

# QuadGuard® II

## CRASH CUSHION

### PRODUCT DESCRIPTION MANUAL



# QuadGuard® II

The QuadGuard® II has been tested pursuant to National Cooperative Highway Research Program (“NCHRP Report 350”) specifications. The QuadGuard® II has been deemed eligible for federal-aid reimbursement on the National Highway System by the Federal Highway Administration (“FHWA”).

## Product Description Manual



15601 Dallas Parkway  
Suite 525  
Addison, Texas, 75001



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

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 QuadGuard® II information available to Valtir at the time of printing. We reserve the right to make changes at any time. Please contact Valtir to confirm that you are referring to the most current instructions.

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## **Customer Service Contacts**

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

### **Valtir**

Telephone	(888) 323-6374 (USA) +1 312 467 6750 (International)
E-mail	<a href="mailto:Valtir.com/Contact">Valtir.com/Contact</a>
Website	<a href="http://Valtir.com">Valtir.com</a>

## **Limitations and Warnings**

Valtir contracts with FHWA approved testing facilities to perform crash tests, evaluate test results, and submit results to the FHWA for review.

The QuadGuard® II has been deemed eligible for reimbursement by FHWA as meeting the requirements and guidelines of NCHRP Report 350. NCHRP Report 350 tests are designed to evaluate product performance involving a range of vehicles on roadways, from lightweight cars (approx. 1800 lb. [820 kg]) to full size pickup trucks (approx. 4400 lb. [2000 kg]). A product can be certified for multiple Test Levels. The QuadGuard® II is certified to the Test Level(s) as shown below:

**Test Level 2: 43 mph [70 km/h]]**

**Test Level 3: 62 mph [100 km/h]**

**These FHWA directed tests are not intended to represent the performance of systems when impacted by every vehicle type or every impact condition existing on the roadway. This system is tested only to the test matrix criteria of NCHRP Report 350 as approved by FHWA.**

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

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

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



## **System Overview**

The QuadGuard® II is a potentially reusable, re-directive, non-gating crash cushion for roadside obstacles ranging in width from 24" to 126" [610 mm to 3200 mm]. It consists of energy-absorbing cartridges surrounded by a framework of Quad-Beam Panels. The decision as to whether this product is reusable after impact rests solely within the sound discretion of the trained engineer, experienced in highway products, who is working at the direction of the local DOT, or appropriate highway authority, which specified and now owns the product.

The QuadGuard® II utilizes two types of cartridges in a staged configuration designed to address both lighter cars and heavier, high center-of-gravity vehicles. Its modular design allows the system length to be tailored to the design speed and appropriate number of Bays for a site (p. 10).

### **Impact Performance**

The 5 Bay QuadGuard® II has successfully passed the requirements outlined in NCHRP Report 350, Test Level 3 tests with both the light car and pickup at speeds of up to 62 mph [100 km/h] at angles up to 20 degrees.

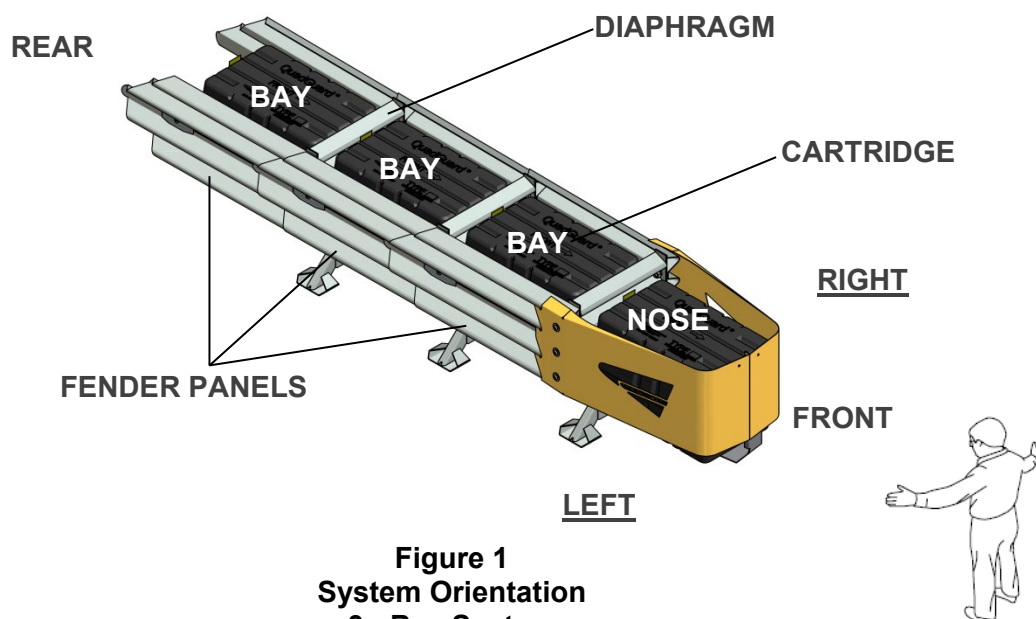
During head-on impact testing, within NCHRP Report 350 criteria, the QuadGuard® II is designed to telescope rearward to absorb the energy of impact. When impacted from the side, within the applicable NCHRP Report 350 criteria, it is designed to redirect the vehicle back toward its original travel path and away from the roadside obstacle.

### **How to Determine Left/Right**

To determine left from right when ordering parts, stand in front of the system facing the roadside feature. Your left is the system's left and your right is the system's right.

### **Counting the Number of Bays**

One Bay consists of one Cartridge, one Diaphragm, two Fender Panels, etc. The Nose section is not considered a Bay, though there is a Cartridge in the Nose of each system. Note that this means there will always be one more Cartridge in the system than the number of Bays in the system. To determine number of Bays, count Fender Panels on one side (Figure 1).



**Figure 1**  
**System Orientation**  
**3 - Bay System**

## Measuring the Width

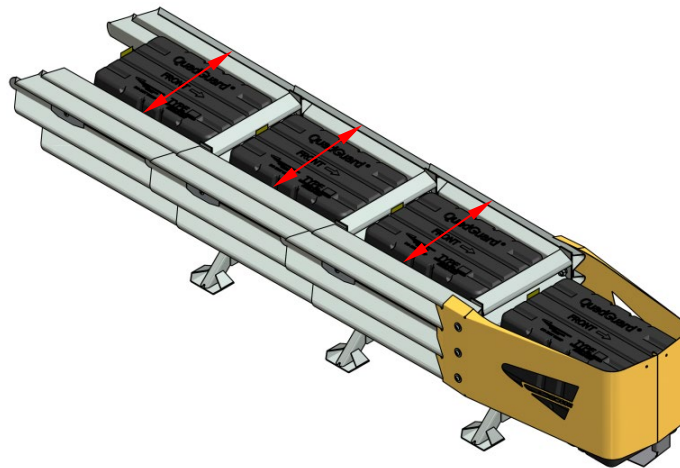
The QuadGuard® II is available in seven (7) nominal widths:

- 24" [610 mm]
- 30" [760 mm]
- 36" [915 mm]
- 48" [1219 mm]
- 69" [1755 mm] - (Minimum 3 Bays Required)
- 90" [2285 mm] - (Minimum 3 Bays Required)
- 126" [3200 mm] - (Minimum 6 Bays Required)

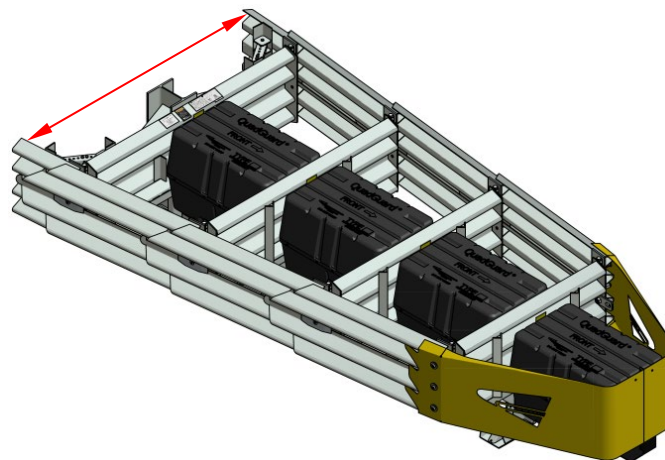
The nominal width of a parallel system is the width of the diaphragm (Figure 2).

The nominal width of a wide system is the width at the location shown in Figure 3.

The outside width of the system is approximately 6" [150 mm] to 9" [230 mm] wider than the nominal width. The width of the system is not the same as the width of the Backup.



**Figure 2**  
**Width of Narrow system**



**Figure 3**  
**Width of Wide system**

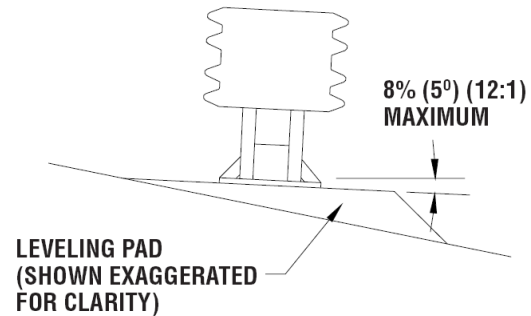
## **Valtir Approved Adhesive Anchoring System**

A Valtir approved adhesive anchoring system is required to securely anchor crash cushions. Each approved adhesive kit contains adhesive, studs, nuts, washers and instructions. Both vertical and horizontal assemblies are possible using an approved adhesive anchoring system.

### **Site Conditions**

**Cross-slope exists** – If there is a cross-slope of more than 8% (5 degrees), or if the cross-slope varies (twists) more than 2% (1 degree) over the length of the system, a concrete leveling pad may be required (Figure 4).

**No cross-slope** – No additional action is required.



**Figure 4  
Cross-Slope**

#### **1) Specify Backup Structure**

The two Backup designs available are the Tension Strut Backup and the Concrete Backup. Both types are appropriate for use on grade or deck.

#### **2) Special Conditions**

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

- 1. Are curbs, islands or elevated objects (delineators or signs) present at the site? What height and width are they?** All curbs and elevated objects over 4" [100 mm] high should be removed. If possible, curbs taller than 4" [100 mm] high should be removed approximately 50' [15 m] in front of the QuadGuard® II and as far back as the system's Backup. Any curbs that must remain should be 4" [100 mm] maximum and be mountable.
- 2. What is the angle of divergence** if the construction site is a gore area?

**What is the general geometry of the site**, including the roadway for at least 500' [150 m] in front, so traffic patterns can be visualized?

- 3. Is there an existing barrier?** Where there is an existing guardrail or median barrier at the site, the Backup of the QuadGuard® II should tie into it when possible.
- 4. 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 interaction (pp. 12 & 13).
- 5. Are there any other unique features at the site that may affect positioning or performance of the QuadGuard® II?**

### 3) Other Factors that May Affect Your Deployment:

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

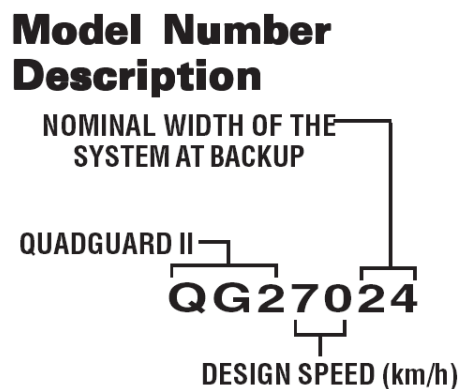
If these or any other special site conditions exist, please contact Valtir Customer Service Department before proceeding with your design (p. 3).



**Important:** It is the responsibility of the appropriate highway authority to select the location for the QuadGuard II in accordance with the Roadside Design Guide. Valtir is not responsible for choosing the location where a system will be placed.

Impact conditions which differ from those described in the NCHRP Report 350 test matrix for non-gating, redirecting crash cushions may result in different crash results than those encountered in testing.

Furthermore, impacts in excess of TL-3 impact severity, or the existence (at the site of assembly) of curbs or cross-slopes in excess of 8%, may yield performance which does not meet NCHRP Report 350 evaluation criteria relative to structural adequacy, occupant risk and vehicle trajectory factors.



**Figure 5  
Model Number Key**

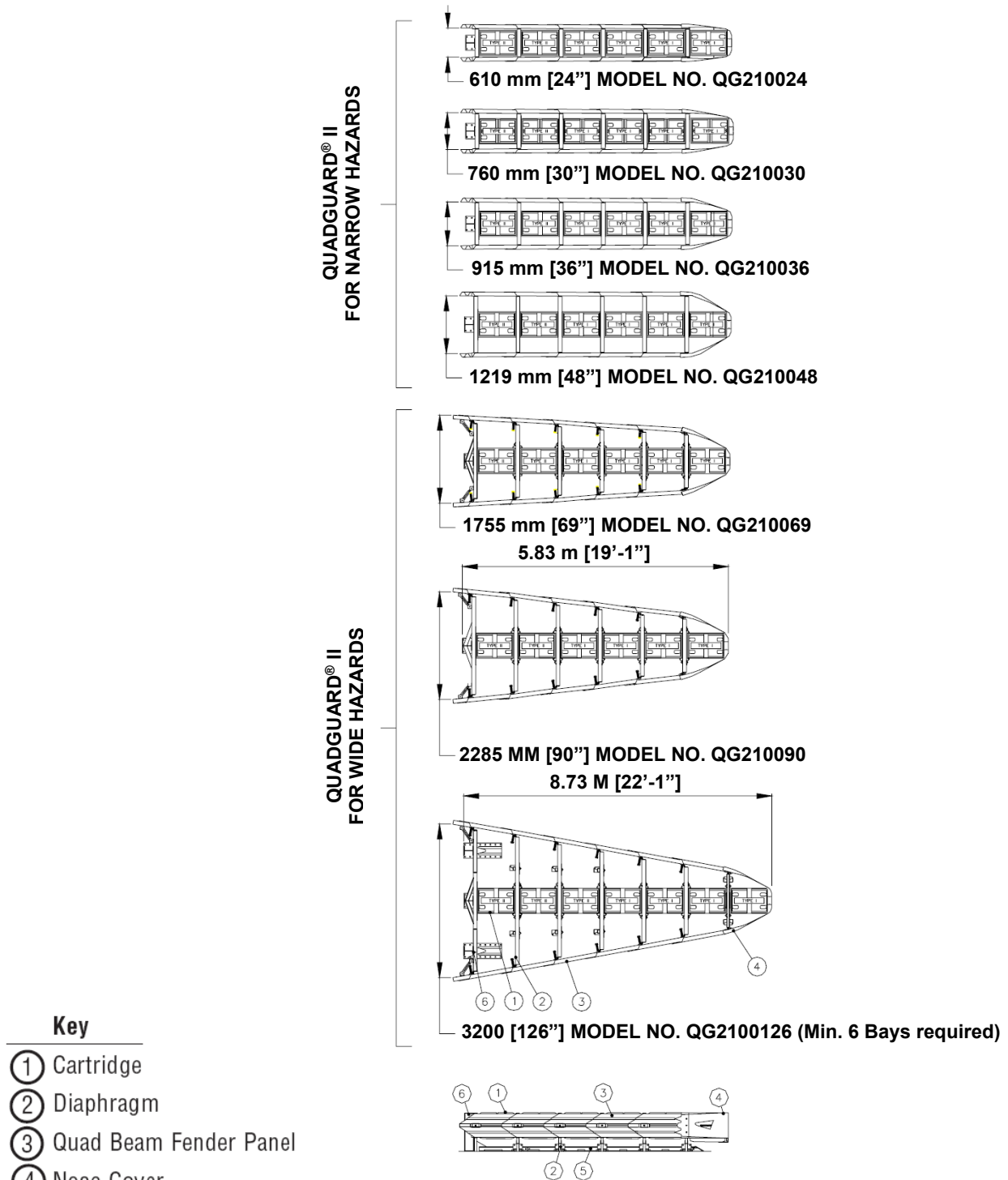
These following charts represent the modified versions of the QG II length relative to impact speed, which is based on the capacity of the system using a 2000 kg [4400 lb.] pickup truck.

Speed & Cartridge Placement Chart For Narrow Systems				
# of Bays	Model #	kph [mph]	Type I	Type II
1*	QG 240__	40 [25]	2	0
2	QG 270__	70 [44]	2	1
3*	QG 280__	80 [50]	2	2
4*	QG 290__	90 [56]	3	2
5	QG 2100__	100 [62]	3	3
6*	QG 2105__	105 [65]	4	3
7*	QG 2110__	110 [68]	4	4
8*	QG 2115__	115 [71]	4	5
9*	QG 2120__	120 [75]	4	6

Speed & Cartridge Placement Chart For Wide Systems				
# of Bays	Model #	kph [mph]	Type I	Type II
3*	QG 270__	70 [44]	2	2
4*	QG 280__	80 [50]	3	2
5*	QG 2100__	100 [62]	3	3
6*	QG 2105__	105 [65]	4	3
7*	QG 2110__	110 [68]	4	4
8*	QG 2115__	115 [71]	4	5
9*	QG 2120__	120 [75]	4	6

\*System capacity estimated through calculation.





**Figure 6  
Plan & Elevation  
5 - Bay system with Tension Strut Backup**

## **Transitioning**

### **Quad-Beam™ End Shoe Transition Panel**

The Quad-Beam™ End Shoe Panel transitions the QuadGuard® II system to vertical faced concrete structures whether it is a concrete Backup or concrete barrier wall (p. 13). An Extended End Shoe is also available. In cases where the corners of the hazard are not chamfered, it may be necessary to add wheel deflectors to the structure in order to prevent wheel interaction.

### **Quad-Beam™ to Guardrail Transition Panel (W-Beam and Thrie-Beam)**

The Quad-Beam™ to W-Beam and Quad-Beam™ to Thrie-Beam Transition Panels transition the QuadGuard® II system to new and existing runs of standard guardrail (p. 13).

### **Quad-Beam™ to Safety Barrier Transition Panel**

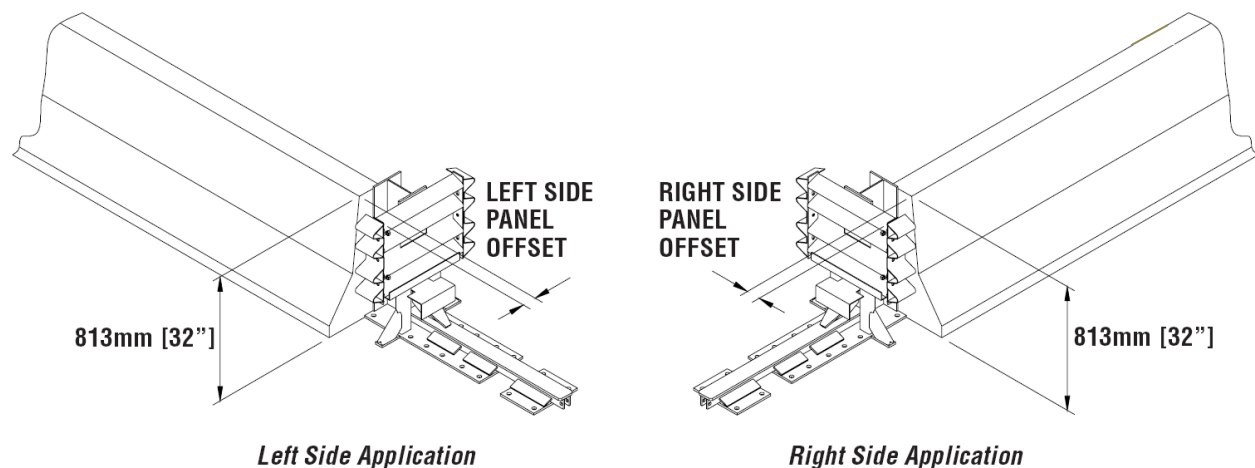
There are several options available when transitioning the QuadGuard® II system to safety shape barrier depending on the shape and position of the barrier.

When transitioning to barriers with a “New Jersey” style profile, the 4” offset Transition Panel is most commonly used (p. 13). For transitioning to barriers that are in line with the side of the system, use transition assembly 616041B or 616044B. For transitioning a wide system to barrier that runs parallel to the centerline of the system, transition assembly 616048B or 616049B is used. A 9” offset Transition Panel is also available for transitioning to barriers that are in line with the side of the system.

When transitioning the Single Slope style barriers and parapets, 6” and 8” offset Transition Panels are available. For transitioning a wide system to barrier that runs parallel to the centerline of the system, a 6” offset panel is available.

### **How do you determine the Transition Panel offset?**

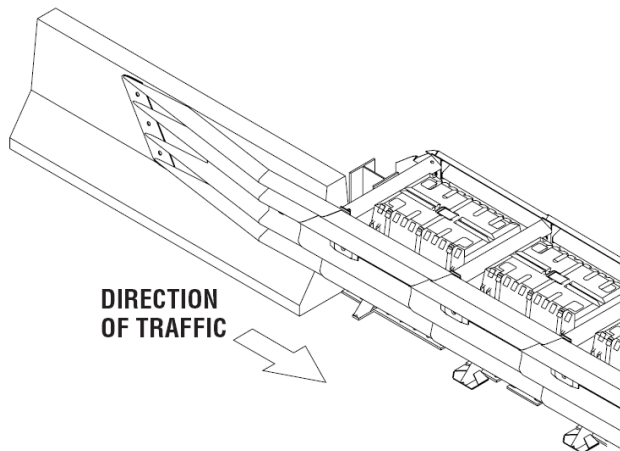
Transition Panel offset is determined by measuring the distance between the face of the barrier and the top edge of the Backup Diaphragm at 32” above ground level (Figure 7). Remember, when assembling the QuadGuard® II that the correct Transition Panel offset must be achieved in order for the offset bracket to nest between the barrier and Transition Panel ensuring proper performance of the transition.



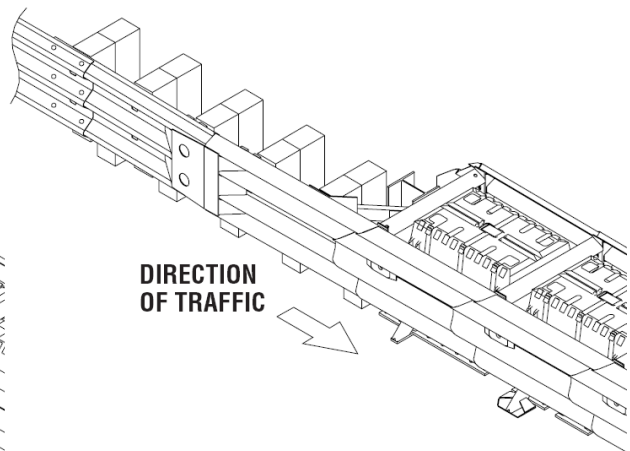
**Figure 7  
Transition Panel Offset**

## **Transition Panel Types**

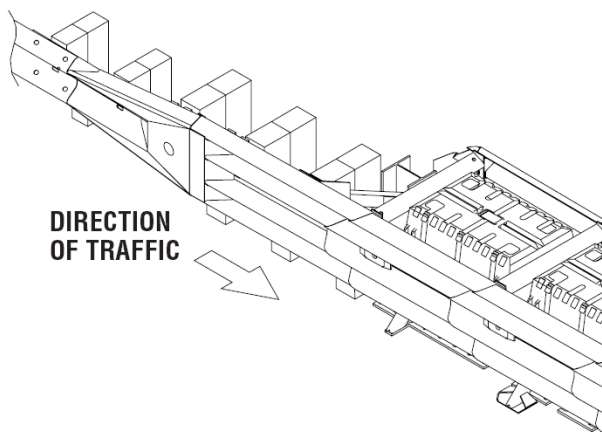
If a system is placed in a location where traffic will be approaching from the rear, a Transition Panel is necessary. Standard panel types are illustrated below and there are variations for each panel type. The specific panel applied will depend on system and site conditions. Therefore, it is important to send site specific data to the Valtir Customer Service Department for exact panel requirements of your application.



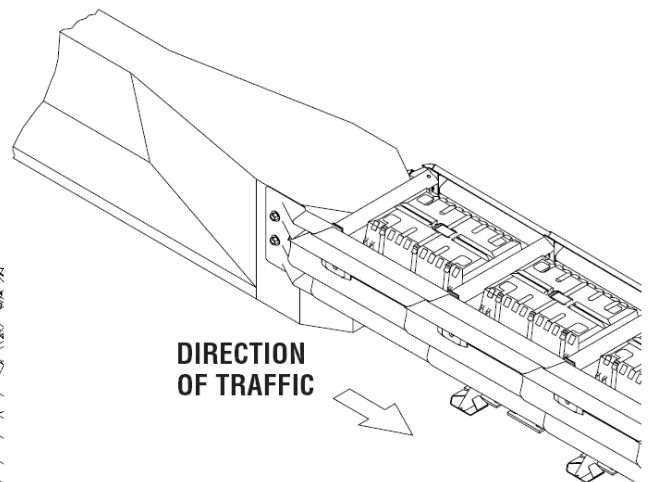
**Figure 8**  
**Quad-Beam™ to Safety Barrier**  
**(NJ shape) Transition Panel**



**Figure 9**  
**Quad-Beam™ to Thrie-Beam**  
**Transition Panel**



**Figure 10**  
**Quad-Beam™ to W-Beam**  
**Transition Panel**



**Figure 11**  
**Quad-Beam™ End Shoe**  
**Transition Panel**

## QuadGuard® II CZ Deployment Criteria

This portable compact crash cushion is for construction zones. The QuadGuard® II CZ is available in the same narrow sizes as permanent systems.

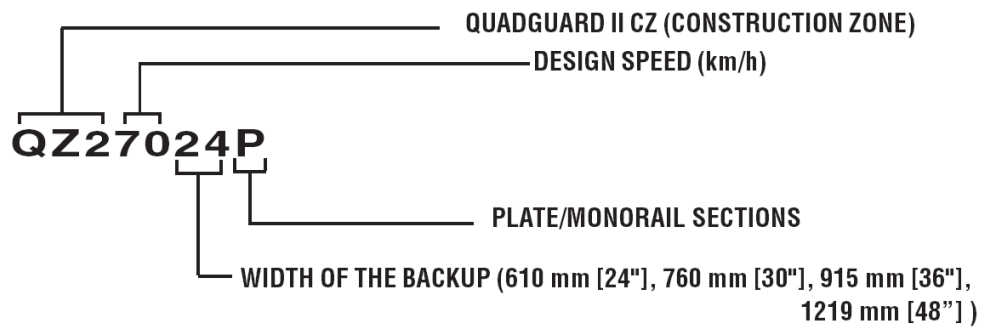
The QuadGuard® II CZ must be properly anchored.



**Important:** QuadGuard® II wide systems should not be anchored to asphalt.

QuadGuard® II CZ Plate Model Numbers and Widths			
Number of Bays	610 mm [24"]	760 mm [30"]	915 mm [36"]
2	QZ27024P	QZ27030P	QZ27036P
5	QZ210024P	QZ210030P	QZ210036P

### Model Number Description



**Figure 12**  
**Model Number Key**

## **Foundation/Anchoring**



**Warning:** It is the responsibility of the installer that this assembly conforms with the guidance provided by the AASHTO Roadside Design Guide, including, but not limited to, those regarding placement on or adjacent to curbs.

### **Asphalt Installations**

Systems with a Tension-Strut Backup may be temporarily installed in construction zones on asphalt. Assemblies on **Asphalt Concrete (“A.C.”)** must provide a minimum of 76 mm [3”] layer of asphalt over a minimum of 76 mm [3”] layer of **Portland Cement Concrete (“P.C.C.”)**, 152 mm [6”] layer of asphalt over 152 mm [6”] layer of subbase, or 203 mm [8”] layer of asphalt with no subbase.



**Important:** Only 460 mm [18”] threaded rods, utilizing Valtir approved adhesive, can be used with **asphalt** foundations. Contact Valtir for a complete list of approved adhesives (p. 3).

### **Concrete Installations**

For concrete installations, the QuadGuard® II 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.

The QuadGuard® II may be installed on any of the following foundations using the specified anchorage:

#### **Foundation A: Reinforced Concrete Pad or Roadway**

Foundation: 150 mm [6”] minimum depth P.C.C.

Anchorage: Approved adhesive 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 460 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: Approved adhesive with 460 mm [18”] studs 420 mm [16 1/2”] embedment

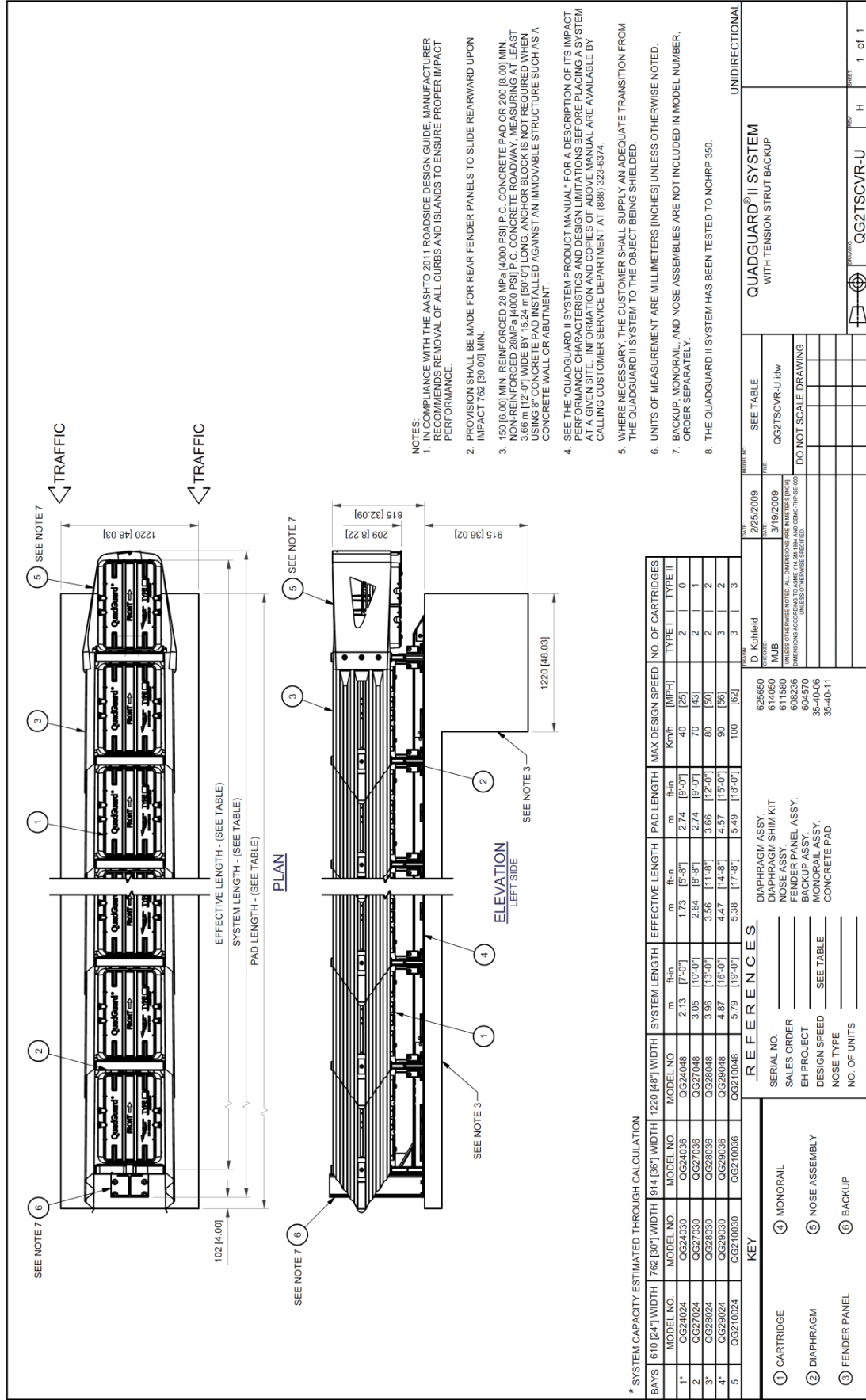
#### **Foundation D: Asphalt Only**

Foundation: 200 mm [8”] minimum A.C.

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

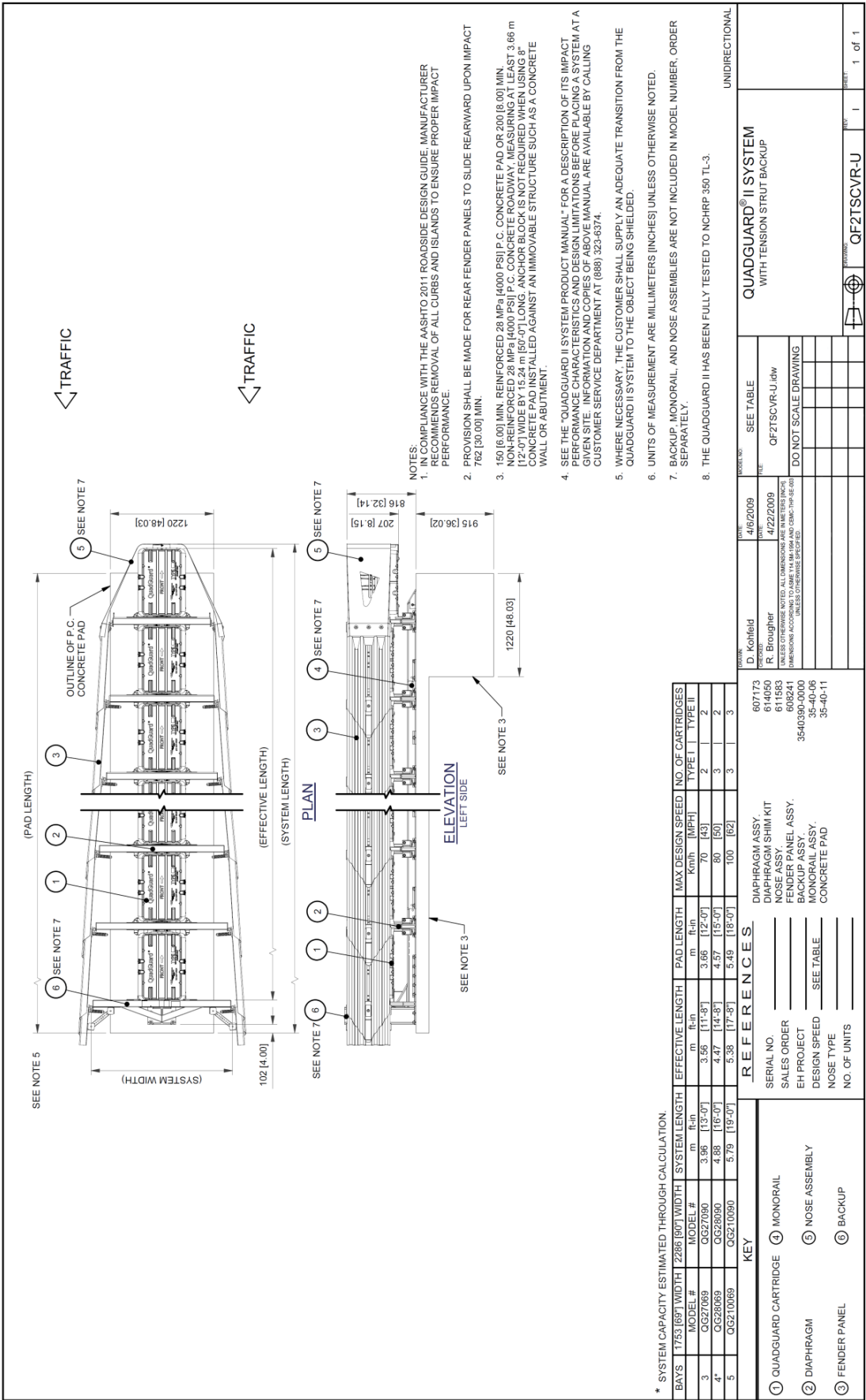


# QG2TSCVR-U

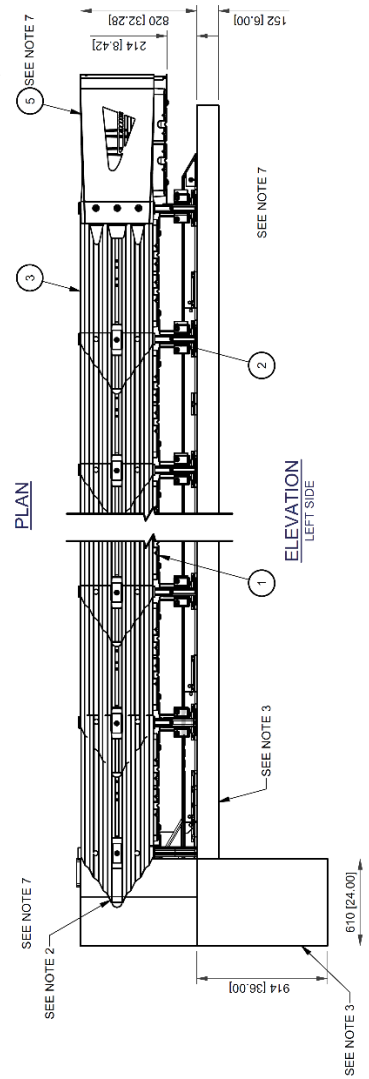


## QuadGuard® II w/Tension Strut Backup

QF2TSCVR-U



QuadGuard® II w/Tension Strut Backup Wide

[illegible]

152 (6.00)

QUADGUARD II

CONCRETE

NOTES:

1. IN COMPLIANCE WITH THE AASHTO 2011 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS TO ENSURE PROPER IMPACT PERFORMANCE.
2. PROVISION SHALL BE MADE FOR REAR FENDER PANELS TO SLIDE REARWARD UPON IMPACT 762 (30.00) MIN.
3. 150 (6.00) MIN. REINFORCED MPa/14000 PSI P.C. CONCRETE PAD OR 200 (8.00) MIN. NON-REINFORCED MPa/14000 PSI P.C. CONCRETE ROADWAY. MEASURING AT LEAST 3.66 m [12'-0"] WIDE BY 15.24 m [50'-0"] LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE SUCH AS A CONCRETE WALL OR ABUTMENT.
4. SEE THE "QUADGUARD II SYSTEM PRODUCT MANUAL" FOR A DESCRIPTION OF ITS IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS BEFORE PLACING A SYSTEM AT A PROJECT LOCATION. THE PRODUCT MANUAL ARE AVAILABLE BY CALLING CUSTOMER SERVICE DEPARTMENT AT (888) 323-6374.
5. WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY AN ADEQUATE TRANSITION FROM THE QUADGUARD II SYSTEM TO THE OBJECT BEING SHIELDED.
6. UNITS OF MEASUREMENT ARE MILLIMETERS (INCHES) UNLESS OTHERWISE NOTED.
7. BACKUP, MONORAIL, AND NOSE ASSEMBLIES ARE NOT INCLUDED IN MODEL NUMBER, ORDER SEPARATELY.
8. THE QUADGUARD II HAS BEEN FULLY TESTED TO NCHRP 350.

[illegible]

**PLAN**

**ELEVATION LEFT SIDE**

**\* SYSTEM CAPACITY ESTIMATED THROUGH CALCULATION**

BAYS	1753 [69"] WIDTH	2236 [90"] WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	PAD LENGTH	MAX DESIGN SPEED	NO. OF CARTRIDGES
	MODEL #	MODEL #	m	ft-in	m	Km/h [MPH]	TYPE I   TYPE II
3	QG27069	QG27080	4.34 [14'-3"]	3.56 [11'-8"]	3.51 [11'-6"]	70 [43]	2   2
4*	QG28069	QG28080	5.26 [17'-3"]	4.47 [14'-8"]	4.42 [14'-6"]	80 [50]	3   2
5	QG210069	QG210090	6.17 [20'-3"]	5.38 [17'-8"]	5.33 [17'-6"]	100 [62]	3   3

**NOTES:**

- IN COMPLIANCE WITH THE AASHTO 2011 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS TO ENSURE PROPER IMPACT PERFORMANCE.
- PROVISION SHALL BE MADE FOR REAR FENDER PANELS TO SLIDE REARWARD UPON IMPACT 762 [30.00] MIN.
- 150 [6.00] MIN. REINFORCED 28 MPa [4000 PSI] P.C. CONCRETE PAD OR 200 [8.00] MIN. NON-REINFORCED 28MPa [4000 PSI] P.C. CONCRETE ROADWAY, MEASURING AT LEAST 3.66 m [12'-0"] WIDE BY 15.24 m [50'-0"] LONG. ANCHOR BOLTS ARE NOT REQUIRED WHEN USING CONCRETE PAD INSTALLED AGAINST AN IMMovable STRUCTURE SUCH AS A RETAINING WALL.
- SEE THE "QUADGUARD II SYSTEM PRODUCT MANUAL" FOR A DESCRIPTION OF ITS IMPACT PERFORMANCE CHARACTERISTICS AND SYSTEM 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.
- WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY AN ADEQUATE TRANSITION FROM THE QUADGUARD II SYSTEM TO THE OBJECT BEING SHIELDED.
- UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN METERS [INCHES].
- BACKUP, MONORAIL, AND NOSE ASSEMBLIES ARE NOT INCLUDED IN MODEL NUMBER, ORDER SEPARATELY.
- THE QUADGUARD II FAMILY HAS BEEN FULLY TESTED TO NCHRP 350.

**REFERENCES**

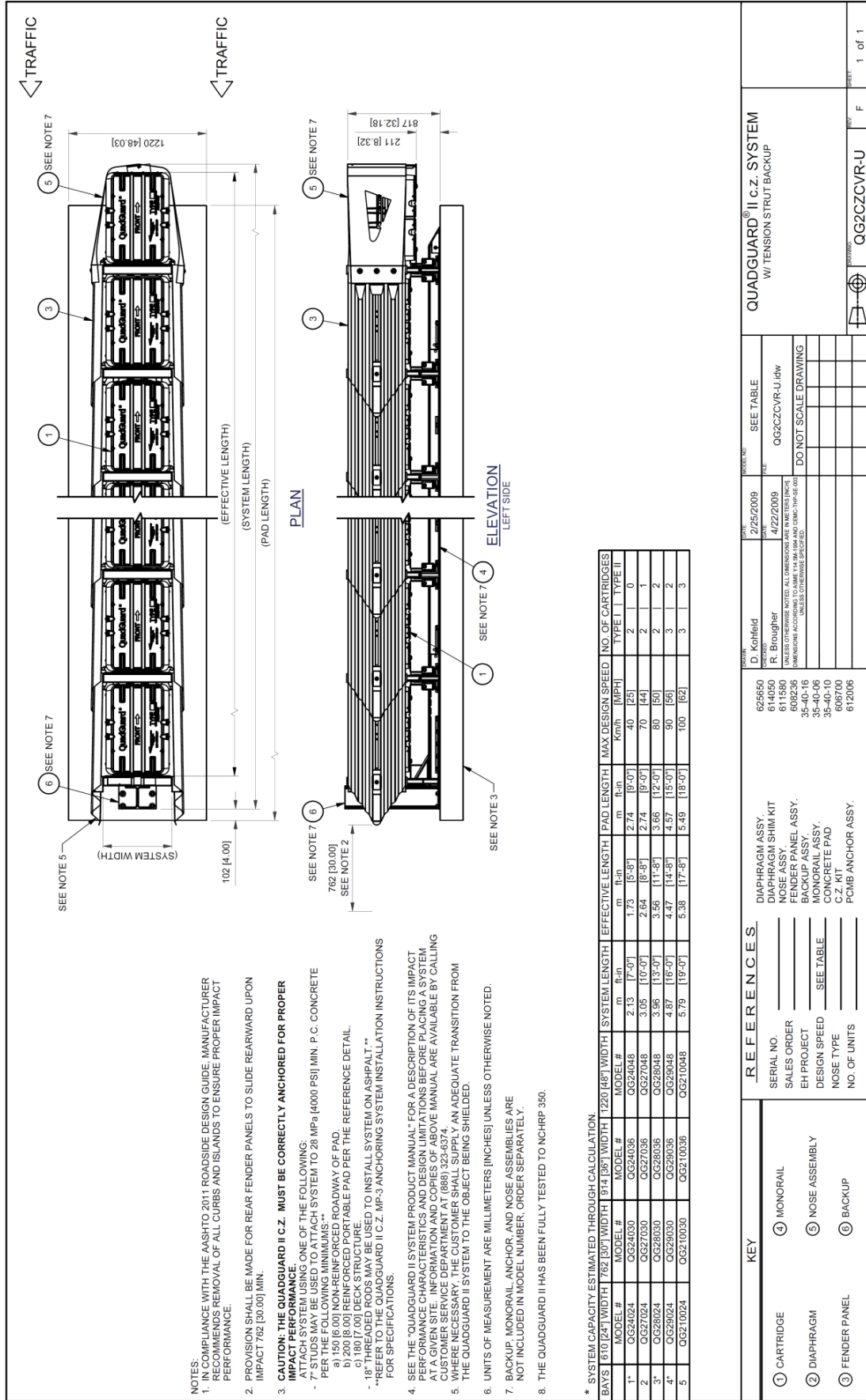
KEY	REFERENCES
① QUADGUARD CARTRIDGE	DIAPHRAGM ASSY.
② DIAPHRAGM	NOSE ASSEMBLY
③ FENDER PANEL	BACKUP
	MONORAIL
	NOSE TYPE
	NO. OF UNITS

**QUADGUARD® II SYSTEM**  
WITH CONCRETE BACKUP

**QF20BCVR-U**

**UNIDIRECTIONAL**

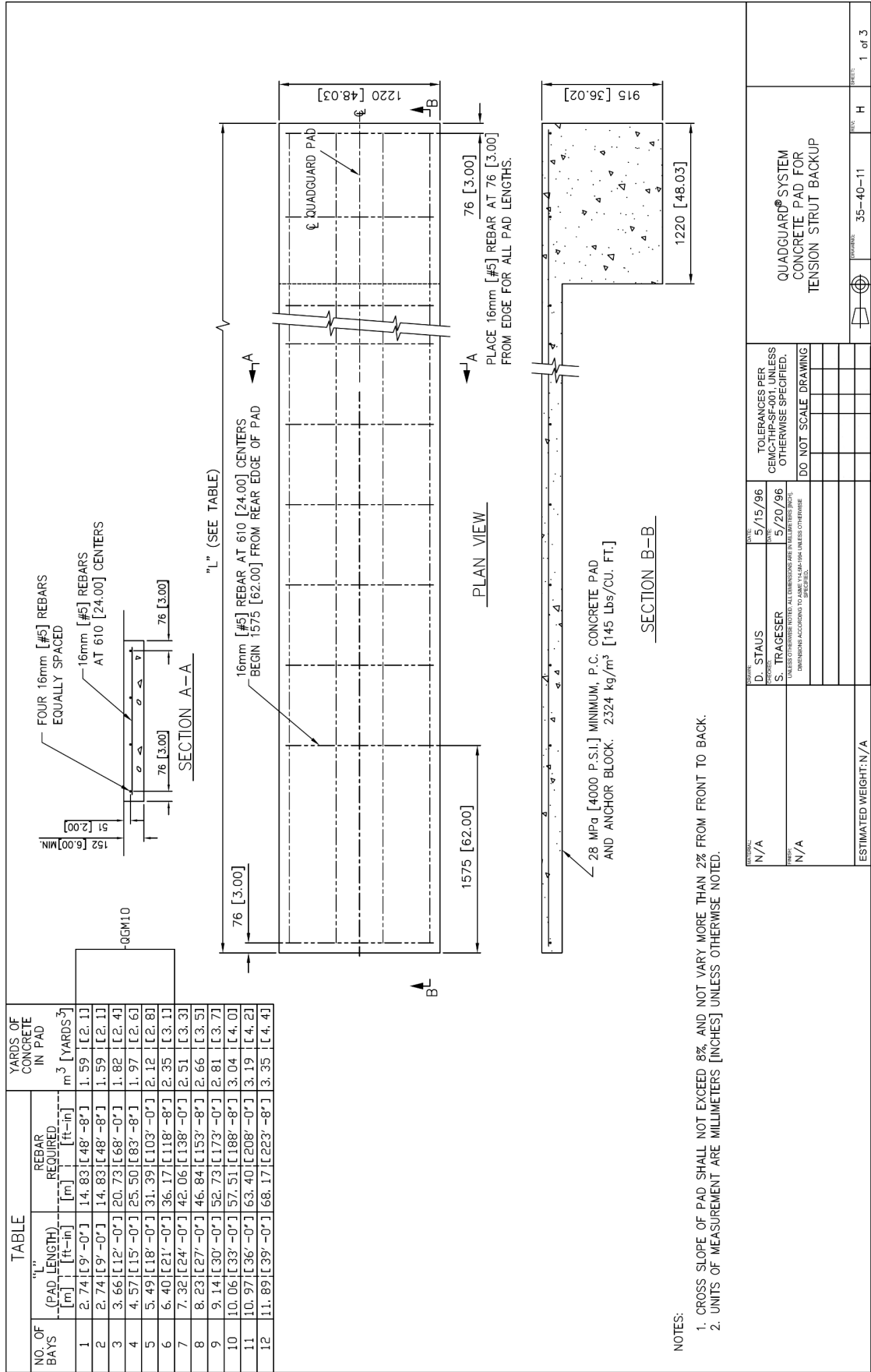
## QG2CZCVR-U



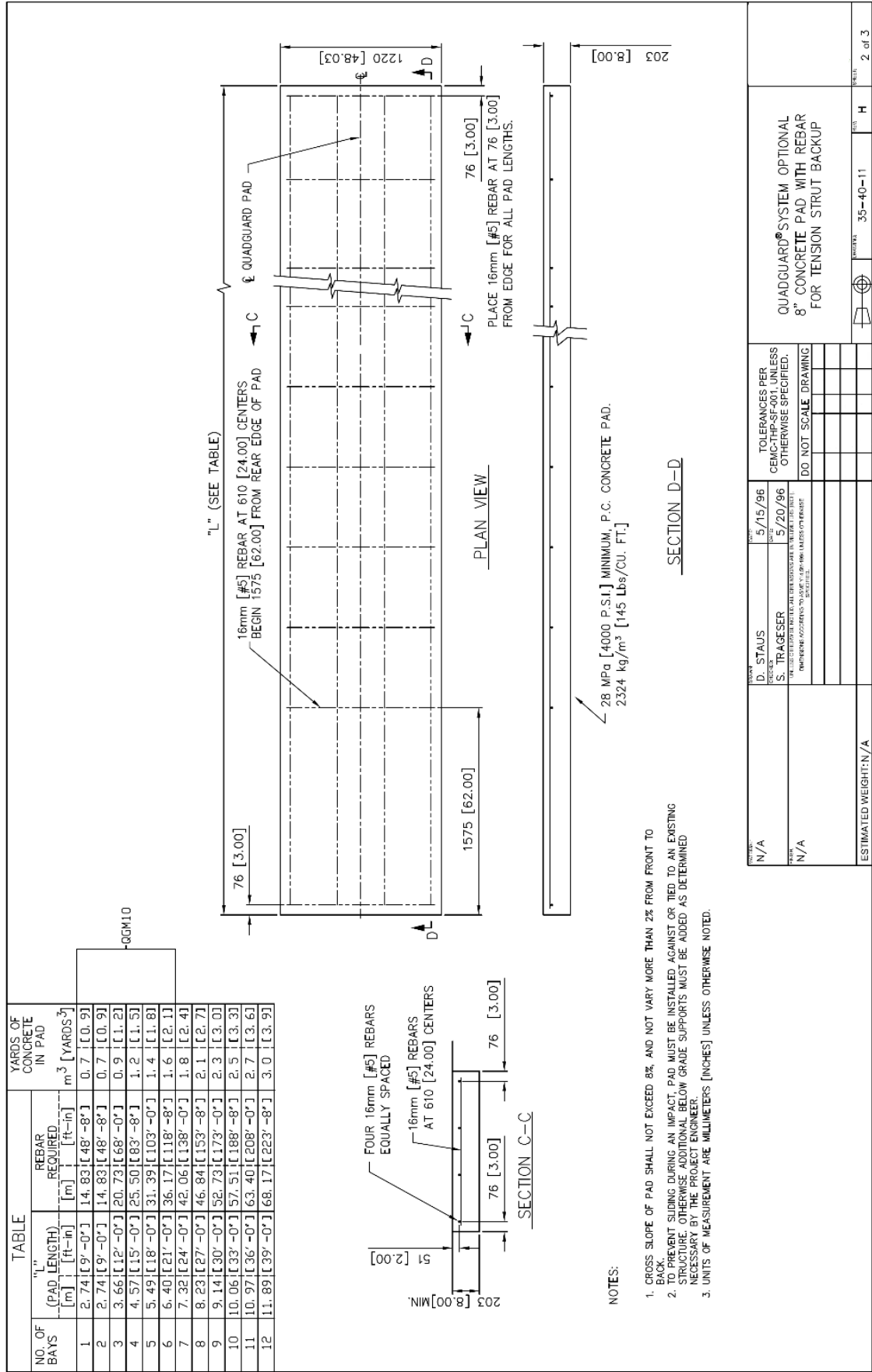
## QuadGuard® II Construction Zone System



35-40-11 - 1 of 3

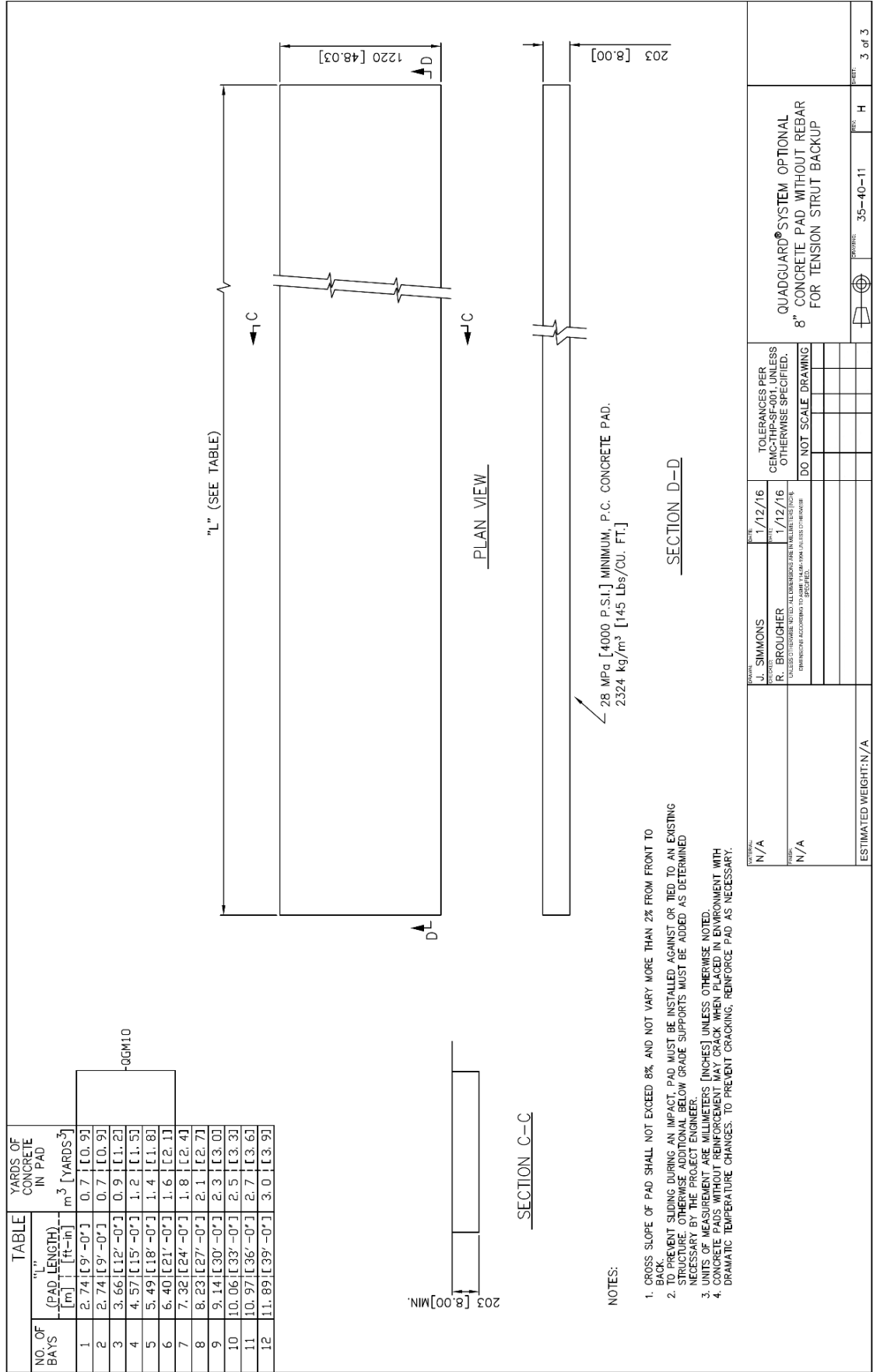


35-40-11 - 2 of 3



Optional 8" Concrete Pad for Tension Strut Backup

35-40-11 – 3 of 3



Optional 8" Concrete Pad Without Rebar for Tension Strut Backup

604570

Exploded view diagram of the Backup Assembly, Tension Strut, QG. The diagram shows various components labeled with circled numbers 1 through 12. Callouts include 'SEE NOTE 1', 'SEE NOTE 2', and 'SEE NOTE 1'. The assembly consists of a main frame, tension struts, and various fasteners and brackets.

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	BACKUP.TS.WIDTH.QG.WITH DECALS	1
2	611898	PANEL SIDE QG	2
9	619316	ANCHOR KIT.HLT.3/4X7(.4)	5
10	003340	NUT.HX.5/8.G.RAIL	4
11	003400	BOLT.RAIL.5/8X2.G	4
12	605447	BRACKET.CARTRIDGE SUPT.TS.BU.QG	1
13	611266	LOCKING BAR.CARTRIDGE SUPT.QG	1

ASSY. NO.	STOCK NO.	DESCRIPTION	WIDTH
604570	604741	BACKUP.TS.24.QG.WITH DECALS.G	610 [24.00]
604574	604748	BACKUP.TS.30.QG.WITH DECALS.G	760 [30.00]
604584	604762	BACKUP.TS.36.QG.WITH DECALS.G	915 [36.00]
604590	604770	BACKUP.TS.48.QG.WITH DECALS	1219 [48.00]

NOTE:  
1. WHEN TRANSITIONING QUADGUARD SYSTEM TO EXISTING BARRIER, REFER TO THE EXISTING BARRIER'S ASSEMBLY DRAWINGS FOR PROPER USE OF SIDE PANEL. PART NO. 811898.  
2. ITEM 1 SHOWN IS 604570 (24"). ASSEMBLY 604574 (30") WILL NOT HAVE HOLES IN THE QUADBEAM PANEL AND HAS CARTRIDGE SUPPORT BRACKETS. ASSEMBLIES 604584 (36") AND 604590 (48") HAVE HOLES IN THE QUADBEAM PANEL, CARTRIDGE SUPPORTS, AND CHAIN-MOUNTING TABS ON THE FRONT OF THE BACKUP.

DESIGNED BY	DATE	REV.	REV. NO.	SEE TABLE	REF.
S. LEWIS	4/22/1996			604570.dwg	
J. Machado	5/15/1996				

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES.  
DIMENSIONS ARE GIVEN UNLESS OTHERWISE SPECIFIED.  
DO NOT SCALE DRAWING

QUADGUARD® SYSTEM
BACKUP ASSY, TS, QG, 24"

REV.	DESCRIPTION	DATE
K	604570	

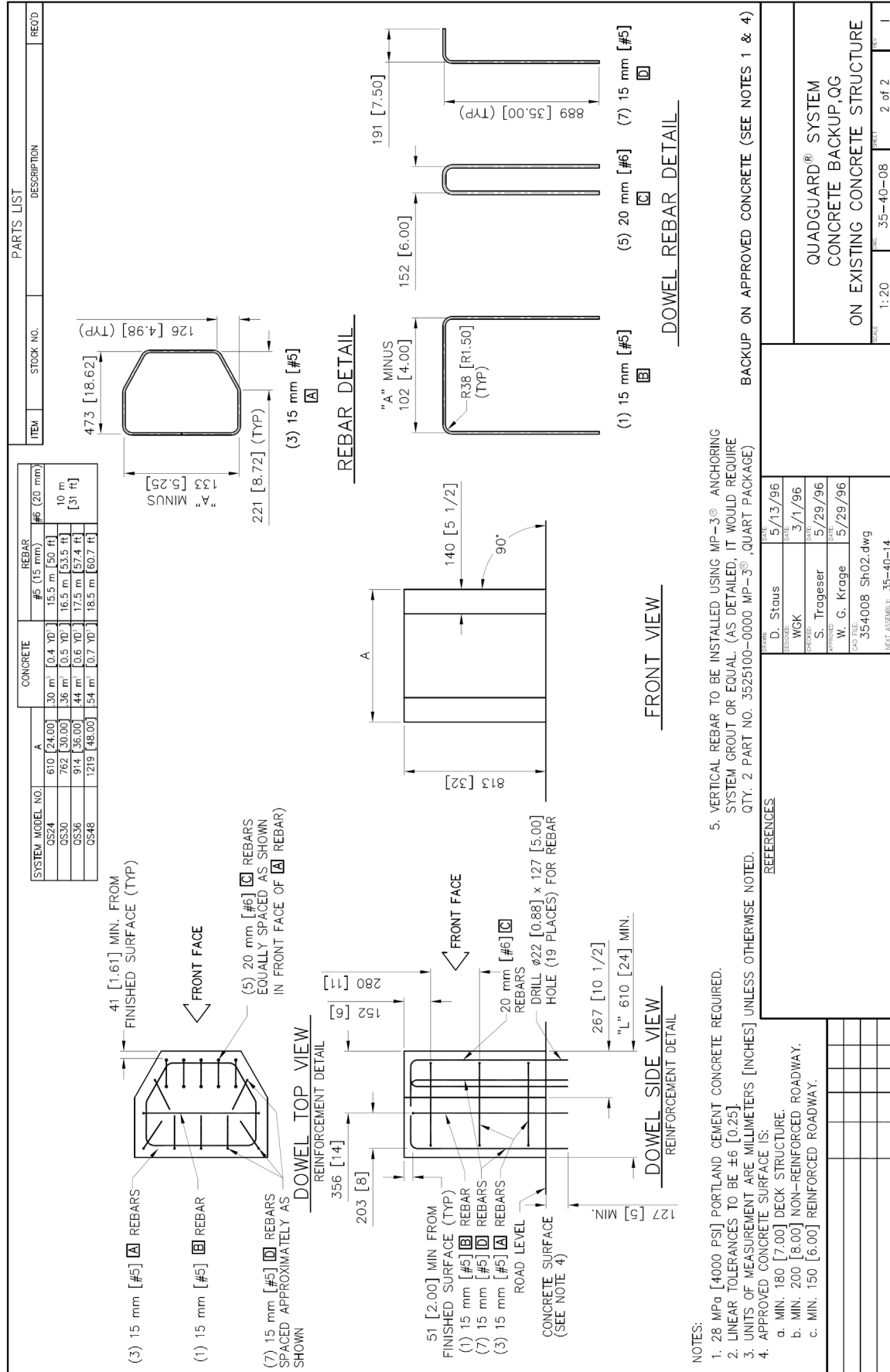
1 of 1

Backup Assembly, Tension Strut, QG





## 35-40-08 – 2 of 2



## Concrete B-up, QG on Existing Concrete Structure

25

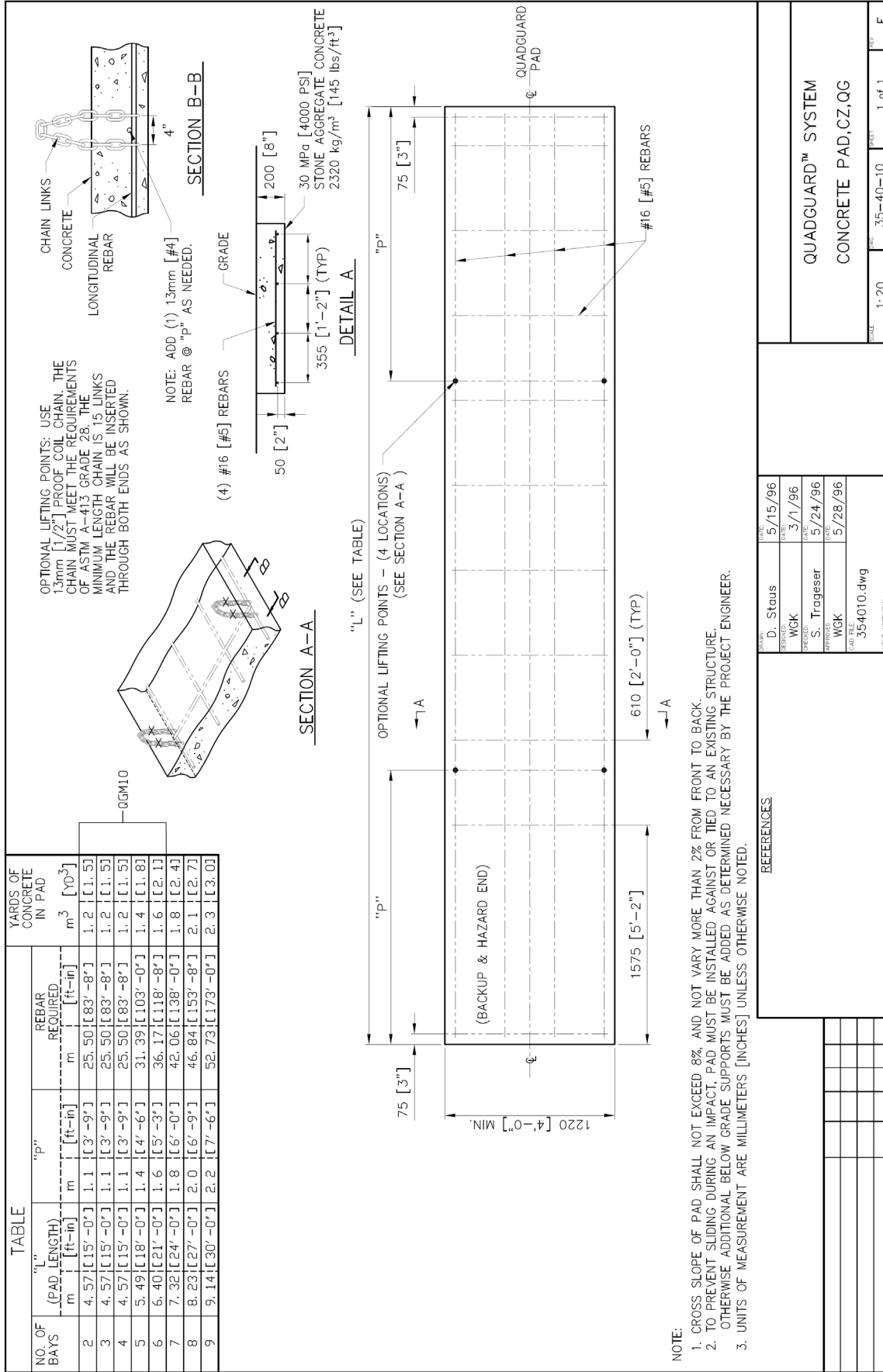
### PLAN VIEW

- |  |  |
|--|--|
|  |  |
|--|--|

## Concrete Pad, for Concrete Backup, QG

## Backup Assembly, Concrete, QG





# Concrete Pad, CZ, QG

# 606700 – 1 of 2

**MONORAIL ATTACHMENT**  
SCALE - 1:25

**EXAMPLE: 6 BAY QUADGUARD CZ**  
SCALE - 1:50

**QUADGUARD CZ DECAL**  
SCALE - 1:30

**ITEMS 5 & 6 LOCATION CHART**

NO. OF BAYS (DIAPHRAGMS)	ASSEMBLY NUMBER	ATTACH TO DIAPHRAGM NO.
3	606700	2 & 3
4	606701	2 & 4
5	606702	2 & 5
6	606703	3 & 6
7	606704	3 & 7
8	606705	4 & 8
9	606706	4 & 9

**TO MOVE SYSTEM:**

1. Verify monorail sections are bolted together.
2. Attach two lifting brackets each on diaphragms listed (four brackets total). See example.
3. Minimum lifting length 3 meters (9 ft). Use fixed equal length slings.
4. Pries unit from anchor bolts & grout prior to lifting the system. To accomplish this, start at the rear of the system and work forward. Place pry bars to ground under the system. Place blocks such as 2x4's under the monorail and work down the length of unit until the unit is completely free of the studs.
5. Lift the system to new location and re-anchor.
6. ANCHOR SYSTEM FOR PROPER IMPACT PERFORMANCE. Use The Adhesive anchor system, supplied by TRINITY HIGHWAY, or approved equal. QuadGuard cz Systems installed on asphalt must be inspected to ensure the anchors are still properly set following each impact. Re-anchor as necessary. See drawing 35-40-06.

**QUADGUARD CZ CAUTION DECAL**  
\* SEE CHART

**ITEMS 5 & 6 LOCATION CHART**

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\* SEE CHART

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\* SEE CHART

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**QUADGUARD CZ CAUTION DECAL**  
\* SEE CHART

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\* SEE CHART

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**QUADGUARD CZ CAUTION DECAL**  
\* SEE CHART

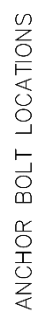
**ITEMS 5 & 6 LOCATION CHART**

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**QUADGUARD CZ CAUTION DECAL**  
\* SEE CHART

**ITEMS 5 & 6 LOCATION CHART**

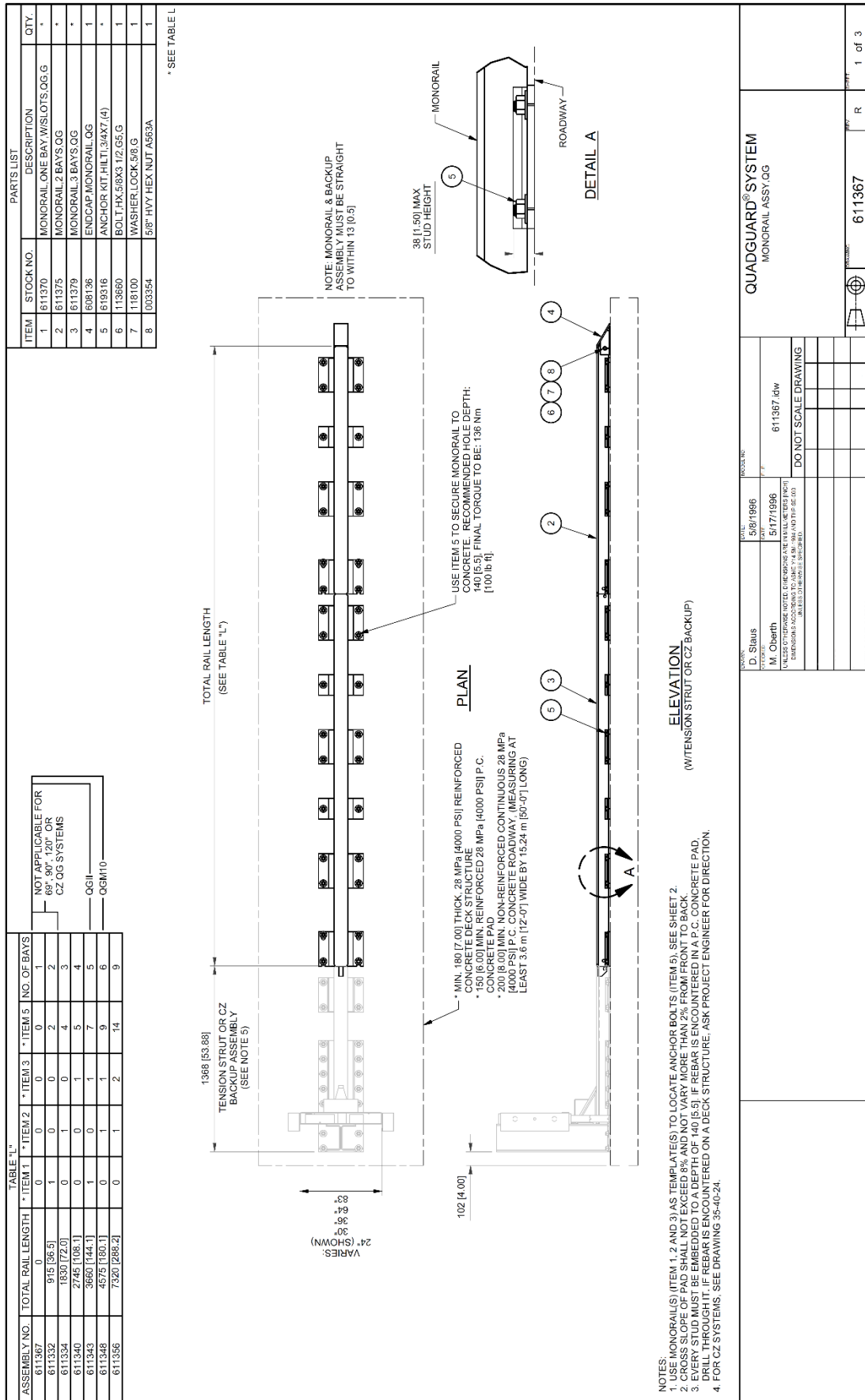
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4	606701	2 & 4
5	606702	2 & 5
6	606703	3 & 6
7	606704	3 & 7
8	606705	



SEE PARTS LIST	QUANTITY	DATE	TOLERANCES PER CENIC-THP-SF-001, UNLESS OTHERWISE SPECIFIED.
N/A	DESCRIPTION	DATE	DO NOT SCALE DRAWING
	D. Stous	10/7/96	
	S. Turner	10/15/96	
	THIS DRAWING IS THE PROPERTY OF CENIC. IT IS TO BE USED FOR THE PROJECT ONLY. IT IS NOT TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF CENIC.		
	QuadGuard® SYSTEM CZ ANCHOR / LIFTING KIT, QG, (3-9 BAYS) INSTRUCTION NO. 115394		
ESTIMATED WEIGHT:			REVISION: 606700 K SHEET: 2 of 2



## 611367 – 1 of 3



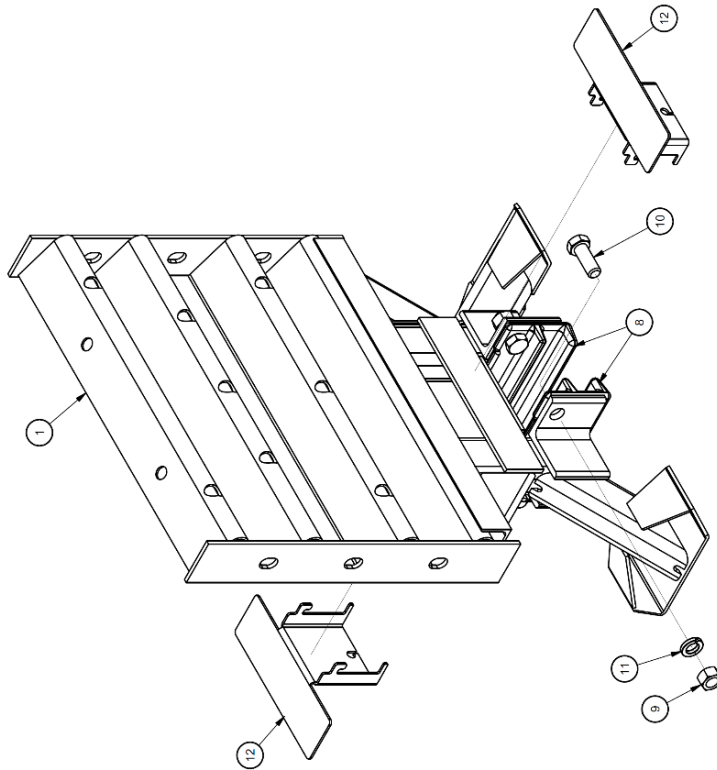
## Monorail Assembly



[illegible]

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	SEE TABLE	1
8	811368	MONORAIL GUIDE,GG,G	2
9	003704	3/4" HWY HEX NUT A563 DH	2
10	113555	BOLT,HX,3/4X2,GG,G	4
11	118089	WASHER LOCK,3/4 G	4
12	605446	BRACKET,CARRIDGE SUPT,DIA FOLDED,GG,G	2

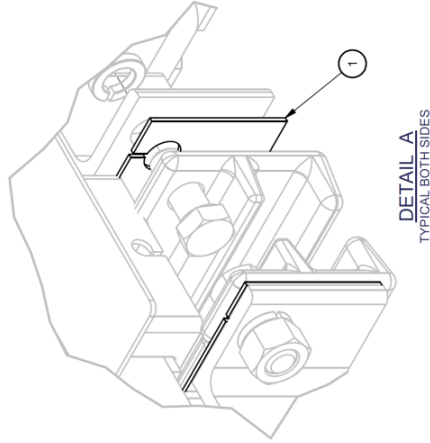
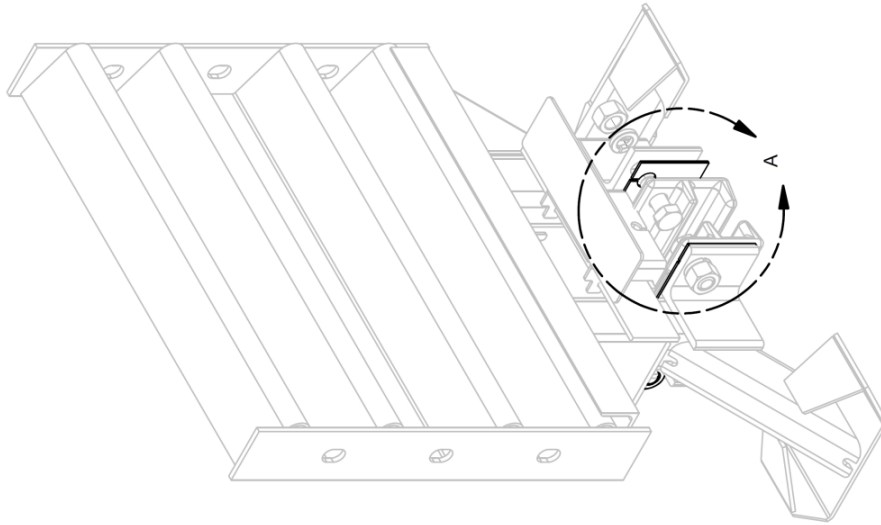
ASSY. NO.	ITEM 1	DESCRIPTION	WIDTH
625647	DIAPHRAGM	QB 24 QG G	610 [24.00]
625648	DIAPHRAGM	QB 30 QG G	760 [30.00]
625649	DIAPHRAGM	QB 36 QG G	915 [36.00]
607838	DIAPHRAGM	QB 48 QG G	1219 [48.00]

[illegible]

## Diaphragm Assembly, QB

614050

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	614062G	SHIM, 1/8X3 5/8X8, G	2



ASSEMBLY NO. 614050B

DRAWING		DATE	2/27/2009
DESIGNED BY		DATE	12/30/2008
CHECKED BY		DATE	3/4/2009
APPROVED BY		DATE	3/19/2009
FILE		614050.idw	
PART ASSEMBLY			
SHIM KIT, DIAPHRAGM, RAIL GUIDE, QG II			
SCALE		DRAWING	614050
		SHEET	1 of 1
		REV	C

## Shim Kit, Diaphragm, Rail Guide, QG II

608236

ITEM

STOCK NO.

DESCRIPTION

QTY.

1	611832	PANEL FENDER QG	1
2	003400	BOLT, TRAIL 5/8X2 G	2
3	003340	5/8" GR HEX NUT	2
4	617045	WASHER, MUSHROOM, FORGED, QG, G	1
5	116878	SCREW, FL 5/8X5 G8.G, HEX SOCKET	1
6	116970	NUT, HX 5/8 G	1
7	003300	WASHER, FLAT, 5/8 X 1 3/4, G	1
8	117459	SPRING DIE, 1 1/4 ODX916X1 1/2 G	1

UNDERLYING PANEL  
(SEE NOTE 1)

SEE NOTE 2

6  
TIGHTEN NUT UNTIL IT  
REACHES END OF THREADS

7

8

1

2

3

4

5

NOTES:

1. UNDERLYING PANEL IS ANOTHER FENDER PANEL. IN THE CASE OF THE LAST FENDER PANEL, THE UNDERLYING PANEL COULD BE A BACKUP SIDE PANEL, EXTENSION PANEL, OR TRAIL PANEL.

2. THERE IS TO BE A 20 [787] MAX. GAP BETWEEN ANY FENDER PANEL AND THE UNDERLYING PANEL.

QUADGUARD®

FENDER PANEL, ASSY, QG

608236.idw

DO NOT SCALE DRAWING

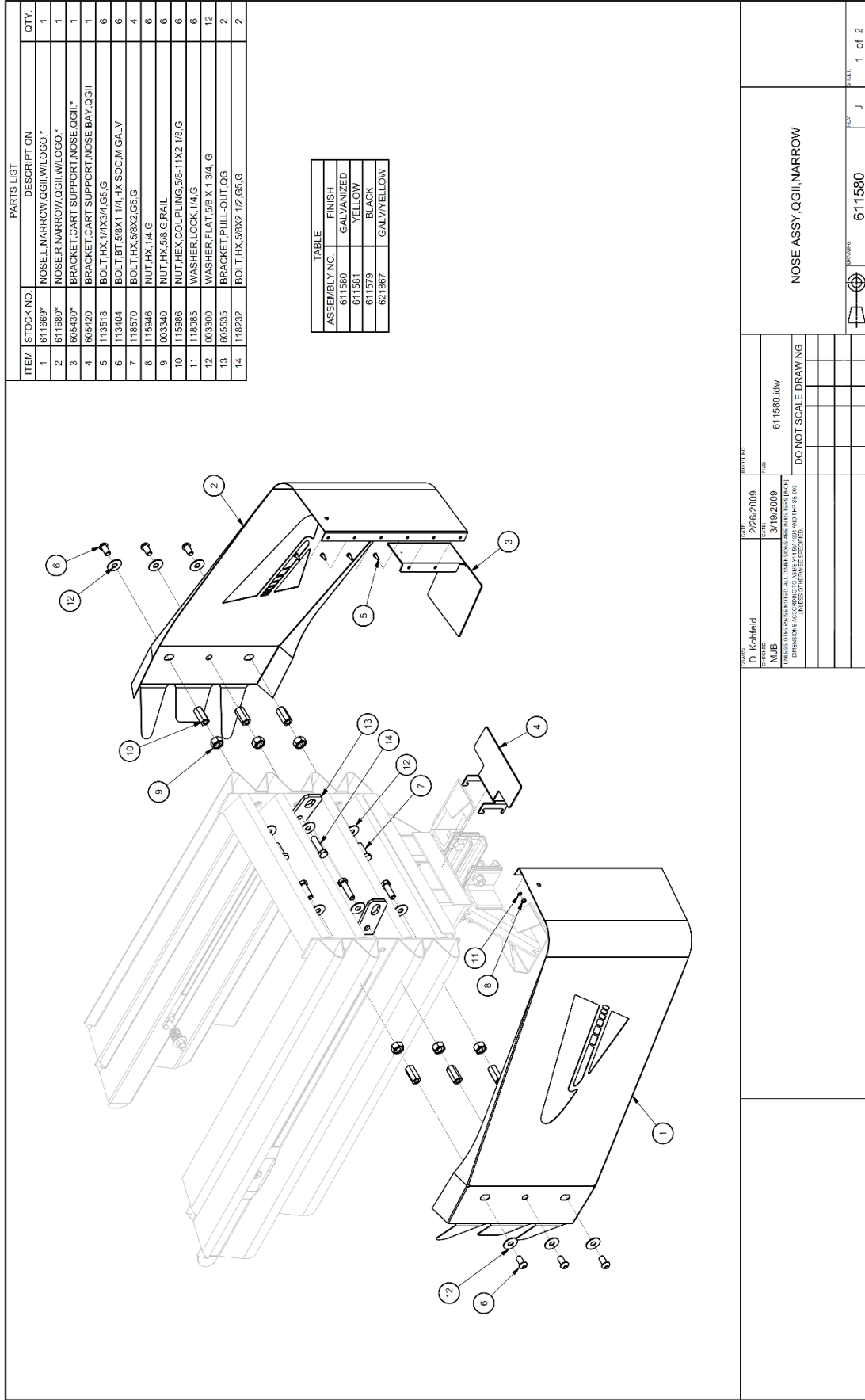
608236

K

1 of 1

Fender Panel Assembly, QG





611580 – 2 of 2

ASSEMBLY NO.	FINISH
611577	GALVANIZED
611578	YELLOW
611576	BLACK
62225	GALV/YELLOW

PARTS LIST	
ITEM	STOCK NO. DESCRIPTION QTY.
1	611689* NOSE L,NARROW,QGII,W/LOGO,* 1
2	611680* NOSE R,NARROW,QGII,W/LOGO,* 1
3	614497* SPACER 12 NOSE ASSY,QGII,* 1
4	605420 BRACKET,CART SUPPORT,NOSE BAY,QGII 1
5	113518 BOLT,HX,1/4X3/4,G5,G 12
6	113404 BOLT,BT,5/8X1 1/4,HX,SOC,M,GALV 6
7	118570 BOLT,HX,5/8X2,G5,G 4
8	115946 NUT,HX,1/4,G 12
9	003340 NUT,HX,5/8,G,RAIL 6
10	115986 NUT,HEX,COUPLING,5/8-11X2 1/8,G 6
11	118085 WASHER,LOCK,1/4,G 12
12	003300 WASHER,FLAT,5/8 X 1 3/4, G 12
13	605535 BRACKET,PULL-OUT,OG,G 2
14	118232 BOLT,HX,5/8X2 1/2,G5,G 2

REV	DATE	BY	APP
1	2/26/2009	D. Kohfeld	
2	3/19/2009	MJB	

611580.dwg

DO NOT SCALE DRAWING

NO	REV	DATE	BY	APP
1	1	2/26/2009	D. Kohfeld	
2	2	3/19/2009	MJB	

611580

J

2 of 2

Nose Assembly, QG II, 48

604596

**604596**

**ANCHORS NOT REQUIRED AT THIS LOCATION BOTH SIDES.**

**NOTES:**  
1. WHEN TRANSITIONING QUADGUARD SYSTEM TO EXISTING BARRIER, REFER TO THE TRANSITION ASSEMBLY DRAWINGS FOR PROPER USE OF SIDE PANEL, NO. 611888.

**PARTS LIST**

ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	BACKUP TS XX WIDE WIDECAL	1
2	611900	PANEL SIDE QG WIDE	2
4	113612	BOLT HK 3/8X3 1/2 ALL THREAD G5.G	16
5	115960	NUT HK 3/8.G	16
7	118092	WASHER LOCK 3/8.G	16
9	618316	ANCHOR KIT HILTI 3/4X7 (4)	5
10	103340	NUT HK 5/8.G RAIL	4
11	103400	BOLT RAIL 5/8X2.G	4
12	113666	BOLT HK 3/8X4 G5.G	6
13	118100	WASHER LOCK 5/8.G	6
14	1003354	5/8" HVT HEX NUT A963A	6
15	610172	HINGE PLATE FENDER PANEL QG	2
16	615156	TEL ST 1 3/4X1 3/4X12 GA X10 H4S.G	4
17	615765	TEL ST 2X2X12 GA X10 H4S.G	4
18	605447	BRACKET CARTRIDGE SUPT.TS B/U QG	1
19	611266	LOCKING BAR CARTRIDGE SUPT QG	1

**TABLE**

ASSY NO.	ITEM 1	DESCRIPTION	WIDTH
604596	604785	BACKUP TS 64 WIDE WIDECALS	1620 [64"]
604599	604788	BACKUP TS 83 QG WIDE WIDECALS	2100 [83"]

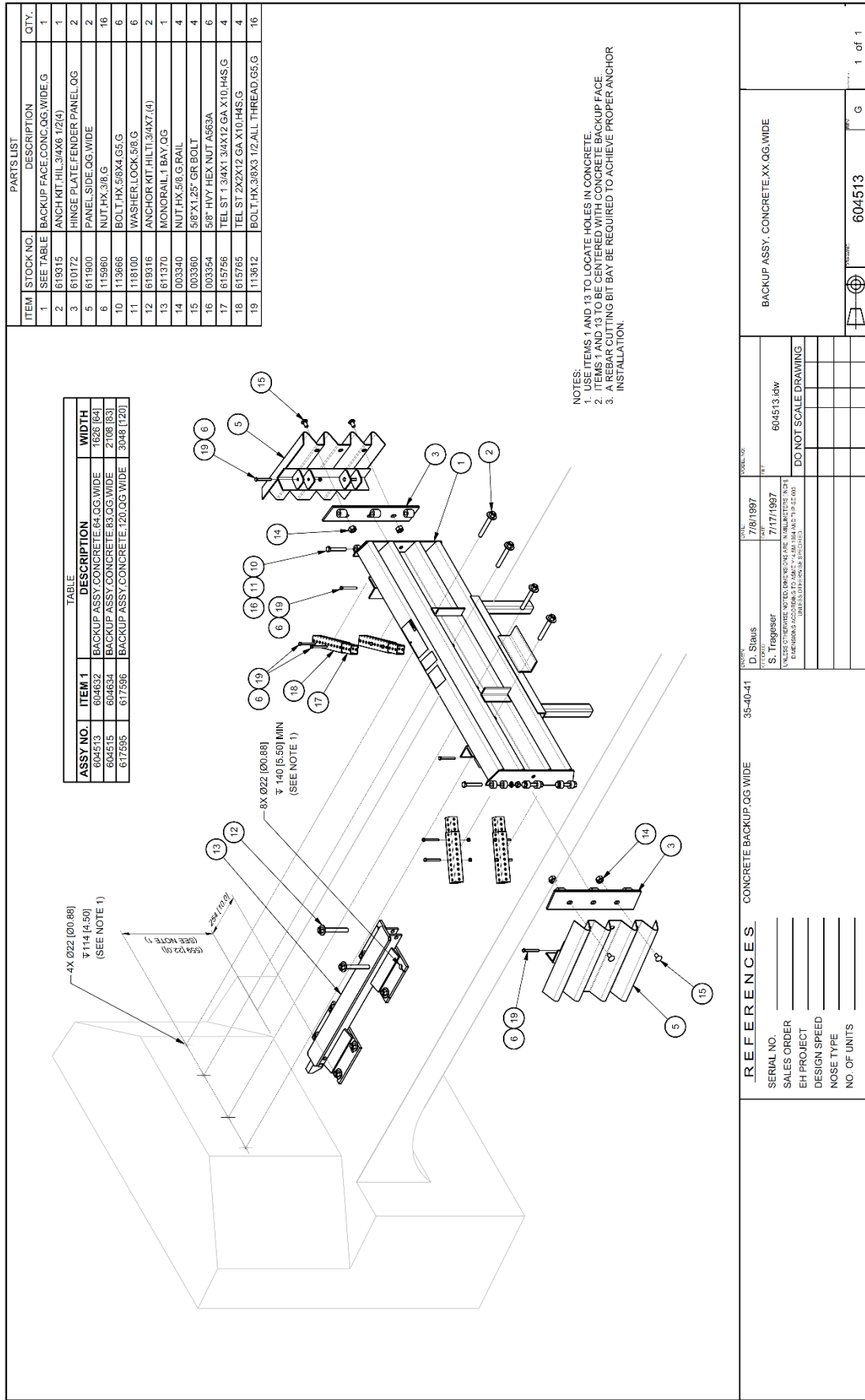
**QUADGUARD® SYSTEM**  
BACKUP ASSY TS QG WIDE

**DO NOT SCALE DRAWING**

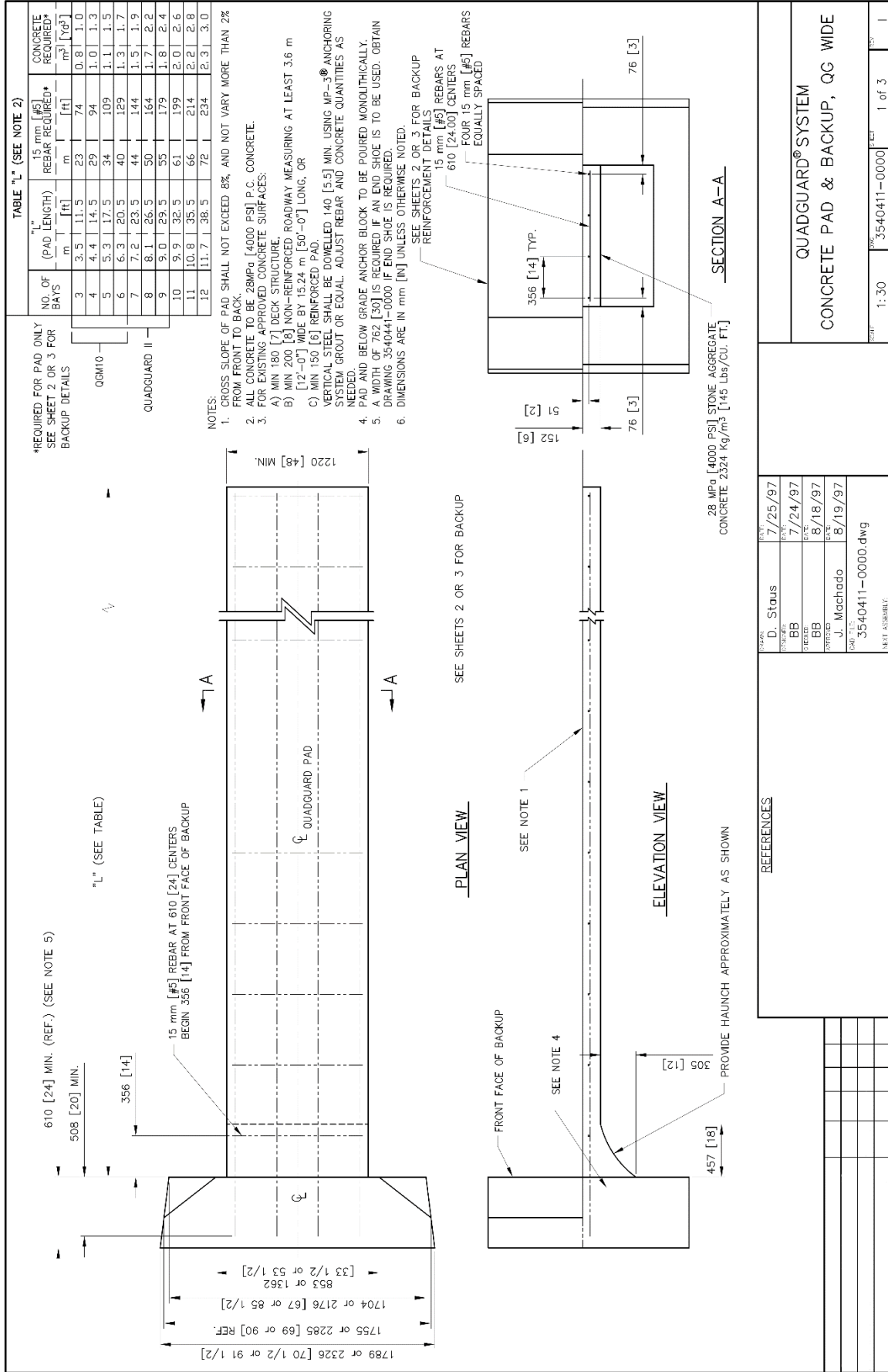
**Backup Assembly, TS, QG Wide**

1 of 1

604513

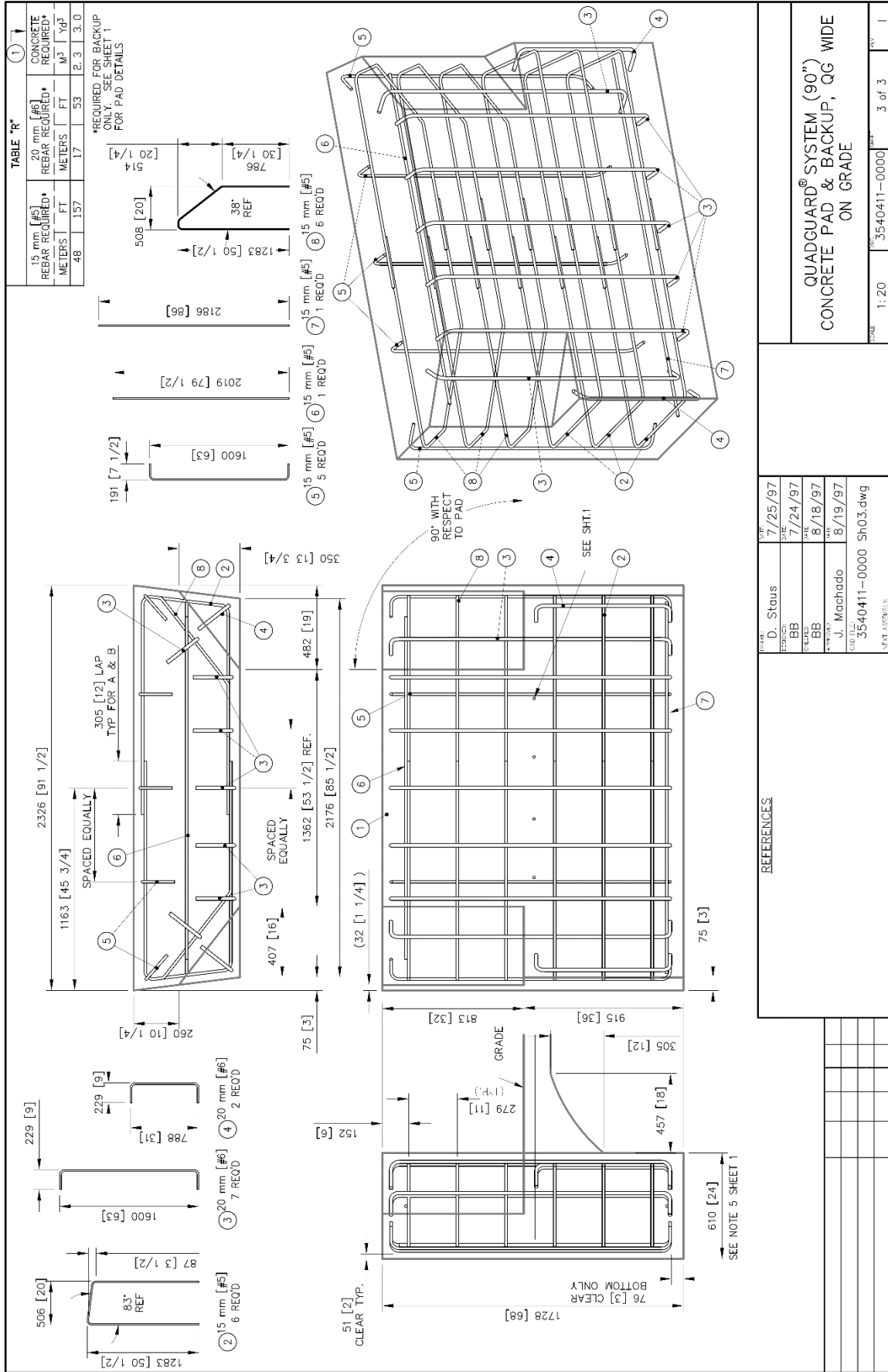


## Backup Assembly, Concrete, QG Wide



# Concrete Pad & Backup, QG Wide





(90") Concrete Pad & Backup, QG Wide on Grade



607173 – 1 of 2

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
11	SEE TABLE	DIAPHRAGM, QG, G	1
2	118089	WASHER, LOCK, 3/4, G	4
3	113555	BOLT, HK, 3/4X2 GS, G	4
4	611368	MONORAIL GUIDE, QG, G	2
5	003704	3/4" HX HEX NUT, A563 DH	4
6	605446	BRACKET, CARTRIDGE SUPT, DIA FOLDED, QG	2
7	510172	HINGE PLATE, FENDER PANEL, QG	2
8	113666	BOLT, HK, 5/8X4 GS, G	6
9	003354	5/8" HX HEX NUT, A563A	6
10	118100	WASHER, LOCK, 5/8, G	6

Table		
ASSEMBLY NO.	DESCRIPTION	ITEM 1 PART NO.
*607173	DIAPHRAGM ASSY, QG, 0673	607766
*607174	DIAPHRAGM ASSY, QG, 0753	607700
*607175	DIAPHRAGM ASSY, QG, 0833	607771
*607176	DIAPHRAGM ASSY, QG, 0913	607773
*607177	DIAPHRAGM ASSY, QG, 0993	607775
*607145	DIAPHRAGM ASSY, QG, 1073	607777
607146	DIAPHRAGM ASSY, QG, 1153	607780
607148	DIAPHRAGM ASSY, QG, 1233	607783
607149	DIAPHRAGM ASSY, QG, 1273	607787
607150	DIAPHRAGM ASSY, QG, 1313	607788
607151	DIAPHRAGM ASSY, QG, 1393	607792
607152	DIAPHRAGM ASSY, QG, 1473	607796
607156	DIAPHRAGM ASSY, QG, 1513	607800
607157	DIAPHRAGM ASSY, QG, 1553	607801
607158	DIAPHRAGM ASSY, QG, 1633	607804
607159	DIAPHRAGM ASSY, QG, 1729	607806
607160	DIAPHRAGM ASSY, QG, 1793	607808
607162	DIAPHRAGM ASSY, QG, 1873	607811
607163	DIAPHRAGM ASSY, QG, 1953	607813
*607164	DIAPHRAGM ASSY, QG, 2033	607815

\* NO LONGER AVAILABLE

NOTE:  
1. QUADGUARD II AND QGM10 REQUIRE SHIM KIT,  
SEE DRAWING 614050.

DESIGNED BY	DATE	ISSUED BY	REVISION
D. Staus	5/12/1997		
J. Mechoso	7/7/1997		

607173.idw

DO NOT SCALE DRAWING

REV	DESCRIPTION	DATE
1	ISSUED FOR FABRICATION	5/12/1997
2	REVISION	
3	REVISION	
4	REVISION	
5	REVISION	
6	REVISION	
7	REVISION	
8	REVISION	
9	REVISION	
10	REVISION	

DIAPHRAGM ASSY, QG, WIDE

607173

N

1 of 2

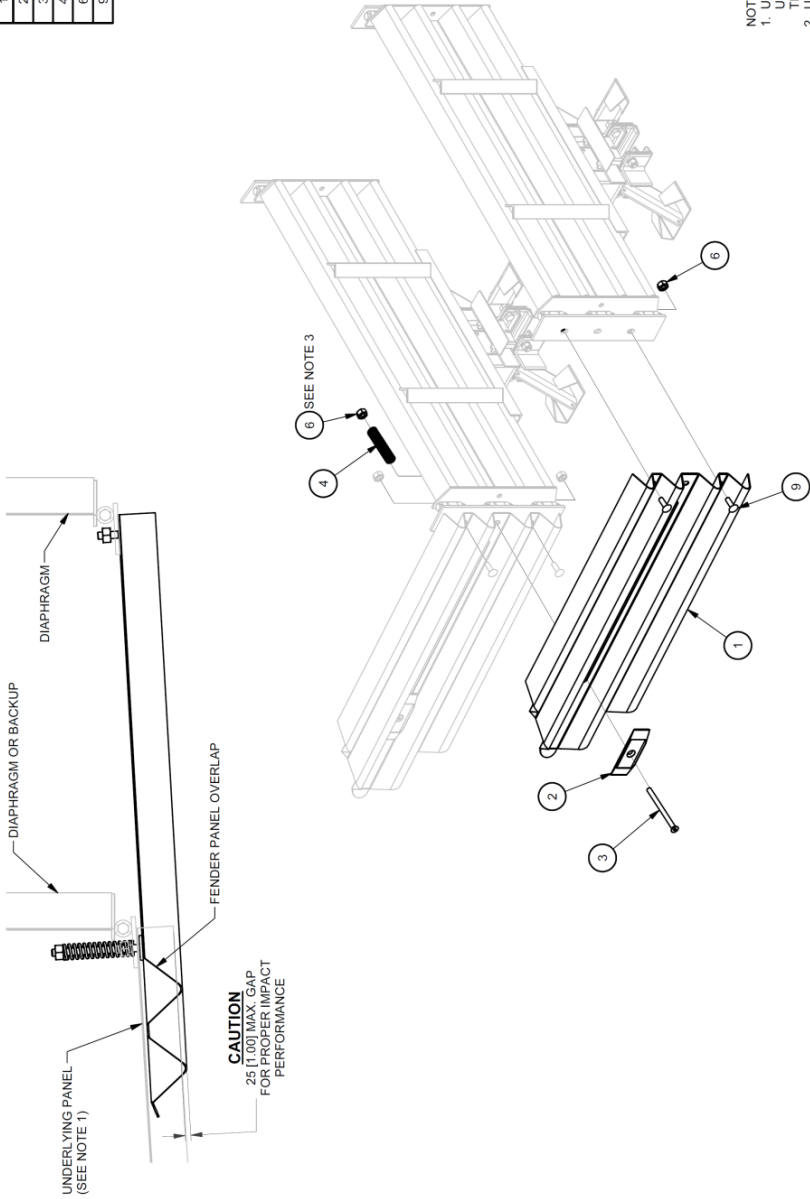
NOTE:  
1. DIMENSIONS ARE IN mm (IN.) UNLESS OTHERWISE NOTED.

[illegible]

608241

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	611832	PANEL,FENDER,QG	1
2	617045	WASHER,MUSHROOM,FORGED,QG,G	1
3	116879	SCREW,FL.5/8X8 1/2,G6,G,SOCKET	1
4	117458	SPRING,DIE,1 1/2 OD X3/4X6,GALV	1
6	003340	NUT,HX.5/8,G,RAIL	3
9	003400	BOLT,RAIL-5/8X2,G	2

TWO FENDER PANEL ASSEMBLIES REQUIRED PER BAY.



- NOTES:
1. UNDERLYING PANEL IS A FENDER PANEL IF ATTACHED TO A DIAPHRAGM.  
UNDERLYING PANEL IS A BACKUP SIDE PANEL, EXTENSION PANEL OR TRANSITION PANEL IF ATTACHED TO THE BACKUP.
  2. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
  3. TIGHTEN NUT UNTIL IT REACHES END OF THREADS.

ASSEMBLY NO. 608241

DESIGNED BY D. Staus		DATE 6/12/1997	608241.dwg			
CHECKED BY J. Machado		DATE 4/10/1997				
APPROVED BY KRM		DATE 7/7/1997				
FILED BY J. Machado		DATE 7/7/1997				
QuadGuard - Wide System FENDER PANEL ASSEMBLY			SCALE 1 : 16	DRAWING 608241	SHEET 1 of 1	REV J

Wide System Fender Panel Assembly

611583

PARTS LIST		
ITEM	STOCK NO	DESCRIPTION
1	611672*	NOSE L.WIDE.QGII.W/LOGO.*
2	611683*	NOSE R.WIDE.QGII.W/LOGO.*
3	605430*	BRACKET/CART SUPPORT NOSE.QGII.*
4	605420	BRACKET/CART SUPPORT NOSE BAY.QGII
5	113518	BOLT.HX.1/4X3/4.G5.G
6	113404	BOLT.BT.5/8X1 1/4.HX.SOC.M GALV
7	118570	BOLT.HX.5/8X2.G5.G
8	115946	NUT.HX.1/4.G
9	003340	NUT.HX.5/8.G RAIL
10	115986	NUT.HEX.COUPLING.5/8-11X2.1/8.G
11	118085	WASHER.FLAT.1/4.G
12	003300	WASHER.FLAT.5/8 X 1 3/4. G
13	113654	BOLT.HX.5/8X1 1/2.G5.G
14	605535	BRACKET/PULL-OUT.QG

TABLE	
ASSEMBLY NO.	FINISH
611583	GALVANIZED
611584	YELLOW
611582	BLACK
621888	GALV/YELLOW

DATE	BY	REV	DESCRIPTION
4/3/2009	D. Konfield	1	611583.idw
4/6/2009	R. Brougher	2	DO NOT SCALE DRAWING

NOSE ASSY.QGII.WIDE

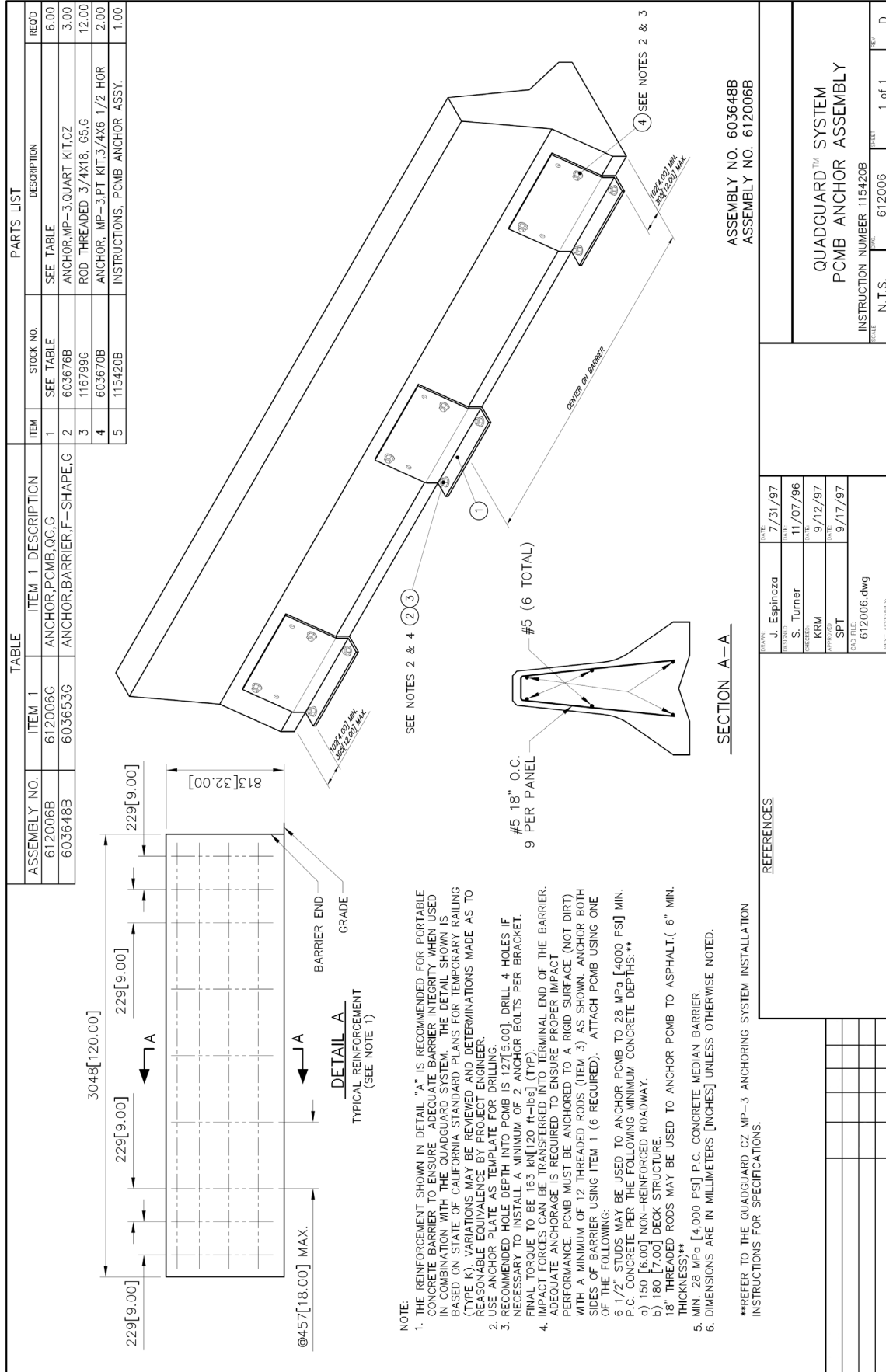
REV	DATE	BY	DESCRIPTION
1	4/3/2009	D. Konfield	611583.idw
2	4/6/2009	R. Brougher	DO NOT SCALE DRAWING

611583

1 of 1

Nose Assembly, QG II, Wide

# 612006



## PCMB Anchor Assembly

608105

400 [10.29]  
REFERENCE

160 [6.55]  
REFERENCE

464 [18.27]  
REFERENCE

2

1

FRONT OF UNIT

EXISTING RAIL BOLT

REPLACE EXISTING PANEL

2 SEE NOTE 2

CONCRETE BACKUP

400 [10.29]  
REFERENCE

160 [6.55]  
REFERENCE

464 [18.27]  
REFERENCE

2

1

FRONT OF UNIT

EXISTING RAIL BOLT

REPLACE EXISTING PANEL

2 SEE NOTE 2

TENSION STRUT BACKUP

ITEM

STOCK NO.

DESCRIPTION

REV'D

1

608122G

SIDE PANEL/END SHOE,QG,G

1.00

2

603670B

ANCHOR,MP-3,PT KIT,3/4X6 1/2 HOR

1.00

1

RIGHT SIDE APPLICATION

1

LEFT SIDE APPLICATION

1

RIGHT SIDE APPLICATION

1

LEFT SIDE APPLICATION

NOTES:

1. DIMENSIONS ARE IN MILLIMETERS [INCHES]

2. USE END SHOE AS TEMPLATE FOR DRILLING

RECOMMENDED HOLE DEPTH 127 [5.00]

FINAL TORQUE TO BE 163Nm [120 FT-LBS] (TYP).

ANCHOR STUD END SHOULD BE FLUSH WITH OUTSIDE SURFACE OF ANCHOR NUT.

REFERENCES

DRAWN

D. Staus

DATE

5/24/96

DESIGNED

WCK

DATE

3/1/96

CHECKED

S. Trageser

DATE

6/5/96

APPROVED

W. Krage

DATE

6/5/96

CAD FILE

608105.dwg

NEXT ASSEMBLY:

ASSEMBLY NO. 608105B

QUADGUARD® SYSTEM

END SHOE ASSY,QG

SCALE

N.T.S.

TITLE

608105

SHEET

1 of 1

REV

I

End Shoe Assembly

Valtir.com

48

Revision I November 2022

## 4" Offset Transition Assembly

CLMC-THP-FE-QAS Rev D, 9/15/2015



**616108**

**DETAIL A**  
FINAL CONFIGURATION OF DIAGONAL BRACE  
FOR MEDIUM OR WIDE ( 762 (30.00) OR 914 (36.00) ) SYSTEMS

**DETAIL A**  
FINAL CONFIGURATION OF DIAGONAL BRACE  
FOR NARROW ( 610 (24.00) ) SYSTEMS

**DIAGONAL BRACE ASSEMBLY**

**NOTES:**  
 1. OVERLAP SHOWN IS FOR TRAFFIC DIRECTION SHOWN. ACTUAL OVERLAP SHALL BE DETERMINED BY THE SITE CONDITIONS AND PROJECT ENGINEER PER TRAFFIC DIRECTION. USE STANDARD GUARDRAIL CONNECTION.  
 2. RIGHT SIDE OF ROAD APPLICATION SHOWN. ASSEMBLY MAY BE USED ON EITHER OR BOTH SIDES FOR LEFT, RIGHT, MEDIAN OR GORE APPLICATIONS. SEE NOTE 1. THIS ASSEMBLY IS NOT INCLUDED IN THE MODEL NUMBER AND MUST BE ORDERED SEPARATELY.  
 3. ENERGY ABSORPTION SYSTEMS, INC. SUPPLIES THE STOCK ITEMS SHOWN IN THE PARTS LIST. ALL OTHER COMPONENTS OF THE DOWNSTREAM GUARDRAIL ARE STANDARD HIGHWAY MATERIALS AND MAY BE OBTAINED FROM YOUR LOCAL HIGHWAY SUPPLY VENDORS.  
 4. TRANSITION AND GUARDRAIL PANEL CONNECTIONS MAY BE SLOTTED IN ORDER TO ACCOMMODATE THERMAL EXPANSION AND CONTRACTION.

**PARTS LIST**

ITEM	STOCK NO.	DESCRIPTION	N	M	W	48	REQ'D
1	611953	PANEL, TRANS QUAD-W-BEAM, Q.G.G	1	1	1	1	1
2	605338	BRACE DIAGONAL, TRANSITION, Q.G.G	1	1	1	1	1
3	003400	BOLT, RAIL, 5/8X2 G	4	6	6	6	6
4	003340	5/8 RECESSED HEX NUT	4	6	6	6	6
5	117976	WASHER BAR, 1/8X1 1/4X2, WHOLE	2	2	2	2	2
6	605334	BRACE BLOCKOUT, 3 Q.G.G	0	1	0	0	0
7	605335	BRACE BLOCKOUT, 6 Q.G.G	0	0	1	0	1
8	605333	BRACE BLOCKOUT, 12 Q.G.G	0	0	0	1	1

**SYSTEM WIDTH**    **ASSEMBLY NO.**    **BLOCKOUT**

910 (24.00)	N	616108	NOT REQ'D
762 (30.00)	M	616107	ITEM #6*
914 (36.00)	W	616109	ITEM #7*
1219 (48.00)	48	616106	ITEM #8*

\*SEE PARTS LIST ABOVE FOR QTY REQ'D

**TRANSITION ASSEMBLY, QUAD-BEAM TO W-BEAM**

**DO NOT SCALE DRAWING**

**DATE:** 9/20/1996  
**BY:** J. Buase  
**CHKD:** J. Machado  
**DATE:** 10/14/1996  
**SCALE:** 616108.dwg  
**PROJECT:** 616108

CEMC-THP-FE-043 Rev C, 7/8/2015

**TRANSITION ASSEMBLY  
QUAD-BEAM TO  
THREE-BEAM**

DESIGNER	J. SIMMONS	DATE	9-15-15
CHECKED	SML	DATE	10/14/96
SHEET OF THREE SHEETS ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED DIMENSIONS ACCORDING TO AASHTO SPEC PWB03			
DO NOT SCALE DRAWING			
PROJECT	35-40-22	SHEET	2 of 2

**PLAN**  
(SEE NOTE 4)

**ELEVATION**  
(SEE NOTE 4)

**DETAIL A**  
POSTS & BLOCKOUTS #1 & #2 (NON-STANDARD)  
SUPPLIED BY OTHERS  
(SEE NOTE 2)

**DETAIL B**  
POSTS & BLOCKOUTS #3 THRU #9  
SEE NOTE 3

**NOTES:**

- DIMENSIONS ARE IN MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
- GUARDRAIL & TRANSITION PANEL NOT SHOWN FOR CLARITY.

**Notes:**

**Notes:**



For more complete information on Valtir products and services, visit us on the web at [www.valtir.com](http://www.valtir.com). Materials and specifications are subject to change without notice. Please contact Valtir to confirm that you are referring to the most current instructions.

**WWW.VALTIR.COM**  
**1.888.323.6374**