



QUEST[®] CEN

CRASH CUSHIONS

PRODUCT DESCRIPTION ASSEMBLY MANUAL



QUEST® CEN

Product Description Assembly Manual



15601 Dallas Parkway
Suite 525
Addison, Texas 75001



Warning: The local highway authority, distributors, owners, contractors, lessors, and lessees are **RESPONSIBLE** for the assembly, maintenance, and repair of the QUEST® CEN. Failure to fulfill these **RESPONSIBILITIES** with respect to the assembly, maintenance, and repair of the QUEST® CEN could result in serious injury or death.



Important: These instructions are for standard assembly specified by the appropriate highway authority. In the event the specified system assembly, maintenance, or repair would result in a deviation from these assembly instructions, contact the appropriate highway authority engineer.

This manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Valtir directly at (888) 323-6374 or visit Valtir.com.

The instructions contained in this manual supersede all previous information and manuals. All information, illustrations, and specifications in this manual are based on the latest QUEST® CEN information available to Valtir at the time of printing. We reserve the right to make changes at any time. Please contact Valtir to confirm that you are referring to the most current instructions.

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Customer Service Contacts

Valtir is committed to the highest level of customer service. Feedback regarding the QUEST® CEN, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

Valtir

Telephone	+1 (214) 589-8140 (International)
Contact Link	Valtir.com/Contact

Important Introductory Notes

Proper assembly of the QUEST® CEN is critical to achieve performance that has been evaluated and accepted per EN 1317-3. These instructions should be read in their entirety and understood before assembling the QUEST® CEN. These instructions are to be used only in conjunction with the assembly of the QUEST® CEN and are for standard assemblies only as specified by the applicable highway authority. If you need additional information, or have questions about the QUEST® CEN, please contact the highway authority that has planned and specified this assembly and, if needed, contact Valtir Customer Service. This product must be assembled in the location specified by the appropriate highway authority. If there are deviations, alterations, or departures from the assembly instructions specified in this manual, the device may not perform as tested.



Important: **DO NOT** use any component part that has not been specifically specified herein for the QUEST® CEN (p. 8). Failure to follow this warning could result in serious injury or death in the event of a collision.




This product has been specified for use by the appropriate highway authority and has been provided to that user who has unique knowledge of how this system is to be assembled. No person should be permitted to assemble, maintain, or repair this system that does not possess the unique knowledge described above. These instructions are intended for an individual qualified to both read and accurately interpret them as written. These instructions are intended only for an individual experienced and skilled in the assembly of highway products that are specified and selected by the highway authority.



Warning: Do not assemble, maintain, or repair the QUEST® CEN until you have read this manual thoroughly and completely understand it. Ensure that all Danger, Warning, Caution, and Important statements within the manual are completely followed. Please call Valtir if you do not understand these instructions. Failure to follow this warning could result in serious injury or death in the event of a collision.

Safety Symbols




This section describes the safety symbols that appear in this manual. Read the manual for complete safety, assembly, operating, maintenance, repair, and service information.

<u>Symbol</u>	<u>Meaning</u>
	Safety Alert Symbol: Indicates Important, Caution, Warning, or Danger. Failure to read and follow the Important, Caution, Warning, or Danger indicators could result in serious injury or death to the workers and/or bystanders.
	Warning: Read safety instructions thoroughly and follow the assembly directions and suggested safe practices before assembling, maintaining, or repairing the QUEST® CEN. It is the responsibility of the installer to follow these warnings.
	Important: Please keep up-to-date instructions for later use and reference by anyone involved in the assembly of the product.

Safety Rules for Assembly

* Important Safety Instructions *

This manual must be kept in a location where it is readily available to persons who assemble, maintain, or repair the QUEST® CEN. Additional copies of this manual are available from Valtir by calling +1 (214) 589-8140 or visiting Valtir.com/contact. Please contact Valtir if you have any questions concerning the information in this manual or about the QUEST® CEN.

	Important: It is the responsibility of the installer to use appropriate safety precautions when operating power equipment, using chemicals, and when moving heavy equipment or QUEST® CEN components. Safety articles including but not necessarily limited to work gloves, eye/ear protection, safety-toe shoes, and back support should be used.
	Warning: It is the responsibility of the installer to use all safety measures incorporating appropriate traffic control devices specified by the highway authority. These measures must be used to protect all personnel while at the assembly, maintenance, or repair site. Contact the specifying highway authority immediately if you have any questions regarding a particular system assembly site.
	Warning: It is the responsibility of the installer to ensure the QUEST® CEN is not modified in any way. Failure to follow this warning could result in serious injury or death in the event of a collision.

Limitations and Warnings

The QUEST® CEN has been evaluated in accordance with European Standard EN 1317-3. The impact conditions tested are intended to represent a wide range of in-service impact conditions.

Impact conditions which differ from those described in European Standard EN 1317-3 may yield results different from those encountered in testing. In particular, impact conditions in excess of specified impact severity, or existence at the site of curbs or cross-slopes in excess of 8%, may yield impact performance which does not meet the evaluation criteria of European Standard EN 1317-3.

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

The QUEST® CEN is intended to be assembled, delineated, and maintained within specific state guidelines. It is important for the highway authority specifying the use of a highway product to select the most appropriate product configuration for its site specifications. The customer should be careful to properly select, assemble, and maintain the product. Site lay out, vehicle population type; speed, traffic direction, and visibility are important elements that require evaluation in the selection of a highway product. For example, curbs could cause an untested effect on an impacting vehicle.

After an impact occurs, the debris from the impact should be removed from the area immediately and the specified highway product should be evaluated and restored to its original specified condition or replaced as the highway authority determines as soon as possible.



Warning: Do not assemble, maintain, or repair the QUEST® CEN until you have read this manual thoroughly and completely understand it. Ensure that all Danger, Warning, Caution, and Important statements within the manual are completely followed. Please call Valtir if you have any questions (p.3).

Inspect Shipping

Before deploying the QUEST® CEN, check the received parts against the shipping list supplied with the system. Make sure all parts have been received.



Important: The Manufacturer's Drawing Package supplied with the QUEST® CEN take precedence over these general instructions and must be used for proper assembly.

System Overview

The QUEST® CEN is a potentially reusable, re-directive, non-gating crash cushion intended for hazards up to 610 mm (24") in width. The Steel Backup is designed to be placed against and nest around the hazard, resulting in a shorter overall assembly length. What constitutes a potentially reusable highway product should only be determined by a trained engineer experienced in highway products, directed by the appropriate highway authority.

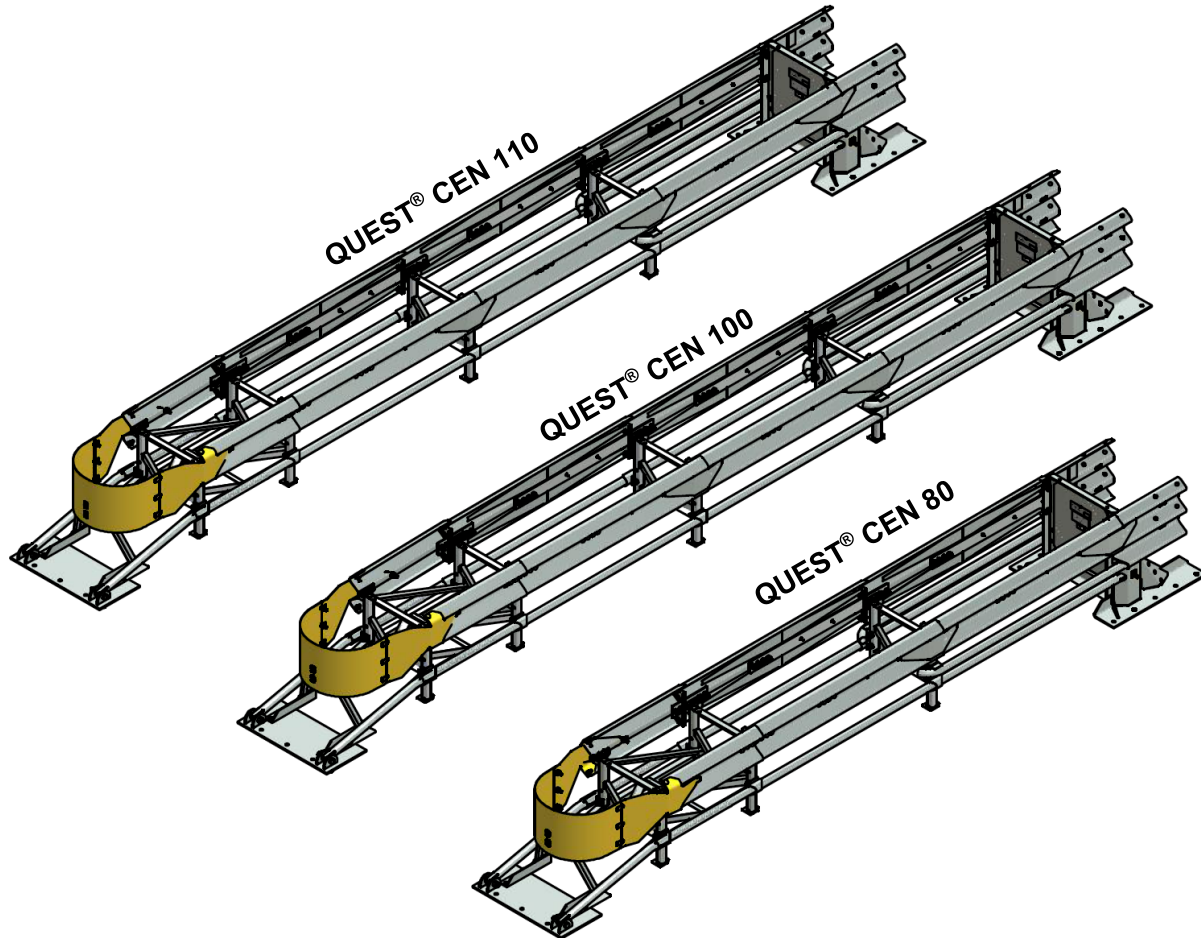


Figure 1 QUEST® CEN

System	Model No.	Performance Level (kph)
QUEST® CEN 110	613484B	110
QUEST® CEN 100	613483B	100
QUEST® CEN 80	613485B	80



Warning: Use only Valtir parts that are specified herein for the QUEST® CEN for assembling, maintaining, or repairing the QUEST® CEN. Do not utilize or otherwise comeingle parts from other systems even if those systems are other Valtir systems. Such configurations have not been tested, nor have they been accepted for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact with an UNACCEPTED system.

QUEST® CEN 110
Model No. TD110CEN610

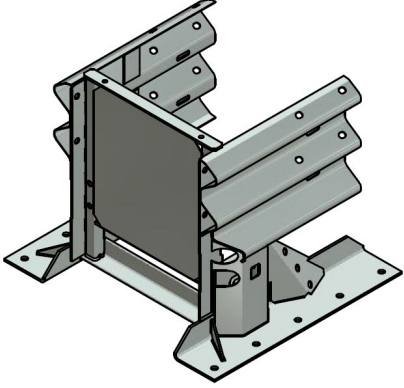
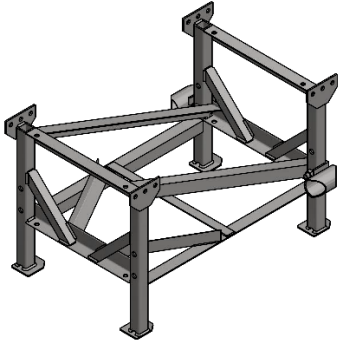


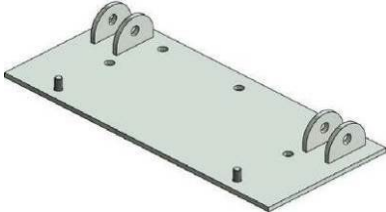
PARTS LIST TD110CEN610			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604647G	BACKUP,24,QUEST®,G	1
2	615467B	SUPPORT FRAME ASSY, QUEST®,DCM	1
3	614029G	SHAPER RAIL,L,QUEST® CEN,G	1
4	614035G	SHAPER RAIL,R,QUEST®,G	1
5	617605G	ANCHOR,FRONT,QUEST®,G	1
6	616230G	TRIGGER STRAP,QUEST®,G	2
7	616212B	TRIGGER ASSY,QUEST®,G,PT	1
8	611642G	NOSE TRANSITION,R,QUEST®,G,PT	1
9	611641G	NOSE TRANSITION,L,QUEST®,PT	1
10	611678G	NOSE,QUEST®,G,PT	1
11	607196B	DIAPHRAGM ASSY,QUEST® CEN	2
12	614042G	SHAPER,BACKUP,QUEST®,G	2
13	613662G	REAR RAIL,QUEST®,G	2
14	614733B	STRAP,PEEL,REAR,QUEST® CEN	2
15	614728B	STRAP,PEEL,BAY 2,QUEST® CEN	2
16	614732B	STRAP,PEEL,BAY 3,QUEST® CEN	2
17	608415G	FLT ST, 1/4X2 13/16X10 7/16CW/HOLES,G	2
18	608513G	FLT ST 1/4X4X14,W/SLOTS,G	2
19	611792G	PANEL,BAY 1,QUEST®,G	2
20	611796G	PANEL,BAYS,QUEST®,DCM,G	6
21	605343G	BRACE,PANEL,QUEST® CEN,G	6
22	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	12
23	617005G	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
24	003300G	WASHER,FLAT,5/8 X 1 3/4,G	6
25	117987B	WASHER,FLAT,#6X5/8X,030,S	24
26	617010G	WASHER,BAR,2X2X1/4,G	2
27	118030G	WASHER,FLAT,3/8 ID X 13/16 OD,P,HRD	48
28	003340G	NUT,HEX,5/8,G,RAIL	78
29	115909B	NUT,HEX,#6-32,S	24
30	003704G	NUT,HEX,3/4",GR DH	12
31	115931G	NUT,HEX,1,G	2
32	115960G	NUT,HEX,3/8,G	24
35	113553G	BOLT,HEX,3/4X2,G5,G	4
36	113538G	BOLT,HEX,1X5 ,G8,G	2
37	113530G	BOLT,HEX,1X3 1/2,G5,G	2
38	113654G	BOLT,HEX,5/8X1 1/2,G5,G	6
39	113558G	BOLT,HEX,3/4X3 1/2,G5,G	4
40	113596G	BOLT,HEX,3/8X1,G5,G	24
41	113568G	BOLT,HEX,3/4X4,G5,G,ALL THRD	2
42	114461B	DECAL,CAUTION, ALL PRODUCTS	1
43	116758G	RIVET,ST,SD68BS,3/15X1/2,DH	1
44	114591B	DECAL,PRODUCT,QUEST®	1
45	115274B	ASSEMBLY MANUAL, QUEST® CEN	1
46	115674B	MATERIAL SAFETY INFORMATION NOTICE	1
47	003400G	BOLT,RAIL,5/8X2,G	72
48	114490B	DECAL,CE,QUEST® CEN,100/110	1
49	614533B	SPACER,RAIL TENSION,QUEST®	2
50	118027G	WASHER,FLAT,3/4X2,HVY,G	2


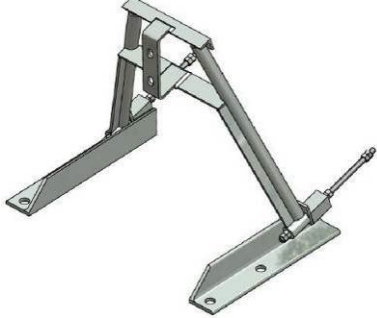
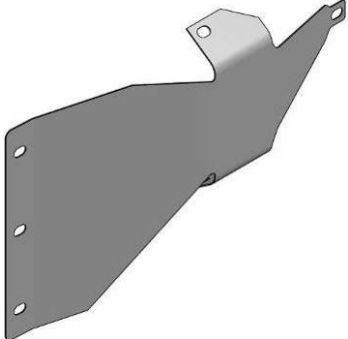
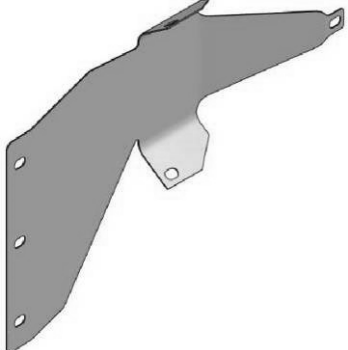
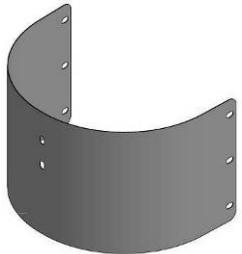
QUEST® CEN 100
Model No. TD100CEN610

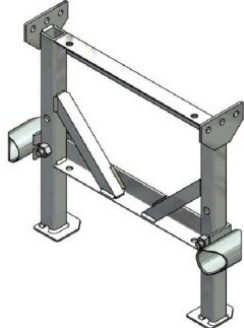
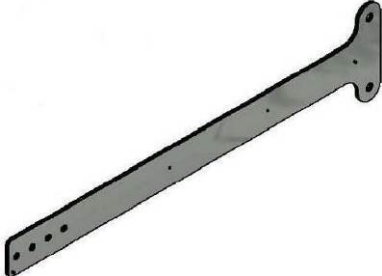
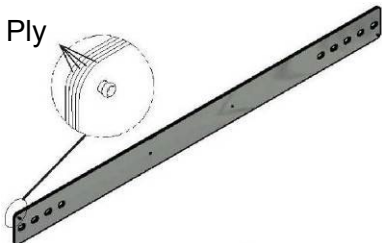
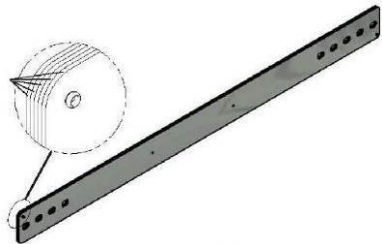
PARTS LIST TD100CEN610			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604647G	BACKUP,24,QUEST®,G	1
2	615467B	SUPPORT FRAME ASSY, QUEST®,DCM	1
3	614029G	SHAPER RAIL,L,QUEST® CEN,G	1
4	614035G	SHAPER RAIL,R,QUEST®,G	1
5	617605G	ANCHOR,FRONT,QUEST®,G	1
6	616230G	TRIGGER STRAP,QUEST®,G	2
7	616212B	TRIGGER ASSY,QUEST®,G,PT	1
8	611642G	NOSE TRANSITION,R,QUEST®,G,PT	1
9	611641G	NOSE TRANSITION,L,QUEST®,PT	1
10	611678G	NOSE,QUEST®,G,PT	1
11	607196B	DIAPHRAGM ASSY,QUEST® CEN	2
13	613663G	REAR RAIL,QUEST®,UNCRIMPED,G	2
14	614733B	STRAP,PEEL,REAR,QUEST® CEN	2
15	614728B	STRAP,PEEL,BAY 2,QUEST® CEN	2
16	614732B	STRAP,PEEL,BAY 3,QUEST® CEN	2
17	608415G	FLT ST, 1/4X2 13/16X10 7/16CW/HOLES,G	2
18	608513G	FLT ST 1/4X4X14,W/SLOTS,G	2
19	611792G	PANEL,BAY 1,QUEST®,G	2
20	611796G	PANEL,BAYS,QUEST®,DCM,G	6
21	605343G	BRACE,PANEL,QUEST® CEN,G	6
22	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	12
23	617005G	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
24	003300G	WASHER,FLAT,5/8 X 1 3/4,G	6
25	117987B	WASHER,FLAT,#6X5/8X,030,S	24
26	617010G	WASHER,BAR,2X2X1/4,G	2
27	118030G	WASHER,FLAT,3/8 ID X 13/16 OD,P,HRD	48
28	003340G	NUT,HEX,5/8,G,RAIL	78
29	115909B	NUT,HEX,#6-32,S	24
30	003704G	NUT,HEX,3/4",GR DH	10
31	115931G	NUT,HEX,1,G	2
32	115960G	NUT,HEX,3/8,G	24
35	113553G	BOLT,HEX,3/4X2,G5,G	4
36	113538G	BOLT,HEX,1X5 ,G8,G	2
37	113530G	BOLT,HEX,1X3 1/2,G5,G	2
38	113654G	BOLT,HEX,5/8X1 1/2,G5,G	6
39	113558G	BOLT,HEX,3/4X3 1/2,G5,G	2
40	113596G	BOLT,HEX,3/8X1,G5,G	24
41	113568G	BOLT,HEX,3/4X4,G5,G,ALL THRD	2
42	114461B	DECAL,CAUTION, ALL PRODUCTS	1
43	116758G	RIVET,ST,SD68BS,3/15X1/2,DH	1
44	114591B	DECAL,PRODUCT,QUEST®	1
45	115274B	ASSEMBLY MANUAL, QUEST® CEN	1
46	115674B	MATERIAL SAFETY INFORMATION NOTICE	1
47	003400G	BOLT,RAIL,5/8X2,G	72
48	114490B	DECAL,CE,QUEST® CEN,100/110	1
49	614533B	SPACER,RAIL TENSION,QUEST®	2
50	118027G	WASHER,FLAT,3/4X2,HVY,G	2

QUEST® CEN 80
Model No. TD80CEN610

PARTS LIST TD80CEN610			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604647G	BACKUP,24,QUEST®,G	1
2	615467B	SUPPORT FRAME ASSY, QUEST®,DCM	1
3	614027G	SHAPER RAIL,L,QUEST® CEN 80,G	1
4	614033G	SHAPER RAIL,R,QUEST® CEN 80,G	1
5	617605G	ANCHOR,FRONT,QUEST®,G	1
6	616230G	TRIGGER STRAP,QUEST®,G	2
7	616212B	TRIGGER ASSY,QUEST®,G,PT	1
8	611642G	NOSE TRANSITION,R,QUEST®,G,PT	1
9	611641G	NOSE TRANSITION,L,QUEST®,PT	1
10	611678G	NOSE,QUEST®,G,PT	1
11	607196B	DIAPHRAGM ASSY,QUEST® CEN	1
13	613663G	REAR RAIL,QUEST®,UNCRIMPED,G	2
14	614733B	STRAP,PEEL,REAR,QUEST® CEN	2
15	614728B	STRAP,PEEL,BAY 2,QUEST® CEN	2
17	608415G	FLT ST, 1/4X2 13/16X10 7/16CW/HOLES,G	2
18	608513G	FLT ST 1/4X4X14,W/SLOTS,G	2
19	611792G	PANEL,BAY 1,QUEST®,G	2
20	611796G	PANEL,BAYS,QUEST®,DCM,G	4
21	605343G	BRACE,PANEL,QUEST® CEN,G	4
22	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	8
23	617005G	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
24	003300G	WASHER,FLAT,5/8 X 1 3/4,G	6
25	117987B	WASHER,FLAT,#6X5/8X,030,S	16
26	617010G	WASHER,BAR,2X2X1/4,G	2
27	118030G	WASHER,FLAT,3/8 ID X 13/16 OD,P,HRD	32
28	003340G	NUT,HEX,5/8,G,RAIL	60
29	115909B	NUT,HEX,#6-32,S	16
30	003704G	NUT,HEX,3/4",GR DH	10
31	115931G	NUT,HEX,1,G	2
32	115960G	NUT,HEX,3/8,G	16
35	113553G	BOLT,HEX,3/4X2,G5,G	4
36	113538G	BOLT,HEX,1X5 ,G8,G	2
37	113530G	BOLT,HEX,1X3 1/2,G5,G	2
38	113654G	BOLT,HEX,5/8X1 1/2,G5,G	6
39	113558G	BOLT,HEX,3/4X3 1/2,G5,G	2
40	113596G	BOLT,HEX,3/8X1,G5,G	16
41	113568G	BOLT,HEX,3/4X4,G5,G,ALL THRD	2
42	114461B	DECAL,CAUTION, ALL PRODUCTS	1
43	116758G	RIVET,ST,SD68BS,3/15X1/2,DH	1
44	114591B	DECAL,PRODUCT,QUEST®	1
45	115274B	ASSEMBLY MANUAL, QUEST® CEN	1
46	115674B	MATERIAL SAFETY INFORMATION NOTICE	1
47	003400G	BOLT,RAIL,5/8X2,G	54
48	114491B	DECAL,CE,QUEST® CEN,80	1
49	614533B	SPACER,RAIL TENSION,QUEST®	2
50	118027G	WASHER,FLAT,3/4X2,HVY,G	2

	<p>ITEM 1</p> <p>604647G BACKUP,610 mm/24",QUEST®,G (1)</p>
	<p>ITEM 2</p> <p>615467B SUPPORT FRAME ASSY,610 mm/24", QUEST® (1)</p>
	<p>ITEM 3</p> <p>614027G SHAPER RAIL,L, QUEST® CEN 80/ (1) or 614029G SHAPER RAIL,L, QUEST® CEN 100/ (1) or 614029G SHAPER RAIL,L, QUEST® CEN 110/ (1)</p>
	<p>ITEM 4</p> <p>614033G SHAPER RAIL,R,QUEST® CEN 80/ (1) or 614035G SHAPER RAIL,R,QUEST® CEN 100/ (1) or 614035G SHAPER RAIL,R,QUEST® CEN 110/ (1)</p>
	<p>ITEM 5</p> <p>617605G ANCHOR,FRONT,QUEST®,610 mm/24",G (1)</p>

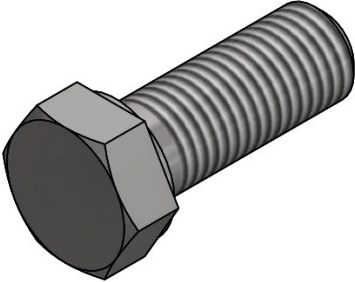
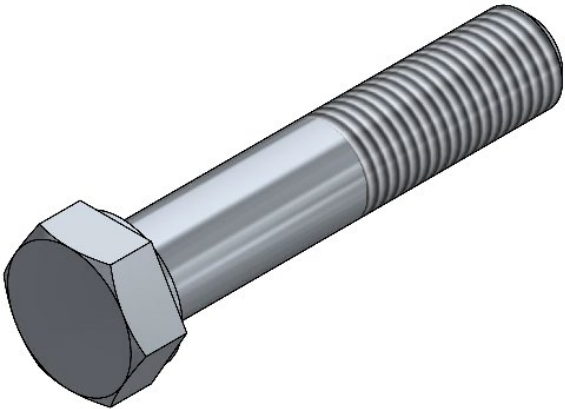
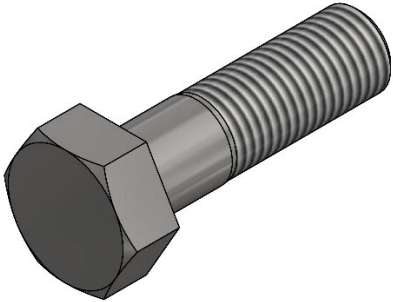
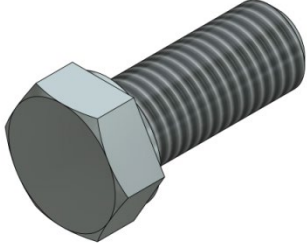
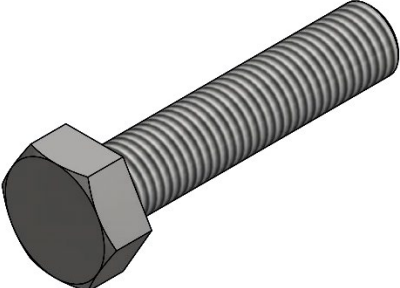
	<p>ITEM 6</p> <p>616230G TRIGGER STRAP,QUEST®,G, (1)</p>
	<p>ITEM 7</p> <p>616212B TRIGGER ASSY,610 mm/24",QUEST® (1)</p>
	<p>ITEM 8</p> <p>611642G NOSE TRANSITION,R,QUEST®,G,PT (1)</p>
	<p>ITEM 9</p> <p>611641G NOSE TRANSITION,L,QUEST®,G,PT (1)</p>
	<p>ITEM 10</p> <p>611678G NOSE,QUEST®,G,PT (1)</p>

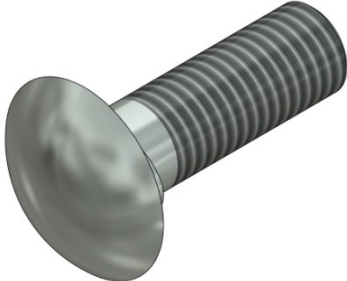
	<p>ITEM 11</p> <p>607196B DIAPHRAGM ASSY,610 mm/24",QUEST® QUEST® CEN 80 (1) QUEST® CEN 100 (2) QUEST® CEN 110 (2)</p>
	<p>ITEM 12</p> <p>614042G SHAPER,BACKUP,QUEST®,G (2) QUEST® CEN 110 (only)</p>
	<p>ITEM 13</p> <p>613663G REAR RAIL,QUEST® UNCRIMPED,G (2) QUEST® CEN 80 QUEST® CEN 100 613662G REAR RAIL,QUEST®, G (2) QUEST® CEN 110</p>
	<p>ITEM 14</p> <p>614733B STRAP,PEEL,REAR,QUEST® (2)</p>
<p>4 Ply</p> 	<p>ITEM 15</p> <p>614728B STRAP,PEEL,BAY 2,QUEST® (2)</p>
<p>5 Ply</p> 	<p>ITEM 16</p> <p>614732B STRAP,PEEL,BAY 3,QUEST® QUEST® CEN 100 (2) QUEST® CEN 110 (2)</p>

	<p>ITEM 17</p> <p>608415G FLT ST 1/4X2 13/16X10 7/16,W/HOLES,G (2)</p>
	<p>ITEM 18</p> <p>608513G FLT ST 1/4X4X14,W/SLOTS,G (2)</p>
	<p>ITEM 19</p> <p>611792G PANEL,BAY 1,QUEST®,G (2)</p>
	<p>ITEM 20</p> <p>611796G PANEL,BAYS,QUEST®,G QUEST® CEN 80 (4) QUEST® CEN 100 (6) QUEST® CEN 110 (6)</p>
	<p>ITEM 21</p> <p>605343G BRACE,PANEL,QUEST®,G QUEST® CEN 80 (4) QUEST® CEN 100 (6) QUEST® CEN 110 (6)</p>
	<p>ITEM 49</p> <p>614533B SPACER,RAIL,TENSION,QUEST® (2)</p>

QUEST CEN Fasteners

	<p>ITEM 28</p> <p>003340G NUT,HEX,5/8,G,RAIL QUEST® CEN 80 (60) QUEST® CEN 100 (78) QUEST® CEN 110 (78)</p>
	<p>ITEM 29</p> <p>115909B NUT,HEX,6-32,S QUEST® CEN 80 (16) QUEST® CEN 100 (24) QUEST® CEN 110 (24)</p>
	<p>ITEM 30</p> <p>003704G NUT,HEX,3/4,GR DH QUEST® CEN 80 (10) QUEST® CEN 100 (10) QUEST® CEN 110 (12)</p>
	<p>ITEM 31</p> <p>115931G NUT,HEX,1,G (2)</p>
	<p>ITEM 32</p> <p>115960G NUT,HEX,3/8, G QUEST® CEN 80 (16) QUEST® CEN 100 (24) QUEST® CEN 110 (24)</p>

	<p>ITEM 35</p> <p>113553G BOLT,HEX,3/4X2,G5,G (4)</p>
	<p>ITEM 36</p> <p>113538G BOLT, HEX,1X5,G8,G (2)</p>
	<p>ITEM 37</p> <p>113530G BOLT, HEX,1x3 1/2,G5,G (2)</p>
	<p>ITEM 38</p> <p>113654G BOLT, HEX,5/8X1 1/2,G5,G (6)</p>
	<p>ITEM 39</p> <p>113558G BOLT,HEX,3/4X3 1/2,G5, G QUEST® CEN 80 (2) QUEST® CEN 100 (2) QUEST® CEN 110 (4)</p>

	<p>ITEM 40</p> <p>113596G BOLT,HEX,3/8X1,G5,G QUEST® CEN 80 (16) QUEST® CEN 100 (24) QUEST® CEN 110 (24)</p>
	<p>ITEM 41</p> <p>113568G BOLT, HEX,3/4X4,G5,G All Thread (2)</p>
	<p>ITEM 47</p> <p>003400G BOLT,RAIL,5/8X2,G QUEST® CEN 80 (54) QUEST® CEN 100 (72) QUEST® CEN 110(72)</p>



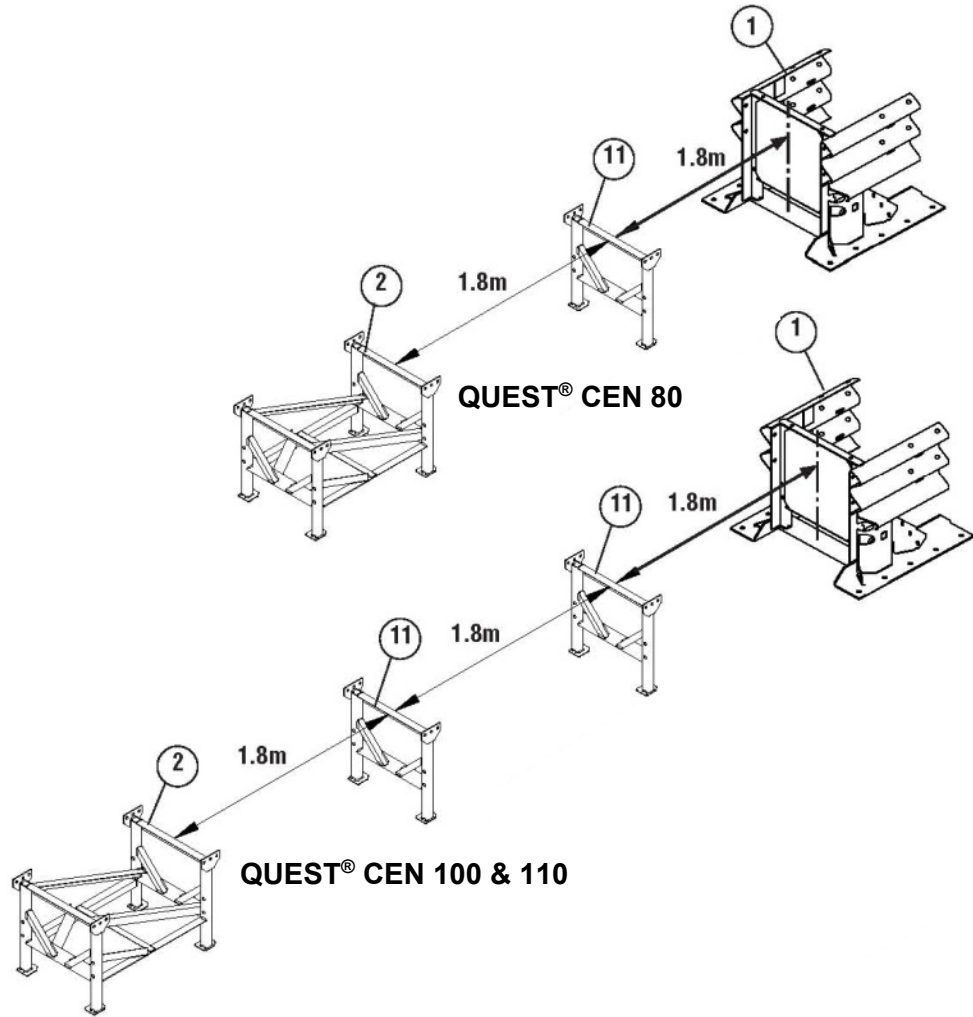
Warning: Safety measures incorporating appropriate traffic control devices specified by the highway authority must be used to protect all personnel while at the assembly, maintenance, or repair site. Failure to follow this warning could result in serious injury or death in the event of a collision. The traffic control plan established by the highway authority must always be observed in assembling or utilizing this product.



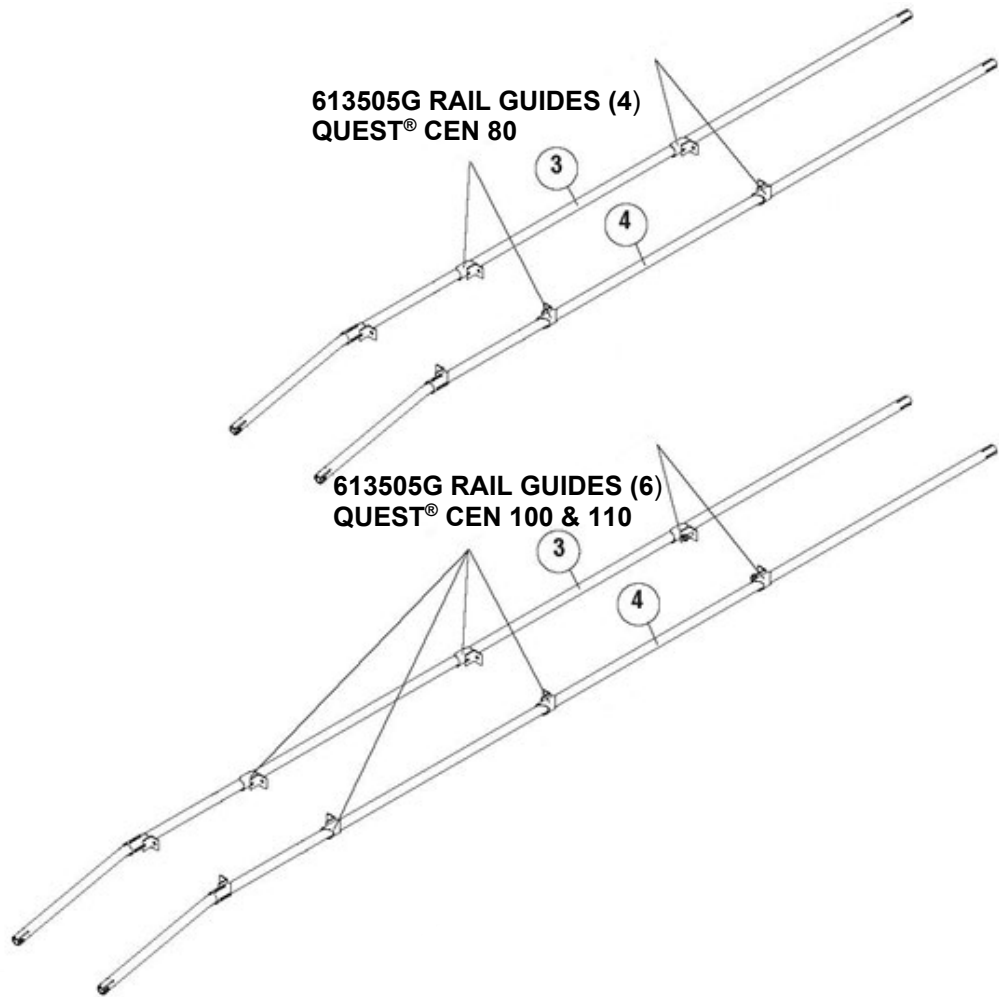
Warning: Ensure that there is proper site grading for QUEST® CEN placement as dictated by the specifying agency.

Pictorial Assembly

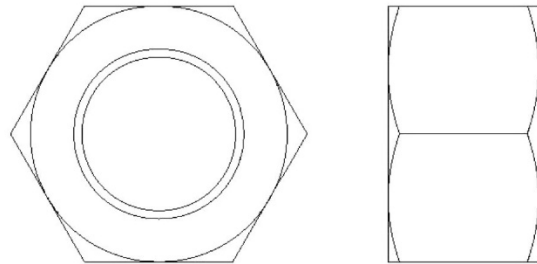
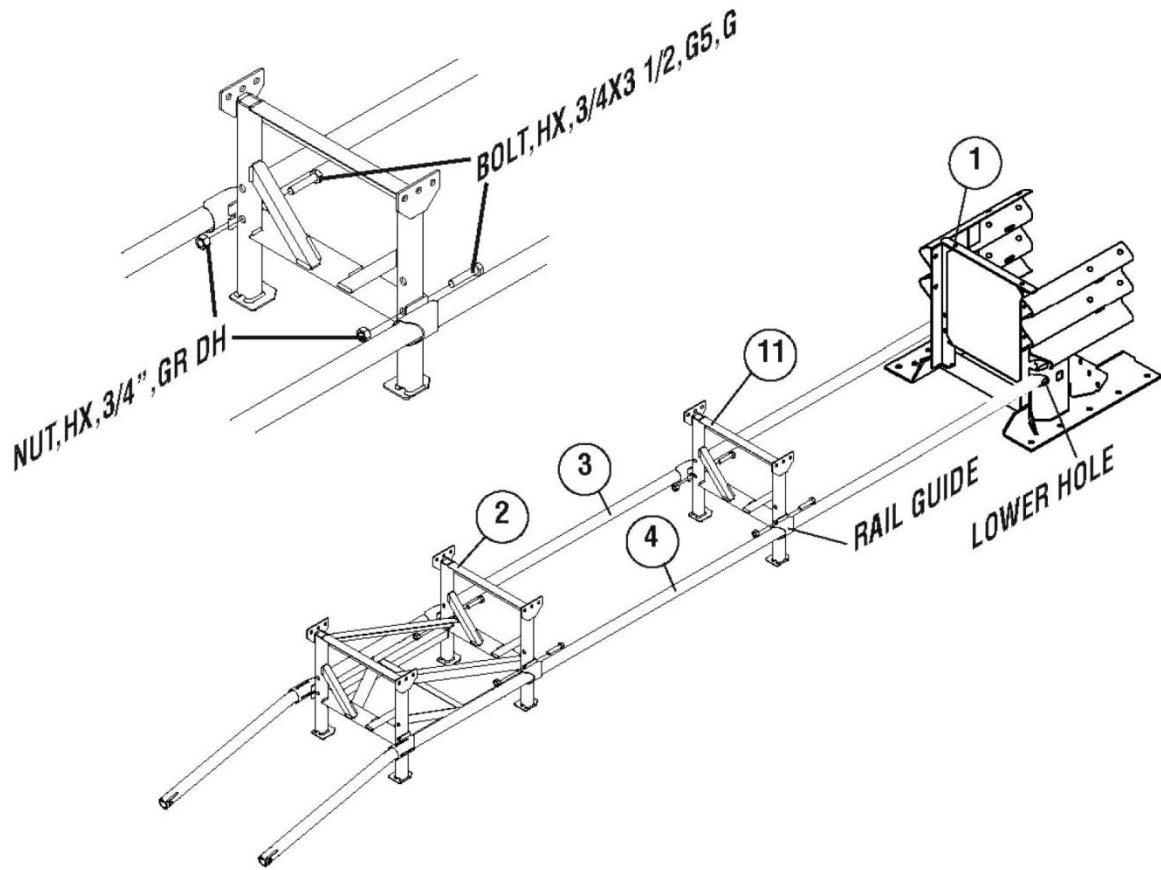
Step 1



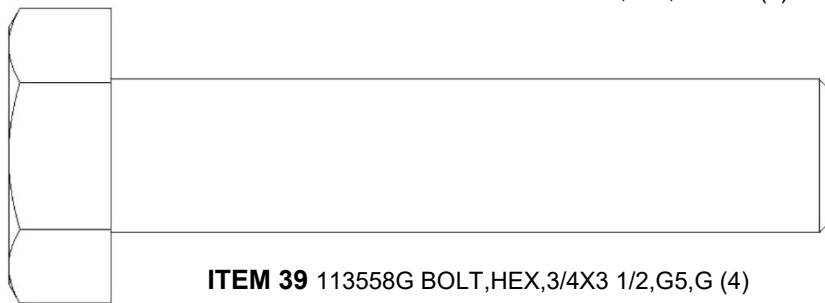
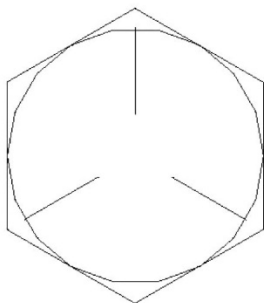
Step 2



Step 3 (QUEST® CEN 80)

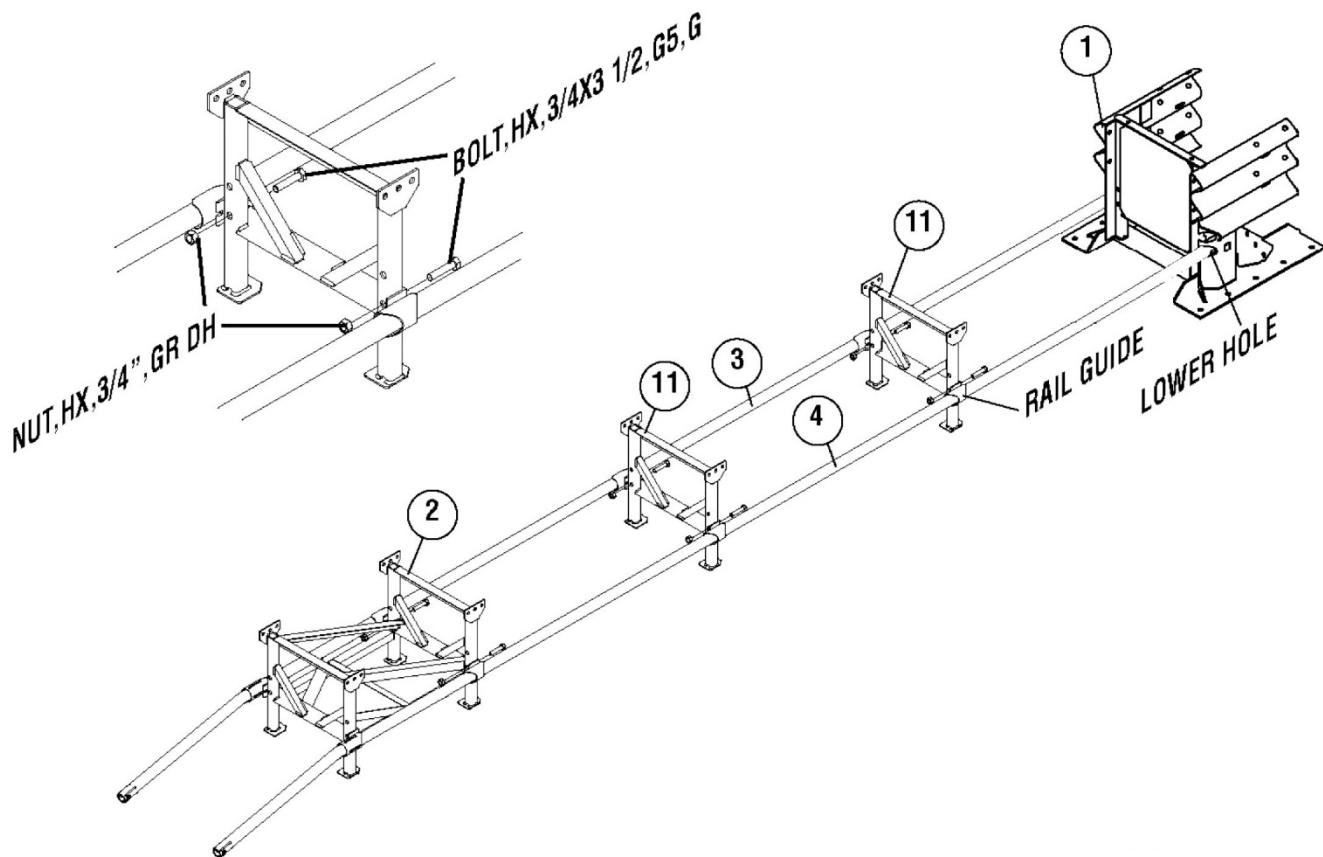


ITEM 30 003704G NUT,HEX,3/4",GR DH (4)

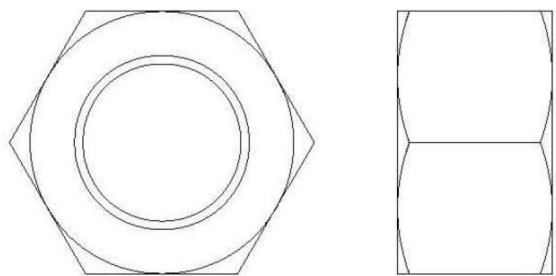


ITEM 39 113558G BOLT,HEX,3/4X3 1/2,G5,G (4)

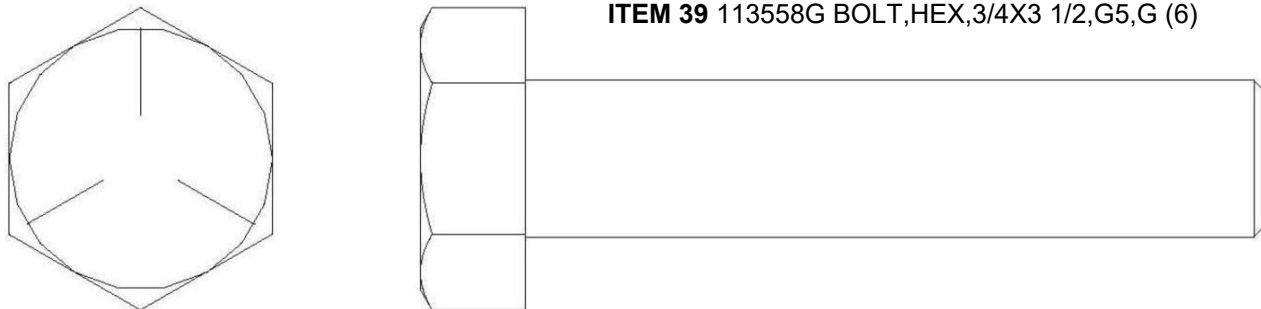
Step 3 (QUEST® CEN 100 & 110)



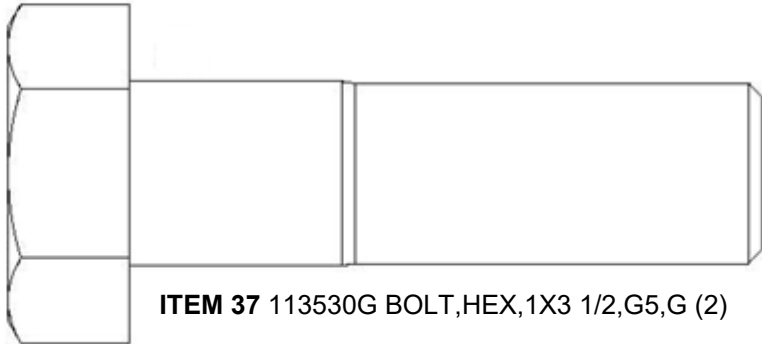
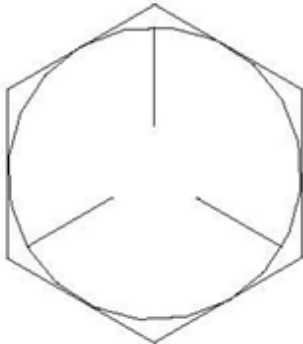
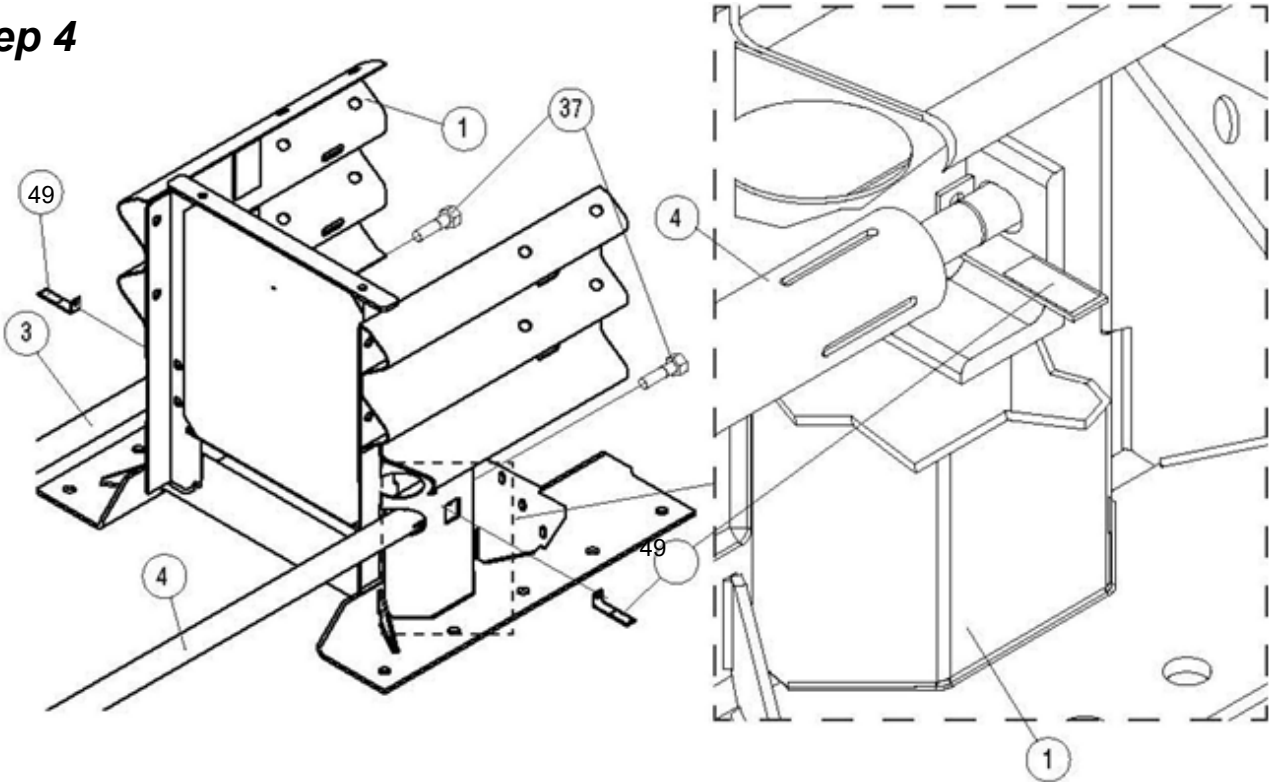
ITEM 30 003704G NUT.HX,3/4", GR DH (6)



ITEM 39 113558G BOLT,HEX,3/4X3 1/2,G5,G (6)



Step 4

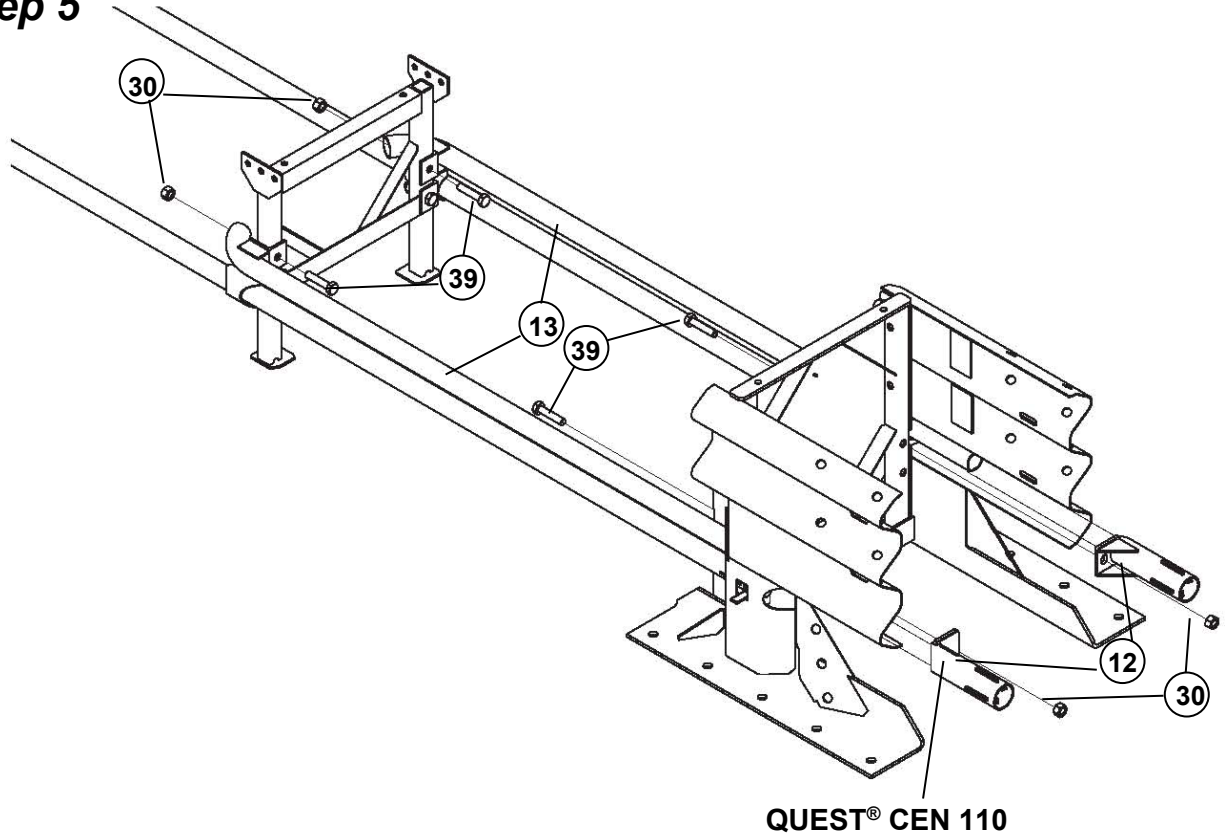


ITEM 37 113530G BOLT,HEX,1X3 1/2,G5,G (2)

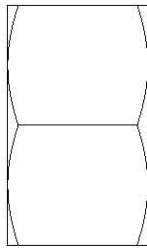
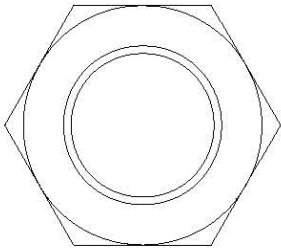


ITEM 49 614533B SPACER,RAIL TENSION,QUEST® (2)

Step 5



QUEST® CEN 110

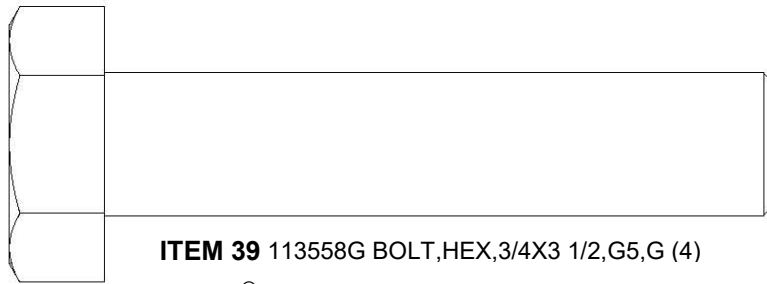
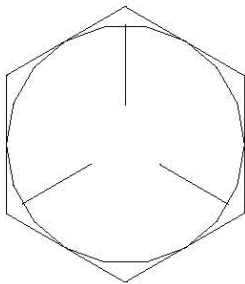


ITEM 30 003704G NUT,HEX,3/4,GR,DH (4)

QUEST® CEN 80 (10)

QUEST® CEN 100 (10)

QUEST® CEN 110 (12)



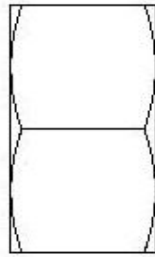
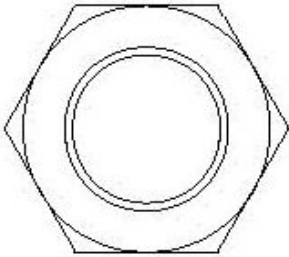
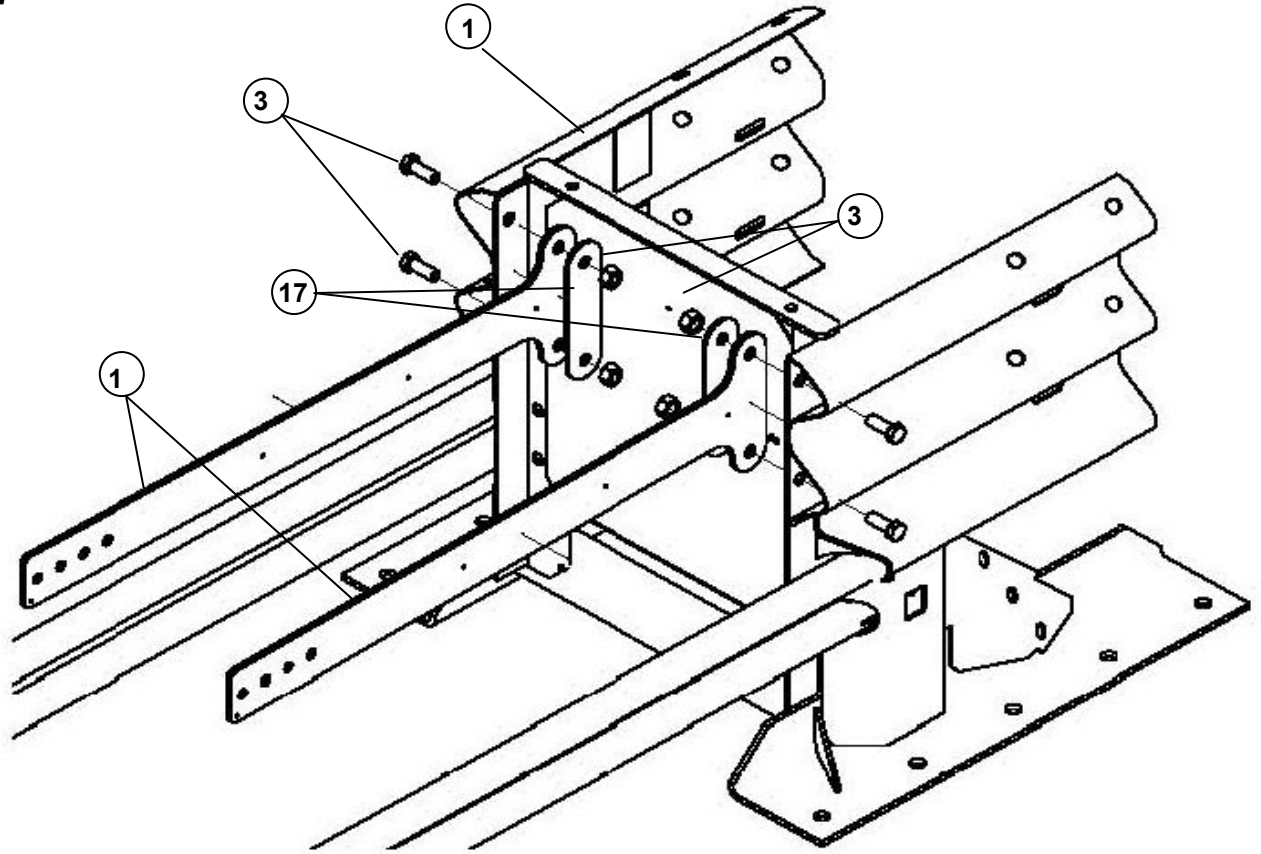
ITEM 39 113558G BOLT,HEX,3/4X3 1/2,G5,G (4)

QUEST® CEN 80 (2)

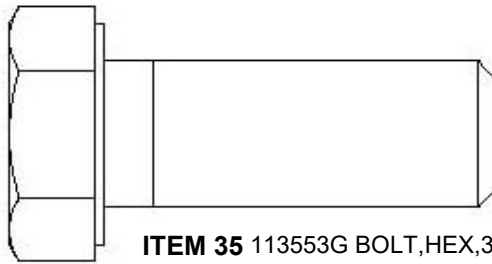
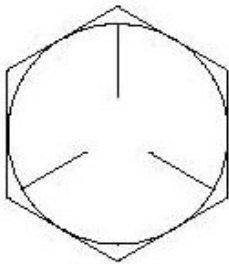
QUEST® CEN 100 (2)

QUEST® CEN 110 (4)

Step 6



ITEM 30 003704G NUT,HEX,3/4,GR DH (4)



ITEM 35 113553G BOLT,HEX,3/4X2,G5,G (4)

Step 7



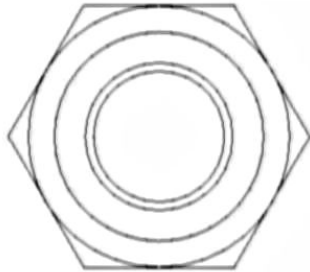
ITEM 22 116933B SCREW,PN, #6-32X1 1/2,PHIL,S (4)



ITEM 25 117987B WASHER,FLAT, #6X5/8X.030,S (8)



ITEM 27 118030G WASHER.FLAT,3/8 ID X13/16 OD,P,HRD (16)



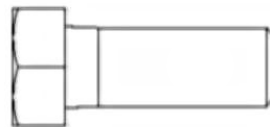
ITEM 28 003340G NUT,HEX,5/8,G,RAIL (18)



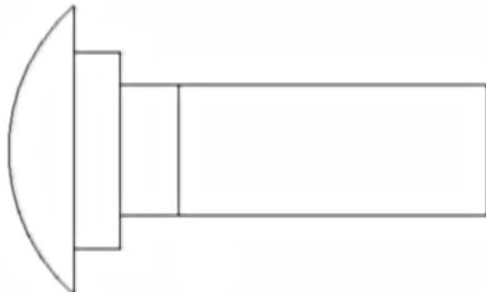
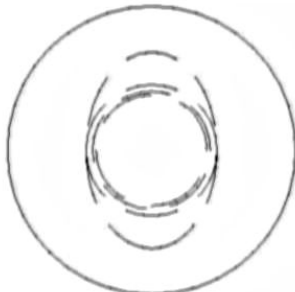
ITEM 29 115909B NUT,HEX, #6-32,S (8)



ITEM 32 115960G NUT, HEX,3/8,G (8)

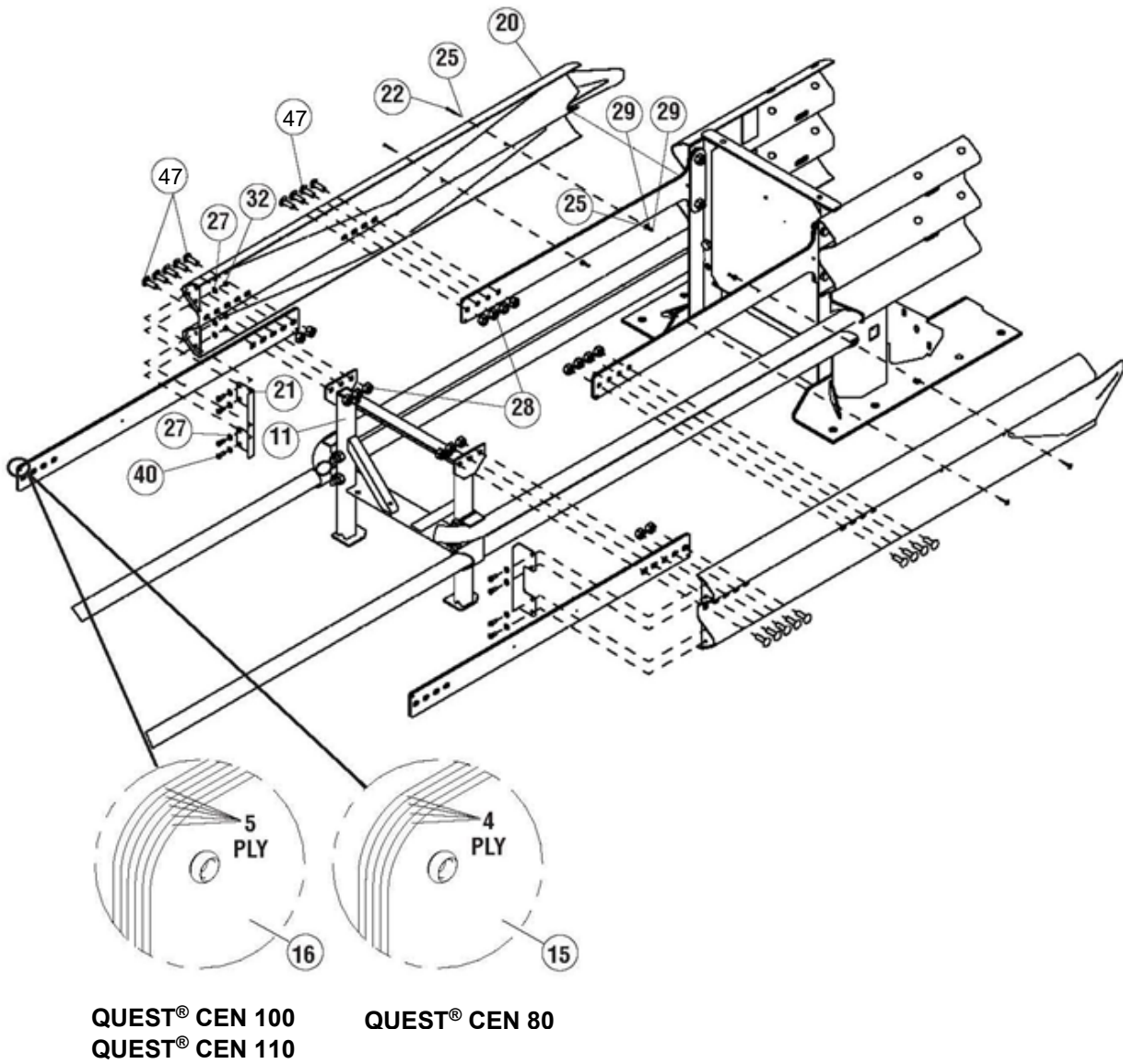


ITEM 40 113596G BOLT, HEX,3/8X1,G5,G (8)

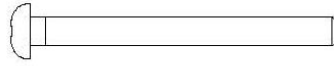


ITEM 47 003400G BOLT RAIL,5/8X2,G (18)

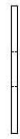
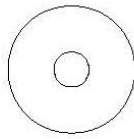
Step 7 (CONT'D)



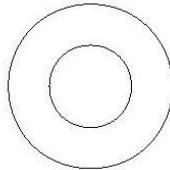
Step 8 (QUEST® CEN 80, Skip this step)



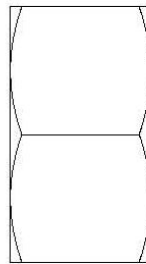
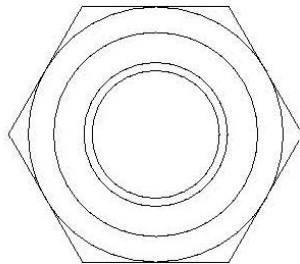
ITEM 22 116933B SCREW, #6-32X1 1/2,PHIL,S (4)



ITEM 25 117987B WASHER,FLAT, #6X5/8X.030,S (8)



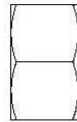
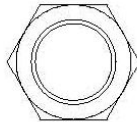
ITEM 27 118030G WASHER,FLAT,3/8 ID X 13/16 OD,P,HRD (16)



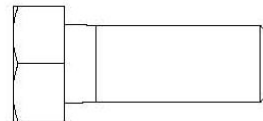
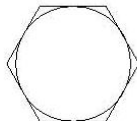
ITEM 28 003340G NUT,HEX,5/8,G,RAIL (18)



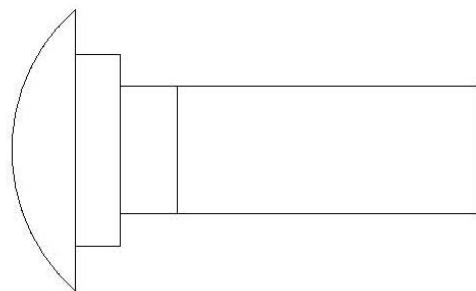
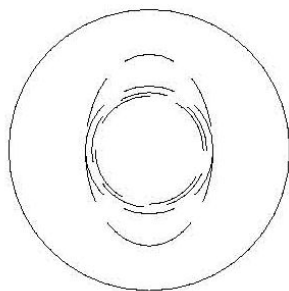
ITEM 29 115909B NUT,HEX,#6-32, S (8)



ITEM 32 115960G NUT,HEX,3/8,G (8)

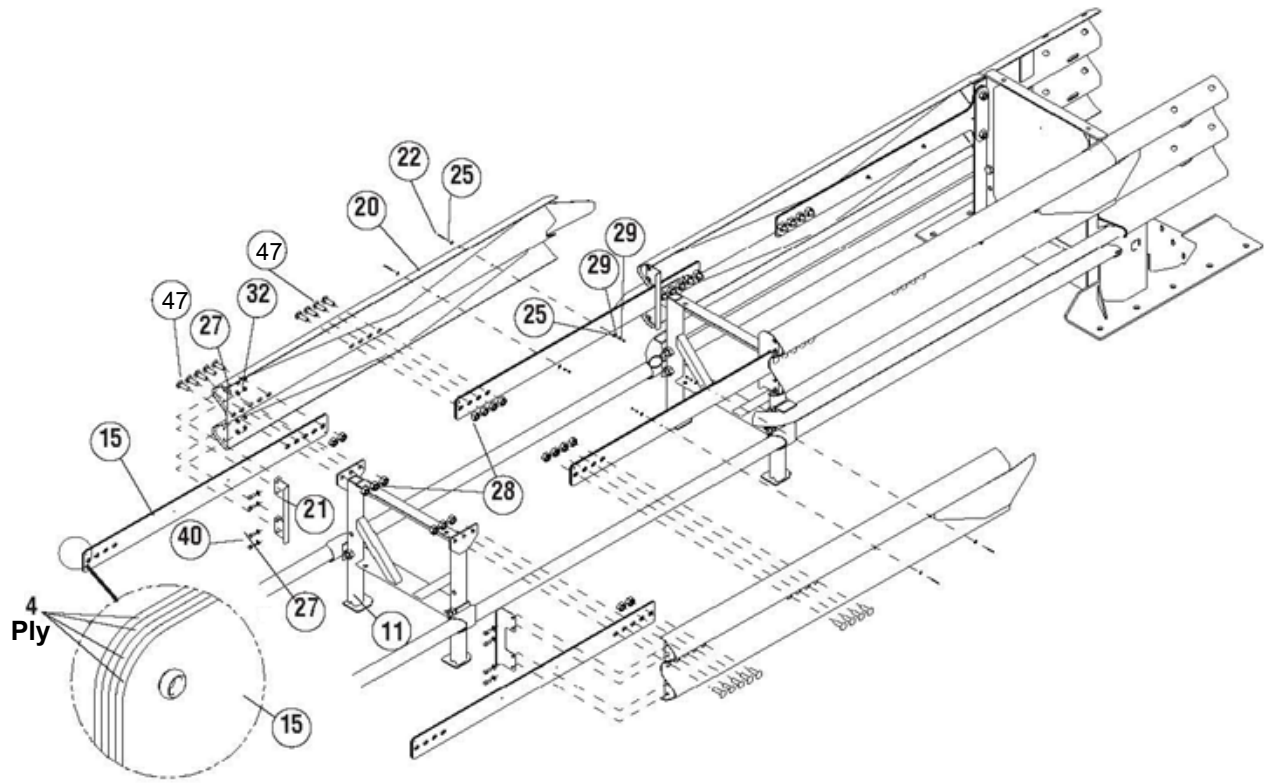


ITEM 40 113596G BOLT,HEX,3/8X1,G5,G (8)



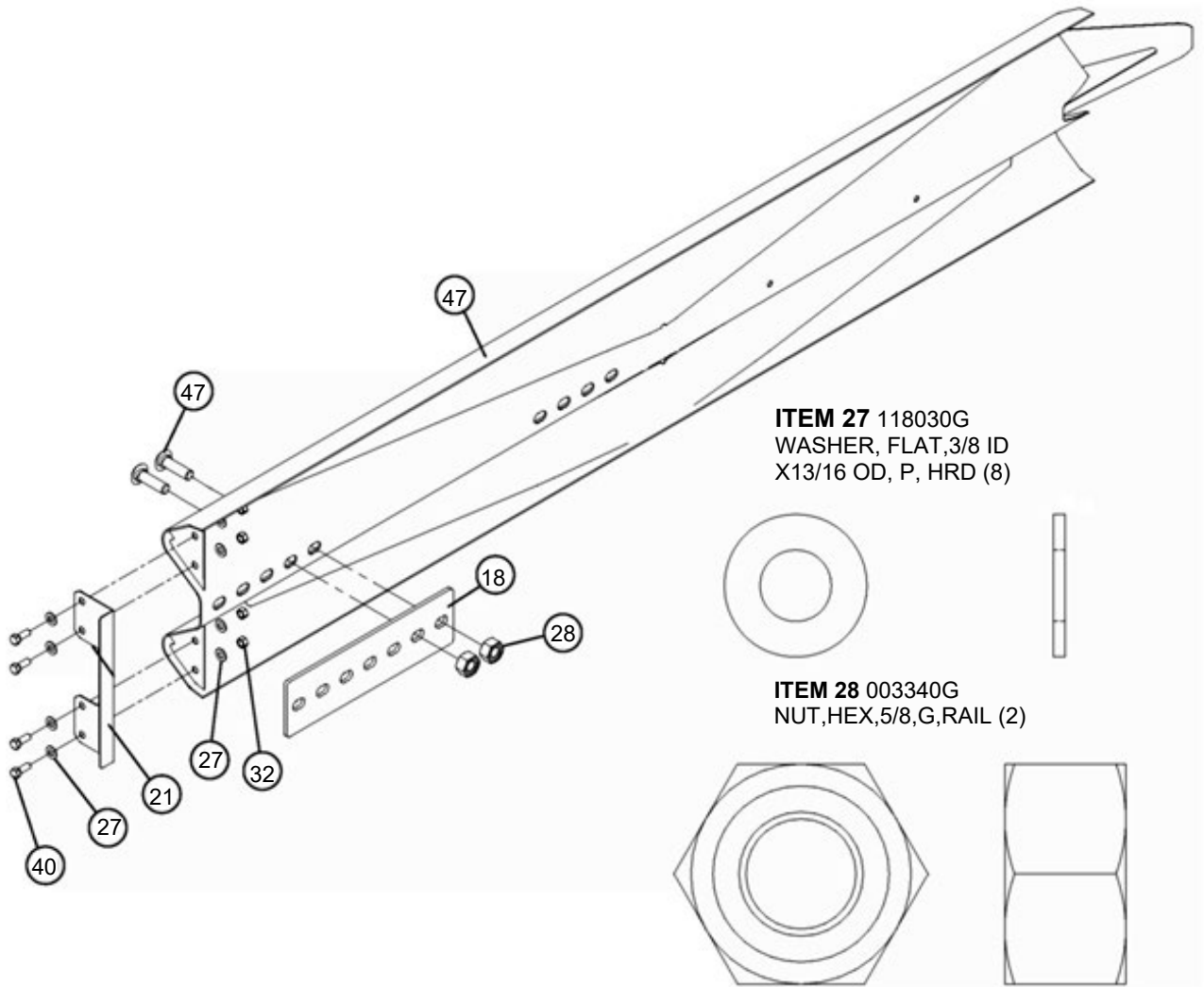
ITEM 47 003400G BOLT RAIL,5/8X2,G (18)

Step 8 (CONT'D) (QUEST® CEN 80, Skip this step)

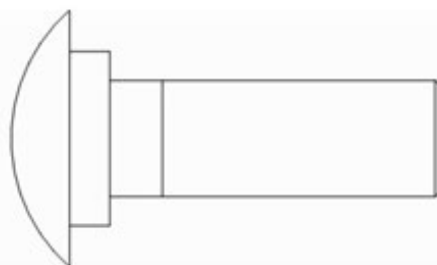


QUEST® CEN 110

Step 9 (x2)



ITEM 32 115960G
NUT, HEX, 3/8, G (4)

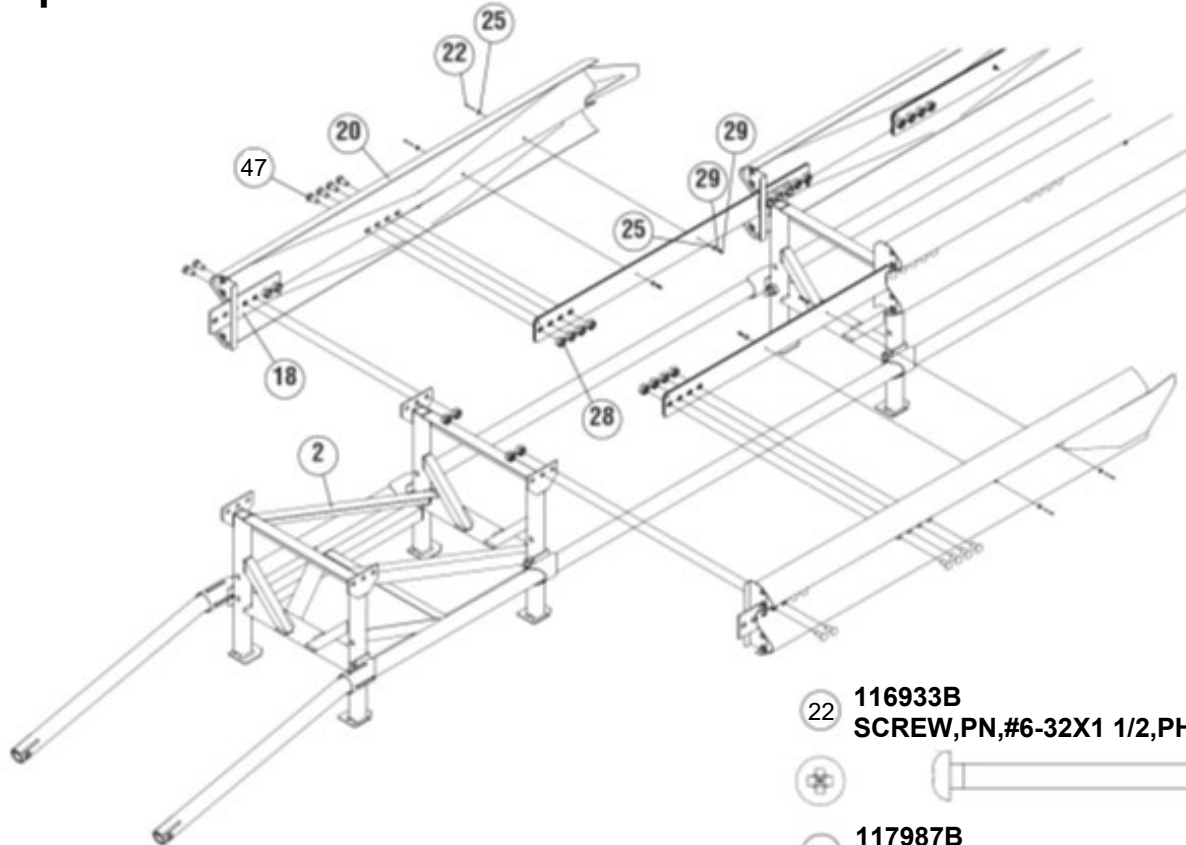


ITEM 47 003400G
BOLT, RAIL, 5/8X2, G (2)



ITEM 40 113596G
BOLT, HEX, 3/8X1, G5, G (4)

Step 10



22 **116933B**
SCREW,PN,#6-32X1 1/2,PHIL,S (4)



25 **117987B**
WASHER,FLAT,#6X5/8X.030,S (8)



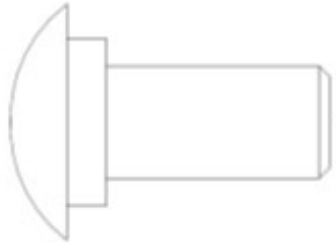
28 **003340G**
NUT,HEX,5/8,G,RAIL (12)



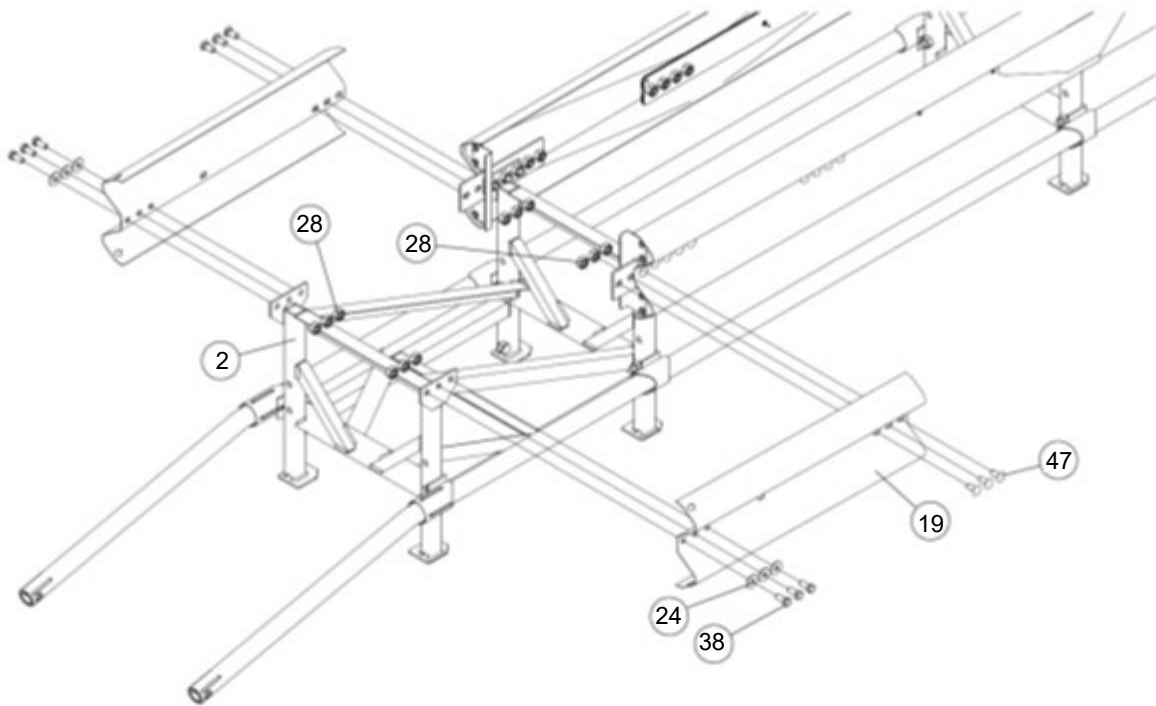
29 **115909B**
NUT,HEX,#6-32,S (8)



47 **003400G**
BOLT,RAIL,5/8X2,G (8)



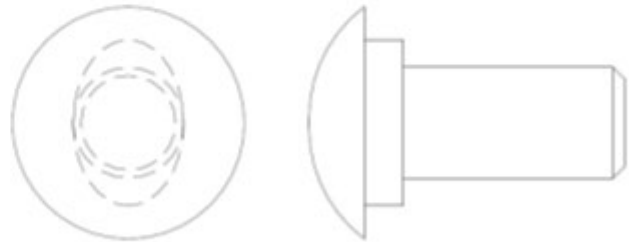
Step 11



24 **003300G**
WASHER,FLAT,5/8X1 3/4,G (6)



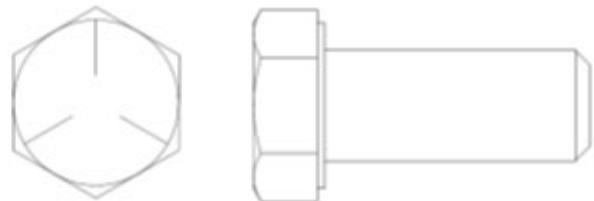
47 **003400G**
BOLT,RAIL,5/8X2, G (6)



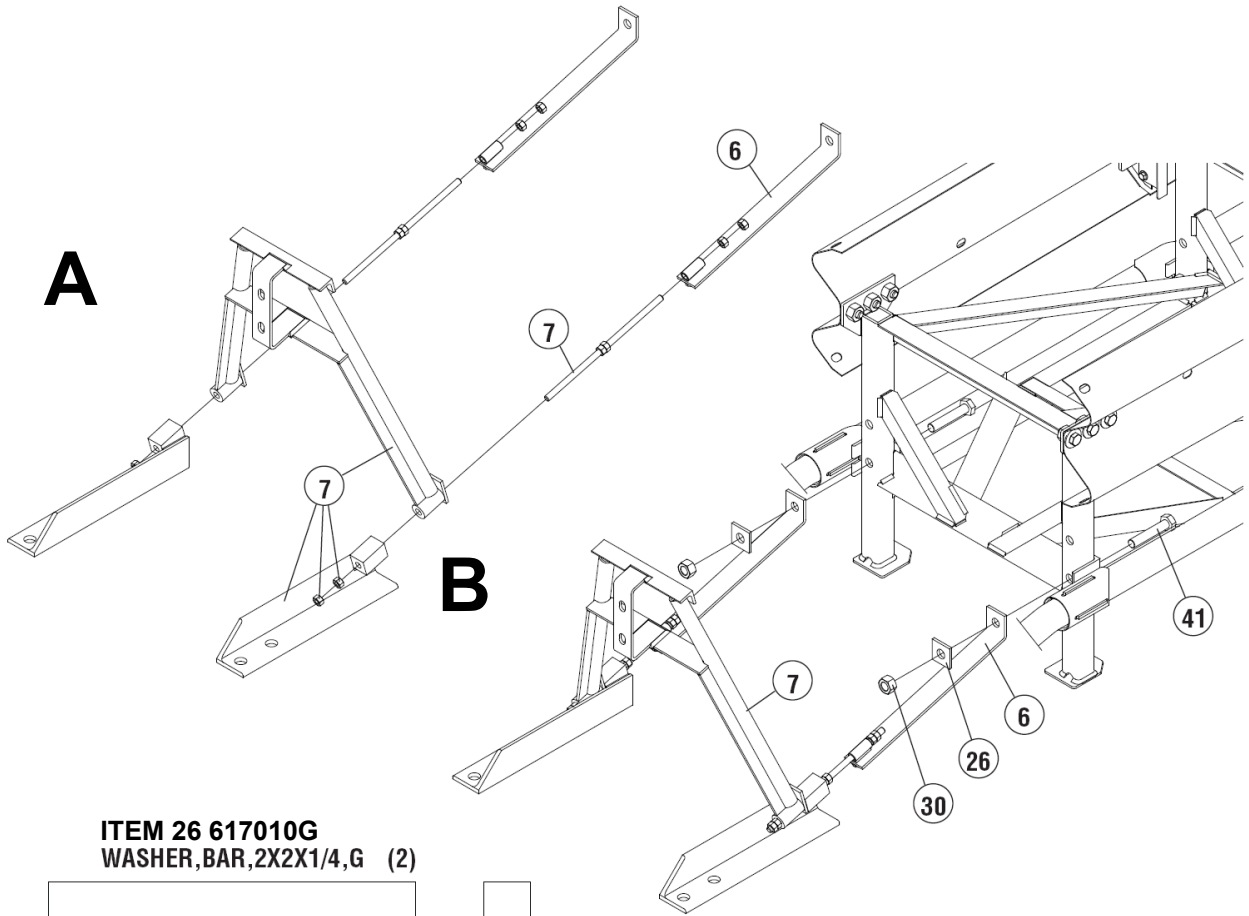
28 **003340G**
NUT,HEX,5/8,G,RAIL (12)



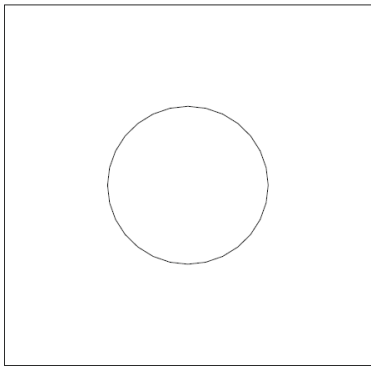
38 **003380G**
BOLT,HEX,5/8X1 1/2,G (6)



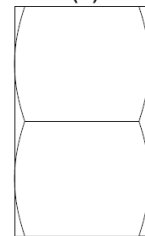
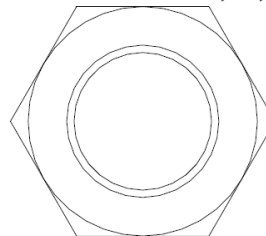
Step 12



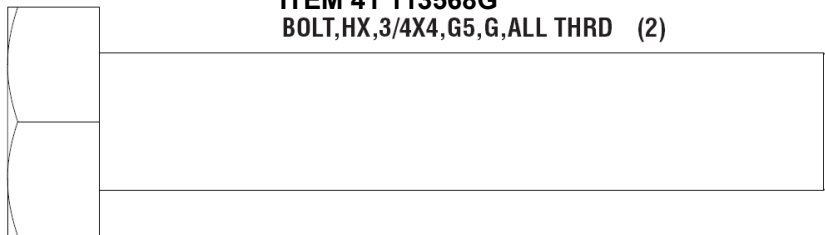
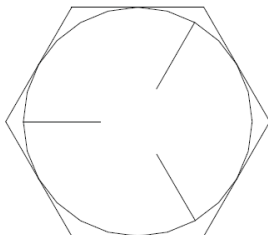
ITEM 26 617010G
WASHER, BAR, 2X2X1/4, G (2)



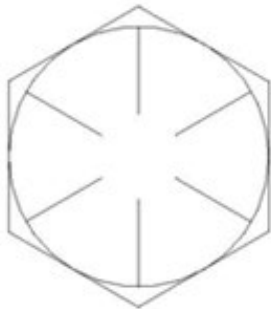
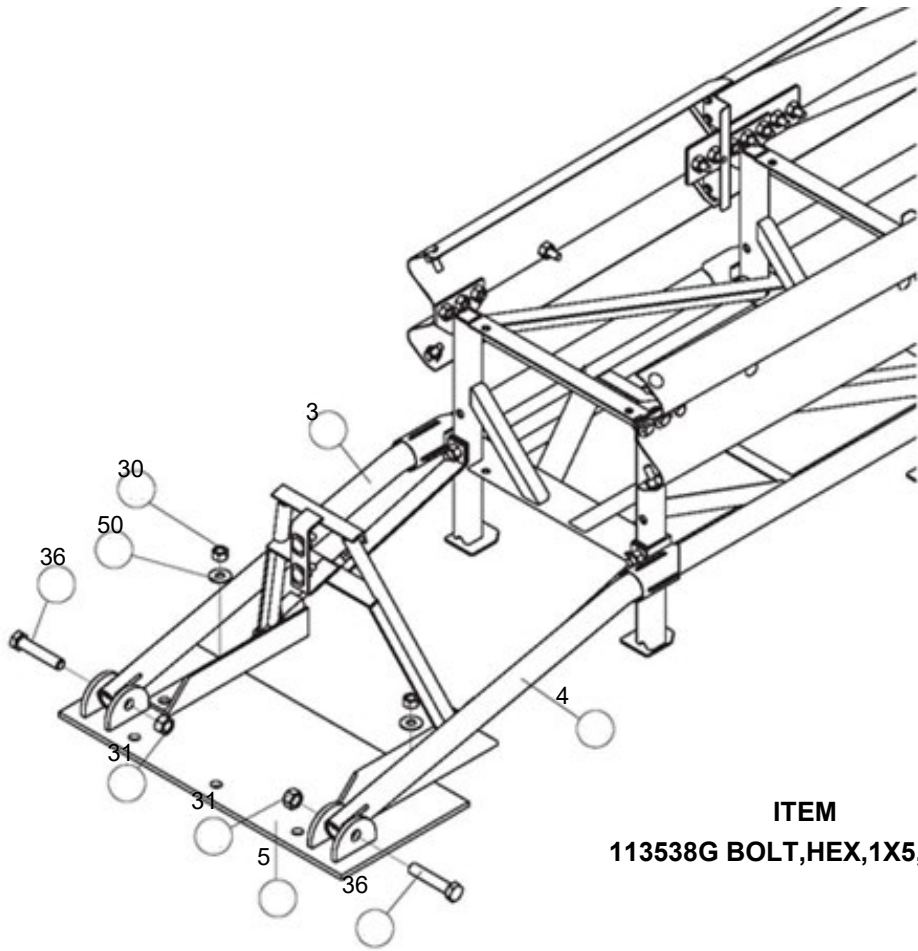
ITEM 30 003704G
NUT, HX, 3/4", GR DH (2)



ITEM 41 113568G
BOLT, HX, 3/4X4, G5, G, ALL THRD (2)



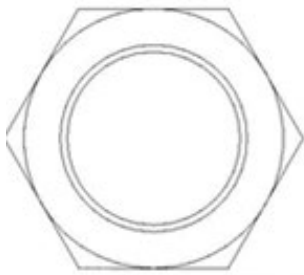
Step 13



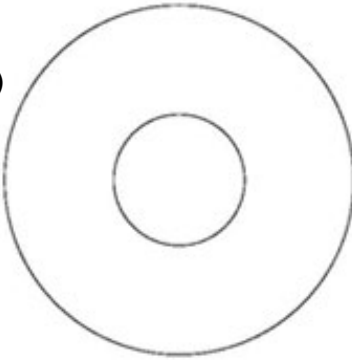
**ITEM
113538G BOLT,HEX,1X5,G8,G**



ITEM 30 003704G NUT,HEX,3/4,GR DH (2)

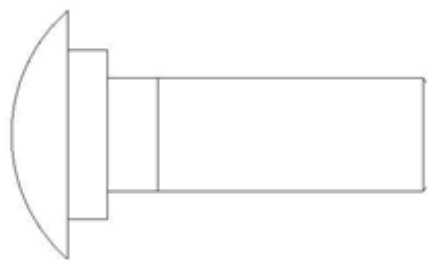
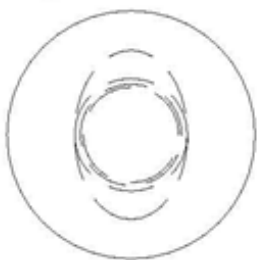
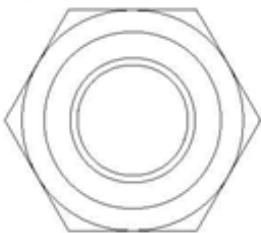
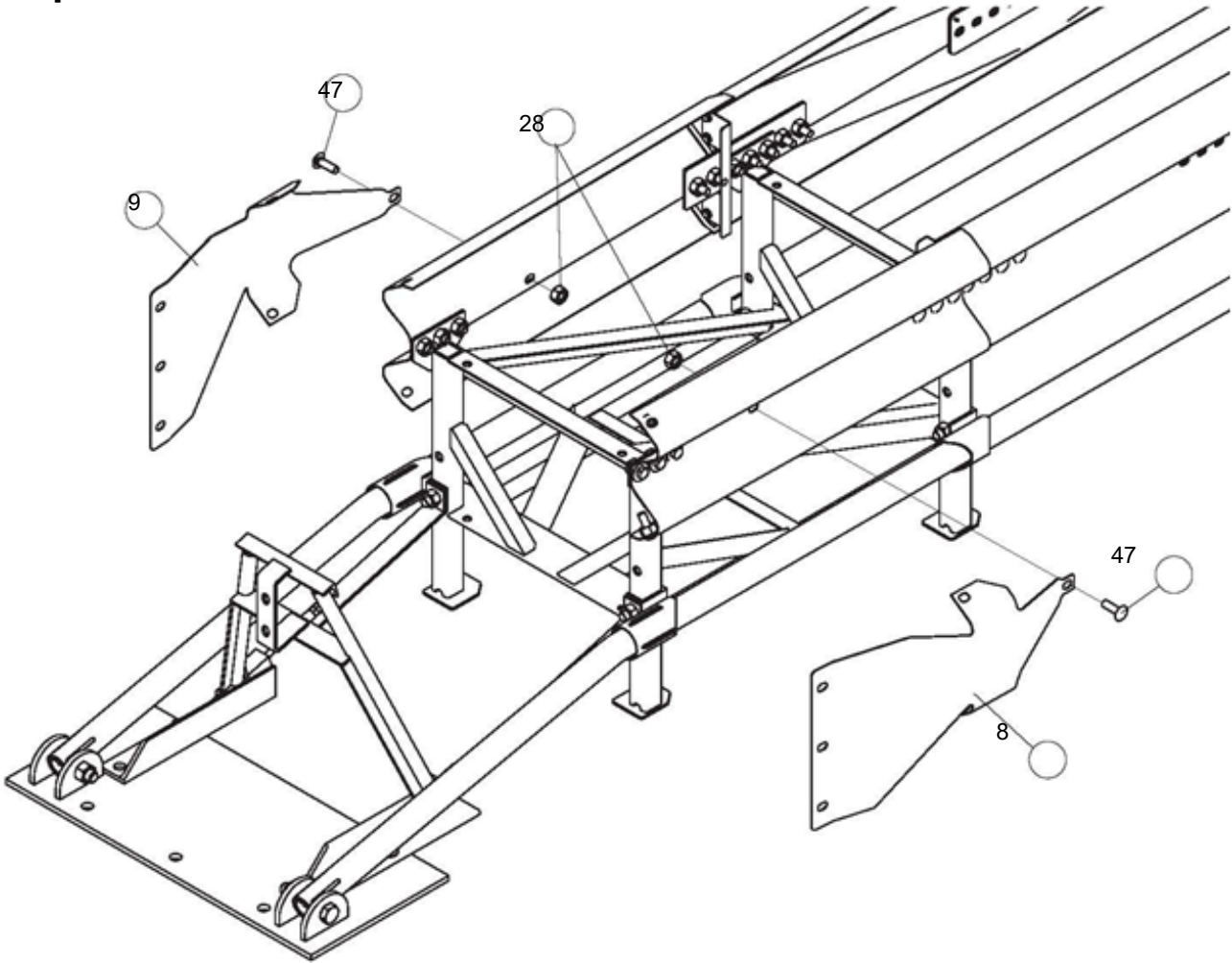


ITEM 31 115931G NUT,HEX,1,G (2)



ITEM 50 118027G WASHER, FLAT,3/4X2,HVY,G (2)

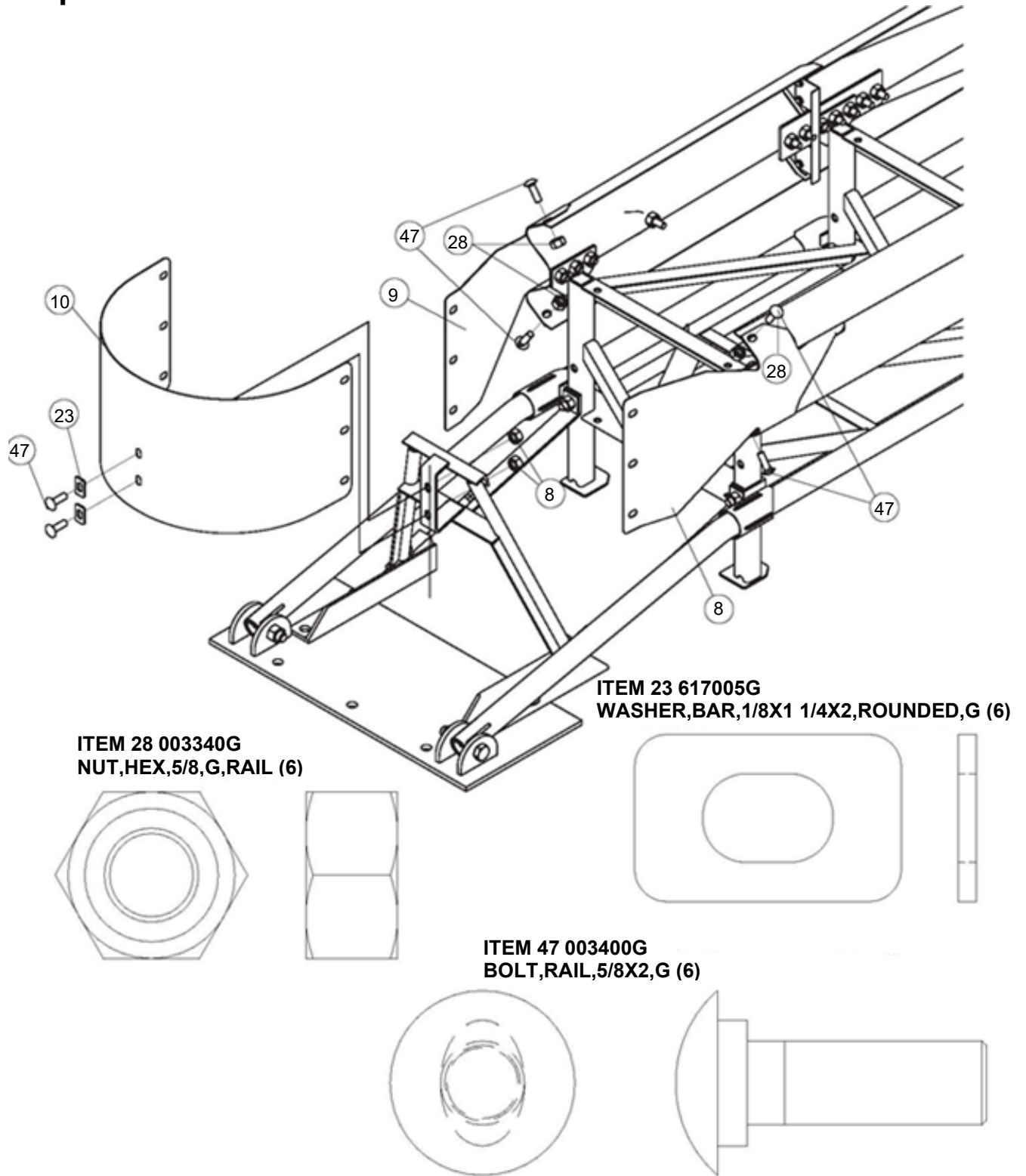
Step 14a



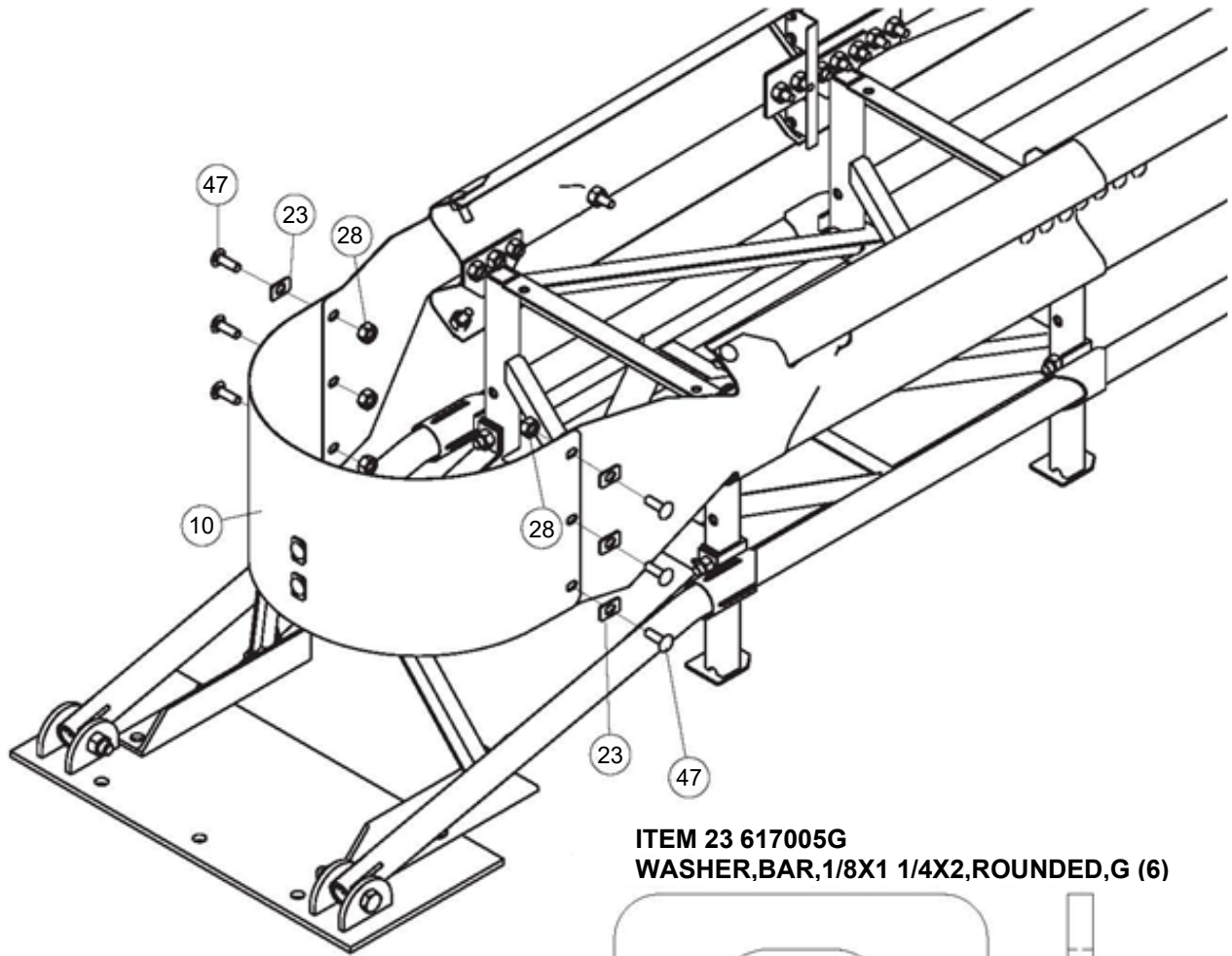
ITEM 28 003340G NUT,HEX,5/8,G,RAIL

ITEM 47 003400G BOLT,RAIL,5/8X2,G

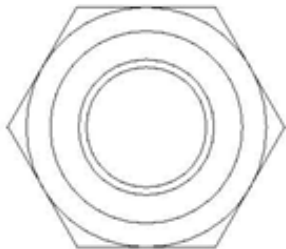
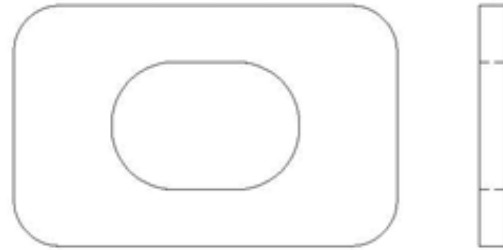
Step 14b



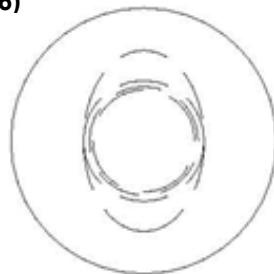
Step 14c



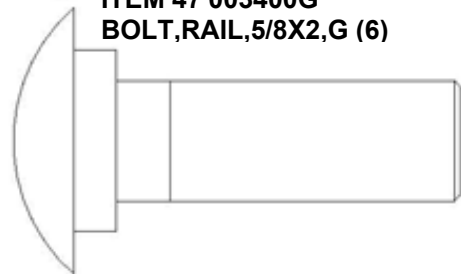
ITEM 23 617005G
WASHER, BAR, 1/8X1 1/4X2, ROUNDED, G (6)



ITEM 28 003340G
NUT, HEX, 5/8, G, RAIL (6)



ITEM 47 003400G
BOLT, RAIL, 5/8X2, G (6)



Site Preparation/Foundation

Anchor the System

Cross-slope of assembled location shall not exceed 8% and not vary (twist) more than 2% from front to back. A leveling pad may be required to meet these conditions. The anchors, when assembled must have a pull out strength of 190 kN.

Test Parameters

The best overall measure of anchor performance is the anchor load capacity. Anchor load capacity can be defined by testing static tensile and static shear strengths. Static tensile strength is the maximum force sustained by an anchor when subjected to gradual increases in loading at the exposed end of the anchor and applied in line along its axis. Static shear strength is the maximum force sustained by an anchor when subjected to gradual increases in loading applied at the base of the exposed end of the anchor and applied perpendicular to its axis.

The tensile strength developed will be a function of the strength of the surface the anchor is placed in. The embedment depth of the anchor can also affect the anchors tensile strength.

Tensile test of anchors chosen should be tested in compliance with ASTM E488 – Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements (Figure 2).

Recording Test Results

Three pull tests should be conducted on site when the anchoring conditions are different from those described in the reference section of this document with the results recorded. Pictures of the testing should also be taken and stored with the recorded data.

The anchor surface is acceptable if the average of the three pulls is equal or greater than 82.3 kN.

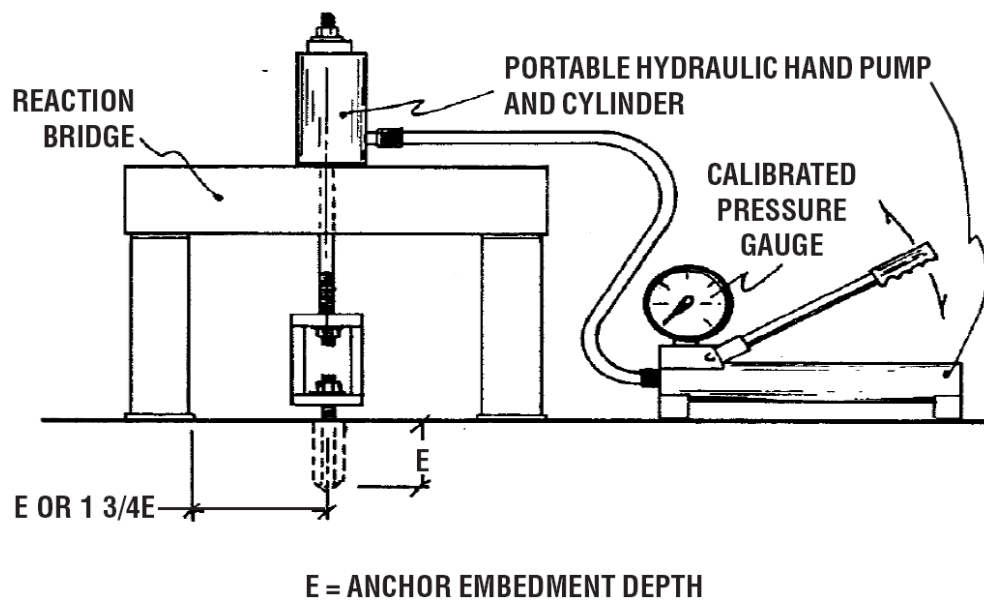


Figure 2

The QUEST® CEN has successfully passed the European Standard EN 1317-3 tests. Impact conditions which differ from those described in the European Standard EN 1317-3 may result in different crash results than those encountered in testing. Furthermore, impacts in excess of design impact severity, or cross-slopes in excess of 8%, may yield crash performance which does not meet the evaluation criteria of European Standard EN 1317-3.

Special Site Conditions

Contact Valtir Customer Service if you would like assistance with your application. You will need to answer the following questions:

1. Are curbs, islands or elevated objects (delineators or signs) present at the site? What height and width are they? All curbs and elevated objects over 100 mm [4"] high should be removed. If possible, curbs less than 100 mm [4"] high should be removed approximately 15 m [50'] in front of the QUEST® CEN and as far back as the system's backup. Any curbs that must remain should be 100 mm [4"] maximum and be mountable.
2. If there is a cross-slope of more than 8% (4.5 degrees), a leveling pad must be used.
3. If the assembly site is a gore area, place where two roads diverge, what is the angle of divergence?
4. What is the general geometry of the site, including the roadway for 150 m [500'] in front, so traffic patterns can be visualized?
5. When there is an existing guardrail or median barrier at the site, the backup of the QUEST® CEN should tie into, or nest around it when possible.
6. Will there be traffic approaching from the rear of the system? Is the system in a two-way (Bidirectional) traffic situation, with traffic going in opposite directions on either side of the system? Or, is the system on the side of the road in a location where cross over traffic is a concern? If so, a connection from the back of the system to the hazard is necessary to prevent vehicle interaction (p. 41).
7. Are the chosen anchors adequate for your foundation conditions? If you are unsure, please contact Customer Service (p. 3).
8. Are there any other unique features at the site that may affect positioning or performance of the QUEST® CEN?

Other Factors That May Affect Your Design

1. The existence of drain inlets.
2. Junction boxes or other items located near the hazard.
3. Insufficient space for the system length.
4. The location and movement of expansion joints.

Contact Valtir Customer Service before proceeding with your design (p. 3).



Caution: Accurate placement of all steel rebar is critical to avoid interference with the concrete anchor bolts if applicable.



Warning: Location of the Backup in relation to the hazard and nearby objects will affect the operation of the attenuator. Upon impact, the Shaper Rails stroke toward and extend beyond the rigid Backup and hazard as much as 1.8 m [6'] from their pre-impact location, therefore the Backup must nest around concrete walls, barriers, and pillars. Failure to comply with this requirement may result in impaired system performance, offering motorists less protection.

Assembly Procedures

Note: The package provided with the QUEST® CEN must be used with these instructions for proper assembly and should take precedence over these general instructions.

1) Deploy Traffic Control

A traffic control plan appropriate to the complexity of the project should be prepared and understood by all parties before the QUEST® CEN is assembled. Follow the traffic plan set forth by the applicable highway authority.

Deploy the appropriate work zone safety devices, as directed by the highway authority, prior to beginning the deployment and keep them present through all phases of the assembly.

2) Determining the Basepoint and Centerline

Typically the Basepoint of the QUEST® CEN will be the midpoint of the hazard at its front face.



Warning: The Backup is designed to nest around concrete walls, barriers, and pillars 24" [610 mm] in width or less. Failure to nest the Backup around these types of hazards may result in impaired system performance.

Extend a chalk line from the Basepoint, perpendicular to the hazard face, or as determined by project engineer, to a distance greater than the maximum length of the QUEST® CEN (refer to the drawings provided). The chalk line will become the centerline for the QUEST® CEN (Figure 3).

Note: The QUEST® CEN, when properly assembled, appears to be an extension of the object which it is shielding (Figure 4).

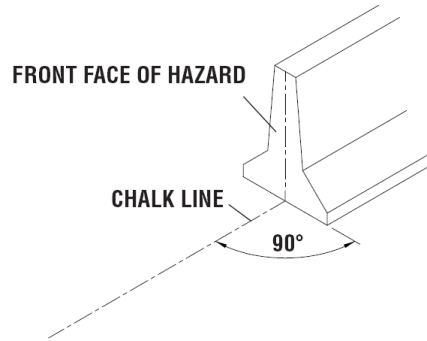


Figure 3 - QUEST® CEN Placement

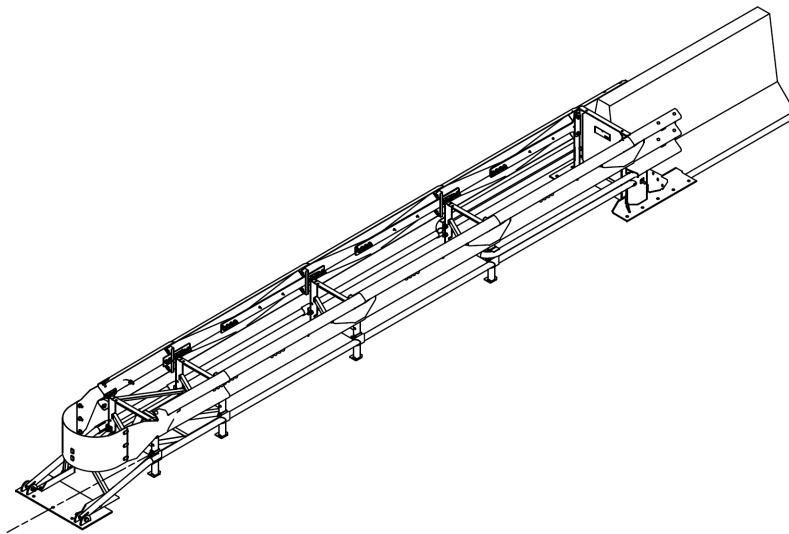


Figure 4 - Backup Location

3) Setting the Shaper Rails

Ensure the Spacers (Item 43) are placed around the bolts (Item 37) inside the window in the Backup. Snug the bolts so the Shaper Rails don't move when the system is lifted. Once the system is placed, the bolts can be loosened 1/2" and the front of the system pulled out if more slack is desired (Figure 5).

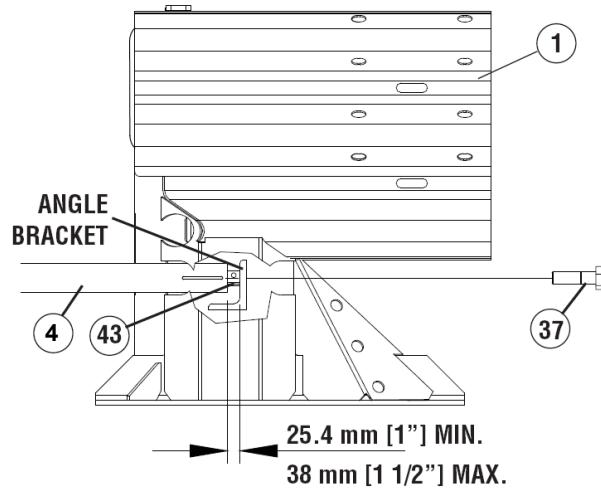


Figure 5 - Trigger Assembly Adjustment



Warning: The tensioning bolt must have slack thread available to tighten the Shaper Rail after anchoring the system.

4) Lifting and Placing the System

Use the lifting points to lift the QUEST® CEN into place (Figure 6).



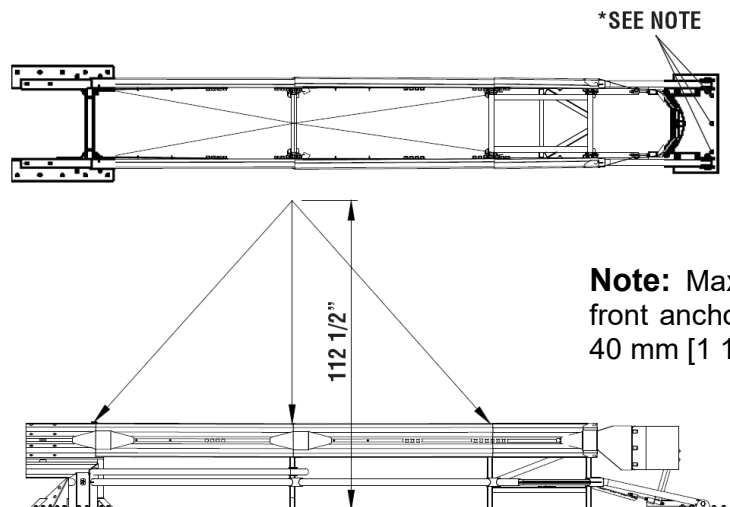
Warning: Do not lift the system using the Tube Rails or Fender Panels! Lift the system using the Diaphragms, Backup, and Support Frame only.

Use fixed-length slings with a 1365 kg minimum capacity. Fixed slings will prevent the system from tipping.



Danger: Do not lift the system over any personnel. Do not stand below or behind the system when performing this function. Failure to heed this warning could result in injury or death.

For assemblies shielding concrete wall, safety shape barrier or pillar, the steel Backup should be nested around the hazard (p. 40).



Note: Maximum stud height for front anchor locations shown is 40 mm [1 1/2"] (Figure 9).

Figure 6

5) Adjusting the Trigger Assembly

Ensure 3/4" x 4" hex bolts attaching front of Shaper Tube are tight. Tension threaded rod by tightening upper nut and 1/8" to 1/4" turn past snug. Assemble second nut on upper side and jam [typical both sides] (Figure 7).

6) Tension Shaper Rails (See Warning Below)

Remove the Spacers (Item 43) and tighten 1" x 3 1/2" bolts in the rear of the Shaper Rail Assembly (Figure 9).

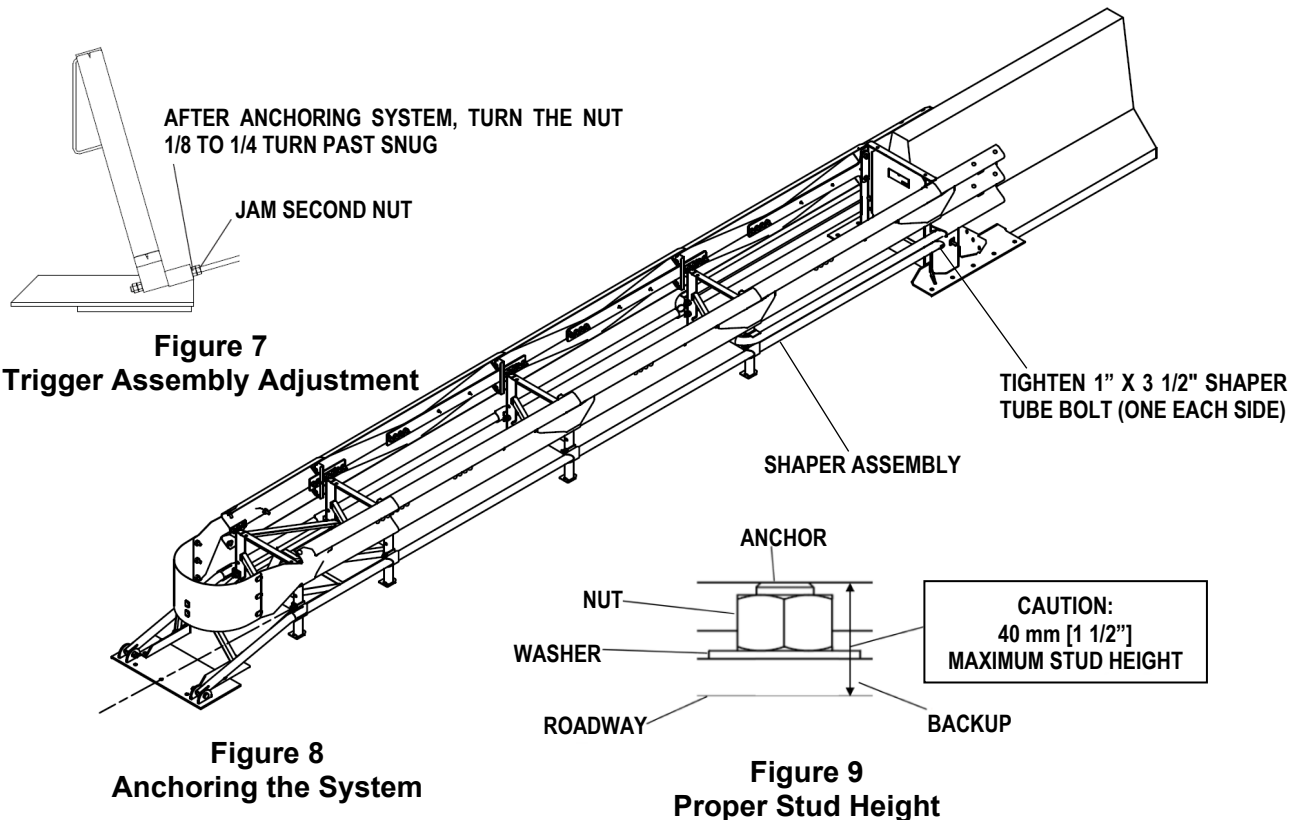
Note: For ease of assembly, Nose Assembly should be left off until system is anchored. See Step 14 - Attaching Nose Assembly on pages 33 - 35.

Bidirectional Traffic

If a QUEST® CEN is placed in a location where traffic will be approaching from the rear, a Connection Panel from the object being shielded to the Backup may be required. Hardware is available to mount guardrail or a safety shaped barrier to the Steel Backup of the QUEST® CEN.



Warning: Location of the system with respect to hazard is critical and dependent on the type of Connection Panel used. See project plans supplied with the system for details.



Connection and Side Panel Types



Important: The proper Connection or Side Panel must be used for optimum impact performance of the system. The correct panel to use will depend on the direction of traffic and what type of barrier or hazard the QUEST® CEN is shielding. See assembly drawings if you have any questions.



Warning: Location of the system with respect to the hazard is critical and dependent on the type of Connection Panel used. See project plans supplied with the system for details.

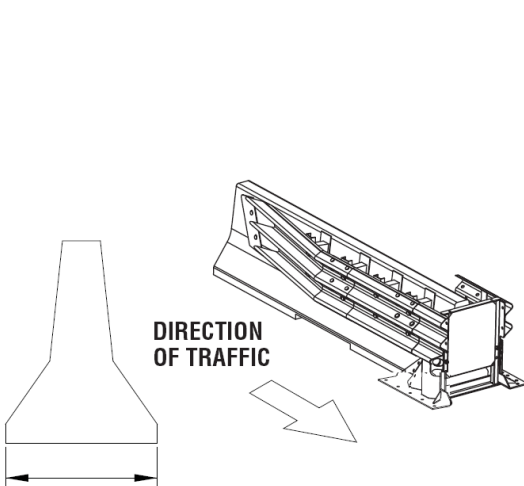


FIGURE 10
Thrie-Beam to Safety Barrier Connection Panel

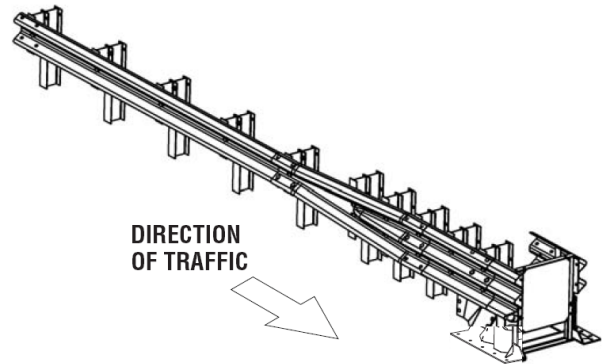


FIGURE 11
Thrie-Beam to W-Beam Connection Panel

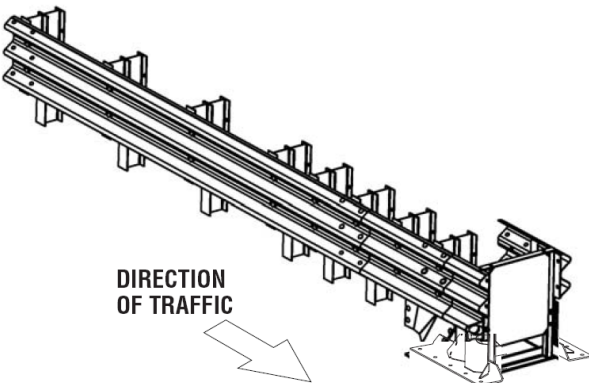


FIGURE 12
Thrie-Beam to Guardrail Connection Panel

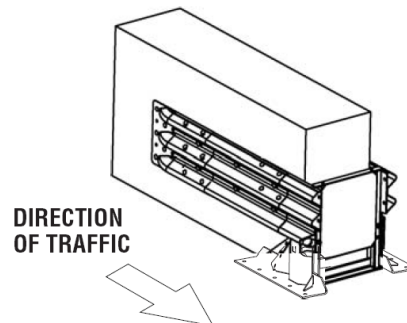


FIGURE 13
Thrie-Beam End Shoe Connection Panel

NOTE: Maximum hazard width for all QUEST® CEN is 610 mm.



Warning: The 610 mm, 760 mm, or 915 mm Backup should nest around concrete walls, barriers, and pillars 610 mm, 760 mm, or 915 mm in width or less, respectively. Failure to nest the Backup around these types of hazards may result in untested system performance.

Maintenance Checklist

Frequency of maintenance required will depend upon site conditions. Visual drive-by inspections are recommended at least once a month. Walk-up inspections are recommended at least once a year for assemblies on concrete and at least once every six months for assemblies on asphalt.

Visual Drive-By Inspection

- 1) Check to see if there is any evidence of an impact (deformed Nose or Side Panels). If so, a walk-up inspection will be necessary.
- 2) Check to see that the surface under the system is clear of debris to ensure performance as tested.
- 3) Note the location, condition of the QUEST® CEN, and the date of the visual drive-by inspection. Drive-by inspections are recommended on an as needed basis based upon traffic volume, site accident history, etc.

Walk-Up Inspection

- 1) Clear and dispose of any debris on the site.
- 2) Be sure all bolts are tight and rust-free.
- 3) Be sure anchor bolts are securely anchored.
- 4) Be sure the Shaper Rails are tensioned and rust-free.
- 5) Check to see that the Trigger Bolts in the Front Anchor Assembly are intact.
- 6) Check to see that the Support Frame Assembly has not engaged the Shaper Rails. Both Shapers must be over the forward-most part of the pre-crimped portion of the Shaper Rails.
- 7) Check to see that the laminated straps at the Fender Panels are intact and connection points are assembled correctly.
- 8) Check to make sure that the Diaphragm legs are on grade level and clear of debris.
- 9) Note the location and condition of the QUEST® CEN for entry in the impact attenuator inspection logbook under the date of this inspection. Walk-up inspections are recommended on an as needed basis based upon traffic volume, site accident history, etc.
- 10) Refer to Post-Impact Instructions for more information.

Post Impact Instructions

After an impact occurs, the system should be repaired or replaced as soon as possible. Due to its light weight, short length and minimal number of anchors, the QUEST® CEN has been shown to be relatively simple for field repair or rapid replacement of the entire unit.

Depending upon the severity of the impact and site conditions, the QUEST® CEN can be either refurbished on the roadside or repaired in the maintenance shop away from traffic dangers.

Some QUEST® CEN components may remain undamaged after less severe impacts, making refurbishment possible. Entire systems can be repaired and then reused on the roadside or damaged portions can be refurbished and reused as needed. Whether a system is repairable or reusable is a decision that can only be made by the highway authority who has specified the use of this device. That decision is never made by the designer or manufacturer of this system.

Recommended Tools

Documentation

- Manufacturer's Product Description Assembly Manual
- Manufacturer's Drawing Package

Cutting equipment

- Rebar Cutting Bits
- Concrete Drill Bits
- Rotary Hammer Drill
- Grinder, Hacksaw or Torch (optional)

Hammers

- Sledgehammer
- Standard Hammer

Wrenches

- Heavy Duty Impact Wrench - 1/2" Drive
- Standard Adjustable Wrench - 12" [300 mm]
- 1/2" Drive Sockets: 1 1/8", 1 1/4", 1 1/2"
- Deep Sockets: 1 1/4"
- Ratchet and Attachments for the above sockets
- Breaker Bar: 1/2" x 24"
- Two of each: Open/Box End Wrench – 1/4", 1/2", 3/4"

Personal protective equipment

- Safety glasses
- Gloves
- Safety toe shoes

Miscellaneous

- Traffic Control Equipment
- Lifting and Moving Equipment (A lifting device is preferred although a forklift can be used.) Minimum 2300 kg capacity required.
- Compressor (100 psi) min. and Generator (5 kW)
- Long Pry Bar
- Drift Pin 300 mm [12"]
- Center Punch
- Tape Measure 7.5 m [25']
- Chalk Line
- Concrete Marking Pencil
- Nylon bottle brush for cleaning drilled holes
- Rags, Water, and Cold Galv for Touch-up

Note: The above list of tools is a general recommendation. Depending on specific site conditions and the complexity of the assembly specified by the appropriate highway authority, additional or fewer tools may be required. Decisions as to what tools are needed to perform the job are entirely within the discretion of the specifying highway authority and the authority's selected contractor performing the assembly of the system at the authority's specified site.

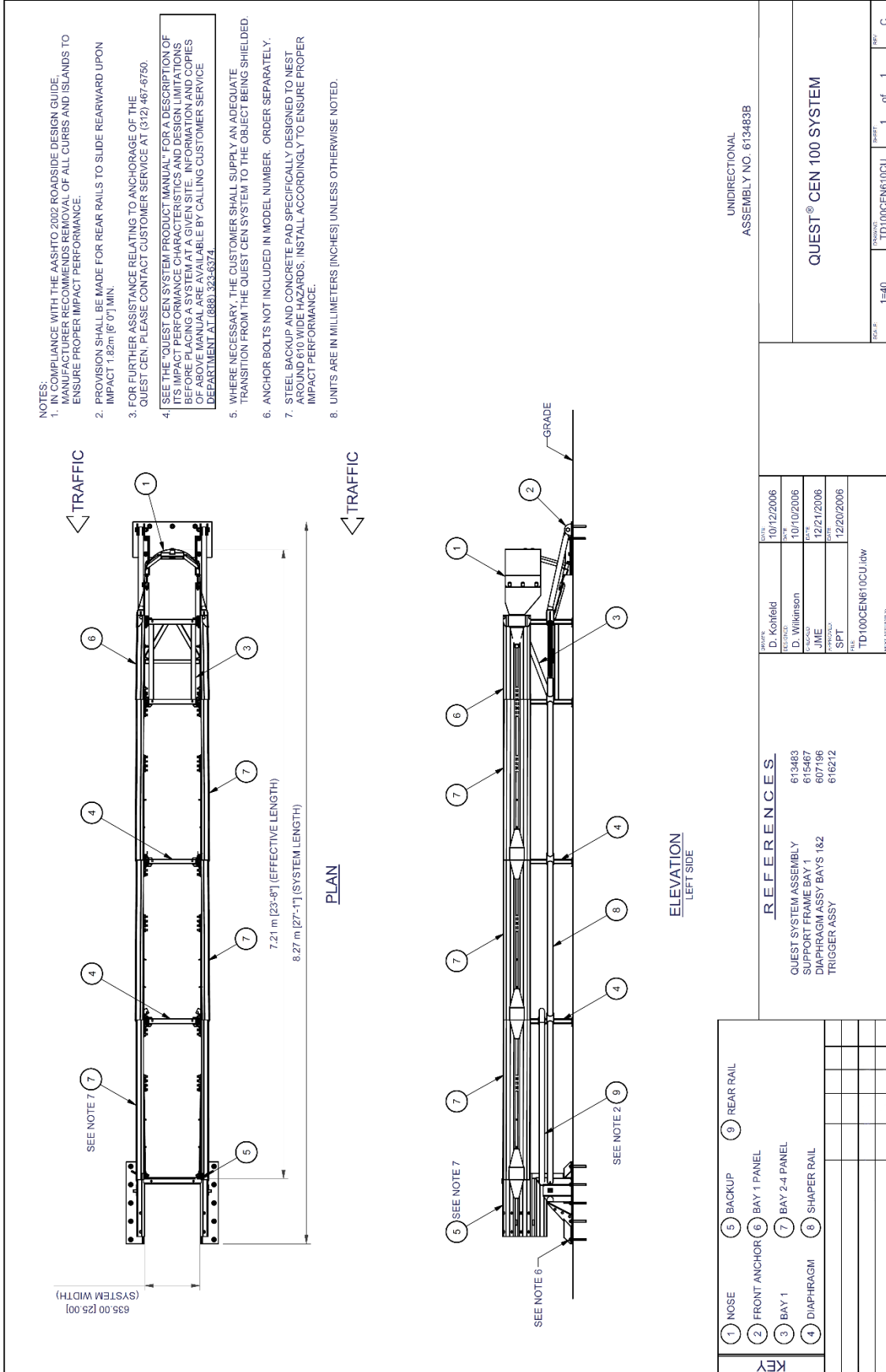
Post Impact Procedures

- 1) Deploy the appropriate traffic-control devices to protect your crew.
- 2) Clear and dispose of any debris on the site.
- 3) Check all components of the QUEST® CEN. Any components that are bent or damaged must be replaced. After some impacts on the nose, it is possible that the only parts that will be reusable are the Backup and Front Anchor Assembly.
- 4) To refurbish the QUEST® CEN, disassemble the system and replace the damaged parts with new parts.
- 5) The Shaper Rail assemblies must be replaced if the Support Frame has begun to crimp the Pipes.
- 6) During the process of refurbishment, follow the assembly drawings and instructions.
- 7) Check to be certain that the site is free from any debris. The QUEST® CEN is now ready for service.

Parts Ordering

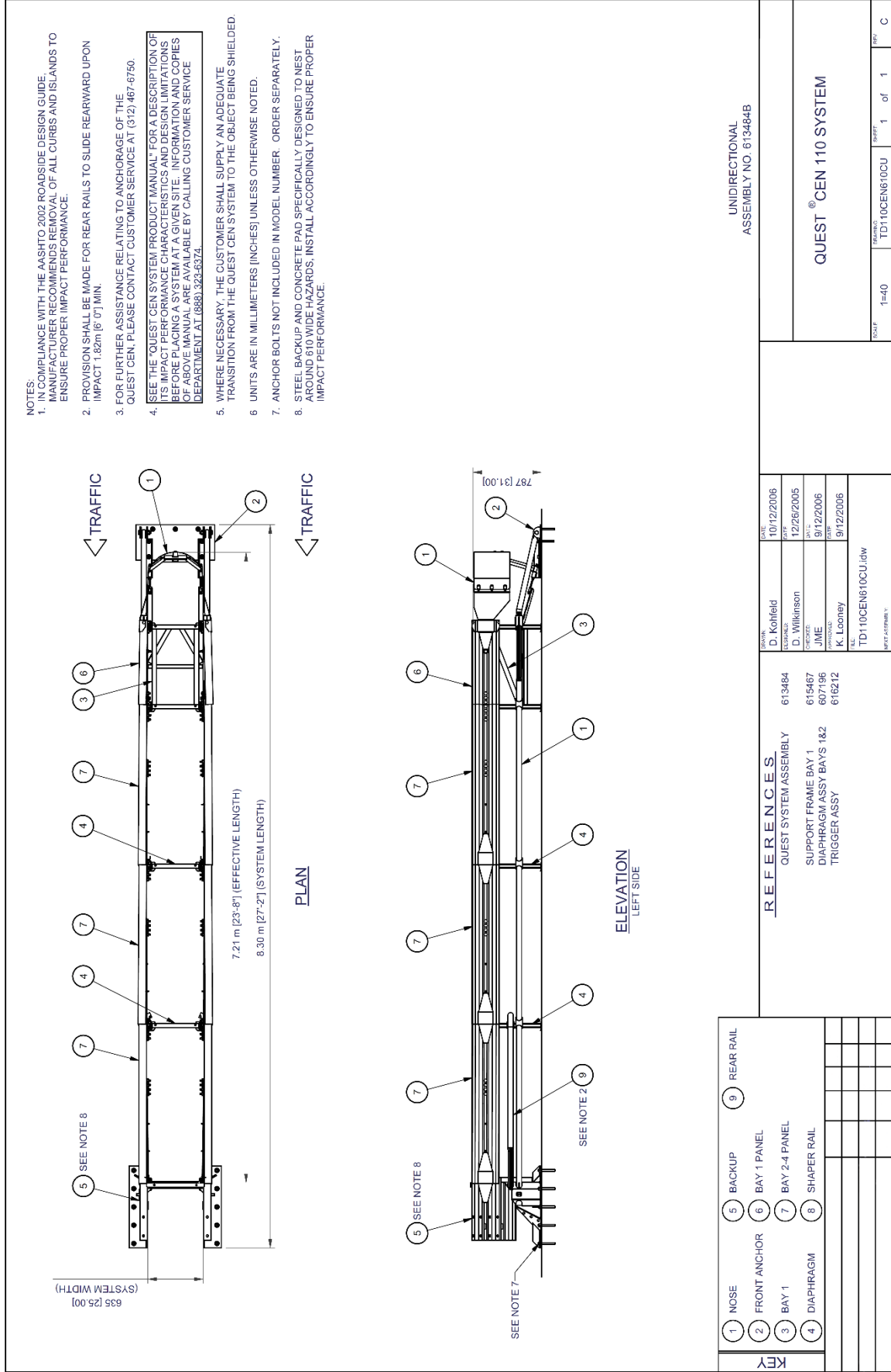
- 1) Make a list of all damaged parts using the part descriptions and part numbers shown on the assembly drawings.
- 2) To contact the Valtir Customer Service Department (p. 3).

Refer to this manual for replacing systems.

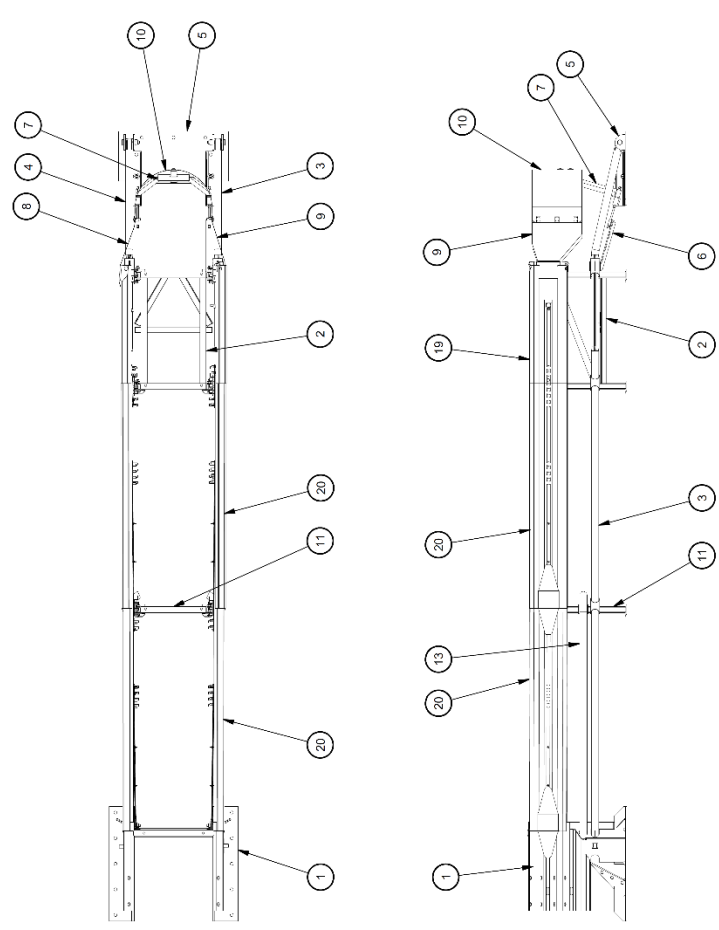


- NOTES:
1. IN COMPLIANCE WITH THE AASHTO 2002 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS TO ENSURE PROPER IMPACT PERFORMANCE.
 2. PROVISION SHALL BE MADE FOR REAR RAILS TO SLIDE REARWARD UPON IMPACT 1.82m [6'-0"] MIN.
 3. FOR FURTHER ASSISTANCE RELATING TO ANCHORAGE OF THE QUEST CEN, PLEASE CONTACT CUSTOMER SERVICE AT (312) 467-6750.
 4. SEE THE "QUEST CEN SYSTEM PRODUCT MANUAL" FOR A DESCRIPTION OF ITS IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS BEFORE PLACING A SYSTEM AT A GIVEN SITE. INFORMATION AND COPIES OF ABOVE MANUAL ARE AVAILABLE BY CALLING CUSTOMER SERVICE DEPARTMENT AT (888) 323-6374.
 5. WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY AN ADEQUATE TRANSITION FROM THE QUEST CEN SYSTEM TO THE OBJECT BEING SHIELDED.
 6. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
 7. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST AROUND 610 WIDE HAZARDS. INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.
 8. UNITS ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE NOTED.

QUEST® CEN 100 SYSTEM TD100CEN610CU



ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604647	BACKUP,24,QUEST	1
2	615467	SUPPORT FRAME ASSY,QUEST,24	1
3	614027	SHAPER RAIL,L,QUEST,80,G	1
4	614033	SHAPER RAIL,R,QUEST,80,G	1
5	617605	ANCHOR FRONT,QUEST,24,G	1
6	616230	TRIGGER STRAP,QUEST,G	2
7	616212	TRIGGER ASSY,QUEST,24	1
8	611642	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641	NOSE TRANSITION,L,QUEST,G,PT	1
10	611678	NOSE,QUEST,G,PT	1
11	607196	DIAPHRAGM ASSY,QUEST,24	1
13	613663	REAR RAIL,QUEST,UNCRIMPED,G	2
14	614733	STRAP,PEEL,REAR,QUEST	2
15	614728	STRAP,PEEL,BAY 2,QUEST	2
17	608415	FLT,ST,1/4X2,13/16X10,7/16,W/HOLES,G	2
18	608513	FLT,ST,1/4X4X14,W/SLOTS,G	2
19	611792	PANEL,BAY 1,QUEST,G	2
20	611796	PANEL,BAYS,QUEST,G	4
21	605343	BRACE,PANEL,QUEST,G	4
22	116933	SCREW,PN,#6-32X1 1/2,PHIL,S	8
23	617005	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
24	003300	WASHER,FLAT,5/8 X 1.3/4, G	6
25	117987	WASHER,FLAT,#6X3/8X,0.30,S	16
26	617010	WASHER,BAR,2X2X1/4,G	2
27	118030	WASHER,FLAT,3/8 ID X1.3/16	32
28	003340	NUT,HX,5/8,G,RAIL	60
29	115909	NUT,HX,#6-32,S	16
30	003704	3/4" HVY HEX NUT A563 DH	2
31	115931	NUT,HX,1,G	10
32	115960	NUT,HX,3/8,G	16
35	113553	BOLT,HX,3/4X2,G5,G	4
36	113538	BOLT,HX,1X5,6S,G	2
37	113530	BOLT,HX,1X3 1/2,G5,G	2
38	113654	BOLT,HX,5/8X1 1/2,G5,G	6
39	113568	BOLT,HX,3/4X3 1/2,G5,G	2
40	113596	BOLT,HX,3/8X1,G5,G	16
41	113568	BOLT,HX,3/4X1,G5,G,ALL THRD	2
42	114461	DECAL,CAUTION,ALL PRODUCTS	1
43	116756	RIVET,ST,S06885,3/16X1/2,DH	1
44	114591	DECAL,PRODUCT,QUEST	1
45	115274	INSTALL INSTRUCTIONS,QUEST,CEN	1
46	115674	MATERIAL SAFETY INFORMATION NOTICE	1
47	003400	BOLT,RAIL,5/8X2,G	54
48	114491	DECAL,CE,QUEST,CEN,80	1
49	614533	SPACER,RAIL,TENSION,QUEST	1
50	118027	WASHER,FLAT,3/4X2,HVY,G	2

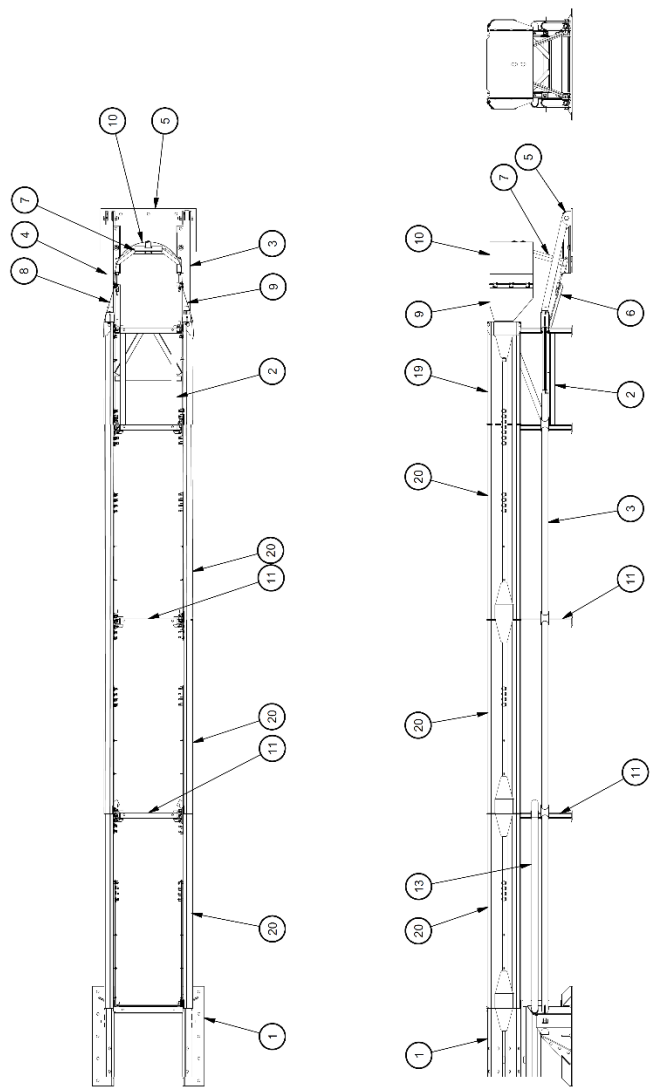


DESIGNER: D. Kohfeld CHECKER: K. Looney		DATE: 8/7/2006 DATE: 9/12/2006	PARTS NO.: TD90CEN610 FILE: 613485.dwg
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DO NOT SCALE DRAWING			
PARTS LIST		QUEST® CEN 80	
ITEM STOCK NO. DESCRIPTION QTY.		REV. K 613485	
		1 of 2	

QUEST® CEN 80 ASSEMBLY 613485

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ITEM	STOCK NO.	DESCRIPTION	QTY.	
1	604647	BACKUP 24 QUEST	1	
2	615467	SUPPORT FRAME ASSY QUEST 24	1	
3	614029	SHAPER RAIL QUEST G	1	
4	614035	SHAPER RAIL QUEST G	1	
5	617605	ANCHOR FRONT QUEST 24 G	1	
6	616230	TRIGGER STRAP QUEST G	2	
7	616212	TRIGGER ASSY QUEST 24	1	
8	611642	NOSE TRANSITION R. QUEST G PT	1	
9	611641	NOSE QUEST G PT	1	
10	611678	NOSE QUEST G PT	1	
11	607198	DIAPHRAGM ASSY QUEST 24	2	
13	619663	REAR RAIL QUEST UNCRIMPED G	2	
14	614733	STRAP PEEL REAR QUEST	2	
15	614728	STRAP PEEL BAY 2 QUEST	2	
16	614732	STRAP PEEL BAY 3 QUEST	2	
17	608415	FLI ST 1/4X2.13/16X10 7/16 W/HOLES G	2	
18	608513	FLI ST 1/4X4X14 W/LOTS G	2	
19	611792	PANEL BAY 1 QUEST G	2	
20	611796	PANEL BAYS QUEST G	6	
21	605343	BRACE PANEL QUEST G	6	
22	118953	SCREW PN#6-32X1 1/2 PHIL S	12	
23	617005	WASHER BAR 1/8X1 1/4X2 ROUNDED G	8	
24	003300	WASHER FLAT 5/8 X 1 3/4 G	6	
25	117987	WASHER FLAT #6X5/8X 0/30 S	24	
26	617010	WASHER BAR 2/2X1/4 G	2	
27	118030	WASHER FLAT 3/8 ID X1 1/2 1/6	46	
28	003340	NUT HX 5/8 G RAIL	8	
29	115909	NUT HX #6-32 S	24	
30	007094	3/4 HVY HEX NUT A563 DH	10	
31	115931	NUT HX 1 G	2	
32	115960	NUT HX 3/8 G	24	
35	113553	BOLT HX 3/4X2 G5 G	4	
36	113538	BOLT HX 1X5 G8 G	2	
37	113530	BOLT HX 1X3 1/2 G5 G	6	
38	113654	BOLT HX 5/8X1 1/2 G5 G	2	
39	113558	BOLT HX 3/4X3 1/2 G5 G	2	
40	113556	BOLT HX 3/8X1 G5 G	24	
41	115968	BOLT HX 3/4X4 G5 G ALL THRD	2	
42	114461	DECAL CAUTION ALL PRODUCTS	1	
43	116758	RIVET ST SD#88S 3/16X1/2 DH	1	
44	114591	DECAL PRODUCT QUEST	1	
45	115274	INSTALL INSTRUCTIONS QUEST CEN	1	
46	115674	MATERIAL SAFETY INFORMATION NOTICE	1	
47	003400	BOLT RAIL 5/8X2 G	72	
48	114480	DECAL CE QUEST CEN 100110	1	
49	614533	SPACER RAIL TENSION QUEST	2	
50	118027	WASHER FLAT 3/4X2 HVY G	2	

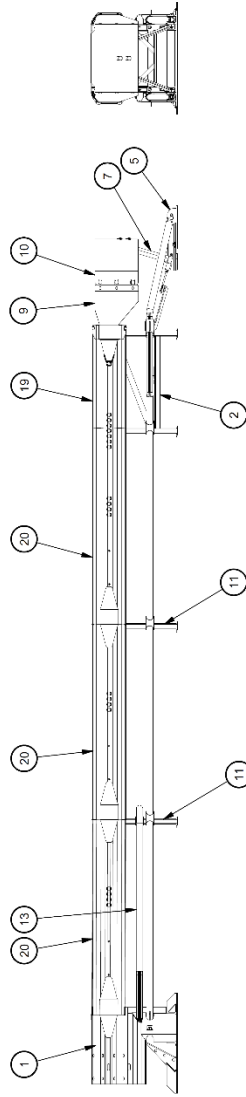
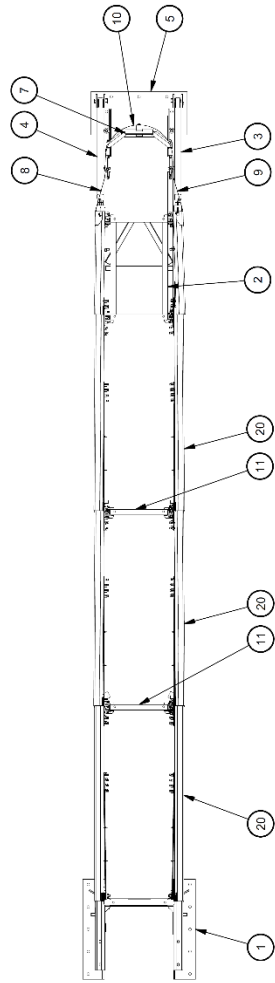


DRAWN: D. Kohfeld CHECKED: 8/1/2016 FILE: TD100CEN610		DATE: 8/1/2016 FILE: 613483.dwg	
TITLE: QUEST CEN 100 ASSEMBLY (PLEASE REFER TO THE DRAWING FOR DIMENSIONS AND TOLERANCES)			
DO NOT SCALE DRAWING			
TOLERANCES UNLESS OTHERWISE SPECIFIED:			
FINISHES UNLESS OTHERWISE SPECIFIED:			
SURFACE FINISH UNLESS OTHERWISE SPECIFIED:			
MATERIALS UNLESS OTHERWISE SPECIFIED:			
DIMENSIONS UNLESS OTHERWISE SPECIFIED:			
WEIGHT UNLESS OTHERWISE SPECIFIED:			
PARTS LIST UNLESS OTHERWISE SPECIFIED:			
REVISIONS UNLESS OTHERWISE SPECIFIED:			
COMMENTS:			
PART NO: 613483		REV: L	
1 of 2			

QUEST® CEN 100 ASSEMBLY 613483

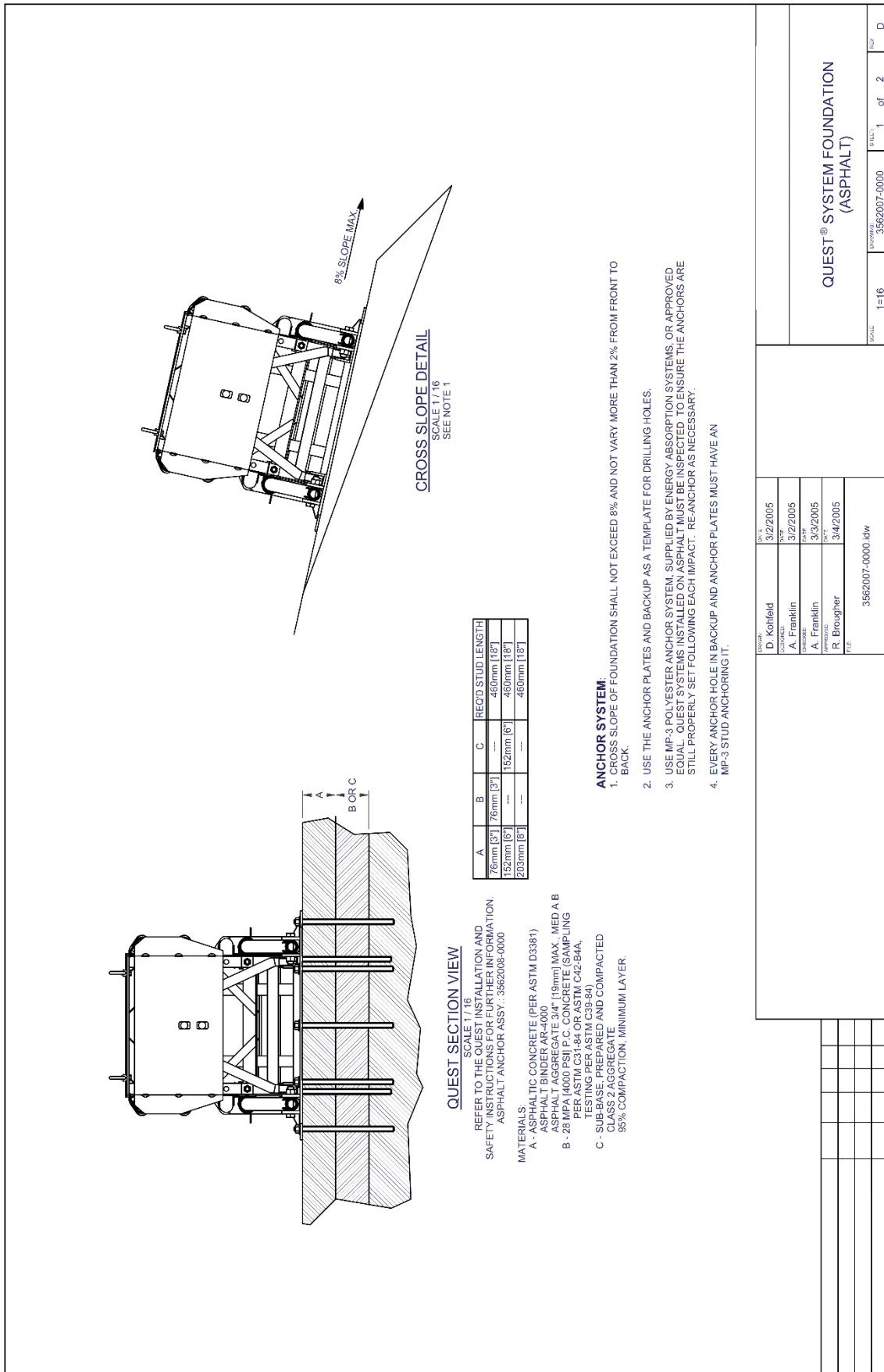
QUEST® CEN 100 SYSTEM

ITEM	STOCK NO.	DESCRIPTION	QTY.
1	60467	BACKUP,24,QUEST	1
2	615467	SUPPORT FRAME ASSY,QUEST,24	1
3	614029	SHAPER RAIL,L,QUEST,G	1
4	614035	SHAPER RAIL,R,QUEST,G	1
5	617605	ANCHOR,FRONT,QUEST,24,G	1
6	616230	TRIGGER STRAP,QUEST,G	2
7	616212	TRIGGER ASSY,QUEST,24	2
8	611642	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641	NOSE TRANSITION,L,QUEST,G,PT	1
10	611678	NOSE,QUEST,G,PT	1
11	607196	DIAPHRAGM ASSY,QUEST,24	2
12	614042	SHAPER BACKUP,QUEST	2
13	613662	REAR RAIL,QUEST,G	2
14	614733	STRAP,PEEL,REAR,QUEST	2
15	614728	STRAP,PEEL,BAY,2,QUEST	2
16	614732	STRAP,PEEL,BAY,3,QUEST	2
17	608415	FLT,ST,1/4X2,13/16X10,7/16,W/PHOLES,G	2
18	608513	FLT,ST,1/4X4X14,W/SLOTS,G	2
19	611792	PANEL,BAY,1,QUEST,G	2
20	611796	PANEL,BAYS,QUEST,G	6
21	605343	BRACE,PANEL,QUEST,G	6
22	116933	SCREW,PN,#6-32X1,1/2,PHIL,S	12
23	617005	WASHER,BAR,1/8X1,1/4X2,ROUNDED,G	8
24	003300	WASHER,FLAT,5/8 X 1.3/4, G	6
25	117987	WASHER,FLAT,#6X6X,030,S	24
26	617010	WASHER,BAR,2X2X1/4,G	2
27	118030	WASHER,FLAT,3/8 ID X13/16	48
28	003340	NUT,HX,5/8,G,RAIL	78
29	115909	NUT,HX,#6-32,S	24
30	003704	3/4" HVY HEX NUT A563,DH	12
31	115931	NUT,HX,1,G	2
32	115960	NUT,HX,3/8,G	24
35	113553	BOLT,HX,3/4X2,G5,G	4
37	113530	BOLT,HX,1X3,1/2,G5,G	2
38	113654	BOLT,HX,5/8X1,1/2,G5,G	6
39	113558	BOLT,HX,3/4X3,1/2,G5,G	6
40	113596	BOLT,HX,3/8X1,G5,G	24
41	113568	BOLT,HX,3/4X4,G5,G,ALL,THRD	2
42	114461	DECAL,CAUTION,ALL,PRODUCTS	1
43	116758	RIVET,ST,SDR88S,3/16X1/2,DH	1
44	114591	DECAL,PRODUCT,QUEST	1
45	115274	INSTALL INSTRUCTIONS,QUEST,GEN	1
46	115674	MATERIAL SAFETY INFORMATION NOTICE	1
47	003400	BOLT,RAIL,5/8X2,G	72
48	114490	DECAL,CE,QUEST,CEN,100/110	1
49	614533	SPACER,RAIL,TENSION,QUEST	2
50	118027	WASHER,FLAT,3/4X2,HVY,G	2

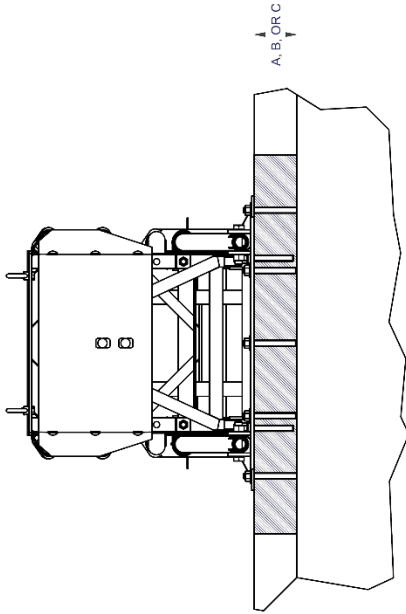


D. Konfeld KWIL <small>UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. DIMENSIONS IN PARENTHESES ARE FOR INFORMATION ONLY.</small>		DATE: 6/30/2006 DATE: 7/14/2006 REF: 613484, idw DO NOT SCALE DRAWING	TD110CEN610 613484, idw
QUEST® CEN 110 SYSTEM		613484 K 1 of 2	

QUEST® CEN 110 ASSEMBLY 613484



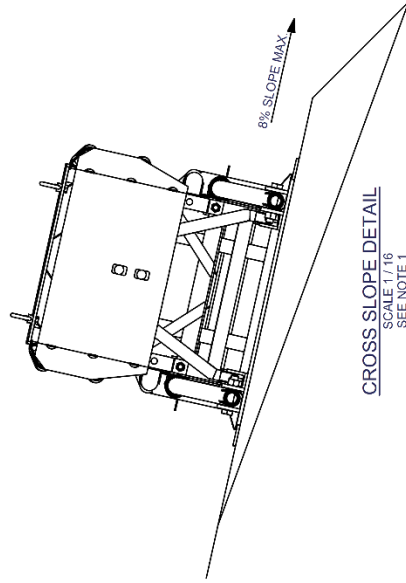
FOUNDATION (ASPHALT) 3562007-0000



QUEST SECTION VIEW

SCALE 1/16
 REFER TO THE QUEST INSTALLATION AND SAFETY INSTRUCTIONS FOR FURTHER INFORMATION.
 REINFORCED CONCRETE ANCHOR ASSY.: 3562009-0000

- MATERIALS:**
 A - 150(18.00) REINFORCED PAD PER REFERENCE DRAWING 3562006-0000
 B - 203(18.00) NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.68m (12' 0") WIDE BY 15.24m (50' 0") LONG, NOT SHOWN.
 C - 180(17.00) REINFORCED DECK STRUCTURE, NOT SHOWN.



CROSS SLOPE DETAIL
 SCALE 1/16
 SEE NOTE 1

ANCHOR SYSTEM:

- CROSS SLOPE OF FOUNDATION SHALL NOT EXCEED 8% AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
- USE THE ANCHOR PLATES AND BACKUP AS A TEMPLATE FOR DRILLING HOLES.
- USE MP-3 POLYESTER ANCHOR SYSTEM, SUPPLIED BY ENERGY ABSORPTION SYSTEMS OR APPROVED EQUIVALENT. QUEST SYSTEMS INSTALLED ON CONCRETE MUST BE INSPECTED TO ENSURE THE ANCHORS ARE STILL PROPERLY SET FOLLOWING EACH IMPACT. RE-ANCHOR AS NECESSARY.
- EVERY ANCHOR HOLE IN THE BACKUP AND ANCHOR PLATE LOCATIONS MUST HAVE AN MP-3 STUD ANCHORING IT.

DRAWN: D. Kohfeld CHECKED: A. Franklin DESIGNED: A. Franklin SPECIFIED: R. Brougher DATE: 3/2/2005 DATE: 3/2/2005 DATE: 3/3/2005 DATE: 3/4/2005 FILE: 3562007-0000.lbw		DATE: 3/2/2005 DATE: 3/2/2005 DATE: 3/3/2005 DATE: 3/4/2005		3562007-0000	
QUEST® SYSTEM FOUNDATION (CONCRETE)				SCALE: 1=16	DRAWING NO: 3562007-0000
		SHEET 2 of 2	REV D	P00021 Rev. 02/02	

FOUNDATION (CONCRETE) 3562007-0000

<p>NOTE: SEE PARTS LIST</p> <p>DO NOT SCALE DRAWING</p>		<p>TOLERANCES PER EAS-SF-001, UNLESS OTHERWISE SPECIFIED.</p>	
<p>PARTS LIST</p>			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	615439G	SUPPORT FRAME ASSY,24,QDCM,G	1
2	613505G	RAIL GUIDE DIAPHRAGM,QUEST,G	2
3	113558G	BOLT,HX,3/4X3 1/2,GE,G	2
4	115954G	NUT,HX3/4",GR,DH	2

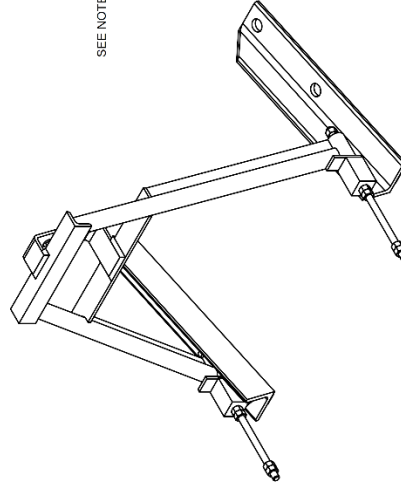
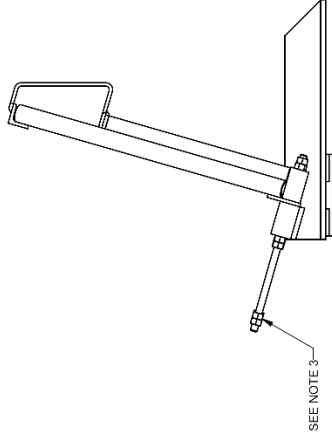
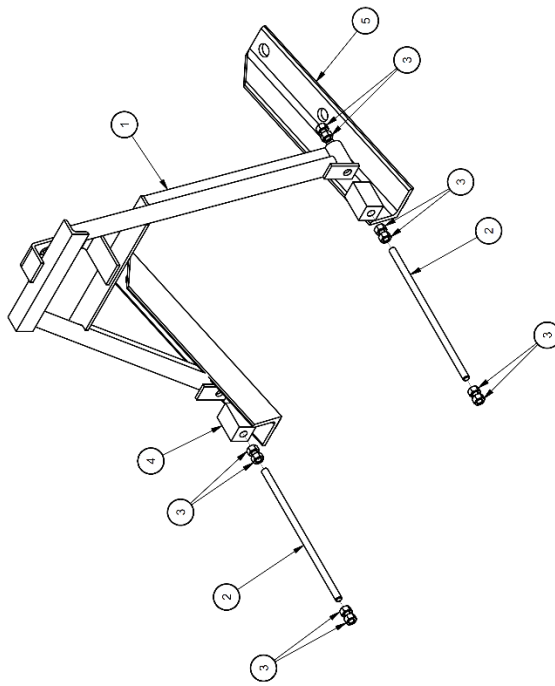
DESIGN	DATE	PART NO.	WEIGHT
D. Kohfeld	4/25/2006	615467B	123.73 lbmass
D. Wilkinson	12/26/2005		
JME	7/7/2006		
KVPL	7/7/2006		

<p>SUPPORT FRAME ASSY,QUEST,24</p>	
<p>UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES</p> <p>AMERICAN LUG NUTS AND WASHERS TO THE LEFT</p> <p>© 2006 VAITIR, INC.</p>	<p>1 of 1</p> <p>B</p>

SUPPORT FRAME ASSEMBLY 615467

TOLERANCES		PARTS LIST	
TOL ANGLUAR	± 1'	ITEM	STOCK NO.
TOL FRACTIONAL	± .016	1	616220G
TOL DECIMAL	± .005	2	116798G
TOL DECIMAL	± .005	3	115940G
UNLESS OTHERWISE SPECIFIED		4	603897G
		5	603694G
			DESCRIPTION
			TRIGGER FRAME,QUEST DCM,G
			ROD,THREADED,1/2X13.1/2,B7,G
			NUT,HX,1/2,G5,G
			ANCHOR,TRIGGER,R,QUEST,G
			ANCHOR,TRIGGER,L,QUEST,G
			QTY
			1
			2
			12
			1
			1

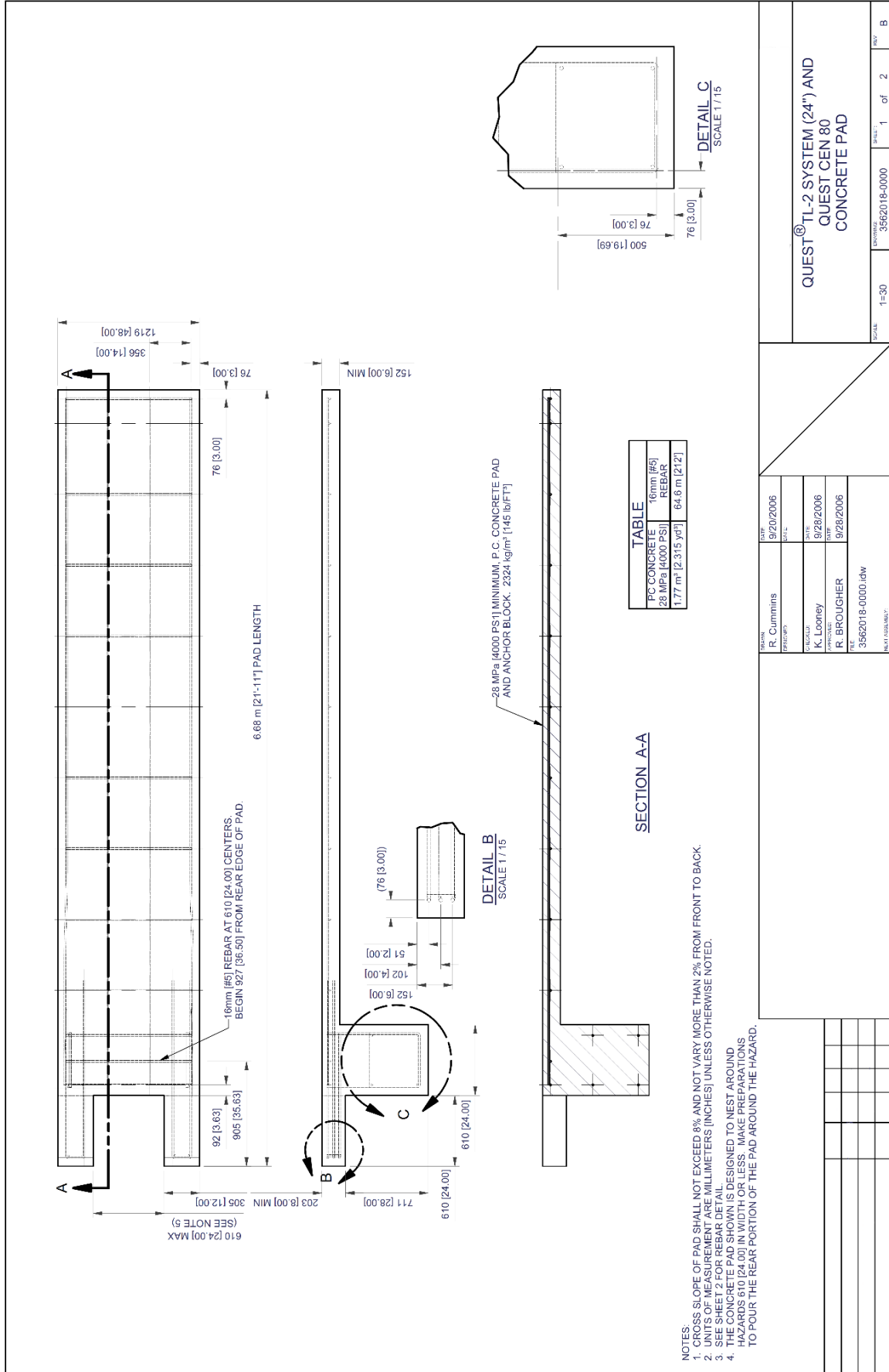
SEE PARTS LIST
DO NOT SCALE DRAWING



- NOTES:
- ASSEMBLE ITEMS AS SHOWN.
 - THREADED ROD INSTALLATION:
 - INSERT THREADED ROD THROUGH ANCHOR AND TRIGGER FRAME.
 - INSTALL ONE NUT ON UPPER SIDE AND TORQUE AGAINST ANCHOR PLATE TO 35 FT. LBS. INSTALL A SECOND NUT ON THE UPPER SIDE AND IAM.
 - NUTS SHOWN AT REAR OF THREADED ROD ARE TO BE LEFT OFF UNTIL TRIGGER STRAPS ARE ATTACHED.

REVISED BY	D. Kohfeld	DATE	4/27/2006	PART NO.	616212B	WEIGHT	42.73 lbmass
DESIGNED BY	D. Wilkinson	DATE	12/27/2005	TRIGGER ASSY,QUEST,24			
CHECKED BY	KRM	DATE	7/14/2006				
APPROVED BY	KWL	DATE	7/14/2006				
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ARE TO UNLESS OTHERWISE SPECIFIED.							
				REV	616212	QTY	1 of 1
				REV		QTY	B

TRIGGER ASSEMBLY 616212



CONCRETE PAD 3562018-0000

NOTES:



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