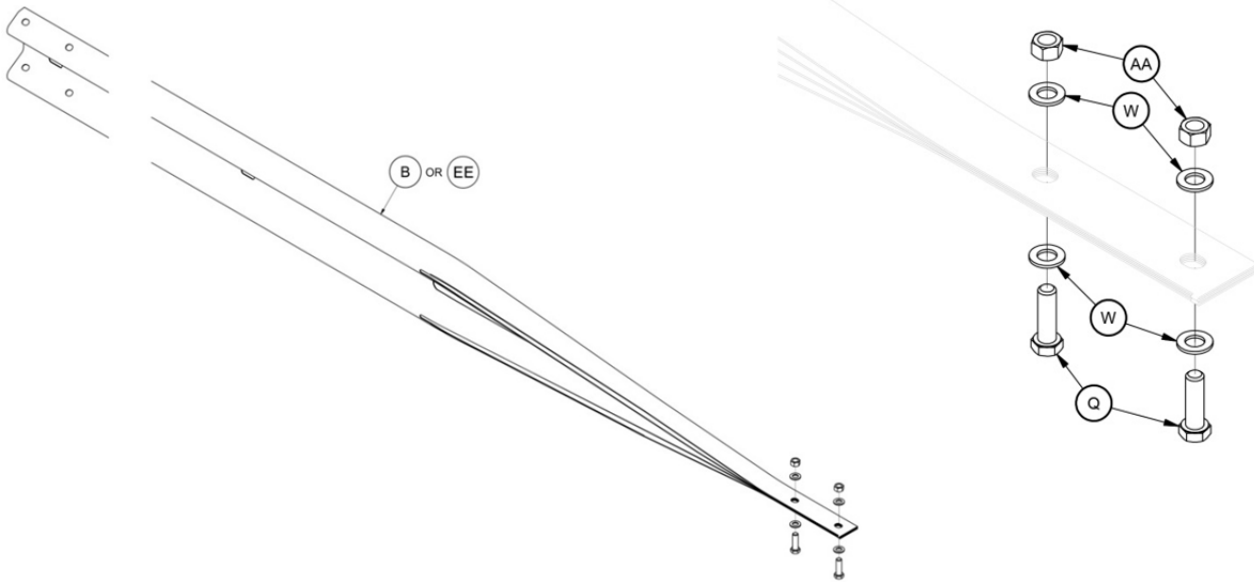


Note: Only one (1) SoftStop® Anchor Rail is used per assembly, 12'-6" (Part B) or 25'-0" (Part EE).

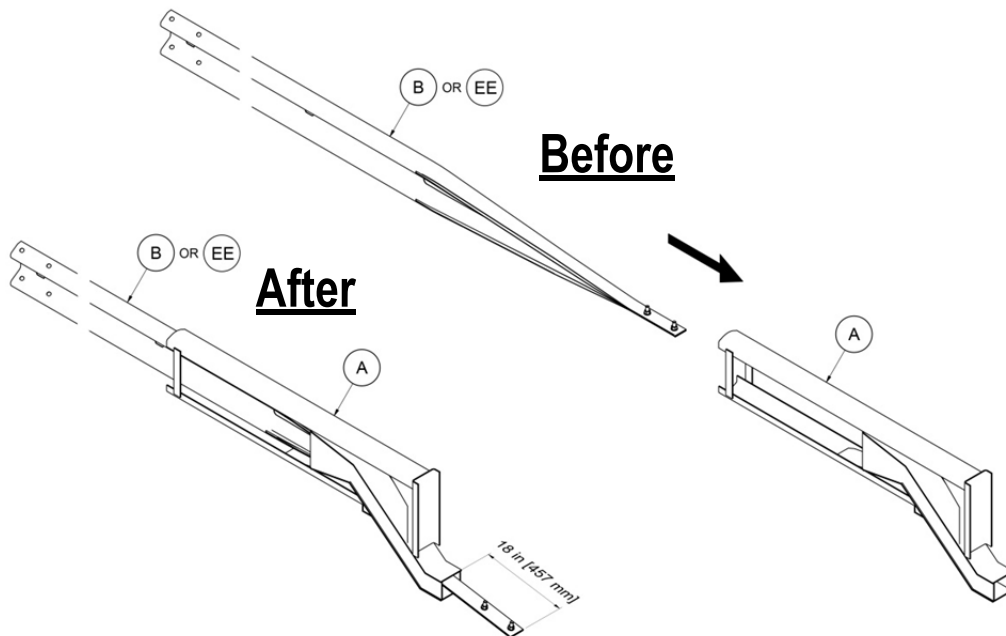


Warning: Keep body parts clear of cutting device. Ensure proper personal protective equipment (PPE) is worn. Failure to follow this warning could result in serious injury or death.

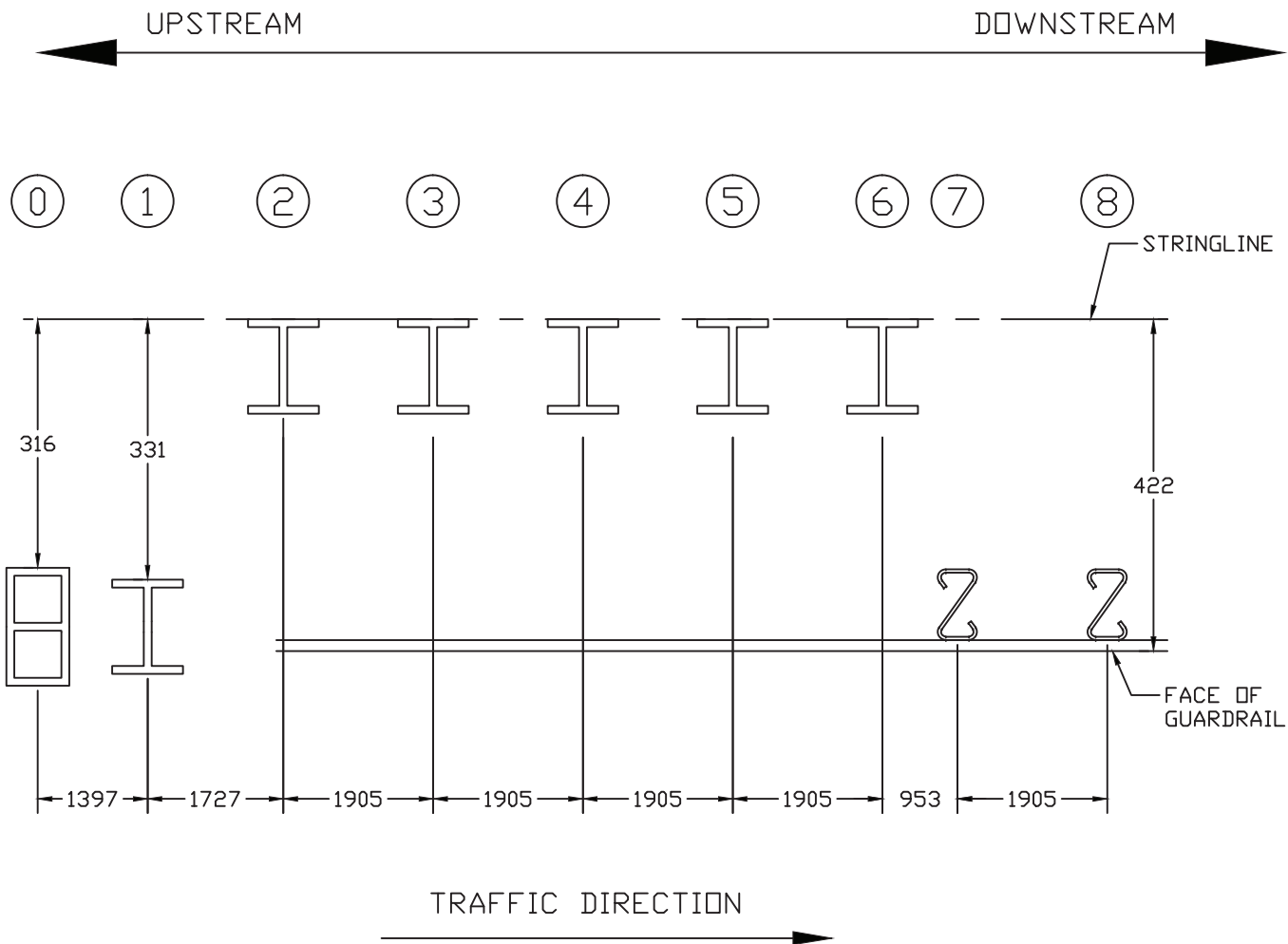
Step B: Assemble all parts in the configuration & orientation shown below. Flatten the (4) plies of the SoftStop® Anchor Rail together and insert both hex bolts (Part Q) through the bottom side of the four (4) plies of the SoftStop® Anchor Rail (Part B or Part EE) with washers and nuts (Parts W & AA). The bottom side is determined by the final assembled position of the SoftStop® System (nuts are on top side of Anchor Rail). The use of locking pliers or c-clamps will assist the assembly process.



Step C: Feed the flattened slotted end of the SoftStop® Anchor Rail (Part B or Part EE) into the SoftStop® Impact Head (Part A) until a minimum 18" [457 mm] of the SoftStop® Anchor Rail is protruding out the Chute of the SoftStop® Impact Head. This can be achieved by the use of a come-a-long or other mechanical means.



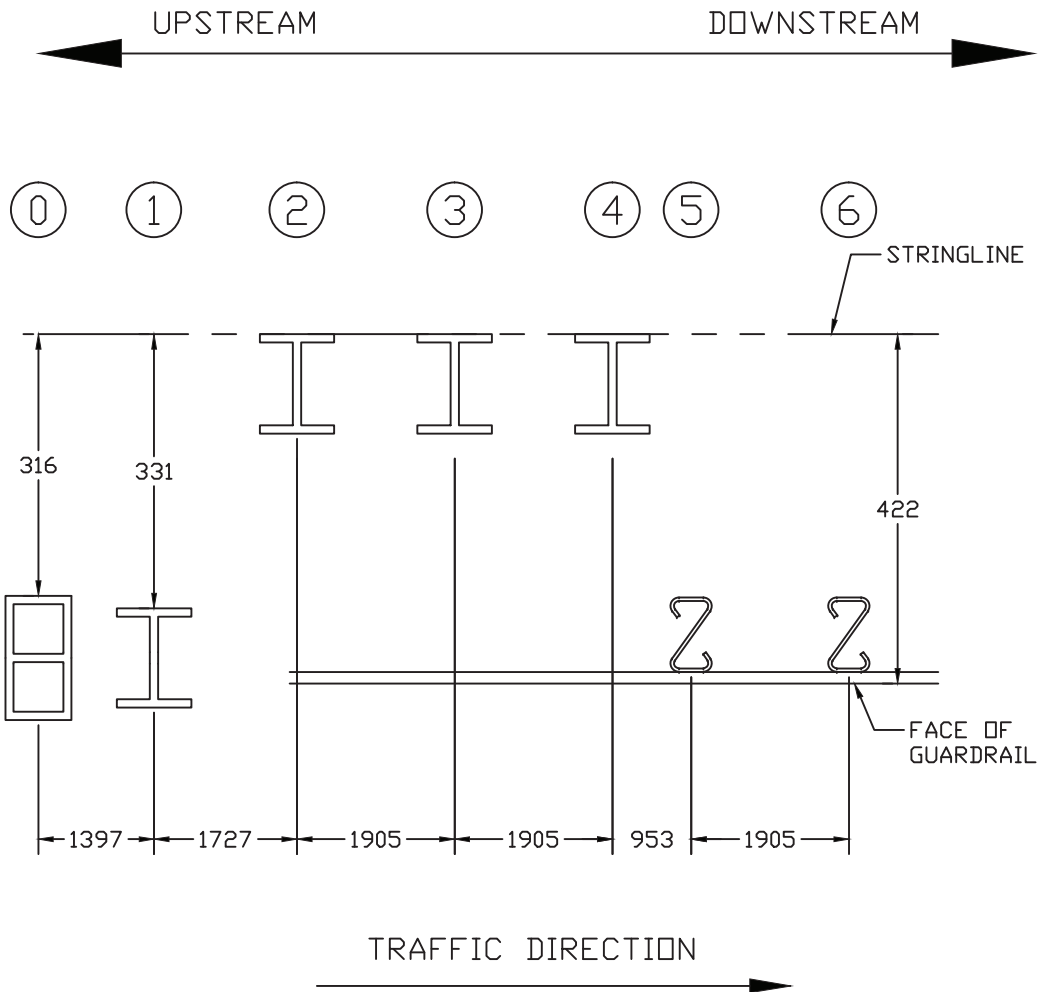
SoftStop® System (Test Level 2) - Post Placement Diagram



NOTES:

1. Post 0-6 part of SoftStop® System TL2
2. Post 7 is first post of longitudinal w-beam system (not included with SoftStop® System)
3. Spacing between posts is on centre as shown
4. All SoftStop® System posts must be installed plumb
5. Guardrail splice joint located at Post 7

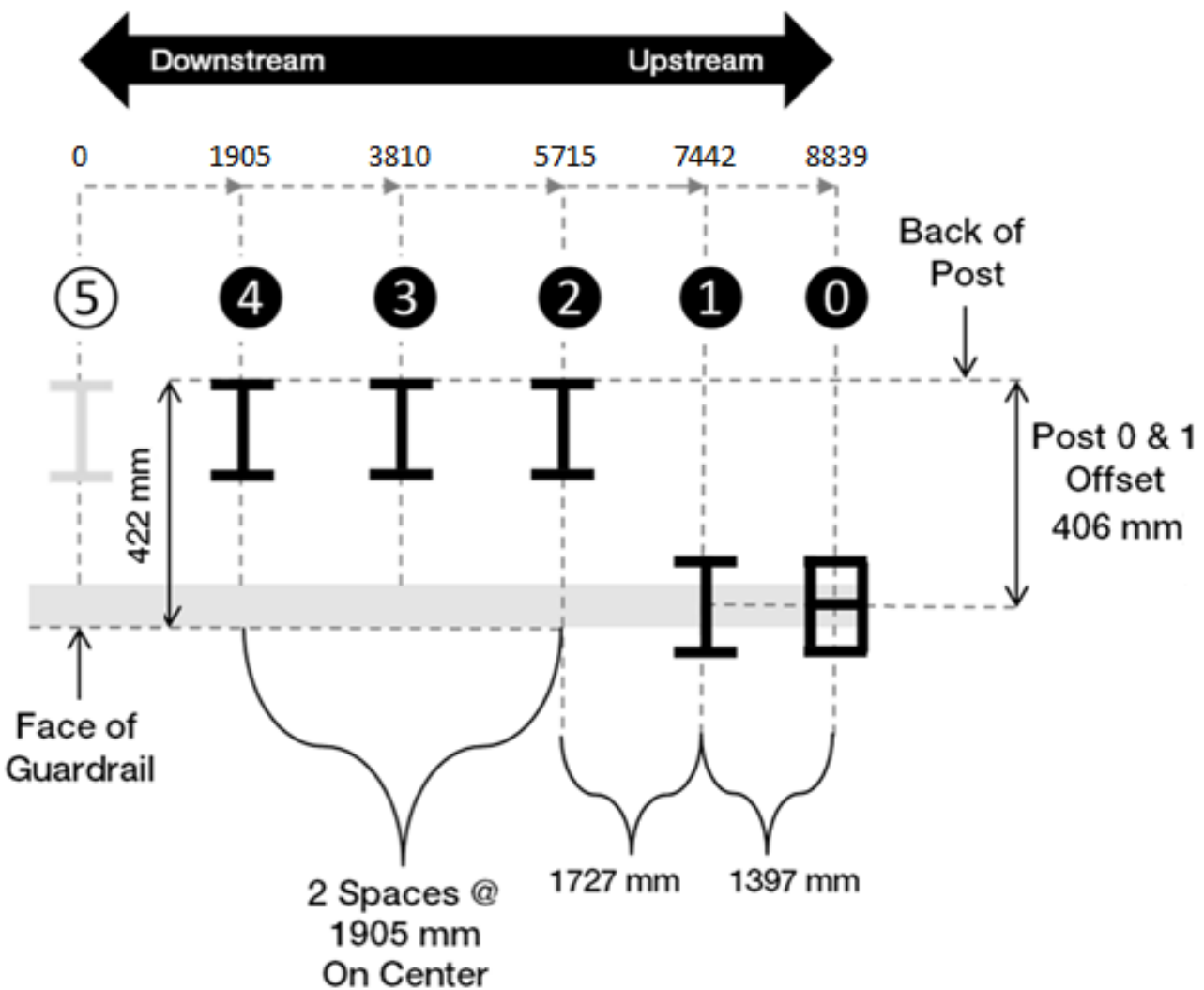
SoftStop® System (Test Level 1) - Post Placement Diagram



NOTES:

1. Post 0-4 part of SoftStop® System TL1
2. Post 5 is first post of longitudinal w-beam system (not included with SoftStop® System)
3. Spacing between posts is on centre as shown
4. All SoftStop® System posts must be installed plumb
5. Guardrail splice joint located at Post 5

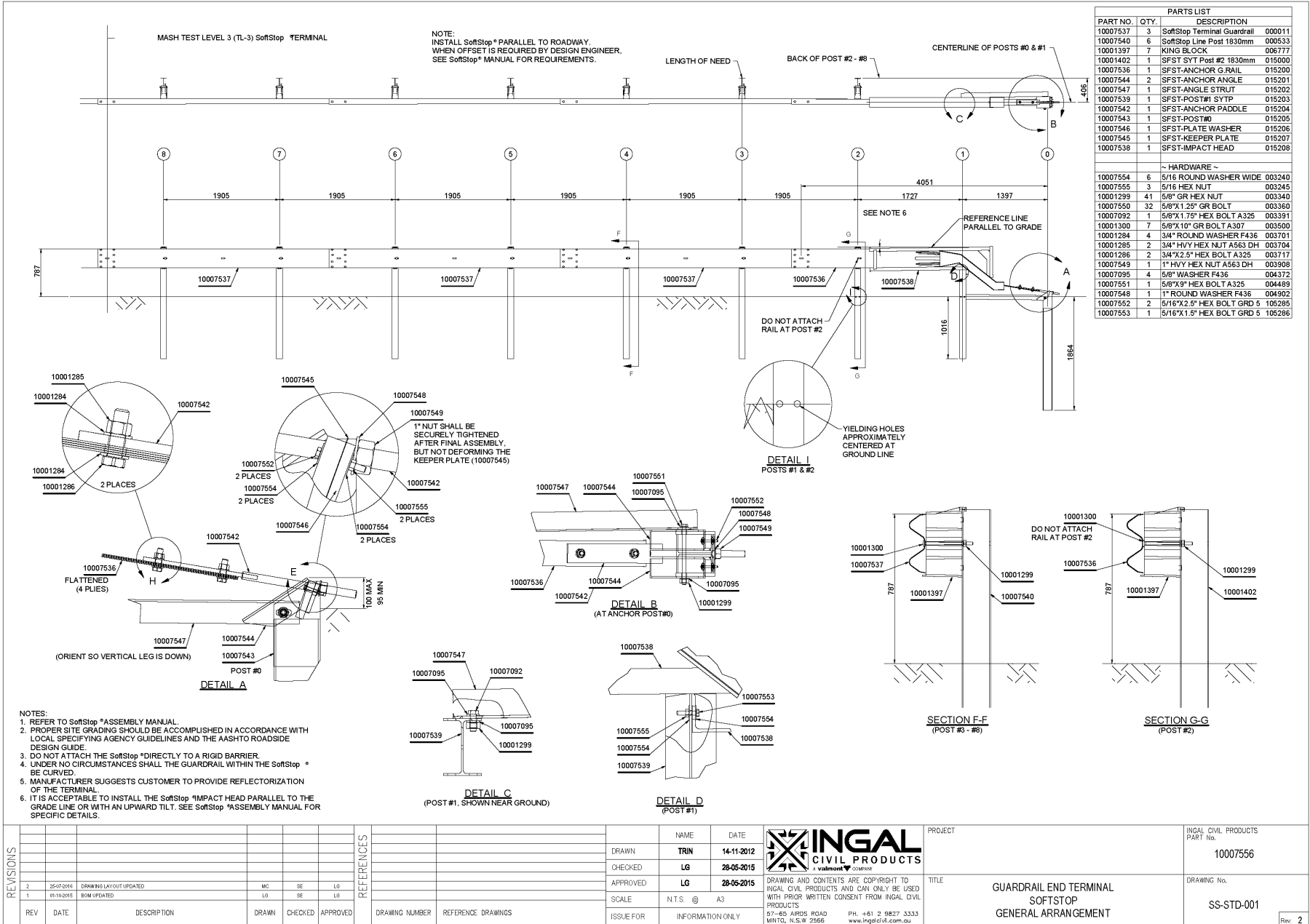
SoftStop® System (Test Level 1) - Post Placement Diagram



Notes:

1. Post 0-4 part of SoftStop® System.
2. Post 5 is first post of strong post w-beam system (not included with SoftStop® System).
3. Spacing between post 4 & 5 is shown 1905 mm on center.
4. All SoftStop® System posts must be installed plumb.

January 2017



REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
2	25-07-2016	DRAWING LAYOUT/OUT UPDATED	MC	SE	LG
1	01-10-2016	BOM UPDATED	LG	SE	LG

DRAWING NUMBER	REFERENCE DRAWINGS

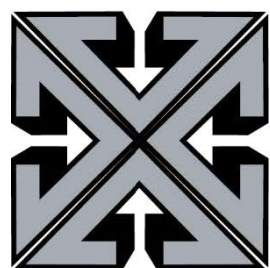
NAME	DATE
DRAWN TRIN	14-11-2012
CHECKED LG	28-05-2015
APPROVED LG	28-05-2015
SCALE N.T.S. @ A3	
ISSUE FOR INFORMATION ONLY	

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PROJECT	TITLE	DRAWING No.
INGAL CIVIL PRODUCTS PART No. 10007556	GUARDRAIL END TERMINAL SOFTSTOP GENERAL ARRANGEMENT	SS-STD-001

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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