QUEST® System
TL-2 & TL-3

Product Description
Assembly Manual

Part No. 115249B

Revision A May 2013

TRINITY
HIGHWAY PRODUCTS
ENERGY ABSORPTION SYSTEMS

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TL-2 & TL-3

Product Description
Assembly Manual

TRINITY HIGHWAY PRODUCTS
ENERGY ABSORPTION SYSTEMS

2525 Stemmons Freeway
Dallas, Texas 75207

Important: These instructions are to be used only in conjunction with the assembly, maintenance, and repair of QUEST® System. These instructions are for standard assemblies specified by the appropriate highway authority only. In the event the specified system assembly, maintenance, or repair requires or involves deviation from standard parameters, contact the appropriate highway authority engineer. This system has been accepted by the Federal Highway Administration for use on the national highway system under strict criteria utilized by that agency. Energy Absorption Systems representatives are available for consultation if required.

This Manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Energy Absorption Systems at (888) 323-6374 or download from websites below.

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® System information available to Energy Absorption Systems at the time of printing. We reserve the right to make changes at any time. Please contact Energy Absorption Systems to confirm that you are referring to the most current instructions.

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Customer Service Contacts

Energy Absorption Systems (a Trinity Industries, Inc. company) is committed to the highest level of customer service. Feedback regarding the QUEST® System, its assembly procedures, supporting documentation, and performance are always welcome. Additional information can be obtained by calling the telephone numbers below:

Energy Absorption Systems:

Telephone:	(888) 323-6374 (USA Only) (214) 589-8140 (USA or International)
E-mail:	customerservice@energyabsorption.com
Internet: Energy Absorption Systems Trinity Highway Products, LLC	http://www.energyabsorption.com http://www.highwayguardrail.com

Important Introductory Notes

The purpose of this Manual is to provide assembly and maintenance instructions for the QUEST® System. Please acquire the proper assembly drawings from the manufacturer to use in conjunction with this Manual prior to assembling a QUEST® System.

Proper assembly of the Quest® System is essential to achieve performance of the system under appropriate federal and state criteria. These instructions should be read in their entirety and understood before assembly of the Quest® System. These instructions are to be used only in conjunction with the assembly of the Quest® System and are for standard assemblies only as specified by the applicable highway authority. In the event your system assembly requires or involves deviation from standard parameters or, during the assembly process a question arises regarding a particular assembly step, please contact the appropriate highway authority that specified this system at this location before proceeding. Energy Absorption Systems is available for consultation with that agency. These instructions are intended for an individual who is qualified to both read and accurately interpret them as written. They are intended for the individual who is experienced and skilled in the assembly of highway products which are specified and selected by the highway authority.

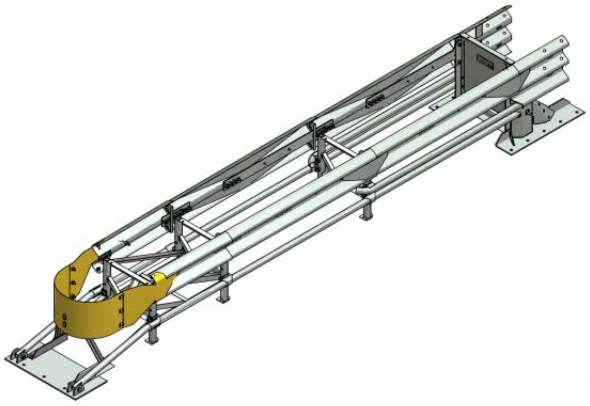
A set of product assembly drawings will be supplied by Energy Absorption Systems. The drawings will be for each section of the assembly. These drawings should be reviewed and studied thoroughly by a qualified individual who is skilled in interpreting them before the start of any assembly.

System Overview

The QUEST® System is available in a variety of widths and lengths.

Three QUEST® System width options may be used to shield hazards up to 610 mm [24”], 760 mm [30”], and 915 mm [36”] in width (See Table on Page 8).

The Steel Backup should be placed against and nest around the hazard, resulting in a shorter overall assembly length.



QUEST® 70/TL-2

QUEST® 100/TL-3

QUEST® 115/TL-3 MOD

Figure 1
(610 mm or 24”) Systems Shown

Performance

The QUEST® System has been tested per the recommended eight test matrix and corresponding evaluation criteria set forth in National Cooperative Highway Research Program (NCHRP) Report 350, 1993*, Test Level 2/70, Test Level 3/100 and Test Level 3 MOD/115 respectively for redirective, non-gating terminals and crash cushions.

*A copy of the report may be obtained from:
Transportation Research Board, National Research Council
2101 Constitution Avenue, N.W., Washington, D.C. 20418

The QUEST® System has been shown to decelerate and stop light and heavy-weight vehicles (820 to 2000 kg [1804 to 4400 lb.]) when impacted head-on at angles up to 15° on the nose at 70 km/h [44 mph], 100 km/h [62 mph] and 115 km/h [71 mph] respectively; and to redirect heavy-weight vehicles (2000 kg [4400 lb.]) when impacting at 70 km/h [44 mph] and 100 km/h [62 mph] respectively along the system's side at 20° or less. Tests were conducted on asphalt and concrete with slopes less than 8° and without curbs.

During head-on impacts, if impacted within NCHRP 350 criteria, the QUEST® System has been shown to telescope rearward and energy is absorbed through momentum transfer, friction and deformation. When impacted from the side, within the same criteria, the QUEST® System has been shown to restrain lateral movement by dynamic tension developed between end restraints and safely redirects the impacting vehicle.

Important: Read safety instructions thoroughly and follow the assembly directions and suggested safe practices before assembling, maintaining, or repairing the QUEST® System. Failure to follow this warning can result in serious injury or death to the worker and/or bystanders. It further compromises the acceptance of this system by the FHWA. Please keep these instructions for later use.

Warning: Ensure that all of the QUEST® System Warnings, Cautions, and Important Statements within the QUEST® System Manual are completely followed. Failure to follow this warning could result in serious injury or death in the event of a collision.

Recommended 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® System. Additional copies of this Manual are available from Energy Absorption Systems by calling (888) 323-6374. Please contact Energy Absorption Systems if you have any questions concerning the information in this Manual or about the QUEST® System.

Always use appropriate safety precautions when operating power equipment, mixing chemicals, and when moving heavy equipment or QUEST® System components. Gloves, safety goggles, apron, and back protection should be used.

Safety measures incorporating traffic control devices must be used to provide safety for personnel while at the assembly, maintenance, or repair site. Please follow the traffic control plan set forth by the appropriate highway authority.

Safety Symbols

This section describes safety symbols that may appear in the QUEST® System Manual. Read the Manual for complete safety, assembly, operating, maintenance, repair, and service information.

Symbol	Meaning
	**Safety Alert Symbol:** Indicates Danger, Warning, or Caution. Failure to read and follow the Danger, Warning, Safety, or Caution indicators could result in serious injury or death to the workers and/or bystanders.

Warnings and Cautions

Read all instructions before assembling, maintaining, or repairing the QUEST® System.

Warning: Do not assemble, maintain, or repair the QUEST® System until you have read this Manual thoroughly and completely understand it. Ensure that all Warnings, Cautions, and Important Statements within the Manual are completely followed. Please call Energy Absorption Systems at (888) 323-6374 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.

Warning: Safety measures incorporating traffic control devices 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: Be sure adequate time is available for complete assembly, maintenance, or repair before beginning the assembly, maintenance, or repair process. Failure to follow this warning could result in serious injury or death in the event of a collision.

Warning: Use only Energy Absorption Systems parts that are specified herein for assembling, maintaining, or repairing the QUEST® System. Do not utilize or otherwise commingle parts from other systems, even if those systems are other Energy Absorption Systems or Trinity Highway Products 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.

Warning: Do NOT modify the QUEST® System in any way. Failure to follow this warning could result in serious injury or death in the event of a collision.

Warning: Ensure that the QUEST® System and delineation used meet all federal, state, specifying agency, and local specifications. Failure to follow this warning could result in serious injury or death in the event of a collision.

Warning: Ensure that your assembly meets all appropriate Manual on Uniform Traffic Control Devices (MUTCD) and local standards. Failure to follow this warning could result in serious injury or death in the event of a collision.

Warning: Ensure that there is proper site grading for QUEST® System placement as dictated by the state or specifying agency, pursuant to Federal Highway Administration (FHWA) acceptance. Failure to follow this warning could result in serious injury or death in the event of a collision.

Selection Criteria

Selection and placement of crash cushions and end terminals must conform to and utilize devices described in:

1) American Association of State Highway and Transportation Officials (AASHTO) 2011 "Roadside Design Guide."
2) U. S. Department of Transportation/Federal Highway Administration (FHWA) Report No. 5040.16 "Crash Cushions, Selection Criteria, and Designs."

Special Site Conditions

Contact Energy Absorption Systems Customer Service Department if you would like input as to your specific 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® System, and as far back as the system's backup. Any curbs that must remain should be no more than 100 mm [4"] high and mountable.
2. **If there is a cross-slope of more than 8% (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® System 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 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 crossover traffic is a concern?** If so, a transition from the back of the system to the hazard is necessary to prevent vehicle snagging (See Page 52, Bidirectional Traffic).
7. **Do the foundation requirements meet or exceed the system footing specification foundation drawings in this Manual?**
8. **Are there any other unique features at the site that may affect positioning or performance of the QUEST® System?** (See Page 52, Bidirectional Traffic)

QUEST® System Model Numbers

QUEST System Model Numbers				
Product Name	**Model No. Unassembled**	**Model No. Preassembled**	**Width**	**Design speed**
QUEST TL-2/70	**TD7024**	**TD7024A**	**610 mm [24”]**	**70 km/h [43 MPH]**
	TD7030	**TD7030A**	**762 mm [30”]**	**70 km/h [43 MPH]**
	TD7036	**TD7036A**	**914 mm [36”]**	**70 km/h [43 MPH]**
QUEST TL-3/100	**TD10024**	**TD10024A**	**610 mm [24”]**	**100 km/h [62 MPH]**
	TD10030	**TD10030A**	**762 mm [30”]**	**100 km/h [62 MPH]**
	TD10036	**TD10036A**	**914 mm [36”]**	**100 km/h [62 MPH]**
QUEST 115	**TD11524**	**TD11524A**	**610 mm [24”]**	**115 km/h [72 MPH]**
	TD11530	**TD11530A**	**762 mm [30”]**	**115 km/h [72 MPH]**
	TD11536	**TD11536A**	**914 mm [36”]**	**115 km/h [72 MPH]**

Parts Identification

Inspect Shipping

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

Note: The parts lists shown on the following pages are for reference only and may not be up to date. For the most accurate parts lists, please refer to the drawing package supplied with the system.

QUEST® System Foundation/Anchoring

Concrete Installations

For concrete installations, the QUEST® system should be installed only on an existing or freshly placed and cured concrete base (28 MPa [4000 psi] minimum). Orientation of the concrete base and the attenuator must comply with the project plans or as otherwise determined by the resident project engineer or appropriate highway authority.

Recommended dimension and reinforcement specifications for new concrete pads can be found on the standard drawings.

Asphalt Installations

For asphalt installations in construction zones, QUEST® System may only be assembled with a Tension-Strut Backup. Assemblies on asphalt must provide a minimum of 76 mm [3”] layer of asphalt over a minimum of 76 mm [3”] layer of Portland Cement concrete, 152 mm [6”] layer of asphalt over 152 mm [6”] layer of subbase, or 203 mm [8”] layer of asphalt with no subbase. 460 mm [18”] threaded rods, installed with the two-part MP-3® grout, must be used for these foundations.

Important: Systems mounted on asphalt must be replaced and mounted on fresh, undisturbed asphalt if more than 10% of anchors are found to be loose, broken, or show signs of pull out. If 10% or fewer anchors are damaged, replace the damaged anchors in the existing asphalt. Anchor bolts used on systems mounted on asphalt must be inspected every 6 months. See Post Impact Instructions and Maintenance and Repair instructions in the QUEST® System Product Description Assembly Manual for details.

The QUEST® system may be installed on any of the following foundations using the specified anchorage:

Foundation A: Concrete Pad or Roadway

Foundation: 150 mm [6”] minimum depth Portland Cement Concrete (P.C.C.)

Anchorage: MP-3® with 180 mm [7”] studs 140 mm [5 1/2”] embedment

Foundation B: Asphalt over P.C.C.

Foundation: 76 mm [3”] minimum asphalt concrete (A.C.) over 76 mm [3”] minimum P.C.C.

Anchorage: Length of anchor required is 180 mm [18”] 420 mm [16 1/2”] embedment

Foundation C: Asphalt over Subbase

Foundation: 150 mm [6"] minimum A.C. over 150 mm [6”] minimum Compacted Subbase (C.S.)

Anchorage: MP-3 with 460 mm [18"] studs 420 mm [16 1/2”] embedment

Foundation D: Asphalt Only

Foundation: 200 mm [8”] minimum A.C.

Anchorage: MP-3 with 460 mm [18”] studs - 420 mm [16 1/2”] embedment

Foundation Specifications

for Foundations A, B, C and D mentioned above:

A.C. (Asphalt Concrete)

AR-4000 A.C. (per ASTM D3381 '83) 3/4” Maximum, Medium (Type A or B) aggregate

Sieve Size	Operating Range (%) Passing
1"	100
3/4"	95-100
3/8"	65-80
No. 4	49-54
No. 8 3	6-40
No. 30 1	8-21
No. 200	3-8

Caution: Walk-up inspections are recommended at least once every six months for installations on asphalt.

P.C.C. (Portland Cement Concrete)

Stone aggregate concrete mix

4000 psi minimum compressive strength

(Sampling per ASTM C31-84 or ASTM C42-84a, testing per ASTM C39-84)

C.S. (Compacted Subbase)

150 mm [6”] minimum depth 95% compaction

Class 2 aggregate

Sieve Size	Moving Average % Passing
3"	100
2 1/2"	90-100
No. 4	40-90
No. 200	0-25

QUEST® 70/TL-2

Parts List (QUEST® 70)			
Item	**Stock No.**	**Description**	**Qty.**
1	(SEE TABLE)	BACKUP,__,QUEST,G	1
2	(SEE TABLE)	SUPPORT FRAME ASSY,__,QUEST	1
3	614027G	SHAPER RAIL,L,QUEST,80,G	1
4	614033G	SHAPER RAIL,R,QUEST,80,G	1
5	SEE TABLE	ANCHOR,FRONT,QUEST,G	1
6	616230G	TRIGGER STRAP,QUEST,G	2
7	(SEE TABLE)	TRIGGER ASSY,__,QUEST	1
8	611642G	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641G	NOSE TRANSITION,L,QUEST,G,PT	1
10	(SEE TABLE)	NOSE,__,QUEST,G,PT	1
11	(SEE TABLE)	DIAPHRAGM ASSY,__,QUEST	1
12	N/A		
13	613663G	REAR RAIL,QUEST,G (UNCRIMPED)	2
14	614733B	STRAP,PEEL,REAR,QUEST	2
15	614728B	STRAP,PEEL,BAY 2,QUEST	2
16	N/A		
17	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/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,G	4
21	605343G	BRACE,PANEL,QUEST,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	118052G	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 X13/16 OD,P,HRD	32
28	003340G	NUT,HX,5/8,G,RAIL	60
29	115914B	NUT,HX,#6-32,S	16
30	003704G	NUT,HX,3/4",GR DH	10
	N/A		
	N/A		
33	115971G	NUT,HX,5/8,G,GR DH	6
	N/A		
35	113553G	BOLT,HX,3/4X2,G5,G	4
36	113538G	BOLT,HX,1X5,G8,G	2
37	113530G	BOLT,HX,1X3 1/2,G5,G	2
38	113654G	BOLT,HX,5/8X1 1/2,G5,G	6
39	113558G	BOLT,HX,3/4X3 1/2,G5,G	2
40	113596G	BOLT,HX,3/8X1,G2,G	16
41	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
42	003400G	BOLT,RAIL,5/8X2,G	54
43	614533B	SPACER,RAIL TENSION,QUEST	2
44	118027G	WASHER,FLAT,3/4X2,HVY,G	2

	(System Width)			
ITEM	**610 mm/24"**	**760 mm/30"**	**915 mm/36"**	**DESCRIPTION**
1	604647G	604648G	604650G	BACKUP,___,QUEST,G
2	615467B	615443B	615444B	SUPPORT FRAME ASSY,___,QUEST
5	617605G	617613G	617616G	ANCHOR,FRONT,QUEST,___,G
7	616212B	616208B	616209B	TRIGGER ASSY,___,QUEST
10	611678W	611650W	611651W	NOSE,___,QUEST,G,PT
11	607196B	606806B	606808B	DIAPHRAGM ASSY,___,QUEST

QUEST® 100/TL-3

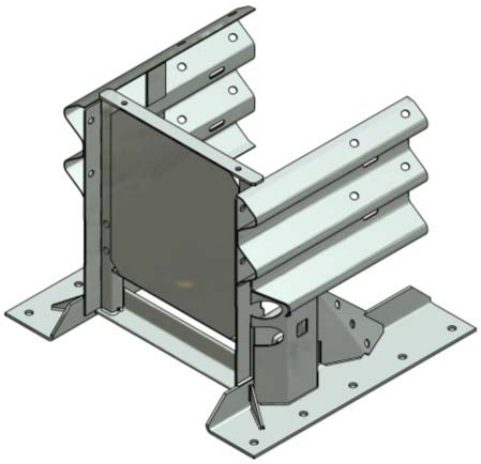
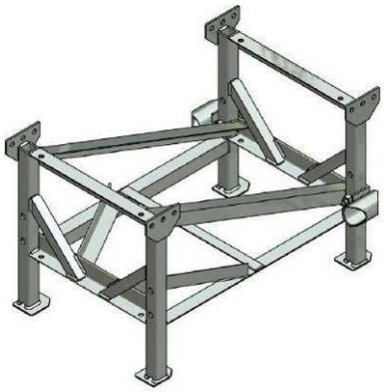
Parts List (QUEST® 100)			
Item	**Stock No.**	**Description**	**Qty.**
1	(SEE TABLE)	BACKUP,__,QUEST,G	1
2	(SEE TABLE)	SUPPORT FRAME ASSY,__,QUEST	1
3	614029G	SHAPER RAIL,L,QUEST,G	1
4	614035G	SHAPER RAIL,R,QUEST,G	1
5	SEE TABLE	ANCHOR,FRONT,QUEST,G	1
6	616230G	TRIGGER STRAP,QUEST,G	2
7	(SEE TABLE)	TRIGGER ASSY,__,QUEST	1
8	611642G	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641G	NOSE TRANSITION,L,QUEST,G,PT	1
10	(SEE TABLE)	NOSE,__,QUEST,G,PT	1
11	(SEE TABLE)	DIAPHRAGM ASSY,__,QUEST	2
12	614042G	SHAPER,BACKUP,QUEST,G	2
13	613662G	REAR RAIL,QUEST,G	2
14	614733B	STRAP,PEEL,REAR,QUEST	2
15	614728B	STRAP,PEEL,BAY 2,QUEST	2
16	614732B	STRAP,PEEL, BAY 3,QUEST	2
17	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/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	118052G	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 X13/16 OD,P,HRD	48
28	003340G	NUT,HX,5/8,G,RAIL	78
29	115914B	NUT,HX,#6-32,S	24
30	003704G	NUT,HX,3/4",GR DH	12
31	115931G	NUT,HX,1,G	2
32	115960G	NUT,HX,3/8,G	24
	N/A		
	N/A		
35	113553G	BOLT,HX,3/4X2,G5,G	4
36	113538G	BOLT,HX,1X5,G8,G	2
37	113530G	BOLT,HX,1X3 1/2,G5,G	2
38	113654G	BOLT,HX,5/8X1 1/2,G5,G	6
39	113558G	BOLT,HX,3/4X3 1/2,G5,G	4
40	113596G	BOLT,HX,3/8X1,G2,G	24
41	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
42	003400G	BOLT,RAIL,5/8X2,G	72
43	614533B	SPACER,RAIL TENSION,QUEST	2
44	118027G	WASHER,FLAT,3/4X2,HVY,G	2

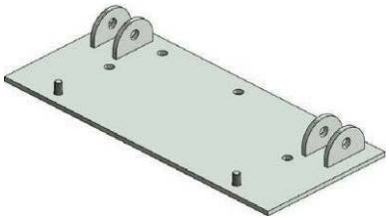
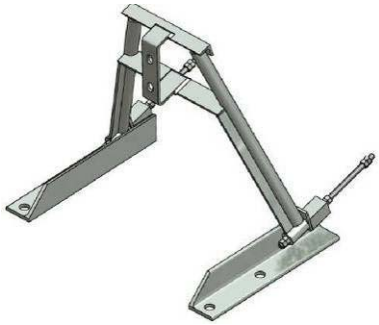
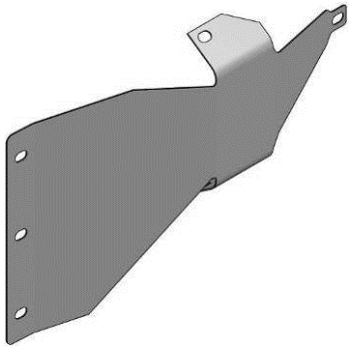
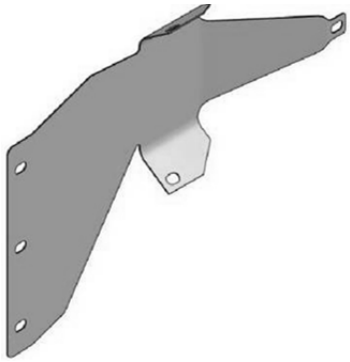
	(System Width)			
ITEM	**610 mm/24"**	**760 mm/30"**	**915 mm/36"**	**DESCRIPTION**
1	604647G	604648G	604650G	BACKUP,___,QUEST,G
2	615467B	615443B	615444B	SUPPORT FRAME ASSY,___,QUEST
5	617605G	617613G	617616G	ANCHOR,FRONT,QUEST,___,G
7	616212B	616208B	616209B	TRIGGER ASSY,___,QUEST
10	611678W	611650W	611651W	NOSE,___,QUEST,G,PT
11	607196B	606806B	606808B	DIAPHRAGM ASSY,___,QUEST

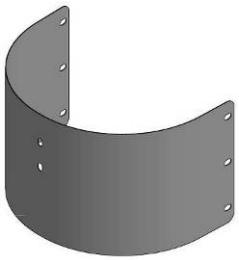
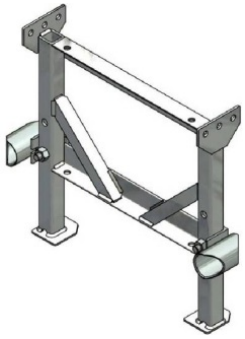
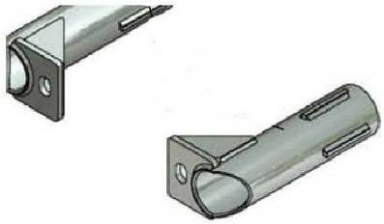
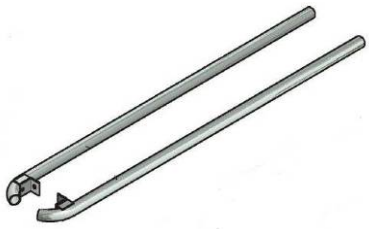
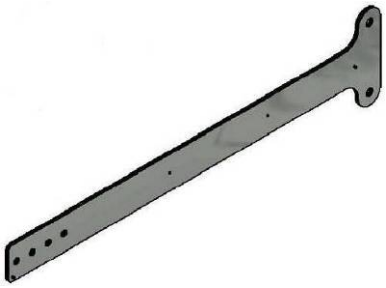
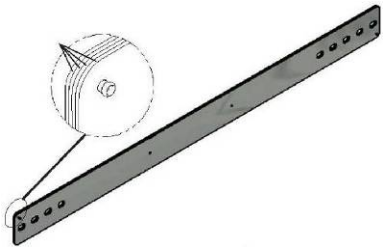
QUEST® 115/TL-3 MOD

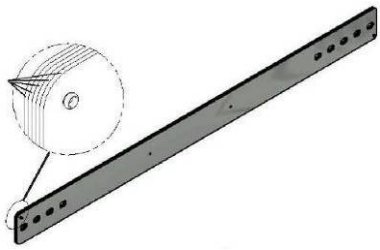
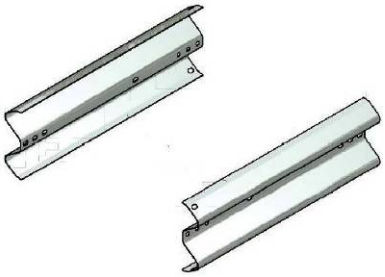
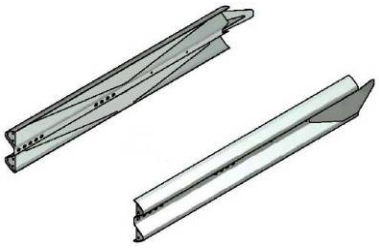
Parts List (QUEST® 115)			
Item	**Stock No.**	**Description**	**Qty.**
1	(SEE TABLE)	BACKUP,__,QUEST,G	1
2	(SEE TABLE)	SUPPORT FRAME ASSY,__,QUEST	1
3	614029G	SHAPER RAIL,L,QUEST,G	1
4	614035G	SHAPER RAIL,R,QUEST,G	1
5	SEE TABLE	ANCHOR,FRONT,QUEST,G	1
6	616230G	TRIGGER STRAP,QUEST,G	2
7	(SEE TABLE)	TRIGGER ASSY,__,QUEST	1
8	611642G	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641G	NOSE TRANSITION,L,QUEST,G,PT	1
10	(SEE TABLE)	NOSE,__,QUEST,G,PT	1
11	(SEE TABLE)	DIAPHRAGM ASSY,__,QUEST	3
12	614042G	SHAPER,BACKUP,QUEST,G	2
13	613662G	REAR RAIL,QUEST,G	2
14	614733B	STRAP,PEEL,REAR,QUEST	2
15	614728B	STRAP,PEEL,BAY 2,QUEST	4
16	614732B	STRAP,PEEL, BAY 3,QUEST	2
17	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/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	8
21	605343G	BRACE,PANEL,QUEST CEN,G	8
22	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	16
23	617005G	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
24	118052G	WASHER,FLAT,5/8 X 1 3/4, G	6
25	117987B	WASHER,FLAT,#6X5/8X.030,S	32
26	617010G	WASHER,BAR,2X2X1/4,G	2
27	118030G	WASHER,FLAT,3/8 ID X13/16 OD,P,HRD	64
28	003340G	NUT,HX,5/8,G,RAIL	96
29	115914B	NUT,HX,#6-32,S	32
30	003704G	NUT,HX,3/4",GR DH	12
31	115931G	NUT,HX,1,G	2
32	115960G	NUT,HX,3/8,G	32
	N/A		
	N/A		
35	113553G	BOLT,HX,3/4X2,G5,G	4
36	113538G	BOLT,HX,1X5,G8,G	2
37	113530G	BOLT,HX,1X3 1/2,G5,G	2
38	113654G	BOLT,HX,5/8X1 1/2,G5,G	6
39	113558G	BOLT,HX,3/4X3 1/2,G5,G	6
40	113596G	BOLT,HX,3/8X1,G2,G	32
41	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
42	003400G	BOLT,RAIL,5/8X2,G	90
43	614533B	SPACER,RAIL TENSION,QUEST	2
44	118027G	WASHER,FLAT,3/4X2,HVY,G	2

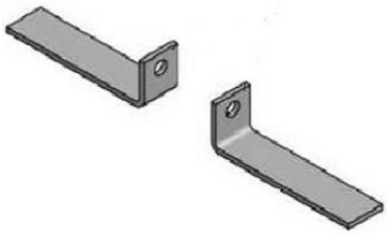
	(System Width)			
ITEM	**610 mm/24"**	**760 mm/30"**	**915 mm/36"**	**DESCRIPTION**
1	604647G	604648G	604650G	BACKUP,___,QUEST,G
2	615467B	615443B	615444B	SUPPORT FRAME ASSY,___,QUEST
5	617605G	617613G	617616G	ANCHOR,FRONT,QUEST,___,G
7	616212B	616208B	616209B	TRIGGER ASSY,___,QUEST
10	611678W	611650W	611651W	NOSE,___,QUEST,G,PT
11	607196B	606806B	606808B	DIAPHRAGM ASSY,___,QUEST

	**ITEM 1** 604647G BACKUP,610 mm/24”, QUEST,G (1) or 604648G BACKUP,760 mm/30”, QUEST,G (1) or 604650G BACKUP,915 mm/36”,QUEST,G (1)
	**ITEM 2** 615467B SUPPORT FRAME ASSY,610 mm/24”, QUEST (1) or 615443B SUPPORT FRAME ASSY,760 mm/30”, QUEST (1) or 615444B SUPPORT FRAME ASSY,914 mm/36”, QUEST (1)
	**ITEM 3** 614027G SHAPER RAIL,L, QUEST 70/TL-2,G (1) or 614029G SHAPER RAIL,L, QUEST 100/TL-3,G (1) or 614025G SHAPER RAIL,L, QUEST 115/TL-3 MOD,G (1)
	**ITEM 4** 614033G SHAPER RAIL, R, QUEST 70/TL-2,G (1) or 614035G SHAPER RAIL, R, QUEST 100/TL-3,G (1) or 614031G SHAPER RAIL,R, QUEST 115/TL-3 MOD,G (1)

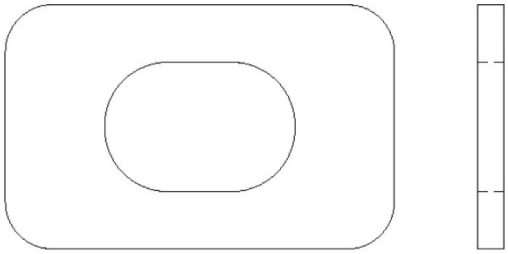
	**ITEM 5** 6176056 ANCHOR,FRONT, QUEST,610 mm/24",G (1) or 617613G ANCHOR,FRONT, QUEST,760 mm/30",G (1) or 617616G ANCHOR,FRONT, QUEST,915 mm/36",G (1)
	**ITEM 6** 616230G TRIGGER STRAP,QUEST, G,PT (1)
	**ITEM 7** 616212B TRIGGER ASSY,610 mm/24”,QUEST (1) or 616208G TRIGGER ASSY,760 mm/30”,QUEST (1) or 616209B TRIGGER ASSY,915 mm/36”,QUEST (1)
	**ITEM 8** 611642G NOSE TRANSITION,R,QUEST,G,PT
	**ITEM 9** 616641G NOSE TRANSITION,L,QUEST,G,PT

	**ITEM 10** 611678G NOSE, 610mm/24”,QUEST,G,PT(1) or 611650G NOSE, 760mm/30”,QUEST,G,PT(1) or 611651G NOSE, 915 mm/36”,QUEST,G,PT (1)
	**ITEM 11** 607146B DIAPHRAGM ASSY,610 mm/24”, QUEST or 606806B DIAPHRAGM ASSY,760 mm/30”, QUEST or 606808B DIAPHRAGM ASSY,915 mm/36”, QUEST
	**ITEM 12** 614042G SHAPER,BACKUP, QUEST,G (2) QUEST 100/TL-3 and QUEST 115/TL-3 MOD
	**ITEM 13** 613663G REAR RAIL, QUEST UNCRIMPED,G (2) QUEST® 70/TL-2 only 613662G REAR RAIL,QUEST,G (2) QUEST® 100/TL-3 and QUEST® 115/TL-3 MOD
	**ITEM 14** 614733B STRAP,PEEL,REAR, QUEST (2)
	**ITEM 15** 614728B STRAP,PEEL,BAY 2, QUEST QUEST® 70/TL-2 (2) only

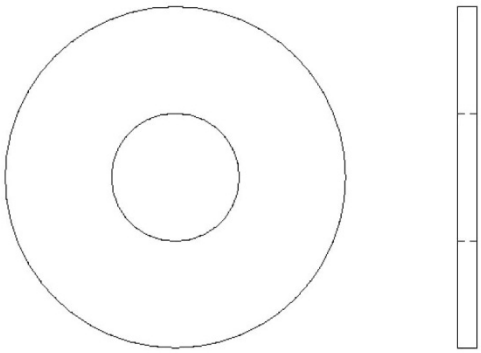
	**ITEM 16** 614732B STRAP,PEEL, BAY 3, QUEST (2) QUEST®100/TL-3 and QUEST® 115/TL-3 MOD
	**ITEM 17** 608415B FLT ST 1/4X2 13/16x10 7/17, W/HOLES,6 (2) QUEST® 100/TL-3 and QUEST® 115/TL-3 MOD
	**ITEM 18** 608513G FLT ST 1/4X4X14,W/SLOTS,G (2)
	**ITEM 19** 611792G PANEL,BAY 1, QUEST,G (2)
	**ITEM 20** 611796G PANEL,BAYS, QUEST,GQUEST® 70/TL-2 (4) QUEST® 100/TL-3 (6)QUEST® 115/TL-3 MOD (8)
	**ITEM 21** 605343G BRACE,PANEL, QUEST,G QUEST® 70/TL-2 (4) QUEST® 100/TL-3 (6) QUEST® 115/TL-3 MOD (8)

	**ITEM 43** 614533B SPACER,RAIL,TENSION, QUEST, PT,Y (2)

ITEM 22 116933B SCREW,PN,#6-32X1 1/2,PHIL,S
QUEST® 70/TL-2 (8)
QUEST® 100/TL-3 (12)
QUEST® 115/TL-3 MOD (16)

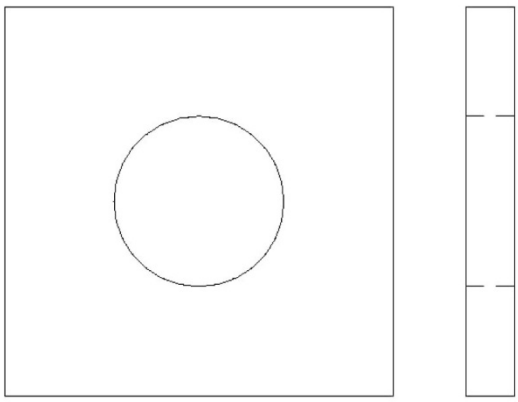


ITEM 23 617005G WASHER,BAR, 1/8X1 1/4X2 ROUNDED, G (8)

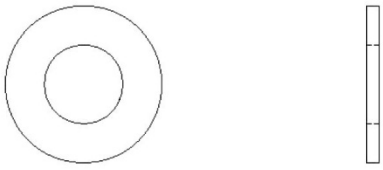


ITEM 24 118052G WASHER, FLAT,5/8X1 3/4,G (6)

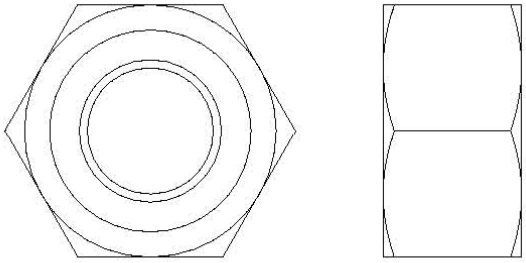
ITEM 25 117987B WASHER, FLAT,#6X5/8X.030,S
QUEST® 70/TL-2 (16)
QUEST® 100/TL-3 (24)
QUEST® 115/TL-3 MOD (32)



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

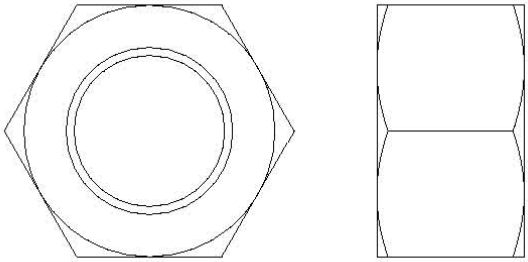


ITEM 27 118030G WASHER, FLAT, 3/8 ID X 13/16 OD, P, HRD
QUEST® 70/TL-2 (32)
QUEST® 100/TL-3 (48)
QUEST® 115/TL-3 MOD (64)

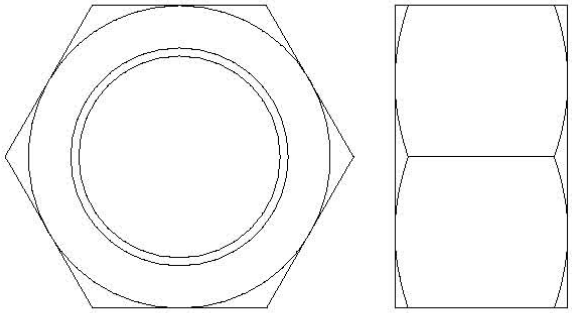


ITEM 28 003340G NUT, HX, 5/8,G,RAIL
QUEST® 70/TL-2 (60)
QUEST® 100/TL-3 (78)
QUEST® 115/TL-3 MOD (96)

ITEM 29 115914B NUT, HX,6-32,S
QUEST® 70/TL-2 (16)
QUEST® 100/TL-3 (24)
QUEST® 115/TL-3 MOD (32)

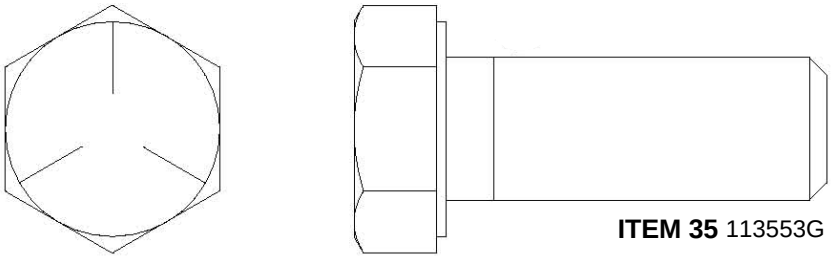


ITEM 30 003704G NUT,HX, 3/4,GR DH
QUEST® 70/TL-2 (10)
QUEST® 100/TL-3 (12)
QUEST® 115/TL-3 MOD (12)

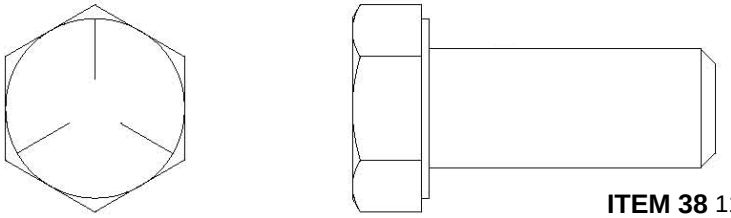


ITEM 31 115931G NUT, HX, 1, G (2)

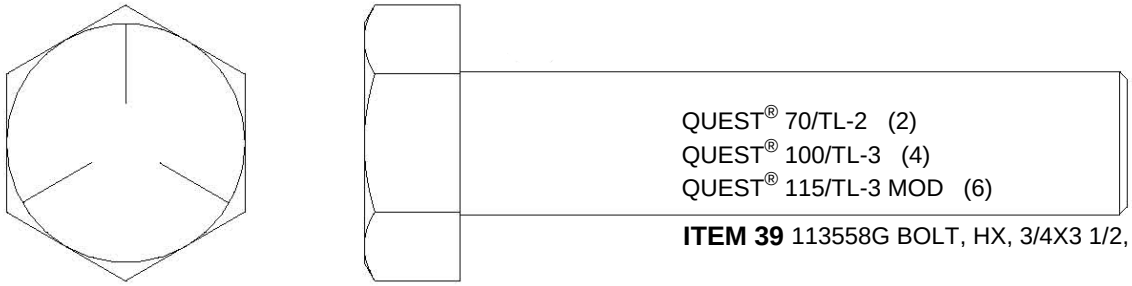
ITEM 32 115960G NUT, HX, 3/8, G
QUEST® 70/TL-2 (16)
QUEST® 100/TL-3 (24)
QUEST® 115/TL-3 MOD (32)



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



ITEM 38 113654G BOLT, HX, 5/8X1 1/2, G5, G (6)

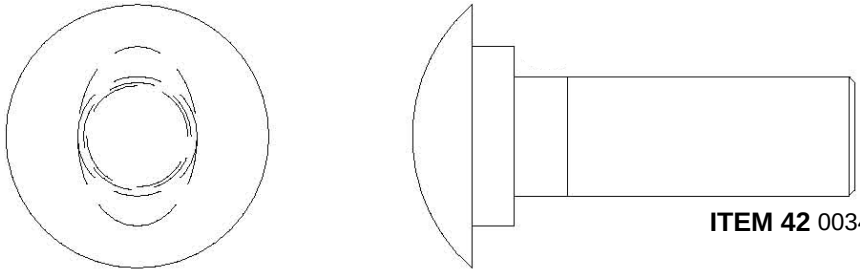


QUEST® 70/TL-2 (2)
QUEST® 100/TL-3 (4)
QUEST® 115/TL-3 MOD (6)

ITEM 39 113558G BOLT, HX, 3/4X3 1/2, G5, G

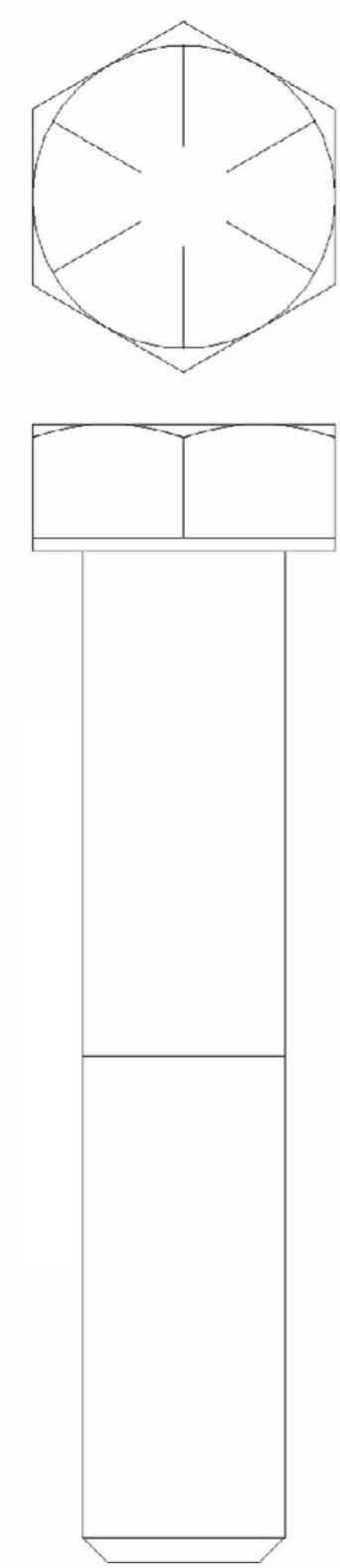
QUEST® 70/TL-2 (16)
QUEST® 100/TL-3 (24)
QUEST® 115/TL-3 MOD (32)

ITEM 40 113596G BOLT, HX, 3/8X1, G2, G

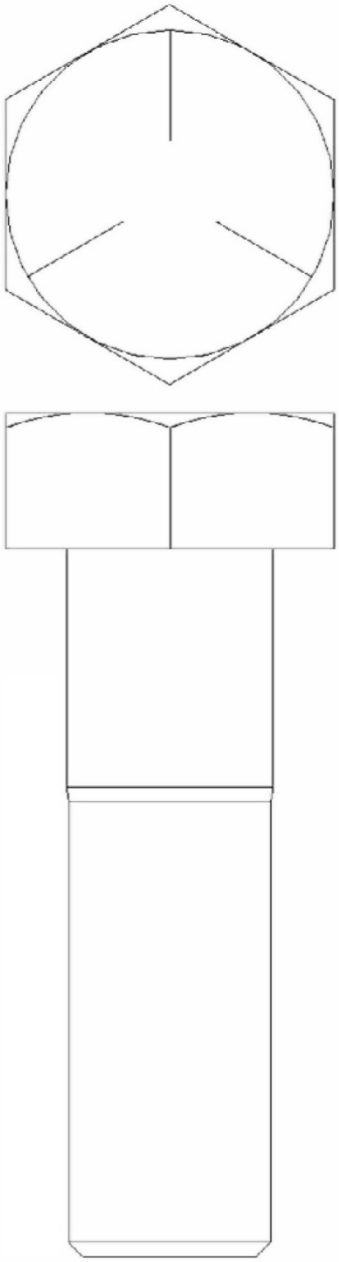


QUEST® 70/TL-2 (54)
QUEST® 100/TL-3 (72)
QUEST® 115/TL-3 MOD (90)

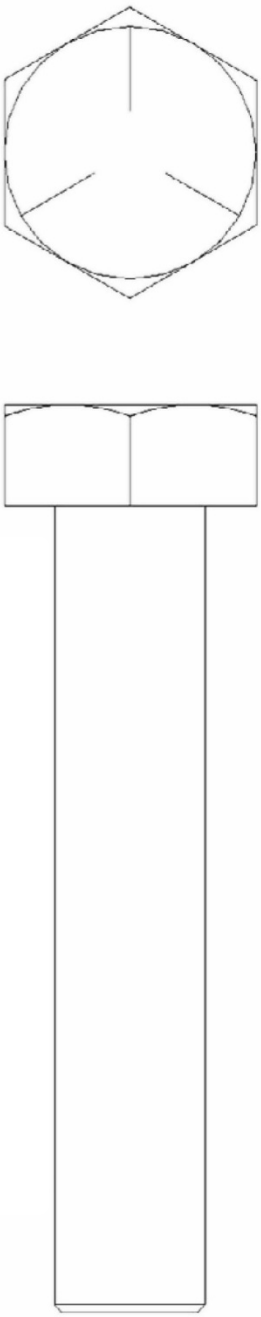
ITEM 42 003400G BOLT, RAIL, 5/8X2, G



ITEM 36 113538G BOLT,
HX, 3/4X2, G5, G (4)



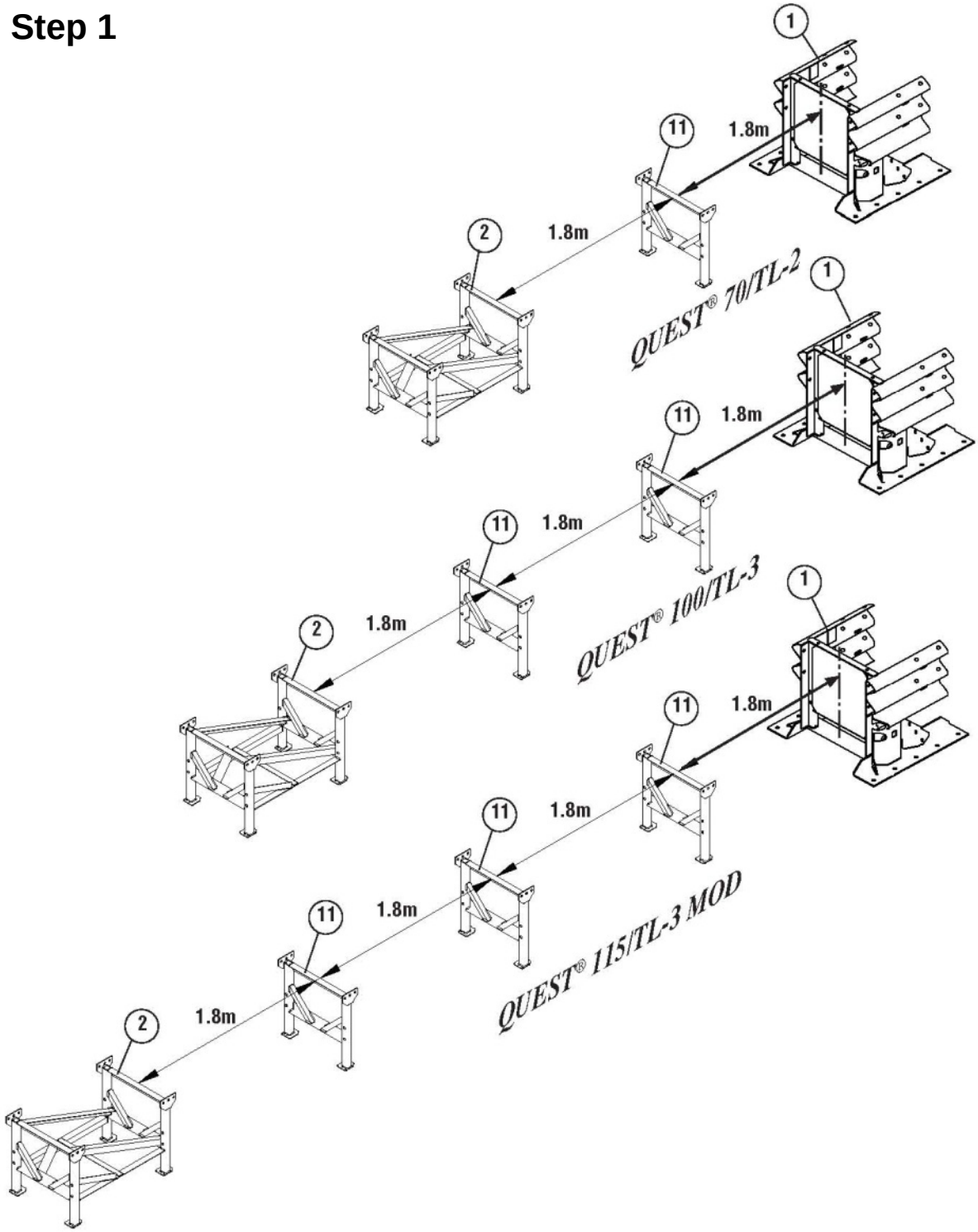
ITEM 37 113530G BOLT,
HX, 3/4X2, G5, G (4)



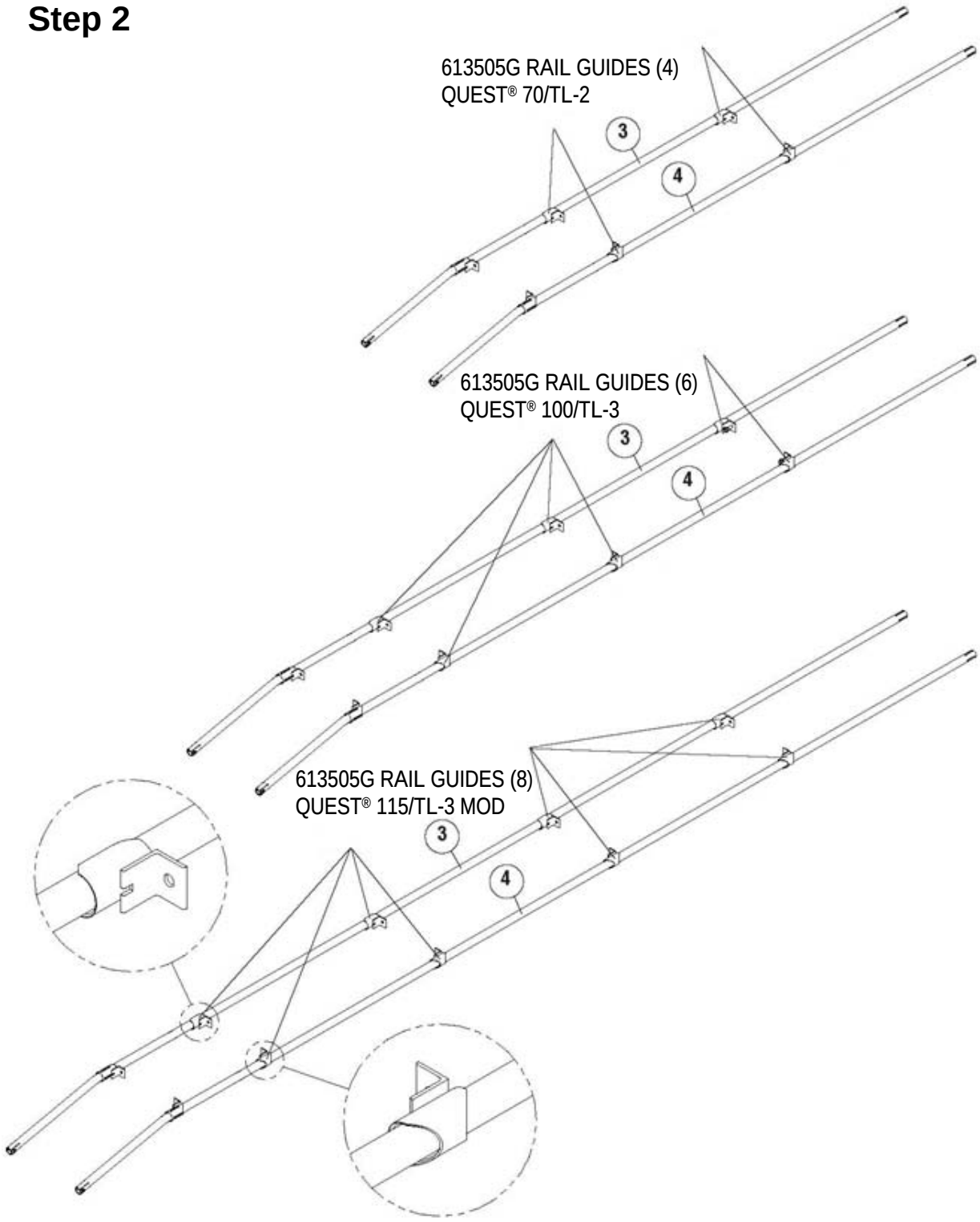
ITEM 41 113568G BOLT,
HX, 3/4X2, G5, G (4)

Pictorial Assembly

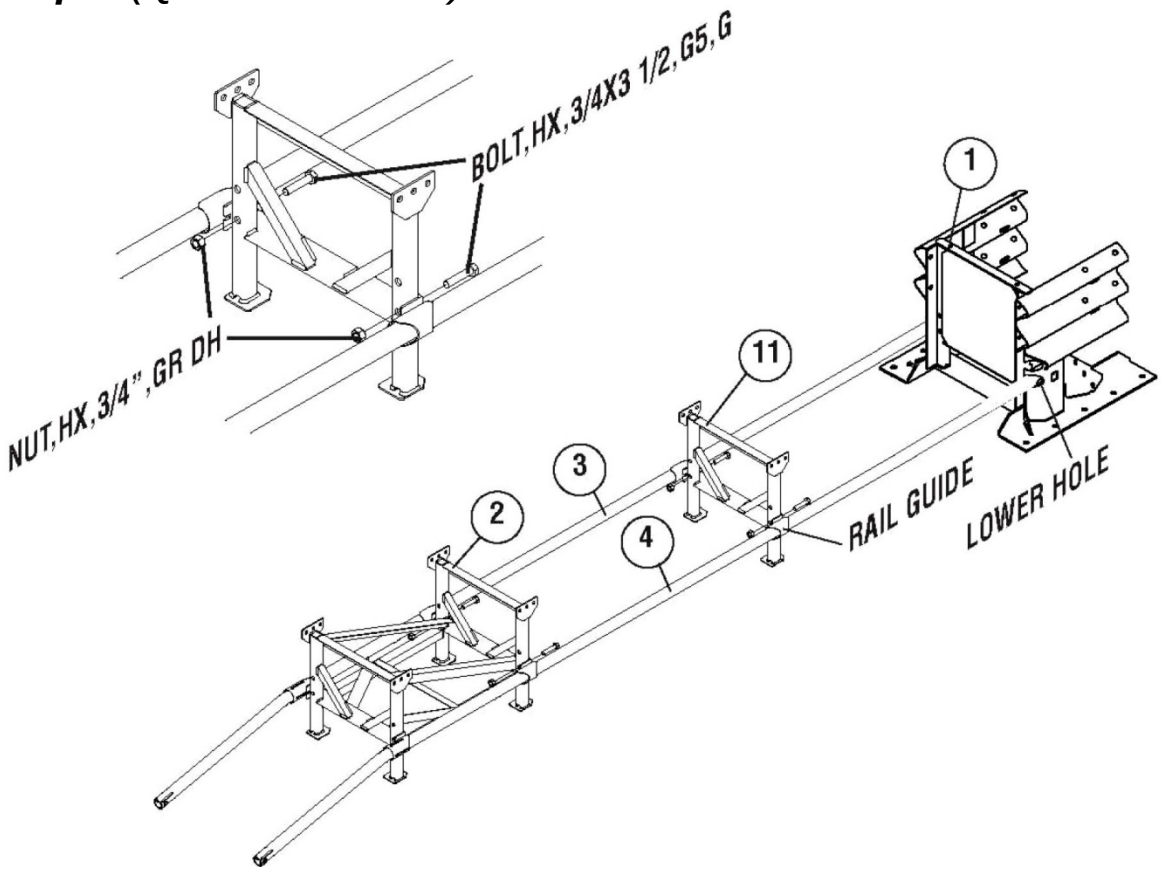
Step 1

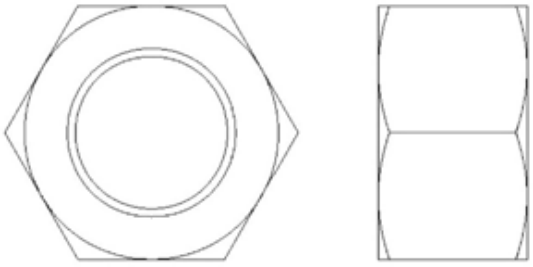


Step 2

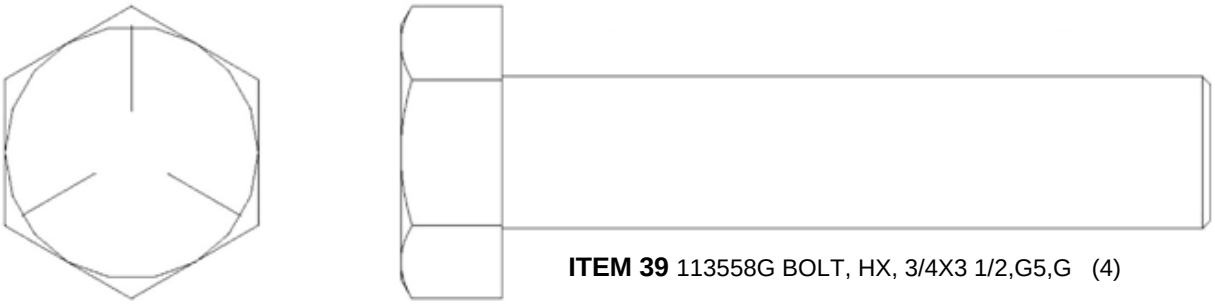


Step 3 *(QUEST 70/TL-2)*



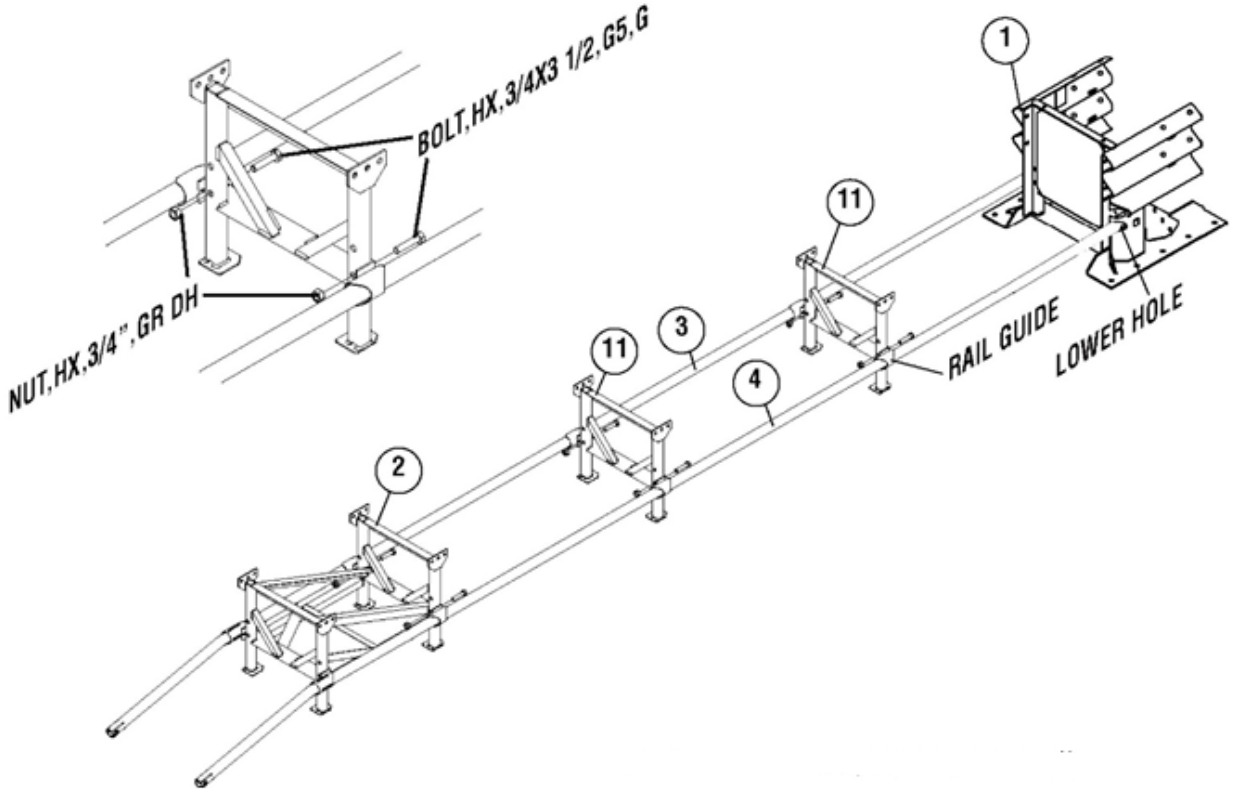


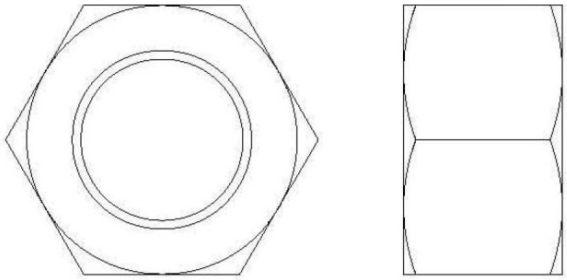
ITEM 30 003704G NUT.HX, 3/4", GR DH (4)



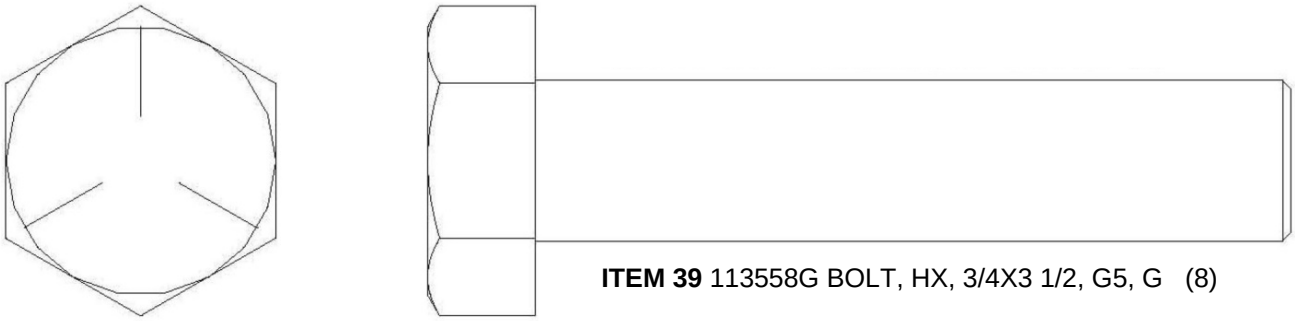
ITEM 39 113558G BOLT, HX, 3/4X3 1/2,G5,G (4)

Step 3 *(QUEST® 100/TL-3)*



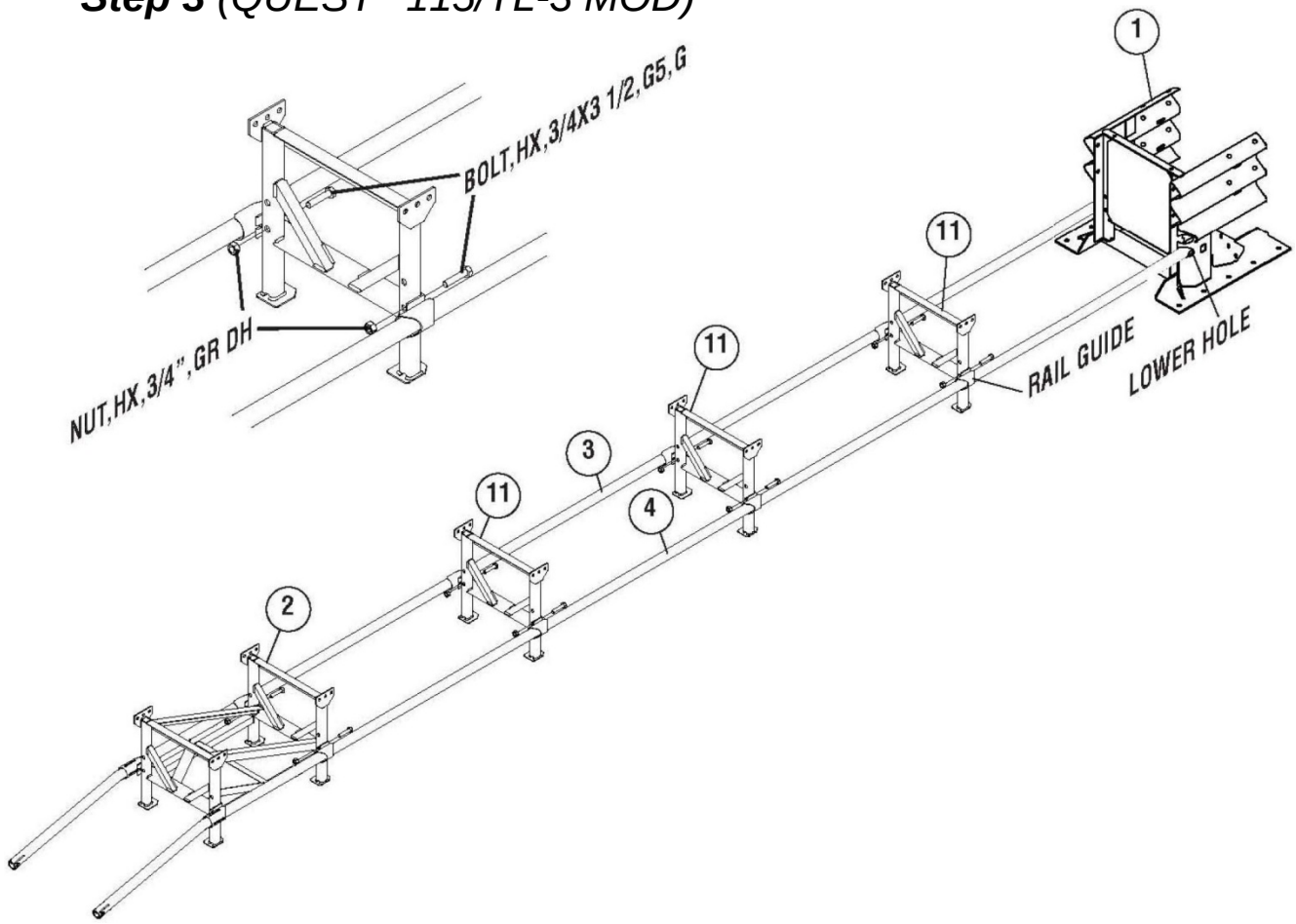


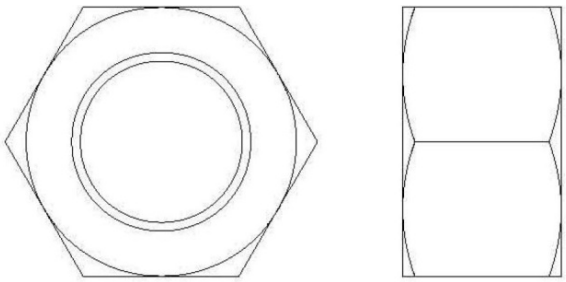
ITEM 30 003704G NUT.HX, 3/4", GR DH (6)



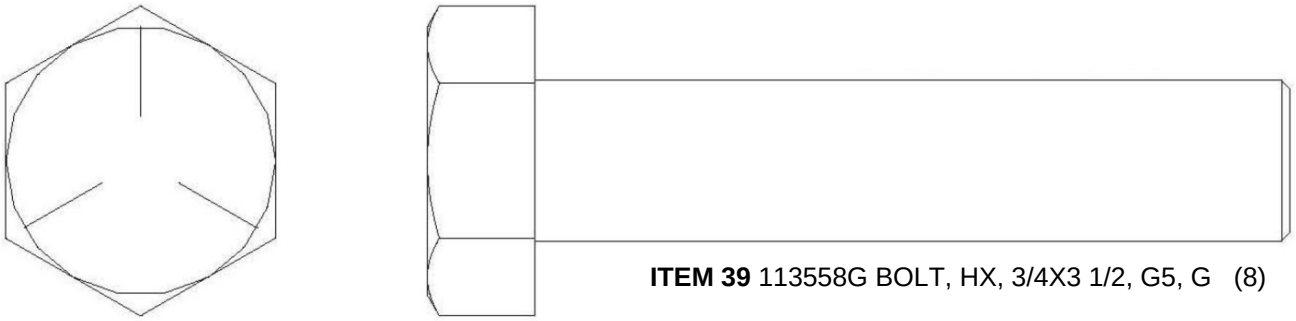
ITEM 39 113558G BOLT, HX, 3/4X3 1/2, G5, G (8)

Step 3 *(QUEST® 115/TL-3 MOD)*



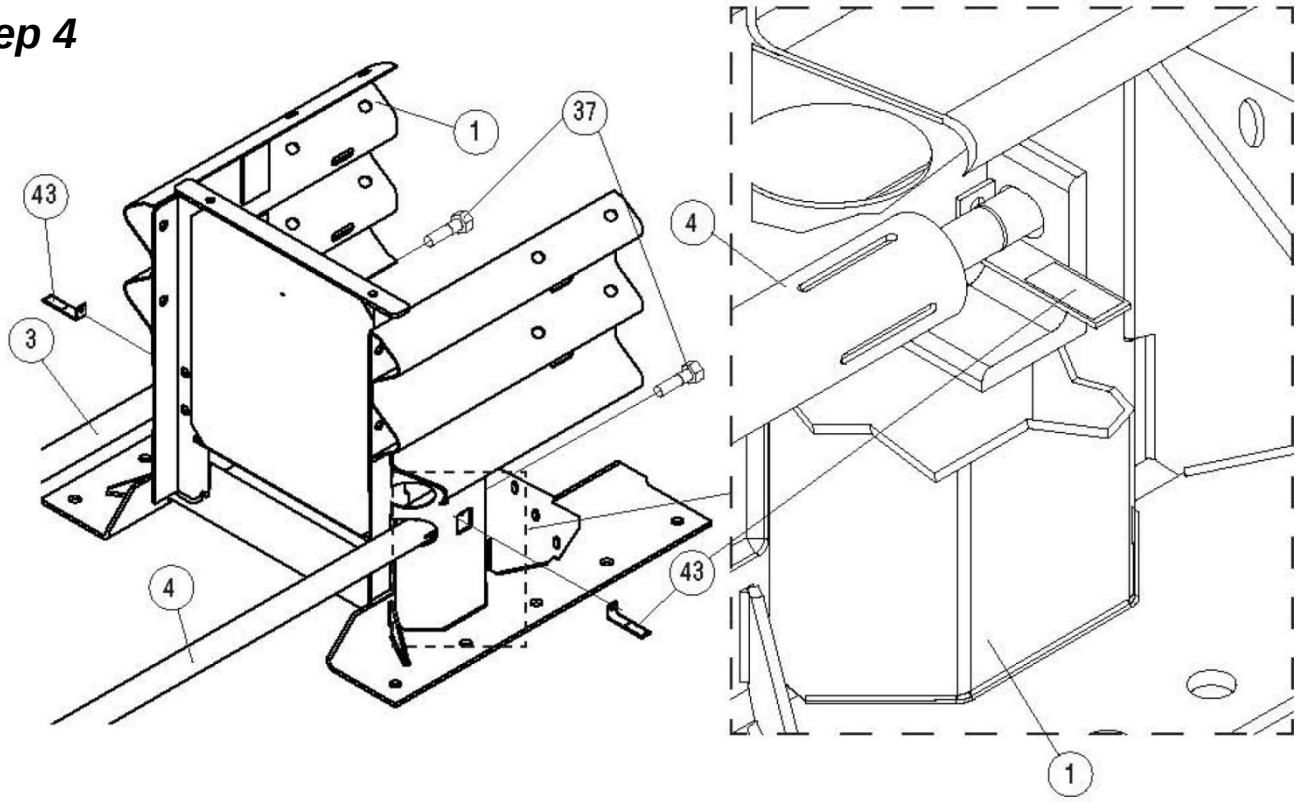


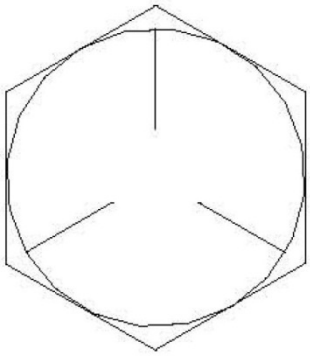
ITEM 30 003704G NUT.HX, 3/4", GR DH (8)

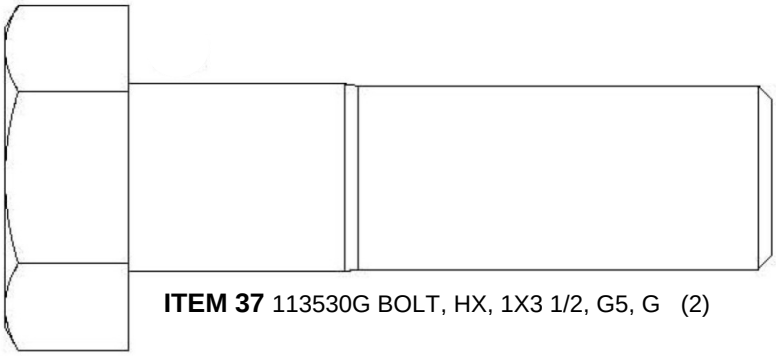


ITEM 39 113558G BOLT, HX, 3/4X3 1/2, G5, G (8)

Step 4



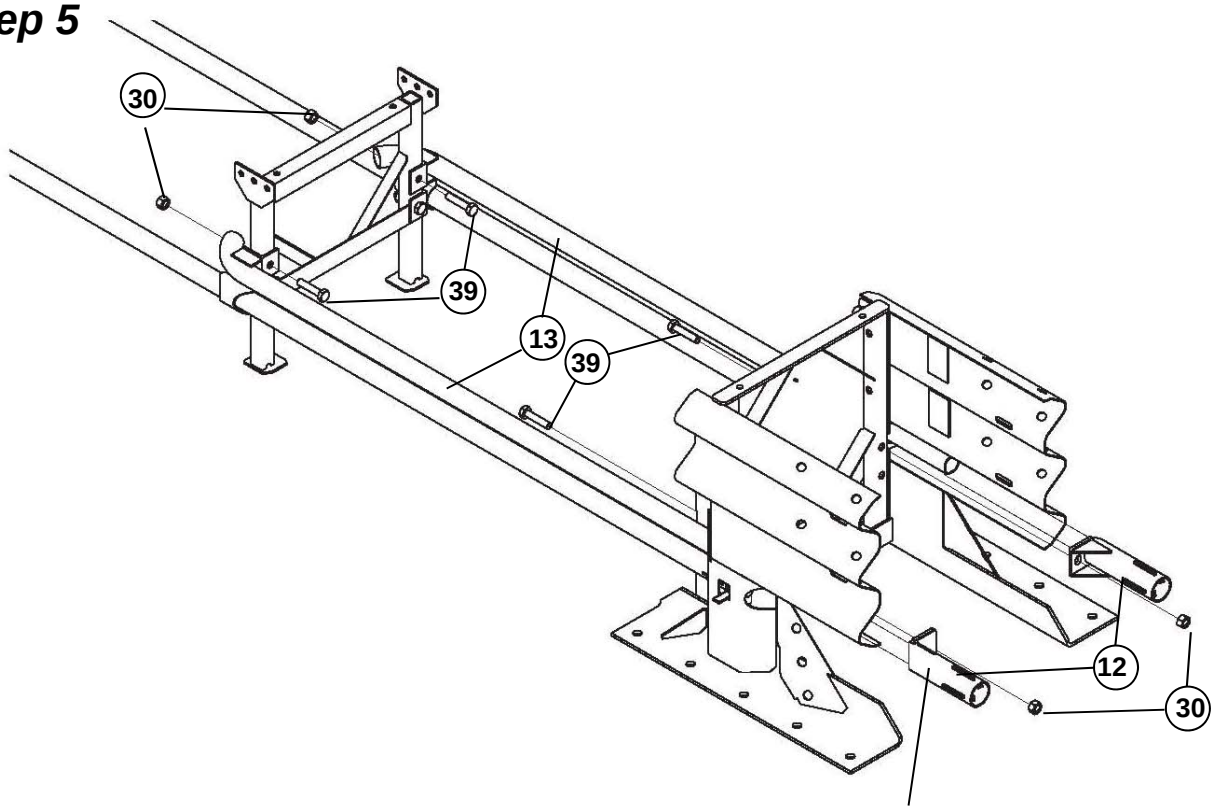




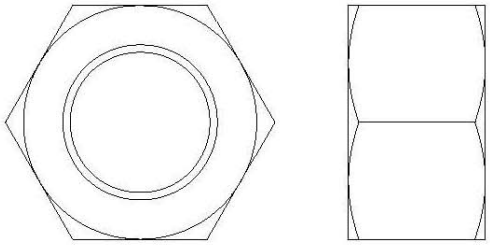
ITEM 37 113530G BOLT, HX, 1X3 1/2, G5, G (2)

ITEM 43 614534G SPACER, RAIL TENSION, QUEST®, PT, Y (2)

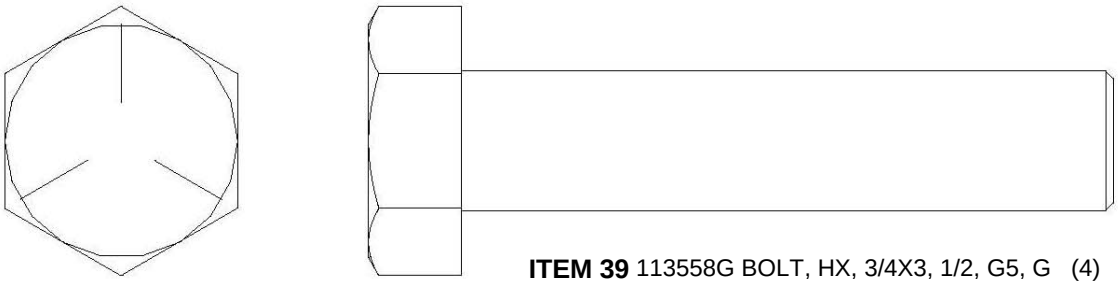
Step 5



QUEST® 100/TL-3 AND QUEST® 115/TL-3 MOD

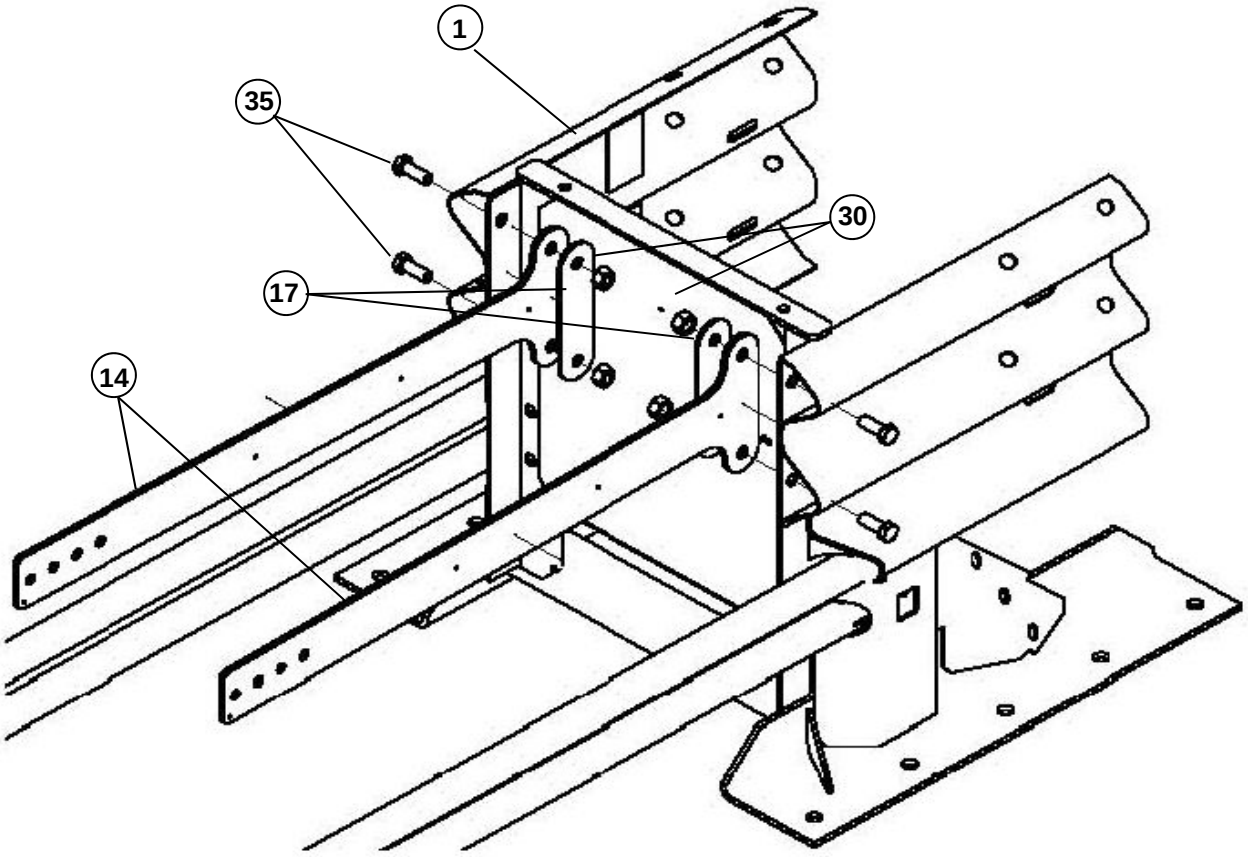


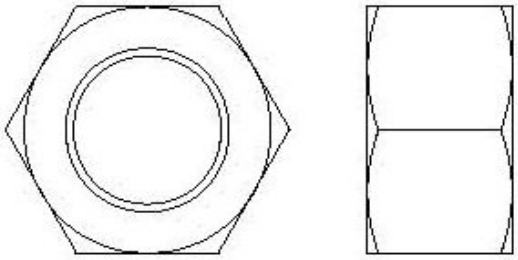
ITEM 30 003704G NUT, HX, 3/4, GR, DH (4)
QUEST® 70/TL-2 (8)
QUEST® 100/TL-3 (12)
QUEST® 115/TL-3 MOD (16)



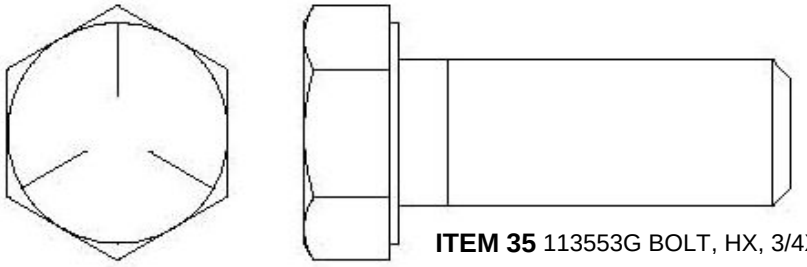
ITEM 39 113558G BOLT, HX, 3/4X3, 1/2, G5, G (4)
QUEST® 70/TL-2 (8)
QUEST® 100/TL-3 (12)
QUEST® 115/TL-3 MOD (16)

Step 6





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



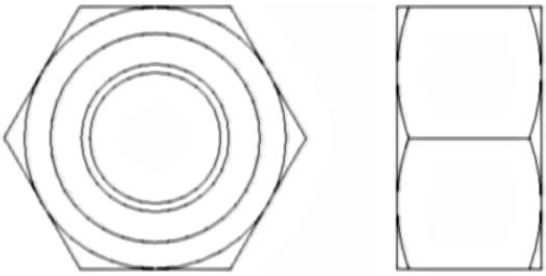
ITEM 35 113553G BOLT, HX, 3/4X2, G5, G (4)

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 X 13/16 OD, P, HRD (16)

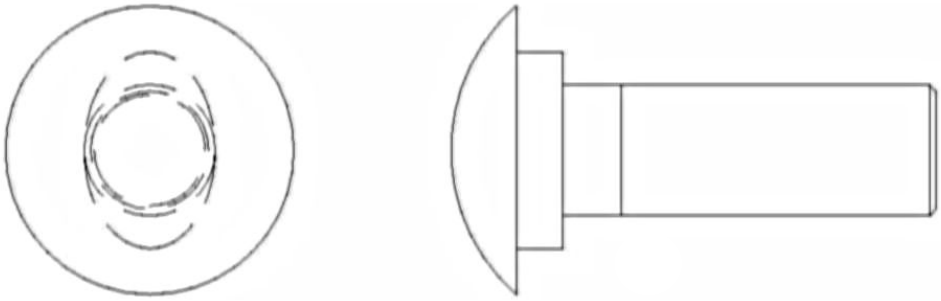


ITEM 28 003340G NUT, HX, 5/8, G, RAIL (18)

ITEM 29 115914B NUT, HX, #6-32, S (8)

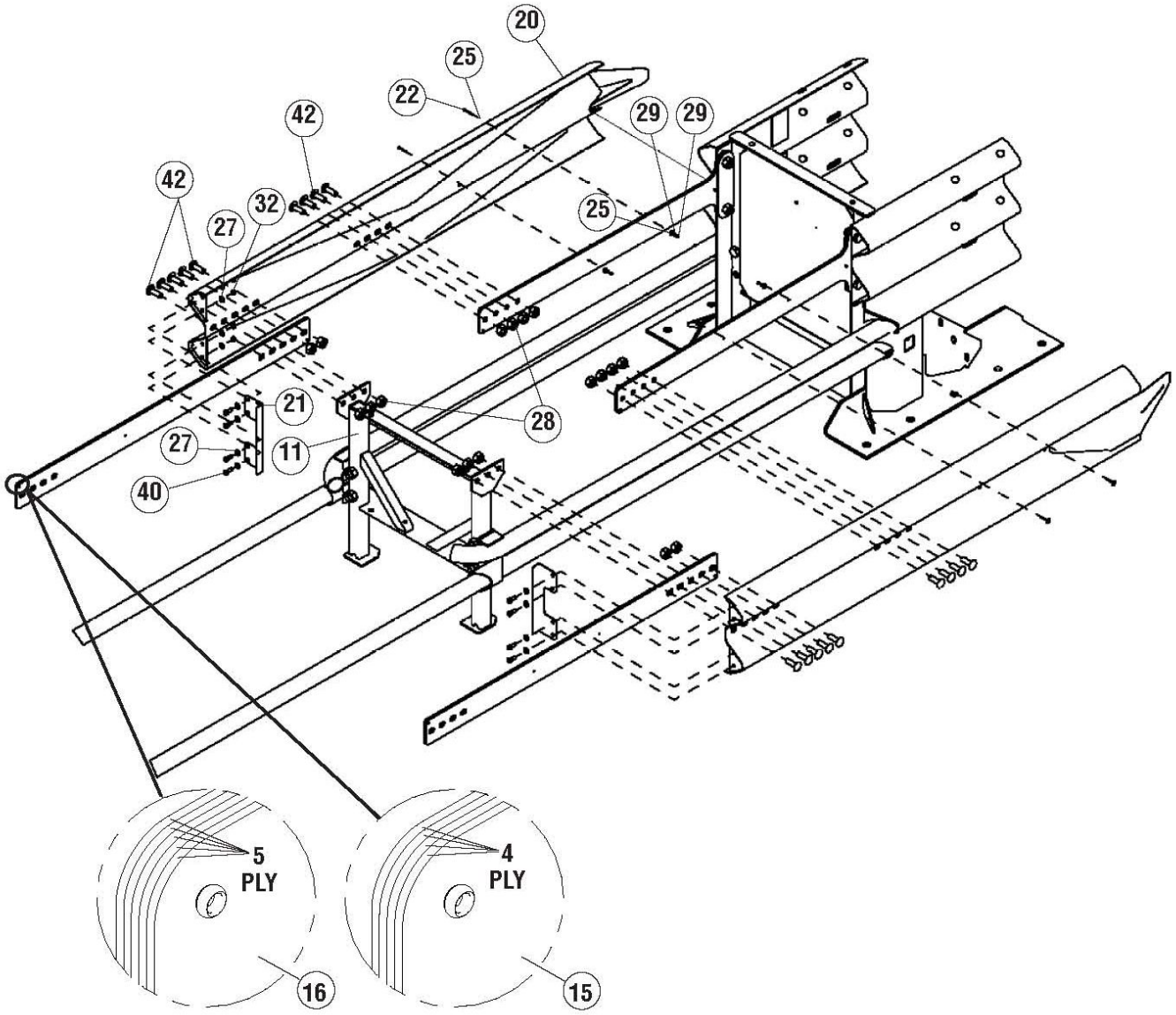
ITEM 32 115960G NUT, HX, 3/8, G (8)

ITEM 40 113596G BOLT, HX, 3/8X1, G2, G (8)



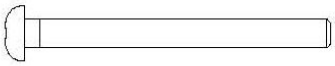
ITEM 42 003400G BOLT RAIL, 5/8X2, G (18)

Step 7 *(CONT'D)*



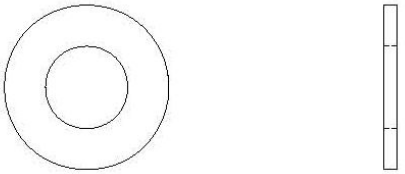
QUEST® 100
QUEST® 115/TL-3 MOD

QUEST® 70/TL-2

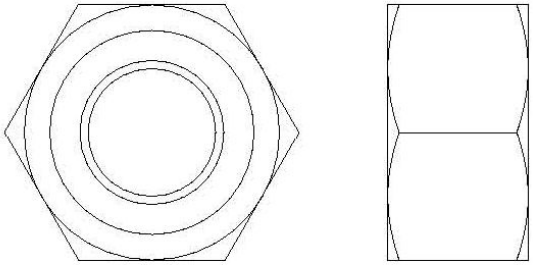


ITEM 22 116933B SCREW, #6-32X1 1/2, PHIL, S (4)

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



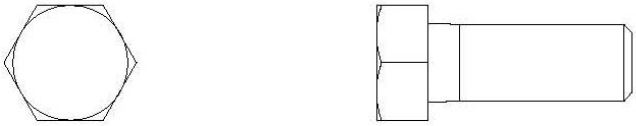
ITEM 27 118030G WASHER.FLAT, 3/8 ID X 13/16 OD,P,HRD (16)



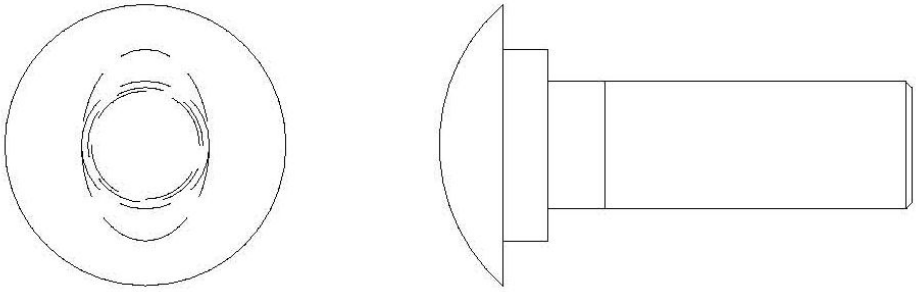
ITEM 28 003340G NUT, HX, 5/8, G, RAIL (18)

ITEM 29 115914B NUT, HX, #6-32, S (8)

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

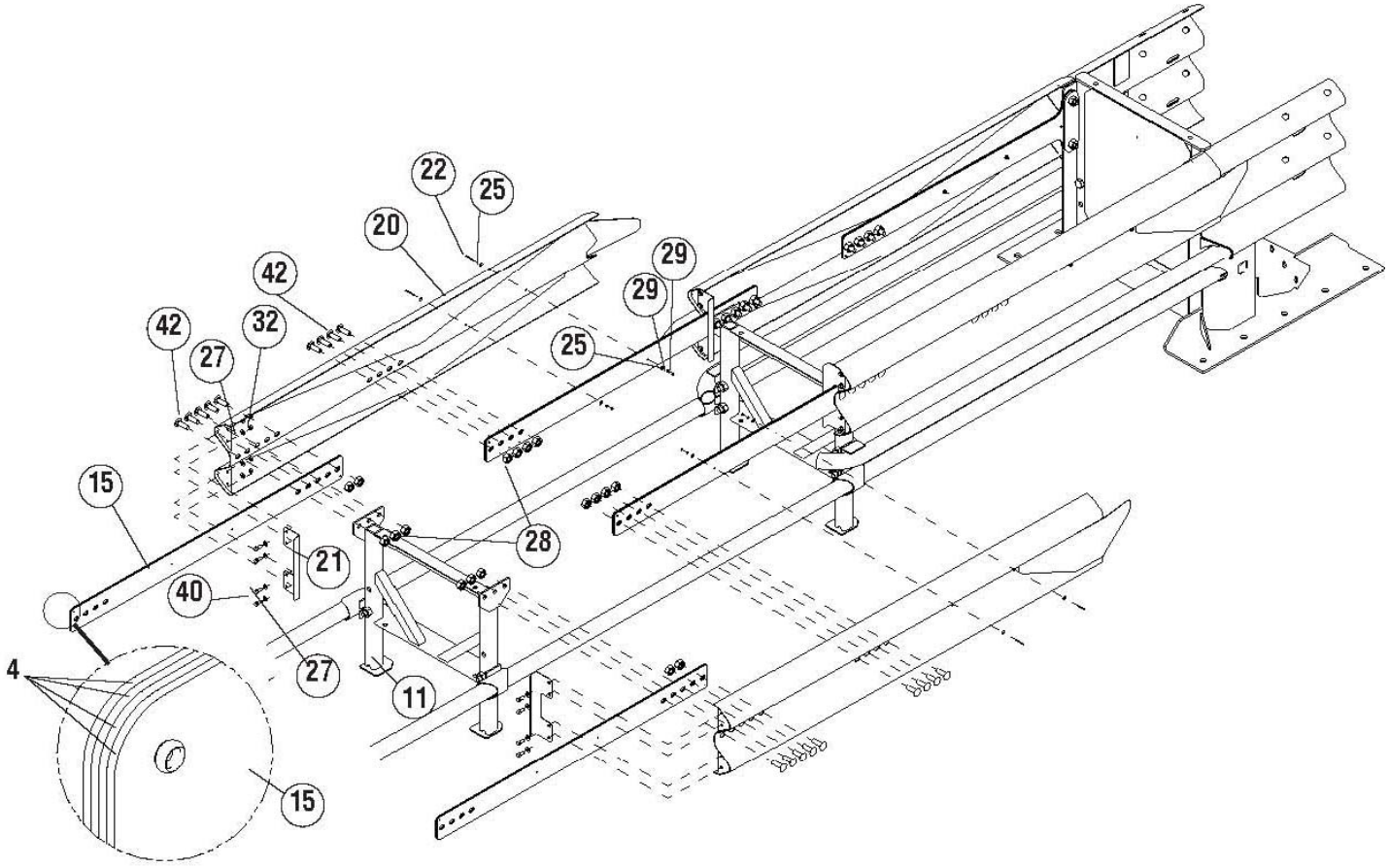


ITEM 40 113596G BOLT, HX, 3/8X1, G2, G (8)



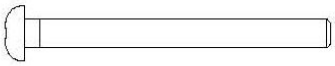
ITEM 42 003400G BOLT RAIL, 5/8X2, G (18)

***Step 8** (CONT'D) (QUEST® 70/TL-2, Skip this step)*



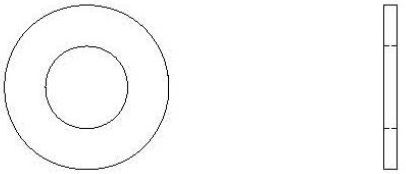
QUEST® 100/TL-3 & QUEST® 115/TL-3 MOD

Step 9 *(QUEST® 70/TL-2 & QUEST® 100/TL-3, Skip this step)*

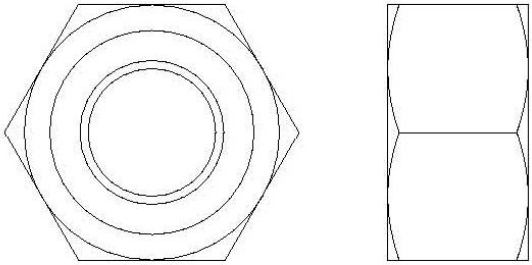


ITEM 22 116933B SCREW, PN,#6-32X1 1/2,PHIL,S (4)

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



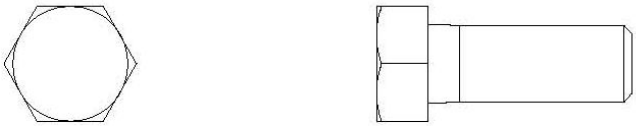
ITEM 27 118030G WASHER.FLAT, 3/8 ID X 13/16 OD, P, HRD (16)



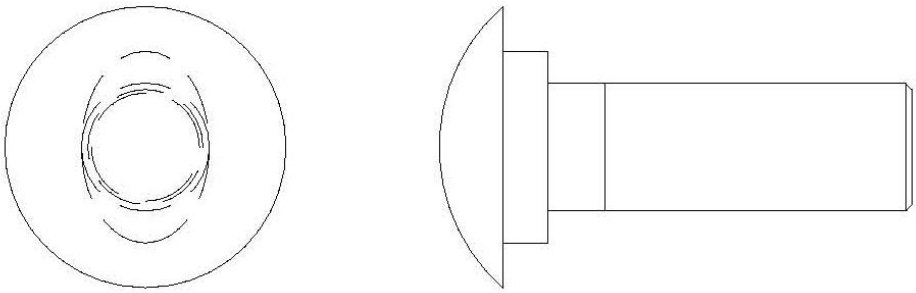
ITEM 28 003340G NUT, HX, 5/8, G, RAIL (18)

ITEM 29 115914B NUT, HX, #6-32, S (8)

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

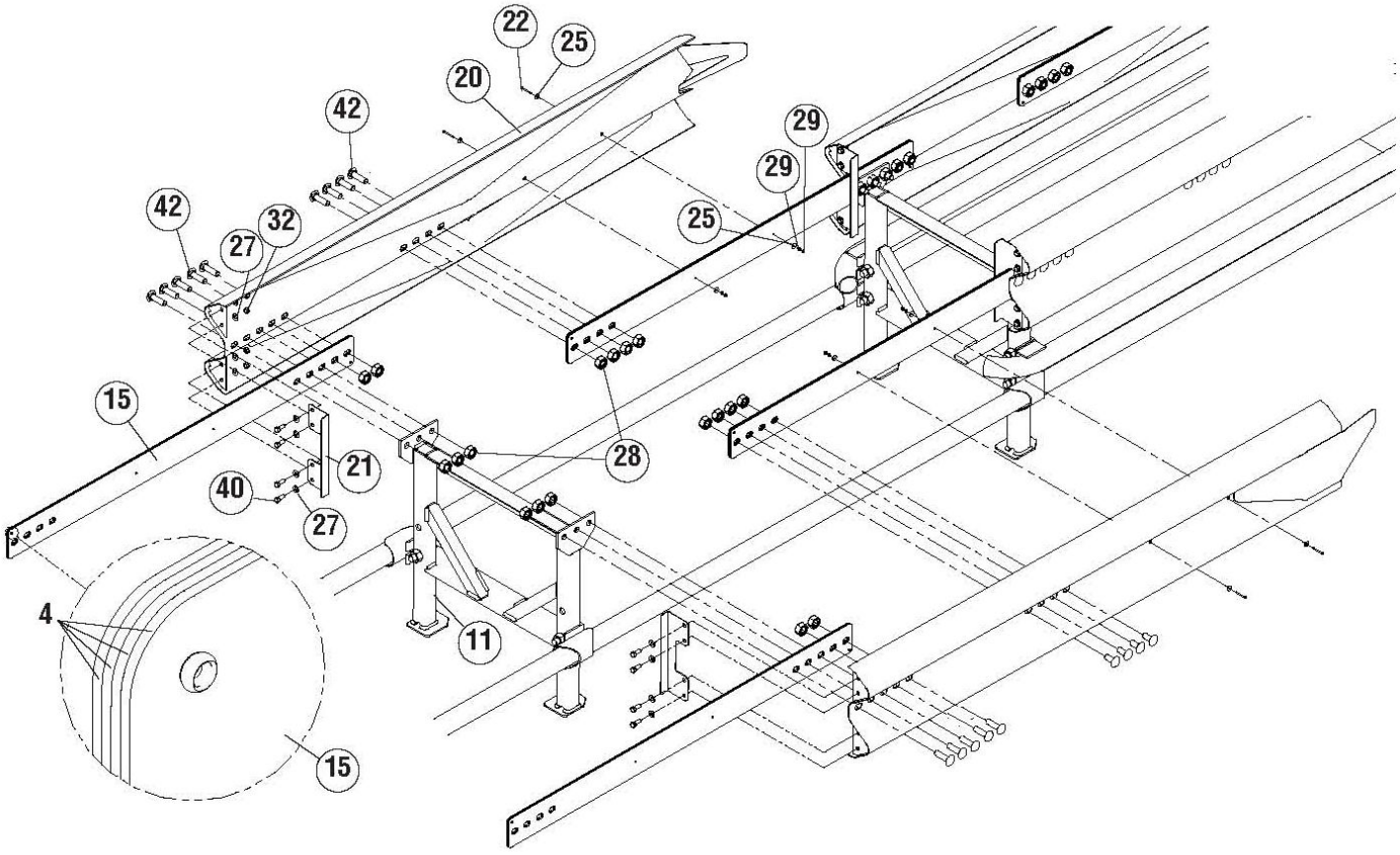


ITEM 40 113596G BOLT, HX, 3/8X1, G2, G (8)



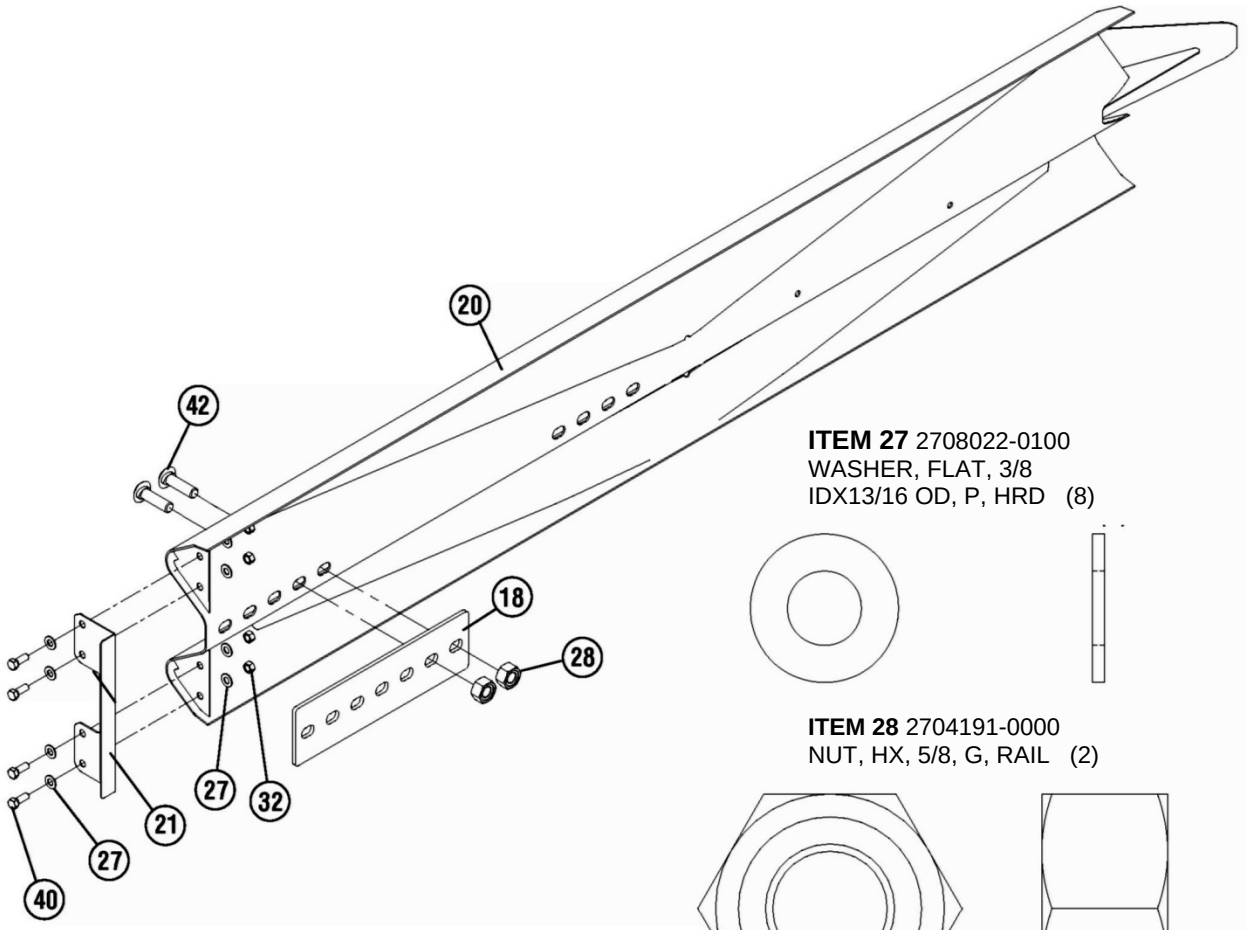
ITEM 42 003400G BOLT RAIL,5/8X2, G (18)

Step 9 (Cont'd) (QUEST® 70/TL-2 & QUEST® 100/TL-3, Skip this step)



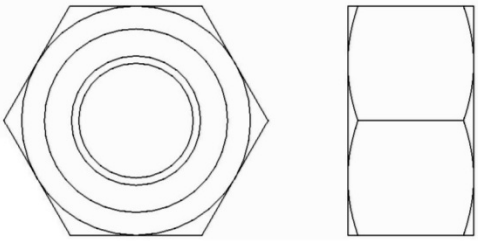
QUEST® 115/TL-3 MOD

Step 10 *(x2)*

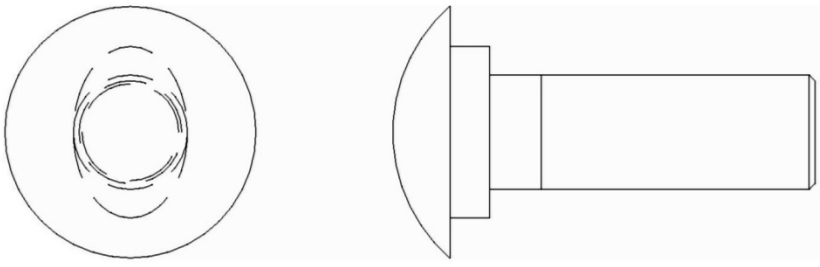


ITEM 27 2708022-0100
WASHER, FLAT, 3/8
IDX13/16 OD, P, HRD (8)

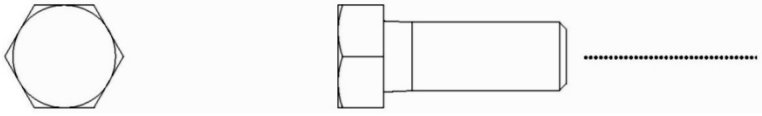
ITEM 28 2704191-0000
NUT, HX, 5/8, G, RAIL (2)



ITEM 32 2704031-0000
NUT, HX, 3/8, G (4)

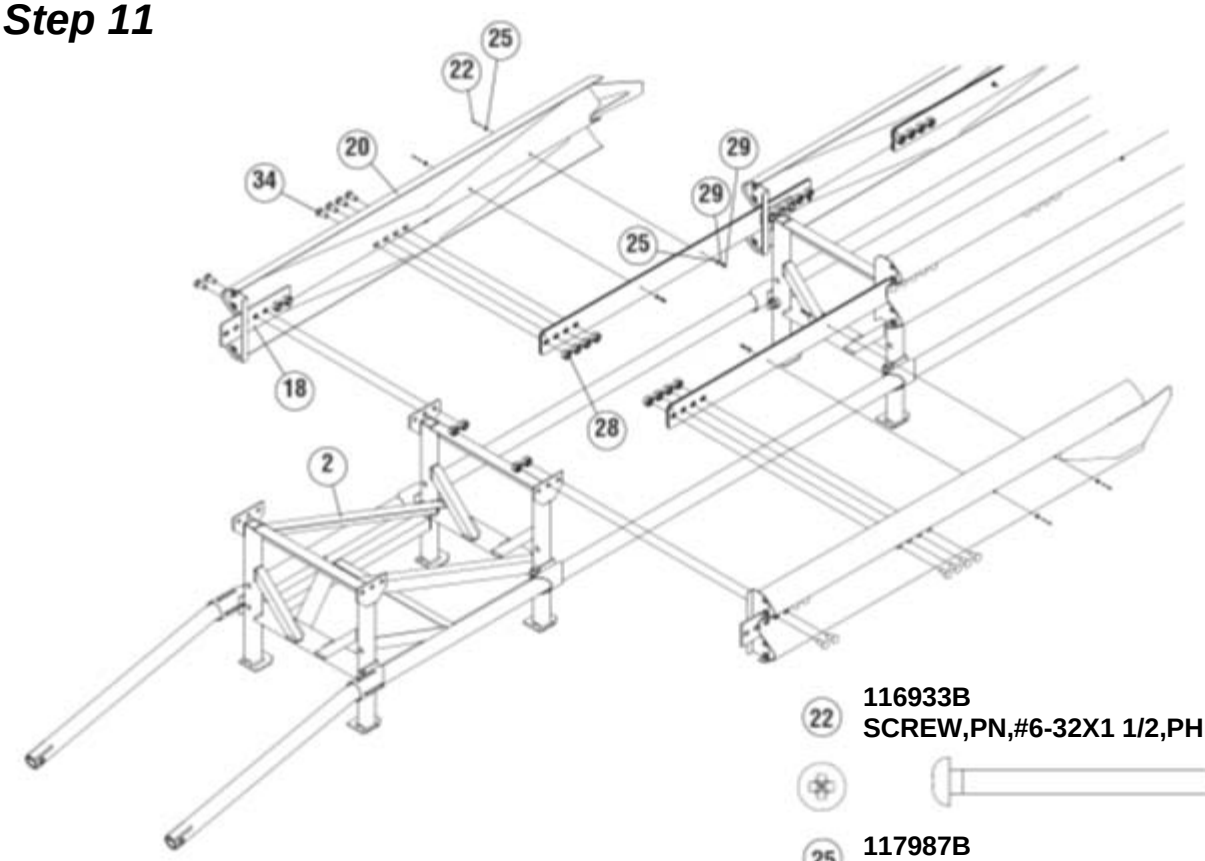


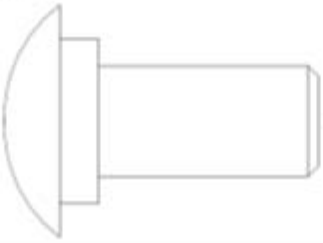
ITEM 42 2699341-0000
BOLT, RAIL, 5/8X2, G5, G (2)



ITEM 40 2701221-0000
BOLT, HX, 3/8X1, G2, G (4)

Step 11





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

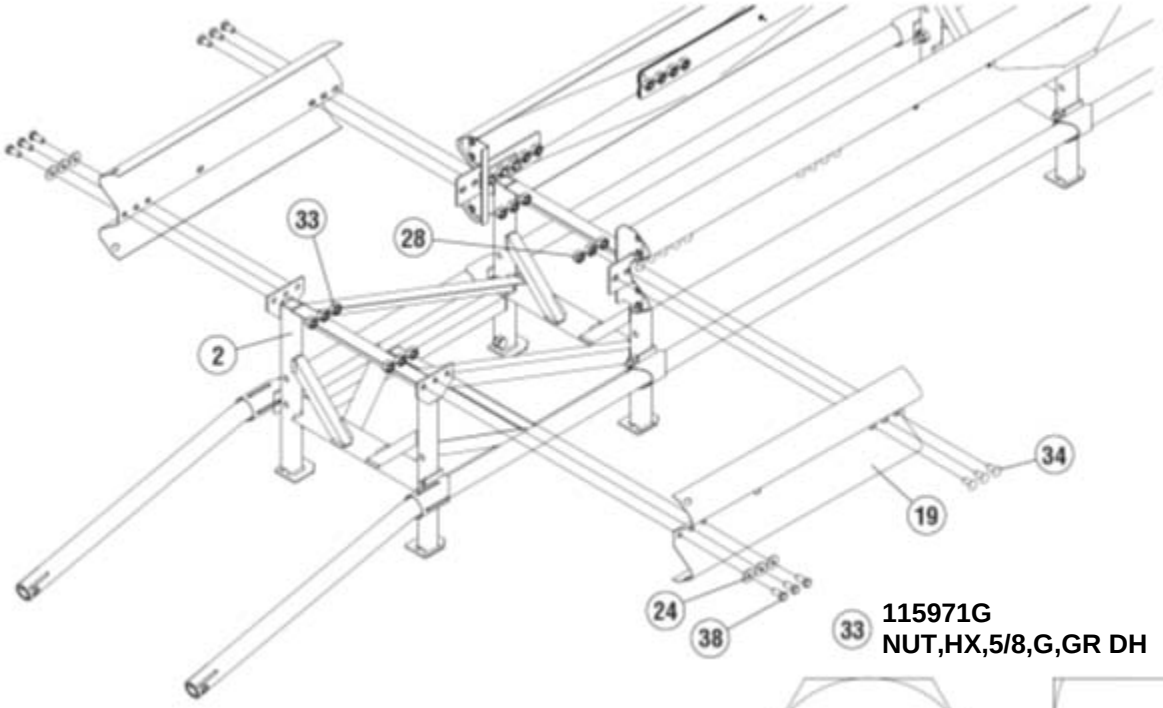
25 **117987B**
WASHER,FLAT,#6X5/8X.030,S (8)

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

29 **115914B**
NUT,HX,#6-32,S (8)

34 **003400G**
BOLT,RAIL,5/8X2,G (8)

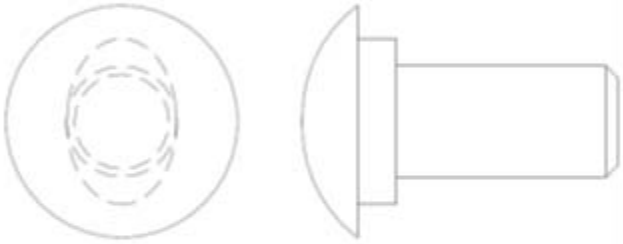
Step 12



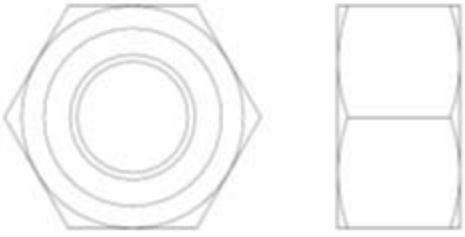
33 **115971G**
NUT,HX,5/8,G,GR DH (6)

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

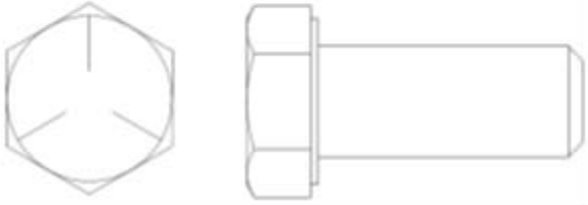
34 **003400G**
BOLT,RAIL,5/8X2,G (6)



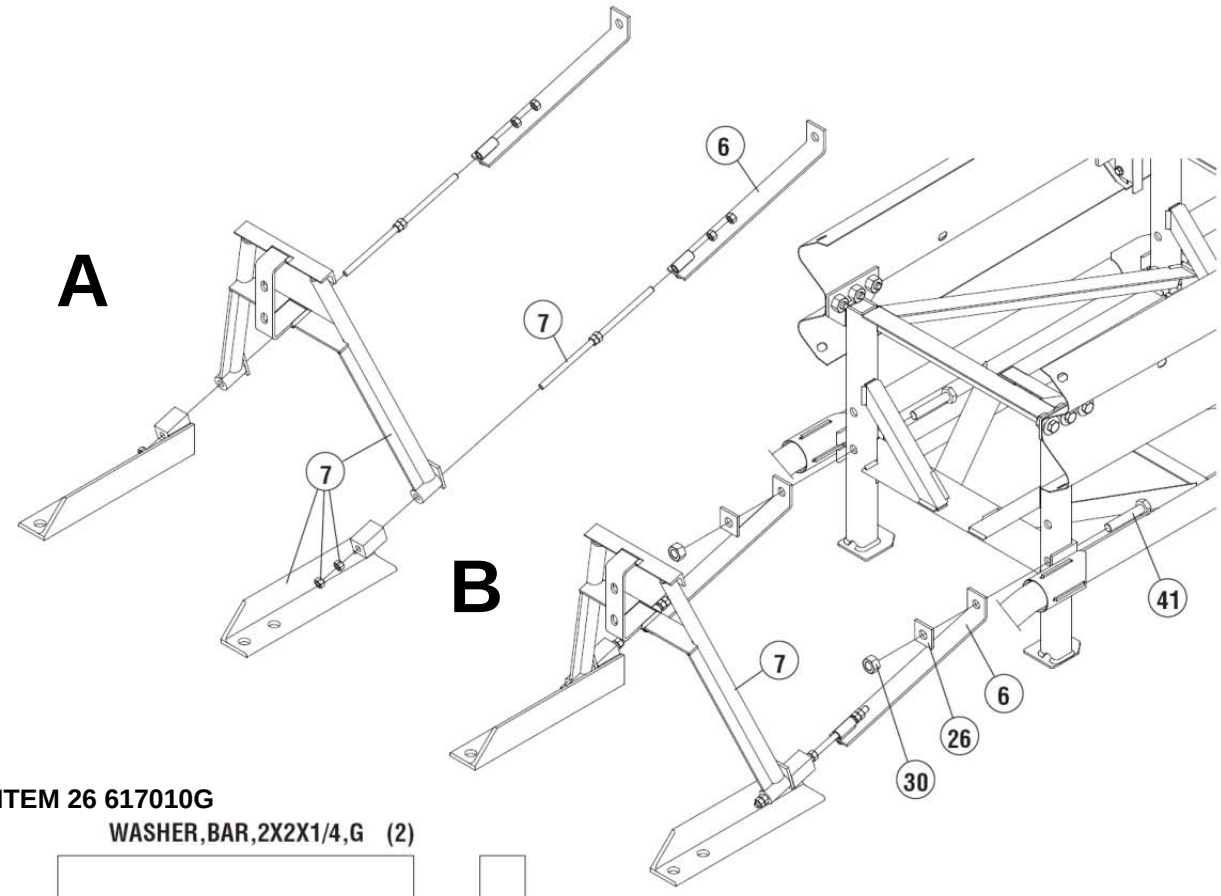
28 **003340G**
NUT,HX,5/8,G,RAIL (6)



38 **113654G**
BOLT,HX,5/8X1 1/2,G5,G (6)

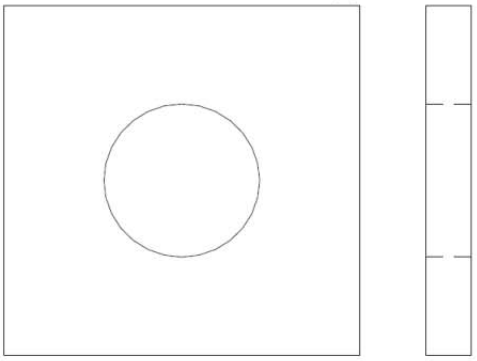


Step 13



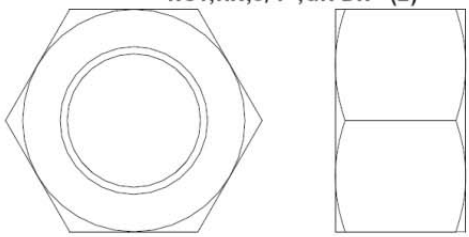
ITEM 26 617010G

WASHER,BAR,2X2X1/4,G (2)



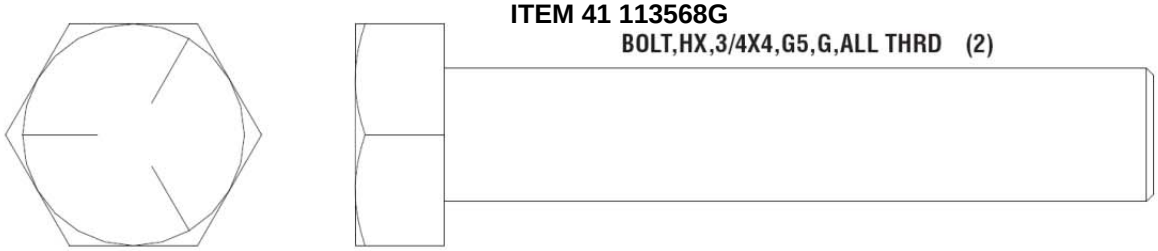
ITEM 30 003704G

NUT,HX,3/4",GR DH (2)

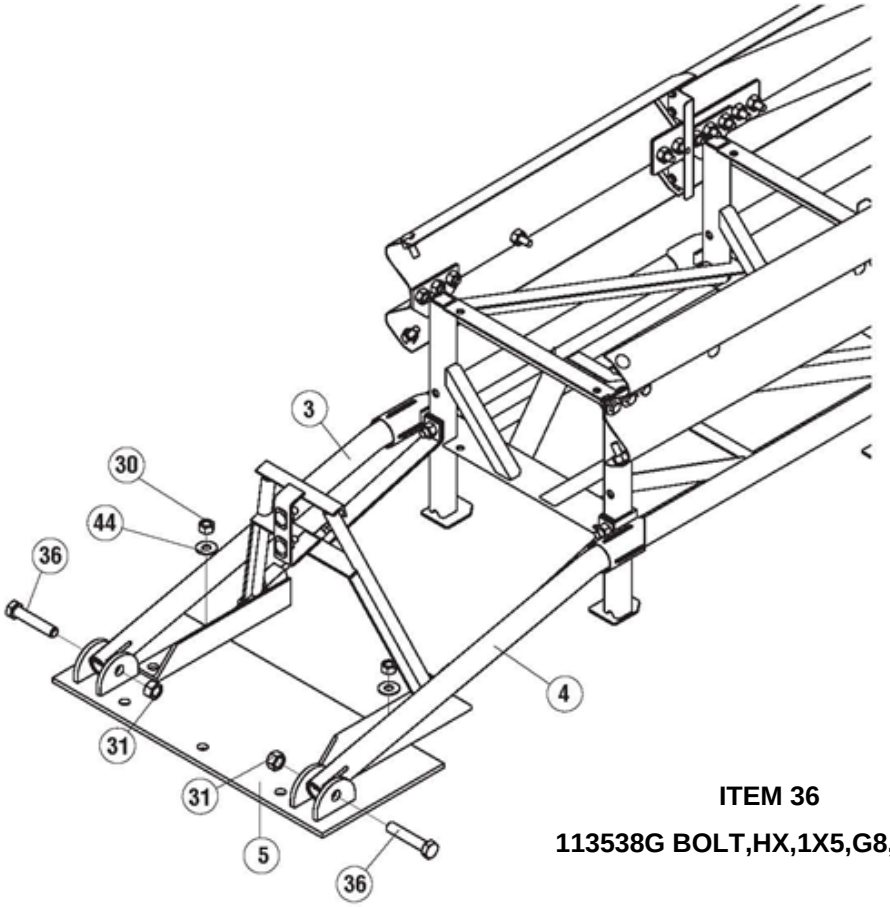


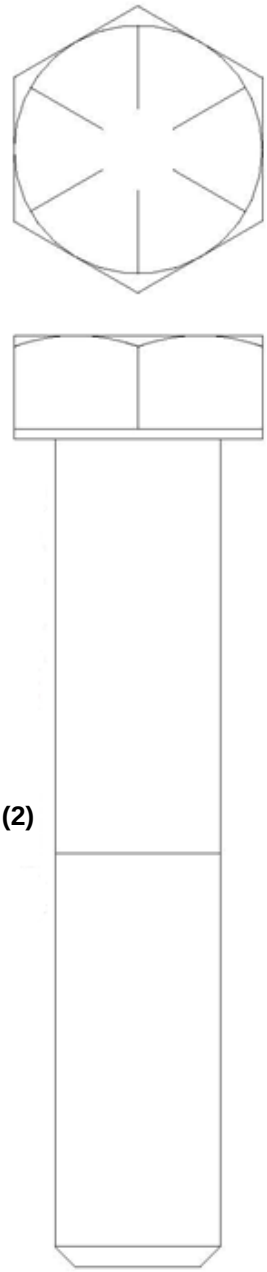
ITEM 41 113568G

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



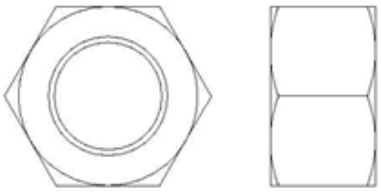
Step 14



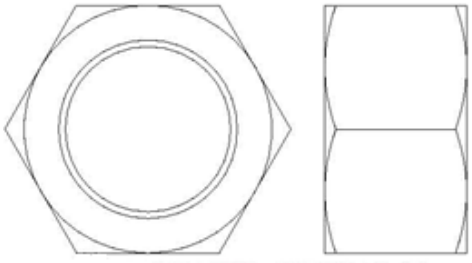


ITEM 36

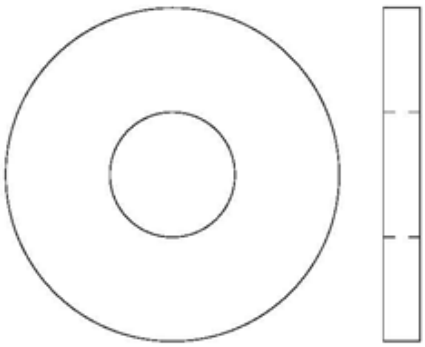
113538G BOLT,HX,1X5,G8,G (2)



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

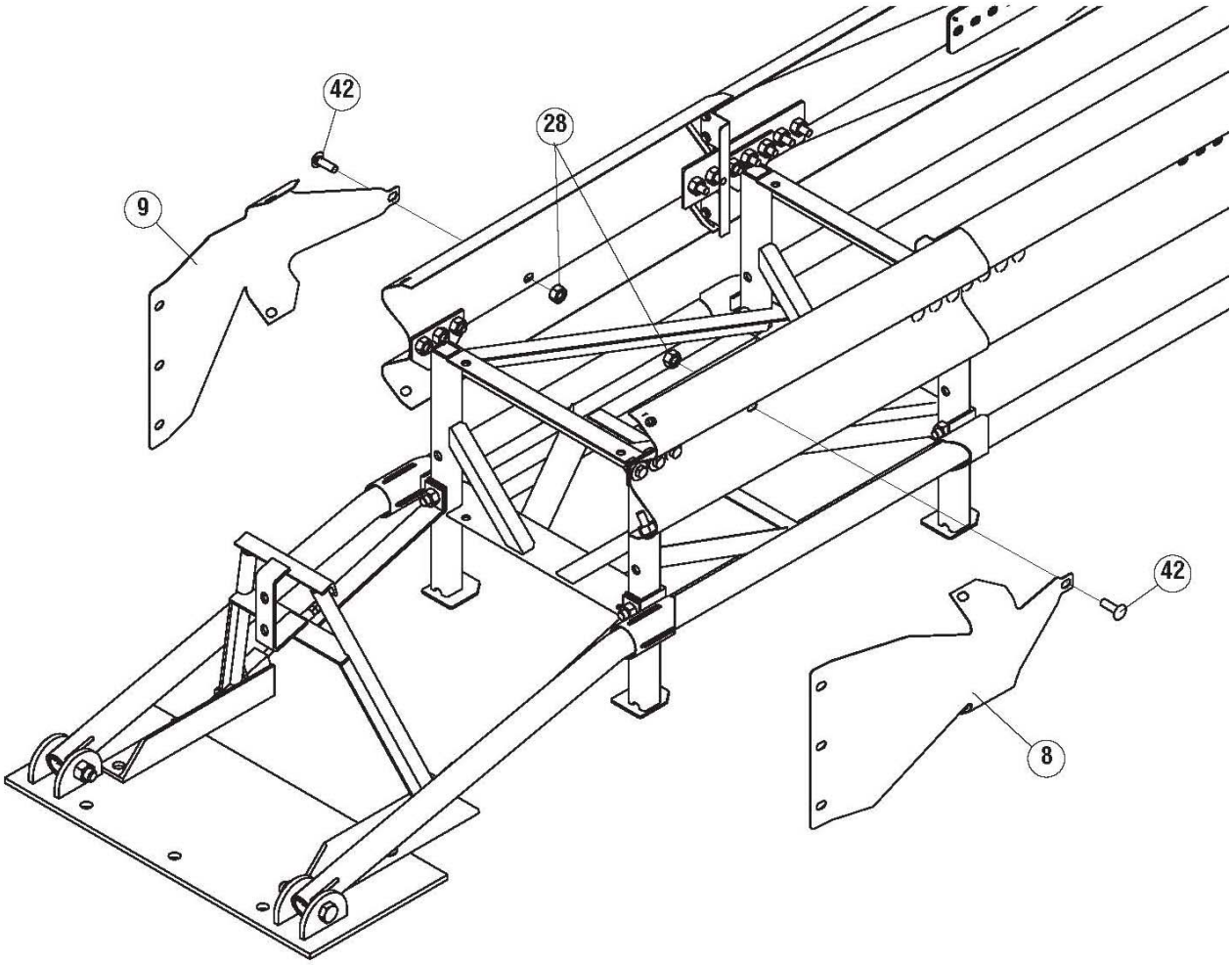


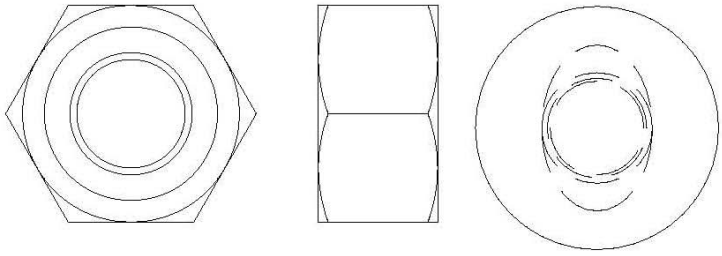
ITEM 31 115931G NUT,HX,1,G (2)



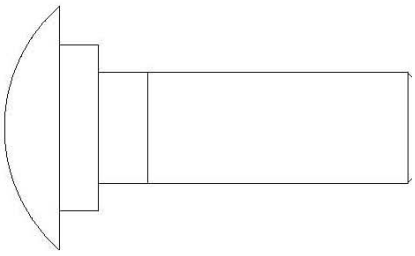
ITEM 44 118027G WASHER, FLAT,3/4X2, HVY (2)

Step 15a



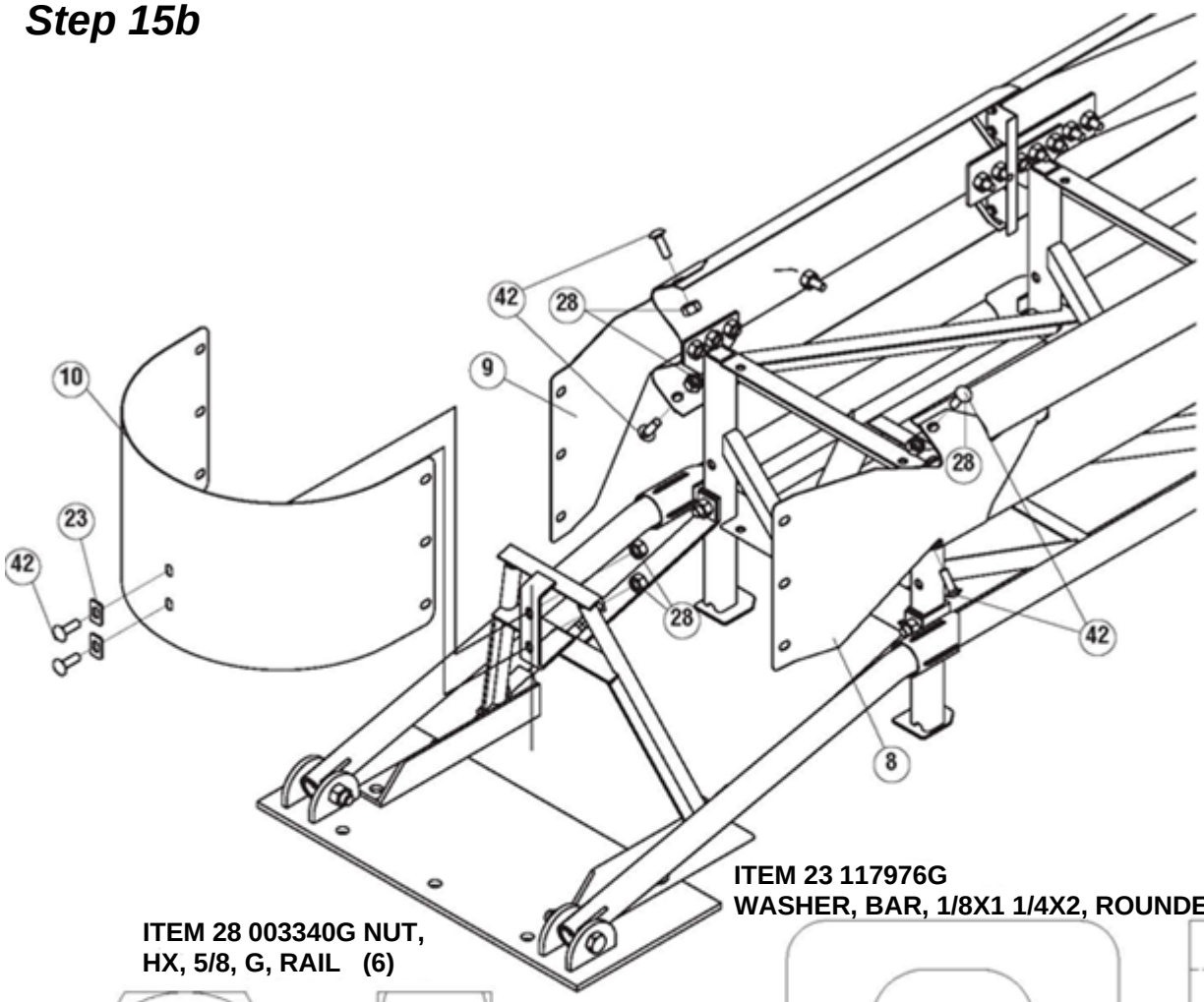


ITEM 28 003340G NUT, HX, 5/8, G, RAIL (2)

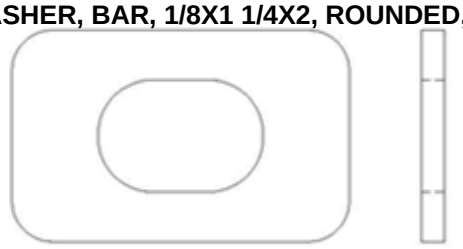


ITEM 42 003400G BOLT, RAIL, 5/8X2, G (2)

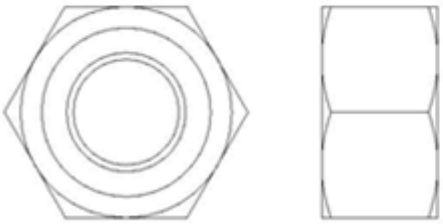
Step 15b



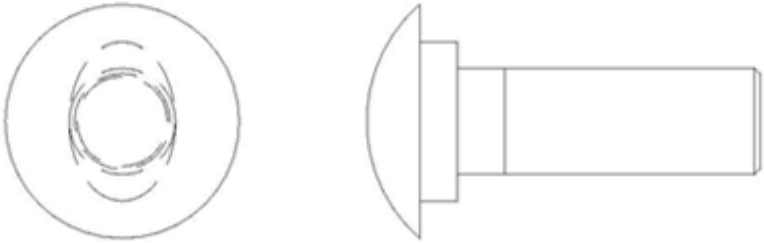
ITEM 23 117976G
WASHER, BAR, 1/8X1 1/4X2, ROUNDED, G (6)



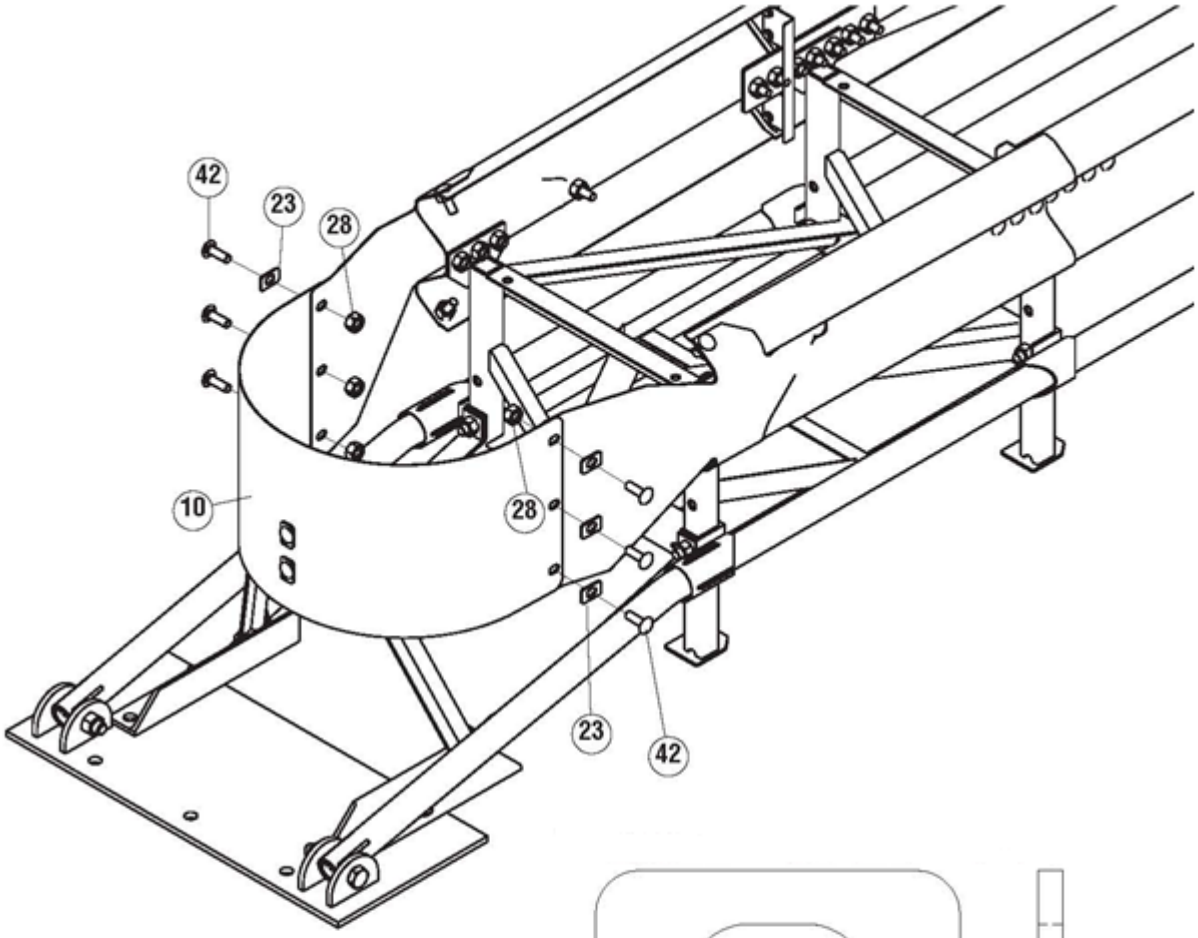
ITEM 28 003340G NUT,
HX, 5/8, G, RAIL (6)

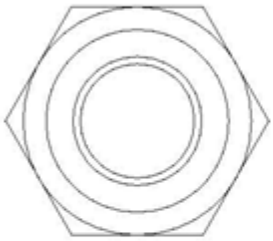


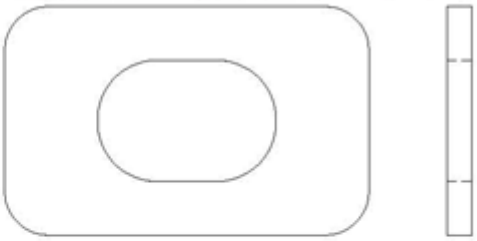
ITEM 42 003400G BOLT, RAIL, 5/8X2, G (6)



Step 15c

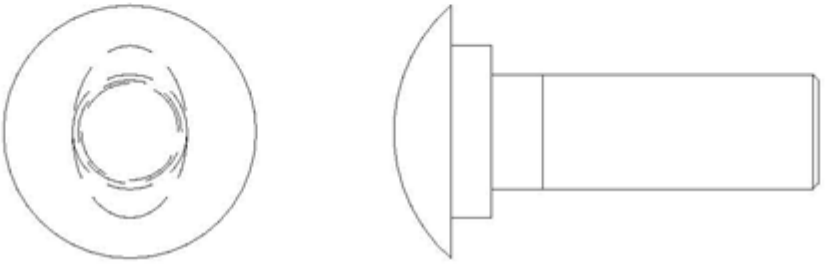






ITEM 23 117976G
WASHER, BAR, 1/8X 1 1/4X2, ROUNDED, G (6)

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



ITEM 42 003400G BOLT, RAIL, 5/8X2, G (6)

Assembly Instructions

Recommended Tools

Documentation

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

Cutting equipment

- Rebar Cutting Bit - 22 mm [7/8"]
- Concrete Drill Bits - 22 mm [7/8"] (*Double Fluted)
- Grinder, Hacksaw or Torch (optional)
- Rotary Hammer Drill

Note: Energy Absorption Systems recommends using double fluted drills to achieve optimum tensile strength when installing the MP-3® anchoring system. That decision must be confirmed with the highway authority authorizing the assembly so it is anchored to their specification.

Wrenches

- Heavy Duty Impact Wrench - 1/2" Drive
- Standard adjustable wrench - 300 mm [12"]
- 1/2" drive sockets: 1 1/8", 1 1/4", 1 1/2"
- 3/8" drive sockets: 1/4", 1/2"
- Deep Sockets: 1 1/4"
- Ratchet and attachments for the above sockets
- Breaker Bar: 1/2" x 24"
- Torque Wrench: 200 ft-lb
- 2 ea. Open/Box End Wrench - 1/4", 1/2", 3/4"

Hammers

- Sledgehammer
- Standard Hammer

Personal protective equipment

- Safety Glasses
- Gloves
- Safety Toe Shoes
- Apron for MP-3® application

Miscellaneous

- Traffic Control Equipment
- Lifting and Moving Equipment (A lifting device is preferred although a forklift can be used.) Minimum 5,000 lb. capacity required.
- Compressor (100 psi)
- 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 7/8” drilled holes
- Rags, Water, and Solvent 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.

Site Preparation/Foundation

Curbs and Islands

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® System, and as far back as the system’s backup. Any curbs that must remain should be 100 mm [4”] maximum and be mountable.

Concrete Assemblies

For concrete assemblies, the QUEST® System should be assembled only on an existing or freshly placed and cured concrete base (28 MPa [4000 psi] minimum). Use 178 mm [7”] threaded rods and two part MP-3® (See Figure 3). Location and orientation of the concrete base and attenuator must comply with project plans or as otherwise determined by the resident project engineer.

For an independent, soil-supported concrete foundation, include a below-grade anchor block as part of the pad. The large block will keep the pad from sliding during an impact, if such impact is within FHWA accepted criteria. Additional details can be found on the standard drawings and project plans.

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

Asphalt Assemblies

The QUEST® System may be assembled on asphalt or asphalt overlays. Provide a minimum of 76 mm [3”] layer of asphalt over a minimum of 76 mm [3”] layer of Portland Cement concrete, 152 mm [6”] layer of asphalt over 152 mm [6”] layer of subbase, or 203 mm [8”] layer of asphalt with no subbase. Refer to Figures 4, 5 or 6. Use 460 mm [18”] threaded rods assembled with the two part MP3® grout for foundations.

Cross-Slope

Assembly cross-slope should not exceed 8% and should not vary more than 2% over the length of the system; the pad surface should have a light broom finish (See Figure 2).

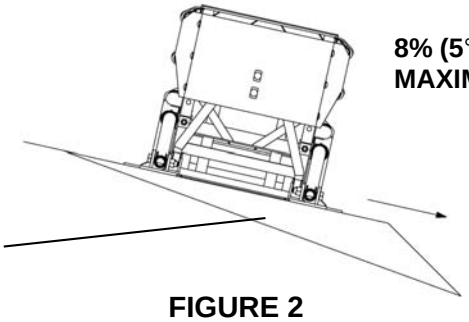


FIGURE 2
CROSS-SLOPE

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 1.82 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 drawing package provided with the QUEST® System 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® System 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 assembly and keep them present through all phases of the assembly.

2) Determining the Base point and Centerline

Typically the base point of the QUEST® System will be the midpoint of the hazard at its front face.

Extend a chalk line from the base point, perpendicular to the hazard face, or as determined by project engineer; to a distance greater than the maximum length of the QUEST® System (refer to the drawings provided). This chalk line will become the centerline for the QUEST® System (See Figure 3). When properly assembled the QUEST® System appears to be an extension of the object which it is shielding (See Figure 4).

Warning: The 610 mm [24”], 760 mm [30”] or 915 mm [36”] Backup should nest around concrete walls, barriers and pillars 610 mm [24”], 760 mm [30”] or 915 mm [36”] in width or less, respectively. Failure to nest the Backup around these types of hazards may result in untested system performance.

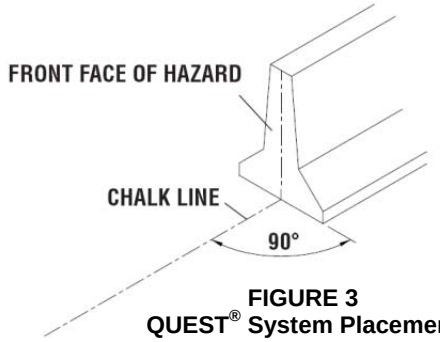


FIGURE 3
QUEST® System Placement

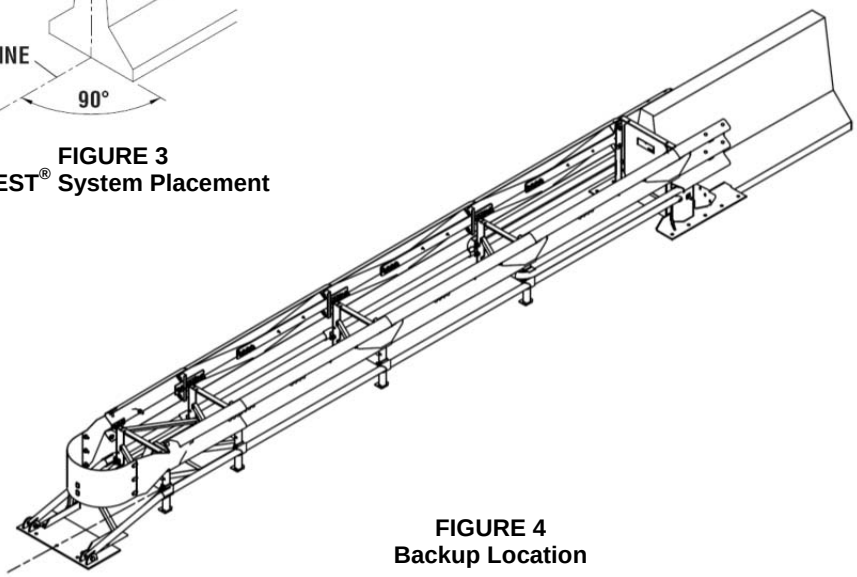
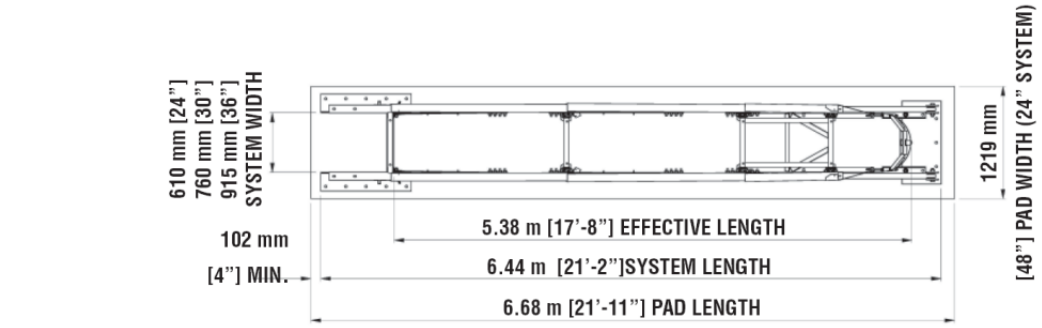
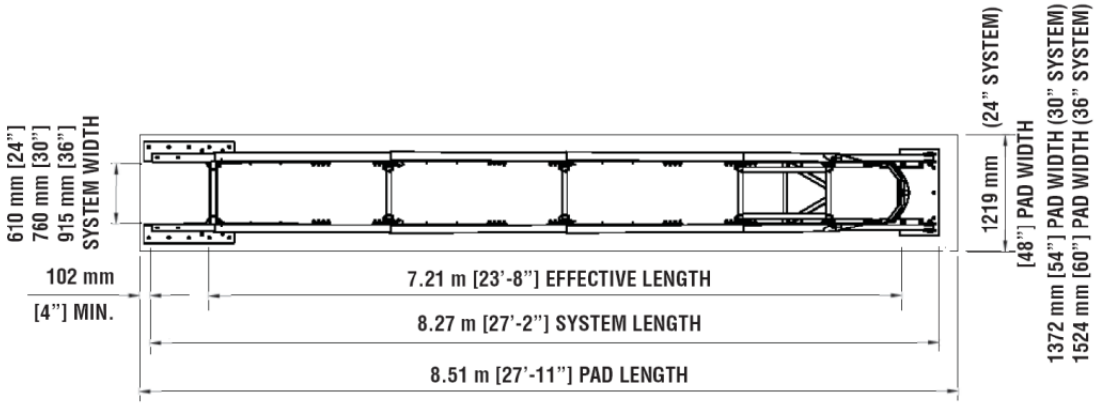


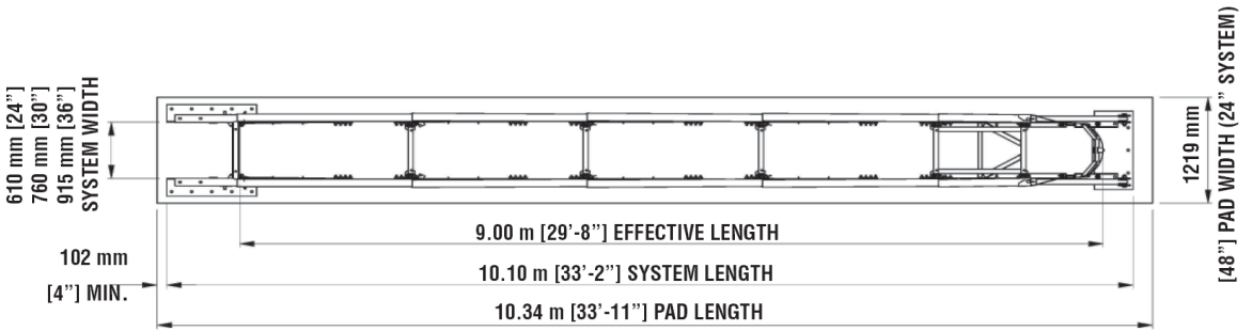
FIGURE 4
Backup Location



QUEST® 70/TL-2
Plan View



QUEST® 100/TL-3
Plan View



QUEST® 115/TL-3 MOD
Plan View

FIGURE 5
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 (See Figure 6).

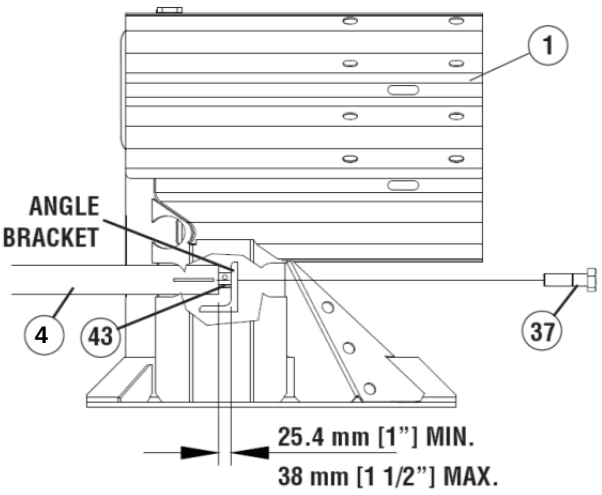


FIGURE 6
Trigger Assembly Adjustment

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

4) Lifting and Placing the System

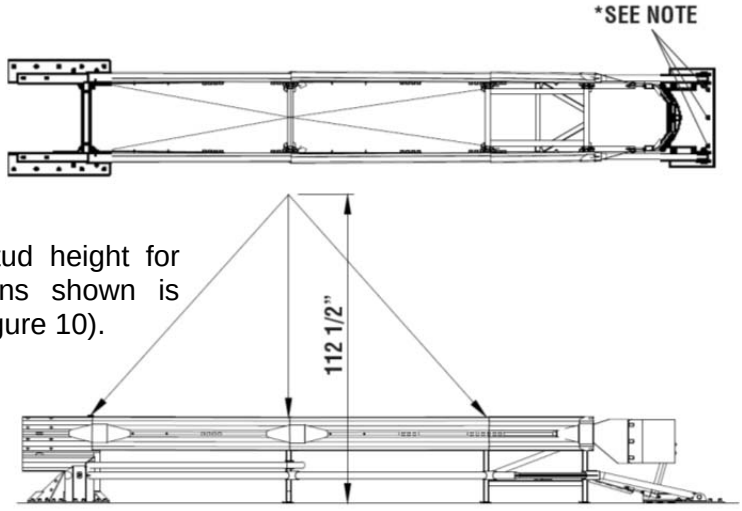
Use the lifting points to lift the QUEST® System into place (See Figures 7a, 7b and 7c).

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* [3,000 lbs.] 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 (See Figure 4).



Note: Maximum stud height for front anchor locations shown is 40 mm [1.5"] (See Figure 10).

FIGURE 7a

5) Drill and Set Anchors

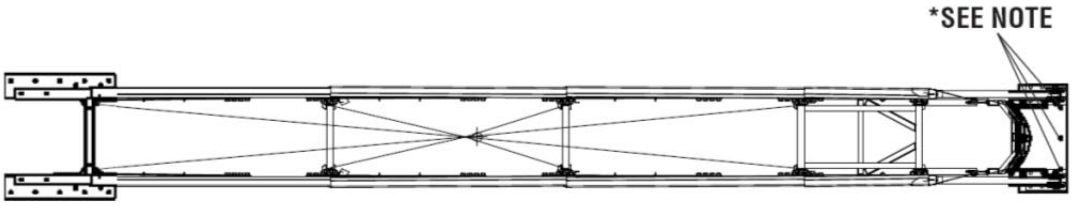
Use the holes in the Backup and Front Anchor Plate as a template to locate and drill holes. The Backup requires 10 MP-3® anchors, 5 anchors on the left side and 5 anchors on the right side. The Front Anchor Plate requires 5 MP-3® anchors.

For Concrete Assemblies

Drill 22 mm [7/8"] diameter x 140 mm [5 1/2"] deep holes into the concrete pad or roadway (See Figure 12). Use vertical MP-3® kits to assemble 3/4" diameter x 7" long studs using instructions included with kit. After grout is hardened, use 3/4" flat washers and nuts provided with kit to anchor system to foundation.

For Asphalt Assemblies

Drill 22 mm [7/8"] diameter x 420 mm [16 1/2"] deep holes into the asphalt roadway. Use vertical MP-3® kits to assemble 3/4" diameter x 18" long studs using instructions included with kit. After grout is hardened, use 3/4" flat washers and nuts provided with kit to anchor system to foundation.



Note: Maximum stud height for front anchor locations shown is 40 mm [1.5"] (See Figure 10).

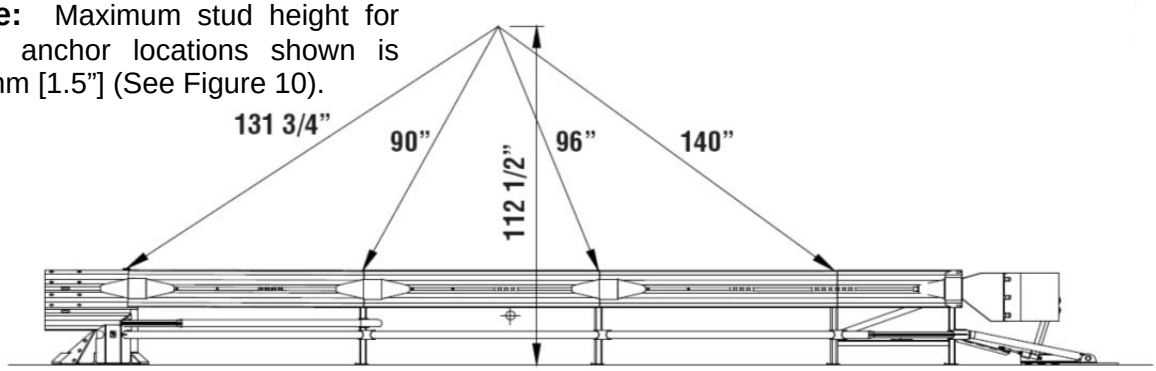
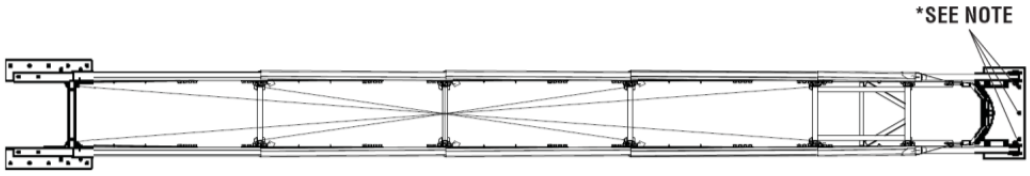


FIGURE 7b



Note: Maximum stud height for front anchor locations shown is 40 mm [1.5"] (See Figure 10).

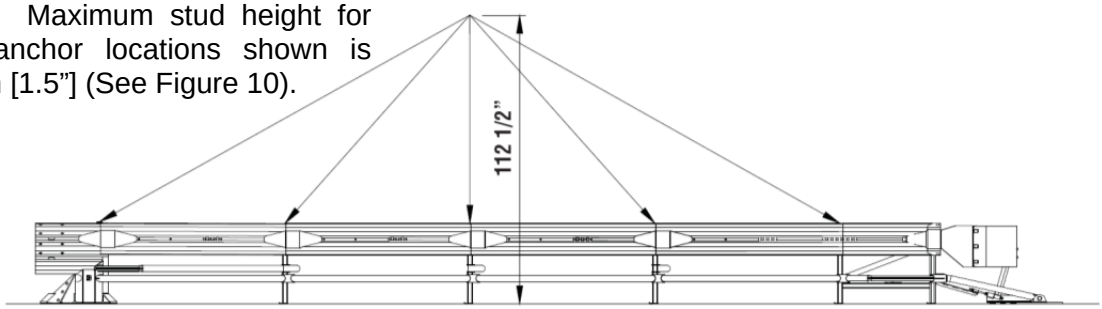


FIGURE 7c

6) Adjusting the Trigger Assembly (See Warning)

Ensure 1” x 5” 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). See also procedure outlined in the drawing package (See Figure 8).

7) Tension Shaper Rails (See Warning)

Remove the Spacers (Item 43) and tighten 1” x 3 1/2” bolts in the rear of the Shaper Rail Assembly (See Figure 6).

Warning: Once the grout has hardened (Refer to Table E on Page 56 for hardening times):

- 3/4” x 7” Anchor Studs Torque to 165 N-m [120 ft-lb] (See Figure 10)
- 3/4” x 18” Threaded Rods Torque <14 N-m [10 ft-lb] (See Figure 10)
- Trigger Assembly Tighten (See Figure 8)
- Tension Shaper Rail Bolts Tighten (See Figure 6)

Note: For ease of assembly, nose assembly should be left off until system is anchored. See Steps 15a, 15b, & 15c on Pages 40, 41, & 42 for attaching nose assembly.

Bidirectional Traffic

If a QUEST® System is placed in a location where traffic will be approaching from the rear, a transition 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® System.

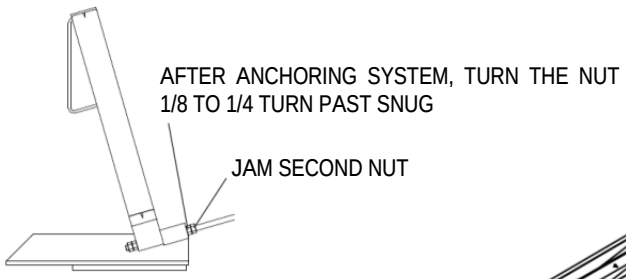


FIGURE 8
Trigger Assembly Adjustment

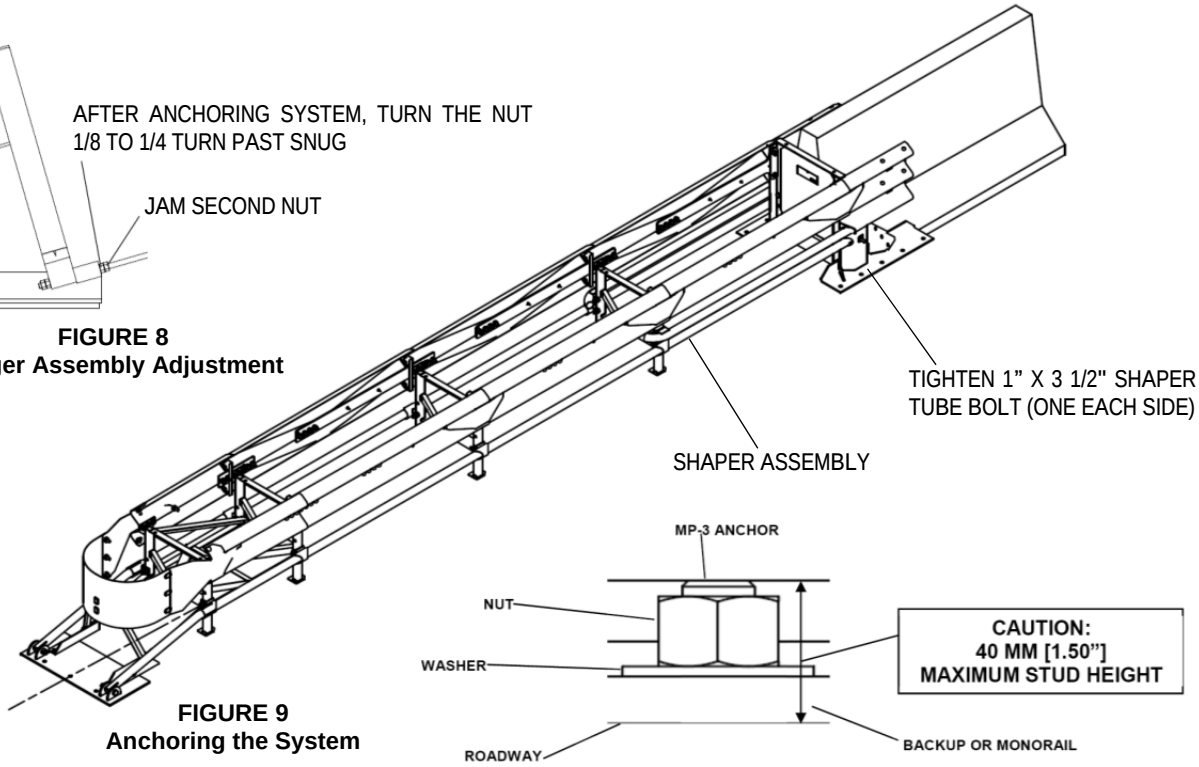


FIGURE 9
Anchoring the System

FIGURE 10
Proper Stud Height

Note: Maximum stud height for front anchor locations shown in Figure 9 is 40 mm [1.5”].

Transition and Side Panel Types

Caution: The proper Transition 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® System 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 Transition Panel used. See project plans supplied with the system for details.

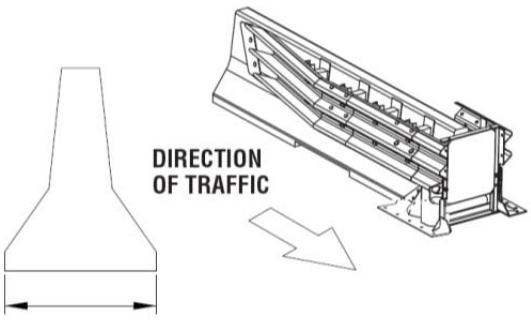


FIGURE 10
Thrie-Beam to Safety Barrier Transition Panel

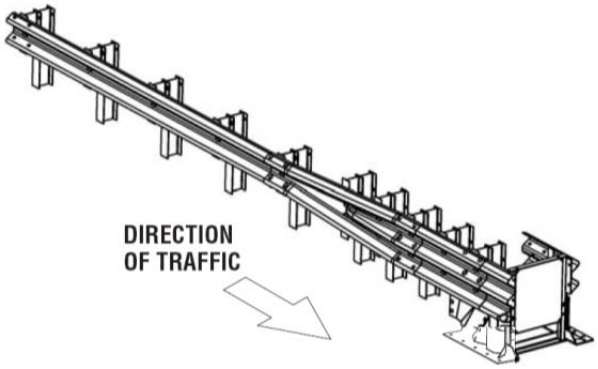


FIGURE 11
Thrie-Beam to W-Beam Transition Panel

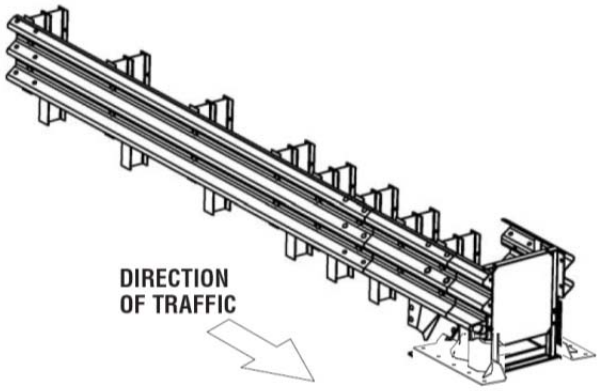


FIGURE 12
Transition to Thrie-Beam Guardrail

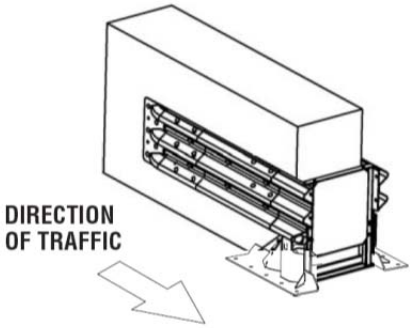


FIGURE 13
Thrie-Beam End Shoe Transition Panel

QUEST System **Maximum Hazard Width**		
Product name	Model No.	Maximum Width
QUEST® 610 MM [24”]	TDXXX24-***	600 mm [24”]
QUEST® 760 MM [30”]	TDXXX30-***	760 mm [30”]
QUEST® 915 MM [36”]	TDXXX36-***	915 mm [36”]

XXX= 70, 100, or 115 (SPEED)

***=70/TL-2, 100/TL-3 OR 115/TL-3 MOD

MP-3® Polyester Anchoring System

The MP-3® Polyester Anchoring System is a quick and easy way to securely anchor crash cushions and other common highway devices. MP-3® features high pullout strength, superior vibration resistance, and exceptional durability.

Each MP-3® kit contains a can of MP-3® resin, hardener, cold weather promoter, studs, washers, and a complete safety sheet. The cold weather promoter shortens hardening time by as much as seven hours. Both vertical and horizontal assemblies are possible using the MP-3® system.

Vertical Assemblies

Note: Read MP-3® Instructions before starting.

1) **Prepare the Concrete Pad**

Warning: Do not allow the MP-3® resin or hardener to contact skin or eyes. See material safety data sheet supplied with the MP-3® kit for first-aid procedures. Use only in well-ventilated area. Do not use near open flame.

Warning: Wear safety goggles, gloves, and apron during application process.

The Anchor Bolts (studs) that anchor the QUEST® system Backup and/or Monorail sections to the concrete pad must be those shipped in the kit or of high strength steel (830 MPa [120,000 psi] minimum tensile strength or equal). These studs must be set in minimum 28 MPa [4000 psi] concrete. Allow the concrete to cure a minimum of seven days before applying MP-3®.

2) Drill Holes

Note: Energy Absorption Systems recommends using two fluted drills to achieve optimum tensile strength when assembling the MP-3® anchoring system.

Use the part that is to be anchored as a drilling template. Drill the holes 3 mm [1/8”] larger than the stud diameter to the recommended depth, using a rotary percussive drill. If a diamond drill is used, the surface will be too smooth for the MP-3® to adhere and full strength will not be achieved. Refer to the MP-3® assembly instructions provided with your kit. Check to be sure all the holes are drilled to the proper depth and aligned with the part to be anchored. Please refer to Table D.

Table D

MP-3® Anchoring Information

Stud Size:	Concrete Bit Size	Minimum Depth	Recommended Torque
3/4”x 6 1/2"	22 mm [7/8”]	125 mm [5”]	165 N-m [120 ft-lb]
3/4”x 7"	22 mm [7/8”]	140 mm [5” 1/2"]	165 N-m [120 ft-lb]
3/4”x 18"	22 mm [7/8”]	420 mm [16 1/2”]	<15 N-m [<10 ft-lb]

3) Clean the Holes

Blow the concrete dust from the hole using oil-free compressed air. Thoroughly brush it with a stiff-bristled brush and then blow it out again. If the hole is wet, completely flush it with water while brushing. Then blow it clean using oil-free compressed air.

4) Mix the Resin and Hardener

Wearing gloves, apron and safety goggles, remove the lids from the MP-3® Part A-resin and Part B-hardener containers. Pour Part B into Part A, then mix vigorously for 30 seconds to form MP-3® grout (an anchor stud may serve as a stirring rod).

5) Add Cold Weather Promoter (in Cold Weather)

For faster hardening in cold weather, promoter may be used. Add the entire contents of the partially filled promoter container to the MP-3® grout, then mix for an additional 30 seconds. Use immediately because the MP-3® grout will thicken quickly. Refer to Table D for hardening times.

Warning: Do not use promoter when the temperature is above 15 degrees Celsius (60 degrees Fahrenheit). Grout will harden too quickly. Use only in well-ventilated area. Do not use near open flame.

6) Pour Grout into Holes

Crimp the mouth of the can to form a spout and pour the MP-3® grout mixture down into the hole through the part. Fill the hole to 1/3 - 1/2 full.

Caution: Do not overfill or under fill the hole. If the hole is overfilled, there will not be enough grout to use all of the anchor studs/kit. If hole is under filled the grout may not develop the required pull out strength.

7) Add the Washers and Nuts

Place a flat washer onto the stud, then thread a nut on until 1 or 2 threads of the NUT are left exposed.

8) Insert Studs in Holes and Wait for Grout to Harden

Push the stud down through the part to be anchored and into the hole. Give the stud several twists in the MP-3® to wet the threads.

Caution: Do not disturb or load the stud until the MP-3® material has hardened (See Table E).

9) Torque the Nuts

Once the grout has hardened, torque the nut to the recommended values (See Table D).

Table E
Approximate Hardening Times (hours)

Temperature Concrete Bit Size		**Hardening Times (hours) Recommended Torque**	
(C)	(F)	No Promoter	With Promoter
>26	>80	1/2	N/R*
22-26	70-79	1	N/R
16-21	60-69	2	N/R
10-15	50-59	4	3/4
4-9	40-49	8	1
-1-3	30-39	N/R	1 1/2
<-1	<30	N/R	N/R**
*Not recommended **Contact Customer Service Department for more information			

Horizontal Assemblies

The horizontal MP-3® kit is the same as the vertical kit except that a cartridge for a standard caulking gun is supplied in the horizontal kits and the resin for the horizontal kits is a thixotropic (TX) resin. The TX-Resin is a gelled resin designed to keep the grout in place in horizontal holes during application.

When using the horizontal MP-3® kits follow the vertical instructions with the following exceptions:

1) Thread Dispensing Tip onto Dispenser

Prior to mixing the grout, carefully thread the dispensing tip onto the dispenser.

2) Pour Mixed Grout into Dispenser

Once the grout is mixed, crimp the mouth of the can to form a spout and pour the MP-3® grout into the open end of the dispenser (use mixing stud to scrape out the portion remaining in the can). You may use the box to hold the dispenser upright. Close the box lid and poke the dispenser tip into the top of it. Seal the dispenser with the plunger provided.

3) Place Dispenser in Caulking Gun and Dispense Grout

Cut the small end of the dispenser tip off. Place the dispenser into a caulking gun and dispense until MP-3® TX grout reaches the tip of the dispenser, then release pressure. Push the dispenser tip through the part to the bottom of the hole and dispense while slowly withdrawing the tip.

Caution: Do not overfill or under fill the hole. Fill hole approximately 1/3 to 1/2 full. If the hole is overfilled, there will not be enough grout to use all of the anchor studs/kit. If hole is under filled the grout may not develop the required pull out strength.

4) Add the Washers and Nuts

Put washer and nut on stud, leaving nut flush with end of stud.

5) Insert Studs into Holes

Push stud through part to be anchored and into hole.

Note: In horizontal applications the stud should be flush with the top of the nut. Torque to 165 N-m [120 ft-lb].

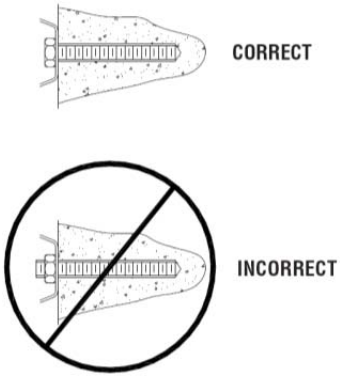


Figure 14
MP-3® Horizontal Application

MP-3® Assembly Cautions

1) Shelf life

If the shelf life of the MP-3® has expired (See MP-3® kit for expiration information), mix a small amount of MP-3® in the proportions of one part A to two parts B by volume. If the material does not set according to the instructions, contact Energy Absorption Systems for guidance.

Warning: Do not use MP-3® if: the material fails to set up, Part A-Resin had gelled (for vertical applications), or TX-Resin is NOT gelled (for horizontal applications).

2) Steel rebar

If steel rebar is encountered while drilling an MP-3® anchor bolt hole, apply one of the following solutions:

A) Using a diamond core drill or rebar drilling tool, drill through the rebar only and then switch back to the concrete bit to drill into the underlying concrete until the proper hole depth is reached.

Caution: Do not drill through rebar without first obtaining permission to do so from the local project engineer.

B) Drill a new hole down at an angle past the rebar to the proper depth. Anchor the stud by completely filling both holes with MP-3®.

Maintenance Checklist

Frequency of maintenance required will depend upon site conditions. Visual drive-by inspections, by the appropriate highway authority, 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® System, 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® System 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® System 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® System can be either refurbished on the roadside or repaired in the maintenance shop away from traffic dangers.

Some QUEST® System 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 than 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 the system.

Recommended Tools

Documentation

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

Cutting equipment

- Rebar Cutting Bit - 22 mm [7/8"]
- Concrete Drill Bits - 22 mm [7/8"]
- Grinder, Hacksaw or Torch (optional)
- Rotary Hammer Drill

Hammers

- Sledgehammer
- Standard Hammer

Wrenches

- Heavy Duty Impact Wrench - 1/2" Drive
- Standard Adjustable Wrench - 300 mm [12"]
- 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"
- Torque Wrench: 200 ft-lb
- Two of each: Open/Box End Wrench – 1/4", 1/2", 3/4"

Personal protective equipment

- Safety Glasses
- Gloves
- Safety Toe Shoes
- Apron for MP-3® application

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) 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 7/8” drilled holes
- Rags, Water, and Solvent 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.

Repair Procedure

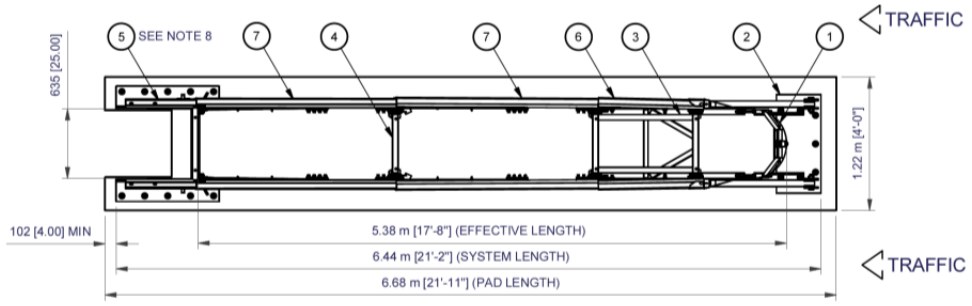
1) Deploy the appropriate traffic-control devices to protect your crew.
2) Clear and dispose of any debris on the site.
3) Check all components of the QUEST® System. Any components that are bent or damaged must be replaced. After some impacts on the nose, it is possible that the only parts that will be reusable are the backup and front anchor assemblies.
4) To refurbish the QUEST® System, 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® System is now ready for service.

Parts Ordering Procedure

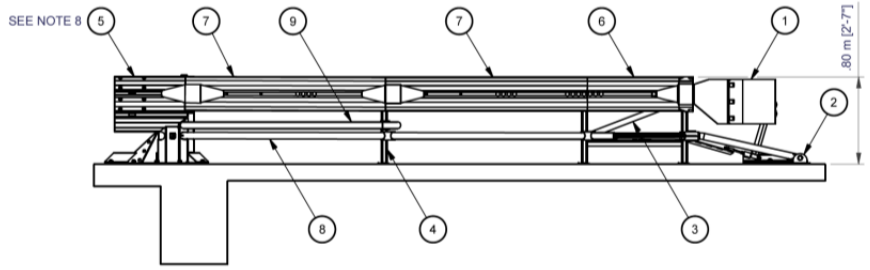
1) Make a list of all damaged parts using the part descriptions and part numbers shown on the assembly drawings.
2) Contact the Energy Absorption Systems Customer Service Department at (214) 589-8140 or (888) 323-6374.

Refer to this Product Description Assembly Manual for replacing systems.

DWG TD7024CU



PLAN



ELEVATION
LEFT SIDE

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 CAUTION: THE QUEST SYSTEM MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. ATTACH SYSTEM USING ONE OF THE FOLLOWING:
   A. (QTY. 15) 7" STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa [4000 PSI] MIN P.C. CONCRETE PER THE FOLLOWING MINIMUMS.**
      1) 152 [6.00] REINFORCED PAD PER REFERENCE DRAWING .
      2) 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG.
      3) 180 [7.00] REINFORCED DECK STRUCTURE.
      4) 18" THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.**
   ** REFER TO THE QUEST INSTALLATION INSTRUCTIONS FOR FOUNDATION SPECIFICATIONS.
4. SEE THE "QUEST 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 SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
8. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST AROUND 610 [24.00] WIDE HAZARDS, INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.

KEY

1 NOSE	5 BACKUP	9 REAR RAIL
2 FRONT ANCHOR	6 BAY 1 PANEL	
3 BAY 1	7 BAY 2-3 PANEL	
4 DIAPHRAGM	8 SHAPER RAIL	

Revision	Date	Rev	By	Chk.	App.
DESC. WAS "QUEST 70 SYSTEM (610)".	9/12/08	A	DK	JME	PLK
DWG & ASSY NO.S WERE TD35024-70CU.	1/2/09	B	DK	KRM	RCB
ECO 3052; UPDATED VIEWS AND NOTES DUE TO CHANGES IN ITEMS 2 AND 5.	2/10/11	C	DDS	KRM	KWL

SERIAL NO.
SALES ORDER
EH PROJECT
NO. OF UNITS

REFERENCES

QUEST SYSTEM ASSEMBLY	613491
SUPPORT FRAME BAY 1	615467
DIAPHRAGM ASSY BAY 1&2	607196
TRIGGER ASSY	616212
CONCRETE PAD	3562018-0000
ANCHOR ASSY	3562007-0000

DRAWN:	D. Kohfeld	DATE: 1/22/2007
DESIGNED:		DATE:
CHECKED:	JME	DATE: 3/20/2007
APPROVED:	SPT	DATE: 3/30/2007
FILE:	TD7024CU.idw	
NEXT ASSEMBLY:		

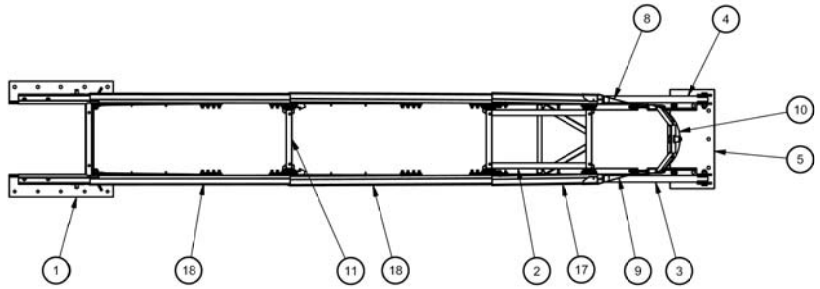
UNIDIRECTIONAL
ASSEMBLY NO. 613491B

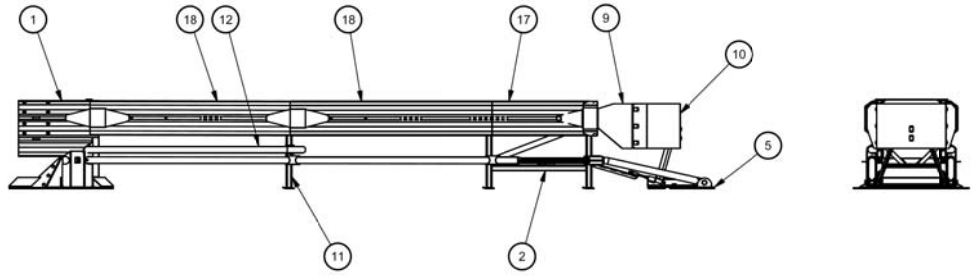
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-2/70 SYSTEM (24" [610mm])
70 km/h [43 MPH]

SCALE:	DRAWING:	SHEET:	REV
1=40	TD7024CU	1 of 1	C

QUEST® TL-2/70 SYSTEM 24”





PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604647G	BACKUP,24,QUEST,G	1
2	615467B	SUPPORT FRAME ASSY,QUEST,24	1
3	614027G	SHAPER RAIL,L,QUEST 80,G	1
4	614033G	SHAPER RAIL,R,QUEST 80,G	1
5	617605G	ANCHOR,FRONT,QUEST,24,G	1
6	616230B	TRIGGER STRAP,QUEST	2
7	616212B	TRIGGER ASSY,QUEST,24	1
8	611642W	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641W	NOSE TRANSITION,L,QUEST,G,PT	1
10	611678W	NOSE,QUEST,G,PT	1
11	607196B	DIAPHRAGM ASSY,QUEST,24	1
12	613663G	REAR RAIL,QUEST,UNCRIMPED,G	2
13	614733B	STRAP,PEEL,REAR,QUEST	2
14	614728B	STRAP,PEEL,BAY 2,QUEST	2
15	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/HOLES,G	2
16	608513G	FLT ST 1/4X4X14,W/SLOTS,G	2
17	611792G	PANEL,BAY 1,QUEST,G	2
18	611796G	PANEL,BAYS,QUEST,G	4
19	605343G	BRACE,PANEL,QUEST,G	4
20	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	8
21	617005G	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
22	118052G	WASHER,FLAT,5/8 X 1 3/4, G	6
23	117987B	WASHER,FLAT,#6X5/8X.030,S	16
24	617010G	WASHER,BAR,2X2X1/4,G	2
25	118030B	WASHER,FLAT,3/8 ID X13/16 OD,P,HRD	32
26	003340G	NUT,HX,5/8,G,RAIL	60
27	115954G	NUT,HX,3/4",GR DH	10
28	115931G	NUT,HX,1,G	2
29	115960G	NUT,HX,3/8,G	16
31	115909G	NUT,HX,#6-32,S	16
33	003400G	BOLT,RAIL,5/8X2,G	54
34	113553G	BOLT,HX,3/4X2,G5,G	4
35	113538G	BOLT,HX,1X5,G8,G	2
36	113530G	BOLT,HX,1X3 1/2,G5,G	2
37	003380G	BOLT,HX,5/8X1 1/2,G5,G	6
38	113558G	BOLT,HX,3/4X3 1/2,G5,G	2
39	113596G	BOLT,HX,3/8X1,G2,G	16
40	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
41	116758G	RIVET,ST,SD68BS,3/16X1/2,DH	1
42	114461B	DECAL,CAUTION,ALL PRODUCTS	1
43	114591B	DECAL,PRODUCT,QUEST	1
44	115249G	INSTALL INSTRUCTIONS,QUEST SYSTEM	1
45	115674G	MATERIAL SAFETY INFORMATION NOTICE	1
46	614533B	SPACER,RAIL TENSION,QUEST	2
47	118027G	WASHER,FLAT,3/4X2,HVY,G	2

ASSEMBLY NO. 613491B

Revision	Date	Rev	By	Chk	App.
DEL ITEMS 30 & 32. 26 QTY WAS 54, 33 QTY WAS 12.	11/16/09	D	DK	JME	FJP
UPDATED ITEM 1, 5 WAS 2762015-0000, 27 QTY WAS 8. ADDED ITEM 47.	1/25/10	E	DK	JME	JMT
PART NO WAS TD7024.	8/9/10	-	DK	/	/

DRAWN: D. Kohfeld	DATE: 1/22/2007	
DESIGNED:	DATE:	
CHECKED: JME	DATE: 3/27/2007	
APPROVED: SPT	DATE: 3/30/2007	
FILE: 613491.idw		

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

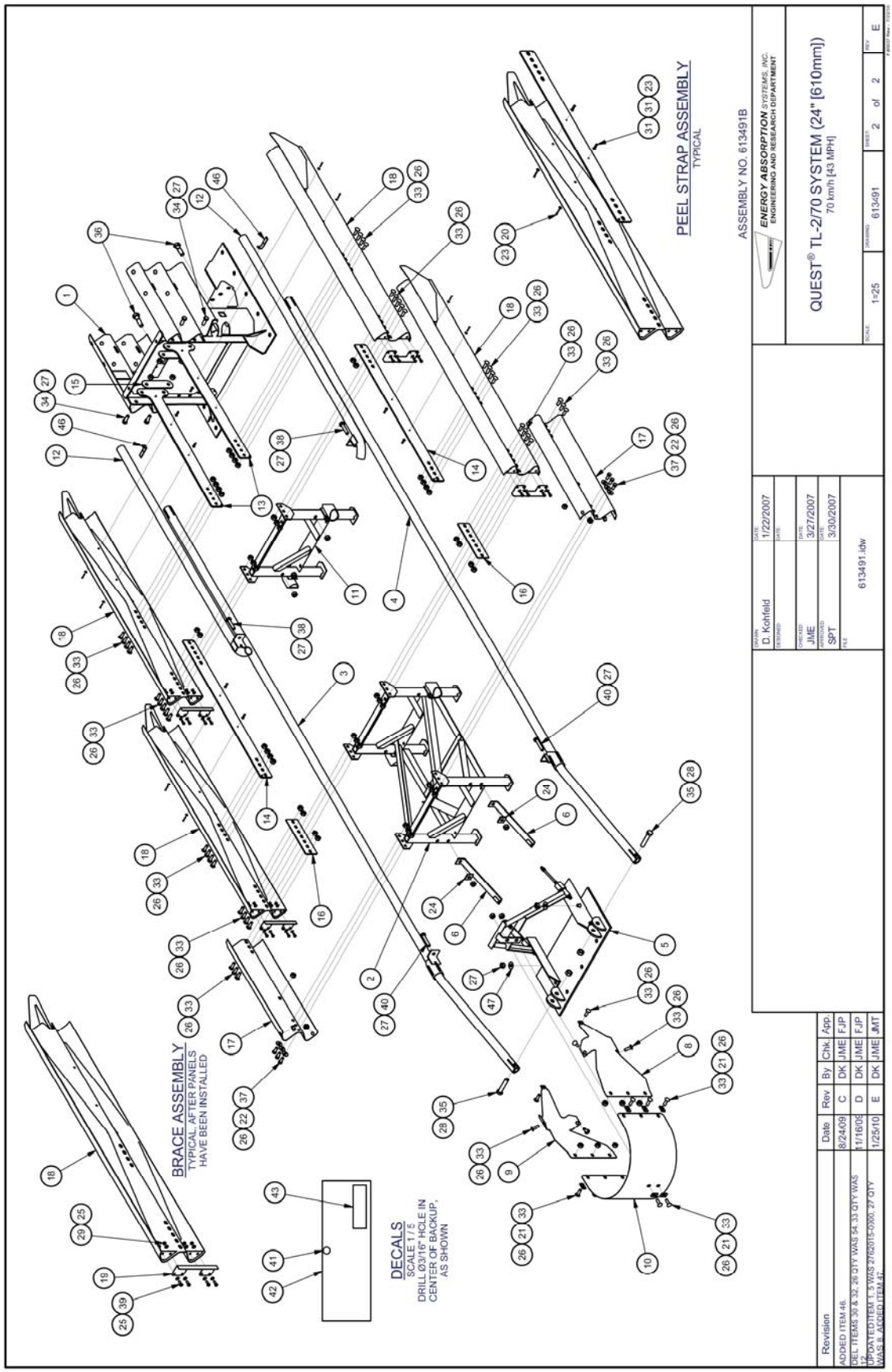
QUEST® TL-2/70 SYSTEM (24" [610mm])
70 km/h [43 MPH]

SCALE	DRAWING	SHEET	REV
1=40	613491	1 of 2	E

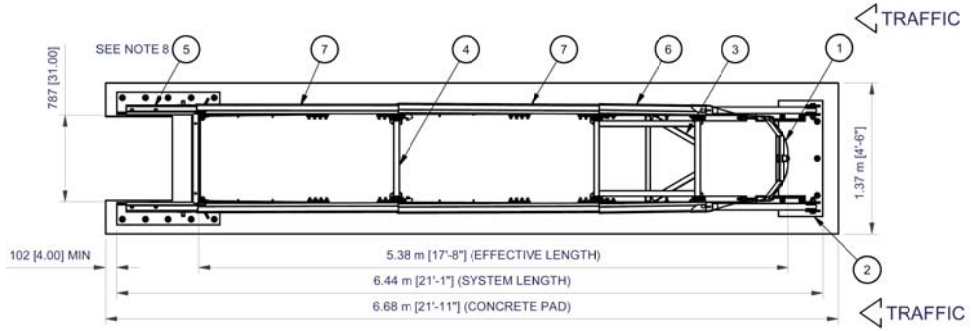
FM0037 Rev -, 7/2010

QUEST® TL-2/70 SYSTEM ASSEMBLY 24”

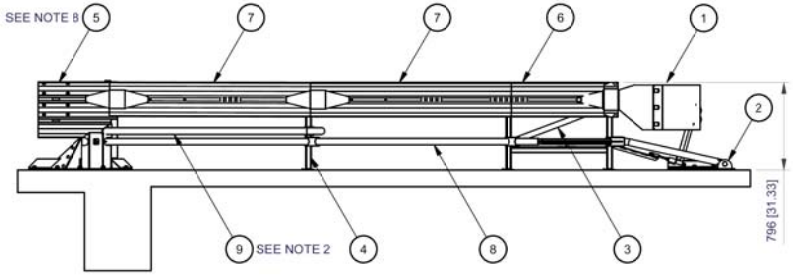
DWG 613491 Sheet 2 of 2



DWG TD7030CU



PLAN



ELEVATION
LEFT SIDE

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. CAUTION: THE QUEST SYSTEM MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. ATTACH SYSTEM USING ONE OF THE FOLLOWING:
   A. (QTY. 15) 7" STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa [4000 PSI] MIN P.C. CONCRETE PER THE FOLLOWING MINIMUMS.**
      1) 152 [6.00] REINFORCED PAD PER REFERENCE DRAWING .
      2) 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG.
      3) 180 [7.00] REINFORCED DECK STRUCTURE.
      4) 18" THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.**
   ** REFER TO THE QUEST INSTALLATION INSTRUCTIONS FOR FOUNDATION SPECIFICATIONS.
4. SEE THE "QUEST 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 SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
8. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST ARCUND 762 [30.00] WIDE HAZARDS, INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.

KEY

1 NOSE	5 BACKUP	9 REAR RAIL
2 FRONT ANCHOR	6 BAY 1 PANEL	
3 BAY 1	7 BAY 2&3 PANEL	
4 DIAPHRAGM	8 SHAPER RAIL	

Revision	Date	Rev	By	Chk.	App.
DESCRIPTION WAS "QUEST 70 SYSTEM (762)".	9/15/08	A	DK	JME	PLK
DRAWING NO. WAS TD35030-70CU. 2430	4/14/09	B	DK	KRM	RCB
ECO 3052; UPDATED VIEWS AND NOTES DUE TO CHANGES IN ITEMS 2 & 5	2/10/11	C	DDS	KRM	KWL

SERIAL NO.
SALES ORDER
EH PROJECT
NO. OF UNITS

REFERENCES

QUEST SYSTEM ASSEMBLY	613493
SUPPORT FRAME ASSY	615443
DIAPHRAGM ASSY	606806
TRIGGER ASSY	616208
CONCRETE PAD	3562029-0000
ANCHOR ASSY	3562007-0000

DRAWN: D. Kohfeld	DATE: 1/23/2007	
DESIGNED:	DATE:	
CHECKED: JME	DATE: 3/29/2007	
APPROVED: SPT	DATE: 3/30/2007	
FILE: TD7030CU.idw		
NEXT ASSEMBLY:		

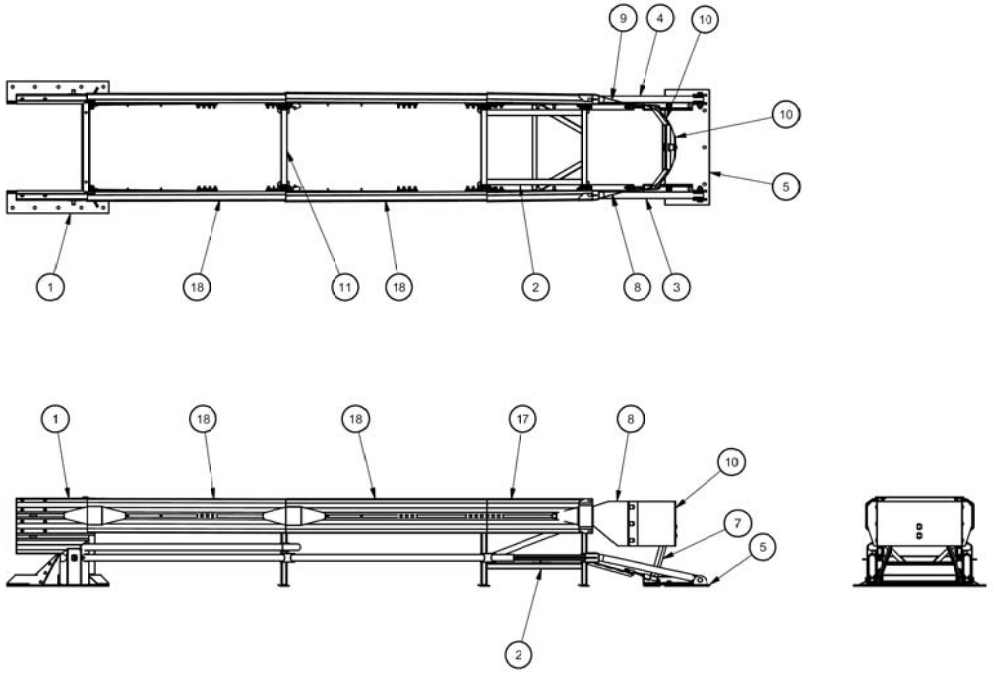
UNIDIRECTIONAL
ASSEMBLY NO. 613493B

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-2/70 SYSTEM (30" [760mm])
70 km/h [43 MPH]

SCALE	DRAWING	SHEET	REV
1=40	TD7030CU	1 of 1	C

QUEST® TL-2/70 SYSTEM 30”



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604648G	BACKUP,30,QUEST,G	1
2	615443B	SUPPORT FRAME ASSY,30,QUEST	1
3	614027G	SHAPER RAIL,L,QUEST 80,G	1
4	614033G	SHAPER RAIL,R,QUEST 80,G	1
5	617613G	ANCHOR,FRONT,QUEST,30,G	1
6	616230G	TRIGGER STRAP,QUEST,G	2
7	616208B	TRIGGER ASSY,30,QUEST	1
8	611641W	NOSE TRANSITION,L,QUEST,G,PT	1
9	611642W	NOSE TRANSITION,R,QUEST,G,PT	1
10	611650W	NOSE,30,QUEST,G,PT	1
11	606806B	DIAPHRAGM ASSY,30,QUEST	1
12	613663G	REAR RAIL,QUEST,UNCRIMPED,G	2
13	614733B	STRAP,PEEL,REAR,QUEST	2
14	614728B	STRAP,PEEL,BAY 2,QUEST	2
15	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/HOLES,G	2
16	608513G	FLT ST 1/4X4X14,W/SLOTS,G	2
17	611792G	PANEL,BAY 1,QUEST,G	2
18	611796G	PANEL,BAYS,QUEST,G	4
19	605343G	BRACE,PANEL,QUEST,G	4
20	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	8
21	617005B	WASHER,BAR,1/8X1 1/4X2,ROUNDED	8
22	118052G	WASHER,FLAT,5/8 X 1 3/4, G	6
23	117987B	WASHER,FLAT,#6X5/8X.030,S	16
24	617010G	WASHER,BAR,2X2X1/4,G	2
25	118030G	WASHER,FLAT,3/8 ID X13/16 OD,P,HRD	32
26	003340G	NUT,HX,5/8,G,RAIL	60
27	115954G	NUT,HX,3/4",GR DH	10
28	115931G	NUT,HX,1,G	2
29	115960G	NUT,HX,3/8,G	16
31	115909B	NUT,HX,#6-32,S	16
33	003400G	BOLT,RAIL,5/8X2,G	54
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40	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
41	116758G	RIVET,ST,SD68BS,3/16X1/2,DH	1
42	114461B	DECAL,CAUTION,ALL PRODUCTS	1
43	114591B	DECAL,PRODUCT,QUEST	1
44	115273G	INSTALL INSTRUCTIONS,QUEST 70/100/115	1
45	115674G	MATERIAL SAFETY INFORMATION NOTICE	1
46	614533B	SPACER,RAIL TENSION,QUEST	2
47	118027G	WASHER,FLAT,3/4X2,HVY,G	2
48	118440B	DECAL,PATENT WEB SITE	1

PART NO. 613493B

Revision	Date	Rev	By	Chk	App.
UPDATED ITEM 1, ITEM 5 WAS 27/62615-0000, 27 QTY WAS 8, ADD ITEM 47.	1/29/10	E	DK	JME	JMT
PART NO. WAS TD7030	8/20/10	-	/	/	/
ECO 3413; ADDED ITEM 48, SEE SHEET 2 FOR DETAIL S	7/5/12	F	DDW	JME	KRM

DRAWN: D. Kohfeld	DATE: 1/22/2007	
DESIGNED:	DATE:	
CHECKED: KRM	DATE: 4/9/2007	
APPROVED: SPT	DATE: 4/9/2007	
FILE: 613493.idw		

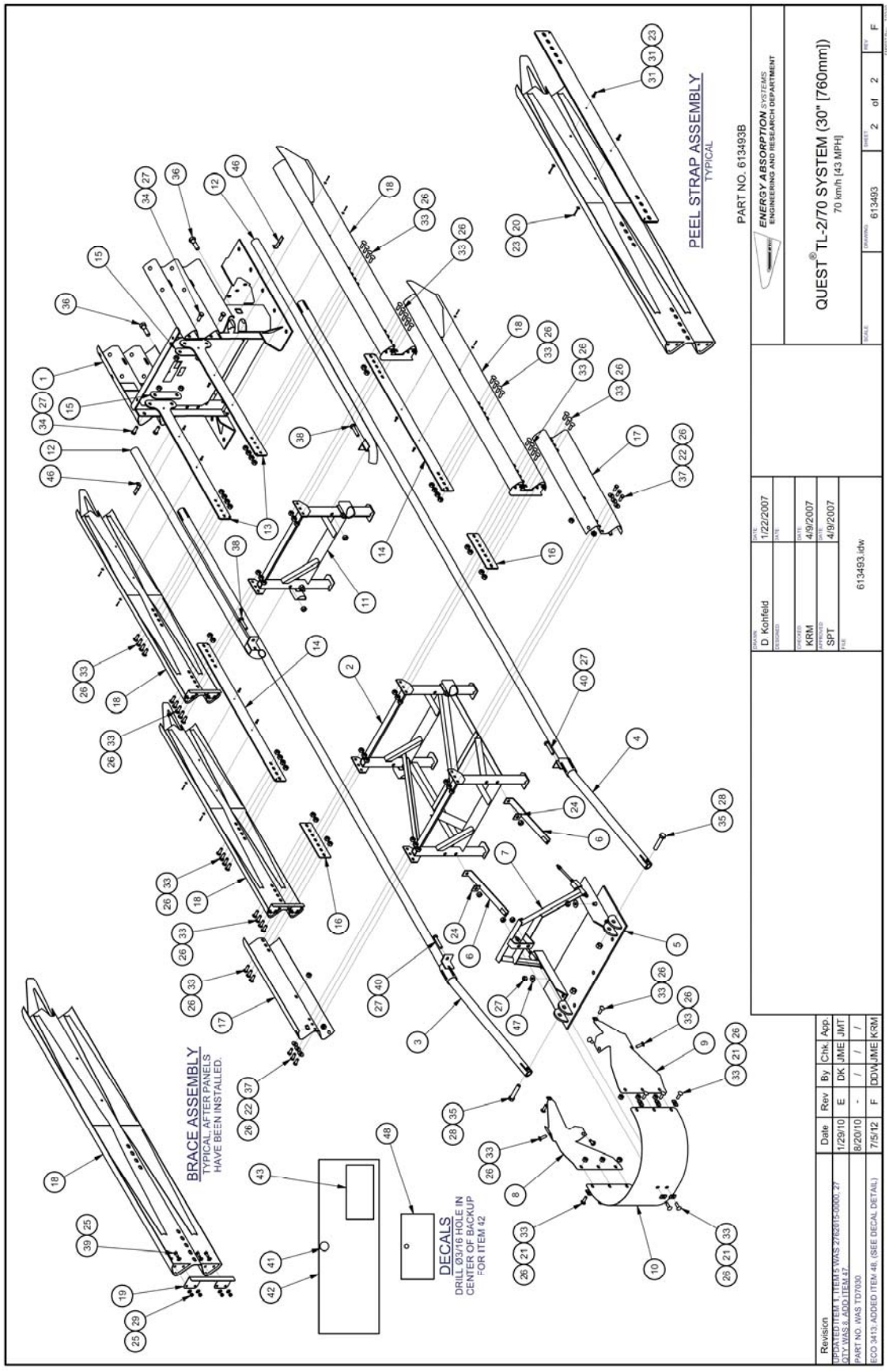
ENERGY ABSORPTION SYSTEMS
ENGINEERING AND RESEARCH DEPARTMENT

QUEST®TL-2/70 SYSTEM (30" [760mm])
70 km/h [43 MPH]

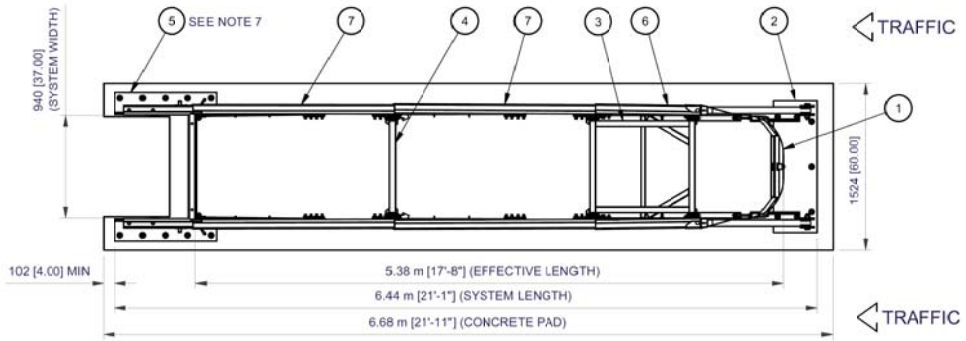
SCALE: | DRAWING: 613493 | SHEET: 1 of 2 | REV: F

QUEST® TL-2/70 SYSTEM ASSEMBLY 30”

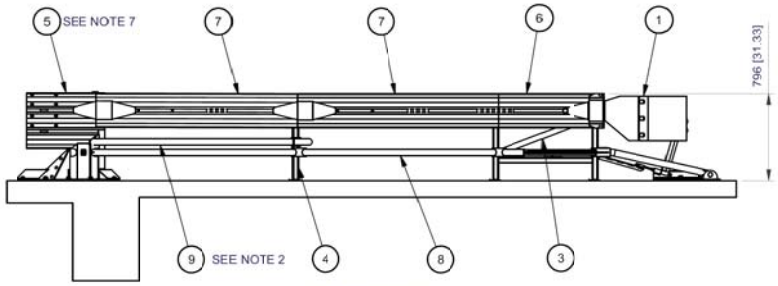
DWG 613493 Sheet 2 of 2



DWG TD7030CU



PLAN



ELEVATION
LEFT SIDE

NOTES:
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      1) 152 [6.00] REINFORCED PAD PER REFERENCE DRAWING .
      2) 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG.
      3) 180 [7.00] REINFORCED DECK STRUCTURE.
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   ** REFER TO THE QUEST INSTALLATION INSTRUCTIONS FOR FOUNDATION SPECIFICATIONS.
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6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
8. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST AROUND 914 [36.00] WIDE HAZARDS, INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.

KEY

1 NOSE	5 BACKUP	9 REAR RAIL
2 FRONT ANCHOR	6 BAY 1 PANEL	
3 BAY 1	7 BAY 2&3 PANEL	
4 DIAPHRAGM	8 SHAPER RAIL	

Revision	Date	Rev	By	Chk.	App.
DESCRIPTION WAS "QUEST 70 SYSTEM (915)".	9/17/08	A	DK	JME	PLK
DRAWING NO. WAS TD35036-70CU. 2530	4/14/09	B	DK	KRM	RCB
ECO 3052; UPDATED VIEWS AND NOTES DUE TO CHANGES IN ITEMS 2 & 5.	2/15/11	C	DDS	KRM	KWL

SERIAL NO.
SALES ORDER
EH PROJECT
NO. OF UNITS

REFERENCES

QUEST SYSTEM ASSEMBLY	613495
SUPPORT FRAME ASSY	615444
DIAPHRAGM ASSY	606808
TRIGGER ASSY	616209
CONCRETE PAD	3562030-0000
FOUNDATIONS	3562007-0000

DRAWN	D. Kohfeld	1/23/2007
DESIGNED		
CHECKED	JME	4/9/2007
APPROVED	SPT	4/9/2007
FILE	TD7036CU.idw	
NEXT ASSEMBLY		

UNIDIRECTIONAL
ASSEMBLY NO. 613495B

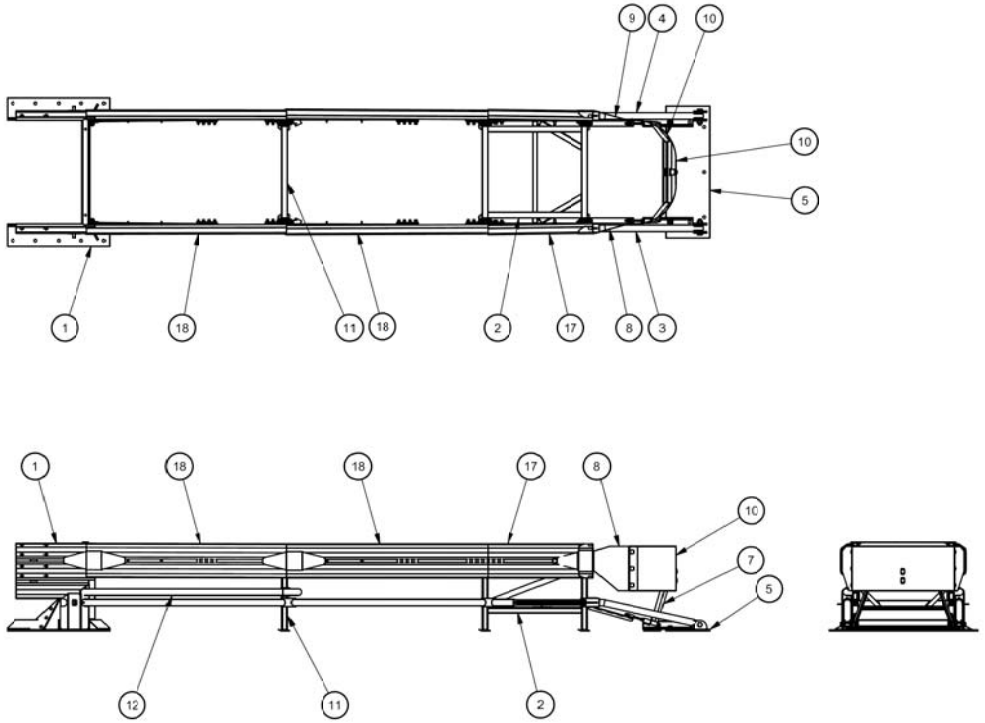
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-2/70 SYSTEM (36" [915mm])
70 km/h [43 MPH]

SCALE	DRAWING	SHEET	REV
1=40	TD7036CU	1 of 1	C

QUEST® TL-2/70 SYSTEM 36”

DWG TD7036CU



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604650G	BACKUP,36,QUEST,G	1
2	615444B	SUPPORT FRAME ASSY,36,QUEST	1
3	614027G	SHAPER RAIL,L,QUEST 80,G	1
4	614033G	SHAPER RAIL,R,QUEST 80,G	1
5	617616G	ANCHOR,FRONT,QUEST,36,G	1
6	616230G	TRIGGER STRAP,QUEST,G	2
7	616209B	TRIGGER ASSY,36,QUEST	1
8	61?641W	NOSE TRANSITION,L,QUEST,G,PT	1
9	61?642W	NOSE TRANSITION,R,QUEST,G,PT	1
10	61?651W	NOSE,36,QUEST,G,PT	1
11	606808B	DIAPHRAGM ASSY,36,QUEST	1
12	613663G	REAR RAIL,QUEST,UNCRIMPED,G	2
13	614733B	STRAP,PEEL,REAR,QUEST	2
14	614728B	STRAP,PEEL,BAY 2,QUEST	2
15	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/HOLES,G	2
16	608513G	FLT ST 1/4X4X14,W/SLOTS,G	2
17	61?792G	PANEL,BAY 1,QUEST,G	2
18	61?796G	PANEL,BAYS,QUEST,G	4
19	605343G	BRACE,PANEL,QUEST,G	4
20	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	8
21	617005G	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
22	118052G	WASHER,FLAT,5/8 X 1 3/4, G	6
23	117987B	WASHER,FLAT,#6X5,8X.030,S	16
24	617010G	WASHER,BAR,2X2X1/4,G	2
25	118030G	WASHER,FLAT,3/8 ID X13/16 OD,P,HRD	32
26	003340G	NUT,HX,5/8,G,RAIL	60
27	115954G	NUT,HX,3/4",GR DH	10
28	115931G	NUT,HX,1,G	2
29	115960G	NUT,HX,3/8,G	16
31	115909B	NUT,HX,#6-32,S	16
33	003400G	BOLT,RAIL,5/8X2,G	54
34	113553G	BOLT,HX,3/4X2,G5,G	4
35	113538G	BOLT,HX,?X5,G8,G	2
36	113530G	BOLT,HX,?X3 1/2,G5,G	2
37	003380G	BOLT,HX,5/8X1 1/2,G5,G	6
38	113558G	BOLT,HX,3/4X3 1/2,G5,G	2
39	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
40	113596G	BOLT,HX,3/8X1,G5,G	16
41	116758G	RIVET,ST,SD68BS,3/16X1/2,DH	1
42	114461B	DECAL,CAUTION,ALL PRODUCTS	1
43	114591B	DECAL,PRODUCT,QUEST	1
44	115249G	INSTALL INSTR,QUEST SYSTEM	1
45	115674G	MATERIAL SAFETY INFORMATION NOTICE	1
46	614533B	SPACER,RAIL TENSION,QUEST	2
47	118027G	WASHER,FLAT,3/4X2,HVY,G	2
48	118440B	DECAL,PATENT WEB SITE	1

PART NO. 613495B

Revision	Date	Rev	By	Chk	App.
UPDATED ITEM 1, ITEM 5 WAS 2762615-0000, 27 QTY WAS 8, ADD ITEM 47.	2/3/10	E	DK	JME	JMT
PART NO. WAS TD7036	8/25/10	-	DK	/	/
ECO 3413; ADDED ITEM 48, SEE SHEET 2 FOR DETAIL S	7/9/12	F	DDW	JME	KRM

DRAWN: D. Kohfeld	DATE: 1/22/2007
DESIGNED:	DATE:
CHECKED: KRM	DATE: 4/9/2007
APPROVED: SPT	DATE: 4/9/2007
FILE: 613495.idw	

ENERGY ABSORPTION SYSTEMS
ENGINEERING AND RESEARCH DEPARTMENT

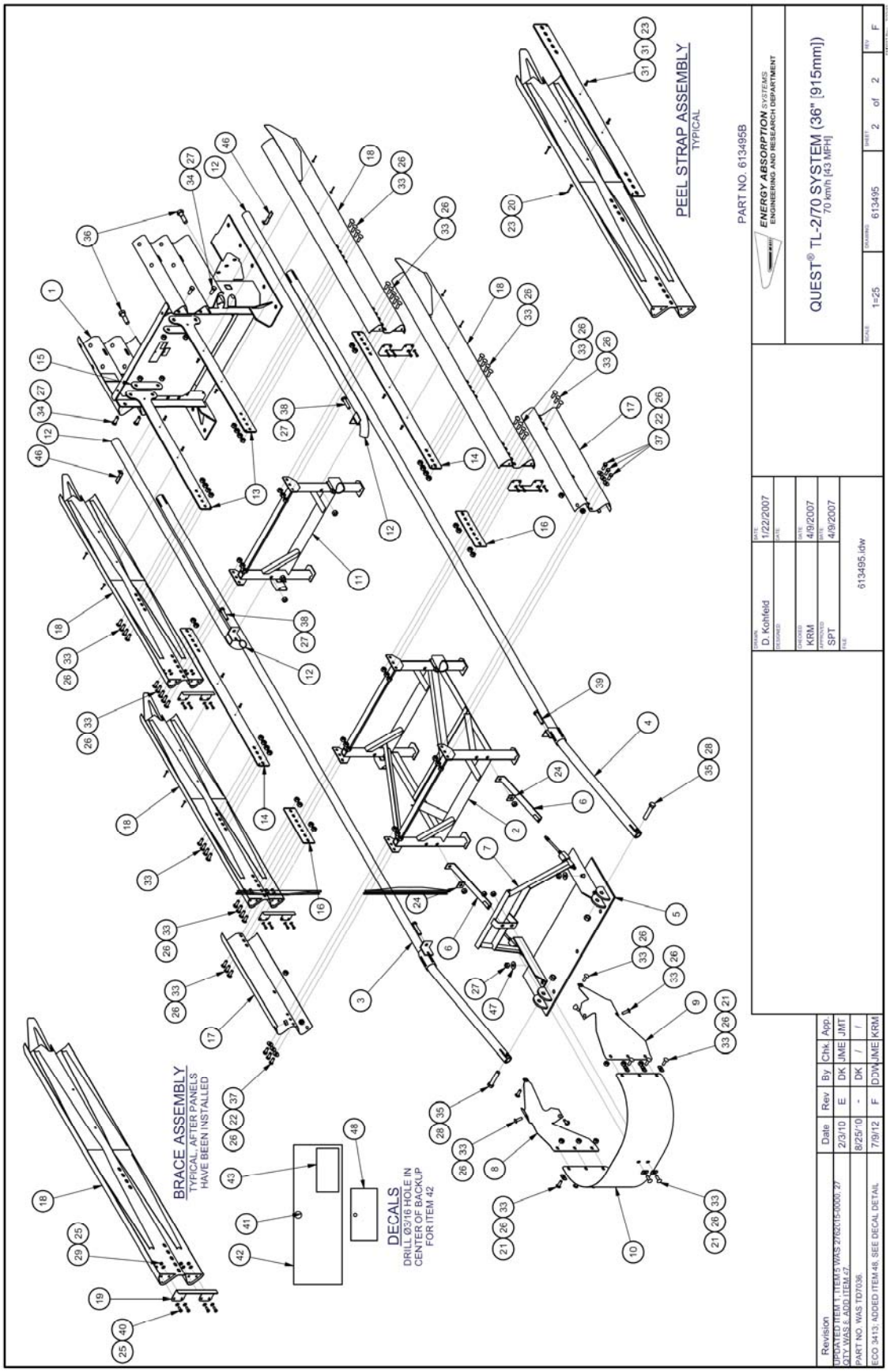
QUEST® TL-2/70 SYSTEM (36" [915mm])
70 km/h [43 MPH]

SCALE	DRAWING	SHEET	REV
1=40	613495	1 of 2	F

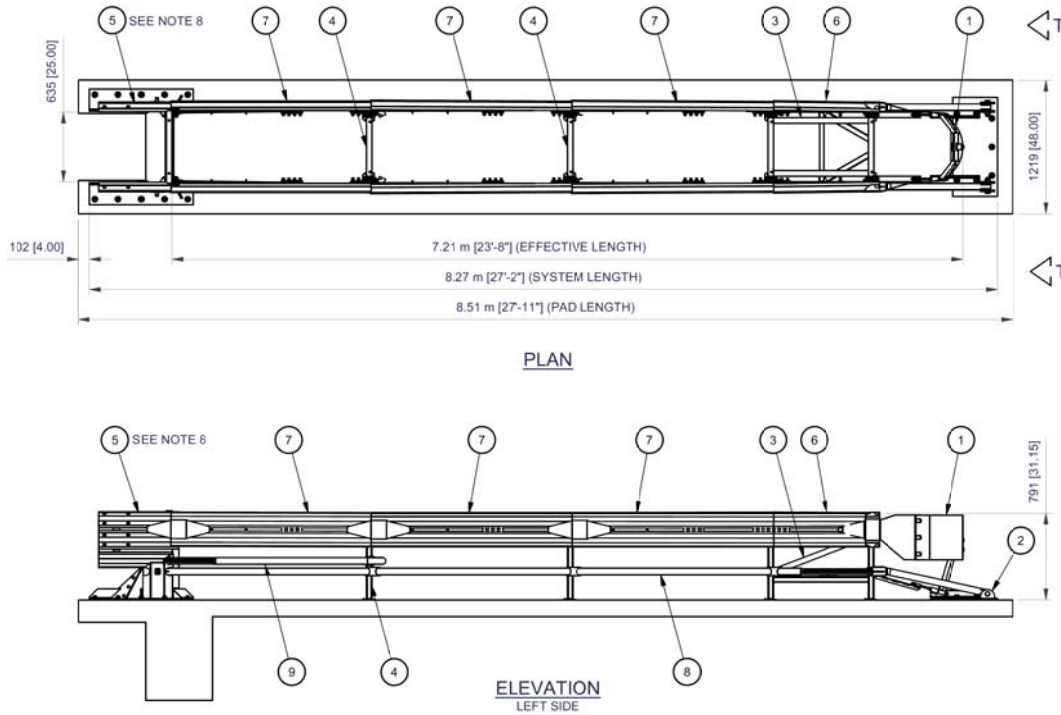
FM0037 Rev - 7/22/10

QUEST® TL-2/70 SYSTEM ASSEMBLY 36”

DWG 613495 Sheet 2 of 2



DWG TD10024CU



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. CAUTION: THE QUEST SYSTEM MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. ATTACH SYSTEM USING ONE OF THE FOLLOWING:
   A. (QTY. 15) 7" STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa [4000 PSI] MIN P.C. CONCRETE PER THE FOLLOWING MINIMUMS.**
      1) 152 [6.00] REINFORCED PAD PER REFERENCE DRAWING .
      2) 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG.
      3) 180 [7.00] REINFORCED DECK STRUCTURE.
      4) 18" THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.**
   ** REFER TO THE QUEST INSTALLATION INSTRUCTIONS FOR FOUNDATION SPECIFICATIONS.
4. SEE THE "QUEST 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 SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
8. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST AROUND 610 [24.00] WIDE HAZARDS, INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.

KEY

1 NOSE	5 BACKUP	9 REAR RAIL
2 FRONT ANCHOR	6 BAY 1 PANEL	
3 BAY 1	7 BAY 2-4 PANEL	
4 DIAPHRAGM	8 SHAPER RAIL	

Revision	Date	Rev	By	Chk.	App.
DWG. & ASSY NO.S WERE TD35024-TL3CU.	1/2/09	A	DK	KRM	RCB
ECO 3052: UPDATED VIEWS AND NOTES DUE TO CHANGES IN ITEMS 2 & 5	2/17/11	B	DDS	KRM	KWL

SERIAL NO.
SALES ORDER
EH PROJECT
NO. OF UNITS

REFERENCES

QUEST SYSTEM ASSEMBLY	613500
SUPPORT FRAME BAY 1	615467
DIAPHRAGM ASSY BAY 1&2	607196
TRIGGER ASSY	616212
CONCRETE PAD	3562015-0000
ANCHOR ASSY	3562007-0000

DRAWN	W. Leddington	9/2/2008
DESIGNED	R. Brougher	8/27/2008
CHECKED	K. Mortensen	9/2/2008
APPROVED	R. Brougher	9/4/2008
FILE	TD10024CU.idw	
NEXT ASSEMBLY		

UNIDIRECTIONAL
ASSEMBLY NO. 613500B

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-3/100 SYSTEM (24" [610mm])
100 km/h [62 MPH]

SCALE	DRAWING	SHEET	REV
1=40	TD10024CU	1 of 1	B

QUEST® TL-3/100 SYSTEM 24”

DWG 613500B Sheet 1 of 2

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
50	118440B	DECAL,PATENT WEB SITE	1

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604647G	BACKUP,24,QUEST,G	1
2	615467B	SUPPORT FRAME ASSY,QUEST,24	1
3	614029G	SHAPER RAIL,L,QUEST,G	1
4	614035G	SHAPER RAIL,R,QUEST,G	1
5	614042G	SHAPER,BACKUP,QUEST,G	2
6	613662G	REAR RAIL,QUEST,G	2
7	617605G	ANCHOR,FRONT,QUEST,24,G	1
8	616230G	TRIGGER STRAP,QUEST,G	2
9	616212B	TRIGGER ASSY,QUEST,24	1
10	611642W	NOSE TRANSITION,R,QUEST,G,PT	1
11	611641W	NOSE TRANSITION,L,QUEST,G,PT	1
12	611678Y	NOSE,QUEST,G,PT	1
13	607196B	DIAPHRAGM ASSY,QUEST,24	2
14	614733B	STRAP,PEEL,REAR,QUEST	2
15	614728B	STRAP,PEEL,BAY 2,QUEST	2
16	614732B	STRAP,PEEL, BAY 3,QUEST	2
17	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/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,G	6
21	605343G	BRACE,PANEL,QUEST,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	617010G	WASHER,BAR,2X2X1/4,G	2
25	118052G	WASHER,FLAT,5/8 X 1 3/4, G	6
26	117987B	WASHER,FLAT,#6X5/8X.030,S	24
27	118030G	WASHER,FLAT,3/8 ID X13/16 OD,P,HRD	48
28	003340G	NUT,HX,5/8,G,RAIL	78
29	115954G	NUT,HX,3/4",GR DH	12
30	115931G	NUT,HX,1,G	2
31	115909B	NUT,HX,#6-32,S	24
32	115960G	NUT,HX,3/8,G	24
35	113553G	BOLT,HX,3/4X2,G5,G	4
36	113538G	BOLT,HX,1X5,G8,G	2
37	113530G	BOLT,HX,1X3 1/2,G5,G	2
38	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
39	003400G	BOLT,RAIL,5/8X2,G	72
40	003380G	BOLT,HX,5/8X1 1/2,G5,G	6
41	113558G	BOLT,HX,3/4X3 1/2,G5,G	4
42	113596G	BOLT,HX,3/8X1,G5,G	24
43	114591B	DECAL,PRODUCT,QUEST	1
44	114461B	DECAL,CAUTION,ALL PRODUCTS	1
45	116758G	RIVET,ST,SD68BS,3/16X1/2,DH	1
46	115249B	INSTALL INSTR,QUEST SYSTEM	1
47	115674B	MATERIAL SAFETY INFORMATION NOTICE	1
48	118027G	WASHER,FLAT,3/4X2,HVY,G	2
49	614533B	SPACER,RAIL TENSION,QUEST	2

ASSEMBLY NO. 613500B

Revision	Date	Rev	By	Chk	App.
UPDATED ITEM 1, ITEM 7 WAS 2762C15-0000; 29 QTY WAS 10. ADDED ITEM 48.	1/26/10	D	DK	JME	JMT
PART NO. WAS TD10024.	9/7/10	-	DK	/	/
ECO 3413; ADDED ITEM 50, SEE SHEET 2 FOR DETAIL	7/5/12	E	DDW	JME	KRM

DRAWN: W. Leddington	DATE: 9/2/2008
DESIGNED: R. Brougher	DATE: 8/28/2008
CHECKED: K. Mortensen	DATE: 9/2/2008
APPROVED: R. Brougher	DATE: 9/4/2008
FILE: 613500.idw	

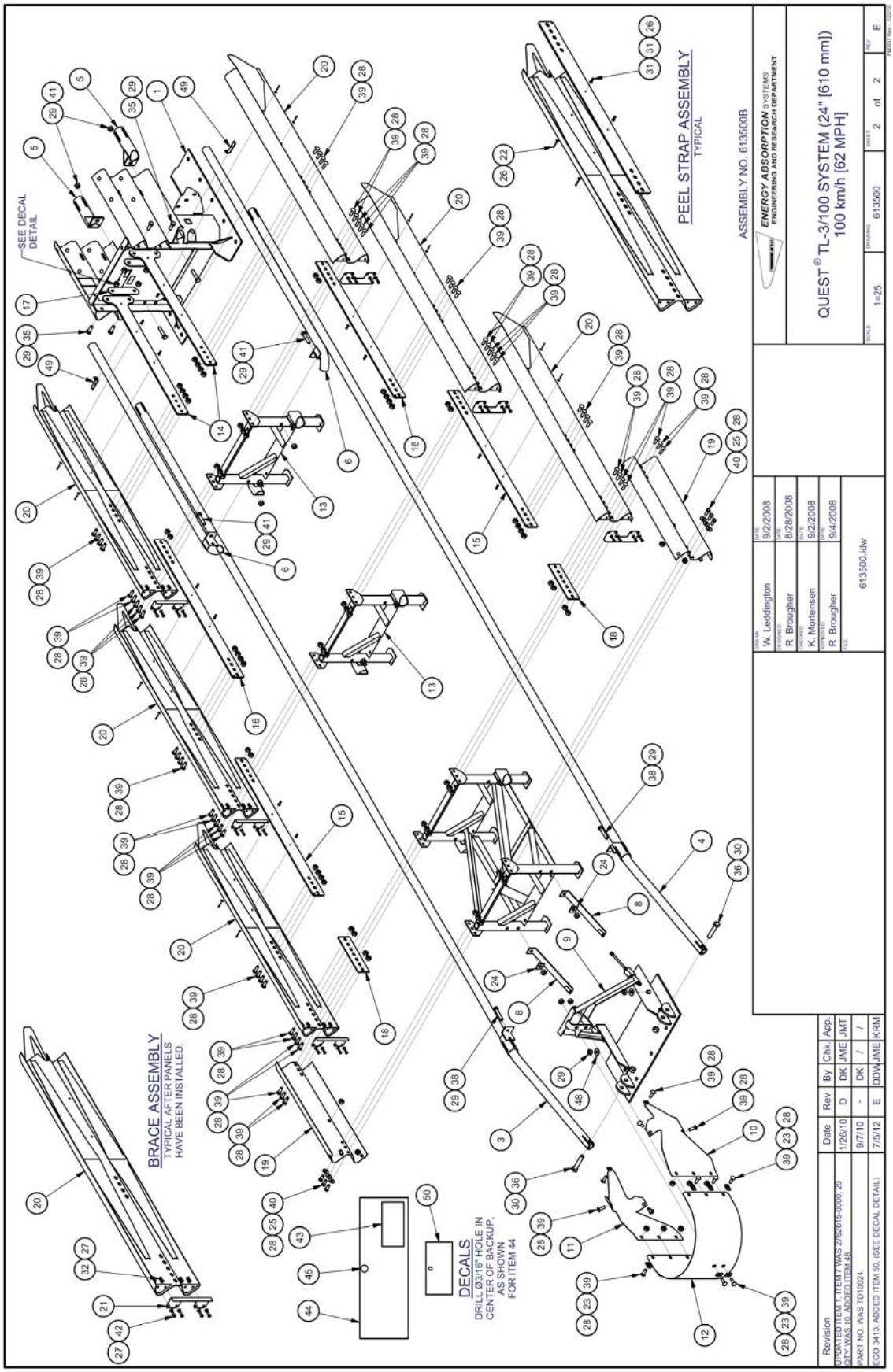
ENERGY ABSORPTION SYSTEMS
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-3/100 SYSTEM (24" [610 mm])
100 km/h [62 MPH]

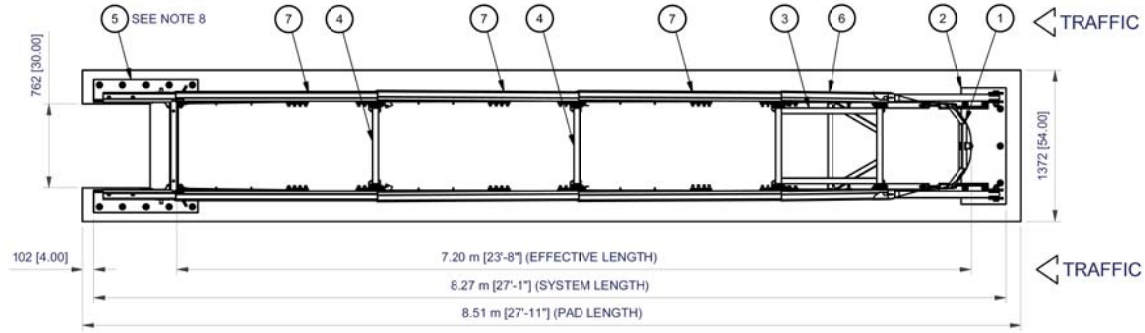
SCALE	DRAWING	SHEET	REV
1=40	613500	1 of 2	E

QUEST® TL-3/100 SYSTEM ASSEMBLY 24”

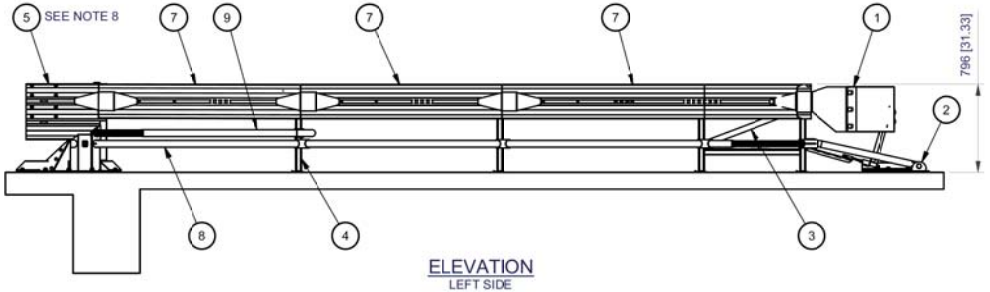
DWG 613500B Sheet 2 of 2



DWG TD10030CU



PLAN



ELEVATION
LEFT SIDE

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. CAUTION: THE QUEST SYSTEM MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. ATTACH SYSTEM USING ONE OF THE FOLLOWING:
   A. (QTY. 15) 7" STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa [4000 PSI] MIN P.C. CONCRETE PER THE FOLLOWING MINIMUMS.**
      1) 152 [6.00] REINFORCED PAD PER REFERENCE DRAWING .
      2) 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG.
      3) 180 [7.00] REINFORCED DECK STRUCTURE.
      4) 18" THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.**
   ** REFER TO THE QUEST INSTALLATION INSTRUCTIONS FOR FOUNDATION SPECIFICATIONS.
4. SEE THE "QUEST 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 SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
8. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST AROUND 762 [30.00] WIDE HAZARDS, INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.

KEY

1 NOSE	5 BACKUP	9 REAR RAIL
2 FRONT ANCHOR	6 BAY 1 PANEL	
3 BAY 1	7 BAY 2-4 PANEL	
4 DIAPHRAGM	8 SHAPER RAIL	

Revision	Date	Rev	By	Chk.	App.
DESC. WAS "QUEST 100 SYSTEM (762)"	9/16/08	A	DK	JME	PLK
DRAWING NO. WAS TD35030-100CU, 2530	4/14/09	B	DK	KRM	RCB
ECO 3052: UPDATED VIEWS AND NOTES DUE TO CHANGES IN ITEMS 2 & 5	2/11/11	C	DDS	KRM	KWL

REFERENCES

QUEST SYSTEM ASSEMBLY	613497
SUPPORT FRAME BAY 1	615443
DIAPHRAGM ASSY BAY 1&2	606806
TRIGGER ASSY	616208
CONCRETE PAD	3562028-0000
ANCHOR ASSY	3562007-0000

SERIAL NO.
SALES ORDER
EH PROJECT
NO. OF UNITS

DRAWN	D. Kohfeld	1/24/2007
DESIGNED		
CHECKED	JME	3/30/2007
APPROVED	SPT	3/30/2007
FILE	TD10030CU.idw	

UNIDIRECTIONAL
ASSEMBLY NO. 613497B

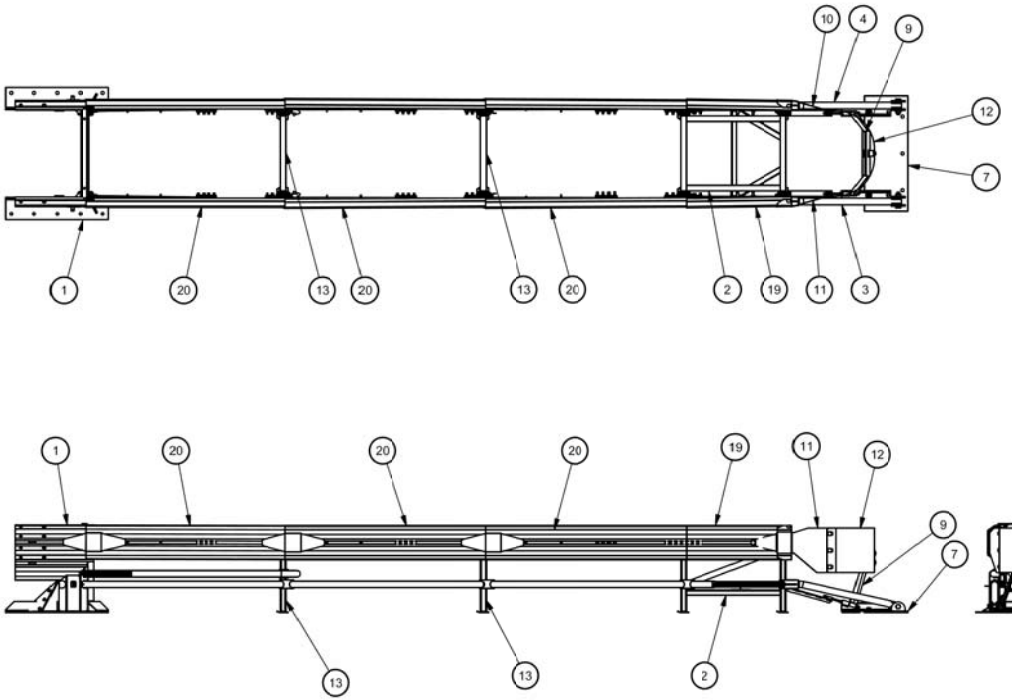
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-3/100 SYSTEM (30" [760mm])
100 km/h [62 MPH]

SCALE	DRAWING	SHEET	REV
1=40	TD10030CU	1 of 1	C

QUEST® TL-3/100 SYSTEM 30”

DWG 613497B Sheet 1 of 2



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604648G	BACKUP,30,QUEST,G	1
2	615443B	SUPPORT FRAME ASSY,30,QUEST	1
3	614029G	SHAPER RAIL,L,QUEST,G	1
4	614035G	SHAPER RAIL,R,QUEST,G	1
5	614042G	SHAPER,BACKUP,QUEST,G	2
6	613662G	REAR RAIL,QUEST,G	2
7	617613G	ANCHOR,FRONT,QUEST,30,G	1
8	616230G	TRIGGER STRAP,QUEST,G	2
9	616208B	TRIGGER ASSY,30,QUEST	1
10	611642W	NOSE TRANSITION,R,QUEST,G,PT	1
11	611641W	NOSE TRANSITION,L,QUEST,G,PT	1
12	611650W	NOSE,30,QUEST,G,PT	1
13	606806B	DIAPHRAGM ASSY,30,QUEST	2
14	614733B	STRAP,PEEL,REAR,QUEST	2
15	614728B	STRAP,PEEL,BAY 2,QUEST	2
16	614732B	STRAP,PEEL, BAY 3,QUEST	2
17	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/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,G	6
21	605343G	BRACE,PANEL,QUEST,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	617010G	WASHER,BAR,2X2X1/4,G	2
25	118030G	WASHER,FLAT,3/8 ID X13/16 OD,P,HRD	48
26	117987B	WASHER,FLAT,#6X5,8X.030,S	24
27	118052G	WASHER,FLAT,5/8 X 1 3/4, G	6
28	003340G	NUT,HX,5/8,G,RAIL	78
29	115954G	NUT,HX,3/4",GR DH	12
30	115931G	NUT,HX,1,G	2
31	115960G	NUT,HX,3/8,G	24
33	115909B	NUT,HX,#6-32,S	24
35	113553G	BOLT,HX,3/4X2,G5,G	4
36	113538G	BOLT,HX,1X5,G8,G	2
37	113530G	BOLT,HX,1X3 1/2,G5,G	2
38	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
39	113558G	BOLT,HX,3/4X3 1/2,G5,G	4
40	003380G	BOLT,HX,5/8X1 1/2,G5,G	6
41	003400G	BOLT,RAIL,5/8X2,G	72
42	113596G	BOLT,HX,3/8X1,G5,G	24
43	114461B	DECAL,CAUTION,ALL PRODUCTS	1
44	114591B	DECAL,PRODUCT,QUEST	1
45	116758G	RIVET,ST,SD68BS,3/16X1/2,DH	1
46	115249B	INSTALL INSTR,QUEST SYSTEM	1
47	115674B	MATERIAL SAFETY INFORMATION NOTICE	1
48	614533B	SPACER,RAIL TENSION,QUEST	2
49	118027G	WASHER,FLAT,3/4X2,HVY,G	2

ASSEMBLY NO. 613497B

Revision	Date	Rev	By	Chk	App.
REPLACED ITEM 32 WITH ITEM 28 AND ITEM 34 WITH ITEM 41. (2725)	9/3/09	D	DK	JME	FJP
UPDATED ITEM 1, ITEM 7 WAS 2762815-0000, 29 QTY WAS 10. ADD ITEM 49.	2/1/10	E	DK	JME	JMT
PART NO. WAS TD10033.	9/10/10	-	DK	/	/

DRAWN: D. Kohfeld	DATE: 1/23/2007	
DESIGNED:	DATE:	
CHECKED: KRM	DATE: 4/9/2007	
APPROVED: SPT	DATE: 4/9/2007	
FILE: 613497.idw		
NEXT ASSEMBLY:		

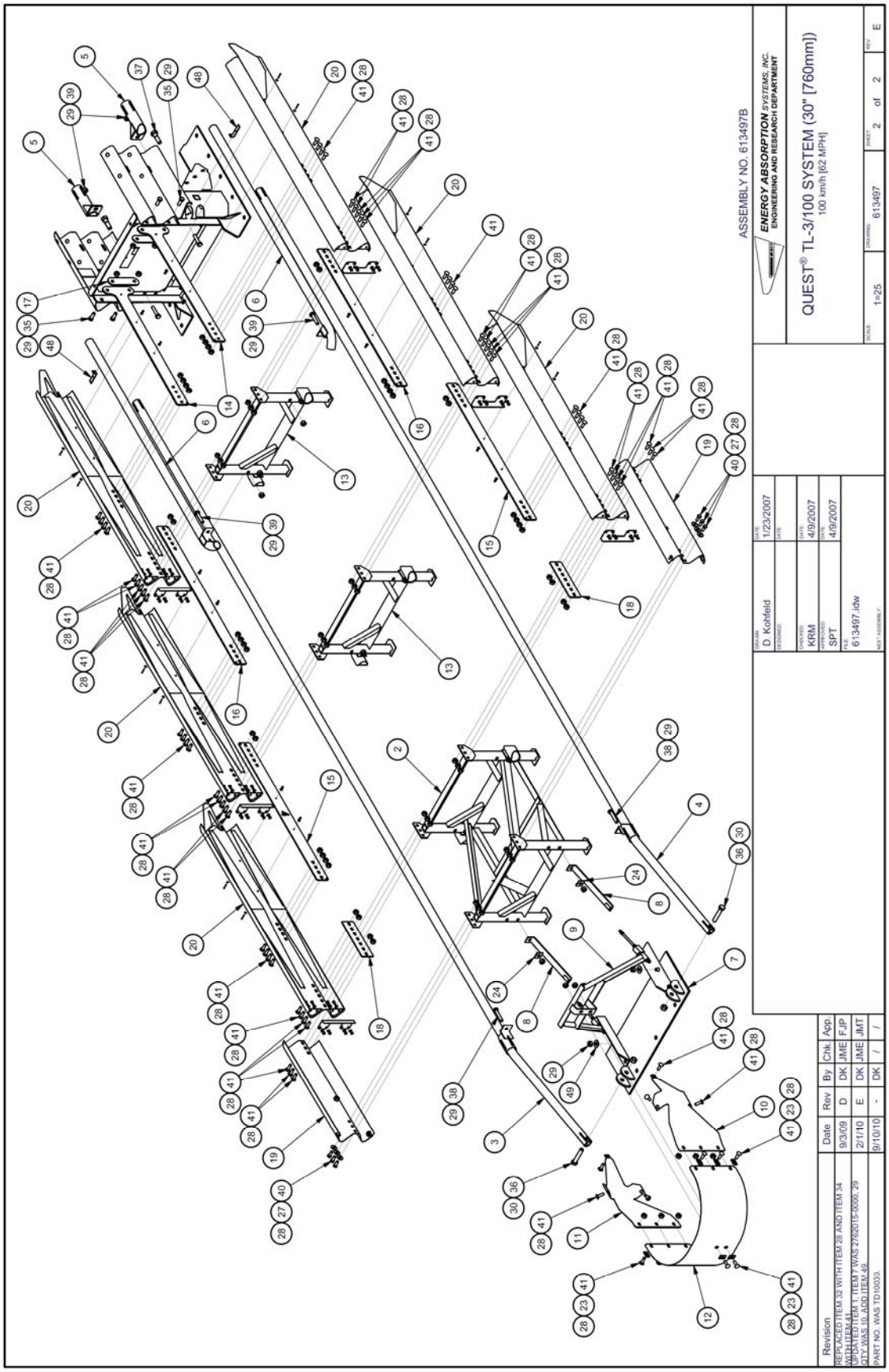
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-3/100 SYSTEM (30" [760mm])
100 km/h [62 MPH]

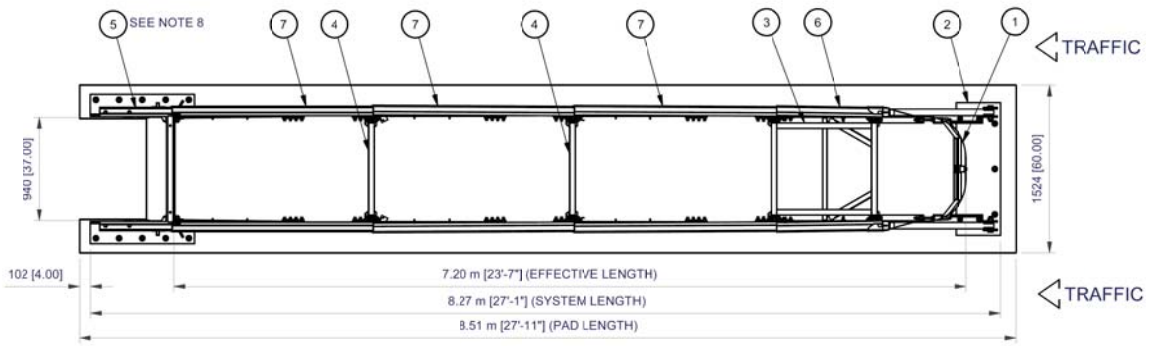
SCALE	DRAWING	SHEET	REV
1=40	613497	1 of 2	E

QUEST® TL-3/100 SYSTEM ASSEMBLY 30”

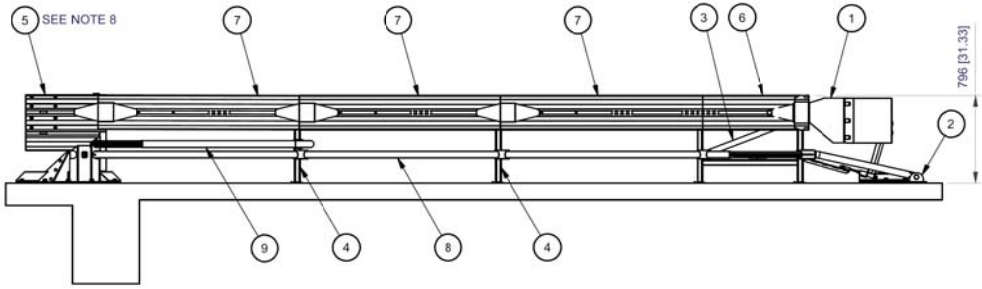
DWG 613497B Sheet 2 of 2



DWG TD10036CU



PLAN



ELEVATION
LEFT SIDE

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. CAUTION: THE QUEST SYSTEM MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. ATTACH SYSTEM USING ONE OF THE FOLLOWING:
   A. (QTY. 15) 7" STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa [4000 PSI] MIN P.C. CONCRETE PER THE FOLLOWING MINIMUMS.**
      1) 152 [6.00] REINFORCED PAD PER REFERENCE DRAWING .
      2) 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG.
      3) 180 [7.00] REINFORCED DECK STRUCTURE.
      4) 18" THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.**
   ** REFER TO THE QUEST INSTALLATION INSTRUCTIONS FOR FOUNDATION SPECIFICATIONS.
4. SEE THE "QUEST 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 SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
8. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST AROUND 914 [36.00] WIDE HAZARDS, INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.

KEY

1 NOSE	5 BACKUP	9 REAR RAIL
2 FRONT ANCHOR	6 BAY 1 PANEL	
3 BAY 1	7 BAY 2-4 PANEL	
4 DIAPHRAGM	8 SHAPER RAIL	

Revision	Date	Rev	By	Chk.	App.
DESCRIPTION WAS "QUEST 100 SYSTEM (914mm [36"])"	0/17/08	A	DK	JME	PLK
DRAWING NO. WAS TD35036-100CU. 2530	4/14/09	B	DK	KRM	RCB
ECO 3052: UPDATED VIEWS AND NOTES DUE TO CHANGES IN ITEMS 2 AND 5	2/15/11	C	DDS	KRM	KWL

REFERENCES

QUEST SYSTEM ASSEMBLY	613498
SUPPORT FRAME BAY 1	615444
DIAPHRAGM ASSY BAY 1&2	606808
TRIGGER ASSY	616209
CONCRETE PAD	3562024-0000
ANCHOR ASSY	3562007-0000

SERIAL NO.
SALES ORDER
EH PROJECT
NO. OF UNITS

DRAWN	D. Kohfeld	1/24/2007
DESIGNED		
CHECKED	JME	3/30/2007
APPROVED	SPT	3/30/2007
FILE	TD10036CU.idw	
NEXT ASSEMBLY		

UNIDIRECTIONAL
ASSEMBLY NO. 613498B

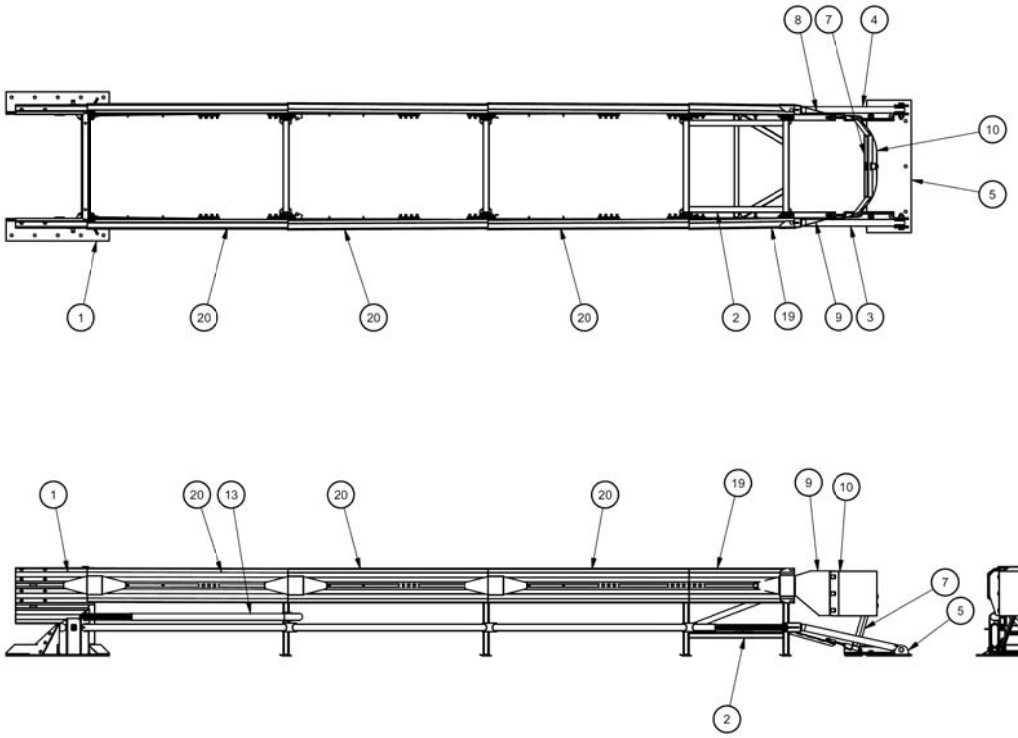
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-3/100 SYSTEM (36" [915mm])
100 km/h [62 MPH]

SCALE	DRAWING	SHEET	REV
1=40	TD10036CU	1 of 1	C

QUEST® TL-3/100 SYSTEM 36”

DWG 613498B Sheet 1 of 2



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604650G	BACKUP,36,QUEST,G	1
2	615444B	SUPPORT FRAME ASSY,36,QUEST	1
3	614029G	SHAPER RAIL,L,QUEST,G	1
4	614035G	SHAPER RAIL,R,QUEST,G	1
5	617616G	ANCHOR,FRONT,QUEST,36,G	1
6	616230G	TRIGGER STRAP,QUEST,G	2
7	616209B	TRIGGER ASSY,36,QUEST	1
8	611642W	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641W	NOSE TRANSITION,L,QUEST,G,PT	1
10	611651W	NOSE,36,QUEST,G,PT	1
11	606808B	DIAPHRAGM ASSY,36,QUEST	2
12	614042G	SHAPER,BACKUP,QUEST,G	2
13	613662G	REAR RAIL,QUEST,G	2
14	614733B	STRAP,PEEL,REAR,QUEST	2
15	614728B	STRAP,PEEL,BAY 2,QUEST	2
16	614732B	STRAP,PEEL, BAY 3,QUEST	2
17	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/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,G	6
21	605343G	BRACE,PANEL,QUEST,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	118052G	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 X13/16 OD,P,HRD	48
28	003340G	NUT,HX,5/8,G,RAIL	78
29	115909B	NUT,HX,#6-32,S	24
30	115954G	NUT,HX,3/4",GR DH	12
31	115931G	NUT,HX,1,G	2
32	115960G	NUT,HX,3/8,G	24
35	003400G	BOLT,RAIL,5/8X2,G	72
36	113553G	BOLT,HX,3/4X2,G5,G	4
37	113538G	BOLT,HX,1X5,G8,G	2
38	113530G	BOLT,HX,1X3 1/2,G5,G	2
39	003380G	BOLT,HX,5/8X1 1/2,G5,G	6
40	113558G	BOLT,HX,3/4X3 1/2,G5,G	4
41	113596G	BOLT,HX,3/8X1,G5,G	24
42	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
43	116758G	RIVET,ST,SD68BS,3/16X1/2,DH	1
44	114461B	DECAL,CAUTION,ALL PRODUCTS	1
45	114591B	DECAL,PRODUCT,QUEST	1
46	115249G	INSTALL INSTR,QUEST SYSTEM	1
47	115674G	MATERIAL SAFETY INFORMATION NOTICE	1
48	614533B	SPACER,RAIL TENSION,QUEST	2
49	118027G	WASHER,FLAT,3/4X2,HVY,G	2
50	118440B	DECAL,PATENT WEB SITE	1

ASSEMBLY NO. 613498B

Revision	Date	Rev	By	Chk.	App.
UPDATED ITEM 1, ITEM 5 WAS 2762015-0000, 30 QTY WAS 10, ADD ITEM 49	2/3/10	E	DK	JME	JMT
PART NO. WAS TD10036	9/16/10	-	DK	/	/
ECO 3413; ADDED ITEM 50, SEE SHEET 2 FOR DETAILS	7/5/12	F	DDW	JME	KRM

DRAWN: D. Kohfeld	DATE: 1/24/2007	
DESIGNED:	DATE:	
CHECKED: KRM	DATE: 4/9/2007	
APPROVED: SPT	DATE: 4/9/2007	
FILE: 613498.idw		

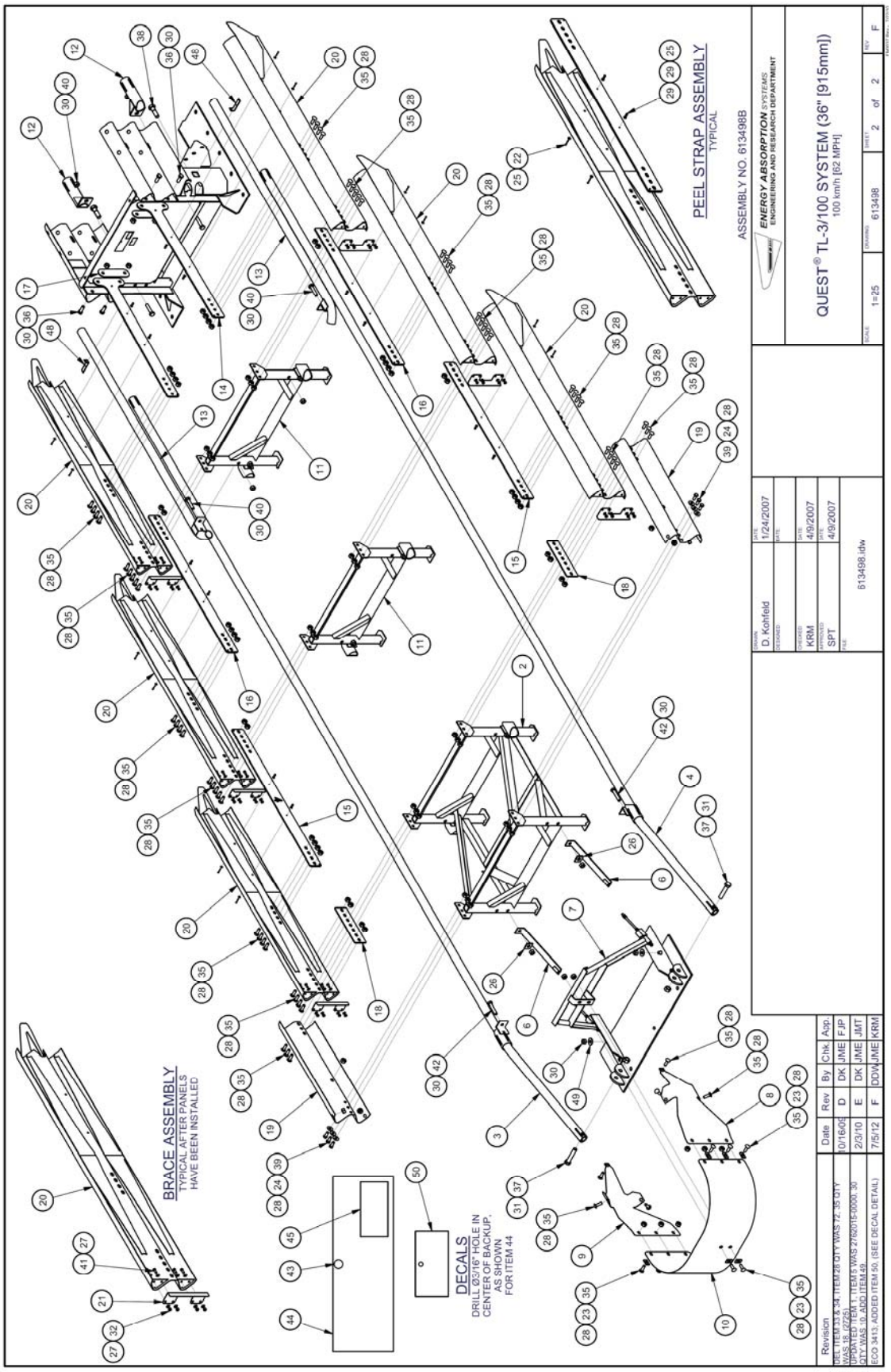
ENERGY ABSORPTION SYSTEMS
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-3/100 SYSTEM (36" [915mm])
100 km/h [62 MPH]

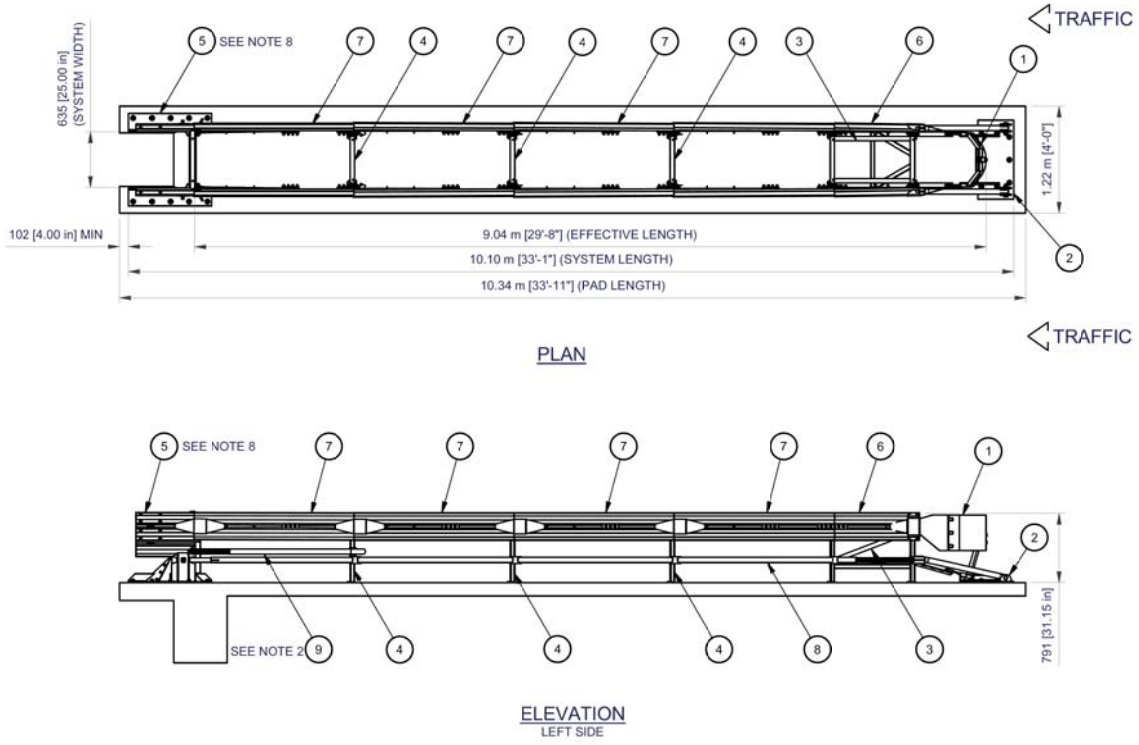
SCALE	DRAWING	SHEET	REV
1=40	613498	1 of 2	F

QUEST® TL-3/100 SYSTEM ASSEMBLY 36”

DWG 613498B Sheet 2 of 2



DWG TD11524CU



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. CAUTION: THE QUEST 115 SYSTEM MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. ATTACH SYSTEM USING ONE OF THE FOLLOWING:
   A. (QTY. 15) 178 [7.00] STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa [4000 PSI] MIN P.C. CONCRETE PER THE FOLLOWING MINIMUMS.**
      1) 152 [6.00] REINFORCED PAD.
      2) 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG.
      3) 180 [7.00] REINFORCED DECK STRUCTURE.
      4) 457 [18.00] THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.**
      ** REFER TO THE REFERENCE DRAWINGS & INSTALLATION INSTRUCTIONS FOR FOUNDATION SPECIFICATIONS.
4. SEE THE "QUEST 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 115 SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
8. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST AROUND 610 [24"] WIDE HAZARDS, INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.

KEY

1 NOSE	5 BACKUP	9 REAR RAIL
2 FRONT ANCHOR	6 BAY 1 PANEL	
3 BAY 1	7 BAY 2-5 PANEL	
4 DIAPHRAGM	8 SHAPER RAIL	

Revision	Date	Rev	By	Chk.	App.
DWG & ASSY NO.S WERE TD35024-115CU. 2530	1/2/09	C	DK	KRM	RCB
REVISED REFERENCE PART NUMBERS.	8/31/09	D	DK	JME	RCB
ECO 3052: UPDATED VIEWS AND NOTES DUE TO CHANGES IN ITEMS 2 & 5	2/17/11	E	DDS	KRM	KWL

SERIAL NO.
SALES ORDER
EH PROJECT
NO. OF UNITS

REFERENCES

QUEST SYSTEM ASSEMBLY	613476
SUPPORT FRAME BAY 1	615467
DIAPHRAGM ASSY BAY 2-4	607196
TRIGGER ASSY	616212
CONCRETE PAD	3562031-0000
ANCHOR ASSY	3562007-0000

DRAWN: D. Kohfeld	DATE: 1/22/2007
DESIGNED:	DATE:
CHECKED: JME	DATE: 3/12/2007
APPROVED: JFL	DATE: 3/7/2007
FILE: TD11524CU.idw	
NEXT ASSEMBLY:	

UNIDIRECTIONAL
ASSEMBLY NO. 613476B

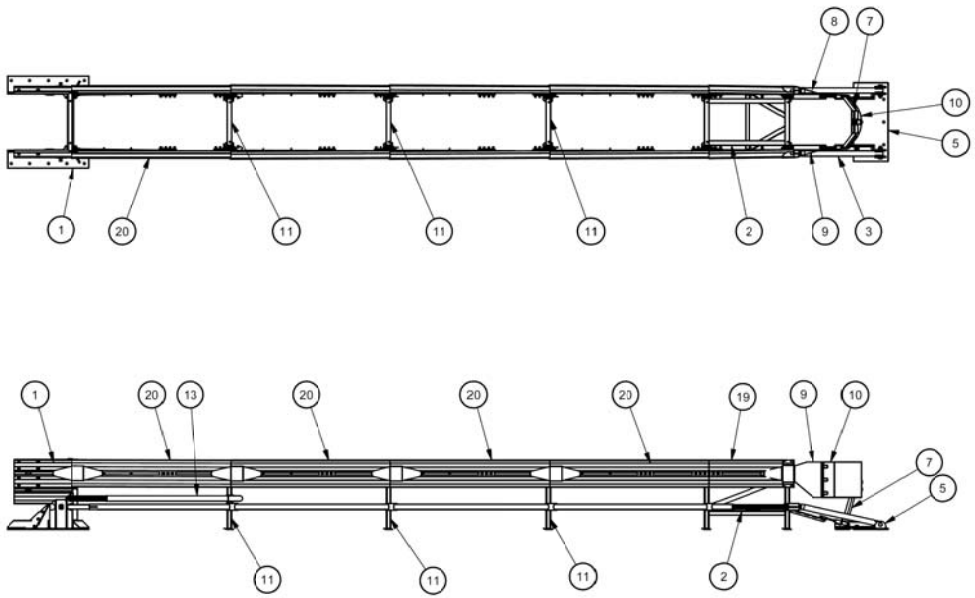
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® 115 SYSTEM (24" [610mm])
115 km/h [72 MPH]

SCALE	DRAWING	SHEET	REV
1=40	TD11524CU	1 of 1	E

QUEST® TL-3/115 SYSTEM 24”

DWG 613476 Sheet 1 of 2



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604647G	BACKUP,24,QUEST,G	1
2	615467B	SUPPORT FRAME ASSY,QUEST,24	1
3	614025G	SHAPER RAIL,L,QUEST 115,G	1
4	614031G	SHAPER RAIL,R,QUEST 115,G	1
5	617605G	ANCHOR,FRONT,QUEST,24,G	1
6	616230G	TRIGGER STRAP,QUEST,G	2
7	616212B	TRIGGER ASSY,QUEST,24	1
8	611642W	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641W	NOSE TRANSITION,L,QUEST,G,PT	1
10	611678Y	NOSE,QUEST,G,PT	1
11	607196B	DIAPHRAGM ASSY,QUEST,24	3
12	614042G	SHAPER,BACKUP,QUEST,G	2
13	613662G	REAR RAIL,QUEST,G	2
14	614733B	STRAP,PEEL,REAR,QUEST	2
15	614728B	STRAP,PEEL,BAY 2,QUEST	2
16	614732B	STRAP,PEEL, BAY 3,QUEST	4
17	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/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,G	8
21	605343G	BRACE,PANEL,QUEST,G	8
22	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	16
23	617005G	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
24	118052G	WASHER,FLAT,5/8 X 1 3/4, G	6
25	117987B	WASHER,FLAT,#6X5/8X.030,S	32
26	617010G	WASHER,BAR,2X2X1/4,G	2
27	118030G	WASHER,FLAT,3/8 ID X13/16 OD,P,HRD	64
28	003340G	NUT,HX,5/8,G,RAIL	96
29	115909B	NUT,HX,#6-32,S	32
30	115954G	NUT,HX,3/4",GR DH	12
31	115931G	NUT,HX,1,G	2
32	115960G	NUT,HX,3/8,G	32
35	003400G	BOLT,RAIL,5/8X2,G	90
36	113553G	BOLT,HX,3/4X2,G5,G	4
37	113538G	BOLT,HX,1X5,G8,G	2
38	113530G	BOLT,HX,1X3 1/2,G5,G	2
39	003380G	BOLT,HX,5/8X1 1/2,G5,G	6
40	113558G	BOLT,HX,3/4X3 1/2,G5,G	4
41	113596G	BOLT,HX,3/8X1,G5,G	32
42	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
43	114461B	DECAL,CAUTION,ALL PRODUCTS	1
44	114591B	DECAL,PRODUCT,QUEST	1
45	116758G	RIVET,ST,SD68BS,3/16X1/2,DH	1
46	115249B	INSTALL INSTR,QUEST SYSTEM	1
47	115674B	MATERIAL SAFETY INFORMATION NOTICE	1
48	614533B	SPACER,RAIL TENSION,QUEST	2
49	118027G	WASHER,FLAT,3/4X2,HVY,G	2
50	118440B	DECAL,PATENT WEB SITE	1

ASSEMBLY NO. 613476B

Revision	Date	Rev	By	Chk.	App.
UPDATED ITEM 1, ITEM 5 WAS 2762015-0000, 30 QTY WAS 10, ADDED ITEM 49.	1/27/10	G	DK	JME	JMT
PART NO. WAS TD11524.	9/21/10	-	DK	/	/
ECO 3413; ADDED ITEM 50, SEE SHEET 2 FOR DETAILS.	7/6/12	H	DDW	JME	KRM

DRAWN: D. Kohfeld	DATE: 1/22/2007
DESIGNED:	DATE:
CHECKED: JME	DATE: 3/13/2007
APPROVED: JFL	DATE: 3/13/2007
FILE: 613476.idw	

ENERGY ABSORPTION SYSTEMS
ENGINEERING AND RESEARCH DEPARTMENT

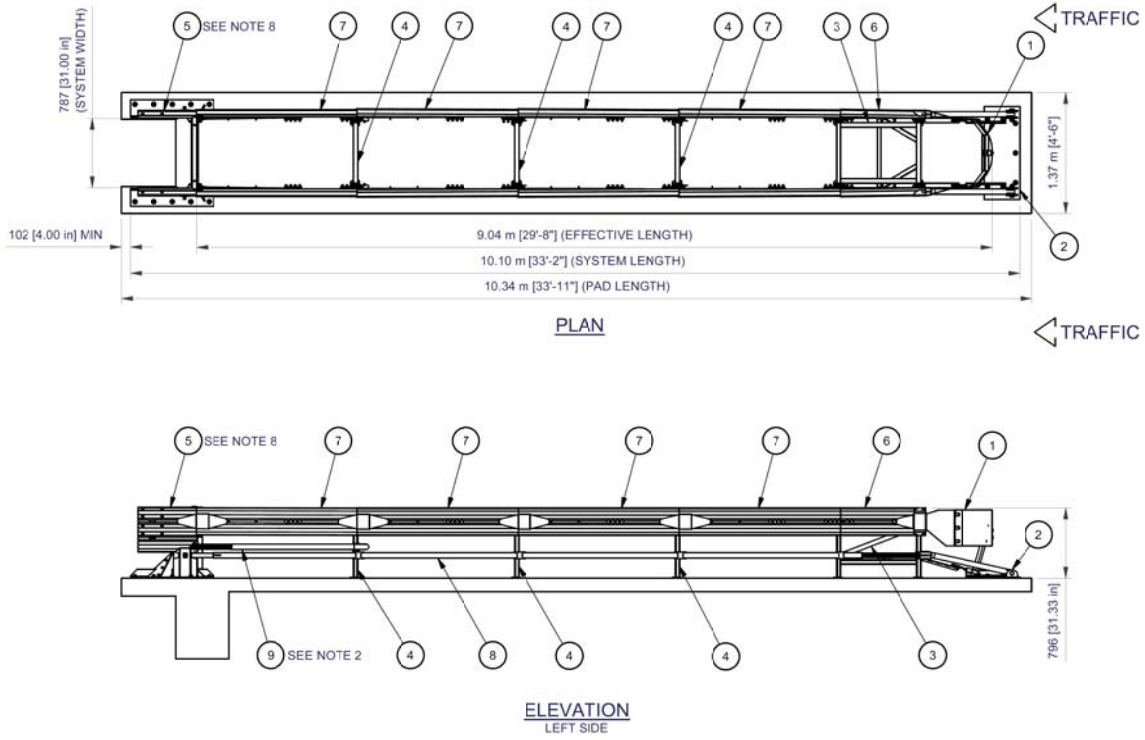
QUEST®115 SYSTEM (24" [610mm])
115 km/h [72 MPH]

SCALE	DRAWING	SHEET	REV
1=50	613476	1 of 2	H

QUEST® TL-3/115 SYSTEM ASSEMBLY 24”

DWG 613476 Sheet 2 of 2

DWG TD11530CU



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. CAUTION: THE QUEST 115 SYSTEM MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. ATTACH SYSTEM USING ONE OF THE FOLLOWING:
   A. (QTY. 15) 178 [7.00] STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa [4000 PSI] MIN P.C. CONCRETE PER THE FOLLOWING MINIMUMS.**
      1) 152 [6.00] REINFORCED PAD.
      2) 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG.
      3) 180 [7.00] REINFORCED DECK STRUCTURE.
      4) 457 [18.00] THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.**
      ** REFER TO THE REFERENCE DRAWINGS & INSTALLATION INSTRUCTIONS FOR FOUNDATION SPECIFICATIONS.
4. SEE THE "QUEST 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 SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
8. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST AROUND 760 [30"] WIDE HAZARDS, INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.

KEY

1 NOSE	5 BACKUP	9 REAR RAIL
2 FRONT ANCHOR	6 BAY 1 PANEL	
3 BAY 1	7 BAY 2-5 PANEL	
4 DIAPHRAGM	8 SHAPER RAIL	

Revision	Date	Rev	By	Chk.	App.
DESCRIPTION WAS "QUEST 115 SYSTEM (760)".	9/16/08	A	DK	JME	PLK
DRAWING NO. WAS TD35030-115CU. 2530	4/14/09	B	DK	KRM	RCB
ECO 3052: UPDATED VIEWS AND NOTES DUE TO CHANGES IN ITEM 2 & 5	2/18/11	C	DDS	KRM	KWL

SERIAL NO.
SALES ORDER
EH PROJECT
NO. OF UNITS

REFERENCES

QUEST SYSTEM ASSEMBLY	613478
SUPPORT FRAME BAY 1	615443
DIAPHRAGM ASSY BAY 2-4	606806
TRIGGER ASSY	616208
CONCRETE PAD	3562037-0000
ANCHOR ASSY	3562007-0000

DRAWN: D. Kohfeld	DATE: 1/22/2007
DESIGNED:	DATE:
CHECKED: S. Trageser	DATE: 3/5/2008
APPROVED: R. Brougher	DATE: 3/7/2008
FILE: TD11530CU.idw	
NEXT ASSEMBLY:	

UNIDIRECTIONAL
ASSEMBLY NO. 613478B

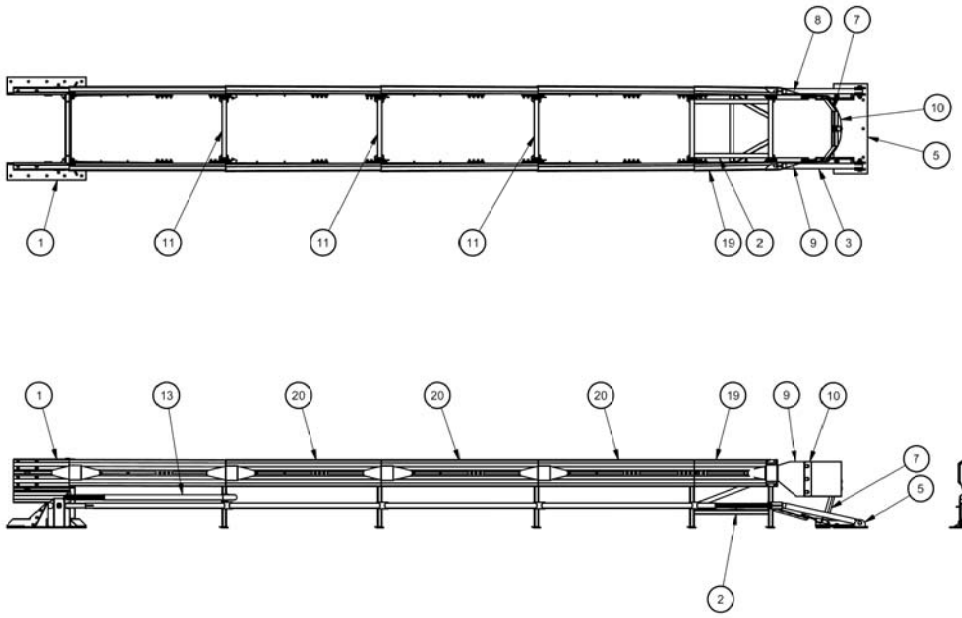
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® 115 SYSTEM (30" [760mm])
115 km/h [72 MPH]

SCALE	DRAWING	SHEET	REV
1=40	TD11530CU	1 of 1	C

QUEST® TL-3/115 SYSTEM 30”

DWG 613478B Sheet 1 of 2



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604648G	BACKUP,30,QUEST,G	1
2	615443B	SUPPORT FRAME ASSY,30,QUEST	1
3	614025G	SHAPER RAIL,L,QUEST 115,G	1
4	614031G	SHAPER RAIL,R,QUEST 115,G	1
5	617613G	ANCHOR,FRONT,QUEST,30,G	1
6	616230G	TRIGGER STRAP,QUEST,G	2
7	616208B	TRIGGER ASSY,30,QUEST	1
8	611642W	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641W	NOSE TRANSITION,L,QUEST,G,PT	1
10	611650W	NOSE,30,QUEST,G,PT	1
11	606806B	DIAPHRAGM ASSY,30,QUEST	3
12	614042G	SHAPER,BACKUP,QUEST,G	2
13	613662G	REAR RAIL,QUEST,G	2
14	614733B	STRAP,PEEL,REAR,QUEST	2
15	614728B	STRAP,PEEL,BAY 2,QUEST	2
16	614732B	STRAP,PEEL, BAY 3,QUEST	4
17	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/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,G	8
21	605343G	BRACE,PANEL,QUEST,G	8
22	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	16
23	617005G	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
24	118052G	WASHER,FLAT,5/8 X 1 3/4, G	6
25	117987B	WASHER,FLAT,#6X5/8X.030,S	32
26	617010G	WASHER,BAR,2X2X1/4,G	2
27	118030G	WASHER,FLAT,3/8 ID X13/16 OD,P,HRD	64
28	003340G	NUT,HX,5/8,G,RAIL	96
29	115909B	NUT,HX,#6-32,S	32
30	115954G	NUT,HX,3/4",GR DH	12
31	115931G	NUT,HX,1,G	2
32	115960G	NUT,HX,3/8,G	32
35	003400G	BOLT,RAIL,5/8X2,G	90
36	113553G	BOLT,HX,3/4X2,G5,G	4
37	113538G	BOLT,HX,1X5,G8,G	2
38	113530G	BOLT,HX,1X3 1/2,G5,G	2
39	003380G	BOLT,HX,5/8X1 1/2,G5,G	6
40	113558G	BOLT,HX,3/4X3 1/2,G5,G	4
41	113596G	BOLT,HX,3/8X1,G5,G	32
42	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
43	114461B	DECAL,CAUTION,ALL PRODUCTS	1
44	114591B	DECAL,PRODUCT,QUEST	1
45	116758G	RIVET,ST,SD68BS,3/16X1/2,DH	1
46	115249B	INSTALL INSTR,QUEST SYSTEM	1
47	115674B	MATERIAL SAFETY INFORMATION NOTICE	1
48	614533B	SPACER,RAIL TENSION,QUEST	2
49	118027G	WASHER,FLAT,3/4X2,HVY,G	2
50	118440B	DECAL,PATENT WEB SITE	1

ASSEMBLY NO. 613478B

Revision	Date	Rev	By	Chk.	App.
UPDATED ITEM 1, ITEM 5 WAS 276201S-0000, 30 QTY WAS 10, ADD ITEM 49.	2/1/10	F	DK	JME	JMT
PART NO. WAS TD11533.	9/29/10	-	DK	/	/
ECO 3413; ADDED ITEM 50, SEE SHEET 2 FOR DETAILS.	7/6/12	G	DDW	JME	KRM

DRAWN: D. Kohfeld	DATE: 1/22/2007	
DESIGNED:	DATE:	
CHECKED: S. Trageser	DATE: 3/5/2008	
APPROVED: R. Brougher	DATE: 3/7/2008	
FILE: 613478.idw		

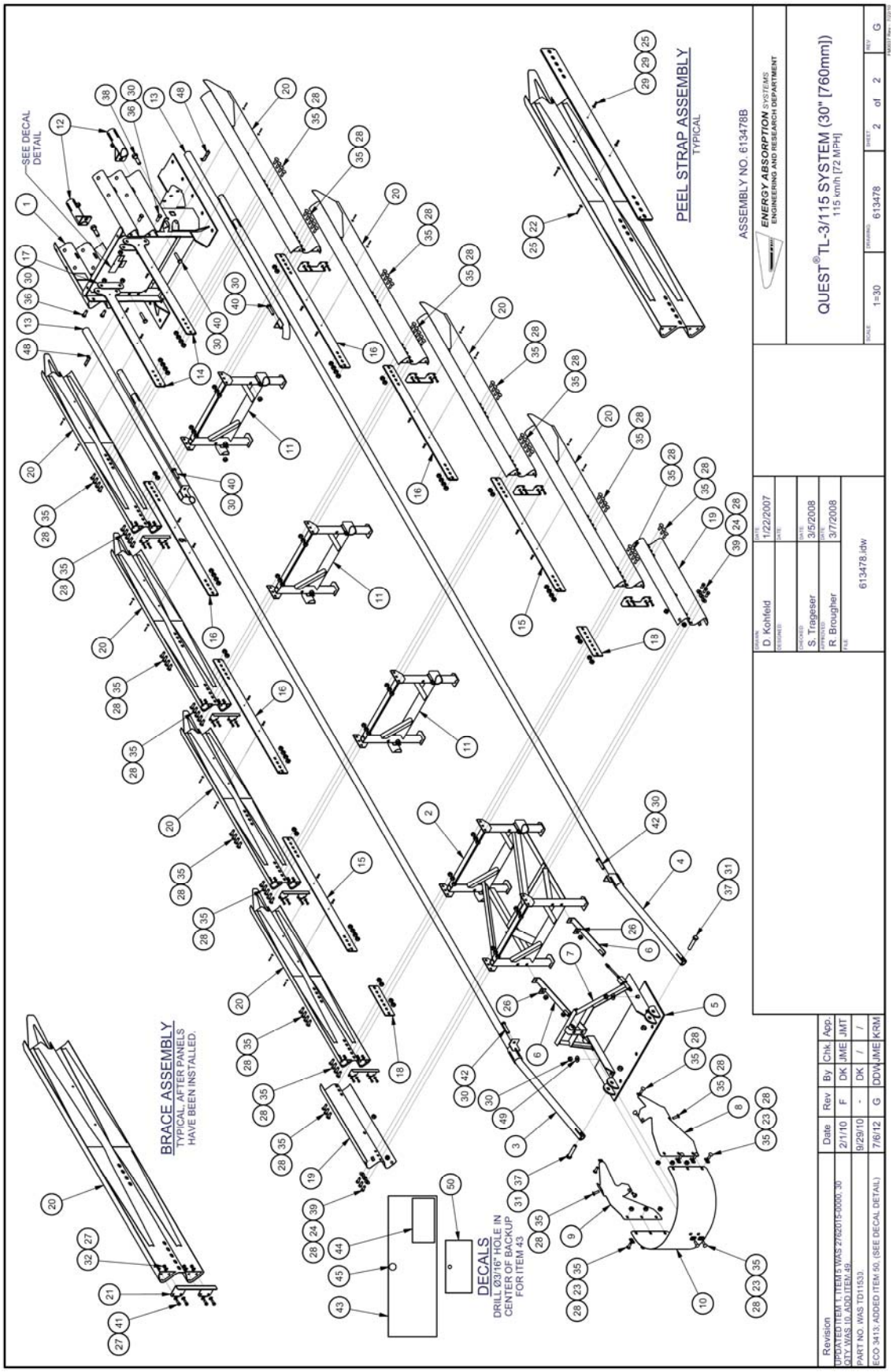
ENERGY ABSORPTION SYSTEMS
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-3/115 SYSTEM (30" [760mm])
115 km/h [72 MPH]

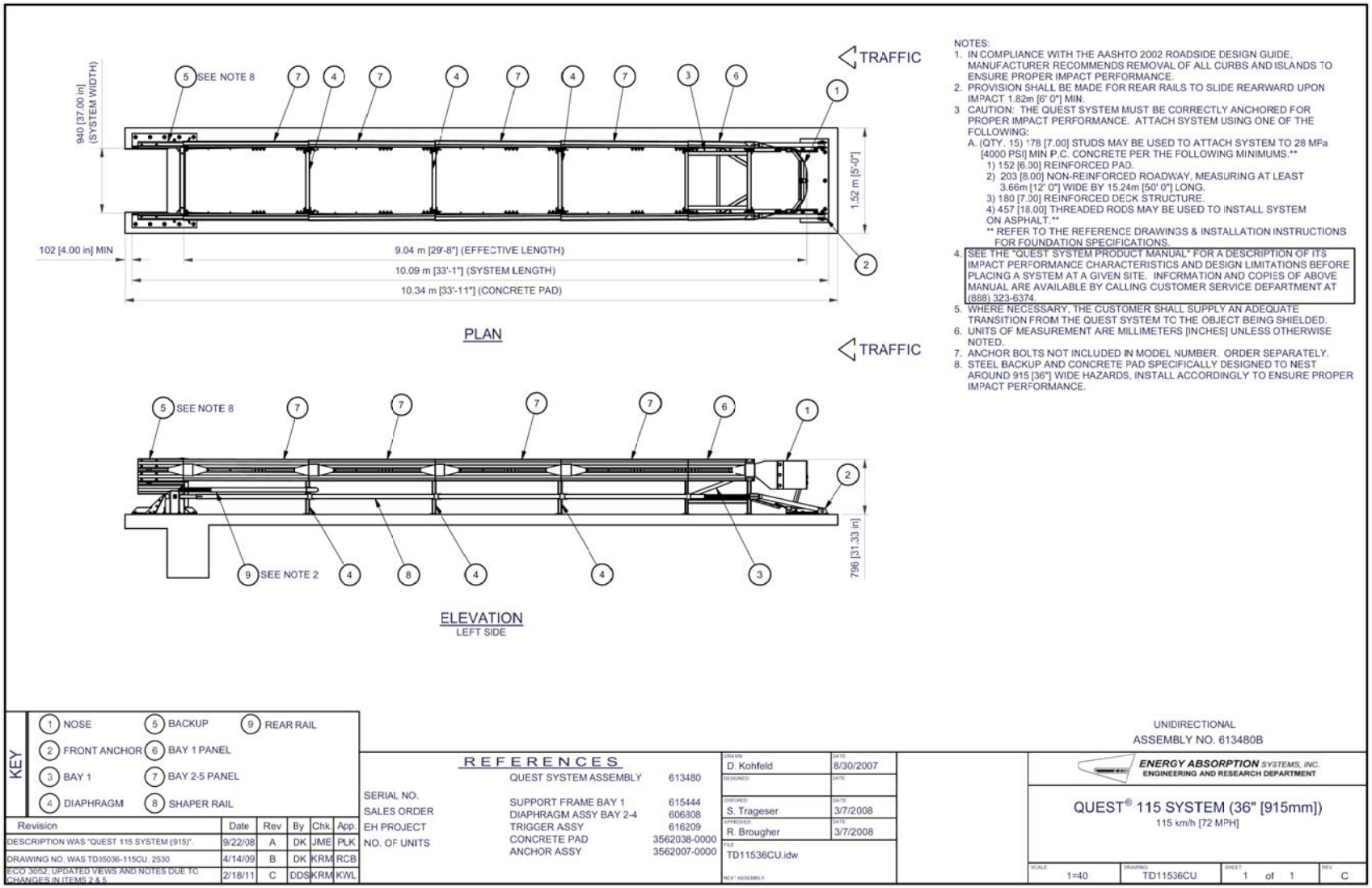
SCALE	DRAWING	SHEET	REV
1=50	613478	1 of 2	G

QUEST® TL-3/115 SYSTEM ASSEMBLY 30”

DWG 613478B Sheet 2 of 2



DWG TD11536CU



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. CAUTION: THE QUEST SYSTEM MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. ATTACH SYSTEM USING ONE OF THE FOLLOWING:
   A. (QTY. 15) 178 [7.00] STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa [4000 PSI] MIN P.C. CONCRETE PER THE FOLLOWING MINIMUMS.**
      1) 152 [6.00] REINFORCED PAD.
      2) 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG.
      3) 180 [7.00] REINFORCED DECK STRUCTURE.
      4) 457 [18.00] THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.**
      ** REFER TO THE REFERENCE DRAWINGS & INSTALLATION INSTRUCTIONS FOR FOUNDATION SPECIFICATIONS.
4. SEE THE "QUEST 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 SYSTEM TC THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
7. ANCHOR BOLTS NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
8. STEEL BACKUP AND CONCRETE PAD SPECIFICALLY DESIGNED TO NEST AROUND 915 [36"] WIDE HAZARDS, INSTALL ACCORDINGLY TO ENSURE PROPER IMPACT PERFORMANCE.

KEY
1 NOSE
2 FRONT ANCHOR
3 BAY 1
4 DIAPHRAGM
5 BACKUP
6 BAY 1 PANEL
7 BAY 2-5 PANEL
8 SHAPER RAIL
9 REAR RAIL

Revision	Date	Rev	By	Chk.	App.
DESCRIPTION WAS "QUEST 115 SYSTEM (915)".	9/22/08	A	DK	JME	PLK
DRAWING NO. WAS TD15036-115CU. 2530	4/14/09	B	DK	KRM	RCB
ECO 3052: UPDATED VIEWS AND NOTES DUE TC CHANGES IN ITEMS 2 & 5	2/18/11	C	DDS	KRM	KWL

REFERENCES

QUEST SYSTEM ASSEMBLY	613480
SUPPORT FRAME BAY 1	615444
DIAPHRAGM ASSY BAY 2-4	606308
TRIGGER ASSY	616209
CONCRETE PAD	3562038-0000
ANCHOR ASSY	3562007-0000

SERIAL NO.
SALES ORDER
EH PROJECT
NO. OF UNITS

DRAWN	D. Kohfeld	8/30/2007
DESIGNED		
CHECKED	S. Trageser	3/7/2008
APPROVED	R. Brougher	3/7/2008
FILE	TD11536CU.idw	
NEXT ASSEMBLY		

UNIDIRECTIONAL
ASSEMBLY NO. 613480B

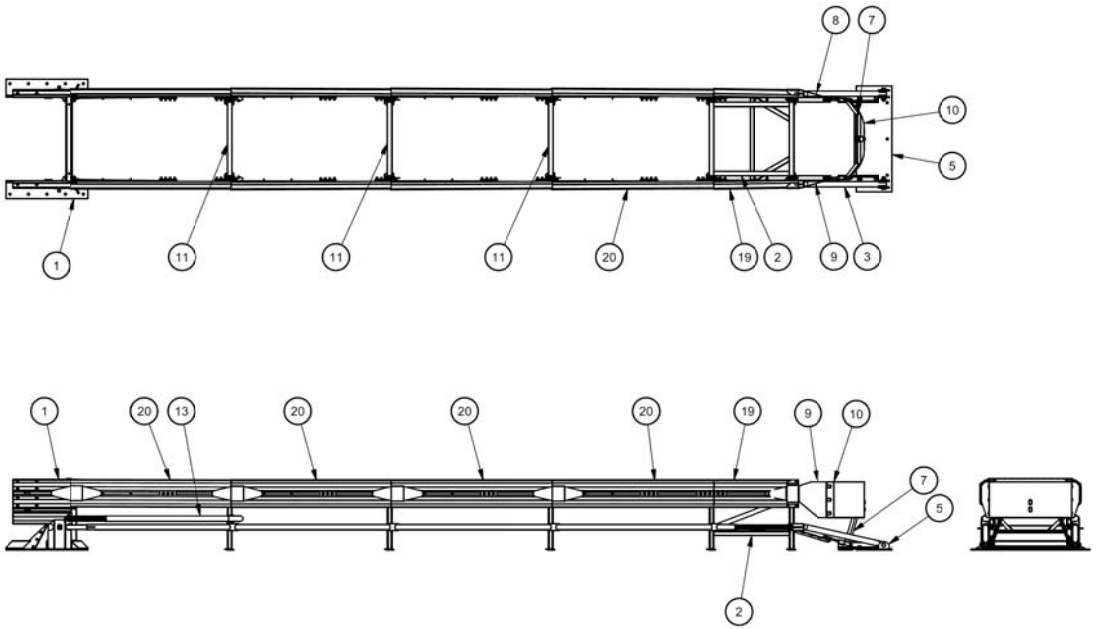
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® 115 SYSTEM (36" [915mm])
115 km/h [72 MPH]

SCALE	DRAWING	SHEET	REV
1=40	TD11536CU	1 of 1	C

QUEST® TL-3/115 SYSTEM 36”

DWG 613480B Sheet 1 of 2



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	604650G	BACKUP,36,QUEST,G	1
2	615444B	SUPPORT FRAME ASSY,36,QUEST	1
3	614025G	SHAPER RAIL,L,QUEST 115,G	1
4	614031G	SHAPER RAIL,R,QUEST 115,G	1
5	617616G	ANCHOR,FRONT,QUEST,36,G	1
6	616230G	TRIGGER STRAP,QUEST,G	2
7	616209B	TRIGGER ASSY,36,QUEST	1
8	611642W	NOSE TRANSITION,R,QUEST,G,PT	1
9	611641W	NOSE TRANSITION,L,QUEST,G,PT	1
10	611651W	NOSE,36,QUEST,G,PT	1
11	606808B	DIAPHRAGM ASSY,36,QUEST	3
12	614042G	SHAPER,BACKUP,QUEST,G	2
13	613662G	REAR RAIL,QUEST,G	2
14	614733B	STRAP,PEEL,REAR,QUEST	2
15	614728B	STRAP,PEEL,BAY 2,QUEST	2
16	614732B	STRAP,PEEL, BAY 3,QUEST	4
17	608415G	FLT ST, 1/4X2 13/16X10 7/16,W/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,G	8
21	605343G	BRACE,PANEL,QUEST,G	8
22	116933B	SCREW,PN,#6-32X1 1/2,PHIL,S	16
23	617005G	WASHER,BAR,1/8X1 1/4X2,ROUNDED,G	8
24	118052G	WASHER,FLAT,5/8 X 1 3/4, G	6
25	117987B	WASHER,FLAT,#6X5/8X.030,S	32
26	617010G	WASHER,BAR,2X2X1/4,G	2
27	118030B	WASHER,FLAT,3/8 ID X13/16 OD,P,HRD	64
28	003340G	NUT,HX,5/8,G,RAIL	96
29	115909G	NUT,HX,#6-32,S	32
30	115954G	NUT,HX,3/4",GR DH	12
31	115931G	NUT,HX,1,G	2
32	115960G	NUT,HX,3/8,G	32
35	003400G	BOLT,RAIL,5/8X2,G	90
36	113553G	BOLT,HX,3/4X2,G5,G	4
37	113538G	BOLT,HX,1X5,G8,G	2
38	113530G	BOLT,HX,1X3 1/2,G5,G	2
39	003380G	BOLT,HX,5/8X1 1/2,G5,G	6
40	113558G	BOLT,HX,3/4X3 1/2,G5,G	4
41	113596G	BOLT,HX,3/8X1,G2,G	32
42	113568G	BOLT,HX,3/4X4,G5,G,ALL THRD	2
43	114461B	DECAL,CAUTION,ALL PRODUCTS	1
44	114591B	DECAL,PRODUCT,QUEST	1
45	116758G	RIVET,ST,SD68BS,3/16X1/2,DH	1
46	115249B	INSTALL INSTR,QUEST SYSTEM	1
47	115674B	MATERIAL SAFETY INFORMATION NOTICE	1
48	614533B	SPACER,RAIL TENSION,QUEST	2
49	118027G	WASHER,FLAT,3/4X2,HVY,G	2

ASSEMBLY NO. 613480B

Revision	Date	Rev	By	Chk.	App.
DEL ITEMS 33 & 34, ITEM 28 QTY WAS 90, 35 QTY WAS 24	11/16/09	E	DK	JME	FJP
UPDATE ITEM 1, ITEM 5 WAS 2762015-0000, 30 QTY WAS 10, ADD ITEM 49	2/3/10	F	DK	JME	JMT
PART NO. WAS TD11535.	10/13/10	-	DK	/	/

DRAWN: D. Kohfeld	DATE: 8/30/2007	
DESIGNED:	DATE:	
CHECKED: S. Trageser	DATE: 3/5/2008	
APPROVED: R. Brougher	DATE: 3/7/2008	
FILE: 613480.idw		
NEXT ASSEMBLY:		

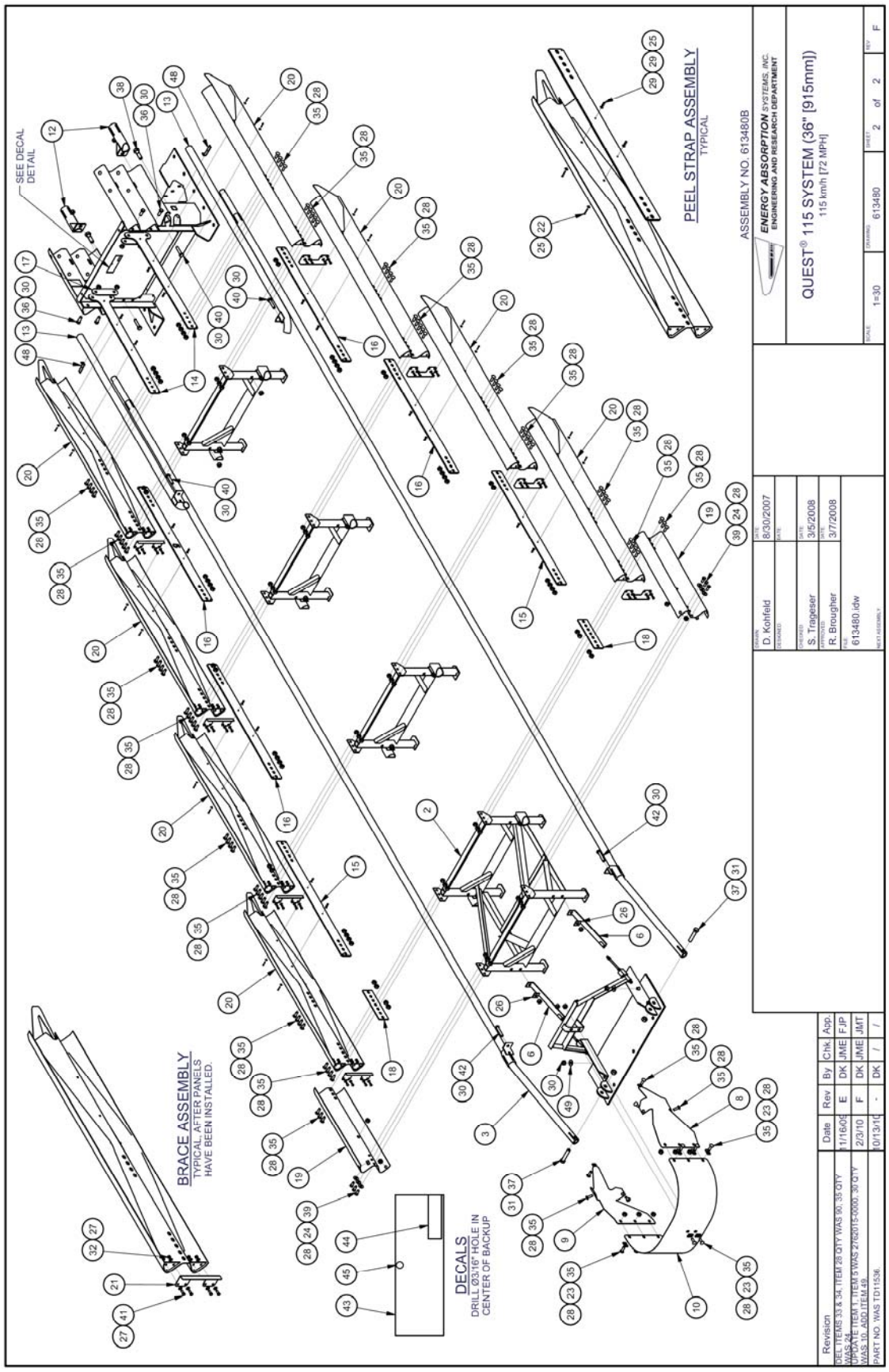
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® 115 SYSTEM (36" [915mm])
115 km/h [72 MPH]

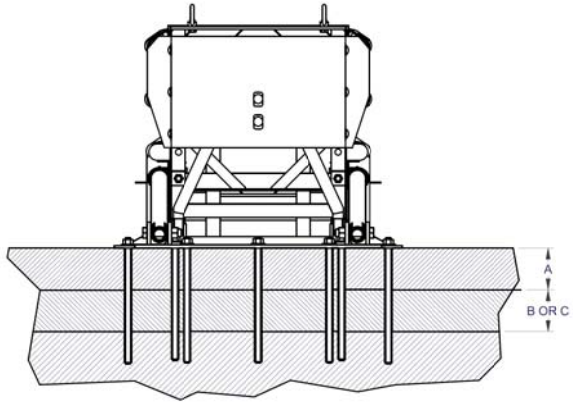
SCALE	DRAWING	SHEET	REV
1=50	613480	1 of 2	F

QUEST® TL-3/115 SYSTEM ASSEMBLY 36”

DWG 613480 Sheet 2 of 2



DWG 3562007-0000 Sheet 1 of 2



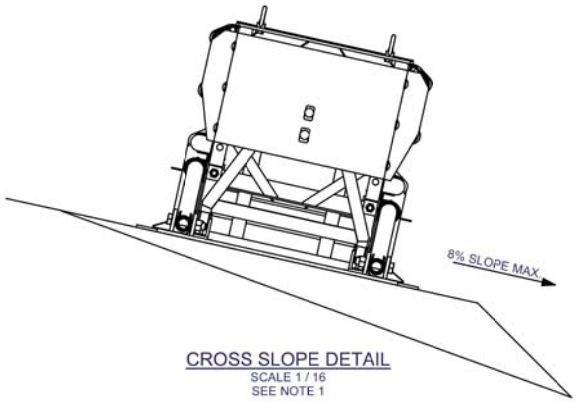
QUEST SECTION VIEW

SCALE 1 / 16

REFER TO THE QUEST INSTALLATION AND SAFETY INSTRUCTIONS FOR FURTHER INFORMATION.
ASPHALT ANCHOR ASSY.: 3562008-0000

MATERIALS:
- A - ASPHALTIC CONCRETE (PER ASTM D3381)
  ASPHALT BINDER AR-4000
  ASPHALT AGGREGATE 3/4" [19mm] MAX., MED A B
- B - 28 MPA [4000 PSI] P.C. CONCRETE (SAMPLING PER ASTM C31-84 OR ASTM C42-B4A, TESTING PER ASTM C39-84)
- C - SUB-BASE, PREPARED AND COMPACTED CLASS 2 AGGREGATE 95% COMPACTION, MINIMUM LAYER.

A	B	C	REQ'D STUD LENGTH
76mm [3"]	76mm [3"]	---	460mm [18"]
152mm [6"]	---	152mm [6"]	460mm [18"]
203mm [8"]	---	---	460mm [18"]



CROSS SLOPE DETAIL

SCALE 1 / 16
SEE NOTE 1

ANCHOR SYSTEM:

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

Revision	Date	Rev	By	Chk.	App.
DESC WAS 'ANCHOR ASSEMBLY' & 'TM'	10/30/06	B	DK	JME	SPT
SEE SHEET 2	8/2/07	C	DDS	JME	RCB
UPDATED QUEST SECTION VIEW TO INCLUDE ANCHOR PLATE AND NOTE 4	7/27/11	D	DDS	JME	KWL

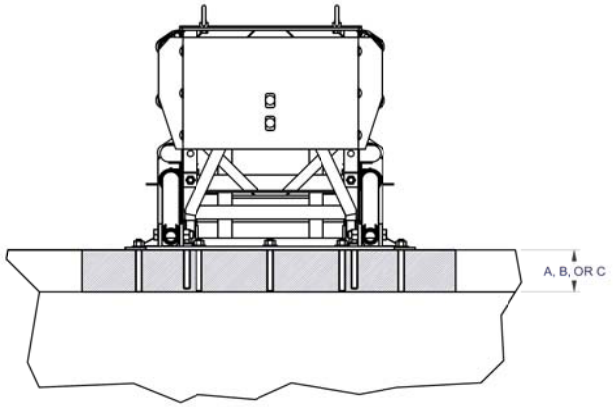
DRAWN: D. Kohfeld	DATE: 3/2/2005	
DESIGNED: A. Franklin	DATE: 3/2/2005	
CHECKED: A. Franklin	DATE: 3/3/2005	
APPROVED: R. Brougher	DATE: 3/4/2005	
FILE: 3562007-0000.idw		

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® SYSTEM FOUNDATION (ASPHALT)

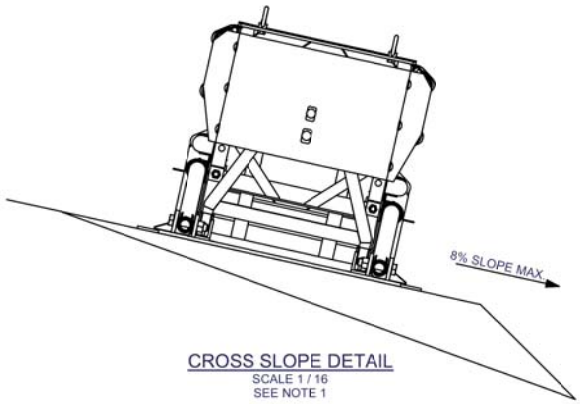
SCALE	DRAWING	SHEET	REV
1=16	3562007-0000	1 of 2	D

QUEST® SYSTEM FOUNDATION (ASPHALT)



QUEST SECTION VIEW
SCALE 1 / 16
REFER TO THE QUEST INSTALLATION AND
SAFETY INSTRUCTIONS FOR FURTHER INFORMATION.
7" REQUIRED STUD LENGTH
CONCRETE ANCHOR ASSY.: 3562009-0000

MATERIALS:
A - 152 [6.00] REINFORCED PAD PER REFERENCE DRAWING 3562006-0000.
B - 203 [8.00] NON-REINFORCED ROADWAY, MEASURING AT LEAST 3.66m [12' 0"] WIDE BY 15.24m [50' 0"] LONG, NOT SHOWN.
C - 180 [7.00] REINFORCED DECK STRUCTURE, NOT SHOWN.



CROSS SLOPE DETAIL
SCALE 1 / 16
SEE NOTE 1

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

Revision	Date	Rev	By	Chk.	App.
DESC WAS "ANCHOR ASSEMBLY" & "TM"	10/30/06	B	DK	JME	SPT
REVISED QUEST SECTION VIEW	8/2/07	C	DDS	JME	RCB
SEE SHEET 1	7/27/11	D	DDS	JME	KWL

DRAWN: D. Kohfeld	DATE: 3/2/2005
DESIGNED: A. Franklin	DATE: 3/2/2005
CHECKED: A. Franklin	DATE: 3/3/2005
APPROVED: R. Brougher	DATE: 3/4/2005
FILE: 3562007-0000.idw	

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® SYSTEM FOUNDATION (CONCRETE)

SCALE	DRAWING	SHEET	REV
1=16	3562007-0000	2 of 2	D

QUEST® SYSTEM FOUNDATION (CONCRETE)

DWG 3562018-0000 Sheet 1 of 2

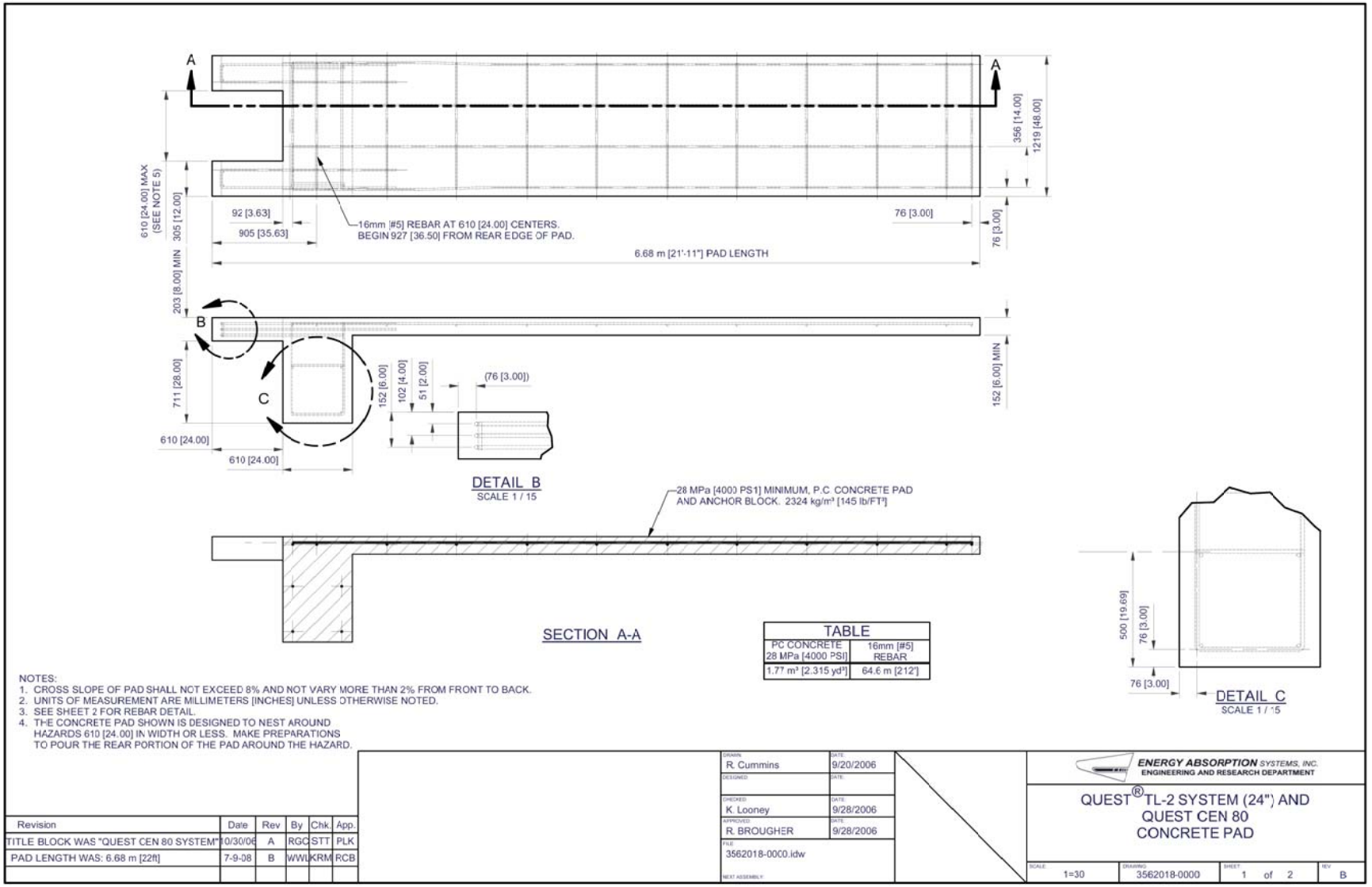


TABLE	
PC CONCRETE 28 MPa [4000 PSI]	16mm [#5] REBAR
1.77 m³ [2.315 yd³]	64.6 m [212']

NOTES:
1. CROSS SLOPE OF PAD SHALL NOT EXCEED 8% AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
2. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
3. SEE SHEET 2 FOR REBAR DETAIL.
4. THE CONCRETE PAD SHOWN IS DESIGNED TO NEST AROUND HAZARDS 610 [24.00] IN WIDTH OR LESS. MAKE PREPARATIONS TO POUR THE REAR PORTION OF THE PAD AROUND THE HAZARD.

Revision	Date	Rev	By	Chk.	App.
TITLE BLOCK WAS "QUEST CEN 80 SYSTEM"	10/30/06	A	RGC	STT	PLK
PAD LENGTH WAS: 6.68 m [22ft]	7-9-08	B	WWL	KRM	RCB

DRAWN: R. Cummins	DATE: 9/20/2006	
DESIGNED:	DATE:	
CHECKED: K. Looney	DATE: 9/28/2006	
APPROVED: R. BROUGHER	DATE: 9/28/2006	
FILE: 3562018-0000.idw		
NEXT ASSEMBLY:		

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-2 SYSTEM (24") AND
QUEST CEN 80
CONCRETE PAD

SCALE	DRAWING	SHEET	REV
1=30	3562018-0000	1 of 2	B

QUEST®, TL-2 SYSTEM 24" CONCRETE PAD

DWG 3562018-0000 Sheet 2 of 2

DWG 3562028-0000 Sheet 1 of 2

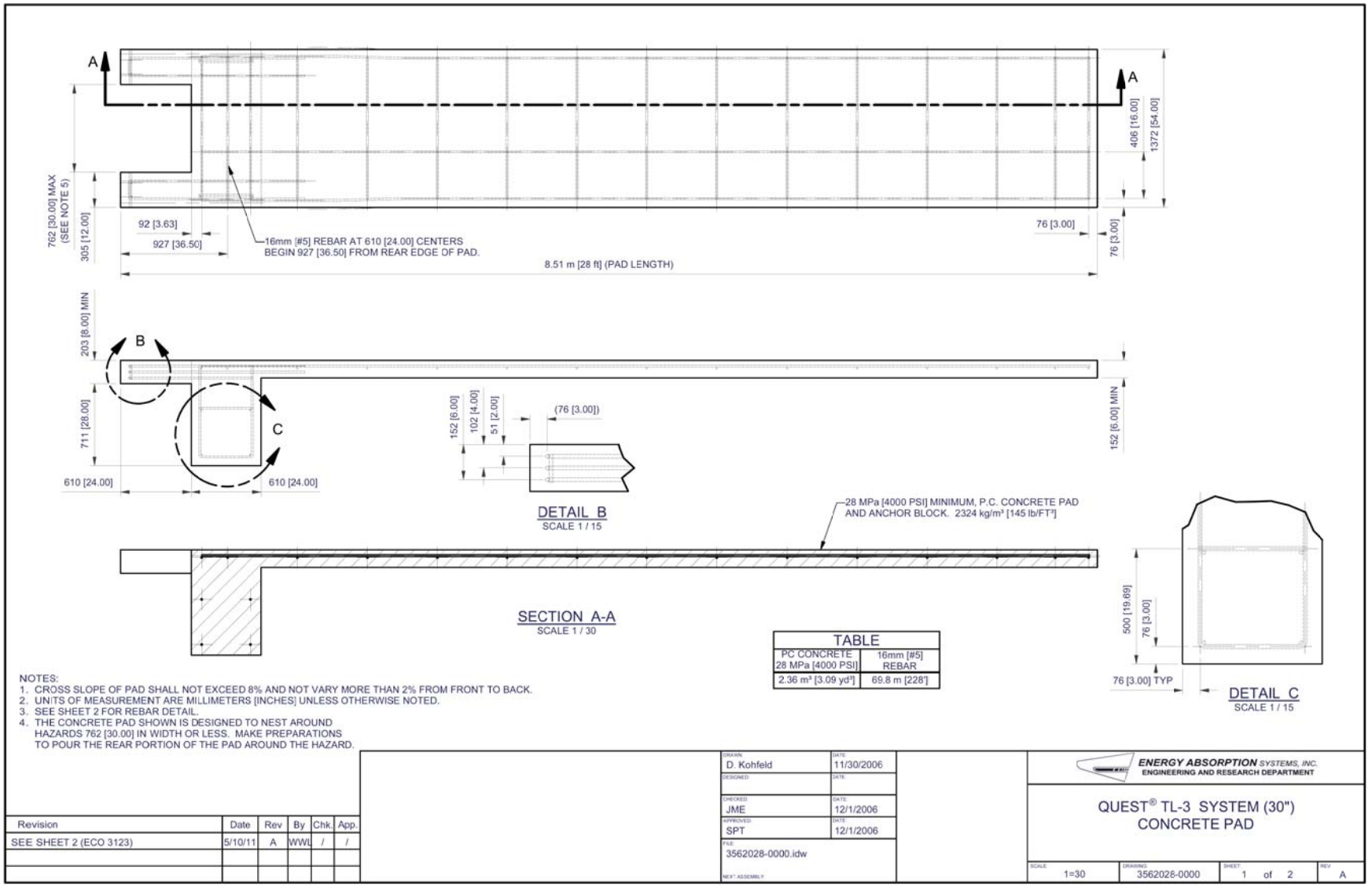


TABLE	
PC CONCRETE 28 MPa [4000 PSI]	16mm [#5] REBAR
2.36 m³ [3.09 yd³]	69.8 m [228']

NOTES:
1. CROSS SLOPE OF PAD SHALL NOT EXCEED 8% AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
2. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
3. SEE SHEET 2 FOR REBAR DETAIL.
4. THE CONCRETE PAD SHOWN IS DESIGNED TO NEST AROUND HAZARDS 762 [30.00] IN WIDTH OR LESS. MAKE PREPARATIONS TO POUR THE REAR PORTION OF THE PAD AROUND THE HAZARD.

Revision	Date	Rev	By	Chk.	App.
SEE SHEET 2 (ECO 3123)	5/10/11	A	WWL	/	/

DRAWN	D. Kohfeld	11/30/2006
DESIGNED		
CHECKED	JME	12/1/2006
APPROVED	SPT	12/1/2006
FILE	3562028-0000.idw	
NEXT ASSEMBLY		

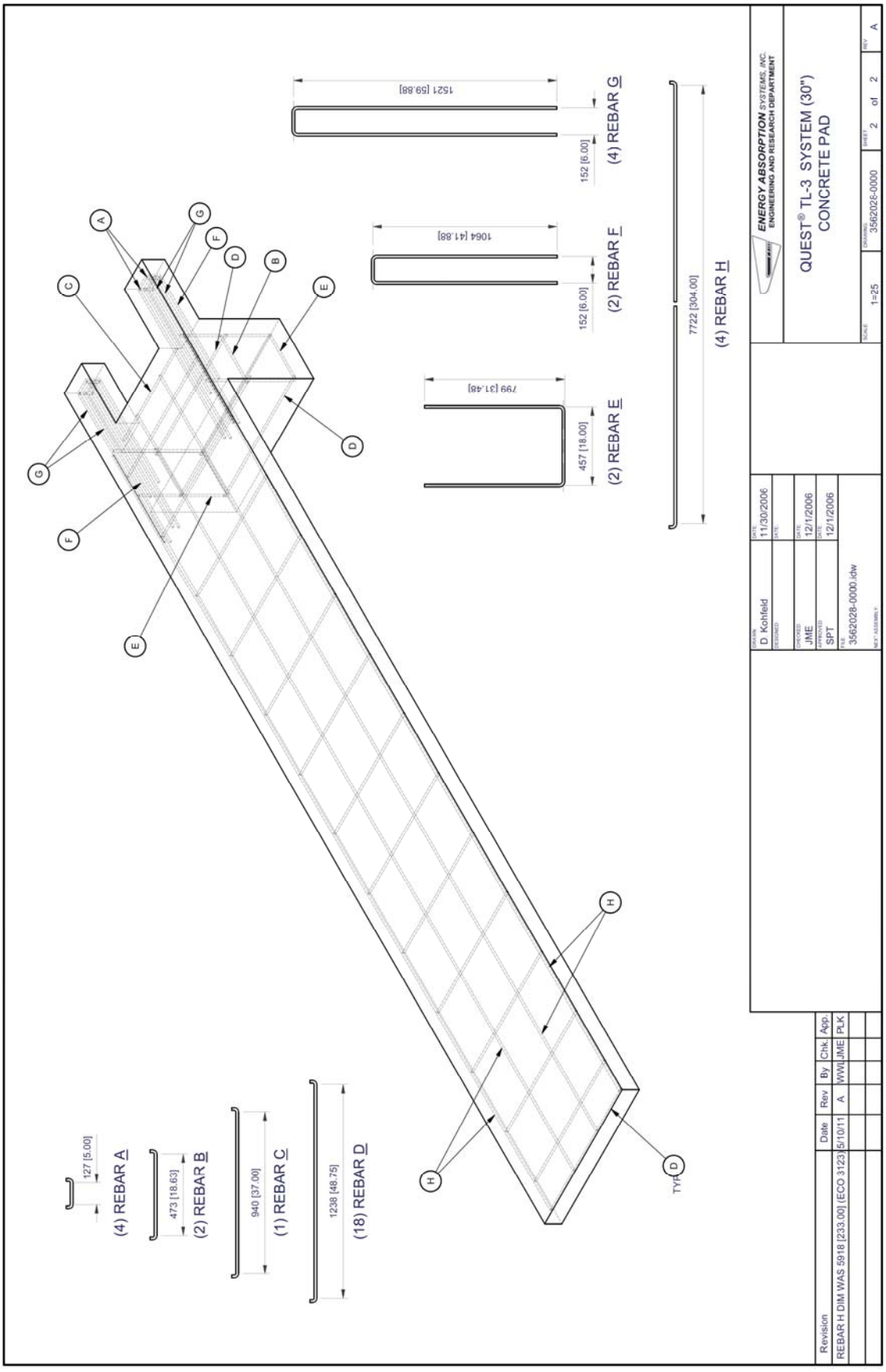
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST® TL-3 SYSTEM (30")
CONCRETE PAD

SCALE	DRAWING	SHEET	REV
1=30	3562028-0000	1 of 2	A

QUEST® TL-3 100 SYSTEM, 30" CONCRETE PAD

DWG 3562028-0000 Sheet 2 of 2



DWG 3562038-0000 Sheet 1 of 2

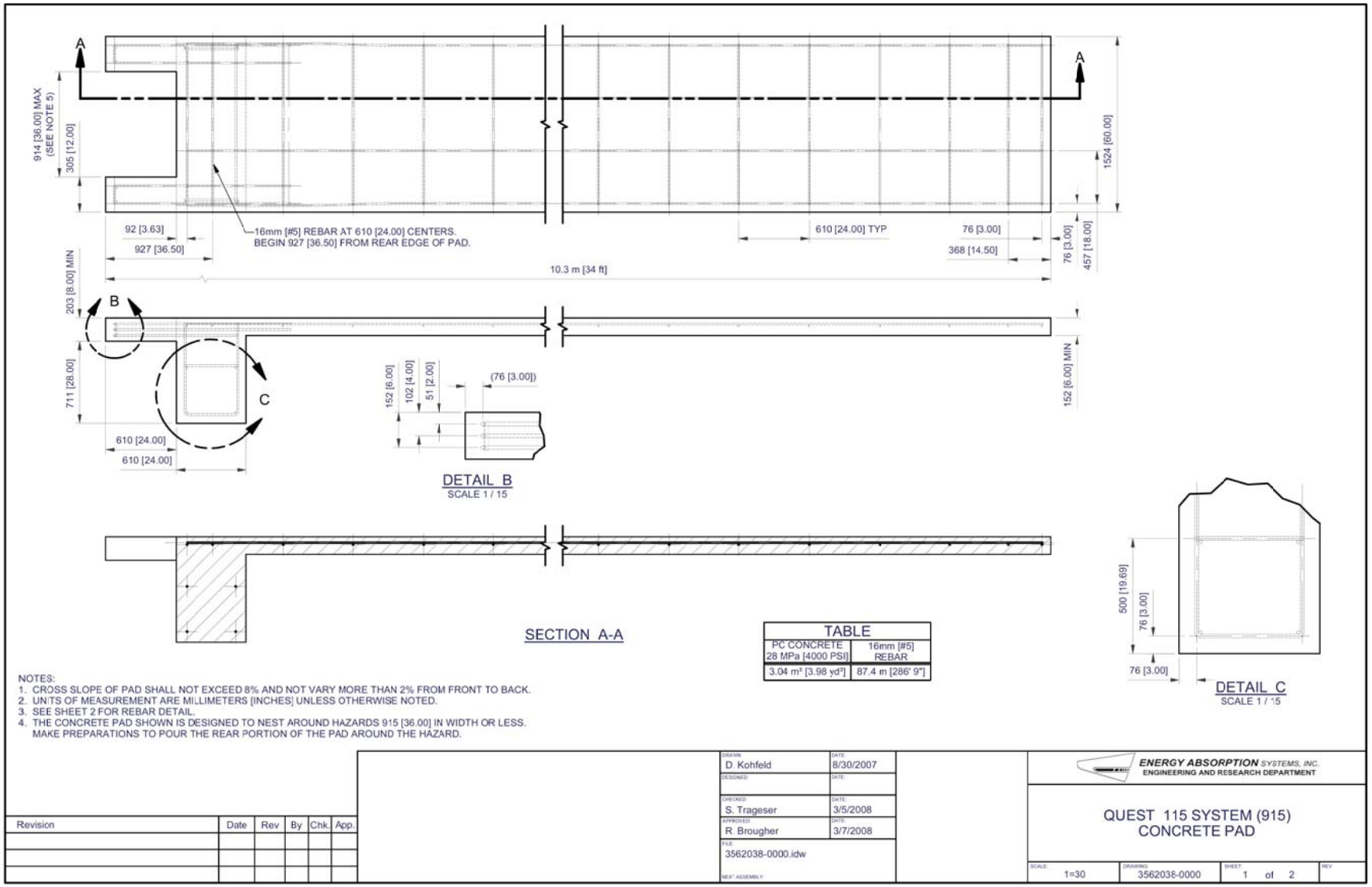


TABLE	
PC CONCRETE 28 MPa [4000 PSI]	16mm [#5] REBAR
3.04 m³ [3.98 yd³]	87.4 m [286' 9"]

NOTES:
1. CROSS SLOPE OF PAD SHALL NOT EXCEED 8% AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
2. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
3. SEE SHEET 2 FOR REBAR DETAIL.
4. THE CONCRETE PAD SHOWN IS DESIGNED TO NEST AROUND HAZARDS 915 [36.00] IN WIDTH OR LESS. MAKE PREPARATIONS TO POUR THE REAR PORTION OF THE PAD AROUND THE HAZARD.

Revision	Date	Rev	By	Chk.	App.

DRAWN: D. Kohfeld	DATE: 8/30/2007	
DESIGNED:	DATE:	
CHECKED: S. Trageser	DATE: 3/5/2008	
APPROVED: R. Brougher	DATE: 3/7/2008	
FILE: 3562038-0000.idw		
NEXT ASSEMBLY:		

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

QUEST 115 SYSTEM (915)
CONCRETE PAD

SCALE	DRAWING	SHEET	REV
1=30	3562038-0000	1 of 2	

QUEST® TL-3 115 SYSTEM, 36" CONCRETE PAD

DWG 3562038-0000 Sheet 2 of 2

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Dallas, Texas 75207
888-323-6374 (USA only)
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www.energyabsorption.com
www.highwayguardrail.com