

**CONTENTS**

DESCRIPTION	DRAWING NO.	SHEET NO.
QuadGuard High Speed System W/Tension Strut Backup	QHTSCVRFL-U	1 Of 1
Diaphragm Assembly High Speed QG	35-40-01	1 Of 1
Backup Assembly TS, I20, QG	35-40-03	1 Of 1
Fender Panel Assembly, QG	35-40-04	1 Of 1
Monorail Assembly, QG	35-40-06	1-3 Of 3
Diaphragm Assembly, QG	35-40-07	1 Of 1
Concrete Pad For Tension Strut Backup	35-40-11	1 Of 2
Optional 8" Concrete Pad For Tension Strut Backup	35-40-11	2 Of 2
QuadGuard High Speed System Nose Assembly	35-40-61	1 Of 1
Bumper Assembly, QG High Speed	35-40-62	1 Of 1
Temporary Anchor QG High Speed System (9 Bay)	3540003-0000	1 Of 1

**NOTES FOR QUADGUARD HIGH SPEED**

1. The energy absorbing system represented on these Qualified Products List (QPL) drawings is a proprietary design by Energy Absorption Systems, Inc. and marketed under the name QuadGuard High Speed System (QGHS). Any infringement on the rights of the designer shall be the sole responsibility of the users.
2. The QGHS is a unidirectional, non-gating, redirective crash cushion which is well suited for use shielding hazards subject to high speed traffic. The QGHS may be used for permanent or temporary installations. The beginning length of need shall be at the point of intersection between the face of the crash cushion and the transverse centerline of the second diaphragm.
3. The QuadGuard tension strut backup is the primary backup to be used on Florida Department of Transportation projects. Use of concrete backups will be permitted, but will require call out and detailing in the plans for site specific construction; concrete backups must meet manufacturer's specifications, installation guidelines and transition hardware requirements.
4. The QGHS shall be assembled and installed in accordance with the manufacturer's detailed drawings, procedures and specifications.
5. The QGHS is available in 24", 30" and 36" nominal widths. The system width will be as called out in the plans, permit or other contract document for each location.
6. Only the QuadGuard Type I and Type II cartridges shall be used as shown on the drawings.
7. All metallic components shall meet the galvanizing requirements for guardrail, Index No. 400.
8. A yellow Type I Object Marker shall be centered 3' in front of the nose of the QGHS. Mounting hardware shall be in conformance with Index Nos. 11860 and 11865. The cost of the Object Marker shall be included in the cost of the QGHS.
9. Quantity for payment is based on each independent location as called for in the plans or as directed by the Engineer. The cost of foundations, subgrade preparation and other appurtenant construction will be included in the cost for the QuadGuard High Speed System. Permanent units will be paid for under the contract unit price for Vehicle Impact Attenuator Crash Cushion, EA; temporary units will be paid for under the contract unit price for Vehicle Impact Attenuator (Redirective Option X Temporary), LO.

**NOTE B ALTERNATIVE:**

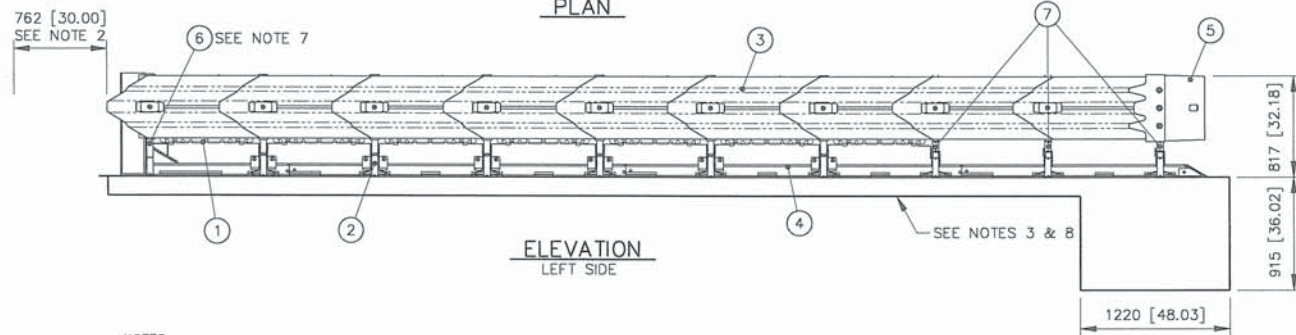
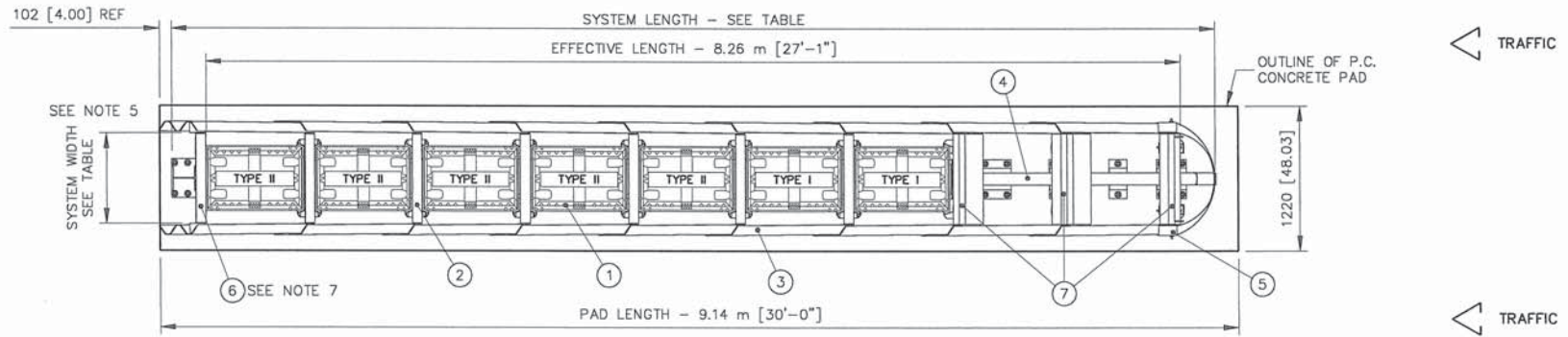
The contractor has the option to install reflective sheeting on the nose of the crash cushion in lieu of placing the yellow Type I Object Marker 3 feet in front of the nose of the crash cushion. The sheeting to be used must be solid yellow, Type III or better, and must be a product listed on the Department's Qualified Products List (QPL). The sheeting to be applied to the nose of the crash cushion shall be a minimum of 360 square inches with a minimum height of 15 inches.  
April 30, 2009

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

**QUADGUARD HIGH SPEED**

Date:  
08/31/05

QPL No. S544 - 0022



NOTES:

- Δ 1. THE QUADGUARD HIGH SPEED SYSTEM IS A NON-GATING, RE-DIRECTIVE SYSTEM WHICH MEETS ALL APPLICABLE NCHRP 350 EVALUATION CRITERIA FOR A TEST LEVEL 3 (TL-3) DEVICE AT THE INCREASED IMPACT SPEED OF APPROXIMATELY 113 km/h (70 MPH), SEE FHWA ACCEPTANCE LETTER HSA-10/CC35E.
2. PROVISION SHALL BE MADE FOR REAR FENDER PANELS TO SLIDE REARWARD UPON IMPACT 762 [30.00] MIN.
3. 150 [6.00] MIN. REINFORCED 28 MPa [4000 PSI] P.C. CONCRETE PAD OR 200 [8.00] MIN. NON-REINFORCED 28 MPa [4000 PSI] P.C. CONCRETE ROADWAY MEASURING AT LEAST 3.66m [12'-0"] WIDE BY 15.24m [50'-0"] LONG.
4. IN COMPLIANCE WITH THE AASHTO 2002 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS TO ENSURE PROPER IMPACT PERFORMANCE.
5. WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY AN ADEQUATE TRANSITION FROM THE QUADGUARD SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES], UNLESS OTHERWISE NOTED.
7. BACKUP ASSEMBLY IS NOT INCLUDED IN MODEL NUMBER, ORDER SEPARATELY.
8. SYSTEM MAY BE TEMPORARILY INSTALLED IN 150[6.00] MIN. ASPHALT WHEN ANCHORED WITH 18" THREADED RODS (P/N 2700731-0500) ORDER ANCHORS SEPARATELY WITH ADDITIONAL MP-3 (P/N 3525100-0000, QTY 12).
9. SEE THE "QUADGUARD HS 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 (312) 467-6750.

TABLE

\* G = GREY OR Y = YELLOW

MODEL NO.	SYSTEM WIDTH	SYSTEM LENGTH
QH2409*	610 [24.00]	8.92 m [29'-3"]
QH3009*	762 [30.00]	8.85 m [29'-0"]
QH3609*	915 [36.00]	9.11 m [29'-11"]

KEY	① QUADGUARD CARTRIDGE	④ MONORAIL	⑦ HS DIAPHRAGM
	② DIAPHRAGM	⑤ NOSE ASSEMBLY	
	③ FENDER PANEL	⑥ BACKUP	

Revisions	Date	Rev.	By	Ckd.	App.
SWAPPED NOTES 1, 4, & 9	04/06/05	A	ACF	ACF	FJP
TEMPORARY ANCHORS REF WAS 3540001-0000	06/12/05	B	TB		<i>Handwritten signature</i>

REFERENCES

SERIAL#	DIAPHRAGM ASSY.	35-40-07
SALES ORDER#	HS DIAPHRAGM ASSY.	35-40-01
EH PROJECT#	NOSE ASSY.	35-40-61
DESIGN SPEED	FENDER PANEL ASSY.	35-40-04
NOSE COLOR	BACKUP ASSY.	35-40-03
NUMBER OF UNITS	MONORAIL ASSY.	35-40-06
TRANSITION ASSY.	CONCRETE PAD	35-40-11
WHEEL DEFLECTOR ASSY.	BUMPER ASSY.	35-40-62
	TEMPORARY ANCHORS	3540003-0000

DRAWN	A. FRANKLIN	DATE	3/28/05
DESIGNED	B. ECKERT	DATE	3/06/01
CHECKED	A. FRANKLIN	DATE	3/28/05
APPROVED	R. BROUGHER	DATE	3/28/05
CAD FILE:	QHTSCVRFL-U.dwg		

AUG 18 2005

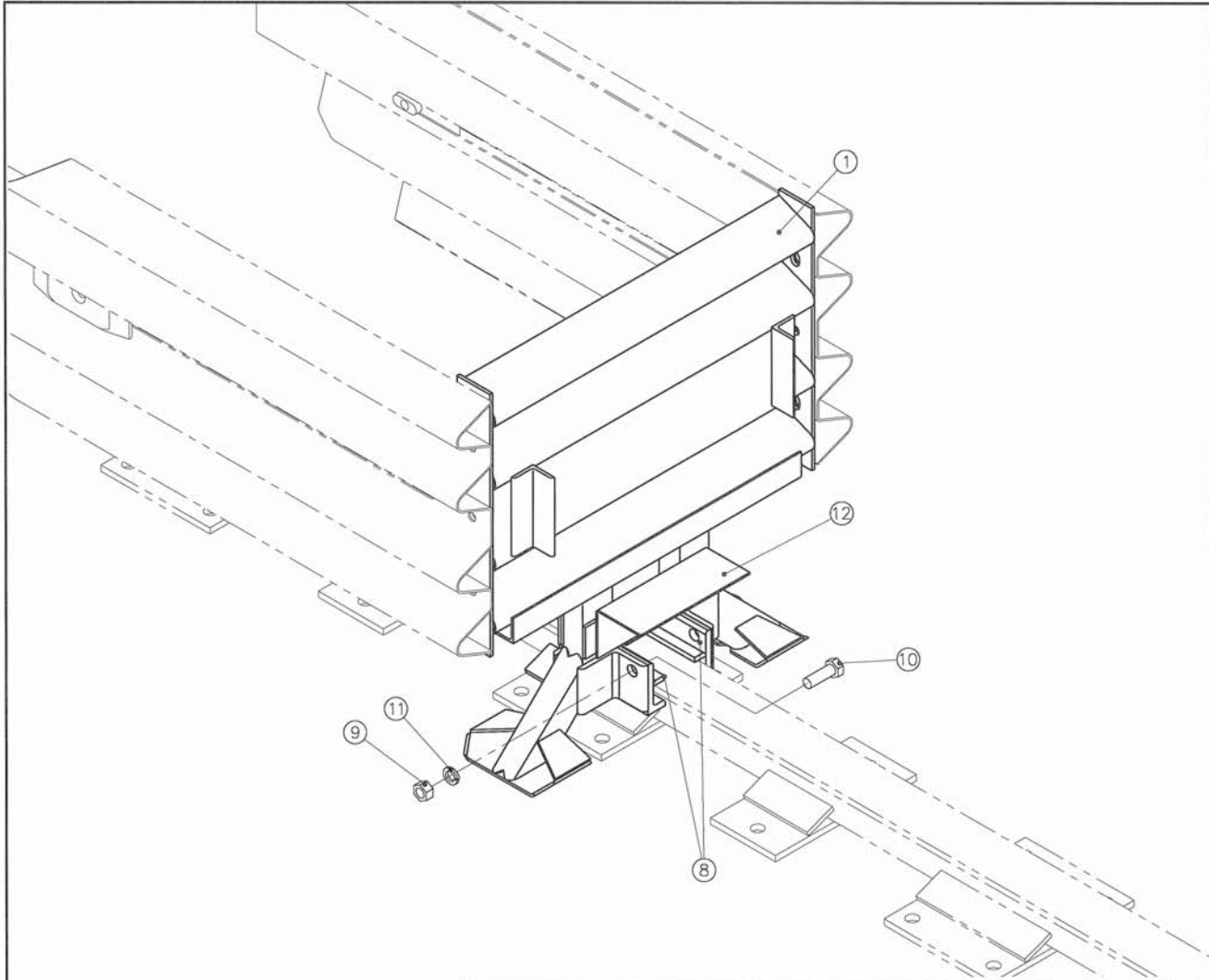
UNIDIRECTIONAL  
MODEL NO.-SEE TABLE

**ENERGY ABSORPTION SYSTEMS, INC.**  
ENGINEERING AND RESEARCH DEPARTMENT

**QUADGUARD® HIGH SPEED SYSTEM**  
W/TENSION STRUT BACKUP

FLORIDA  
REV B

SCALE: 1=40    DWG: QHTSCVRFL-U    SHEET: 1 OF 1



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	SEE TABLE A	DIAPHRAGM,QB,QG,G	1.00
8	2760091-0000	MONORAIL GUIDE,QG,G	2.00
9	2704341-0000	NUT,HX,3/4,G,GR DH	4.00
10	2699121-0000	BOLT,HX,3/4X2,G8,G	4.00
11	2708201-0000	WASHER,LOCK,3/4,G	4.00
12	2760292-0000	BRACKET,CART SUPPORT,DIAPHRAGM	2.00

TABLE A

ASSY. NO.	STOCK NO.	DESCRIPTION	WIDTH
3540071-0000	2761011-0000	DIAPHRAGM,QB,24,QG,G	610 [24.00]
3540072-0000	2761021-0000	DIAPHRAGM,QB,30,QG,G	760 [30.00]
3540073-0000	2761031-0000	DIAPHRAGM,QB,36,QG,G	915 [36.00]

REFERENCES

DRAWN: J. Espinoza	DATE: 5-2-96
DESIGNED:	DATE:
CHECKED: S. Trageser	DATE: 5/17/96
APPROVED: J. Machado	DATE: 5/17/96
CAD FILE: 354007.dwg	
NEXT ASSEMBLY:	

ASSEMBLY NO. SEE TABLE A

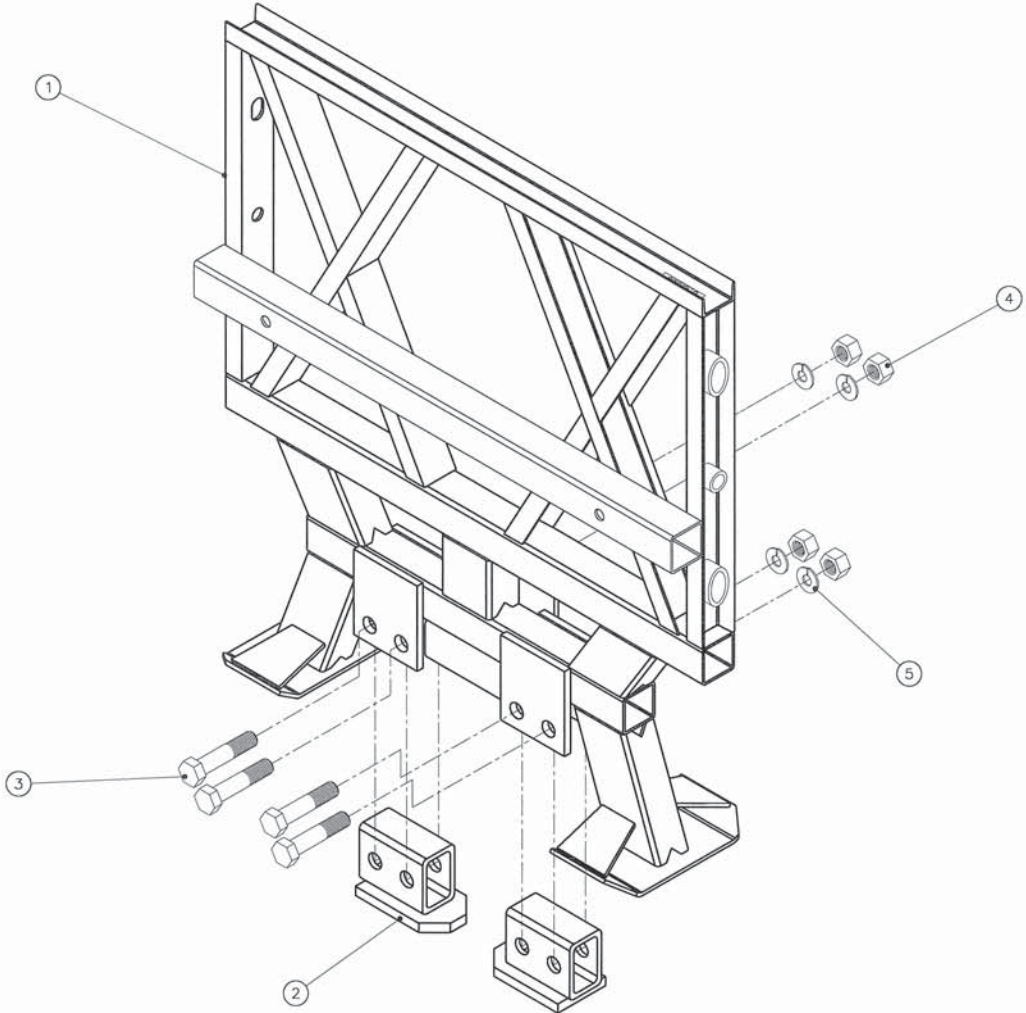


ENERGY ABSORPTION SYSTEMS, INC.  
ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD® SYSTEM  
DIAPHRAGM ASSY, QG

Revisions	Date	Rev.	By	Ckd.	App.
DEL ITEMS 2,4,5,&6,ADDED ITEM 12,UPDATED CART SUPPORT	11/04/97	D	RGC	KRM	DLJ
CHGD #5 & #10 BOLT DIRECTION,#2 WAS 2760101	8/8/96	B	DLS	STT	JVM
#7 WAS 2708021-0000	07/08/97	C	JF	BB	SPT

SCALE: N.T.S.	DWG: 35-40-07	SHEET: 1 of 1	REV: D
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PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	SEE TABLE	DIAPHRAGM, QG HIGH SPEED, G	1.00
2	2765011-0000	RAIL GUIDE, REACT, G	2.00
3	2699561-0000	BOLT, HX, 3/4X4, G5, G	4.00
4	2704091-0000	NUT, HX, 3/4, G	4.00
5	2708201-0000	WASHER, LOCK, 3/4, G	4.00


TABLE		
SYSTEM WIDTH	ASSY NO.	ITEM 1 PART NO.
24"	3540015-0000	2760591-0001
30"	3540016-0000	2760592-0001
36"	3540017-0000	2760593-0001

Revisions	Date	Rev.	By	Ckd.	App.
REVISED ITEM 1 P/N'S ALL MODELS	01/25/02	A	LWC	JME	BRE

REFERENCES

DRAWN:	D. Webber	DATE:	07/24/01
DESIGNED:	B. Eckert	DATE:	02/01/01
CHECKED:	J. Espinoza	DATE:	10/12/01
APPROVED:	S. Trageser	DATE:	10/12/01
CAD FILE:	354001.dwg.dwg		
NEXT ASSEMBLY:	QH2409, QH3009 & QH3609		

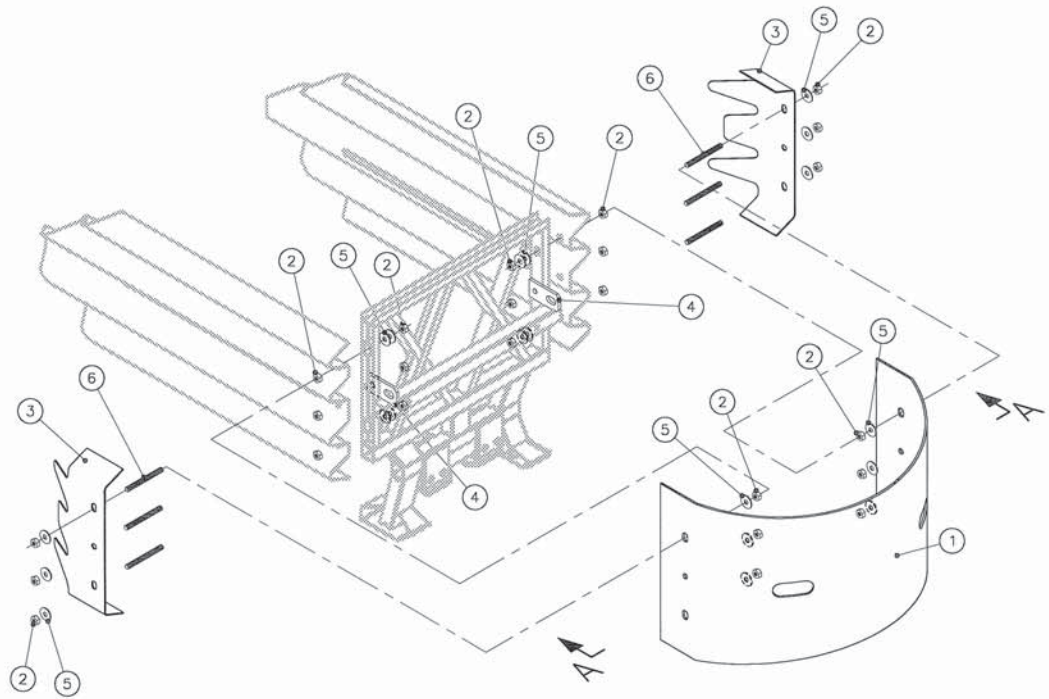
ASSEMBLY NO. - SEE TABLE



**ENERGY ABSORPTION SYSTEMS, INC.**  
ENGINEERING AND RESEARCH DEPARTMENT

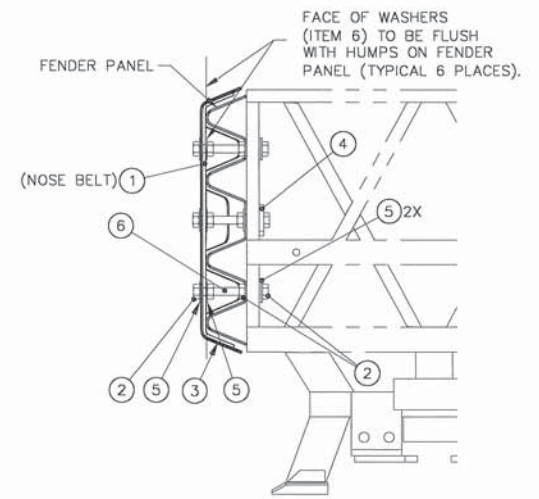
**DIAPHRAGM ASSEMBLY  
HIGH SPEED QG**

SCALE:	N.T.S.	DWG:	35-40-01	SHEET:	1 of 1	REV:	A
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PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	SEE TABLE	BELT,NOSE,QG CEN	1.00
2	2704141-0000	NUT,HX,5/8,G	24.0
3	2760504-0000	CLAMP,BELT,LMC	2.00
4	2760251-0000	BRACKET,PULL OUT,QG	2.00
5	2708291-0000	WASHER,FLAT,5/8X1 3/4,G	20.0
6	2699016-0000	ROD,THREADED,5/8X6,G5,G	6.00

\* 0 = GRAY, 1 = YELLOW



VIEW A-A  
SCALE - 1:10

SYSTEM WIDTH	BELT LENGTH	COLOR	ASSY NO.	ITEM 1 PART NO.
24" OR 30"	1524	GRAY	3540611-0000	2718106-0000
	1524	YELLOW	3540611-0100	2718106-0100
36"	1780	GRAY	3540612-0000	2718108-0000
	1780	YELLOW	3540612-0100	2718108-0100

ASSEMBLY NO. - SEE TABLE

 ENERGY ABSORPTION SYSTEMS, INC.  
ENGINEERING AND RESEARCH DEPARTMENT

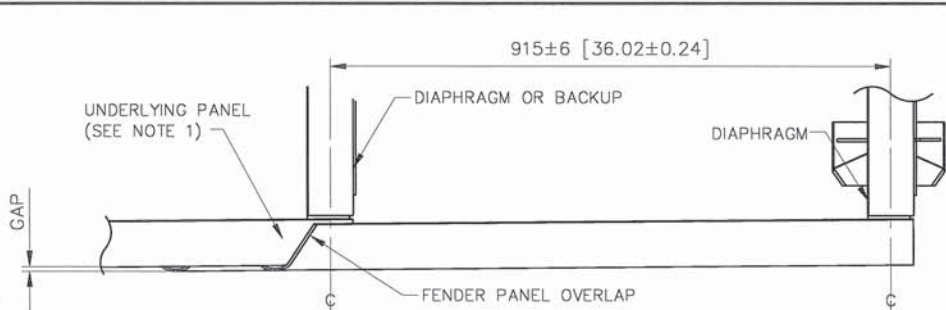
QUADGUARD HIGH SPEED SYSTEM  
NOSE ASSY

SCALE	DWG	SHEET	REV
1:15	35-40-61	1 of 1	A

REFERENCES

DRAWN:	D. Webber	DATE:	7/26/01
DESIGNED:	Bret Eckert	DATE:	7/26/01
CHECKED:	JME	DATE:	10/12/01
APPROVED:	Bret Eckert	DATE:	10/12/01
CAD FILE:	354061.dwg		
NEXT ASSEMBLY:			

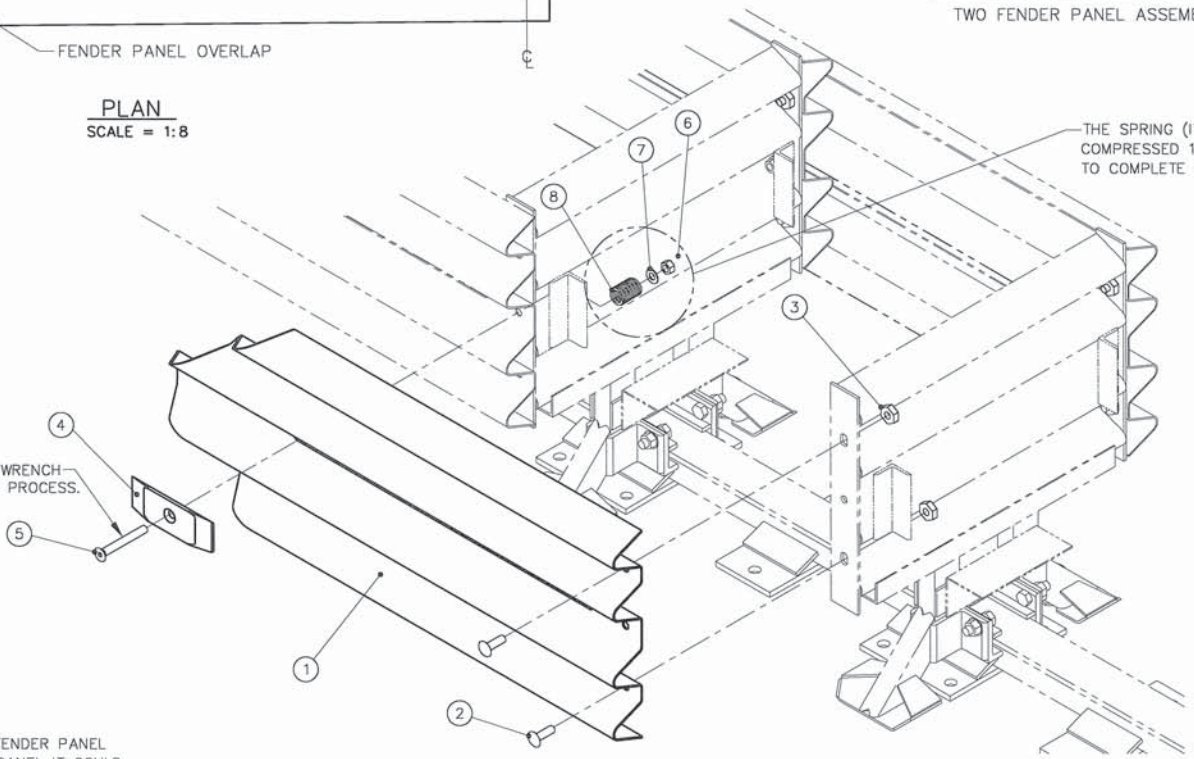
Revisions	Date	Rev.	By	Ckd.	App.
ITEM 6 WAS 2701024-0000, ITEM 2 WAS 18.0	4/17/02	A	DDW	JME	DMO



**CAUTION**  
 20 [0.78] MAX.  
 FOR PROPER IMPACT  
 PERFORMANCE.

**PLAN**  
 SCALE = 1:8

USE A 3/8" ALLEN WRENCH  
 DURING THE ASSEMBLY PROCESS.



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	2760081-0000	PANEL,FENDER,QG,G	1.00
2	2699341-0000	BOLT,RAIL,5/8X2,G	2.00
3	2704191-0000	NUT,HX,5/8,G,RAIL	2.00
4	2708841-0000	WASHER,MUSHROOM,CAST,QG,G	1.00
5	2706604-0000	SCREW,FL,5/8X5,G8,G,SOCKET	1.00
6	2704141-0000	NUT,HX,5/8,G	1.00
7	2708291-0000	WASHER,FLAT,5/8X1 3/4,G	1.00
8	2715343-0000	SPRING,DIE,1 1/4 OD X5/8X1 1/2	1.00

TWO FENDER PANEL ASSEMBLIES REQUIRED PER BAY.

THE SPRING (ITEM 8) SHOULD BE COMPRESSED 1 TO 3 mm (1/16" TO 1/8") TO COMPLETE THE ASSEMBLY.

- NOTES:
1. UNDERLYING PANEL IS EITHER ANOTHER FENDER PANEL OR, IN THE CASE OF THE LAST FENDER PANEL IT COULD BE A BACKUP SIDE PANEL, EXTENSION PANEL OR TRANSITION PANEL.
  2. UNITS OF MEASUREMENT ARE IN MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.

Revisions	Date	Rev.	By	Ckd.	App.
CORRECTED DIAPHRAGM SPACING	10/28/98	G	RGC	STT	KRM
DIAPHRAGM SPACING WAS FRONT TO FRONT	11/26/01	H	DDW	JME	DMQ
8 WAS 2021611-0000, 7 QTY WAS 4.0	4/22/04	I	DK	JME	AC

REFERENCES
DRAWN: J. Espinoza DATE: 5/21/96 DESIGNED: JVM/MHO DATE: 3/1/96 CHECKED: S. Trageser DATE: 5/21/96 APPROVED: J. Machado DATE: 5/21/96 CAD FILE: 354004.dwg NEXT ASSEMBLY: ALL MODELS

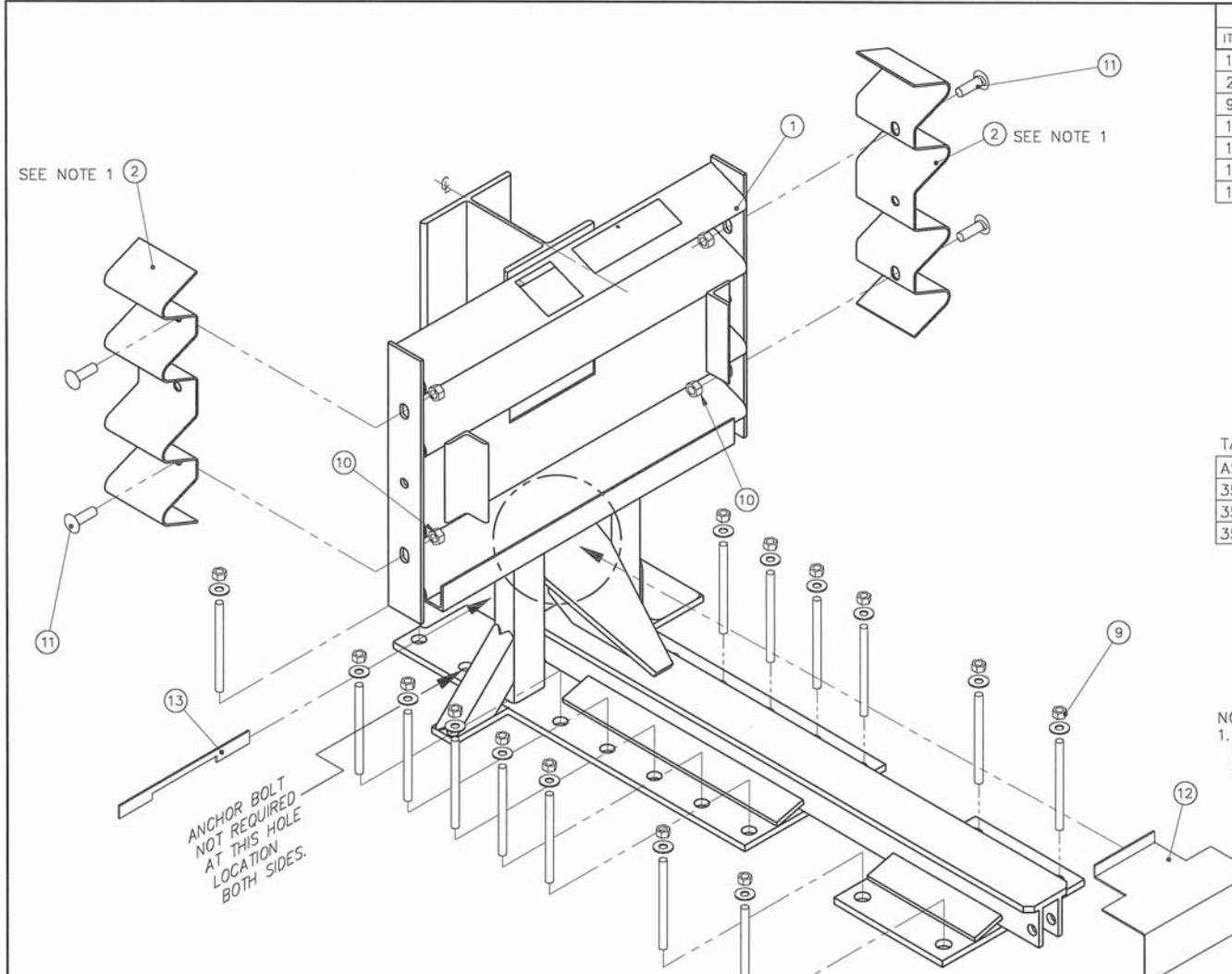
ASSEMBLY NO. 3540040-0000

**ENERGY ABSORPTION SYSTEMS, INC.**  
 ENGINEERING AND RESEARCH DEPARTMENT

**QUADGUARD® SYSTEM**

**FENDER PANEL ASSY, QG**

SCALE: 1:12	DWG: 35-40-04	SHEET: 1 of 1	REV: 1
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PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	SEE TABLE A	BACKUP, TS, QG, G	1.00
2	2760141-0000	PANEL, SIDE, QG, G	2.00
9	3525300-0000	ANCHOR, MP-3, PT-KIT, 3/4X7, VT	3.00
10	2704191-0000	NUT, HX, 5/8, G, RAIL	4.00
11	2699341-0000	BOLT, RAIL, 5/8X2, G	4.00
12	2760293-0000	BRACKET, CARTRIDGE SUPPORT, TS B/U	1.00
13	2760294-0000	LOCKING BAR, CARTRIDGE SUPPORT	1.00

TABLE A

ASSY. NO.	STOCK NO.	DESCRIPTION	WIDTH
3540031-0000	2760011-0000	BACKUP, TS, 24, QG, G	610 [24.00]
3540032-0000	2760021-0000	BACKUP, TS, 30, QG, G	760 [30.00]
3540033-0000	2760031-0000	BACKUP, TS, 36, QG, G	915 [36.00]

NOTES:  
 1. WHEN TRANSITIONING QUADGUARD SYSTEM TO EXISTING BARRIER REFER TO THE TRANSITION ASSEMBLY DRAWINGS FOR PROPER USE OF SIDE PANEL PART NO. 2760141-0000.

REFERENCES

DRAWN:	S. LEWIS	DATE:	4-22-96
DESIGNED:	JVM/MHO	DATE:	3-1-96
CHECKED:	S. Trageser	DATE:	5/16/96
APPROVED:	J. Machado	DATE:	5/16/96
CAD FILE:	354003.dwg		
NEXT ASSEMBLY:			

ASSEMBLY NO. SEE TABLE A

 ENERGY ABSORPTION SYSTEMS, INC.  
 ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD® SYSTEM  
 BACKUP ASSY, TS, QG

Revisions	Date	Rev.	By	Ckd.	App.
DEL ITEMS 3,5,6,7,&8, ADDED ITEMS 12 & 13, UPDATED RAIL END HOLES	10/21/97	E	RGC	KRM	DLJ
REMOVED 1 ANCHOR BOLT & ADDED NOTE	03/19/99	F	LWC	KM	SPT
QTY #8 WAS 4	07/08/97	D	JF	BB	SPT

SCALE:	N.T.S.	DWG:	35-40-03	SHEET:	1 of 1	REV:	F
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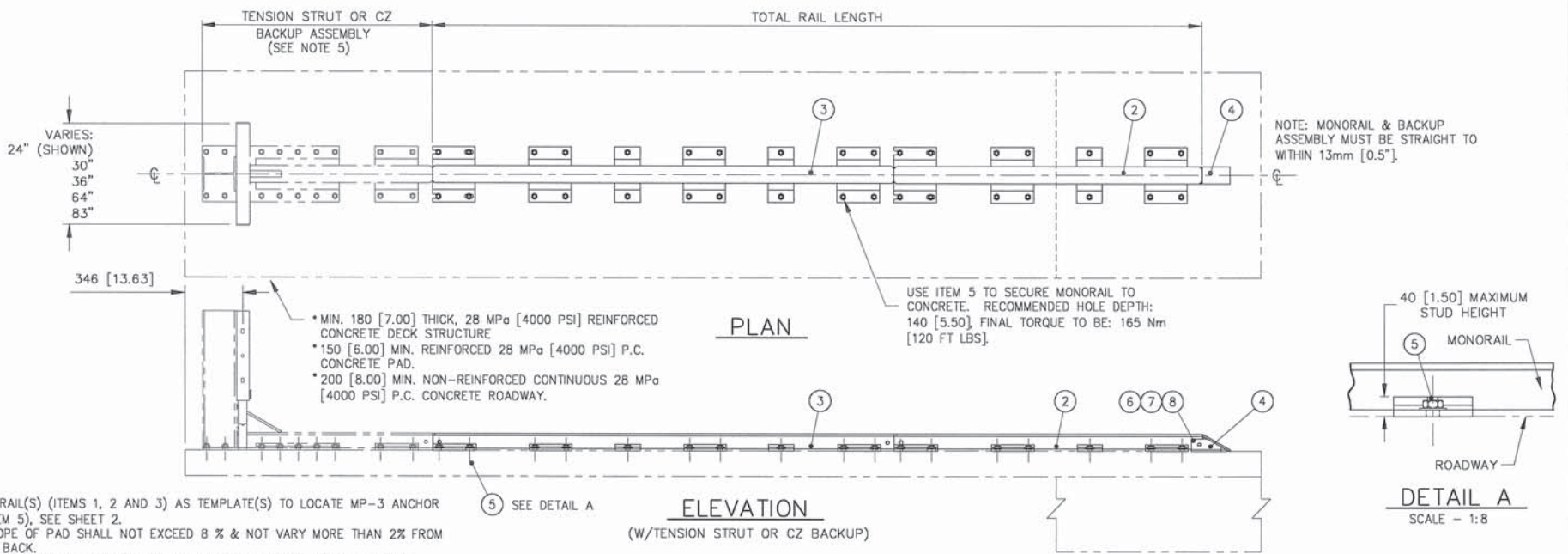
TABLE "L"						
ASSEMBLY NO.	TOTAL RAIL LENGTH	*ITEM 1	*ITEM 2	*ITEM 3	*ITEM 5	NO. OF BAYS
3540060-0100	0	0	0	0	0	1
3540060-0200	915 [36.0]	1	0	0	2	2
3540060-0300	1830 [72.0]	0	1	0	3	3
3540060-0400	2745 [108.1]	0	0	1	4	4
3540060-0500	3660 [144.1]	1	0	1	5	5
3540060-0600	4575 [180.1]	0	1	1	6	6
3540060-0700	5490 [216.1]	0	0	2	7	7
3540060-0800	6405 [252.1]	1	0	2	8	8
3540060-0900	7320 [288.2]	0	1	2	9	9
3540060-1000	8235 [324.2]	0	0	3	10	10
3540060-1100	9150 [360.2]	1	0	3	12	11
3540060-1200	10065 [396.2]	0	1	3	13	12

-NOT APPLICABLE FOR 69" & 90" OR CZ QG SYSTEMS

-NOT APPLICABLE FOR CZ QG SYSTEMS

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	2760051-0000	MONORAIL, ONE BAY, QG, G	*
2	2760061-0000	MONORAIL, TWO BAYS, QG, G	*
3	2760071-0000	MONORAIL, THREE BAYS, QG, G	*
4	2760041-0000	END CAP, MONORAIL, QG, G	1.00
5	3525300-0000	ANCHOR, MP-3, PT-KIT, 3/4X7, VT	*
6	2699571-0000	BOLT, HX, 5/8X3 1/2, G5, G	1.00
7	2704141-0000	NUT, HX, 5/8, G	1.00
8	2708231-0000	WASHER, LOCK, 5/8, G	1.00

\* SEE TABLE



- NOTES:
- USE MONORAIL(S) (ITEMS 1, 2 AND 3) AS TEMPLATE(S) TO LOCATE MP-3 ANCHOR BOLTS (ITEM 5), SEE SHEET 2.
  - CROSS SLOPE OF PAD SHALL NOT EXCEED 8 % & NOT VARY MORE THAN 2% FROM FRONT TO BACK.
  - UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
  - EVERY STUD MUST BE EMBEDDED TO A DEPTH OF 140 [5.5]. IF REBAR IS ENCOUNTERED IN A P.C. CONCRETE PAD, DRILL THROUGH IT. IF REBAR IS ENCOUNTERED ON A DECK STRUCTURE, ASK PROJECT ENGINEER FOR DIRECTION.
  - FOR CZ SYSTEMS, SEE DRAWING 35-40-24 ALSO.

REFERENCES

DRAWN:	D. Staus	DATE:	5-8-96
DESIGNED:	MHO/JVM	DATE:	3-1-96
CHECKED:	S. Trageser	DATE:	5/17/96
APPROVED:	M. Oberth	DATE:	5/17/96
CAD FILE:	354006.dwg		
NEXT ASSEMBLY:			

ASSEMBLY NO. SEE TABLE L  
**ENERGY ABSORPTION SYSTEMS, INC.**  
 ENGINEERING AND RESEARCH DEPARTMENT

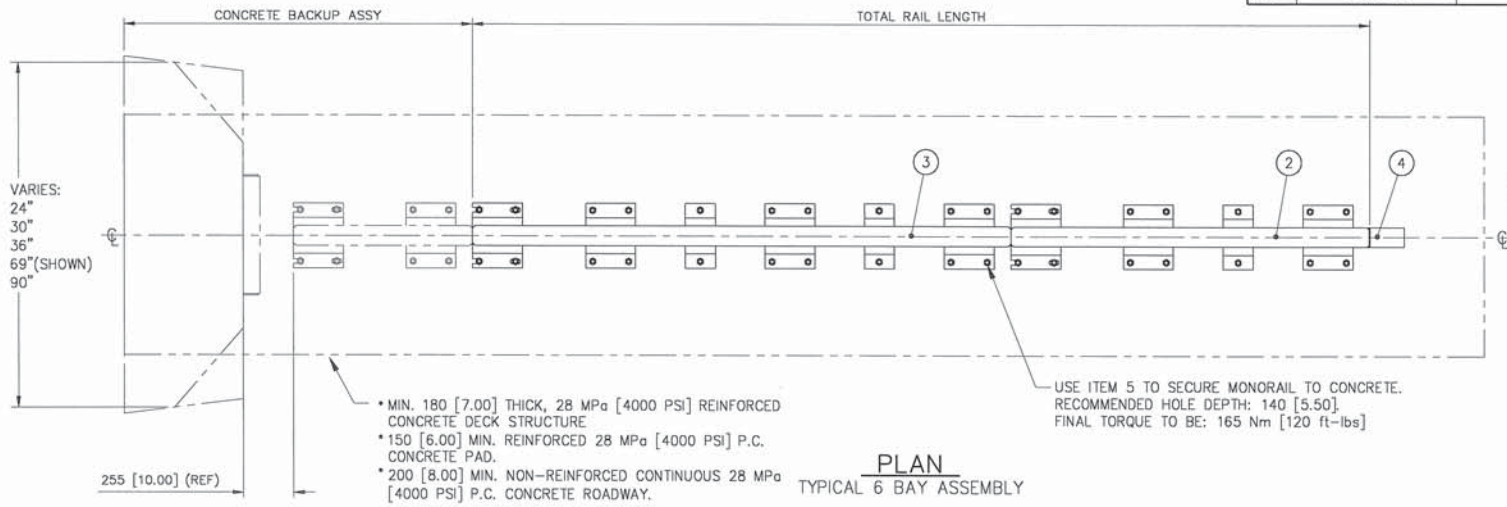
**QUADGUARD® SYSTEM**  
**MONORAIL ASSY, QG**

Revisions	Date	Rev.	By	Ckd.	App.
ITEM 6 WAS 2701991-0000	03/03/98	K	TB	BB	KM
ITEM 4 REDESIGNED	05/05/99	L	LWC	KM	SPT
DELETED HOLES IN CROSSPIECE	10/16/00	M	EB	DO	SPT

SCALE	N.T.S.	DWG	35-40-06	SHEET	1 of 3	REV	M
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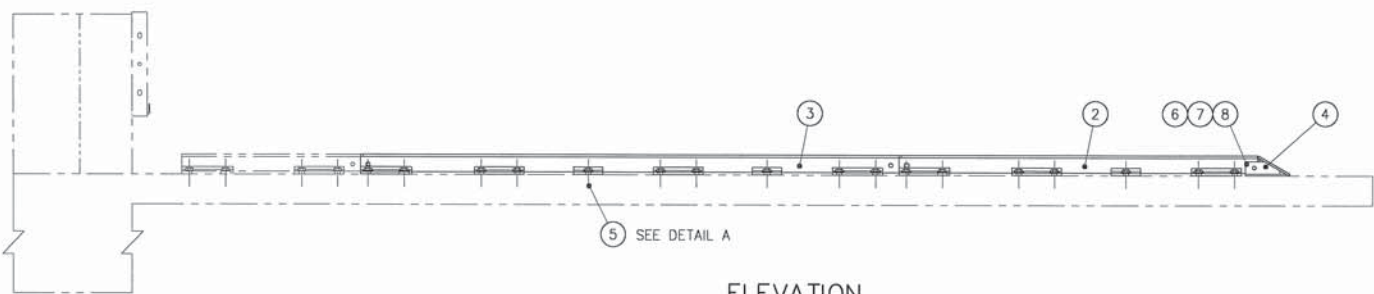


PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	REQ'D

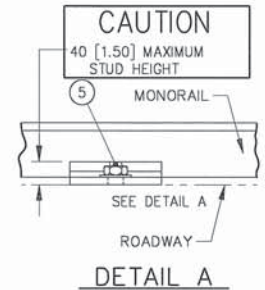


**PLAN**  
TYPICAL 6 BAY ASSEMBLY

NOTE: MONORAIL & BACKUP ASSEMBLY MUST BE STRAIGHT TO WITHIN 13 [0.50].



**ELEVATION**  
(W/CONCRETE BACKUP)



ASSEMBLY NO. SEE TABLE L ON SHEET 1

Revisions	Date	Rev.	By	Ckd.	App.
SEE SHEET 1	03/03/98	K	TB	/	/
ITEM 4 REVISED	05/10/99	L	LWC	KM	SPT
CHANGED REV TO MATCH SHEET 1	10/16/00	M	EB	DO	SPT

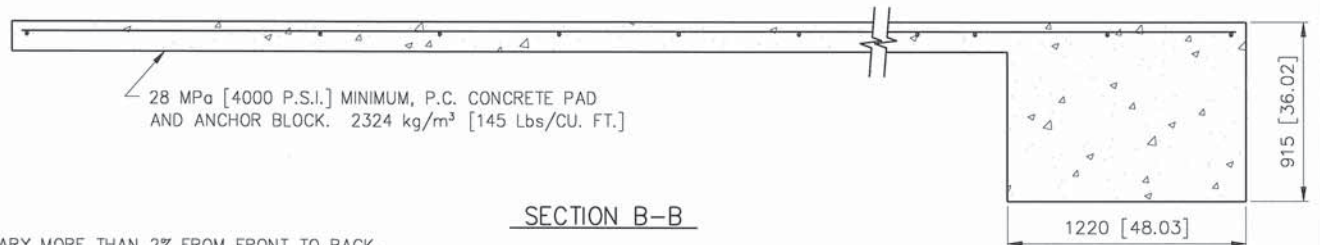
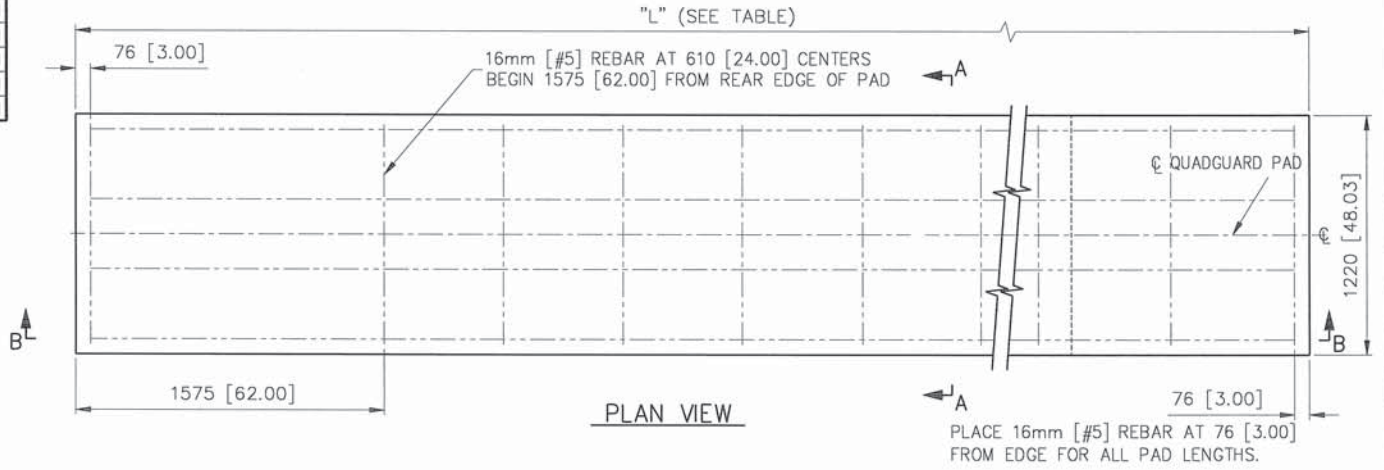
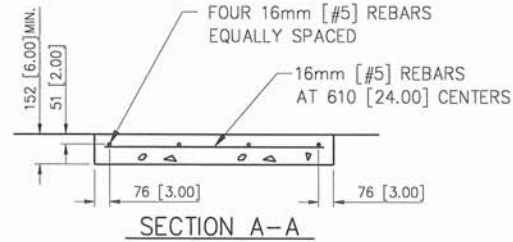
REFERENCES

DRAWN: D. Staus	DATE: 3-1-96
DESIGNED: MHO/JVM	DATE: 5-8-96
CHECKED: S. Trageser	DATE: 5/17/96
APPROVED: M. Oberth	DATE: 5/17/96
CAD FILE: 354006-02.dwg	
NEXT ASSEMBLY:	

ENERGY ABSORPTION SYSTEMS, INC. ENGINEERING AND RESEARCH DEPARTMENT			
<b>QUADGUARD® SYSTEM</b>			
<b>MONORAIL ASSY, QG</b>			
SCALE: N.T.S.	DWG: 35-40-06	SHEET: 2 of 3	REV: M



NO. OF BAYS	"L" (PAD LENGTH)		REBAR REQUIRED		YARDS OF CONCRETE IN PAD	
	[m]	[ft-in]	[m]	[ft-in]	m <sup>3</sup>	[YARDS <sup>3</sup> ]
1	2.74	[9'-0"]	14.83	[48'-8"]	1.59	[2.1]
2	2.74	[9'-0"]	14.83	[48'-8"]	1.59	[2.1]
3	3.66	[12'-0"]	20.73	[68'-0"]	1.82	[2.4]
4	4.57	[15'-0"]	25.50	[83'-8"]	1.97	[2.6]
5	5.49	[18'-0"]	31.39	[103'-0"]	2.12	[2.8]
6	6.40	[21'-0"]	36.17	[118'-8"]	2.35	[3.1]
7	7.32	[24'-0"]	42.06	[138'-0"]	2.51	[3.3]
8	8.23	[27'-0"]	46.84	[153'-8"]	2.66	[3.5]
9	9.14	[30'-0"]	52.73	[173'-0"]	2.81	[3.7]
10	10.06	[33'-0"]	57.51	[188'-8"]	3.04	[4.0]
11	10.97	[36'-0"]	63.40	[208'-0"]	3.19	[4.2]
12	11.89	[39'-0"]	68.17	[223'-8"]	3.35	[4.4]



NOTES:

- CROSS SLOPE OF PAD SHALL NOT EXCEED 8%, AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
- UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.

REFERENCES

DRAWN: D. Staus	DATE: 5/15/96
DESIGNED: WCK	DATE: 3/1/96
CHECKED: S. Trageser	DATE: 5/20/96
APPROVED: W. G. Krage	DATE: 5/20/96
CAD FILE: 354011.DWG	
NEXT ASSEMBLY:	



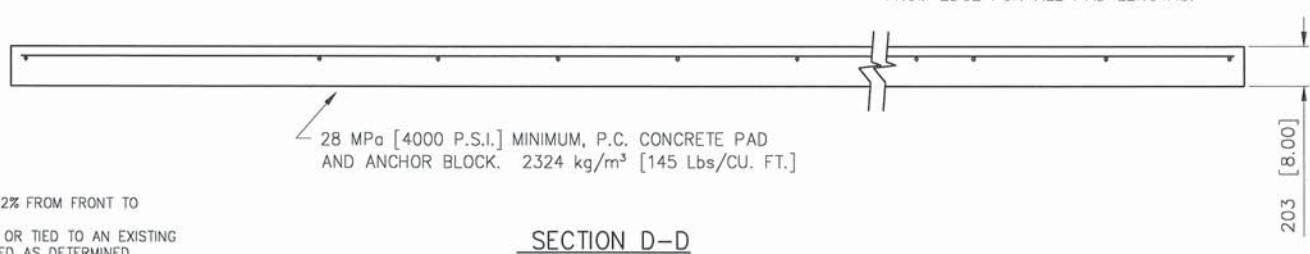
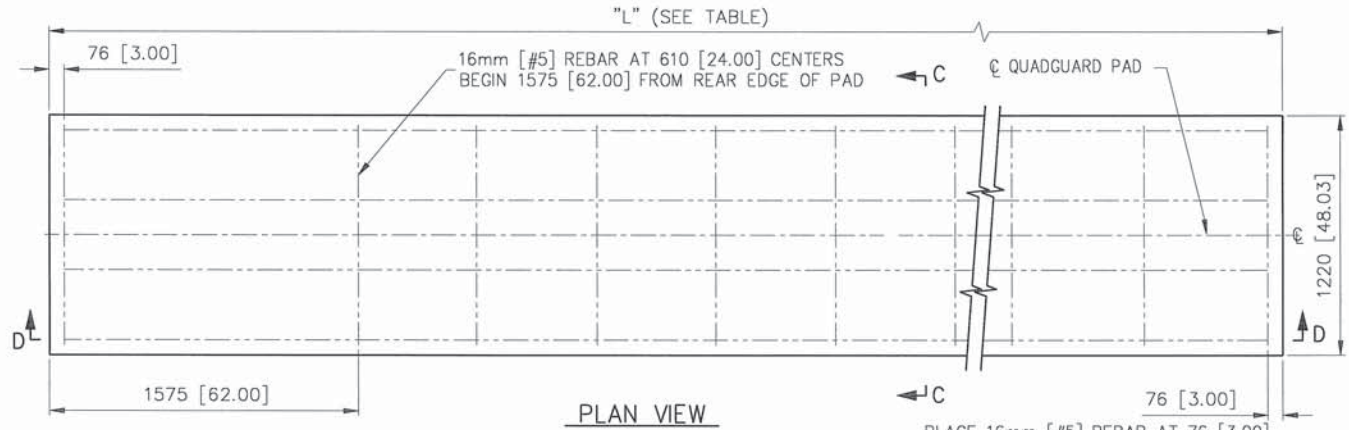
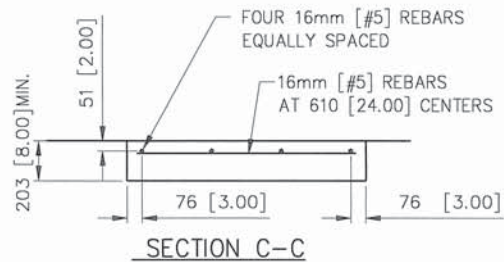
ENERGY ABSORPTION SYSTEMS, INC.  
ENGINEERING AND RESEARCH DEPARTMENT

QUADGUARD® SYSTEM  
CONCRETE PAD FOR  
TENSION STRUT BACKUP

Revisions	Date	Rev.	By	Ckd.	App.
ADDED SHEET 2	12/03/03	E	RGC	STT	ACF
REVISED FOOTING DIMENSIONS	9/25/98	C	JE	KM	SPT
REBAR WAS 15mm	07/11/01	D	RSG	DMO	SPT

SCALE: NTS	DWG: 35-40-11	SHEET: 1 of 2	REV: E
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NO. OF BAYS	"L" (PAD LENGTH)		REBAR REQUIRED		YARDS OF CONCRETE IN PAD m <sup>3</sup> [YARDS <sup>3</sup> ]
	[m]	[ft-in]	[m]	[ft-in]	
1	2.74	[9'-0"]	14.83	[48'-8"]	0.7 [0.9]
2	2.74	[9'-0"]	14.83	[48'-8"]	0.7 [0.9]
3	3.66	[12'-0"]	20.73	[68'-0"]	0.9 [1.2]
4	4.57	[15'-0"]	25.50	[83'-8"]	1.2 [1.5]
5	5.49	[18'-0"]	31.39	[103'-0"]	1.4 [1.8]
6	6.40	[21'-0"]	36.17	[118'-8"]	1.6 [2.1]
7	7.32	[24'-0"]	42.06	[138'-0"]	1.8 [2.4]
8	8.23	[27'-0"]	46.84	[153'-8"]	2.1 [2.7]
9	9.14	[30'-0"]	52.73	[173'-0"]	2.3 [3.0]
10	10.06	[33'-0"]	57.51	[188'-8"]	2.5 [3.3]
11	10.97	[36'-0"]	63.40	[208'-0"]	2.7 [3.6]
12	11.89	[39'-0"]	68.17	[223'-8"]	3.0 [3.9]



NOTES:

- CROSS SLOPE OF PAD SHALL NOT EXCEED 8%, AND NOT VARY MORE THAN 2% FROM FRONT TO BACK.
- TO PREVENT SLIDING DURING AN IMPACT, PAD MUST BE INSTALLED AGAINST OR TIED TO AN EXISTING STRUCTURE. OTHERWISE ADDITIONAL BELOW GRADE SUPPORTS MUST BE ADDED AS DETERMINED NECESSARY BY THE PROJECT ENGINEER.
- UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.

28 MPa [4000 P.S.I.] MINIMUM, P.C. CONCRETE PAD AND ANCHOR BLOCK. 2324 kg/m<sup>3</sup> [145 Lbs/CU. FT.]

REFERENCES

DRAWN: D. Staus	DATE: 5/15/96
DESIGNED: WGK	DATE: 3/1/96
CHECKED: S. Trageser	DATE: 5/20/96
APPROVED: W. G. Krage	DATE: 5/20/96
CAD FILE: 354011.DWG	
NEXT ASSEMBLY:	

**ENERGY ABSORPTION SYSTEMS, INC.**  
ENGINEERING AND RESEARCH DEPARTMENT

**QUADGUARD® SYSTEM**  
OPTIONAL 8" CONCRETE PAD  
FOR TENSION STRUT BACKUP

SCALE: NTS    DWG: 35-40-11    SHEET: 2 of 2    REV: E

Revisions	Date	Rev.	By	Ckd.	App.
ADDED 8" PAD OPTION	12/03/03	E	RCC	STT	ACF

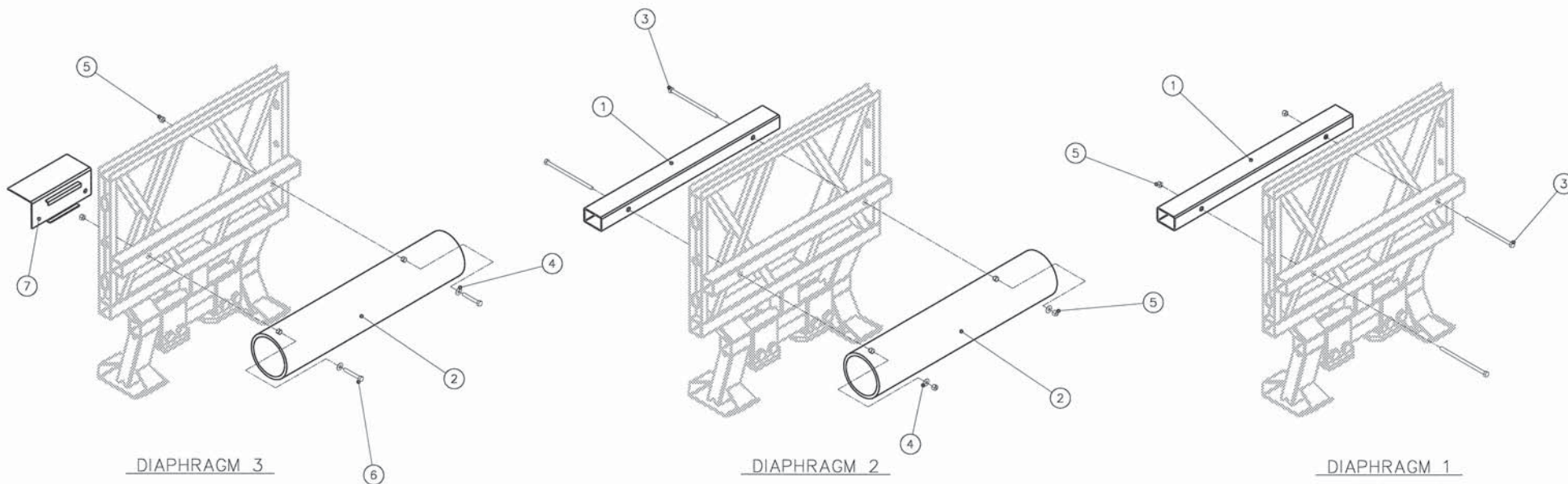
NEXT ASSEMBLY:  
QH2409, QH3009  
& QH3609

MATERIAL:  
SEE PARTS LIST

TOL ANGULAR:  $\pm 1'$   
TOL LINEAR:  $\pm 1/16"$   
UNLESS OTHERWISE NOTED.

PARTS LIST

ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	SEE TABLE	SPACER,DIAPHRAGM,QG HIGH SPEED,G	2.00
2	SEE TABLE	BUMPER,HDPE,QUADGUARD HIGH SPEED	2.00
3	2700012-0000	BOLT,HX,1/2X8,G5,G,ALL THREAD	4.00
4	2708011-0000	WASHER,FLAT,1/2X1 3/8,G	4.00
5	2704011-0000	NUT,HX,1/2,G	6.00
6	2701361-0000	BOLT,HX,1/2X3,G2,G	2.00
7	2760292-0000	BRACKET,CARTRIDGE SUPT,DIA,QG,G	1.00




TABLE

SYSTEM WIDTH	ASSY NO.	ITEM 1 PART NO.	ITEM 2 PART NO.
24"	3540621-0000	2760017-0000	2021042-0000
30"	3540622-0000	2760028-0000	2021043-0000
36"	3540623-0000	2760000-0000	2021044-0000

ASSEMBLY NO. - SEE TABLE

DRAWN: D. Webber	DATE: 7/26/01
DESIGNED: B. Eckert	DATE: 3/6/01
CHECKED: JME	DATE: 10/12/01
APPROVED: Bret Eckert	DATE: 10/12/01
D.C. S. Trageser	DATE: 10/12/01
CAD FILE: 354062.dwg	

 ENERGY ABSORPTION SYSTEMS, INC.  
ENGINEERING AND RESEARCH DEPARTMENT

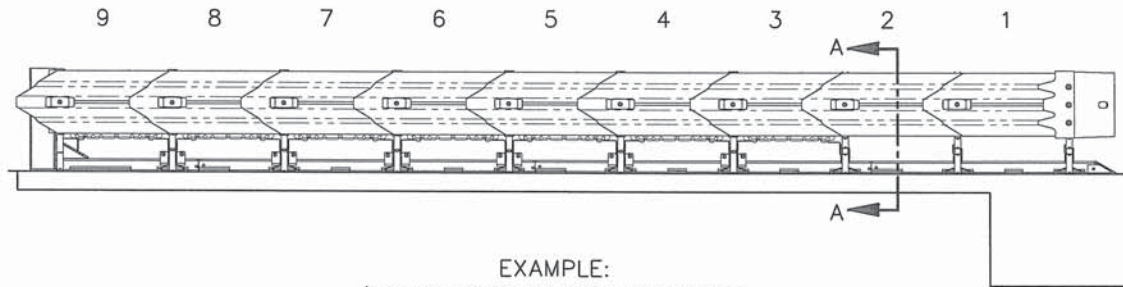
**QUADGUARD SYSTEM**

**BUMPER ASSY,QG HIGH SPEED**

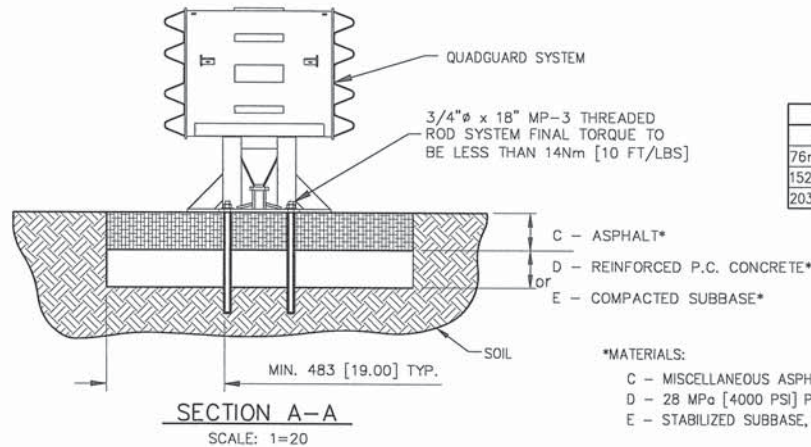
SCALE: 1 = 4    DWG: 35-40-62    SHEET: 1 of 1    REV:

PARTS LIST												
ITEM	STOCK NO.	DESCRIPTION	REQ'D									
			BAYS →			3	4	5	6	7	8	9*
1	2700731-0500	ROD, THREADED, 3/4x18, G5, G	32	38	46	52	58	66	72			
2	2704341-0000	NUT, HX, 3/4, G, GR DH	32	38	46	52	58	66	72			
3	2708081-0000	WASHER, FLAT, 3/4x2, HVY, G	32	38	46	52	58	66	72			
4	3525100-0000	MP-3, QUART PACKAGE	8	10	12	13	15	17	18			

\*AVAILABLE FOR QUADGUARD HIGH SPEED SYSTEM AS WELL AS QUADGUARD SYSTEM.



EXAMPLE:  
(9 BAY QUADGUARD HIGH SPEED SYSTEM SHOWN)



DEPTH COMBINATION			
"C"	"D"	"E"	REQ'D STUD LENGTH
--	152mm [6"]	--	180mm [7"]
76mm [3"]	76mm [3"]	--	460mm [18"]
152mm [6"]	--	152mm [6"]	460mm [18"]
203mm [8"]	--	--	460mm [18"]

\*MATERIALS:  
C - MISCELLANEOUS ASPHALTIC CONCRETE  
D - 28 MPa [4000 PSI] P. C. CONCRETE  
E - STABILIZED SUBBASE, PREPARED & COMPACTED

REFER TO QUADGUARD CZ ANCHORING SYSTEM INSTALLATION & SAFETY INSTRUCTIONS FOR FURTHER INFORMATION

NOTE:

- ANCHOR SYSTEM FOR PROPER IMPACT PERFORMANCE. Use MP-3® polyester anchor system, supplied by Energy Absorption Systems, or approved equal. QuadGuard Systems installed temporarily on asphalt must be inspected to ensure the anchors are still properly set following each impact. Re-anchor as necessary. See Post-Impact Instructions in Maintenance and Repair Section of Installation Manual.

DRAWN: T. Busse DESIGNED: CHECKED: APPROVED: DATE: 8/17/05 8/17/05 8-15-05 CAT FILE: 3540003-0000.dwg	DATE: 8/12/05 DATE: DATE: DATE: DATE: SCALE: 1=40	ENERGY ABSORPTION SYSTEMS, INC. ENGINEERING AND RESEARCH DEPARTMENT <b>TEMPORARY ANCHOR</b> <b>QuadGuard® SYSTEM</b> <b>(3-9 BAYS)</b> <b>QuadGuard® HIGH SPEED SYSTEM (9 BAY)</b> SCALE: 1=40 DWG: 3540003-0000 SHEET: 1 of 1 REV:
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