

Installation, Design and Maintenance Manual

BarrierGuard 800™ Steel Barrier



- *Efficient to Transport*
- *Easy to Install & Remove*
- *Approved to NCHRP Test Level - 4*

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PARTS LIST

Figure 1.
Pt # BG12EF
40 ft. [12 m] Section
Female / End Terminal

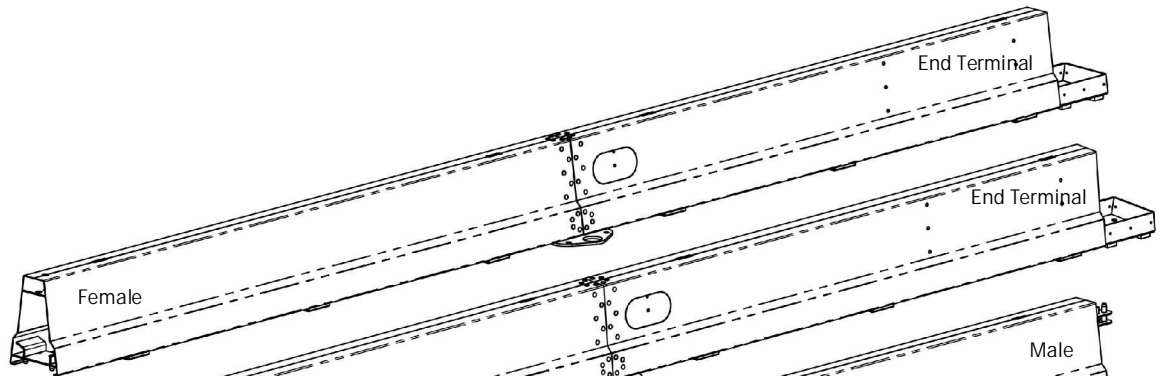


Figure 2.
Pt # BG12EM
40 ft. [12 m] Section
Male / End Terminal

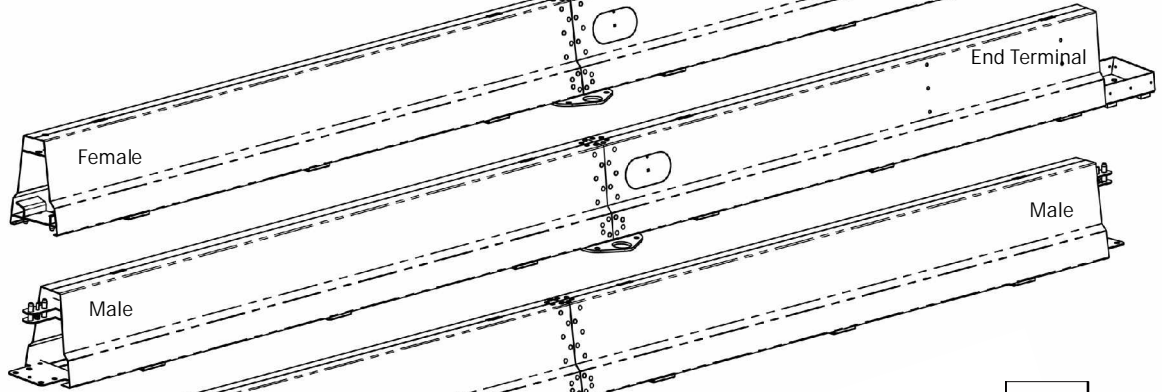


Figure 3.
Pt3 BG12MS
40 ft. [12 m] Section
Standard 40 ft. Mid Section

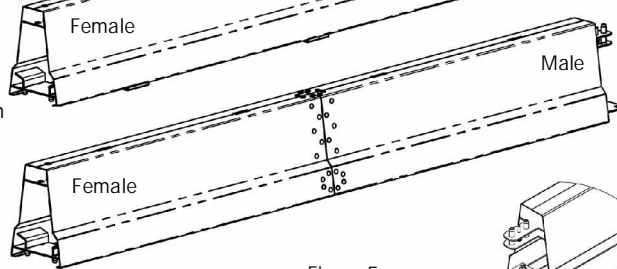


Figure 4.
Pt# BG06MS
20 ft. [6 m] Section
Standard 20 ft. Mid Section

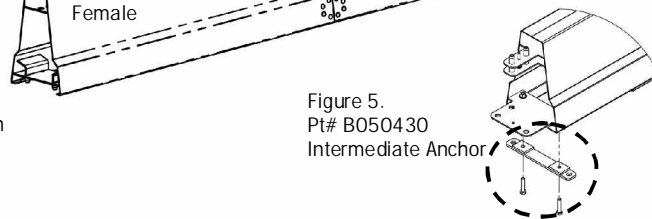


Figure 5.
Pt# B050430
Intermediate Anchor

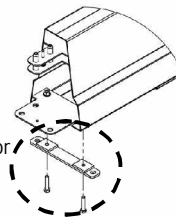


Figure 8.
Pt# B051136
End Terminal Cover

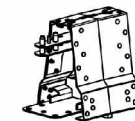
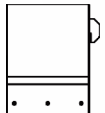


Figure 6.
Pt# BG05AR / L
5 degree Angle



Figure 7.
Pt# BG10AR/L
10 degree Angle

BARRIER END PROTECTION



Figure 9. Universal TAU-II® Crash Cushion attached to the BG800.

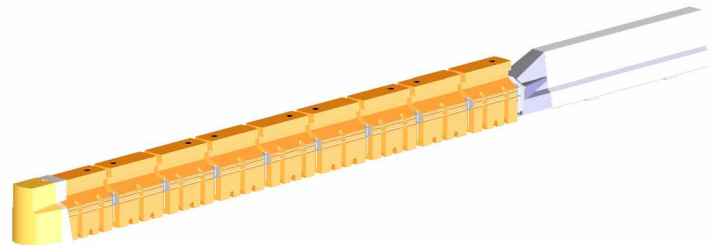


Figure 10. ABSORB 350® Crash Cushion attached to the BG800.

INSTALLATION AND DEPLOYMENT

Deployment and Installation Overview

Deployment of the BarrierGuard 800 is accomplished with a crane or other lifting device. The crane must have a safe working capacity of 2,500 lbs. [1100 kg] at a reach of 26 ft. [8 m] to enable the 12 meter sections to be safely loaded, offloaded, and installed on site. Typical transportation would require a 40 ft. [12 m] flat bed trailer. A crane mounted on the tow vehicle or a separate crane truck may be used. The trailer should be loaded according to the deployment schedule. The first segment to be offloaded and installed is the 40 ft. [12 m] male end terminal section (BG12EM) followed by the predetermined series of components. The last segment to be installed is the 40 ft. [12m] female end terminal section (BG12EF).

In cases of large deployments, the first barrier to be set can be a standard male-male middle section (BG12MM or BGO6MM) set at a mid point in the system and deployed outwards toward each end simultaneously. In this case, both ends would terminate with female end terminal sections (BG12EF).

In any case the trailer should be loaded with the male ends of the barrier sections facing toward the direction of deployment.

The BarrierGuard 800 requires anchoring at each end of the system. (Intermediate anchors can be added to reduce deflection.) The top Quickmount connection is secured with a retaining nut on all component connections and is secured on both the top and bottom when connected to an end terminal section (see pictures in Installation Procedure section). The following list outlines the tools and equipment necessary to deploy and install a BarrierGuard 800 system.

Installation Tools Required:

- Tractor Trailer unit with crane capable of lifting and removing 40 ft. [12m] BarrierGuard 800 sections from the trailer.
- Ladder for safe access of the load.
- Load Tested chains and hooks.
- Guide Ropes (tag lines) for guiding sections.

- 200 ft-lb. [270 N-m] Torque Wrench for Anchors.
- 1.5 in. [40mm] Socket for Torque Wrench
- 6mm Allen Wrench for removing/installing access covers
- Hammer Drill with 1.125 in. [30mm] drill bit or Diamond Core Drill with 1.125 in. [30mm] drill bit if possibility of encountering rebar.
- Angle Grinder with cut-off wheel.
- Generator / Power Supply for drill and angle grinder
- Large and Small pry bars
- Tape Measure
- 24mm Wrench and Socket / Ratchet set for adjusting 20 ft. [6m] sections (if necessary)
- Magnetic Deep Socket for Quickmount retaining nut
- Compressed air for blowing drilled holes clean prior to anchoring.

Installation Procedure:

NOTE: This procedure is for a typical "single direction" installation that starts with a Male End Terminal Section and moves with the direction of traffic (downstream).

STEP 1. – Position the End Terminal Section

Position the first Male End Terminal Section, BG12EM (Figure 11). Use the recommendations in the "Design Guide" portion of this manual to determine the starting location of the End Section.

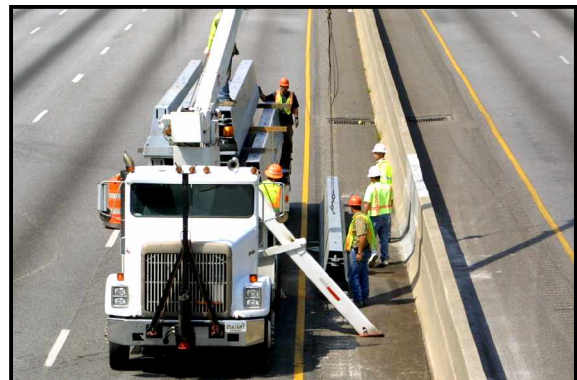


Figure 11. Carefully Position the first Male Terminal End Section

INSTALLATION AND DEPLOYMENT

STEP 2. – Connect The Mid Sections

NOTE: If you are installing a low deflection system, refer to page 9 for connecting intermediate anchors to the underside of the system at 6m intervals.

2A. Unload and connect the second section. (BG12MS or BG06MS or angle).

IMPORTANT NOTE: The middle sections may be shipped with the bottom retaining bolt pre-installed in the bottom hole of the female end. The two sections will not connect properly with the bolt pre-installed. If the bottom retaining bolt is installed, it **MUST** be removed before installing the section.

Using the crane, position the female end of the second barrier section over the male section of the end section and lower (Figure 12). The two sections should fit “flush” on the top and sides when properly connected. Do not remove lifting chains.

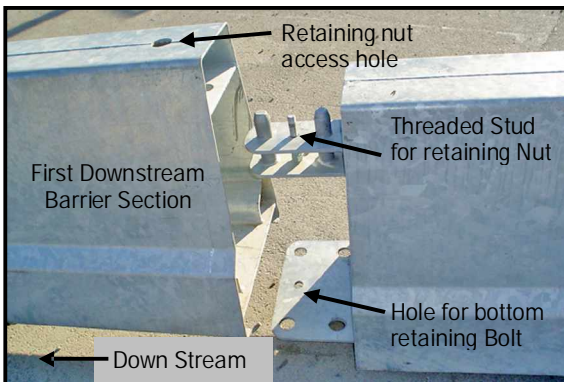


Figure 12. Lower the holes in the female end over the pins and retaining bolt on the End Section.

2B. Using the Deep Socket (preferably magnetic), place the retaining nut through the access hole onto the threaded stud on top of the male section. Tighten the nut using a ratchet or “T” handle wrench as shown. (Figure 13).

NOTE: Uneven road conditions may make it difficult to get the proper alignment of the two sections. If needed, shim under one or both of the sections to attain a “flush fit” before installing the top retaining nut.



Figure 13. Tighten the retaining nut on top of the threaded stud

2C. With the lifting chains still attached, raise the second section a few inches off of the ground. The retaining nut and male pins will lift the end terminal section also. Place an appropriate sized wooden block underneath the end section to provide access for the installation of the bottom retaining bolt.

SAFETY WARNING: To prevent injury, do not rely on the lifting chain to support the weight of the sections while installing the bottom retaining bolt. Do not access the under-side of the barrier without the placement of blocks capable of supporting the weight of both sections.



Figure 14. Block under the Male End Terminal Section to support both sections.

INSTALLATION AND DEPLOYMENT

2D. Reach underneath the sections to install the Lower Retaining Bolt that was removed from the bottom of the second section earlier. Drop the bolt through the holes located in the lower plate of the second section and the End section (See Figure 15). Install the nut on the bolt and tighten with a wrench to secure the lower portions of the two sections. (Figure 16).

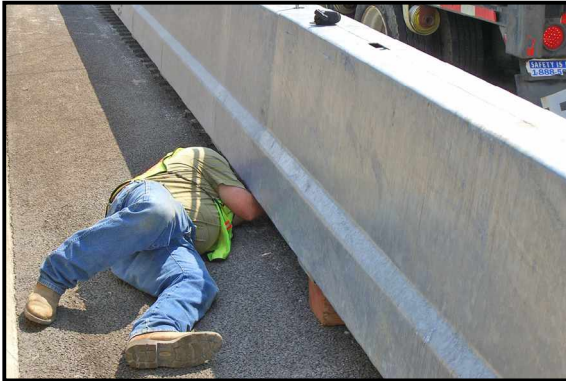


Figure 15. Reach under the "securely supported" sections to install the Lower Retaining Bolt.



Figure 16. Tighten the nut of the lower retaining bolt under the end terminal section at the bottom of the Quickmount.

2E. Lower the sections to the ground. The top and sides of the joined sections should be flush or close to it. (The maximum allowable gap at the joint at the top of the two sections should be no more than 0.5 in. [13mm])

2F. Complete the barrier deployment by connecting additional sections, one at a time, to the anchored end section. Attach sections of straight 40 ft. [12m], 20 ft. [6m] and/or angled sections to create the desired system layout using the Quickmount connections (Figure 13). Install the Top Retaining nut only on the mid section Quickmount connections. It is not

necessary to install the Lower Retainer Bolt to mid sections if they are not connected to end terminal sections.

2G. Unload and position the last End Terminal Section, (BG12EF). Using the crane, position the female end of the end section over the male section of the last standard section and lower. Do not remove lifting chains.

2H. Place retaining nut on top Quickmount (see Figure 13).

5I. Raise the end section a few inches off of the ground. The retaining nut should also lift the last standard section slightly.

2J. Block the End section (Figure 14) to support the weight of the two sections. Install the Lower Retaining Bolt on the lower Quickmount plates using the supplied hardware (Figure 17). After the Lower Retaining Bolt is installed, lower the sections to the proper end terminal position of the barrier.

2K. With the BarrierGuard 800 system fully deployed and the end section properly positioned and connected to the last mid section, anchor the end section to the foundation. Follow the same steps outlined earlier to anchor the first terminal end section.

INSTALLATION AND DEPLOYMENT

STEP 3. - Anchor the End Sections

NOTE: If you are installing a low deflection system with intermediate anchors, follow the same procedures outlined below for 6-meter anchors. Refer to page 9 for anchor installation instructions.

The End Terminal Section and the second section should now be properly connected with the top retaining nut and the bottom retaining bolt installed. Before anchoring the End section to the foundation, insure that the sections are positioned correctly. You can now anchor the end section to the foundation.

3A. Drill the anchor bolt holes into the foundation through the 4 (smaller) holes located inside the base plate of the End Terminal Section (Figure 17).

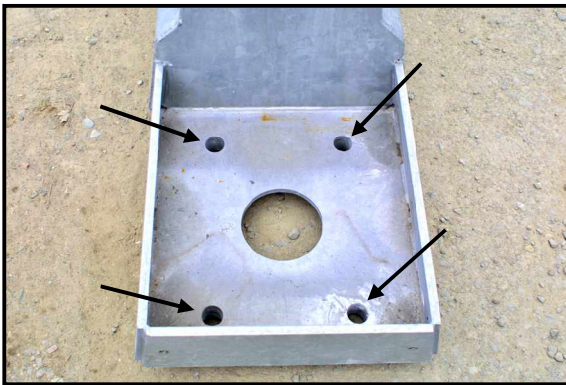


Figure 17. End Terminal anchor hole locations (concrete and asphalt).



Figure 18. Drill the anchor bolt holes through the 4 holes in the end section.

Asphaltic concrete foundations require minimum of 16 in. [400mm] bolt embedment and PC concrete foundations require minimum of 6 in. [150mm] bolt embedment. Drill 1.125 in. [30mm] holes (unless otherwise directed by

anchoring compound manufacturer). If anchoring to a soil foundation, refer to the soil anchor specification in the Appendix, Page 32.

IMPORTANT NOTE. The size and depth of the anchor bolt holes is determined by the type of foundation the system is being installed on and the anchoring specifications of anchor manufacturer. Refer to Table 1 and the Appendix (Page 32.) for anchor bolt hole size and depth.

3B. Drill another 4 holes through the 6-meter anchor plate located on the sides of the barrier, 20 ft. [6m] from the end (Figure 19 - 20). Asphaltic concrete foundations require minimum of 16 in. [400mm] bolt embedment and PC concrete foundations require minimum of 6 in. [150mm] bolt embedment. Drill 1.25 in. [30mm] holes (unless otherwise directed by anchoring compound manufacturer). If anchoring to a soil foundation, refer to the soil anchor specification in table 1 or the Appendix (Page 32).



Figure 19. 6-meter anchor hole locations (concrete or Asphalt)

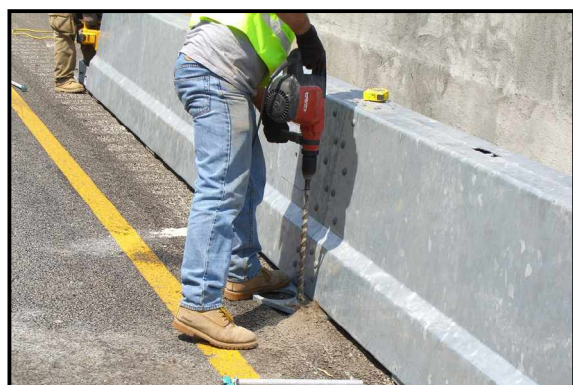


Figure 20. Drill through the holes in the 6-meter anchor

INSTALLATION AND DEPLOYMENT

3c. Set the Anchors with the recommended epoxy. If anchoring into Asphaltic Concrete use a 1 in. [25mm] diameter by 18 in. [460mm] long threaded rod (16 in. [460mm], rod embedment). If anchoring into PC Concrete use 1 in. [25mm] diameter by 9 in. [230mm] long threaded rod (6 in. [155mm] rod embedment).

Torque the nuts on the anchors after the anchoring compound is adequately set (reference manufactures literature for time/strength information).

- If using PC Concrete anchors, torque nuts to 200 ft-lbs. [300 N-m].
- If using Asphaltic Concrete anchors, torque nuts to 5 ft-lbs. [8 N-m].

IMPORTANT - Only the first standard Mid Sections after or before the End Sections require the installation of Lower retaining Bolts.



Figure 21. Slide the cover over the End Terminal. Attach the cover with the eight bolts around the base of the cover (both sides and end).

Step 4. Installing Barrier End Protection

The ends of the barrier must be protected to prevent vehicle impacts with the blunt ends. BSI provides three (3) methods to protect the ends of the system.

4a End Terminal Cover.

The End Terminal Cover is suitable for the "down stream" end of a system that does not have exposure to on-coming traffic. *Crash cushions should be installed on both ends of systems located between bi-directional traffic.*

To install the cover, slide the End Terminal Cover over the End Terminal. Attach the cover with the eight (8) bolts located around the bottom of the cover (figure 21).

4b. Universal TAU-II Crash Cushion

Crash cushions are suitable for the "up stream" end of a system that has direct exposure to on-coming traffic. *Crash cushions should be installed on both ends of systems located between bi-directional traffic.*

Install the Universal TAU-II, redirective, non-gating crash cushion when it is desirable for post impact vehicle trajectories to remain on the impact side. See page 9 of this manual or call BSI customer service for the complete Universal TAU-II installation manual.

4b. ABSORB 350 Crash Cushion

Crash cushions are suitable for the "up stream" end of a system that has direct exposure to on-coming traffic. *Crash cushions should be installed on both ends of systems located between bi-directional traffic.*

Install the ABSORB 350, non-redirective, gating crash cushion where post impact vehicle trajectory is acceptable behind the barrier. See page 10. of this manual or call BSI customer service for the complete Universal TAU-II installation manual.

Installing T-Top for Minimum Deflection System

Refer to page 9 for T-Top installation instructions.

	Concrete*	Asphalt*	Soil*
Anchor Diameter	1 in.	1 in.	5.75 in.
Embedment Depth	8 in.	16 in.	32 in.
Drill Diameter	1.125 in.	1.125 in.	Driven
** Alternate Anchor Specifications			
Pull Out Capacity	17,500 lbs.	n/a	n/a
Shear Capacity	25,000 lbs.	n/a	n/a

* Foundation Requirements as specified in BSI Drawing A050801 (See Appendix)
 ** Alternate anchors may be used if they meet the strength requirements listed.

Table 1. Anchoring Requirements

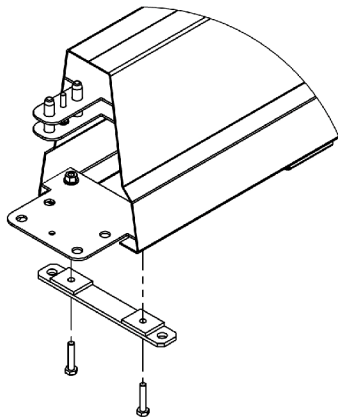
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INSTALL MINIMUM DEFLECTION SYSTEM (MDS)

Minimum Deflection System (MDS) Installation Instructions

1a. Install quick connect intermediate anchors

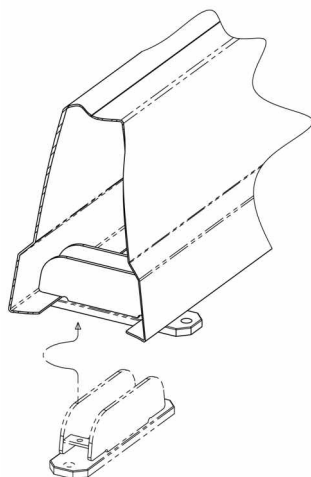
Before BG800 sections are deployed to the ground, the quick connect intermediate anchors must be attached at each quick connect point (between end anchored terminals).



Quick connect intermediate anchor installation

1b. Install mid section intermediate anchors

Mid section intermediate anchors must be installed within 6 in of the center feet. To install, place the anchor under the barrier section and twist 90 degrees until anchor holes are visible and perpendicular with the system.

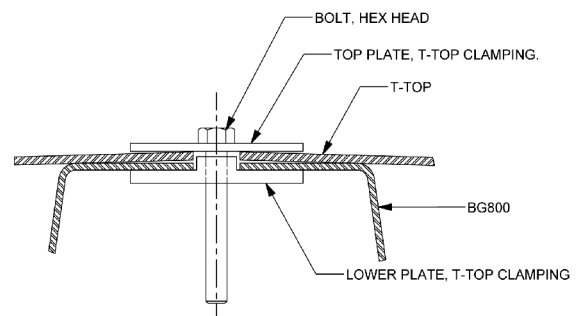


Mid section intermediate anchor installation

2. Install T-Top

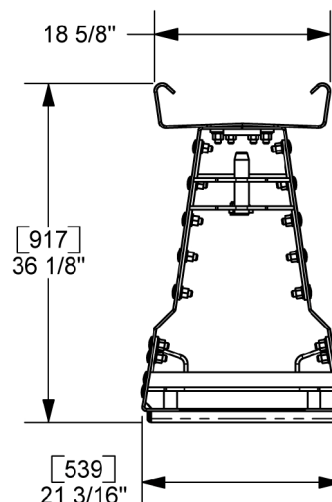
The T-Top is to be installed after the BG800 has been fully assembled and anchored in place. A T-Top is required when BG800 sections are used in conjunction with intermediate anchoring, gate sections, and/or variable length barriers. The T-Top should extend 39' (12m) on either side of these conditions and be terminated with a transition section.

Attach the T-Top using supplied hardware as shown in the figure below.



T-Top hardware attachment

Splice each 6m section using the splice bracket and supplied hardware. Transition the ends of the T-Top with a T-Top transition panel (tapered end section).



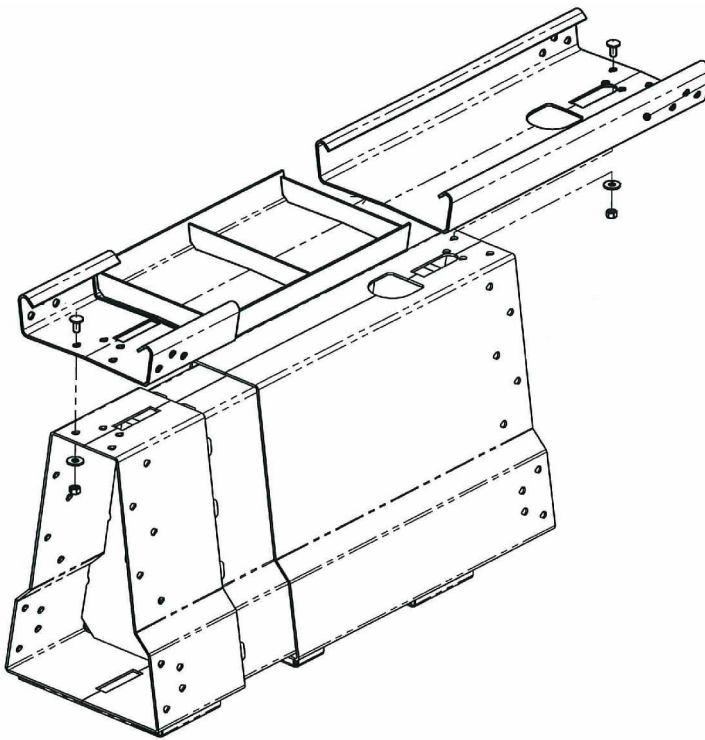
T-Top cross section / dimensions

INSTALL VARIABLE LENGTH BARRIER SECTION

VLB Installation Instructions

A BG800 Variable Length Barrier (BGVLB) should be used when the BG800 system is anchored across an expansion joint to allow clear movement across the joint. The T-Top section should be used for 12m on either side of the VLB and terminated with a transition section.

The BGVLB installs in the BG800 system using quick connects and is deployed as any other BG800 standard section. Each BGVLB provides approximately 7 in (+/-) of travel. Link multiple BGVLBs together to provide the required expansion. The BGVLBs should be placed in the vicinity of the expansion joint.



BGVLB with T-Top

INSTALL UNIVERSAL TAU-II®

Universal TAU-II® Attachment to Barrier Guard 800

Installation Guide

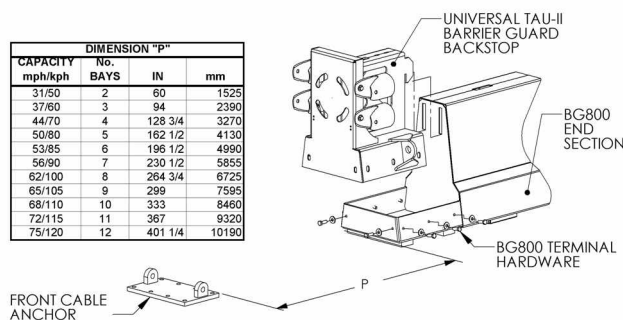
Refer to the Universal TAU-II Installation and Maintenance Manual (IMM) for more information, introduction, system overview, required tools, and other considerations for the Universal TAU-II systems. The Universal TAU-II system is installed after the Barrier Guard 800 is fully deployed, installed, and anchored.

The Universal TAU-II system utilizes a monolithic backstop that bolts directly in place of the terminal cover of the Barrier Guard 800. The front cable anchor remains as the only foundation anchorage required for the Universal TAU-II system. The front cable anchor is to be anchored to the same foundation type as the end of the Barrier Guard 800 that it is attached to (PC Concrete or Asphaltic Concrete). Anchorage shall be in accordance with BSI specifications A040113.

Installation Procedure: *Each Procedure references a page number from the Universal TAU-II Installation Manual for further information -*

- 1.) Remove terminal cover from Barrier Guard 800 end section (if in place).
- 2.) Install and fasten Universal TAU-II BG800 Backstop in place. See below.
- 3.) Locate and position Front Cable anchor (see below). Drill and secure the appropriate anchors for the foundation used per BSI specification A040113. Use the Front Cable anchor as the drilling template. Use a BSI approved anchoring compound. See IMM pages 12 & 13.

- 4.) Place the Middle Bulkheads along the centerline of the system spaced approximately 34" [865mm] apart. See IMM page 13.
- 5.) Thread the guide Cables through the legs of the Middle Bulkheads, threaded end first, starting from the front of the system. Loosely place the threaded end into the backstop lugs and spin the nut on to hold it in place. IMM pages 13 & 14.
- 6.) Pin the guide Cables to the Front Cable Anchor with the shackles. See IMM page 14.
- 7.) Install Cable Guides. See IMM pages 14 & 15.
- 8.) Attach Pipe Panel Mounts. See IMM page 15.
- 9.) Install the End Panels and first Slider Panels starting at the Pipe Panel Mounts. If a transition is to be installed the End Panel will be replaced by the Angled End Panel. See page IMM 16 & 72.
- 10.) Install Slider Panels. Start from the back of the system and move forward, overlapping the rearward panel. Secure the panels in place with the Slider Bolts. See IMM pages 16 & 17.
- 11.) Install the Front Support, attach the Slider Panels, Nose Cover, and Leg Supports and connect to the first Middle Support with Slider Bolts. See IMM page 18.
- 12.) Torque Slider Bolts and Front Panel Bolts and install Energy Absorbing Cartridges. See IMM page 19.
- 13.) Apply tension to cables – Torque to specification. Ensure foundation anchors are properly cured. See IMM page 20.



INSTALL ABSORB 350®

ABSORB 350® Attachment to Barrier Guard 800

Installation Guide

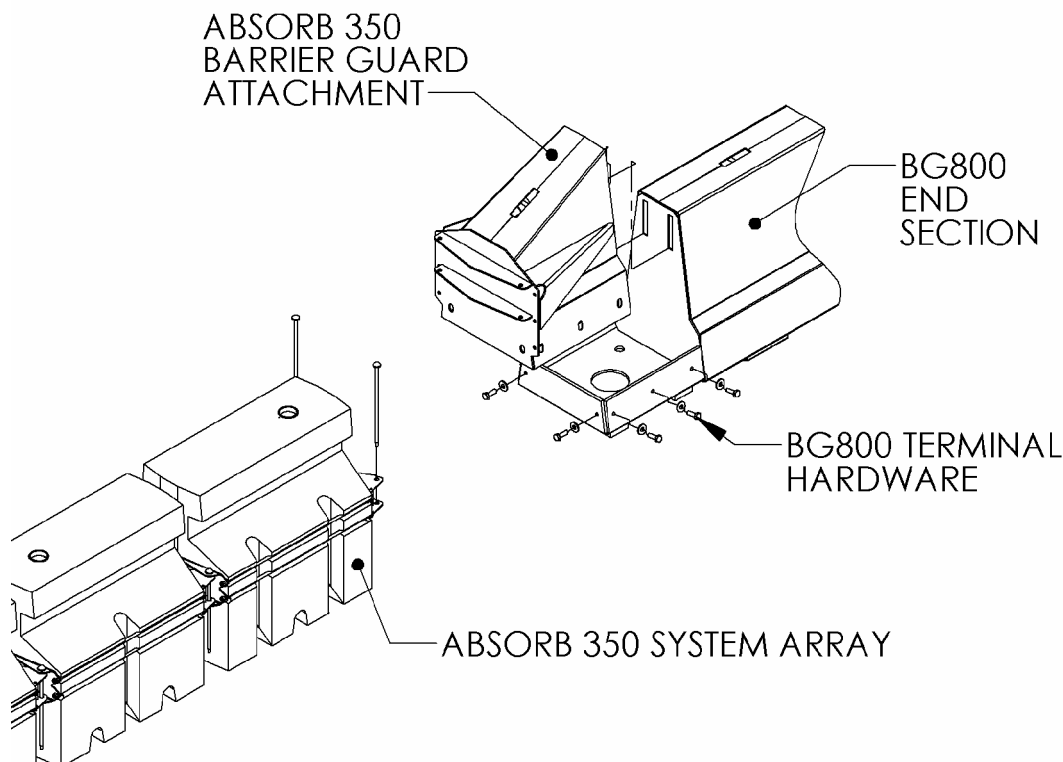
Refer to the ABSORB 350 Installation and Maintenance Manual (IMM) for more information, introduction, system overview, required tools, and other considerations for the ABSORB 350 systems.

The ABSORB 350 system is installed after the Barrier Guard 800 is fully deployed, installed, and anchored. Reference the Barrier Guard 800 Design, Installation, and Maintenance Manual for complete information on the Barrier Guard 800 barrier system implementation and installation.

The ABSORB 350 system utilizes a monolithic backstop attachment that bolts directly in place of the terminal cover of the Barrier Guard 800. The ABSORB elements connect directly to this attachment and require no anchorage to the foundation.

Installation Procedure:

1. Remove terminal cover from Barrier Guard 800 end terminal section (if in place).
2. Install and fasten ABSORB 350 BGPSB backstop attachment in place. See below.
3. Install Energy Absorbing Elements according to specified system and installation instructions on pages 11 through 24 of the ABSORB 350 Installation and Maintenance Manual.



Introduction

The BarrierGuard 800™ has been developed as a rapidly deployable longitudinal Temporary Steel Safety Barrier for use at construction work zones or any other application where a vehicle restraint system conforming to NCHRP Report 350 TL-1, TL-2, TL-3 or TL-4 is required or EN-1317 Containment Level T1, T2, T3, N1, N2, H1 or H2 is required.

BarrierGuard 800™ has been tested in accordance with NCHRP Report 350 and EN-1317 parts 1 and 2 and has successfully demonstrated its capability to achieve the containment and performance Levels stated above.

BarrierGuard 800™ is a longitudinal barrier system anchored to the ground at the ends of each run through specially designed terminal sections. Terminal sections may be capped or may be treated with an ABSORB 350® or Universal TAU-II® crash cushion. 6 or 12 meter sections are pre-assembled with male and female QuickMount connectors at the ends. The section connection is achieved by simply lining up the barrier and locking the QuickMount connectors together. Pre-Assembled angled sections provide tapers for radius applications.

System Specifications

- Approved to NCHRP Test Level-4
- Length of Need is total length of installed barrier minus 40 ft. [12 m]
- Minimum Length of BarrierGuard 800 is approximately 100 ft. [30 m]
- Unlimited Permissible Length
- Maximum Allowable Cross Slope is 6 degrees
- Minimum Radius of 12 ft. [3.65 meters]
- Deflections can be reduced with the installation of intermediate anchors.
- Zero deflection can be obtained for TL-3 with an adapter kit and multiple intermediate anchors.
- Approximate deflection (End anchoring only)
 - TL-1: 15 in. [375 mm]
 - TL-2: 29 in. [735 mm]
 - TL-3: 59 in. [1500 mm]
 - TL-4: 79 in. [2000 mm]

Component Specifications

- Barrier Profile: Base Width 21 in. [540mm], Top Width 9 in. [235mm], Height 31 in. [800mm]
- Barrier Weight Per Unit Length: 60 lb/ft [90 kg/m]
- Standard Section Length: 20 ft. [6 m] and 40 ft. [12 m]
- Standard Section Weight: 20 ft. [6 m]- 1190 lbs. [540 kg] and 40 ft [12 m]- 2380 lbs. [1080 kg]
- Angled Section Length and Weight: 2 ft. [0.6 m], 120 lbs. [55 kg]

Deployment Specifications

- (1) Truck Load on 40 ft. Flat Bed Trailer - (15) 12 meter Sections = 600 ft. [183 m]
- (15) 12 meter Sections Weight: 36,000 lbs. [16330 kg]
- Deployment Rate with (2) Workers, (1) Crane Operator: 1000 ft/hr [305 m/hr]
- Typically deployed from one end and set with direction of traffic. Long runs may start somewhere in the middle and be deployed outward toward the ends simultaneously using special middle barrier.

VERY IMPORTANT!

Considerations for Designing a BarrierGuard 800 system

Design Considerations

When planning the job it is essential that the following is established and agreed with the client:

- The start, finish and alignment of the BarrierGuard 800;
- Any curvature of the BarrierGuard 800 in both the horizontal and vertical plain;
- The type of road surface and the method of anchorage;
- Any expansion joints are identified;

- In the case of concrete pavements, if reinforcement is encountered when drilling that this can be drilled through;
- The method of reinstatement of drilled holes when the BarrierGuard 800 is removed;
- That there are no underground services, waterproof membranes etc. that could be damaged by drilling;
- That there are no overhead cables that could be contacted by the crane or BarrierGuard 800; and
- That there is adequate working room and safety zone.

Determine Which Components Are Needed
(See Next Page)

Determine Radius and Components:

In many cases it will be necessary for the barrier to follow a curve in the road. There are a variety of options for building the barrier by combining the straight sections and angle sections depending on the curve radius. These are described below followed by a table of curvatures that can be achieved and methods of estimating the curvature.

To find the radius of the curve, measure a straight-line distance between two points on the curve (C) and measure the maximum distance from this straight line to the curve (H) and use formula.

$$\text{Radius} = R = \frac{C^2 + 4H^2}{8H}$$

TO FIND RADIUS OF CURVE

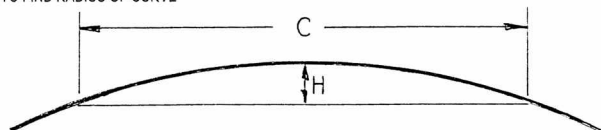


Figure 11. Use this formula to calculate the Radius.

There are several methods for achieving radius sections of BarrierGuard 800. The movement in the Quickmount, adjustable 6 meter sections and short angled sections allow a radius as low as 12 ft [3.65 m]. The Quickmount attachment of the standard 20 ft. [6m] and 40 ft. [12m] meter segments are free to rotate approximately 1.25 degrees which will afford a large radius. Using shorter segments (20 ft. [6m] sections)

will allow shorter radiuses. The 20 ft. [6m] sections are also adjustable 5 degrees left, right, up, or down at their midpoint. Angled sections of 5 or 10 degrees configured with the standard sections should provide for any radius desired. The chart on the next page can be used to plot configurations for obtaining a desired radius.

The chart on the following page is designed to help determine the most accurate and cost effective configurations of BarrierGuard 800 components to create a desired radius. Each curve represents the resulting radius by using a turning section with standard barrier segments at different intervals.

For example, if a 1600 ft. radius is required, there are four options which result in radiuses in the vicinity:

1. Place a 5 degree turning segment (BG05AR or BG05AL) every seven standard 20 ft. [6m] sections (BG06MS).
2. Place a 10 degree turning segment (BG10AR or BG10AL) every seven standard 40 ft. [12m] sections (BG12MS).
3. Place a 20 ft. [6m] section adjusted to 5 degrees every six standard 20 ft. [6m] sections (BG06MS).
4. Place a 20 ft. [6m] section adjusted to 5 degrees every three standard 40 ft. [12m] sections (BG12MS).

These options should be compared for cost efficiency. An additional turning segment may be required to account for configurations which are not exactly the radius required.

Installing on Tapers:

A 1.25 degree taper can be installed without using angled sections. Larger tapers can be achieved by inserting a turn section. Turn sections include adjustable 20 ft. [6m] sections

and the 5 and 10 degree angled sections. The table below shows the lateral offset achieved per length of barrier using the different angled tapers.

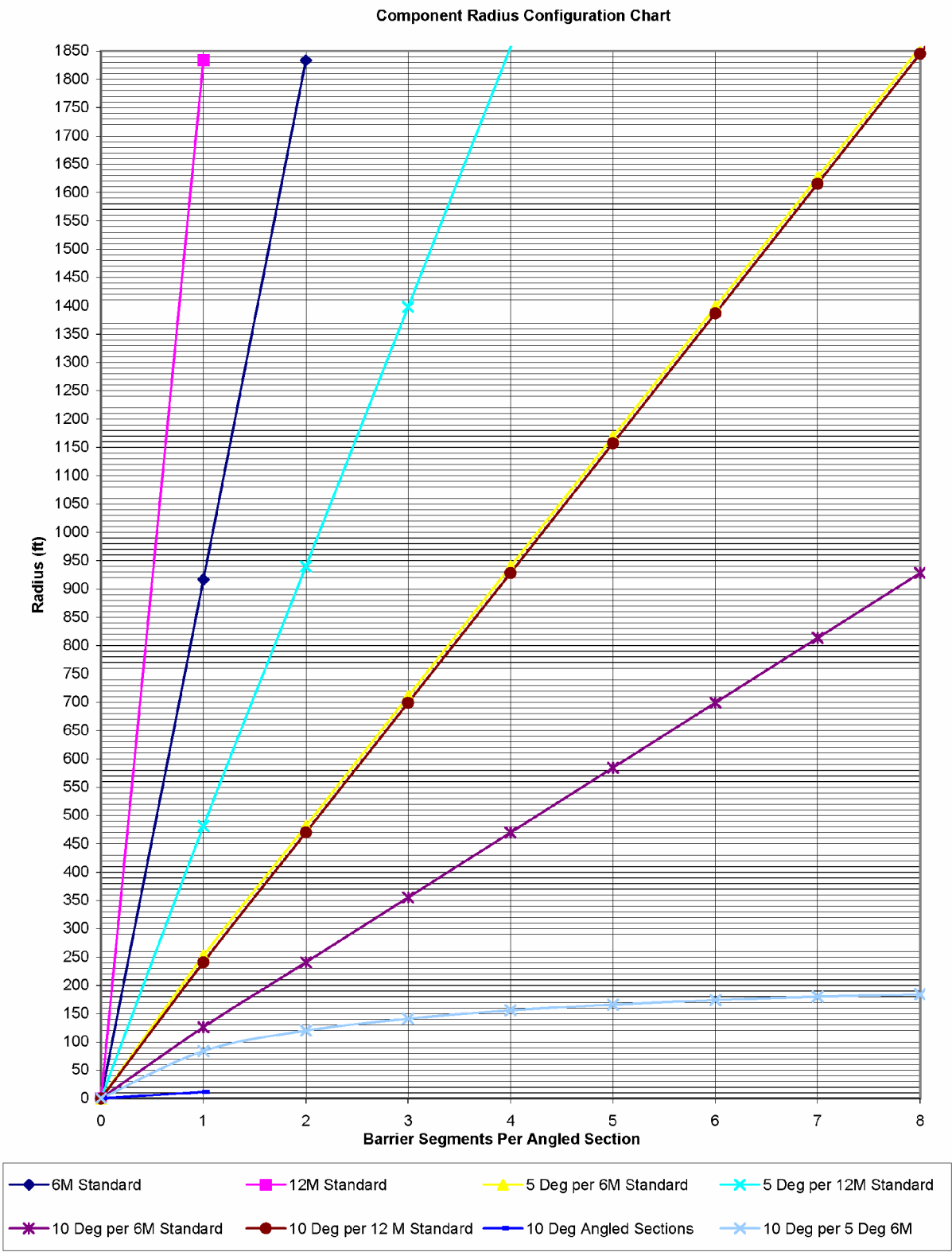
Taper Lateral Distance Per Barrier Length ft-in
[mm]

	6 Meter Section (BG06MS)	12 Meter Section (BG12MS)
1.25 Degree	0'-6" [130]	0'-11" [265]
5 Degree	1'-9" [530]	3'-6" [1060]
10 Degree	3'-6" [1060]	7'-0" [2120]

Table 1. Lateral distance table.

Grade Changes and Adjusting 6 Meter Sections:

Where the barrier needs to curve in the vertical plane, a limited amount of adjustment can be achieved at the bolted joints. Standard 20 ft. [6m] sections, (BG06MS) are fitted with slotted connecting plates which allow up to 5 degrees of adjustment in both vertical and horizontal planes. To achieve this, remove the cover by the bolted joint and slacken all the bolts. Position the section as needed to fit the contour of the road. Tighten the bolts after adjustment has been achieved. (See Appendix Pg. 19)



TROUBLESHOOTING / REMOVAL / REPAIR

Troubleshooting the Quickmount Joining of the BarrierGuard 800 sections:

The BarrierGuard 800 should be suspended from the crane with the female end approximately 4" [100mm] above the male end. The female end is then lowered over the male end of the BarrierGuard 800 already in place and the Quickmounts connected leaving all faces of the BarrierGuard 800 flush with each other. The maximum allowable tolerance at the joints is 0.5 in. [13mm].

If this cannot be achieved, first check along the length of BarrierGuard 800 for alignment and adjust for horizontal alignment if necessary. If the ground is uneven and the male end is low, lift the male end of the installed BarrierGuard 800 and place plywood spacers under the foot at the male end. If the BarrierGuard 800 still won't sit flush, unhook the leg of the chain nearest the joint being made, bring the other chain leg vertical and lift and lower on this leg. The last option is to lift the last installed section of BarrierGuard 800, place a timber bearer under the male end and lower the BarrierGuard 800 onto this timber bearer. Then lower the next section of BarrierGuard 800 into place and connect. Once the connection is made and the joint is flush, (within 0.5 in. [13mm]) raise the second to last section and remove the timber bearer. If these methods do not work the barrier may be damaged and should not be used.

Removal Procedure:

This is a reversal of the installation procedure.

Any anchorage that cannot be removed will have to be cut off using an angle grinder and driven into the foundation to a safe depth with a jack hammer to prevent damage to equipment if the roadway is ever ground before resurfacing. Always have an angle grinder and a generator available when removing BarrierGuard 800. Reinstating the pavement from holes left by the removal or driving of the pins should be done in accordance with state and local standards and specifications for repairing roadways.

To separate the barrier sections, lift with the chain legs at equal length. This will tend to lift the connected end first. If the section of barrier being removed lifts the next section, place a 2 in. [50mm] thick block under the foot of the section being removed next to the joint to be separated and lower the barrier. It will then separate.

Repair and Maintenance:

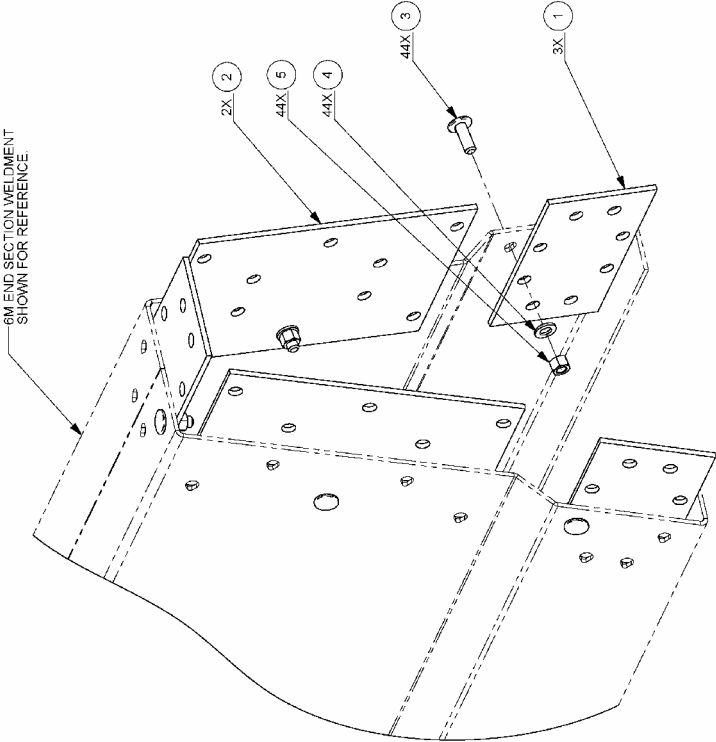
Following an impact it may be necessary to replace damaged sections. It may also be found that sections on either side of the impacted length have been stretched at the bolted joint. It is then necessary to remove these sections, inspect for damaged bolts and reassemble with the joint closed or it will be found impossible to replace the barrier sections due to the extra length caused by stretching.

If the sections requiring attention are within 600 ft [180 m] of the end of the barrier in the direction laid, it may be easier to remove sections from the end.

If the damage is further from the end, the barrier will have to be split at the downstream end of the section to be removed by unbolting the jointing plates from two joints 40 ft. [12 m] apart. The bolts can be accessed through the hatch by the joint and undone.

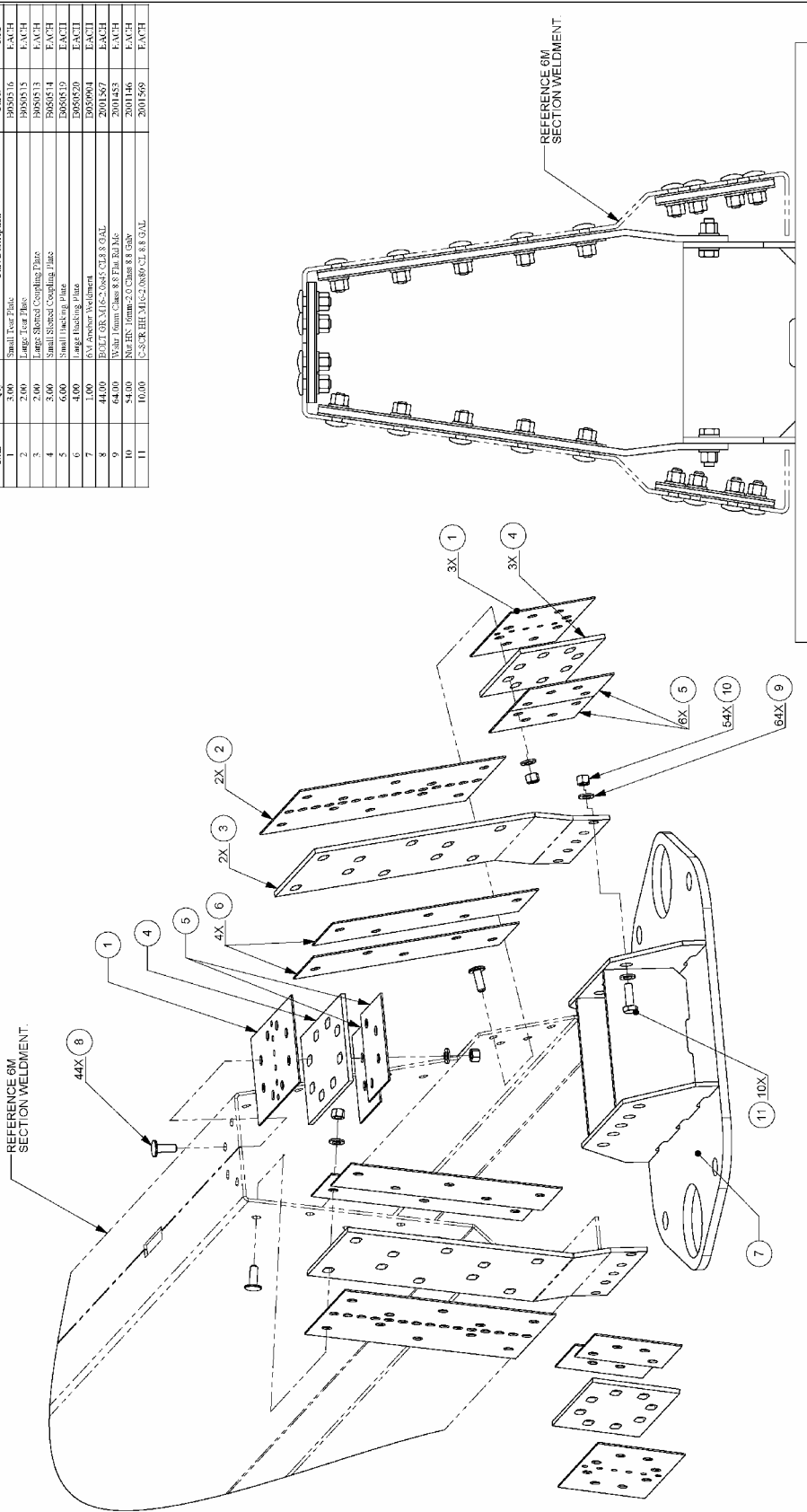
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<div> <div>Standard Tolerance</div> <div>Angular $\pm 1/2$</div> <div>Fractional $\pm 1/16$</div> <div>Dec .XXX = $\pm .010$</div> <div>Dec .XX = $\pm .030$</div> </div>						
<div> <div>TITLE: BARRIER GUARD 800</div> <div>ANCHORING FOUNDATION</div> <div>SPECIFICATIONS</div> </div>						
MODEL		DRAWING NUMBER		REV.		
		A050801				

Item	Qty	Part Description	Part#	UOM
1	3.00	Large Coupling Plate	B050412	EACH
2	2.00	Large Coupling Plate	B050411	EACH
3	44.00	BOLT GR.M16-2.0x45 CLAR 3.0AL	2001567	EACH
4	44.00	Weldin 16mm Chan 8 R Flat Rd M6	2001453	EACH
5	44.00	Nut BS 16mm-2.0 Class 8.8 Galv	2001146	EACH

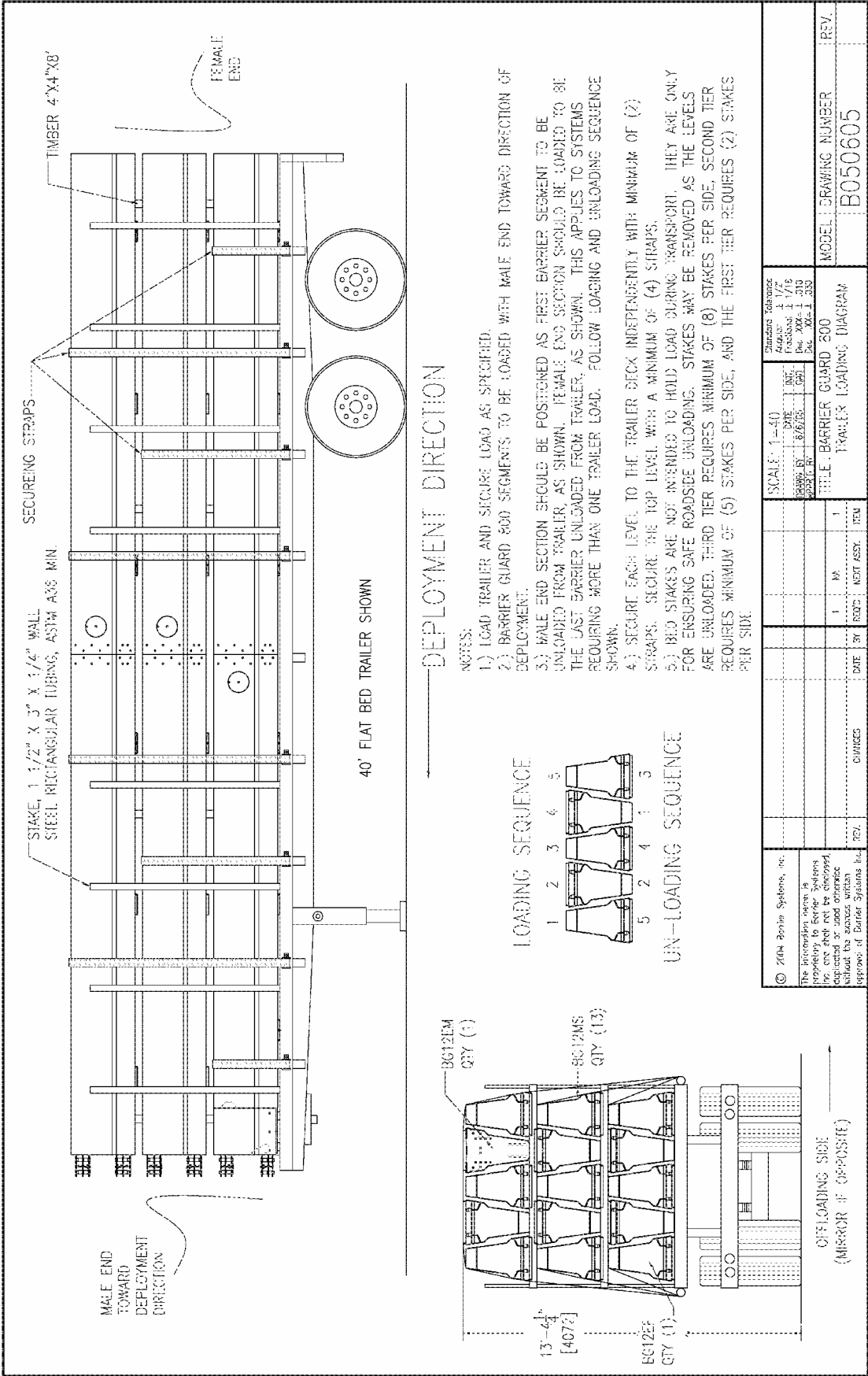


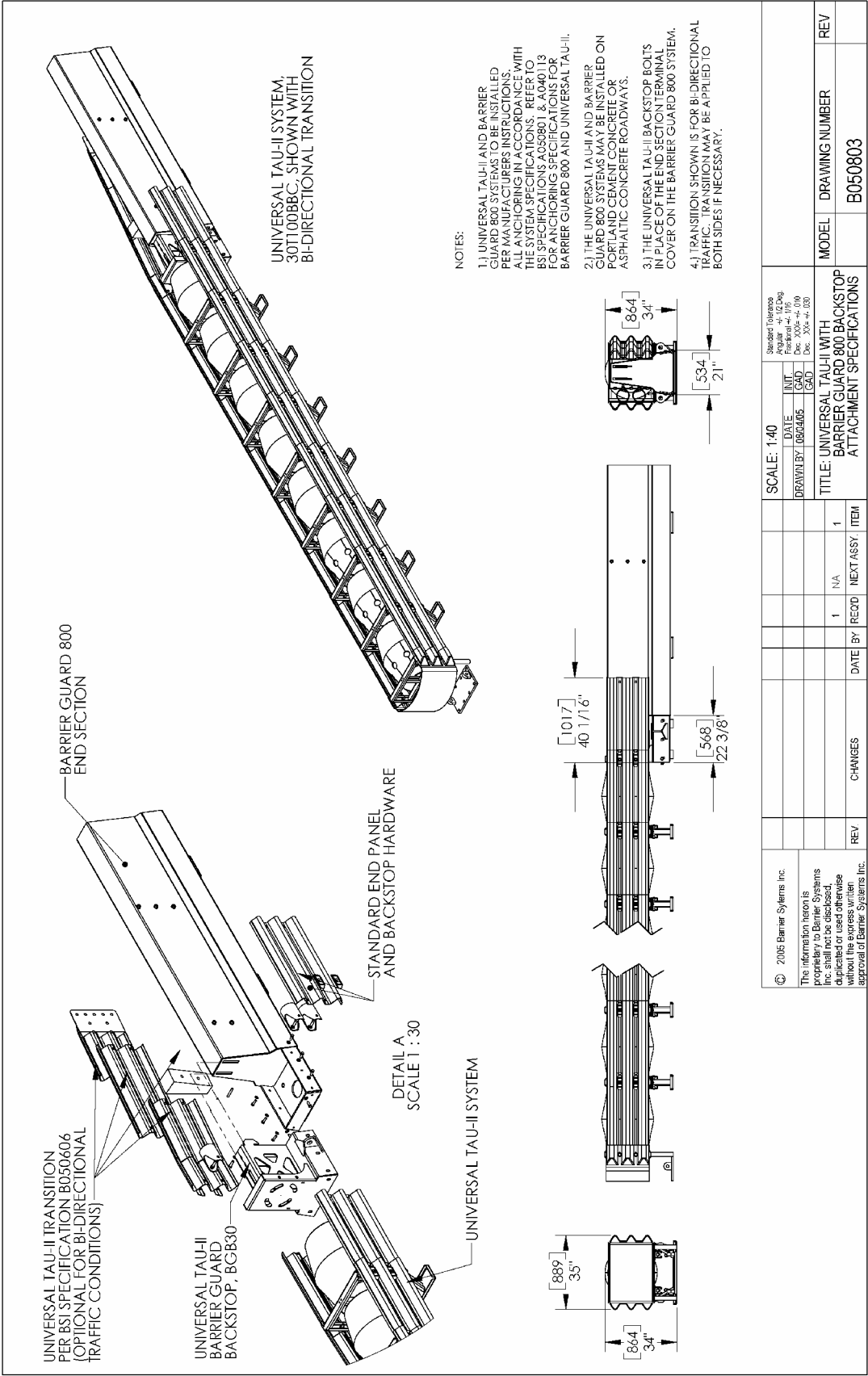
© 2006 Barrier Systems Inc. The information herein is proprietary to Barrier Systems Inc. shall not be disclosed, duplicated or used otherwise without the express written approval of Barrier Systems Inc.	NOTE: THICKNESS OF WELD TO BE EQUAL TO THE THINNER OF 2 PIECES BEING JOINED. WELD TO BE ALL AROUND UNLESS OTHERWISE SPECIFIED		SCALE: 1:6		Standard Tolerances Angular: +0.12 Deg Fractional: +0.1/16 Dec: .005-+0.001 Dec: .005-+0.001		BARRIER SYSTEMS INC. 180 RIVER RD, RIO VISTA, CA 94271 TEL: 707/374-8800 FAX: 707/374-5801		
	DRAWN BY: JMT APPROVED BY: AEM DATE: 07/20/06 TITLE: STANDARD SECTION COUPLING SET		1 BC12MF 1 BC12MM 1 BC12MF		1 BC12MF 1 BC12MM 1 BC12MF		SHEET 1 OF 1		
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REV		CHANGES		DATE					

Item	Qty	Part Description	Part#	Unit
1	3.00	Small Tear Piece	190515	EACH
2	2.00	Large Tear Piece	190515	EACH
3	2.00	Large Shear Coupling Plate	190514	EACH
4	3.00	Small Shear Coupling Plate	190514	EACH
5	6.00	Small Locking Plate	190519	EACH
6	4.00	Large Locking Plate	190519	EACH
7	1.00	AV Anchor Weldment	1905004	EACH
8	44.00	BEUT GR M16-2.0x85 CL2.8 GAL	2001367	EACH
9	64.00	Weld 1 Form Class 8.8 Flat Rd M6	2001453	EACH
10	54.00	Weld 2 Form 2.0 Class 8.8 Galv	2001446	EACH
11	10.00	C-SCR HE M16-2.0x80 CL2.8 GAL	2001569	EACH

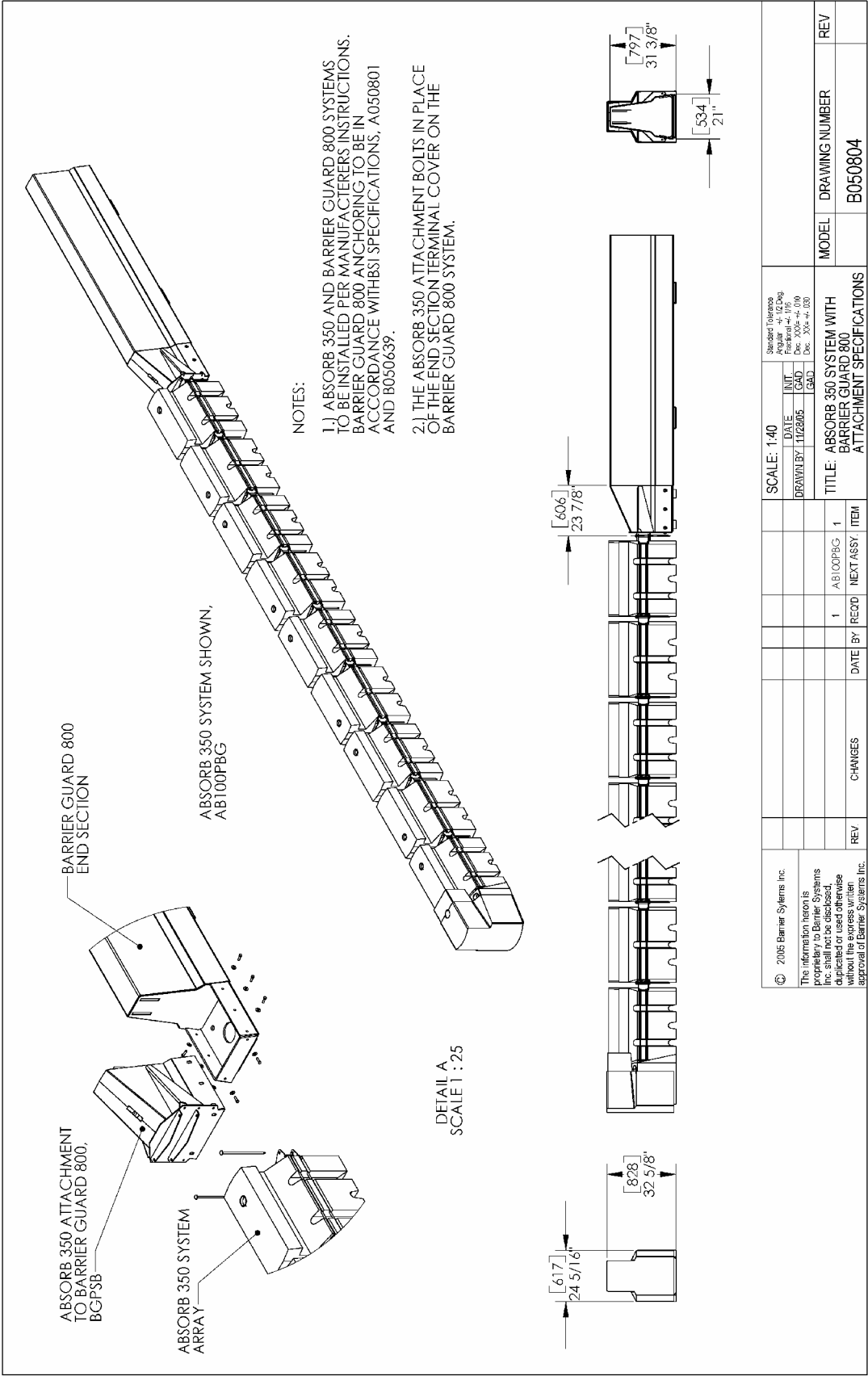


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		REV.						
		ITEM						

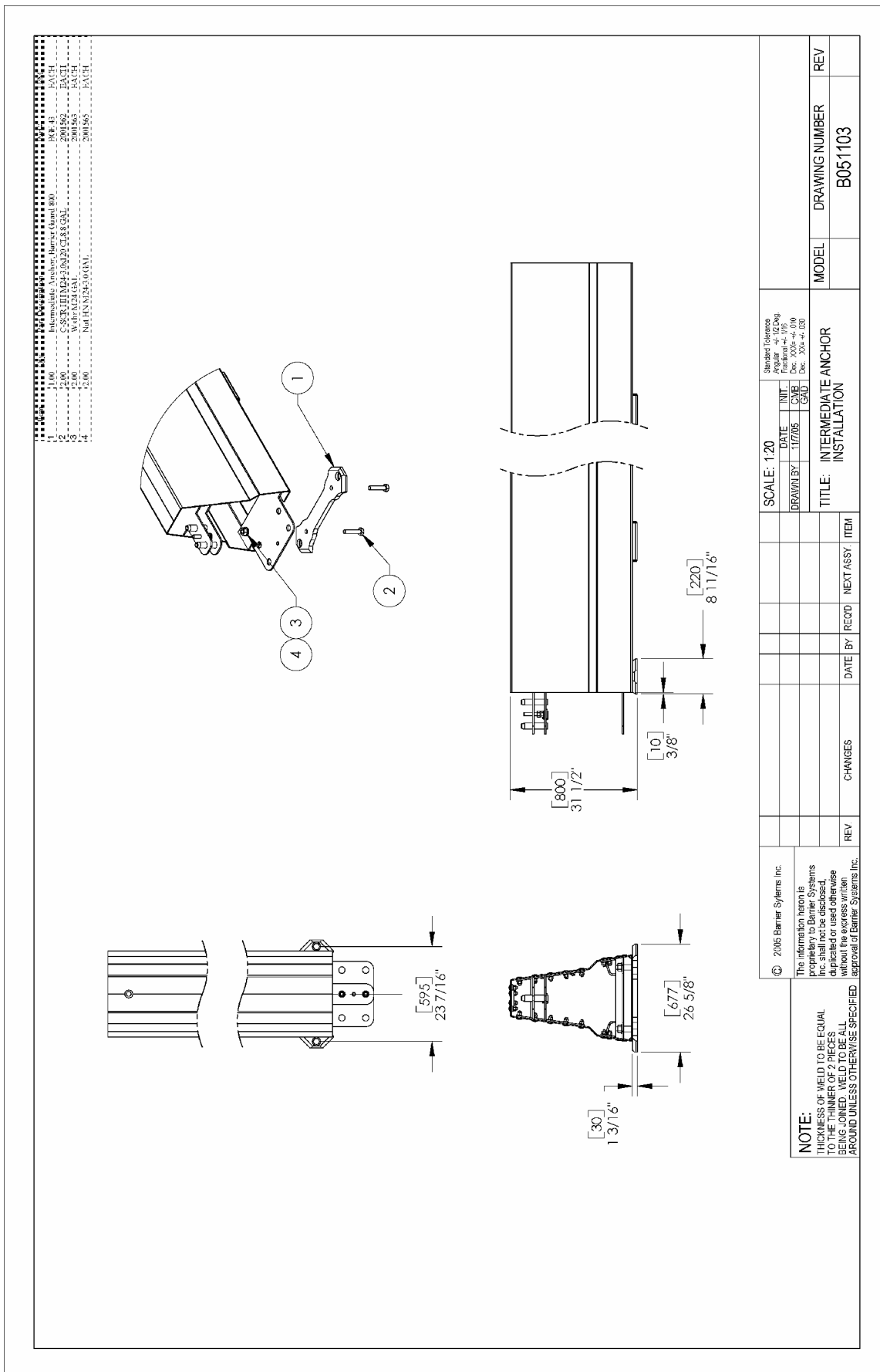


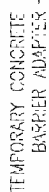


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					1	1



APPENDIX



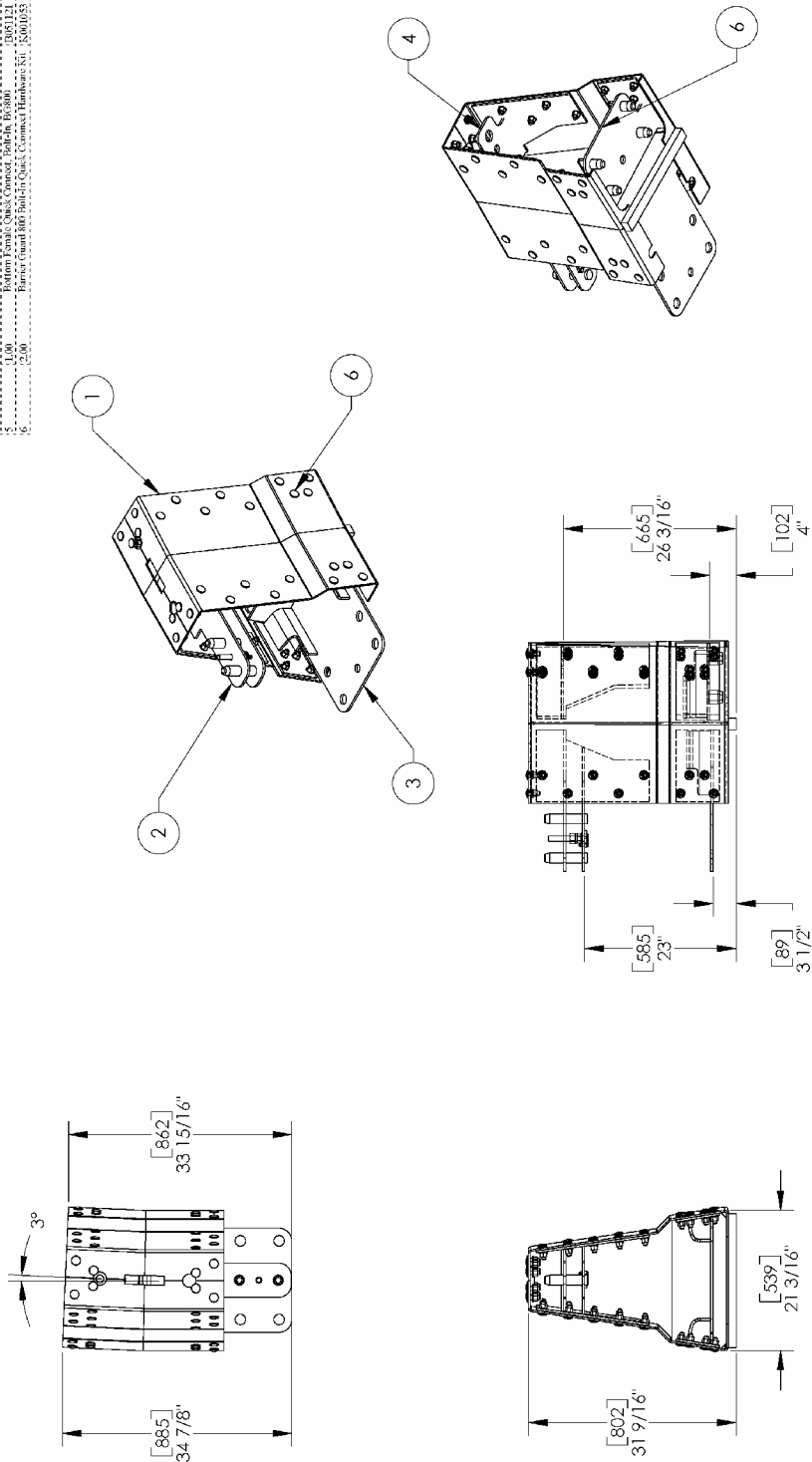


END TERMINAL COVER

- 1.) TO ATTACH BARRIER GUARD 800 TO TEMPORARY CONCRETE BARRIER, BOLT ADAPTER TO END TERMINAL COVER AS SHOWN, AND PIN IT TO CONCRETE BARRIER. BARRIER GUARD 800 SYSTEM IS TO BE ANCHORED IN ACCORDANCE WITH BSI SPECIFICATIONS B050639.
- 2.) LOCATE TEMPORARY CONCRETE BARRIER ADAPTER ACCORDING TO SPECIFIC CONCRETE BARRIER USED. ALIGNMENT IS NECESSARY BOTH VERTICALLY AND HORIZONTALLY. BARRIER GUARD 800 SYSTEM MAY NEED TO BE SHIFTED TO PREVENT POTENTIAL SNAGGING POINTS AS THE TWO BARRIER PROFILES ARE JOINED.
- 3.) ALL STEEL COMPONENTS ARE HOT DIPPED GALVANIZED PER ASTM A-123. ALL FASTENERS ARE TO BE GRADE 2 OR GREATER AND HOT DIPPED GALVANIZED.

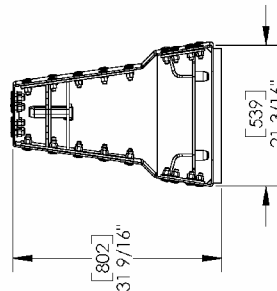
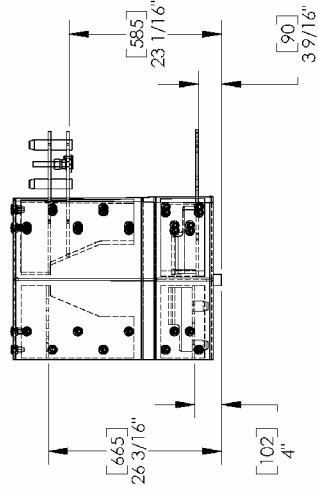
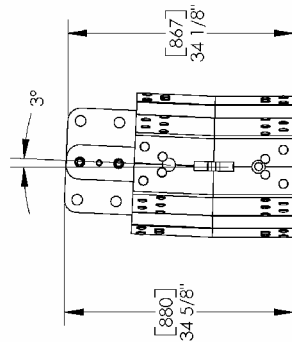
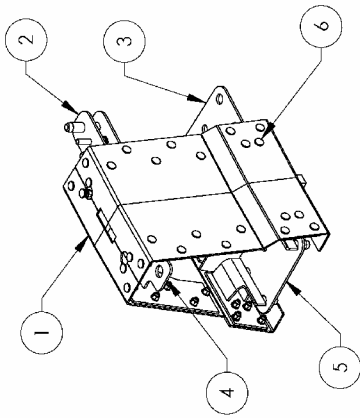
<p>③ 20th Century Systems, Inc.</p> <p>The information herein is proprietary to 20th Century Systems and may not be reproduced or used without the express written consent of 20th Century Systems, Inc.</p>	<p>CHANGES</p> <p>DATE: 10/28/2000</p> <p>BY: A.S.O.</p> <p>BY: J.F.A.</p>	<p>1</p> <p>1</p> <p>30'-25'</p> <p>30'-25'</p>	<p>SCALE: 1"=10'</p> <p>1/4"=1' 1/2"=3' 0"</p> <p>1/8"=1' 0"</p> <p>1/16"=1' 0"</p>	<p>Standard Reference Modulus of Elasticity = 4,115,000 Poisson's Ratio = 0.15 Unit Weight = 150 pcf</p>	<p>MODEL</p> <p>DRAWING NUMBER</p> <p>REV.</p>
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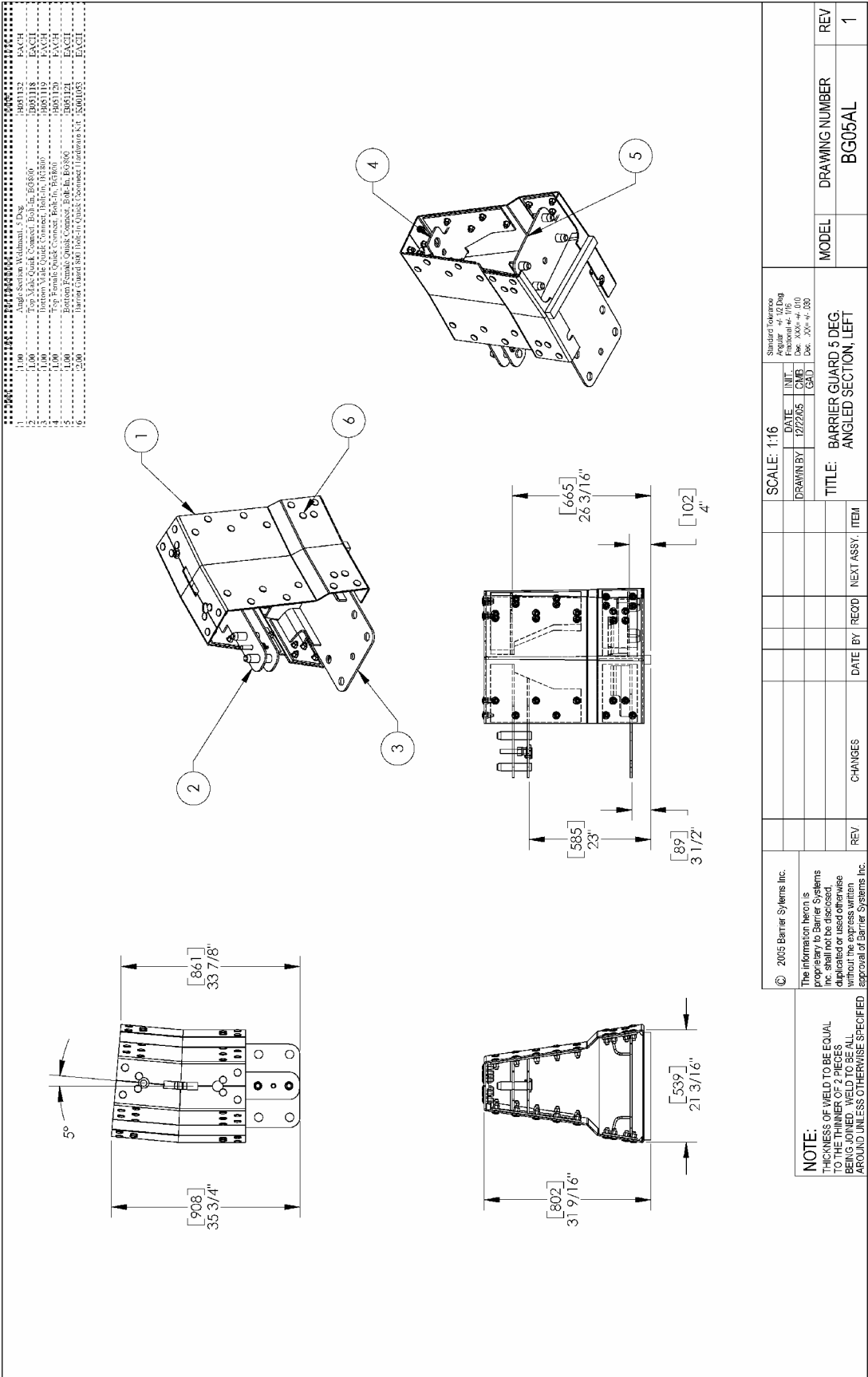
APPENDIX

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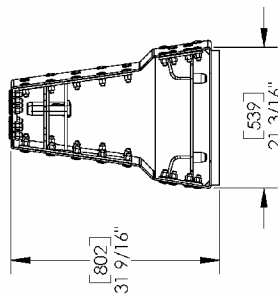
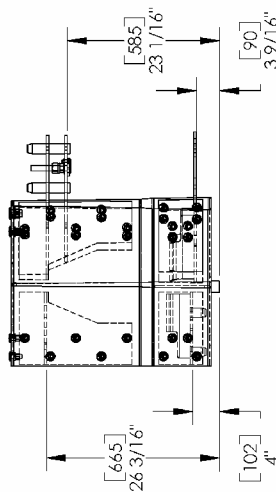
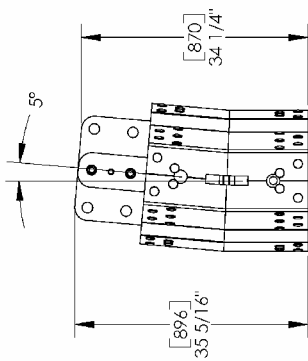
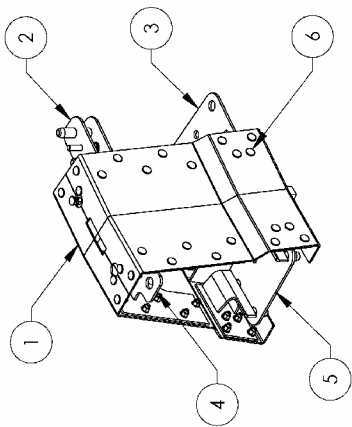
<div>© 2005 Barrier Systems Inc.</div> <div>The information herein is proprietary to Barrier Systems Inc. shall not be disclosed, duplicated or used otherwise without the express written permission of Barrier Systems Inc.</div>											Standard T-Membrane 200mil x 42' Roll Extruded 4+ 1/2' Deg Doe XXX-# 010 Soc. 508-# 355								
	SCALE: 1:16																		
<div>NOTE:</div> <div>THICKNESS OF WELD TO BE EQUAL TO THE THINNER OF 2 PIECES BEING JOINED. WELD TO BE ACCEPTED IF THE EXPRESS WRITTEN</div>	REV	CHANGES	DATE	BY	RECD	NEXT ASSY	ITEM	DRAWN BY				DATE		INT		CMB		GBA	
												12/22/05							
TITLE: BARRIER GUARD 2.5 DEG. ANGLED SECTION, LEFT												MODEL		DRAWING NUMBER		REV			
												BG03AL		1					

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5	2002-2003	96	96	2002-2003	96	96
6	2003-2004	95	95	2003-2004	95	95
7	2004-2005	94	94	2004-2005	94	94
8	2005-2006	93	93	2005-2006	93	93
9	2006-2007	92	92	2006-2007	92	92
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63	2060-2061	38	38	2060-2061	38	38
64	2061-2062	37	37	2061-2062	37	37
65	2062-2063	36	36	2062-2063	36	36
66	2063-2064	35	35	2063-2064	35	35
67	2064-2065	34	34	2064-2065	34	34
68	2065-2066	33	33	2065-2066	33	33
69	2066-2067	32	32	2066-2067	32	32
70	2067-2068	31	31	2067-2068	31	31
71	2068-2069	30	30	2068-2069	30	30
72	2069-2070	29	29	2069-2070	29	29
73	2070-2071	28	28	2070-2071	28	28
74	2071-2072	27	27	2071-2072	27	27
75	2072-2073	26	26	2072-2073	26	26
76	2073-2074	25	25	2073-2074	25	25
77	2074-2075	24	24	2074-2075	24	24
78	2075-2076	23	23	2075-2076	23	23
79	2076-2077	22	22	2076-2077	22	22
80	2077-2078	21	21	2077-2078	21	21
81	2078-2079	20	20	2078-2079	20	20
82	2079-2080	19	19	2079-2080	19	19
83	2080-2081	18	18	2080-2081	18	18
84	2081-2082	17	17	2081-2082	17	17
85	2082-2083	16	16	2082-2083	16	16
86	2083-2084	15	15	2083-2084	15	15
87	2084-2085	14	14	2084-2085	14	14
88	2085-2086	13	13	2085-2086	13	13
89	2086-2087	12	12	2086-2087	12	12
90	2087-2088	11	11	2087-2088	11	11
91	2088-2089	10	10	2088-2089	10	10
92	2089-2090	9	9	2089-2090	9	9
93	2090-2091	8	8	2090-2091	8	8
94	2091-2092	7	7	2091-2092	7	7
95	2092-2093	6	6	2092-2093	6	6
96	2093-2094	5	5	2093-2094	5	5
97	2094-2095	4	4	2094-2095	4	4
98	2095-2096	3	3	2095-2096	3	3
99	2096-2097	2	2	2096-2097	2	2
100	2097-2098	1	1	2097-2098	1	1

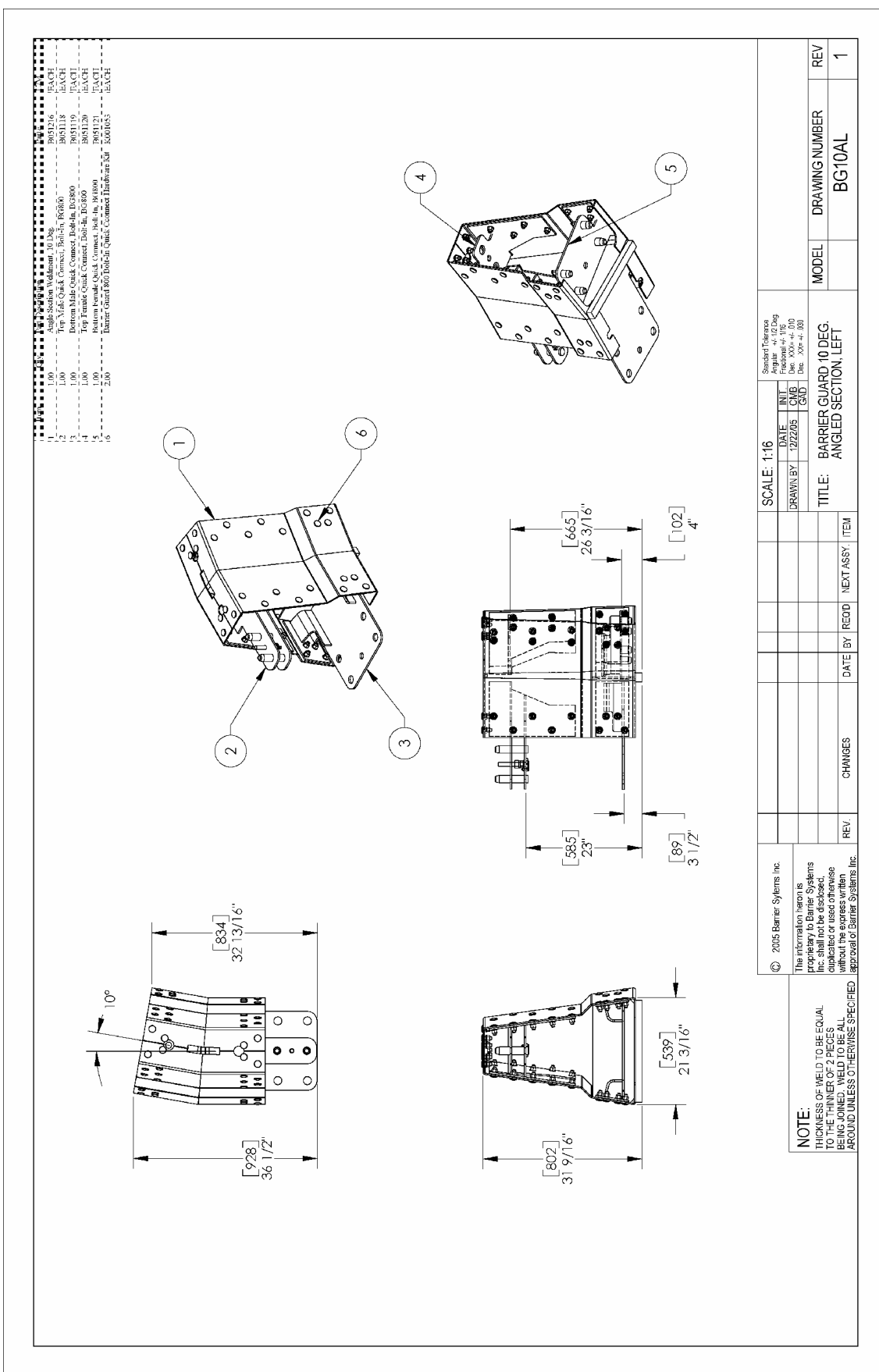
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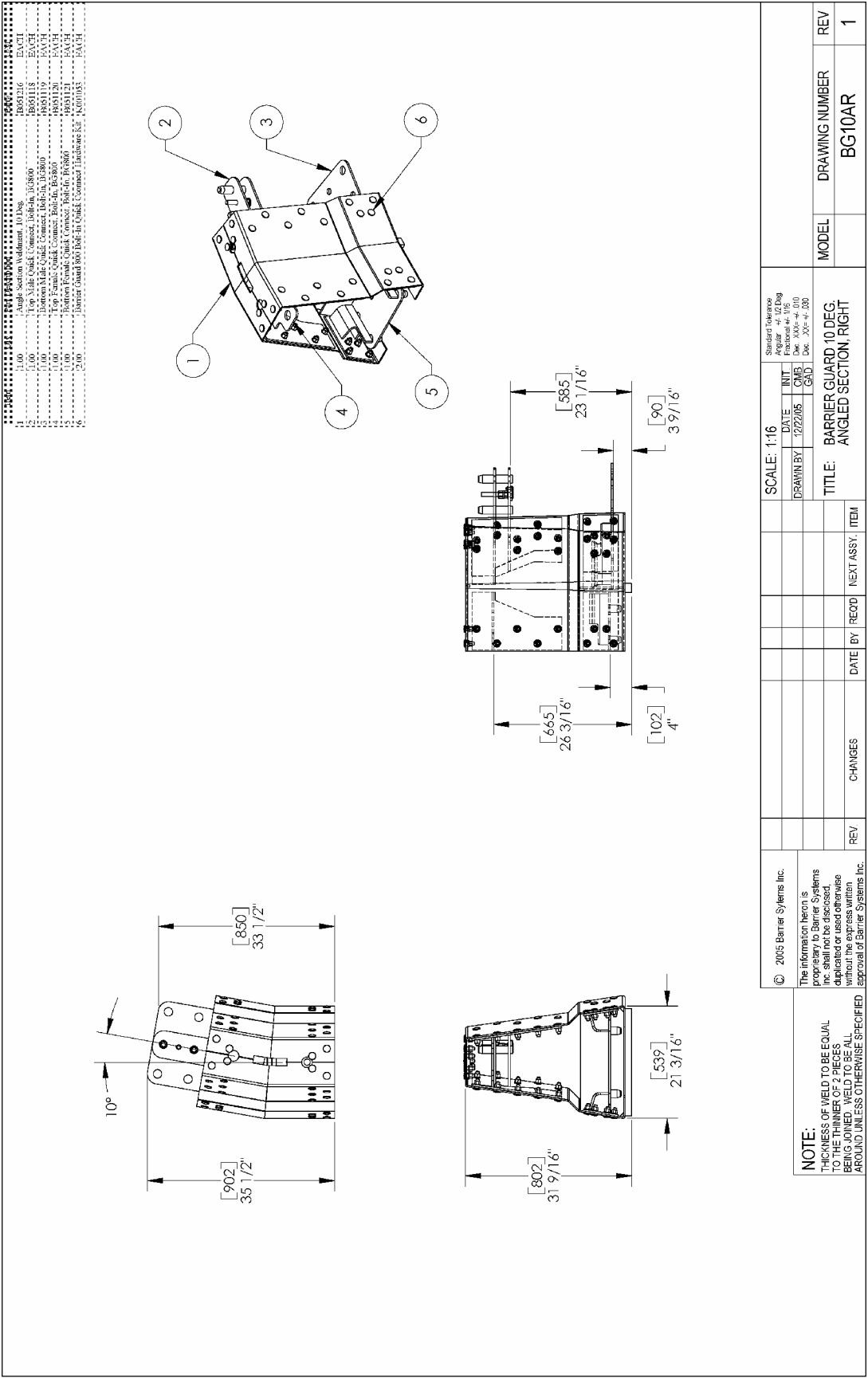


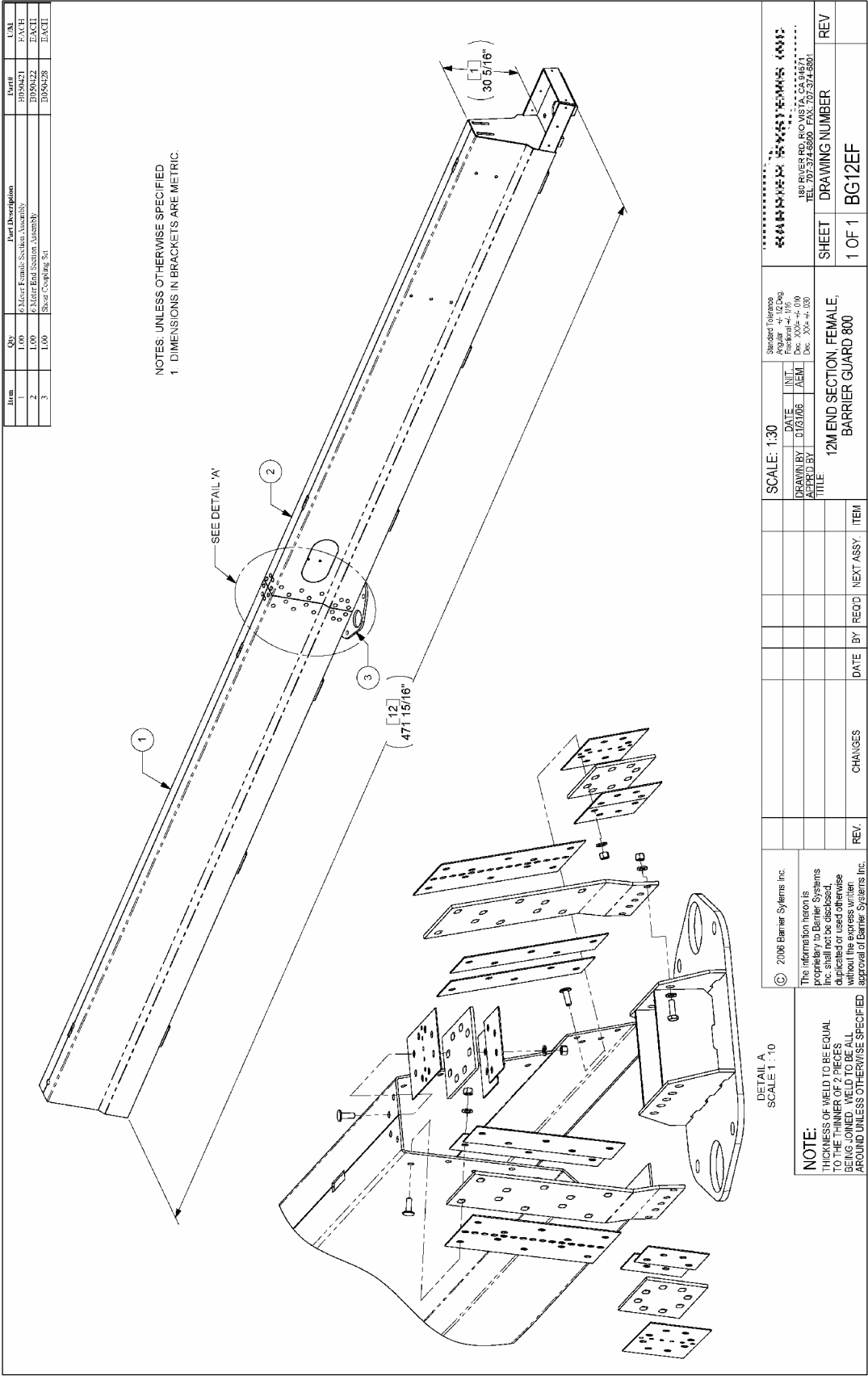
Rank	Year	Team	Score	Coach
1	1900	York Union Male Club, NYC	350/132	EACH
2	1900	Top Male Quail Club, Boston, MA	345/118	EACH
3	1900	Porton Male Quail Club, Boston, MA	345/119	EACH
4	1900	Top Female Quail Club, Boston, MA	345/129	EACH
5	1900	Lowell Female Quail Club, Lowell, MA	335/121	EACH
6	1900	Boston Grand 900 Club, Boston, MA	330/165	EACH

[illegible]

APPENDIX

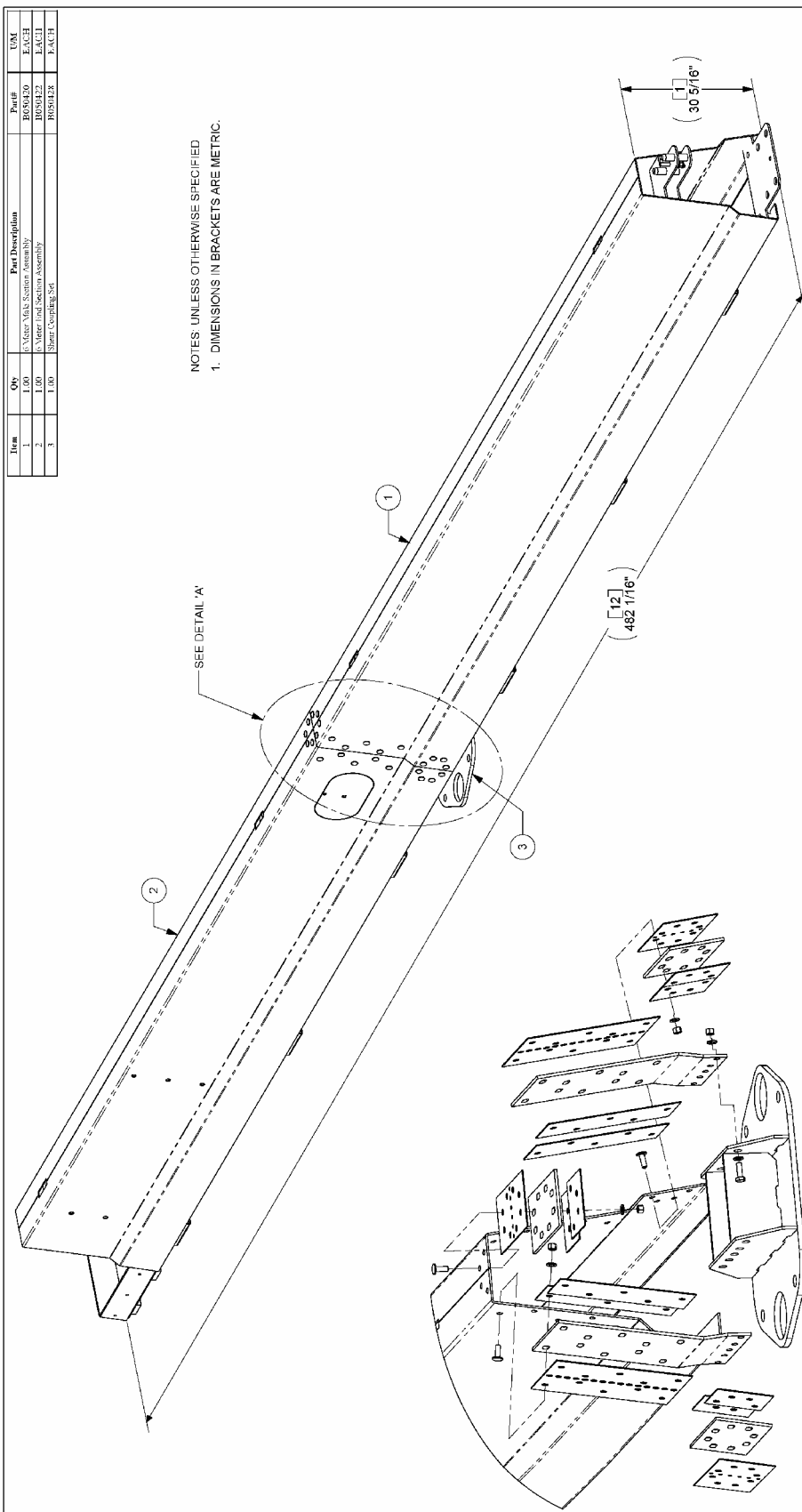






Item	Qty	Part Description	Part#	U/M
1	1.00	6 Meter Main Section Assembly	B050430	EACH
2	1.00	6 Meter End Section Assembly	B050422	EACH
3	1.00	Shear Coupling Set	B050428	EACH

NOTES: UNLESS OTHERWISE SPECIFIED
1. DIMENSIONS IN BRACKETS ARE METRIC.



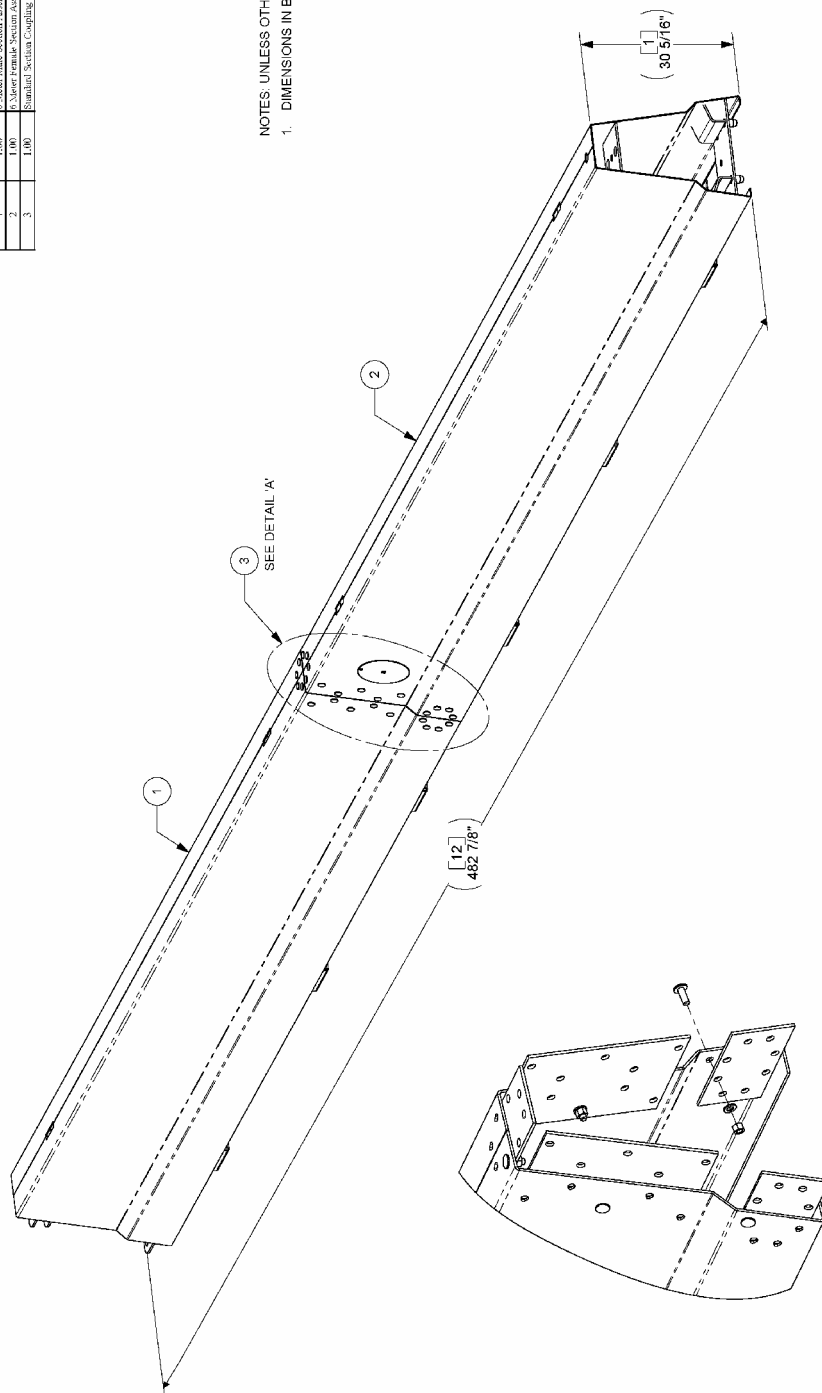
REV	CHANGES	DATE	BY	RECD	NEXT ASSY	ITEM
1 OF 1	BG12EM					
<p>Standard Tolerances Fractional: 1/16, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8 Dec: .005 - .01, .010 Dec: .005 - .020</p>						
<p>SCALE: 1:20</p>						
DRAWN BY		DATE	INT			
APPROVED BY		12/30/06	AEM			
<p>TITLE: 12M END SECTION, MALE BARRIER GUARD, 800</p>						
SHEET		DRAWING NUMBER		REV		
1 OF 1		BG12EM				
<p>***** 180 RIVER RD, RICHMOND, CA 94807 TEL 707-374-6500 FAX 707-374-6501</p>						

DETAIL A
SCALE 1 : 12

NOTE:
THICKNESS OF WELD TO BE EQUAL
TO THE THINNER OF 2 PIECES
BEING JOINED. WELD TO BE ALL
ROUND LINE FOR ATTACHMENT OF

Item	Qty	Part Description	Part#	U/M
1	1.00	6 Meter Male Section Assembly	B950420	EACH
2	1.00	6 Meter Female Section Assembly	B950421	EACH
3	1.00	Standard Section Coupling Set	B950427	EACH

NOTES: UNLESS OTHERWISE SPECIFIED
1. DIMENSIONS IN BRACKETS ARE METRIC.



DETAIL A
SCALE 1:10

© 2006 Banner Systems Inc. The information herein is proprietary to Banner Systems Inc. shall not be disclosed, duplicated or used otherwise without the express written permission of Banner Systems Inc.	REV.	CHANGES	DATE	BY	REC'D	NEXT ASSY.	ITEM
SCALE: 1:20							
DRAWN BY		DATE	INT.				
BY 0130006			AEM				
APPROVED BY							
TITLE		12M STANDARD SECTION BARRIER GUARD 800					
Standard Tolerances Fractions - 1/16" & 1/32" Dec. .0005 - .010 Holes - .0005 - .010 Dec. .0005 - .010		***** 1890 RIVER RD, RICHMOND, CA 94807 TEL 707-574-6600 FAX 707-574-6801					
***** *****							

NOTE: