SMART CUSHION 70GM AND 100GM

DESIGN, INSTALLATION AND MAINTENANCE MANUAL

Low Maintenance - Severe Duty Crash Cushion

SMART CUSHION®

MASH 2016 Compliant

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OVERVIEW

Product

The SMART CUSHION® impact attenuators are manufactured by Hill & Smith Inc. The Test Level 3 model is NCHRP 350/MASH approved by the FHWA. The Test Level 2 is NCHRP 350 approved and has passed the MASH capacity test #2-31. Based on that test, it is MASH approved in many states. They and are fully redirective, non-gating, and bi-directional. SMART CUSHION® impact attenuators are used to help protect motorists from hazards in both permanent and temporary work zone locations. They can be attached to most types of median and roadside barriers.

The SMART CUSHION® attenuators use a patented system for stopping vehicles. The system is speed dependent and stops small and large vehicles by automatically regulating the stopping force exerted on a vehicle. Essentially, the system provides the necessary forces based on the speed of the vehicle automatically compensating for the mass of the vehicle.

The SMART CUSHION® attenuators are slightly tapered from front to rear. This allows the side panel sections to collapse over the next section without stress or damage. During collapse, the parts move freely past each other and do not become wedged during the impact.

Wide temperature variations and temperature extremes do not affect the performance of SMART CUSHION® impact attenuators.

Maintenance

SMART CUSHION® impact attenuators are severe-duty, low-maintenance units. A trained, two-person maintenance crew can return most impacted SMART CUSHION® attenuators to full service within 30 minutes. This short repair time reduces the maintenance workers' exposure to traffic and minimizes traffic congestion. Side impacts rarely require a repair which eliminates worker exposure, repair costs and traffic delays/exposure.

Crash Performance

The NCHRP 350 Test Level 3 Smart Cushion performed and passed ALL MASH tests to exact MASH 16 standards with no modifications. The NCHRP Test Level 2 Smart Cushion also performed and passed the pickup capacity test #2-32 with no modifications. These tests were performed by an accredited independent testing facility. As with the NCHRP 350 tests, MASH frontal impacts only needed two shear bolts to reset the unit back to full operation status.

SPECIFICATIONS

Description

The SMART CUSHION® is a re-directive, non-gating crash attenuator that consists of a base, supporting frames, a sled, side panels, a wire rope cable, sheaves, and a shock-arresting cylinder. The base is anchored to the mounting surface and provides support for the frames that are mounted on it. The support frames hold the side panels that provide a flat outer redirective surface for side impacts. The sled provides redirective support for side impacts and deceleration force for frontal impacts. The SMART CUSHION® telescopes rearward upon frontal impact and can be reset with minimal repair parts.

System Dimensions & Weight

	SCI 70 GM	SCI 100 GM
Width - (Inside Rear Panels)	24 inch (610 mm) - Nominal	24 inch (610 mm) - Nominal
Length	164 1/4 inch (4172 mm)	260 1/4 inch (6610 mm)
Height	33 1/2 inch (851 mm)	33 1/2 inch (851 mm)
Weight	2465 lbs. (1120 kg)	3450 lbs. (1570 kg)
Test Level	MASH / NCHRP 350 Level 2	MASH / NCHRP 350 Level 3

DESIGN CRITERIA

General

SMART CUSHION® impact attenuators comply with MASH 16 and NCHRP Report 350. They are designed for temporary work zone and permanent applications on shoulders or in medians.

Foundations

Foundations must be a flat surface with longitudinal and cross slopes of 10:1 (horizontal: vertical) or less. SMART CUSHION® impact attenuators should not be located over drainage basins or expansion joints. Portland cement concrete foundation pads are preferred for permanent installations; asphaltic concrete foundation pads are appropriate for temporary work zone installations. The following table describes the foundations that may be used. See Appendices for drawings.

Foundations

Pad Material and Thickness	Anchor Embedment
6 inch (150 mm) reinforced PCC [1]	5 ½ inch (140 mm)
8 inch (205 mm) non-reinforced PCC	5 ½ inch (140 mm)
3 inch (75 mm) AC [2,3] over 3 inch (75 mm) non-reinforced PCC	16 ½ inch (420 mm)
6 inch (150 mm) AC over 6" compacted subgrade [3]	16 ½ inch (420 mm)
8 inch (205 mm) AC [3]	16 ½ inch (420 mm)

Notes: 1. Portland cement concrete 2. Asphaltic concrete 3. Minimum compaction: 95% of optimal

Concrete compressive strength shall be 4000 psi (28 MPa) at 28 days. Foundation lengths vary when using wide transitions. Consult your Hill & Smith Inc. representative for applications engineering evaluation and site specific drawings.

Support Structure

SMART CUSHION® impact attenuators are self-supporting and do not require an additional support structure.

Location

The SMART CUSHION® impact attenuator's location determines its position and transition requirements.

1. Approach Zone – SMART CUSHION® impact attenuators should not be placed directly behind raised curbs that exceed 4 inches in height. The longitudinal and cross slopes in front of the device should not exceed 10:1 (horizontal: vertical).
2. Barrier Width – SMART CUSHION® impact attenuators are 24 inch (610 mm) wide between the side panels at the rear. Barriers 24 inch (610 mm) wide, or less, can be shielded without using a transition if there is no reverse direction traffic. Barriers that are wider than 24 inch (610 mm) and/or have reverse direction traffic require a transition, available from Hill & Smith Inc.
3. Barrier Height – SMART CUSHION® impact attenuators are approximately 33 1/2 inch (851 mm) high.
4. Barrier Shape – SMART CUSHION® transitions allow for connection to many barrier shapes.

Transition Design

SMART CUSHION® impact attenuators can be attached to many different barrier shapes. The attenuators are designed for direct attachment to 24 in wide barriers and Jersey/F-Shape barriers. **The SMART CUSHION® side panels must have an unobstructed travel zone for 30" behind the attenuator to allow a full collapse.**. SMART CUSHION® transitions provide this travel zone in front of wide hazards.

See appendices for SMART CUSHION® transition drawings. Additional transitions are available for other frequently used applications. Contact your Hill & Smith Inc. representitive for drawings and details.

Transitions

Necessary Locations (see Figure 1 – Necessary Locations):

There is reverse direction traffic within the clear zone.

The barrier intrudes into the side panels' travel zone.

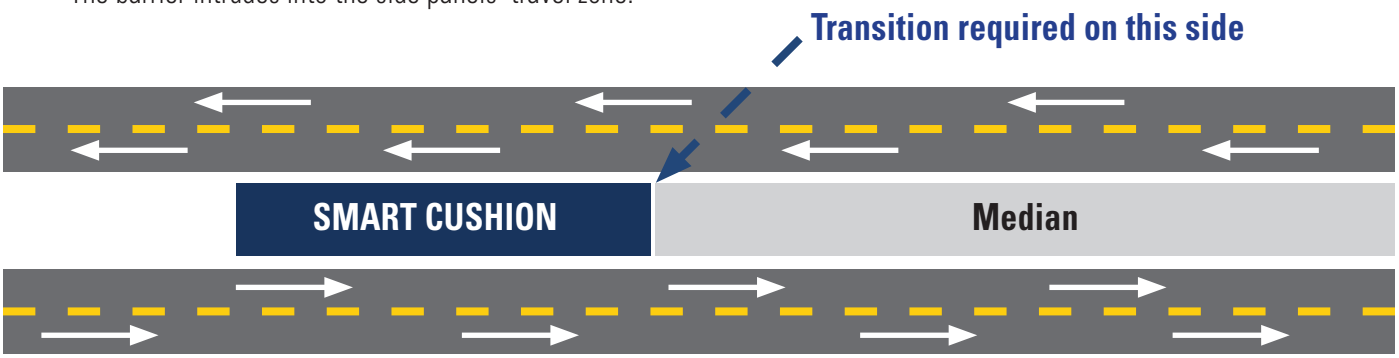


Figure 1 – Necessary Locations

Examples are median applications with bidirectional traffic, two lane roads with crossover potential, etc.

Unnecessary Locations (see Figure 2 – Unnecessary Locations):

No reverse direction traffic within the clear zone.

The barrier does not intrude into the side panels' travel zone.

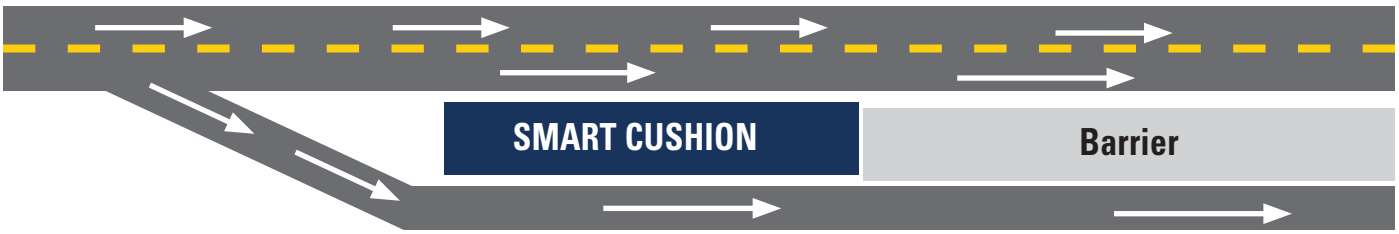


Figure 2 – Unnecessary Locations

Examples are traffic splits, shoulder applications with no crossover potential, one-way roads, etc.

Determining Side of Transition

The transition's side is determined by standing at the front of the attenuator looking rearward toward the barrier to choose between left and right.

INSTALLATION

Installation and Performance Statements

Proper performance within MASH 16/NCHRP 350 design limits depends on correct installation of the SMART CUSHION® on an approved foundation. Any SMART CUSHION® not installed according to the drawings and the requirements of this installation manual may present an unsafe condition and should be reinstalled accordingly.

Impacts with vehicles whose size or mass are outside of those tested according to MASH/NCHRP 350 or with vehicles traveling at speeds greater than those tested according to MASH/NCHRP 350 will not necessarily produce results within the test criteria. The crash cushion is in conformance with all requirements of MASH 16 Test Level 3 , MASH 16 Test Level 2 test #2-31 and NCHRP 350 Test Levels 2 & 3.

Safety

All work during installation, repair and inspection of the SMART CUSHION® should be performed according to federal, state and local laws.

Equipment List

See Appendix B

Site Preparation

Check to make sure there are no drains, steep slopes, expansion joints, buried conduit, cables or utility lines in the footprint space where the attenuator will be placed. Remove any curbs >4 inch or obstacles in front of or beside where the attenuator will be installed. Be sure to set up proper traffic control before beginning any installation or repair work at the site.

Foundations – (reference Appendices E and E2)

New foundations should be installed according to Appendix E – Foundation Drawing. Concrete cure strength should reach 4,000 psi minimum before use. The surface of the foundation must be cleaned of all debris, dirt, mud, sand, etc., as the crash cushion must sit on a flat plane. A longitudinal and/or cross slope of up to 10:1 (horizontal:vertical) is allowed.

Any of the following foundations will meet the minimum requirements:

- 6 inch reinforced concrete pad
- 8 inch non-reinforced concrete pad
- 3 inch asphalt over 3 inch of concrete
- 6 inch asphalt over 6 inch of compacted sub base
- 8 inch asphalt

Note: Concrete should be 28 MPa or 4000 psi minimum at full cure. The slope should not exceed 10:1.

Installing the SMART CUSHION® on an existing foundation may result in anchor bolt locations corresponding to rebar positions in the foundation. When rebar is encountered, rebar bits should be used as concrete bits may bend around the rebar and continue to drill at an angle while the anchors will not bend.

Prior to installing the SMART CUSHION® on an existing foundation, the concrete must be thoroughly inspected for slope, signs of cracking, surface wear, shifting from original position, undercut of earth below or to the sides supporting the foundation, settling, and any other signs of age or deterioration which may make the foundation unusable. If any of these signs are evident, the foundation should be removed and a new one must be installed.

Placement of the SMART CUSHION®

Measure the correct distance and offset of the SMART CUSHION® according to the type of object being shielded and the type of transition being used. The dimensions shown on the transition drawings may be used as a guide and system drawings are also available from Hill & Smith Inc. applications engineering.

The crash cushion is shipped in one piece, fully assembled. Use a choked four-point attachment on panel support frames 3 & 4 behind the sled for the Test Level 3 unit. **Do not lift using the side panels only!** The lift points on the Test Level 2 unit are the 1st and 2nd frames behind the sled. Lift the SMART CUSHION® off the transporting vehicle with a boom or forklift of sufficient capacity and place it in the position marked on the foundation.

Once in place, double-check the measurements to be sure of the proper location of the SMART CUSHION®.

Warning: On a full collapse, the last set of side panels will telescope 30 inches beyond the last terminal brace at the rear of the crash cushion. All objects that may interfere with this motion can affect the performance of and cause undue damage to the crash cushion.

Anchor Installation

Embedment Requirements are as follows:

1. 6 inch reinforced concrete pad – anchor embedment of 5 ½ inch / torque value of 170 N-m (125 ft-lbs)
2. 8 inch non-reinforced concrete pad – anchor embedment of 5 ½ inch / torque value of 170 N-m (125 ft-lbs)
3. 3 inch asphalt over 3 inch of concrete – anchor embedment of 16 ½ inch / torque value of 14 N-m (10 ft-lbs)
4. 6 inch asphalt over 6 in of compacted sub base – anchor embedment of 16 ½ inch / torque value 14 N-m (10 ft-lbs.)
5. 8 inch asphalt – anchor embedment of 16 ½ inch and a torque value of less than 14 N-m (10 ft-lbs)

Using the holes in the base as a template, drill 7/8 inch diameter holes to the proper depth as previously defined. If the SMART CUSHION® is being installed on an existing foundation and the drills are hitting rebar, use a core drill or rebar cutter to ensure that straight, vertical holes are made at each location. Take care that the holes do not break out the bottom of the foundation as this may result in loss of epoxy during anchor placement.

Once the holes are drilled, clean the hole of all debris using a bottle brush and a vacuum or compressed air. To ensure epoxy adhesion, **concrete holes MUST be cleaned with a bottle brush to remove embedded dust,** and a final check conducted that all holes are clean of debris. Inject the epoxy into each hole at an angle to avoid air entrapment. Use a sufficient amount of epoxy so that the hole will be filled when the bolt is inserted. Screw the nut on the anchor bolt flush with the end, put the washer on the stud, and immediately insert the anchor stud all the way to the bottom while turning the anchor. This method assures the anchor bolts are vertically plumb and the threads are coated with epoxy. **Bolts should not project more than ½ inch above the nut after final torque is completed.**

- There is a quantity of 48 anchors for the 100 GM, TL-3 attenuator
- There is a quantity of 34 anchors for the 70 GM, TL-2 attenuator

The epoxy should be ready for bolt tightening after 30 minutes at 80 degrees F (27 degrees C). See the container label for other temperatures and bolt up times. Allow the epoxy to cure. Torque the anchor nuts to 170 N-m (125 ft-lbs). Substitute epoxy must match our specifications. Asphalt anchors are longer and should have a torque value of 14 N-m (10 ft-lbs). The use of Redhead A7+ Epoxy (or equivilent) is recommended. Concrete TL2 and TL3 units require 3 and 4 tubes of epoxy, respectively while Asphalt TL2 and TL3 units require 9 and 12 tubes of epoxy, respectively.

Delineator Panel Attachment

Installation of the front delineation plate will be determined by the location of the attenuator and state regulations. A delineation plate is shipped with a yellow powder coat background and no striping. It is attached with four bolts. Applying the striping to the plate is easier while it is removed from the attenuator. Examples of the delineation plate are as follows:

Left Shoulder

Chevron for Median

Right Shoulder

Transition Installation

Transitions may be required. Any use of a SMART CUSHION® with a possible reverse direction impact will require transition. Consult the drawings for details of the required anchor locations. For horizontal stud installation in concrete use mechanical anchors. Transition drawings and parts explosions are in the appendices. System drawings are available for additional details such as foundation lengths. Transition Concrete Drop-in anchors only expose the head of the anchor to reduce snag potential.
For guardrail transition connections <30" behind the attenuator, you must use guardrail bolt heads (not nuts) to provide unobstructed side panel travel.

Final Inspection

After the anchor bolts have been tightened to the proper torque value, check that the SMART CUSHION® is not distorted in any way as might happen if the unit is secured to a foundation which is not a flat plane. Check that the front section is pulled out to within 1 inch of the front stop bolts and that no part of the unit has been damaged by shipping and handling. Verify that all assembly bolts are tight and have not come loose during shipping or installation. Finally, check that no tools or other equipment have been left within the SMART CUSHION® structure. Complete the **Installation Check List** located in Appendix S.

Resetting SMART CUSHION® after Impact

In the event of any impact, the crash cushion will require a full evaluation to determine the necessary repairs to return it to service. To do this, proceed as follows:

Site Preparation - Do not begin work until the area is declared safe and accessible.

Re-Extension and Inspection after Frontal Impact

1. Remove the front delineator panel and attach pulling means to the **bottom brace** of the front sled.
2. Use wire/bungee cord on the bottom brace at the front of the sled to hold the spelter socket up in the air while pulling out or it will catch on the base frame cross braces. *(See Fig. 1)*
3. Remove the front cable bracket that is located on the front sheave at the front of the attenuator. *(See Fig. 2)*
4. Attach a ½" Grade 100 chain to the bottom brace of the front sled.
5. Pull the sled forward one to two feet to give you slack on the cable.
6. If necessary, use the cable release tool to break cable loose from the sheave at the front of the attenuator if the zinc coating has attached the cable to the sheave. *(See Fig. 3)*

Fig. 1

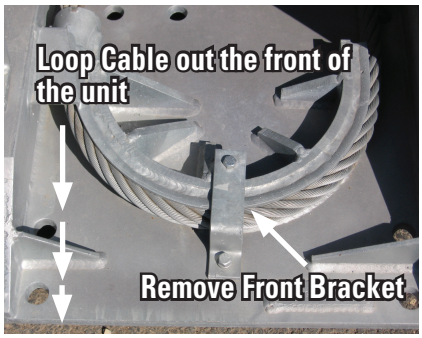


Fig. 2

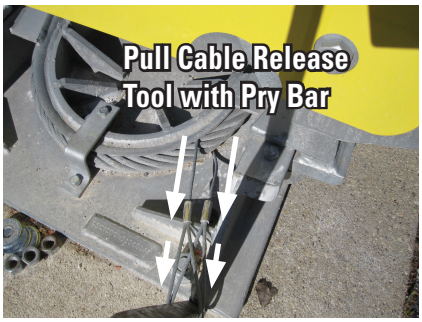


Fig. 3

7. Pull out in two foot increments while helping the cable feed out of the front of the unit. *(See Fig. 4)*

Fig. 4

8. Pull the sled out the rest of the way in **short smooth increments** so you can help feed the cable out the front of the attenuator. This will give you a cable loop in front of the attenuator. **When you are past the last cross brace, you will need to remove the strap or wire to allow the cable to follow the path down into the front sheave.** The sled must be fully extended to replace the shear bolts. The sled should be no more than 1 inch from the stop bolts in the front.

During any pullout, do not stand within the snap radius of the chain in case of failure.

9. During frame pullout, inspect the front part of the cable from the spelter socket, as it will be partially obscured after extension of the mobile frames and sheaves. **See the cable inspection procedure.**

10. Remove the front and rear sheave cover plates at each end of the cylinder by removing the two hex bolts that hold them down. Perform steps 11 and 12 when you have access to them. Access may be restricted until the unit if fully pulled out.

11. Remove the anti-rotation pins, which are the two outer pins, inserted through the holes in the sheaves from both the front and back sheaves. This will be easily done with the anti-rotation pin removal tool.

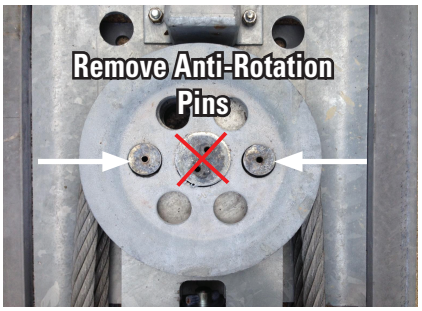


Fig. 5

Caution: Do not remove the center pin. The rear sheave pins are longer than the front sheave pins and cannot be intermixed so leave them by their locations. (See Fig. 5)

12. Remove shear bolt remnants in the holes on both sides of the mobile sheaves. These are grade 8 bolts so they can be difficult to remove without a 90 degree pry bar with a claw to pry out. *(See Fig. 6)*

13. Attach a pulling means to the shackle on the mobile sheave assembly. *(See Fig. 6)*

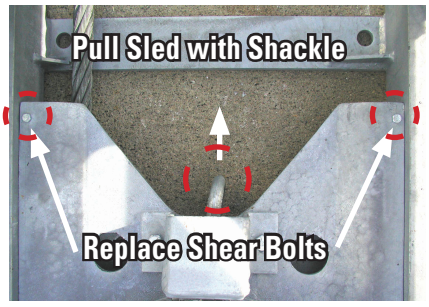


Fig. 6

14. Slowly pull out the mobile sheaves. **Do not stand inside the cable loop or be in the pulling strap danger zone.**

15. Finish pulling out the mobile sheaves until you can see through the shear bolt holes **but do not put in the shear bolts yet.**
16. If the cable passes inspection, release any tension on your pulling means and reinstall the anti-rotation pins in the front and back sheave assemblies and reinstall the cover plates for those sheaves using marine grade anti-seize on the bolt threads. The sheaves may be aligned by inserting a pry bar into the sheave holes. Work your way from the bottom up.
17. Re-tension your chain and replace the two ¼ inch **Grade 8** shear bolts in the front corners of the mobile sheaves.
18. Inspect the cylinder, anchor bolts and side panels according to the subsequent procedures listed.

Side Impact Inspection and Repair

1. Inspect and replace any damaged side panels.
2. Inspect and replace any damaged side keeper bolts on all panels. There are three styles of side keeper bolts. The winged style is for the panel connected to the sled and bolts through the first frame behind the sled. The center side keepers have a ½ inch shoulder while the last side keeper, which is bolted to the terminal frame, has a ¼ inch shoulder.
3. Inspect and replace any damaged side guides or side panel keepers.

Cable Inspection Procedure

The cable should be visually inspected for damage. The visual inspection should include looking for broken wire strands, localized wear or crowns. If inspection shows any damage, contact your Hill & Smith Inc. representative for evaluation by applications engineering.

Inspect the spelter socket for broken wires, damaged eyes or other fatigue. Any signs of broken wires at the spelter socket will require the unit to be removed from service.

Cable damage is the indication of an over-design impact. You should replace the attenuator if the cable does not pass inspection. This is a clear sign that an over design impact occurred and other parts could possibly be compromised.

Cylinder Inspection

The cylinder should be inspected for:

- Dented or swollen tube jacket
- Visible cracks in any welds and fluid leakage from the welds
- Piston rod surface damage, bending or fluid leakage in seal area

If any of these inspections are suspect, remove the unit from service. Current models have PTFE seals with an unlimited static life.

Anchor Bolt Inspection

Loose or damaged anchor bolts should be extracted and reinstalled.

Side Panel Inspection

Side Panels are designed to nest and collapse with minimal or no damage upon frontal impact. The side keepers should be replaced if there are any signs of fatigue, bending or other visible damage. Inspect the side panels for any bending or torn metal. If damage is found, any side panel is removable by removing four bolts. The side keepers used to hold the large front sled panels are different than the side keepers on the center panels. Also, the side keeper used on the last terminal brace, which is the rearmost support, has a shorter collar (¼ inch vs. ½ inch), as it does not have a panel overlap. These shoulders must seat into the outer overlapping panel and pin the inside panel to the frames using a torque value of 270 N-m (200 ft-lbs). Be careful to fully insert the collar into the panel slot so you do not pin the edge of the outside panel as it will restrict free sliding of that panel.

Side Guide Inspection

At the bottom of each support frame, there are two guides to stabilize and guide collapse of the attenuator. Inspect each side guide for damage. The torque value for the side guides is 920 N-m (680 ft-lb). These side guides are stronger than the rail, so visually inspect the rail for crowns. Any crowning of the rail can be straightened using a large maul to flatten it back to its' original position.

Final Inspection

After the resetting of the SMART CUSHION® is complete, verify by visual inspection that all assembly bolts are tight and show no sign of damage. Finally, check that no tools and other equipment or debris have been left within the SMART CUSHION® structure. Verify that no other damage unrelated to the most recent impact has occurred and that no significant corrosion or other deterioration has taken place.

Non-Repairable Impacts

There can be instances where the impact is outside the scope of the SMART CUSHION® design. This may render the SMART CUSHION® unsafe to reuse and it should be replaced.

Periodic Maintenance

Maintenance is site dependent. Small amounts of debris and trash will not affect the performance of the SMART CUSHION®. Accumulations of dirt/mud can impede the collapse of any system. We suggest an annual clean-out of the system in the fall of the year. If sites are in locations prone to heavy rain/mud runoff, a bi-annual cleaning may be required.

APPENDIX A - SMART CUSHION® PARTS LIST

Prod No.	Description	Unit of Measure
270128	Attenuator 24" wide w/Concrete Anchors TL3	
270127	Attenuator 24" wide w/Asphalt Anchors TL3	
270126	Attenuator 24" wide w/Concrete Anchors TL2	
270125	Attenuator 24" wide w/Asphalt Anchors TL2	
270667	Bolt Concrete Anchor 3/4" X 7" TL3 (Included in P/N 270128)	KIT/48 pcs.
270663	Bolt Asphalt Anchor 3/4" x 18" TL3 (Included in P/N 270127)	KIT/48 pcs.
270666	Bolt Concrete Anchor 3/4" X 7" TL2 (Included in P/N 270126)	KIT/34 pcs.
270664	Bolt Asphalt Anchor 3/4" x 18" TL2 (Included in P/N 270125)	KIT/34 pcs.
271242	Epoxy 28 oz. Cartridge and Nozzle	EACH
273113	Nozzle Epoxy Mixing	EACH
272612	Epoxy Kit for TL3 Concrete Attenuator	EACH
272610	Epoxy Kit for TL3 Asphalt Attenuator	EACH
272611	Epoxy Kit for TL2 Concrete Attenuator	EACH
272609	Epoxy Kit for TL2 Asphalt Attenuator	EACH
270683	Bolt Shear	EACH
270770	Brace Terminal	EACH
272527	Keeper Side #3 (Sled Panels) TL2 & TL3	EACH
272593	Keeper Side #1 (Side Panels) TL2 & TL3	EACH
272595	Keeper Side #2 (Rear Panels) TL2 & TL3	EACH
273378	Panel Delineator (Painted Yellow) TL3	EACH
273386	Panel Delineator (Painted Black) TL3	EACH
273381	Panel Delineator Diamond Grade Chevron 6 inch stripes TL3	EACH
273383	Panel Delineator Diamond Grade Left 6 inch stripes TL3	EACH
273389	Panel Delineator Diamond Grade Right 6 inch stripes TL3	EACH
273380	Panel Delineator (Painted Yellow) TL2	EACH
273385	Panel Delineator (Painted Black) TL2	EACH
273382	Panel Delineator Diamond Grade Chevron 6 inch stripes TL2	EACH
233928	Panel Delineator Diamond Grade Left 6 inch stripes TL2	EACH
273388	Panel Delineator Diamond Grade Right 6 inch stripes TL2	EACH
273401	Panel Side TL2 & TL3	EACH
273402	Panel Sled	EACH
273399	Panel Rear	EACH
274649	Sled (with guide rollers) 24" TL3	EACH
274648	Sled (with guide rollers) 24" TL2	EACH
271946	Dispenser Epoxy	EACH
270707	Boot Cylinder TL3	EACH
233937	Boot Cylinder TL2	EACH
272621	Reset Parts Kit TL3	EACH
272620	Reset Parts Kit TL2	EACH
273994	Tool Anti Rotation Pin Removal	EACH
270069	Anchor Drop In	EACH
275224	Cable Release Tool	EACH
238247	Shear Bolt Removal Tool	EACH
270952	Hole Brush-Nylon	EACH
264383	Drop-in Anchor Setting Tool	EACH
262004	SCI Debris Hood Assembly- DH3	EACH
262006	Fiberglass Stay Kit for Debris Hood - DH3	KIT

APPENDIX B - EQUIPMENT LIST

The following tools and equipment will be required to install and repair the Crash Cushion:

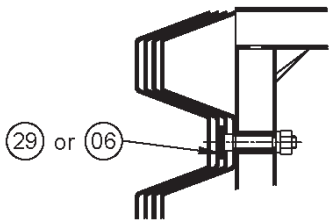
- Standard roadside work area safety equipment
- Personal safety equipment (gloves, latex gloves for epoxy, eye/face protection, etc.)
- Means of safely unloading 3500 lbs.
- Compressed air source/vacuum
- 1 inch nylon bottle brush (Part # 270952)
- Safety goggles
- Four lifting slings or four-point sling
- Bosch rotary hammer drill 13 ½ amp #11263EVS Model 0 611 263 739 or equal
- ⅞ inch X 22 inch concrete drill bit for concrete installations or ⅞ inch X 28 inch drill bit for asphalt installations
- Relton rebar eater bit #RB-14 - ⅞ inch rebar cutter bit or equal
- 1 inch X 12 inch concrete drill bit for drop-in anchors on transitions
- Punch or setting tool for drop in anchors (Part # 264383)
- ½ inch electric drill for rebar bit and bottle brush (cordless will work for bottle brush)
- Epoxy dispenser for 28 oz. dual cartridge system. A spare is recommended in case of malfunction. (Part # 271946)
- Socket wrench and breaker bar
- Torque wrench (225 ft-lb capacity) with 3 ft extension
- Measuring and layout equipment (tape measure, chalk line, markers, etc.)
- Combination wrenches, deep sockets (Including 7/16 inch - ⅝ inch, 1 ¼ inch, 1 ½ inch, 1 ⅝ inch) and 3+ inch extension
- 5 foot wedge and round-ended pry bar
- Loctite #34395 marine grade anti-seize
- Suitable pulling means – Chain 20’ x ½” Grade 100
- Misc. small tools (hammers, pliers, screw drivers, vise grips, etc.)
- Bear claw pry bar to remove ¼ inch shear bolt remnants (Part # 238247)
- Anti-rotation pin removal tool (Part # 273994)
- Cable release tool (Part # 275224)
- Piece of wire or bungee cord to hold up spelter socket during pullout

This list is adequate for general installation and repair. Depending on site conditions, additional tools and equipment may be required.

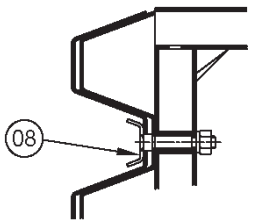
APPENDIX C - SMART CUSHION, TL II

01 - Front TL2 Sled Item 274648
02 - Cable Assembly
05 - Sled Panel Item 273402
07 - Terminal Brace Item 270770
09 - Anchor Bolts
12 - Side Panels Item 273401
14 Mobile Sheave Assembly
17 - Cable Adjuster Bolt
18-20 - Mobile Frames 4-6
27 - Rear Panel Item 273399
28 - TL2 Cylinder
08 - Sled Side Keeper Item 272597
06 - Center Side Keeper Item 272593
29 - Rear Side Keeper Item 272595

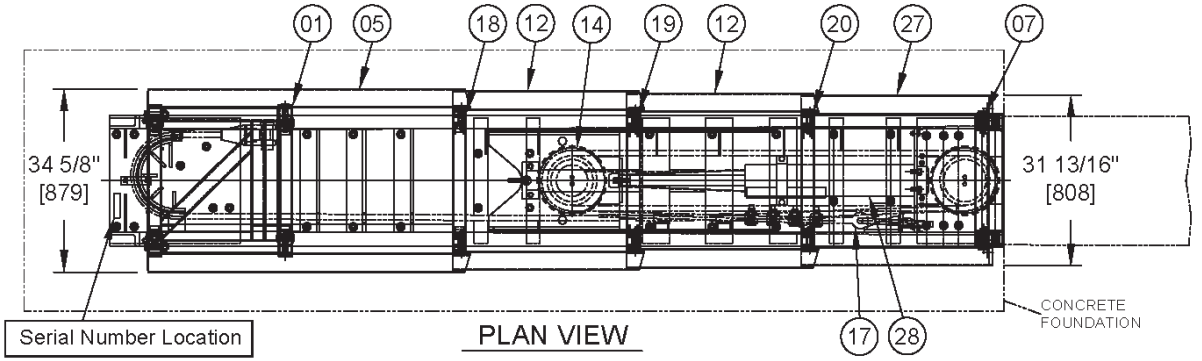
270126 - Testl Level 2, Concrete
270125 - Test Level 2, Asphalt



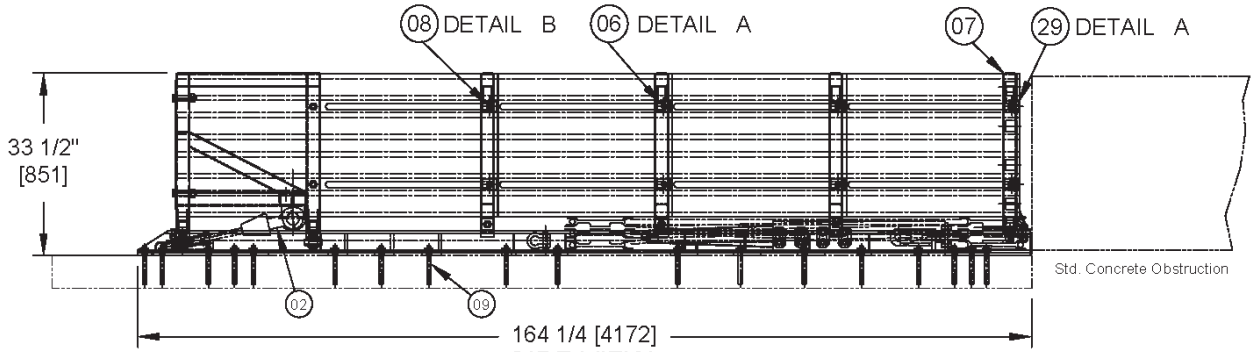
DETAIL A



DETAIL B



PLAN VIEW

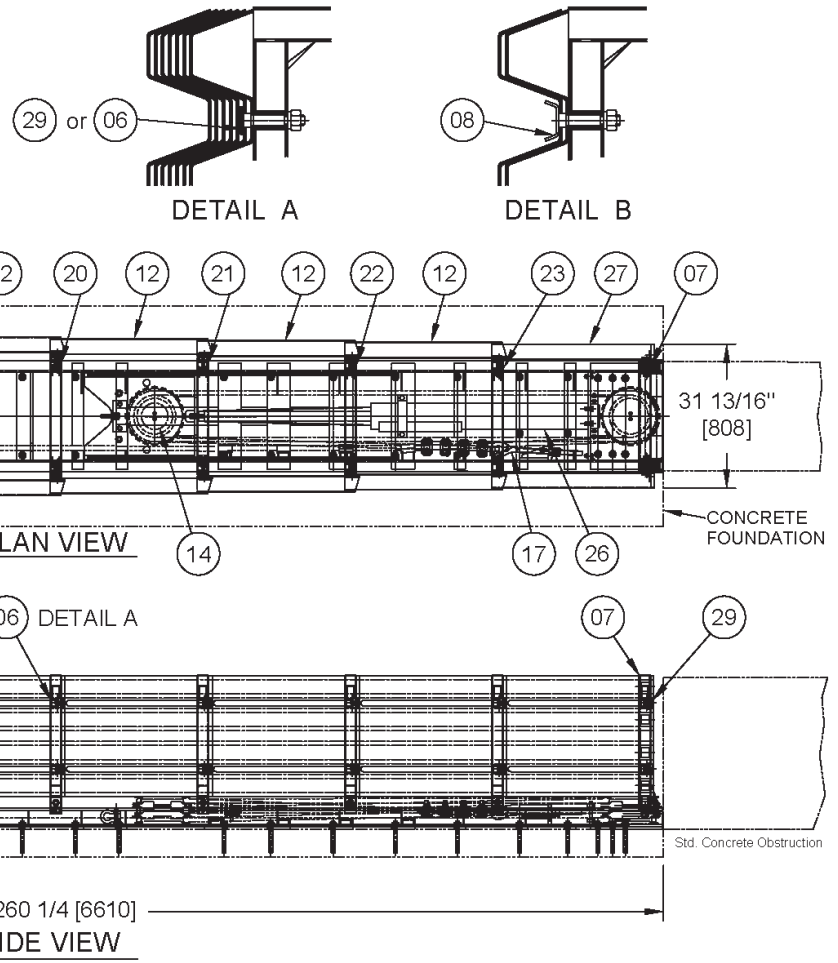


SIDE VIEW

APPENDIX D - SMART CUSHION, TL III

01 - Front TL3 Sled Item 274649
02 - Cable Assembly
05 - Sled Panel Item 273402
07 - Terminal Brace Item 270770
09 - Anchor Bolts
12 - Side Panels Item 273401
14 Mobile Sheave Assembly
17 - Cable Adjuster Bolt
18-23 - Mobile Frames 4-6
27 - Rear Panel Item 273399
28 - TL3 Cylinder
08 - Sled Side Keeper Item 272597
06 - Center Side Keeper Item 272593
29 - Rear Side Keeper Item 272595

270128 - Testl Level 3, Concrete
270127 - Test Level 3, Asphalt



APPENDIX E - TEST LEVEL II FOUNDATION

Cross Slope at Top Surface not to Exceed 1 in 10
Foundation must be a Level Plane

* * * * * Wide Hazards and Transitions may require the foundation to be longer. See Transition Drawings.

SPECIFICATIONS

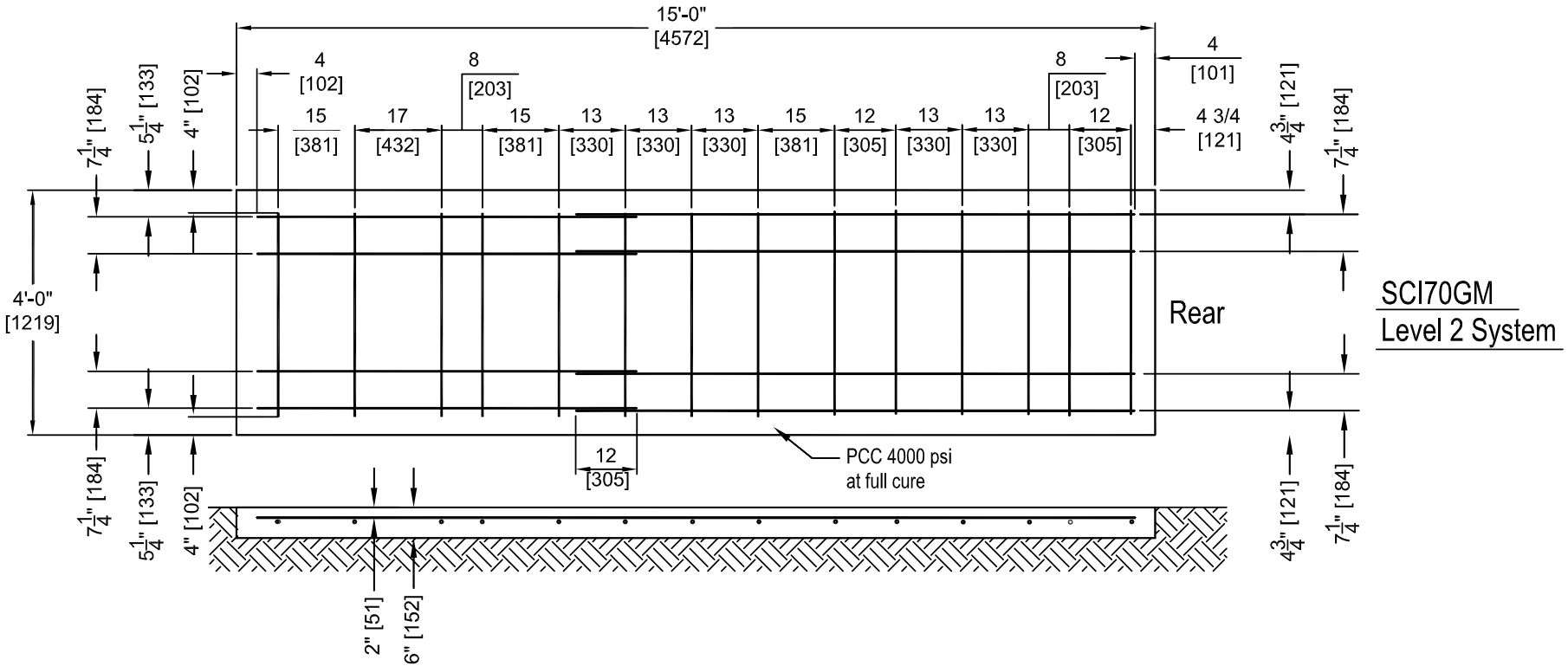
All reinforcing steel - straight #4 ASTM-A36

Embedment requirements:

- 6" reinforced concrete pad with anchor embedment of 5 1/2"
- 8" non-reinforced concrete pad with anchor embedment of 5 1/2"
- 3" asphalt over 3" concrete with anchor embedment of 16 1/2"
- 6" asphalt over 6" of compacted subbase with anchor embedment of 16 1/2"
- 8" asphalt with anchor embedment of 16 1/2"

The contractor shall furnish a certification for material installed to the following requirements:

- 6" reinforced concrete (PCC) sampling per ASTM C31-84, testing per ASTM C39-84
- 8" non-reinforced concrete (PCC) sampling per ASTM C31-84, testing per ASTM 39-84
- 3" asphalt over 3" concrete - Type SP 12.5 Level C or higher
- 6" asphalt over 6" of compacted subbase - same as above
- 8" asphalt (AC) - Type SP 12.5 Traffic Level C or higher



APPENDIX E(2) - TEST LEVEL III FOUNDATION

Cross Slope at Top Surface not to Exceed **10 in 1**
Foundation must be a Level Plane

* * * * * Wide Hazards and Transitions may require the foundation to be longer. See Transition Drawings.

SPECIFICATIONS

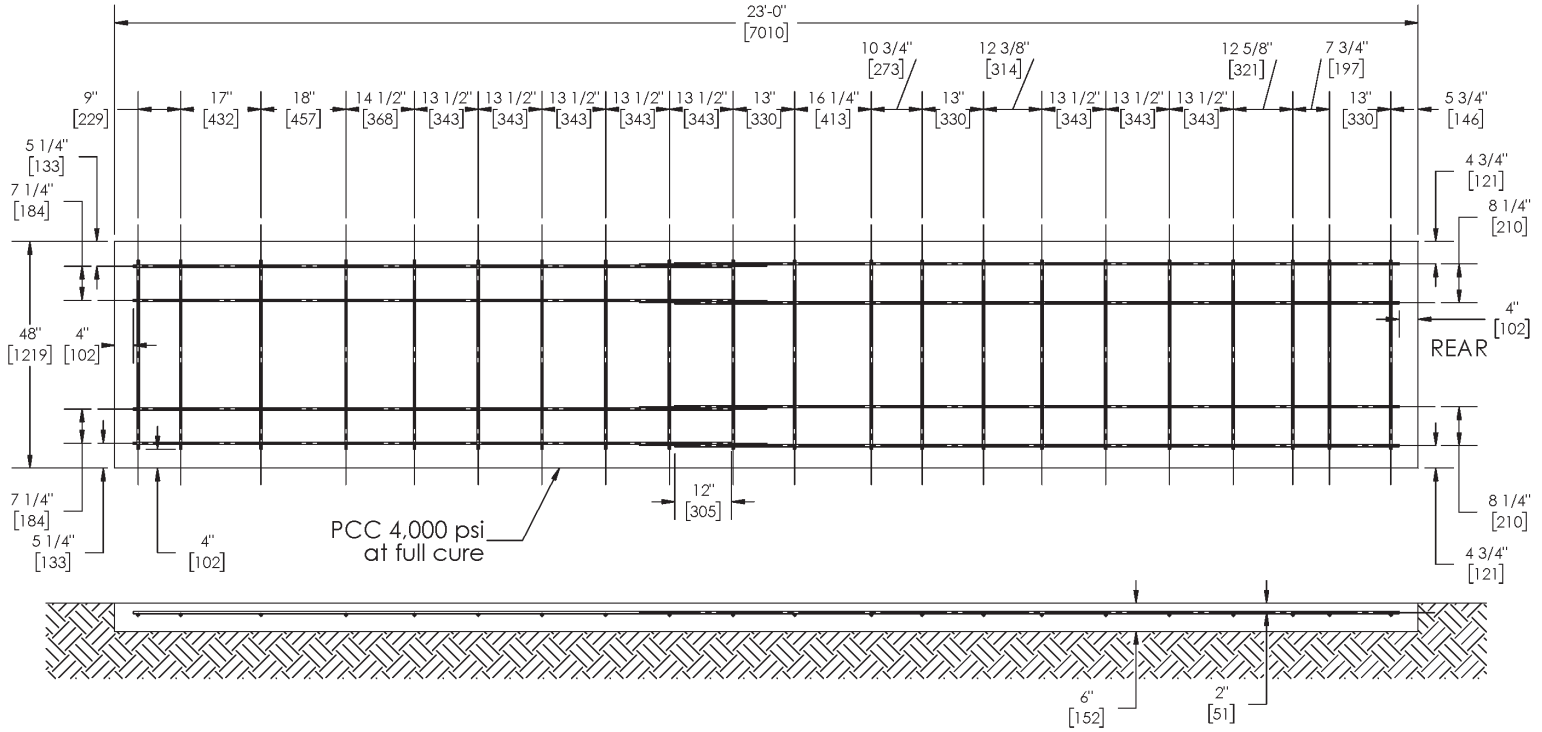
All reinforcing steel - straight #4 ASTM-A36

Embedment requirements:

- 6" reinforced concrete pad with anchor embedment of 5 1/2"
- 8" non-reinforced concrete pad with anchor embedment of 5 1/2"
- 3" asphalt over 3" concrete with anchor embedment of 16 1/2"
- 6" asphalt over 6" of compacted subbase with anchor embedment of 16 1/2"
- 8" asphalt with anchor embedment of 16 1/2"

The contractor shall furnish a certification for material installed to the following requirements:

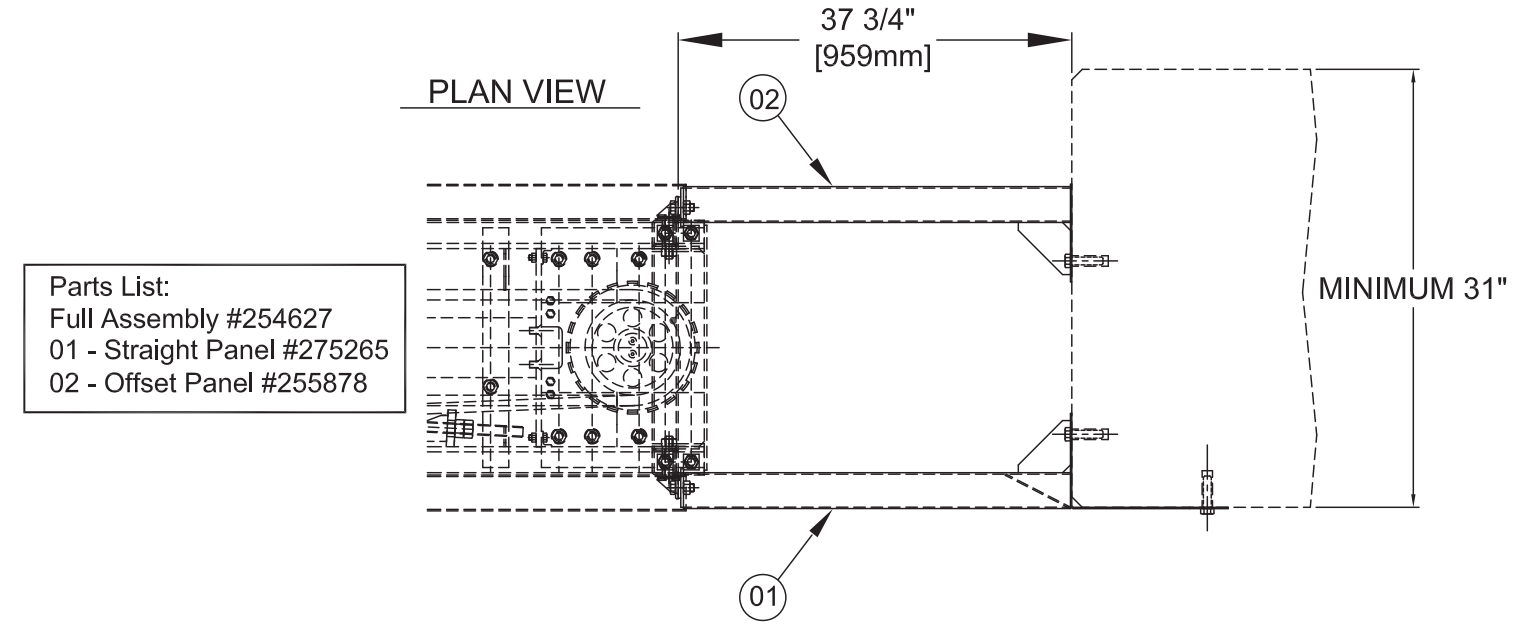
- 6" reinforced concrete (PCC) sampling per ASTM C31-84, testing per ASTM C39-84
- 8" non-reinforced concrete (PCC) sampling per ASTM C31-84, testing per ASTM 39-84
- 3" asphalt over 3" concrete - Type SP 12.5 Level C or higher
- 6" asphalt over 6" of compacted subbase - same as above
- 8" asphalt (AC) - Type SP 12.5 Traffic Level C or higher

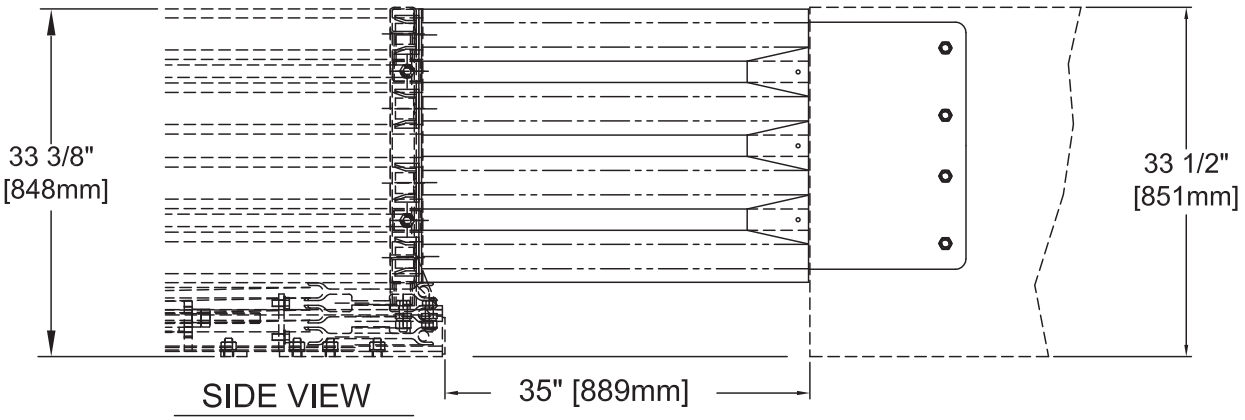


SCI100GM
Level 3 System

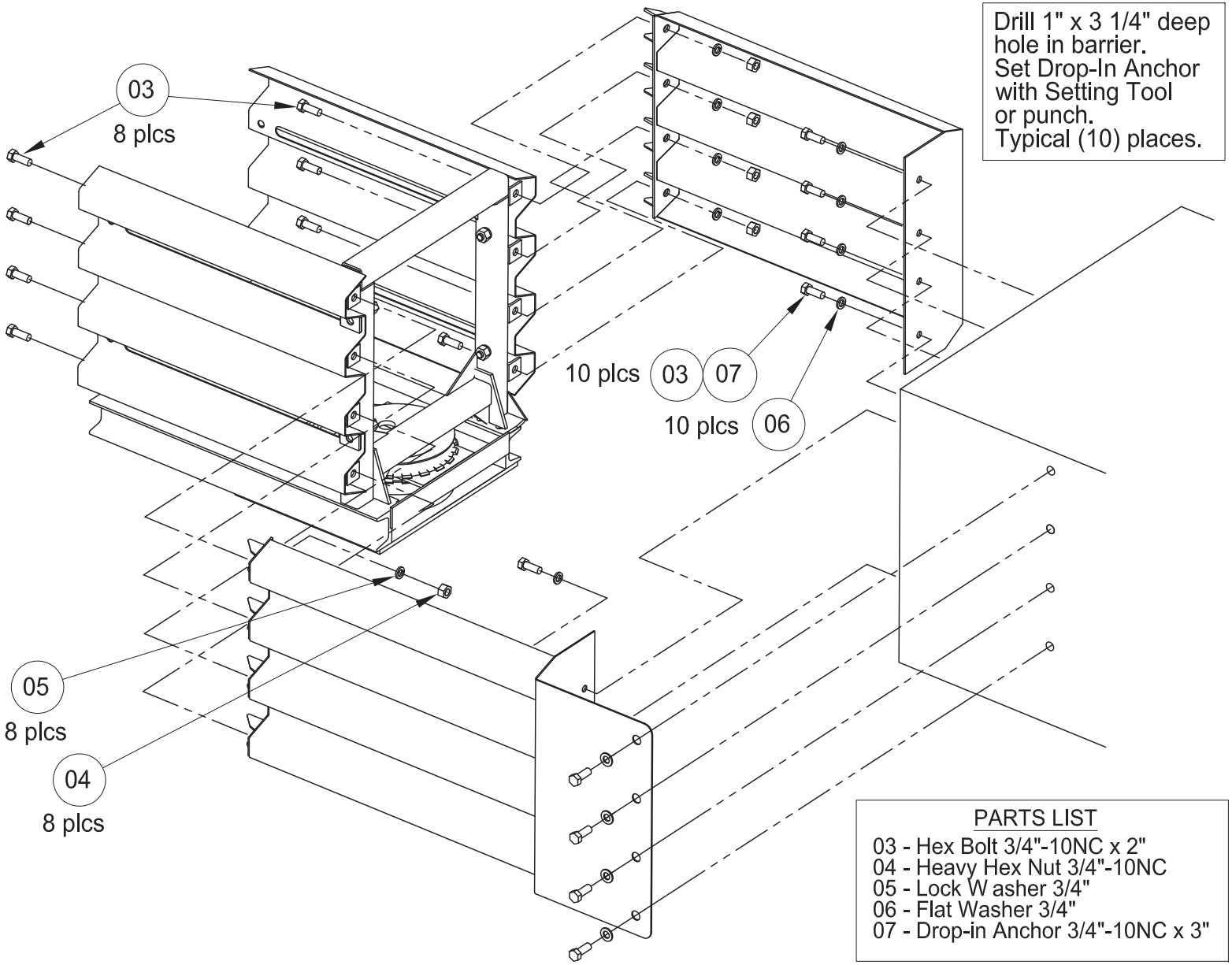
APPENDIX F - TRANSITION, OFFSET CONCRETE BLOCK

Parts List:
Full Assembly #254627
01 - Straight Panel #275265
02 - Offset Panel #255878





APPENDIX F(2) - TRANSITION, OFFSET CONCRETE BLOCK



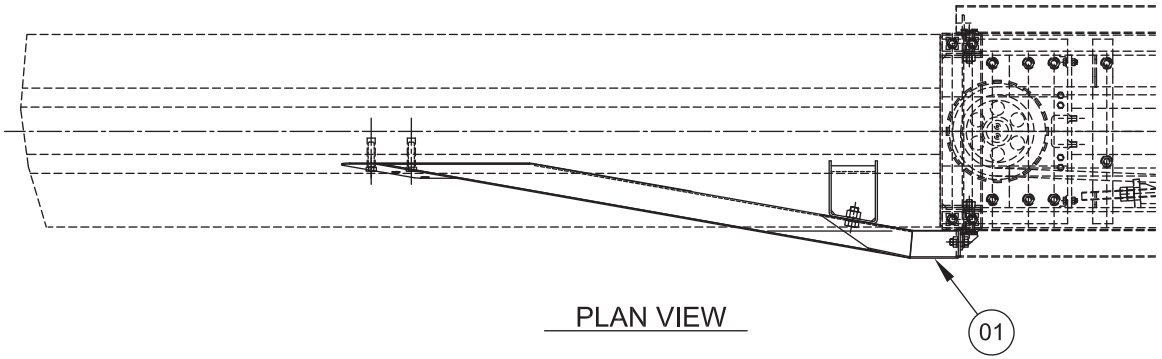
PARTS LIST

03 - Hex Bolt 3/4"-10NC x 2"
04 - Heavy Hex Nut 3/4"-10NC
05 - Lock W asher 3/4"
06 - Flat Washer 3/4"
07 - Drop-in Anchor 3/4"-10NC x 3"

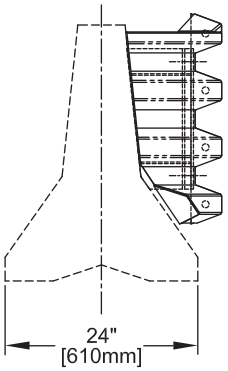
APPENDIX G - MASH TRANSITION, JERSEY/F SHAPE BARRIER PERMANENT

Parts List:	Jersey/K-Rail
01 - Transition Assembly MASH Left (shown)	#268891
01 - Transition Assembly MASH Right (not shown)	#268892

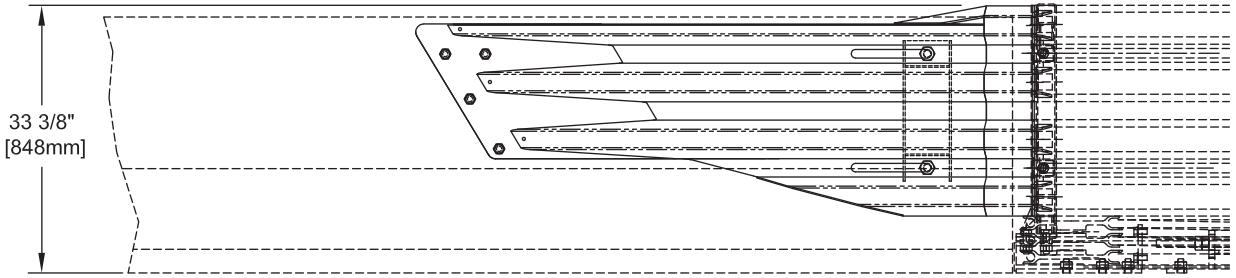
NOTES:
1. TRANSITION ASSEMBLIES INCLUDE SUPPORT BRACKET AND ALL HARDWARE.



PLAN VIEW



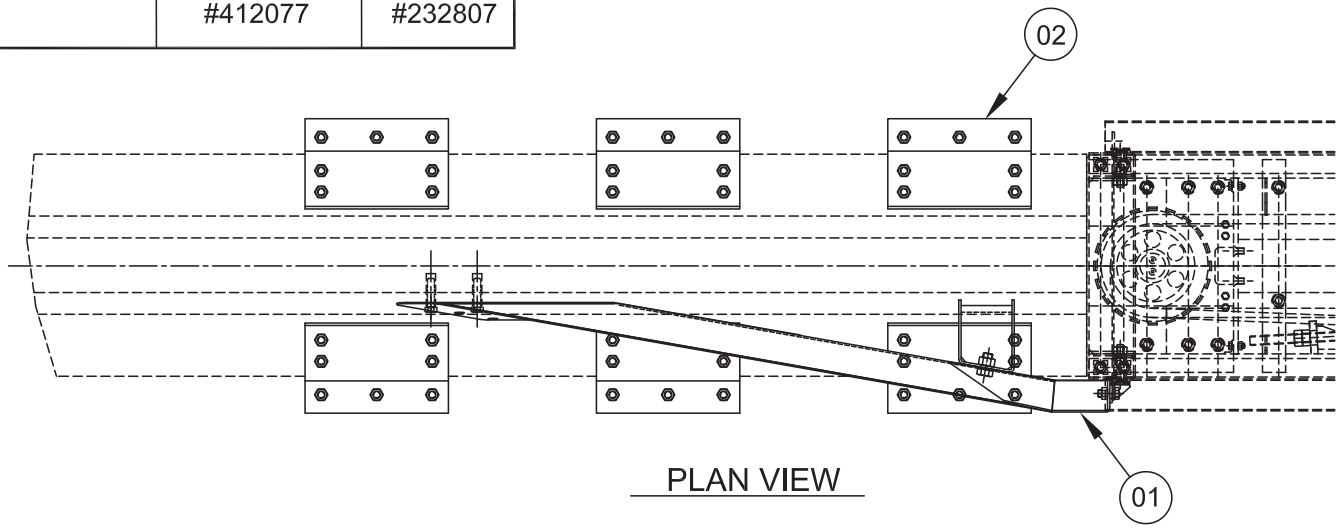
END VIEW



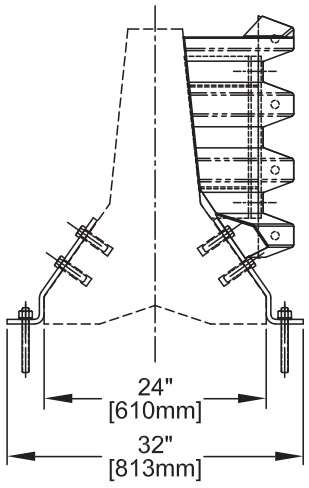
SIDE VIEW

APPENDIX G(2) - MASH TRANSITION, JERSEY/F SHAPE BARRIER TEMPORARY

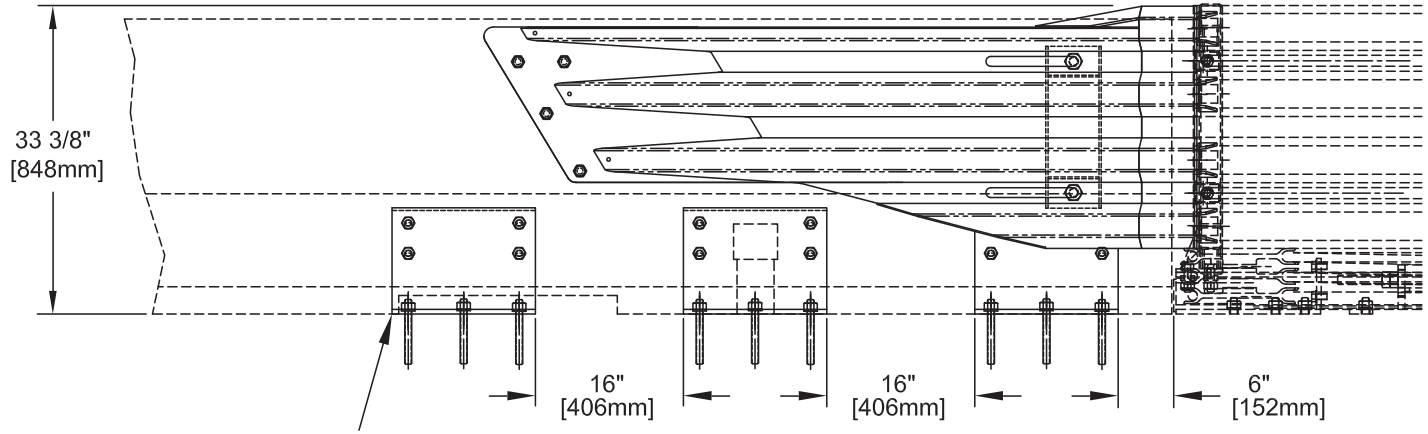
Parts List:	Jersey Barrier	K-Rail
01 - Transition Assembly MASH Left (shown)	#268891	#268891
01 - Transition Assembly MASH Right (not shown)	#268892	#268892
02 - Median Barrier Support Plate	#412077	#232807



PLAN VIEW



END VIEW

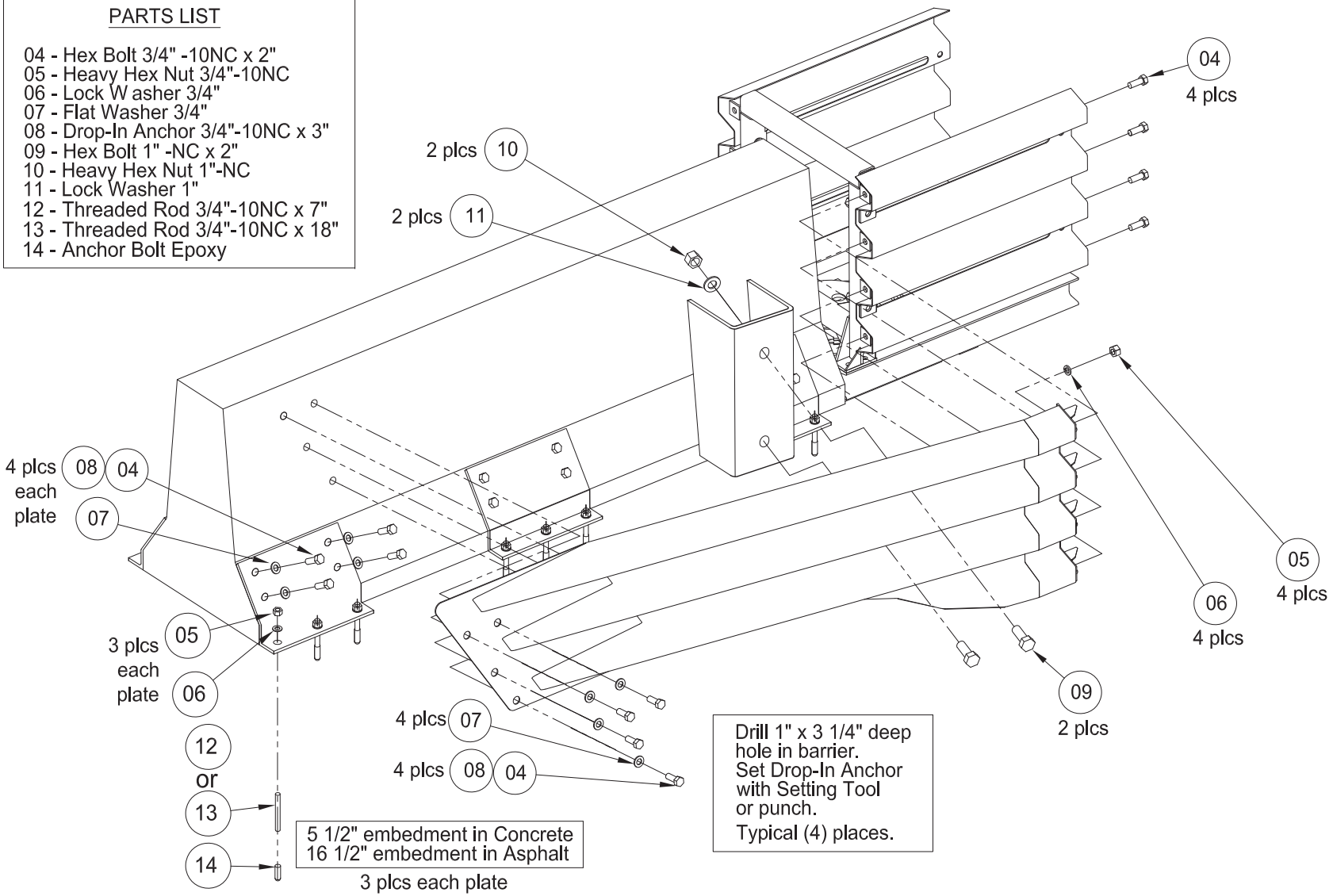


SIDE VIEW

APPENDIX G(3) - MASH TRANSITION, JERSEY/F SHAPE BARRIER PERM & TEMP

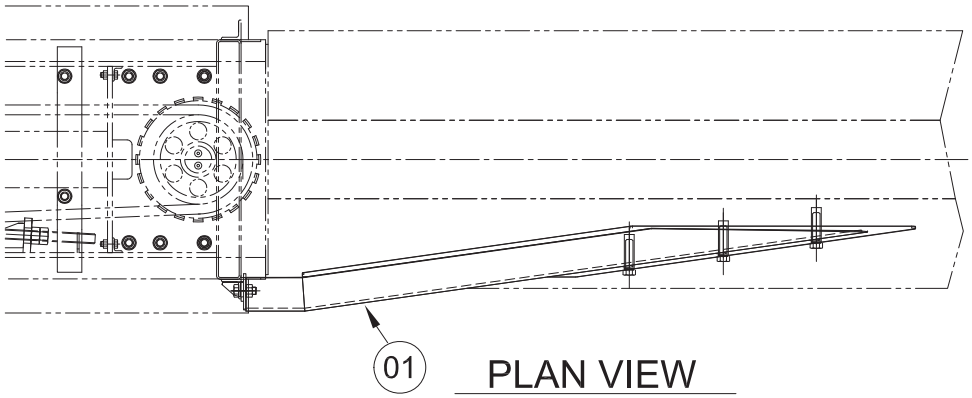
PARTS LIST

04 - Hex Bolt 3/4" -10NC x 2"
05 - Heavy Hex Nut 3/4"-10NC
06 - Lock W asher 3/4"
07 - Flat Washer 3/4"
08 - Drop-In Anchor 3/4"-10NC x 3"
09 - Hex Bolt 1" -NC x 2"
10 - Heavy Hex Nut 1"-NC
11 - Lock Washer 1"
12 - Threaded Rod 3/4"-10NC x 7"
13 - Threaded Rod 3/4"-10NC x 18"
14 - Anchor Bolt Epoxy

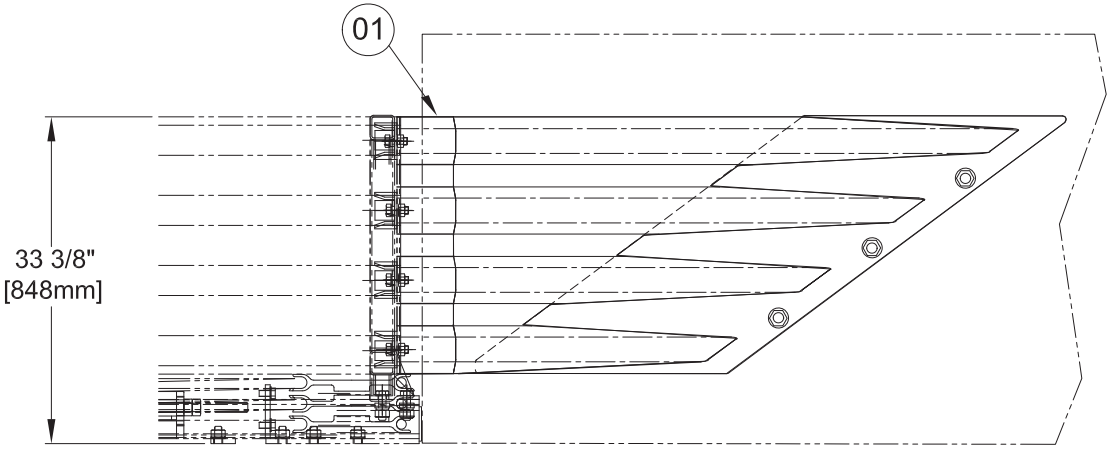


APPENDIX H - TRANSITION, MEDIAN BARRIER - SINGLE SLOPE 24" - 26.75" BASE

Parts List:
01 - Transition Single Slope Median Barrier - Right #275299 (shown)
01 - Transition Single Slope Median Barrier - Left #275302 (not shown)

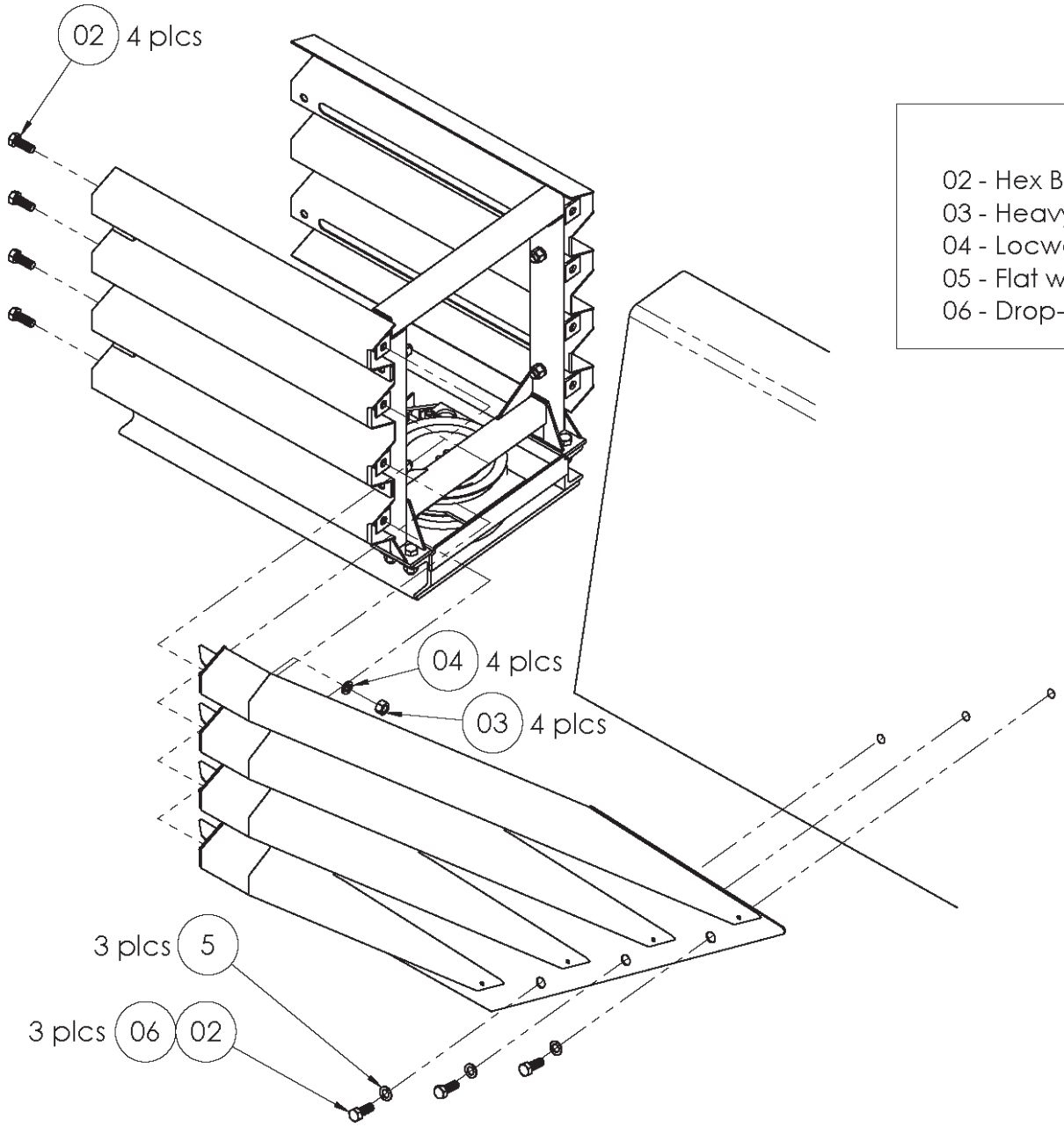


PLAN VIEW



SIDE VIEW

APPENDIX H(2) - TRANSITION, MEDIAN BARRIER - SINGLE SLOPE 24"- 26.75" (610 - 679mm) Base



PARTS LIST

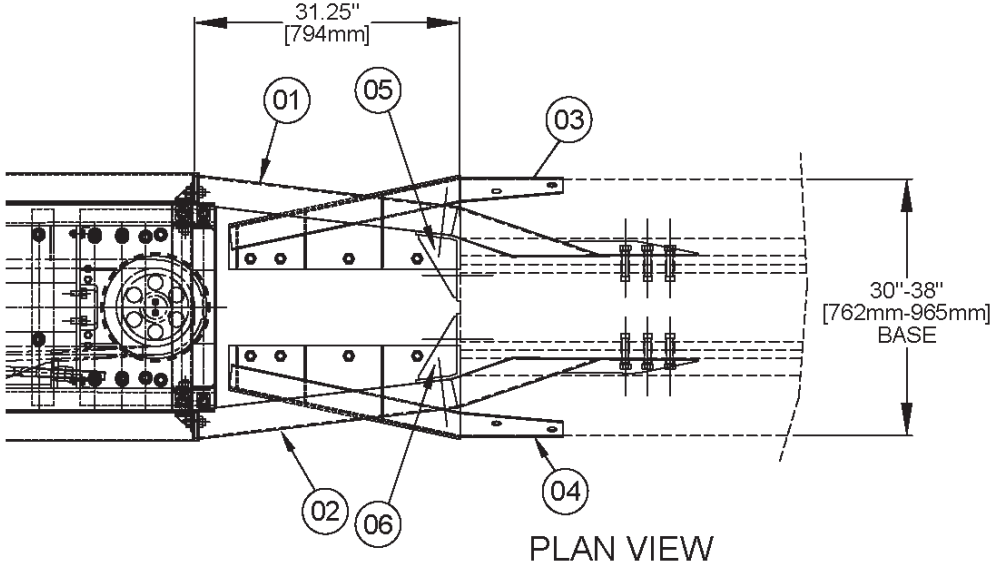
02 - Hex Bolt 3/4"-10NC x 2"
03 - Heavy Hex Nut 3/4"-10NC
04 - Locwasher 3/4"
05 - Flat washer 3/4"
06 - Drop-in Anchor 3/4"-10NC x 3"

Drill 1" x 3 1/4" deep hole in barrier. Set Drop-In Anchor with Setting Tool or with punch. Typical (3) places.

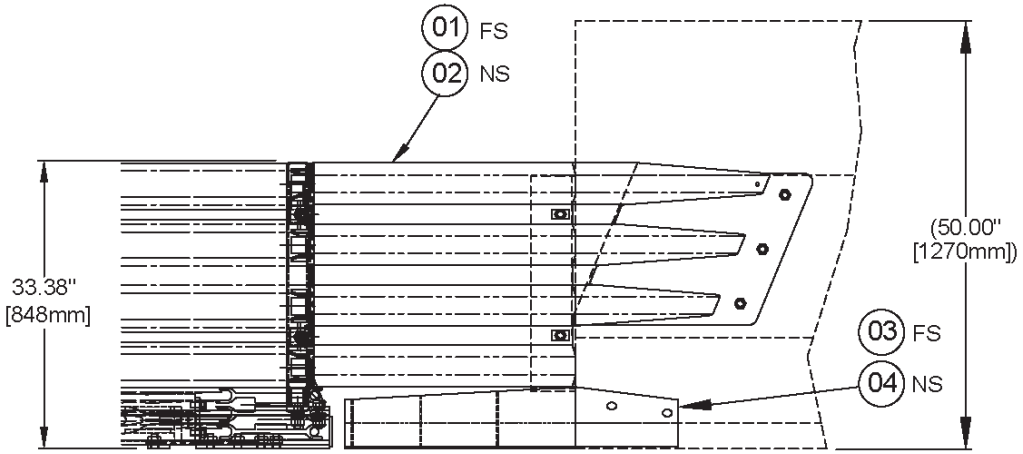
APPENDIX I - TRANSITION, JERSEY/F SHAPE, VARIABLE WIDTH BASE

Parts List for Double Sided Median Barrier 30"-38" Base:
Two-Sided Full Assembly #239542 (with rub rail),
#239545 (without rub rail)
01 - Transition - Left #275272
02 - Transition - Right #275273
03 - Transition Rub Rail - Left #275270
04 - Transition Rub Rail - Right #275271
05 - Transition Support Bracket - Right #239471
06 - Transition Support Bracket - Left #239472

For use with barriers with base widths of 30"-38"
Rub rails only required for base widths > 34"

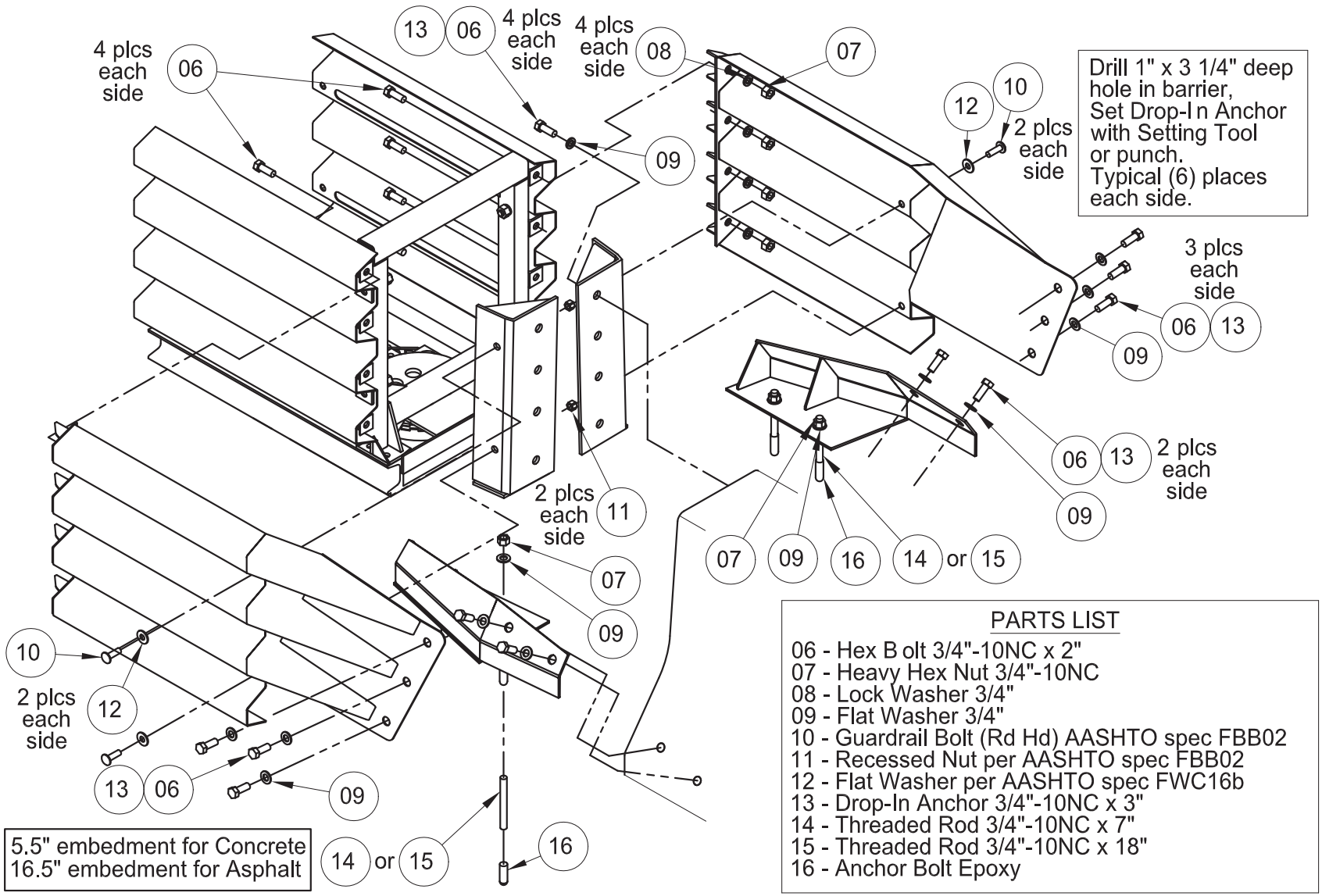


PLAN VIEW



SIDE VIEW

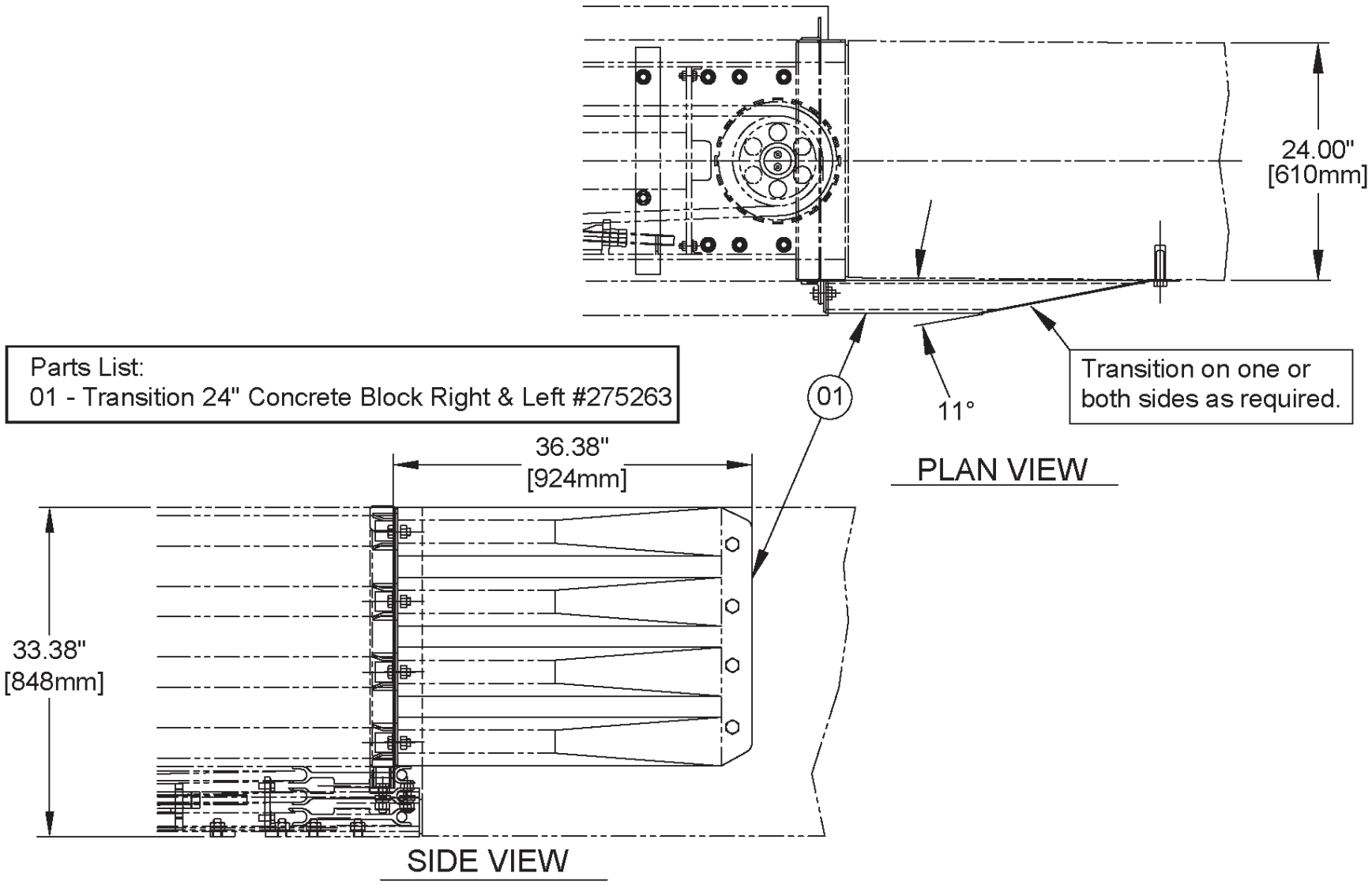
APPENDIX I(2) - TRANSITION, JERSEY/F SHAPE, VARIABLE WIDTH BASE



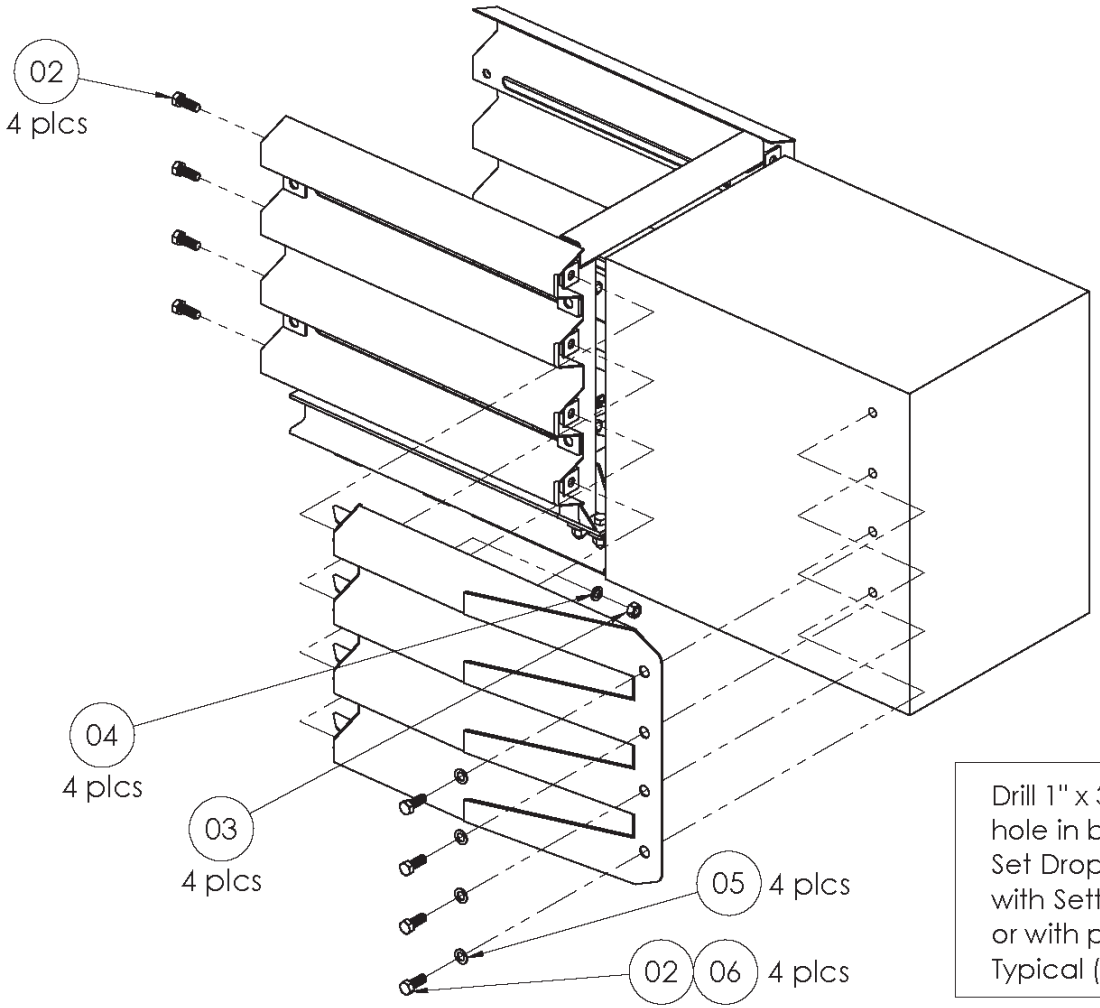
PARTS LIST

06 - Hex Bolt 3/4"-10NC x 2"
07 - Heavy Hex Nut 3/4"-10NC
08 - Lock Washer 3/4"
09 - Flat Washer 3/4"
10 - Guardrail Bolt (Rd Hd) AASHTO spec FBB02
11 - Recessed Nut per AASHTO spec FBB02
12 - Flat Washer per AASHTO spec FWC16b
13 - Drop-In Anchor 3/4"-10NC x 3"
14 - Threaded Rod 3/4"-10NC x 7"
15 - Threaded Rod 3/4"-10NC x 18"
16 - Anchor Bolt Epoxy

APPENDIX J - TRANSITION, CONCRETE BLOCK, 24 INCH (610mm)



APPENDIX J(2) - TRANSITION, CONCRETE BLOCK, 24 INCH (610mm)



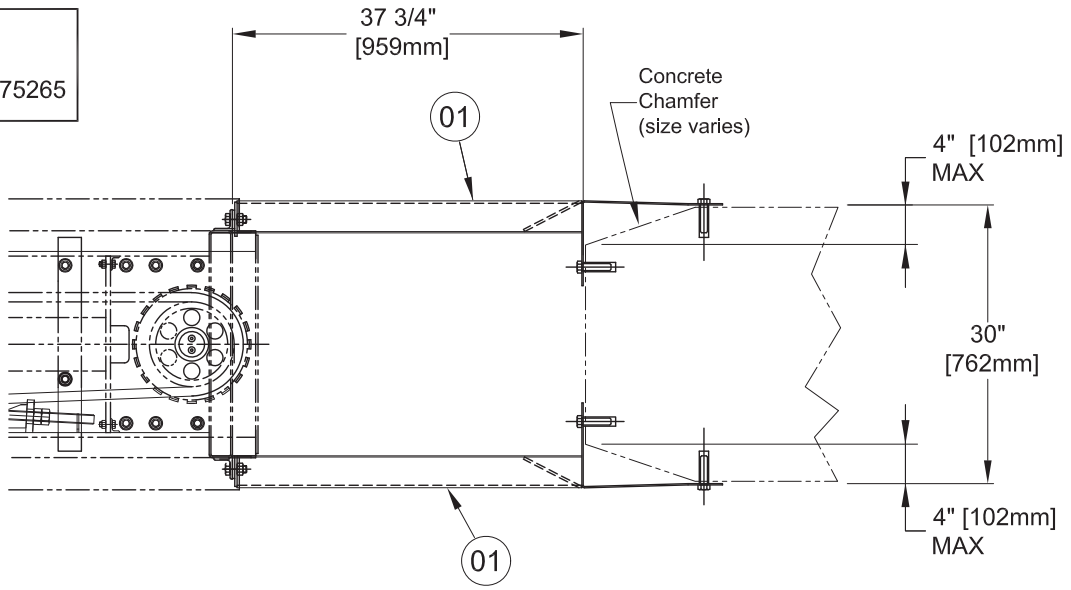
PARTS LIST

02 - Hex Bolt 3/4"-10NC x 2"
03 - Heavy Hex Nut 3/4"-10NC
04 - Locwasher 3/4"
05 - Flat washer 3/4"
06 - Drop-in Anchor 3/4"-10NC x 3"

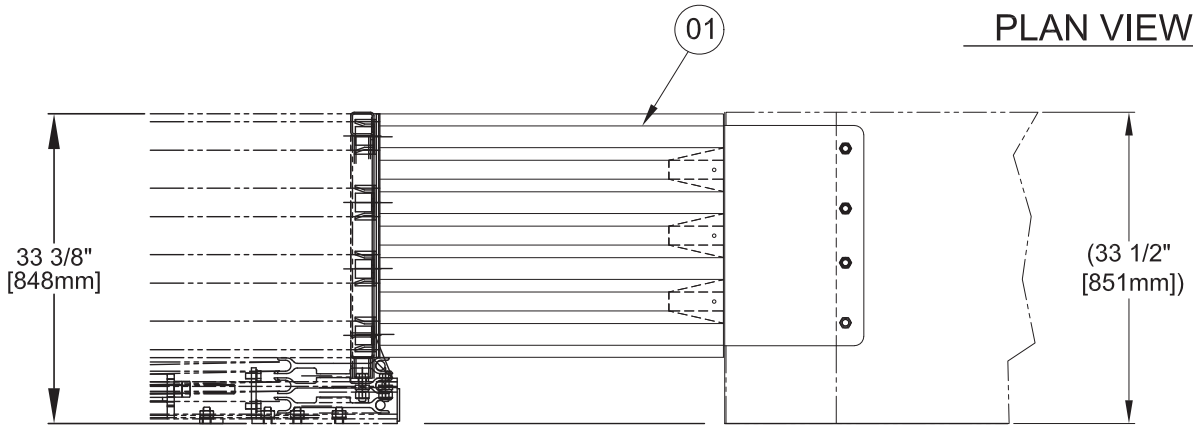
Drill 1" x 3 1/4" deep hole in barrier. Set Drop-In Anchor with Setting Tool or with punch. Typical (4) places.

APPENDIX K - TRANSITION, CONCRETE BLOCK, 30 INCH (762mm)

Parts List:
Full Assembly #275279
01 - Transition 30" Concrete Straight Connection #275265



PLAN VIEW

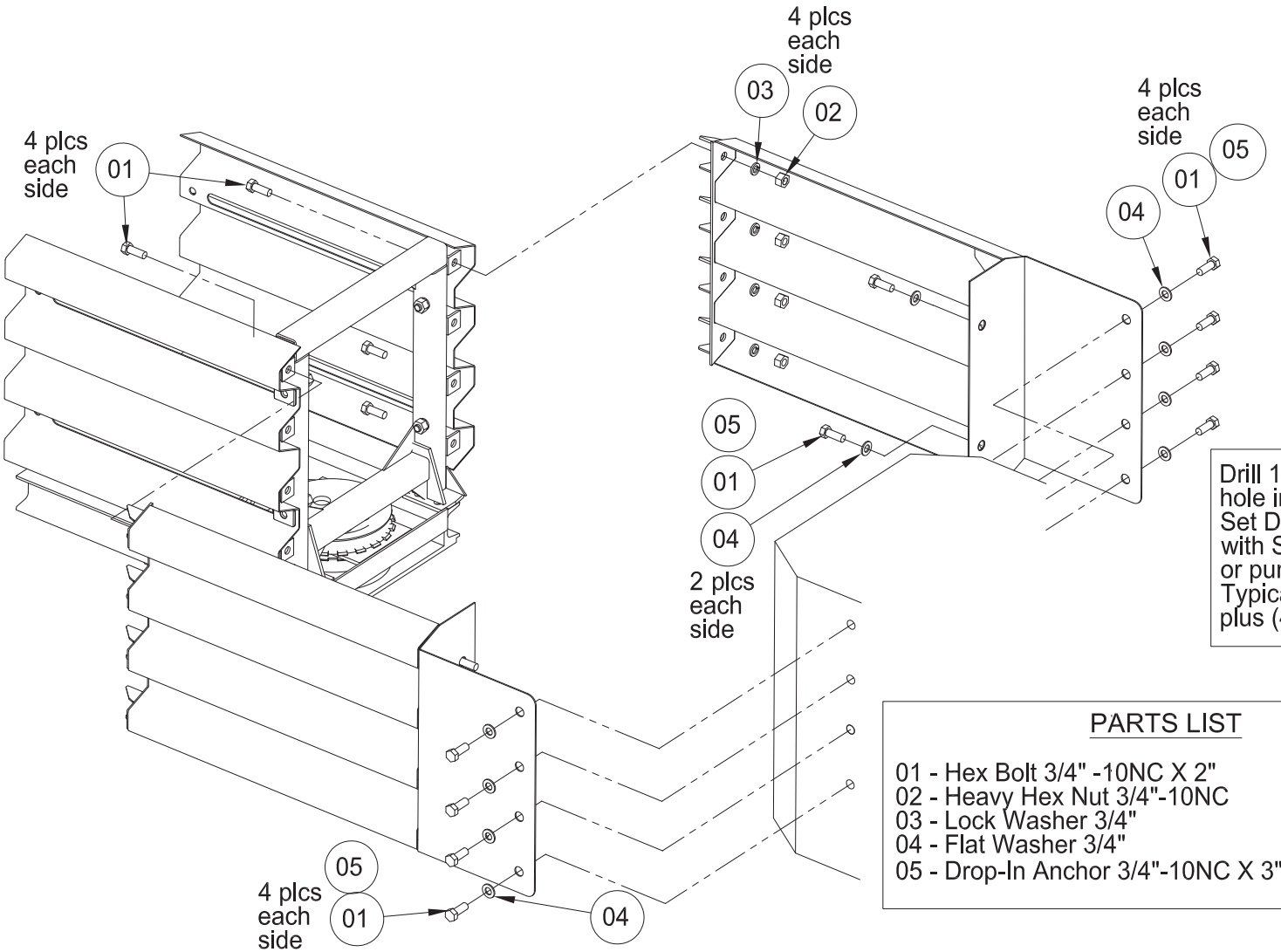


SIDE VIEW

USED FOR:
1. Unchamfered Concrete Block
2. Chamfered Concrete Block ***

*** Chamfer limited to <4"

APPENDIX K(2) - TRANSITION, CONCRETE BLOCK, 30 INCH (762mm)



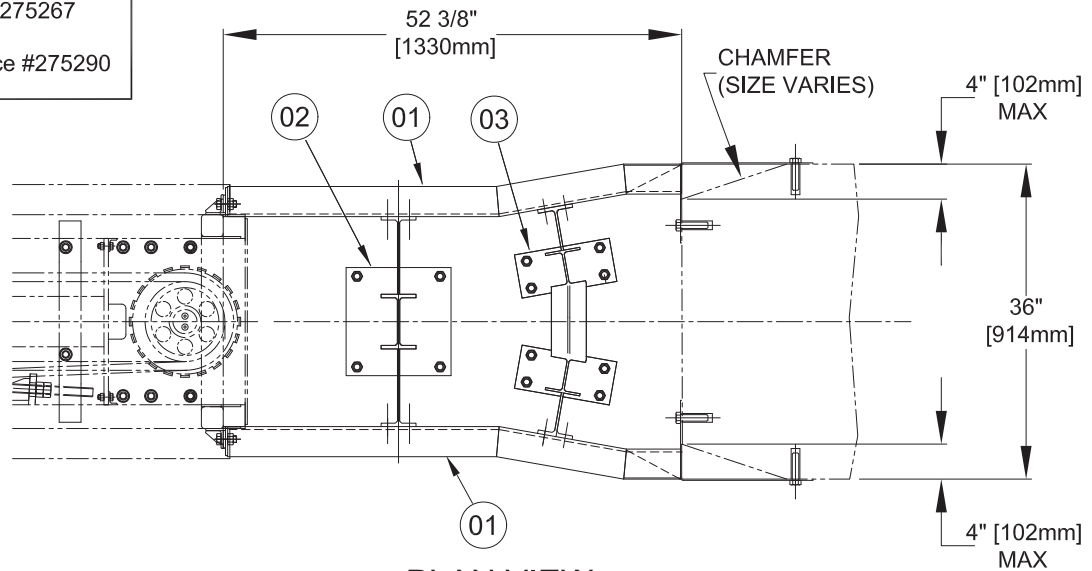
Drill 1" x 3 1/4" deep hole in barrier, Set Drop-in Anchor with Setting Tool or punch. Typical (4) each side plus (4) on end of block.

PARTS LIST

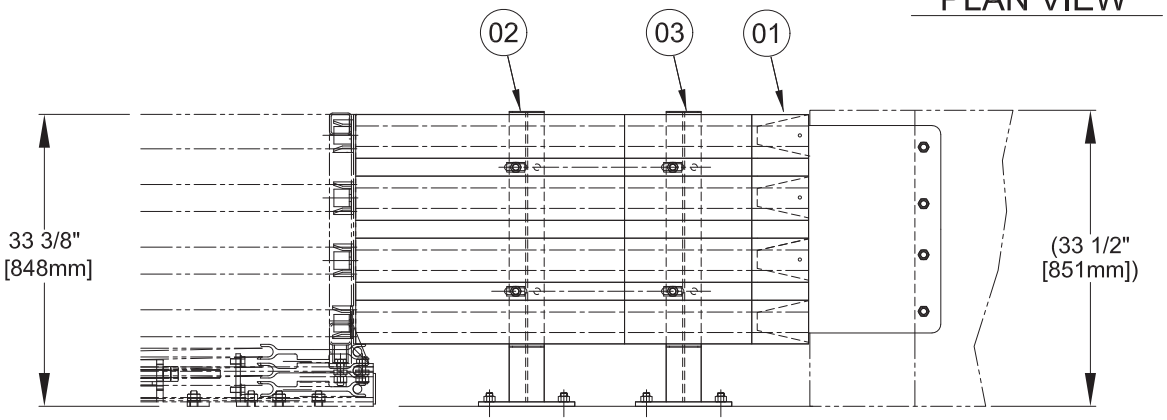
01 - Hex Bolt 3/4" -10NC X 2"
02 - Heavy Hex Nut 3/4"-10NC
03 - Lock Washer 3/4"
04 - Flat Washer 3/4"
05 - Drop-In Anchor 3/4"-10NC X 3"

APPENDIX L - MASH TRANSITION, CONCRETE BLOCK, 36 INCH (915mm)

Parts List:
Full Assembly #275283
01 - Transition 36" Concrete Straight Connection #275267
02 - Transition Concrete Spanner Brace #275291
03 - Transition Concrete #1 Tapered Spanner Brace #275290



PLAN VIEW

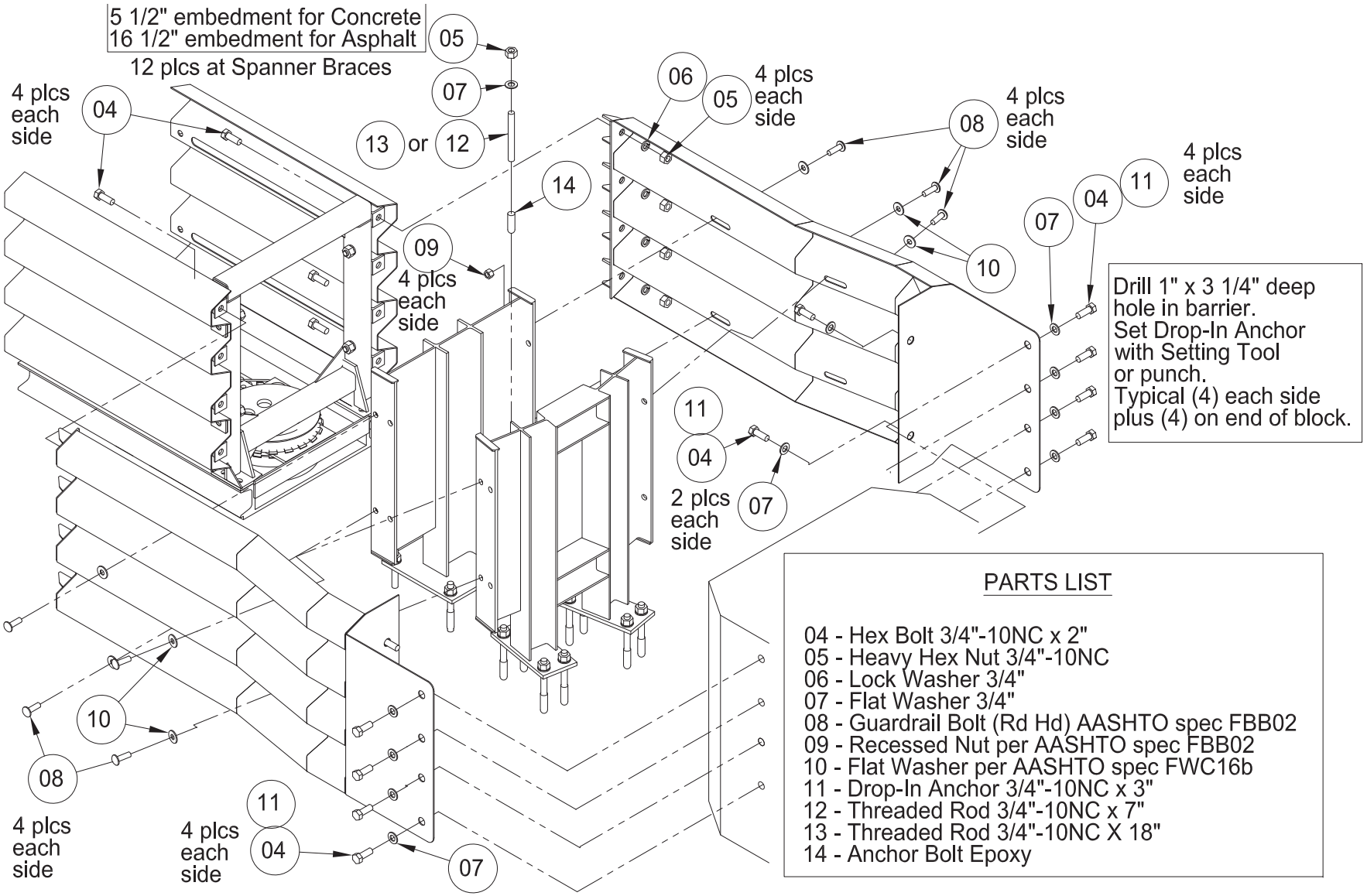


SIDE VIEW

USED FOR:
1. Unchamfered Concrete Block
2. Chamfered Concrete Block ***

***Chamfer limited to <4"

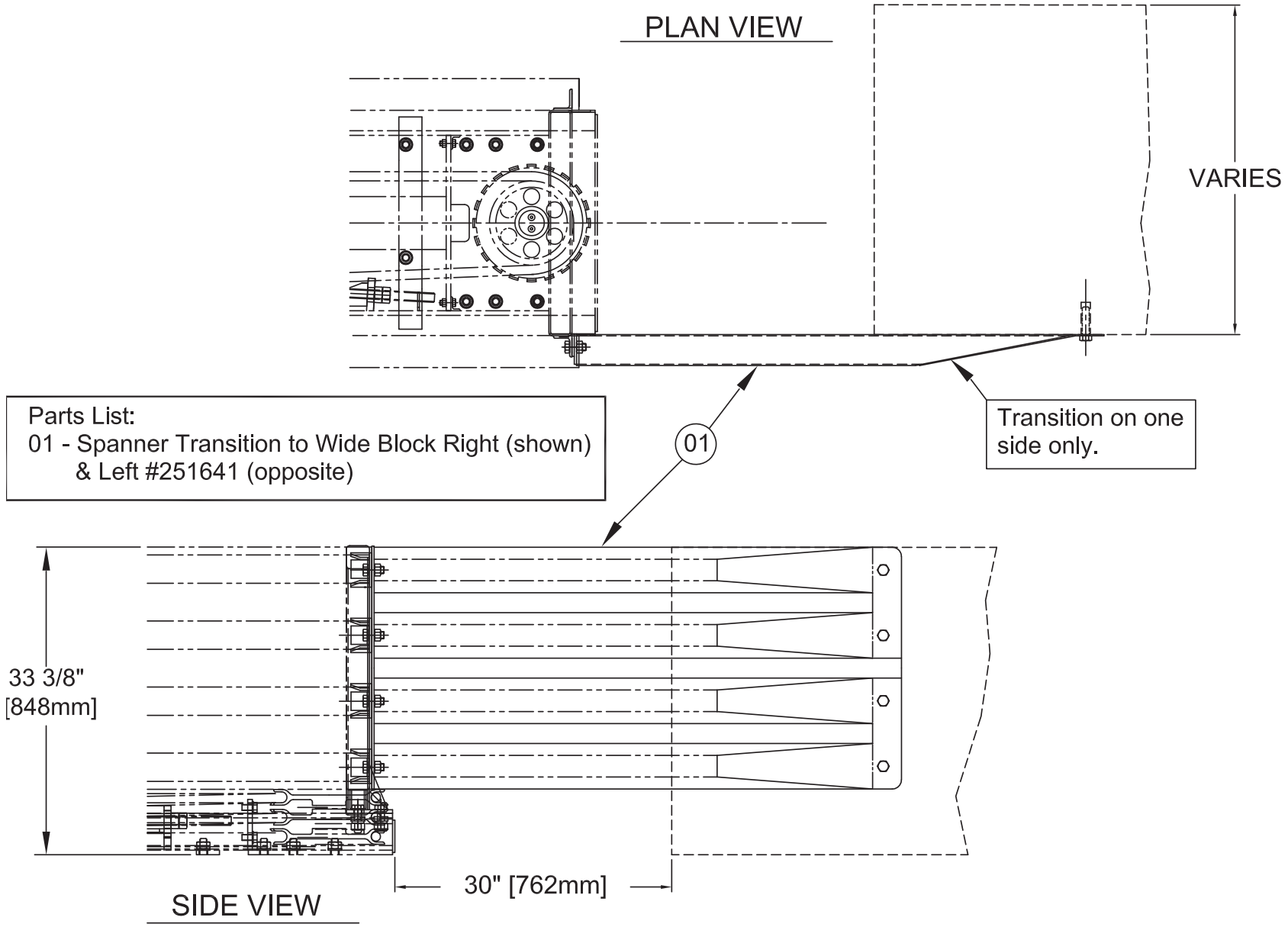
APPENDIX L(2) - MASH TRANSITION, CONCRETE BLOCK, 36 INCH (915mm)



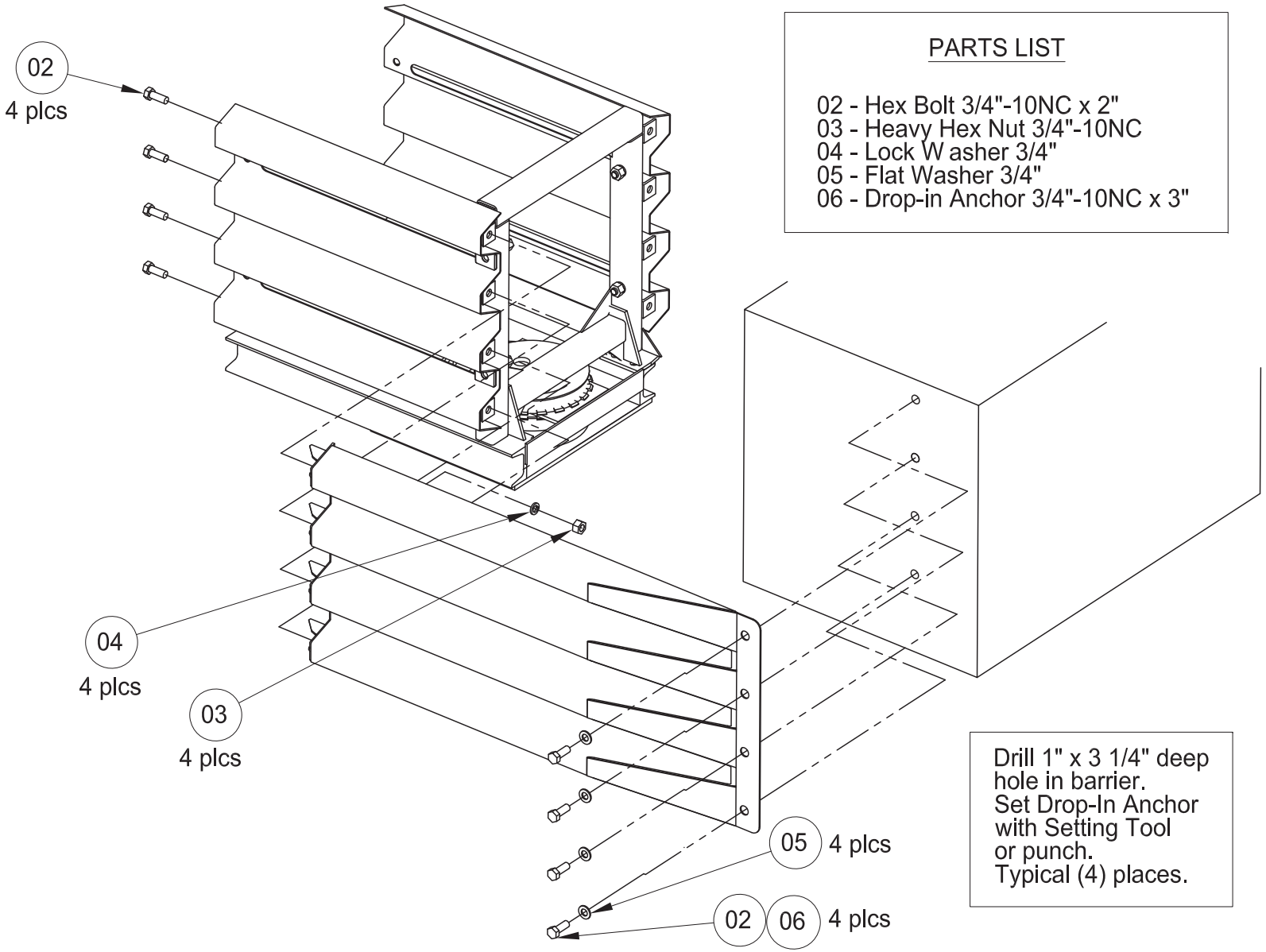
PARTS LIST

04 - Hex Bolt 3/4"-10NC x 2"
05 - Heavy Hex Nut 3/4"-10NC
06 - Lock Washer 3/4"
07 - Flat Washer 3/4"
08 - Guardrail Bolt (Rd Hd) AASHTO spec FBB02
09 - Recessed Nut per AASHTO spec FBB02
10 - Flat Washer per AASHTO spec FWC16b
11 - Drop-In Anchor 3/4"-10NC x 3"
12 - Threaded Rod 3/4"-10NC x 7"
13 - Threaded Rod 3/4"-10NC X 18"
14 - Anchor Bolt Epoxy

APPENDIX M - TRANSITION, SPANNER FOR CONCRETE BLOCK



APPENDIX M(2) - TRANSITION, SPANNER FOR CONCRETE BLOCK



PARTS LIST

02 - Hex Bolt 3/4"-10NC x 2"
03 - Heavy Hex Nut 3/4"-10NC
04 - Lock W asher 3/4"
05 - Flat Washer 3/4"
06 - Drop-in Anchor 3/4"-10NC x 3"

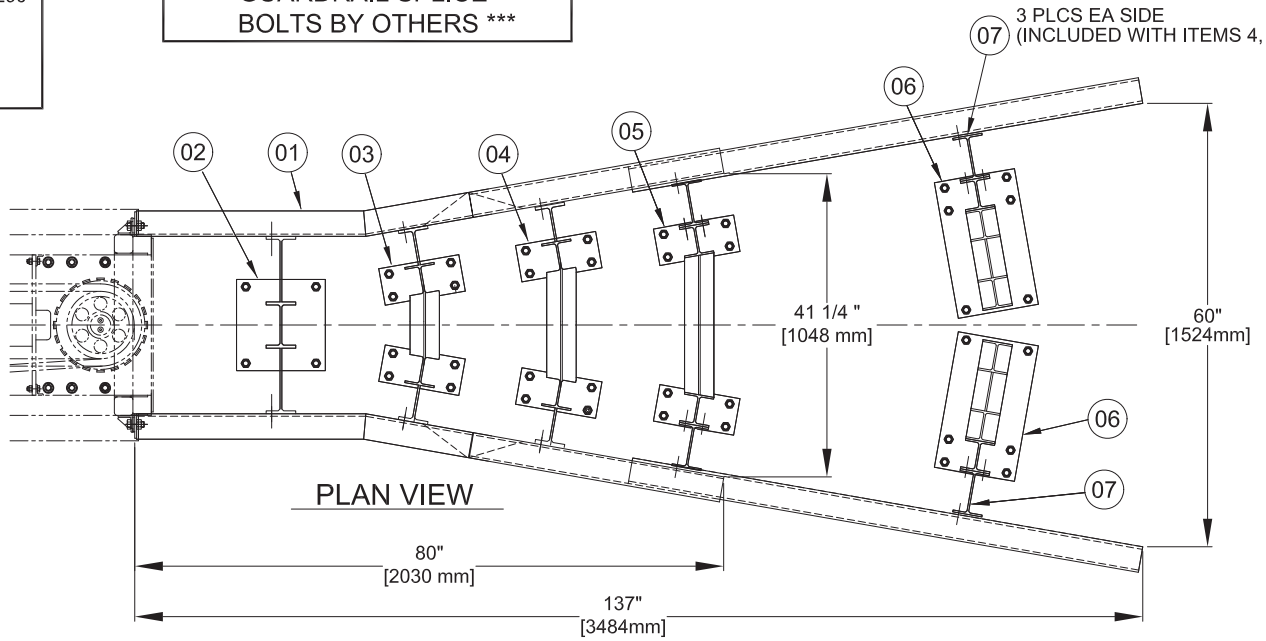
Drill 1" x 3 1/4" deep hole in barrier.
Set Drop-In Anchor with Setting Tool or punch.
Typical (4) places.

APPENDIX N - TRANSITION, THRIE BEAM WIDE TAPER

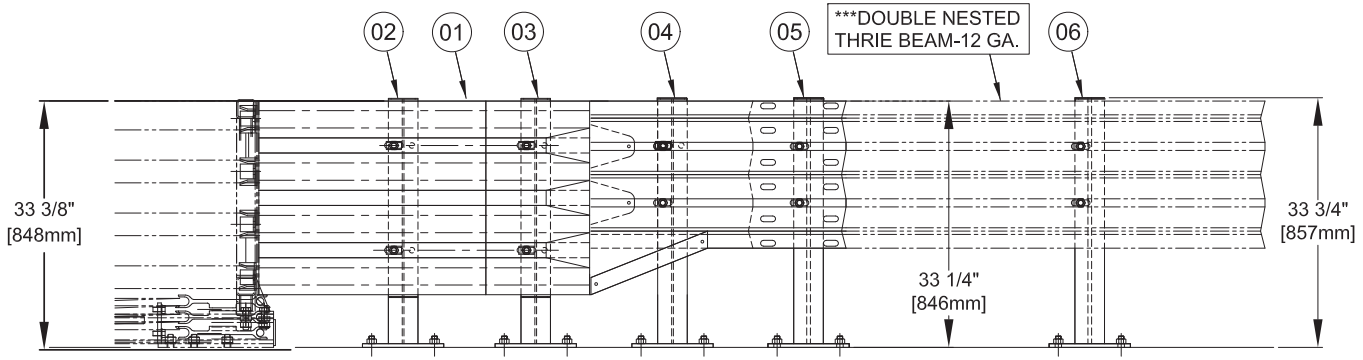
Parts List:
Gore Assembly Complete to Brace #5 - #275288
01 - Transition Thrie 10 Degree Flare Right #275304
01 - Transition Thrie 10 Degree Flare Left #275306
02 - Transition Concrete Spanner Brace #275291
03 - Transition Concrete #1 Tapered Spanner Brace #275290
04 - Transition Gore Tapered #1 Spanner Brace #275292
05 - Transition Gore Tapered #2 Spanner Brace #275293
06 - Thrie Beam Concrete Leg Brace #270765
07 - Thrie Beam Blockout AASHTO PWB02 #233449

*** THRIE BEAM AND GUARDRAIL SPLICE BOLTS BY OTHERS ***

NOTES:
1. DIMENSIONS SHOWN ARE FOR 60" WIDTH. REFERENCE HILL & SMITH DRAWING ET-06-07 FOR HAZARD WIDTH RANGES 38" - 120".
2. LENGTH OF THRIE BEAM AND QUANTITY OF LEG BRACES VARY WITH HAZARD WIDTH. CONTACT HILL & SMITH FOR SITE-SPECIFIC DRAWING AND TRANSITION RECOMMENDATIONS.
3. GUARDRAIL TERMINATION - ADD REQUIRED GUARDRAIL LENGTH AND TERMINATE PER STATE REGULATIONS.

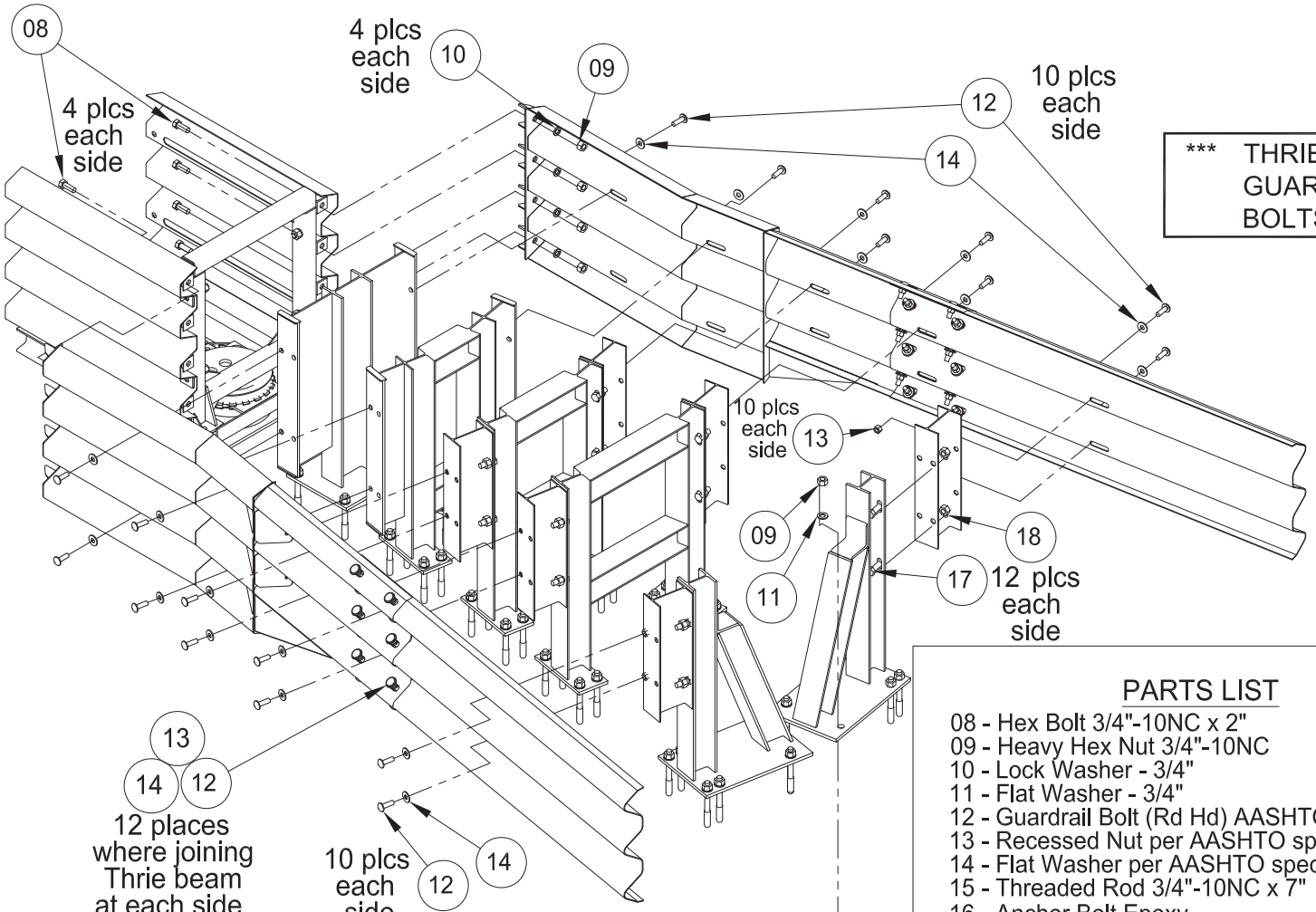


PLAN VIEW



SIDE VIEW

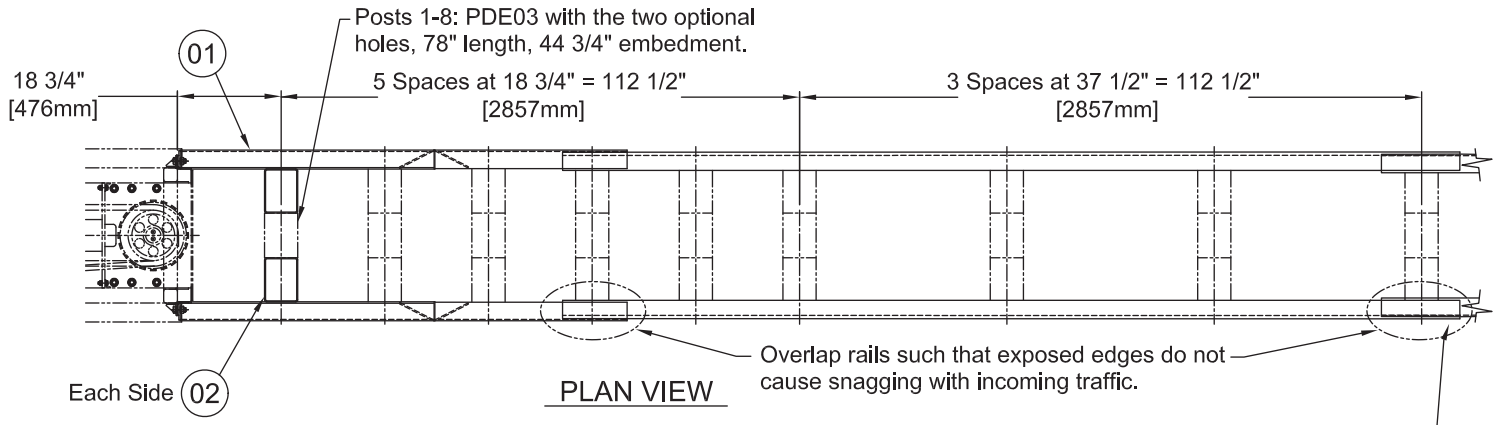
APPENDIX N(2) - TRANSITION, THRIE BEAM WIDE TAPER



PARTS LIST

08 - Hex Bolt 3/4"-10NC x 2"
09 - Heavy Hex Nut 3/4"-10NC
10 - Lock Washer - 3/4"
11 - Flat Washer - 3/4"
12 - Guardrail Bolt (Rd Hd) AASHTO spec FBB02
13 - Recessed Nut per AASHTO spec FBB02
14 - Flat Washer per AASHTO spec FWC16b
15 - Threaded Rod 3/4"-10NC x 7"
16 - Anchor Bolt Epoxy
17 - Hex Bolt per AASHTO FBX16a
18 - Hex Nut per AASHTO FBX16a

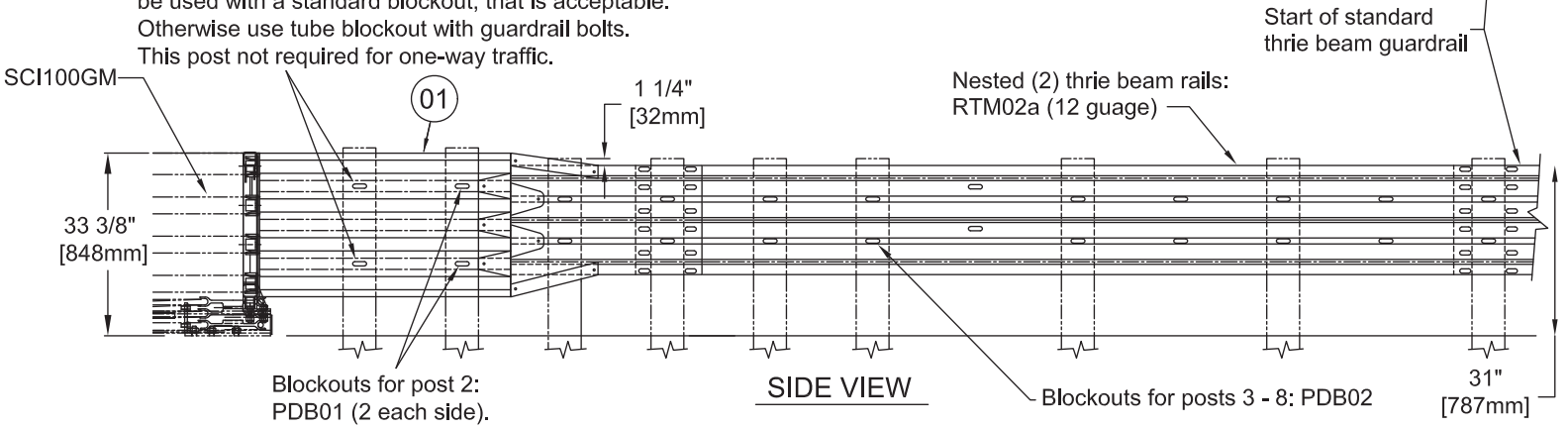
APPENDIX O - TRANSITION TO THRIE BEAM
FOR USE WITH BIDIRECTIONAL TRAFFIC



Parts List:
01 - Transition Thrie & W Beam - Right #275298
01 - Transition Thrie & W Beam - Left #232971
02 - Rectangular Tube Blockout #265580

****THIS DESIGN IS FOR BIDIRECTIONAL TRAFFIC POST SPACING AND NESTED GUARDRAIL PER SPEC.***

GUARDRAILS, POSTS, BLOCKOUTS AND CONNECTION BOLTS BY OTHERS.



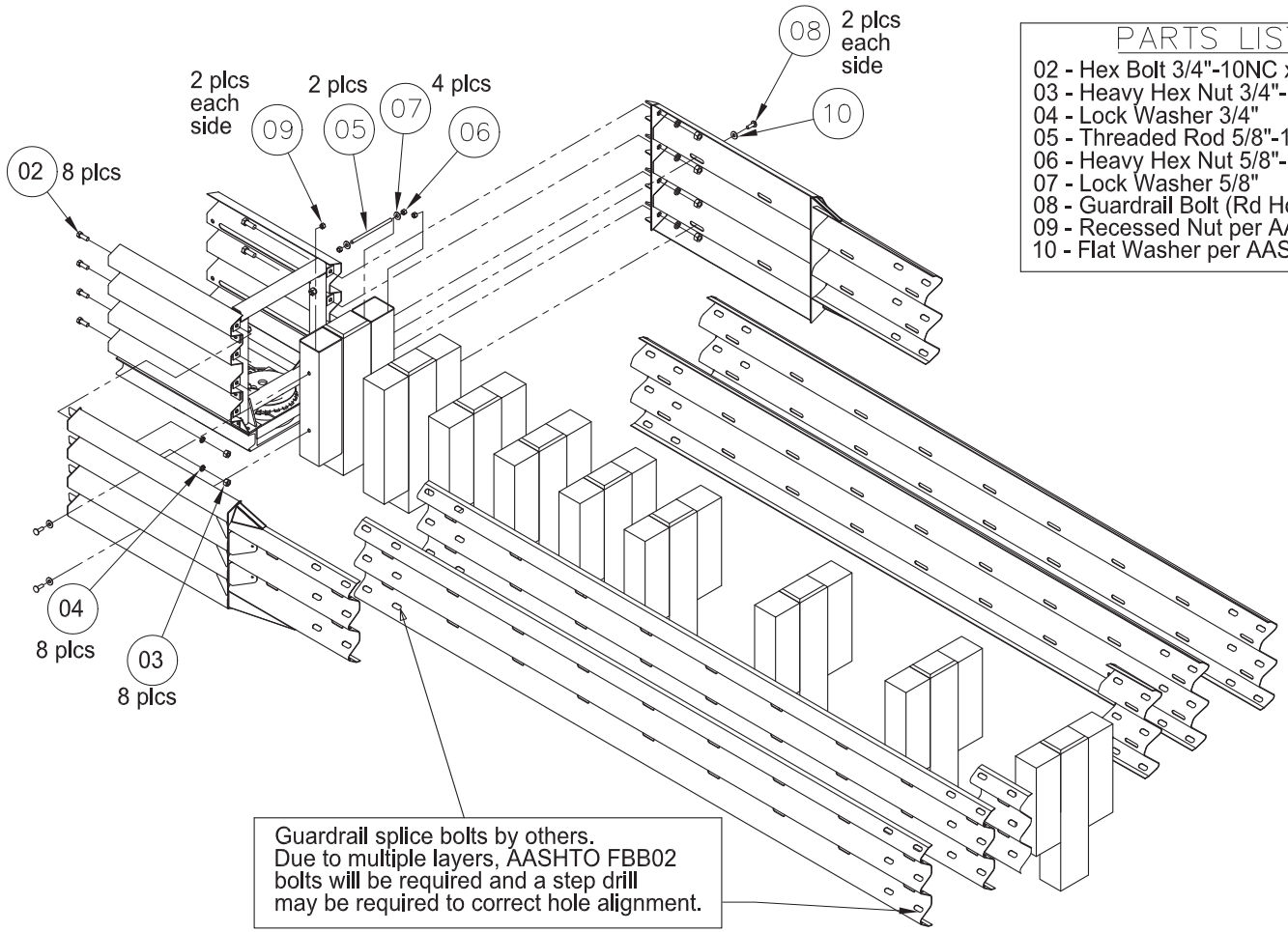
APPENDIX O(2) - TRANSITION TO THRIE BEAM
** FOR USE WITH BIDIRECTIONAL TRAFFIC**

***THIS DESIGN IS FOR BIDIRECTIONAL TRAFFIC.
POST SPACING AND NESTED GUARDRAIL PER SPEC.

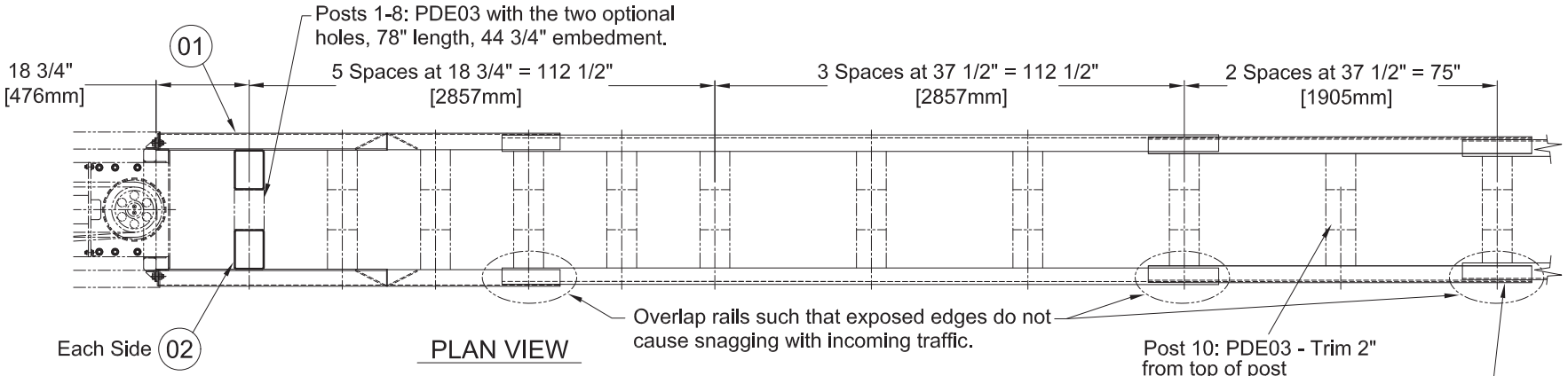
***GUARDRAILS, POSTS, BLOCKOUTS AND
CONNECTION BOLTS BY OTHERS.***

PARTS LIST

02 - Hex Bolt 3/4"-10NC x 2"
03 - Heavy Hex Nut 3/4"-10NC
04 - Lock Washer 3/4"
05 - Threaded Rod 5/8"-11NC x 11"
06 - Heavy Hex Nut 5/8"-11NC
07 - Lock Washer 5/8"
08 - Guardrail Bolt (Rd Hd)AASHTO spec FBB02
09 - Recessed Nut per AASHTO spec FBB02
10 - Flat Washer per AASHTO spec FWC16b



APPENDIX P - TRANSITION TO W BEAM
FOR USE WITH BIDIRECTIONAL TRAFFIC

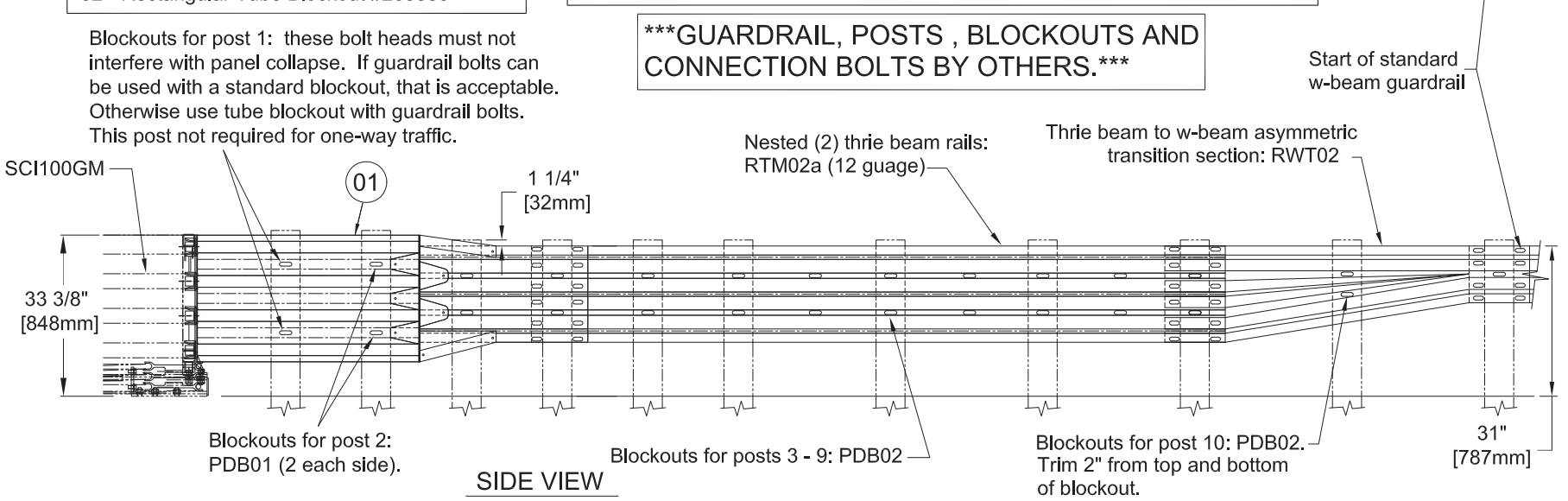


PLAN VIEW

Parts List:
01 - Transition Thrie & W Beam - Right #275298
01 - Transition Thrie & W Beam - Left #232971
02 - Rectangular Tube Blockout #265580

****THIS DESIGN IS FOR BIDIRECTIONAL TRAFFIC PATTERNS POST SPACING AND NESTED GUARDRAIL PER SPEC. ****

GUARDRAIL, POSTS , BLOCKOUTS AND CONNECTION BOLTS BY OTHERS.



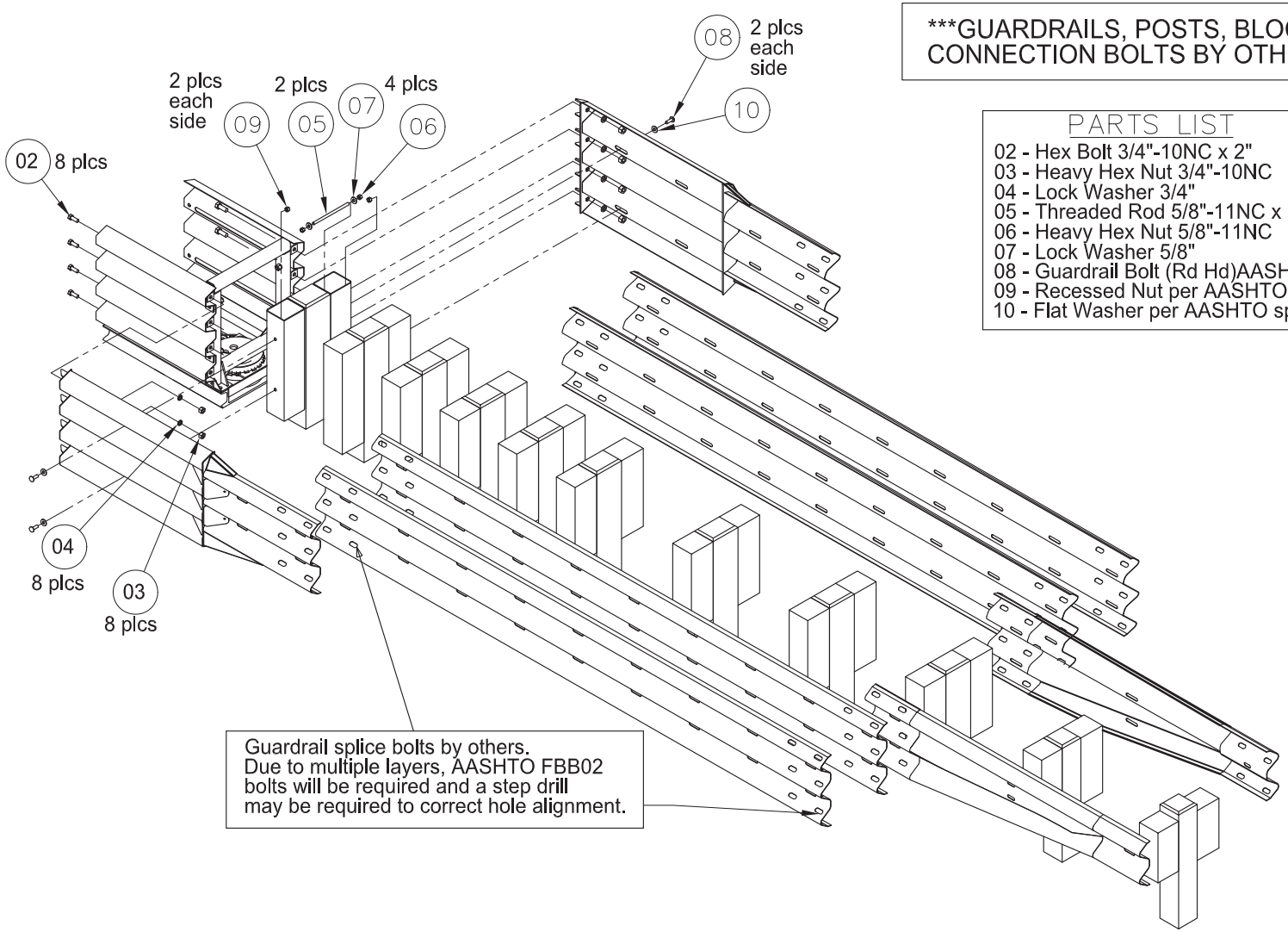
SIDE VIEW

APPENDIX P(2) - TRANSITION TO W BEAM
** FOR USE WITH BIDIRECTIONAL TRAFFIC**

***THIS DESIGN IS FOR BIDIRECTIONAL TRAFFIC.
POST SPACING AND NESTED GUARDRAIL PER SPEC.

GUARDRAILS, POSTS, BLOCKOUTS AND CONNECTION BOLTS BY OTHERS.

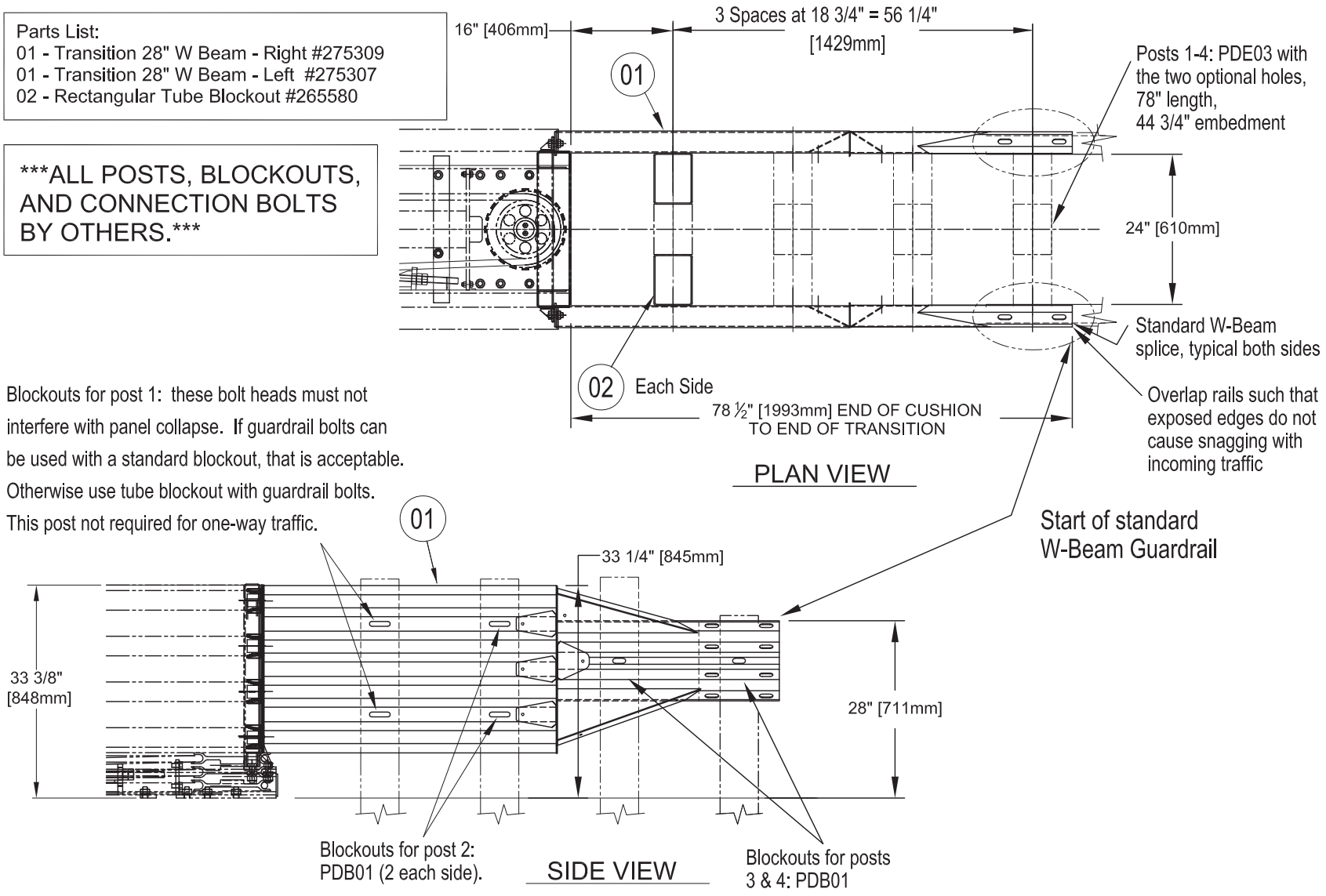
PARTS LIST
02 - Hex Bolt 3/4"-10NC x 2"
03 - Heavy Hex Nut 3/4"-10NC
04 - Lock Washer 3/4"
05 - Threaded Rod 5/8"-11NC x 11"
06 - Heavy Hex Nut 5/8"-11NC
07 - Lock Washer 5/8"
08 - Guardrail Bolt (Rd Hd)AASHTO spec FBB02
09 - Recessed Nut per AASHTO spec FBB02
10 - Flat Washer per AASHTO spec FWC16b



APPENDIX Q - TRANSITION, W BEAM 28" HIGH
Unidirectional Traffic Only

Parts List:
01 - Transition 28" W Beam - Right #275309
01 - Transition 28" W Beam - Left #275307
02 - Rectangular Tube Blockout #265580

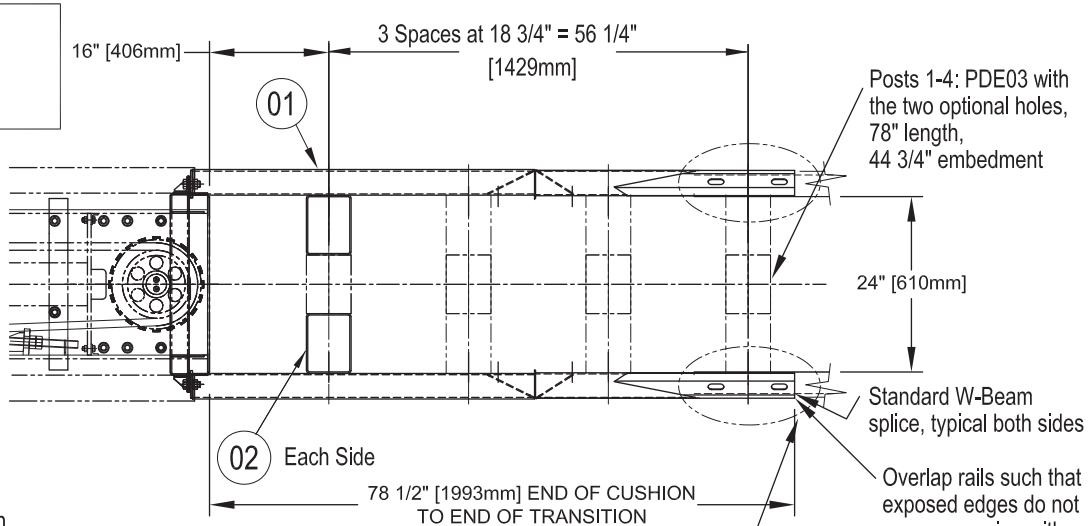
ALL POSTS, BLOCKOUTS, AND CONNECTION BOLTS BY OTHERS.



APPENDIX R - TRANSITION, W BEAM 31" HIGH
** Unidirectional Traffic Only

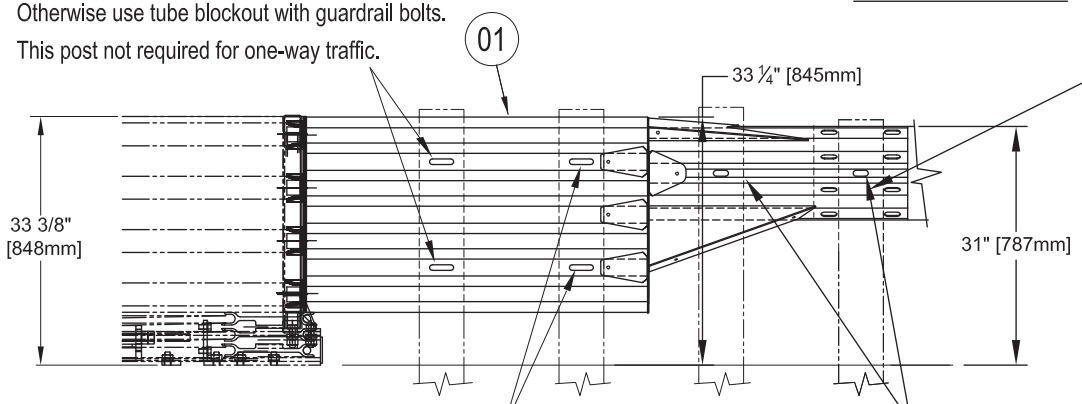
Parts List:
01 - Transition 31" W Beam - Right #275311
01 - Transition 31" W Beam - Left #275310
02 - Rectangular Tube Blockout #265580

ALL POSTS, BLOCKOUTS AND CONNECTION BOLTS SUPPLIED BY OTHERS.

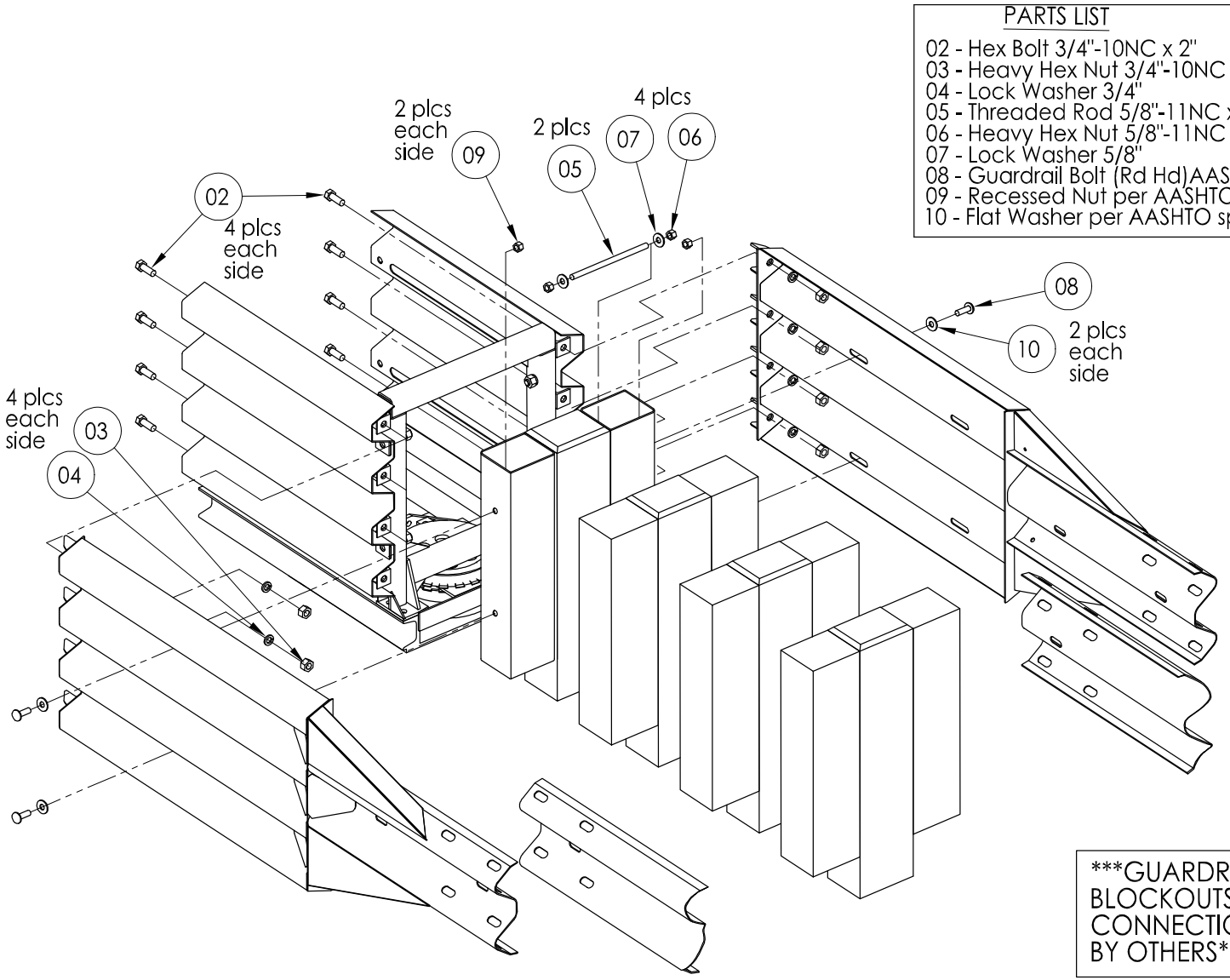


Blockouts for post 1: these bolt heads must not interfere with panel collapse. If guardrail bolts can be used with a standard blockout, that is acceptable. Otherwise use tube blockout with guardrail bolts. This post not required for one-way traffic.

Start of standard W-Beam Guardrail



APPENDIX Q(2) & R(2) - TRANSITION, W BEAM 28" & 31" HIGH



Name: _____ Date: _____

Location: _____ Serial #: _____

SMART CUSHION® ATTENUATOR INSTALLATION CHECKLIST

The following procedures should be used to properly install the Smart Cushion crash attenuator. It is important that these procedures be followed for proper performance of the attenuator as it was designed and manufactured. All work should be performed with proper Traffic Control in place according to Local, State and Federal laws.

Foundation Requirements (new or existing)	
	The foundation is 6" of reinforced concrete pad or 8" of non-reinforced concrete pad.
	The foundation pad is a planar surface with a maximum cross slope of 10:1 (front to back or side to side)
	The Concrete is 28 Mpa or 4000 psi at full cure.
	The new or existing foundation has been inspected for slope, signs of cracking, surface wear, shifting from original position, undercut of earth below or to the sides supporting the foundation, settling and any other signs of age or deterioration which may make the foundation unusable.
	The foundation pad is per recommendation as found in Appendices E1 and E2 of the Manufacturer's *Design and Installation Manual.*
Unloading and Placement	
	The attenuator has been lifted using a device that can safely lift 3,500 lbs.
	Lifting straps or chains have been used at the lift-point markings on the support frames using a four-point choked lifting method.
	The attenuator has been centered on the hazard and is aligned facing traffic in order to provide the best possible protection and redirection capabilities possible.
Anchors, Drilling, Cleaning, Adhesive and Torque Values	
	Anchor embedment is per specifications as found in Appendices E1 and E2 of the Manufacturer's *Design and Installation Manual.*
	The anchor holes have been drilled to the proper depth using a 7/8" diameter drill bit.
	Debris from drilling holes is safely removed with shop-vac or air hose.
	The holes were "scrubbed out" using a nylon or wire bottle brush, then the dust was removed with a shop-vac or with an air-hose.
	RedHead A-7 Adhesive was placed into the holes per manufacturer's recommendations.
	The anchor rods were rotated one full turn while inserting into the anchor holes previously filled with adhesive.
	Once the adhesive has fully cured, the anchor nuts have been torqued to 125 ft.-lbs. and no more than 1/2" of anchor rod thread is visible above the nut.
	All 48 anchors have been installed for a TL3 attenuator or all 34 anchors have been installed for a TL2 attenuator.
Hardware Check	
	All Hardware is tightened to specifications.
	Spelter Socket pin is fully seated and cotter pin in place.
	Shear Bolts are in place.
Rear Panel Clearance	
	The rearmost panel is allowed to travel straight back 30" beyond the last terminal brace without obstruction.
Front Panels	
	The front delineation panel is striped appropriately per agency regulations for the site location where the attenuator is installed.
Transitions	
	Transitions will be required anytime that a hazard is wider than 24" or if traffic can approach the attenuator from the rear of the unit. Please reference the Manufacturer's Design and Installation Manual for further information and drawings of available transitions.

70/100GM SMART CUSHION COMMERCIAL 1-YEAR WARRANTY

Hill & Smith Inc. warrants this product to be free from defects in material and workmanship under normal use and service for a period of one (1) year beginning on the date of installation. Hill & Smith Inc. will repair or replace without charge to the original customer any defective component. This is the sole and exclusive remedy.

This warranty is contingent upon proper use of the System and does not cover Systems that have been modified (including the addition of parts) without the approval of Hill & Smith Inc. or which are in need of repair due to damage from external cause, including accident, collision, improper handling, improper transporting, failure to properly maintain the System as recommended by Hill & Smith Inc. abuse, misuse or which have been damaged by outside parties not employed by Hill & Smith Inc., whether in installation or otherwise.

THIS IS A LIMITED WARRANTY AND IT IS THE ONLY WARRANTY MADE BY HILL & SMITH INC. HILL & SMITH INC. MAKES, AND CUSTOMER RECEIVES, NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. HILL & SMITH INC. SHALL HAVE NO LIABILITY WITH RESPECT TO ITS OBLIGATIONS UNDER THIS WARRANTY FOR CONSEQUENTIAL, EXEMPLARY OR INCIDENTAL DAMAGES EVEN IF IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THIS DOCUMENT WITH RESPECT TO THE PRODUCT INDICATED ABOVE. BUYER ACKNOWLEDGES THAT ANY STATEMENTS MADE WHICH ARE NOT FOUND IN THIS DOCUMENT ARE NOT PROMISES TO BE RELIED UPON.

THE BUYER AGREES TO INSPECT THE PRODUCT ON RECEIPT AS FULLY AS THE BUYER DESIRES AND TO NOTIFY HILL & SMITH INC. OF ANY REVEALED DEFECT.

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