



QuadGuard[®]

CRASH CUSHION

PRODUCT DESCRIPTION MANUAL



PN 619185
REVISION B NOVEMBER 2022

QuadGuard®

The QuadGuard® has been tested pursuant to National Cooperative Highway Research Program (“NCHRP”) Report 350 specifications. The QuadGuard® 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®. Failure to fulfill these **RESPONSIBILITIES** with respect to the assembly, maintenance, and repair of the QuadGuard® 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® 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® system, 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) (312) 467-6750 (International)
Contact Link	Valtir.com/Contact

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® system 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. QuadGuard® is certified to the Test Level(s) as shown below:

Test Level 2: 43 mph [70 kph]

Test Level 3: 62 mph [100 kph]

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® 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® is a potentially reusable, re-directive, non-gating crash cushion for road features ranging in width from 24" to 126" [610 mm to 3200 mm]. After those impacts observed within NCHRP Report 350 criteria, it has been observed that, potentially, the bulk of the system can be reused. The system consists of energy-absorbing Cartridges surrounded by a framework of Quad-Beam Panels. What constitutes a potentially reusable highway product should only be determined by a trained engineer, experienced in highway products, directed by the DOT, or other appropriate local highway authority.

The QuadGuard® system utilizes two types of Cartridges in a "staged" configuration 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 of a site. See QuadGuard® Design Table on page 8 to determine the appropriate system length for a given speed.

Impact Performance

The Six Bay QuadGuard® has successfully passed the requirements stipulated in NCHRP Report 350 with both the light car and pickup at speeds of up to **100 km/h [62 mph]** at angles up to 20 degrees.

During head-on impacts, the QuadGuard® system telescopes rearward and crushes to absorb the energy of impact. When impacted from the side, within NCHRP Report 350 criteria, it has been observed to safely redirect the vehicle back toward its original travel path and away from the road feature.

How to Determine Left/Right

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

System Bay Count

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). The Five-Bay system is shown.

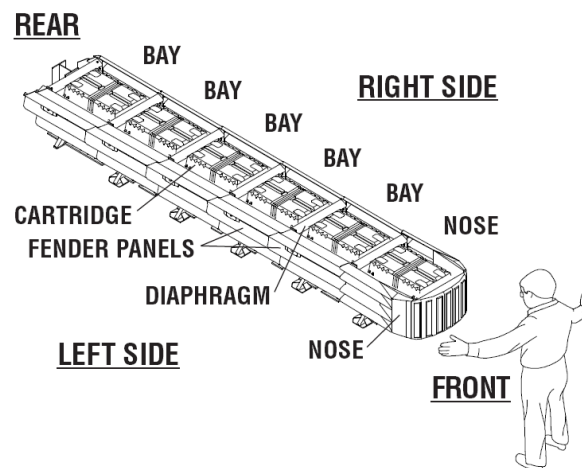


Figure 1
System Orientation

Measuring the Width

The QuadGuard® system is available in seven nominal widths:

- 24" [610 mm]
- 30" [760 mm]
- 36" [915 mm]
- 48" [1219 mm]
- 69" [1755 mm]
- 90" [2285 mm]
- 126" [3200 mm]

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.

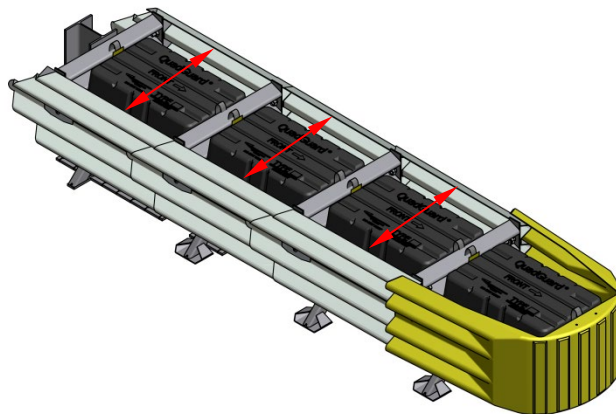


Figure 2
Parallel system

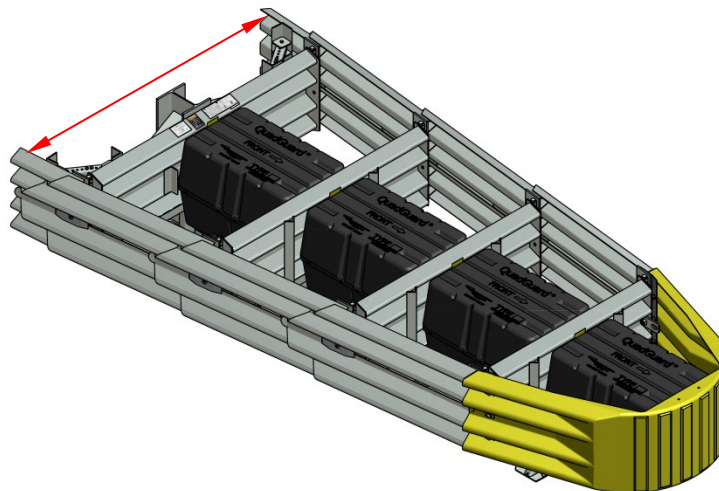


Figure 3
Wide system

QuadGuard® System Criteria

Contact Valtir Customer Service Department if you would like input as to your specific application (p. 3). Proper model selection is essential to QuadGuard® performance. You will need to answer the following questions:

1) Width Specification

As a general rule, selection of the narrowest width that adequately shields the road feature is recommended (p. 5).

2) Specification of System Length

System length is specified by the number of Bays the system includes. The number of Bays required is a function of the intended speed of the roadway.

3) Specify Foundation

The system must be anchored. Refer to QuadGuard® Assembly Manual and approved adhesive anchoring kits for detailed instructions.

A. Is the system to be placed on existing concrete?

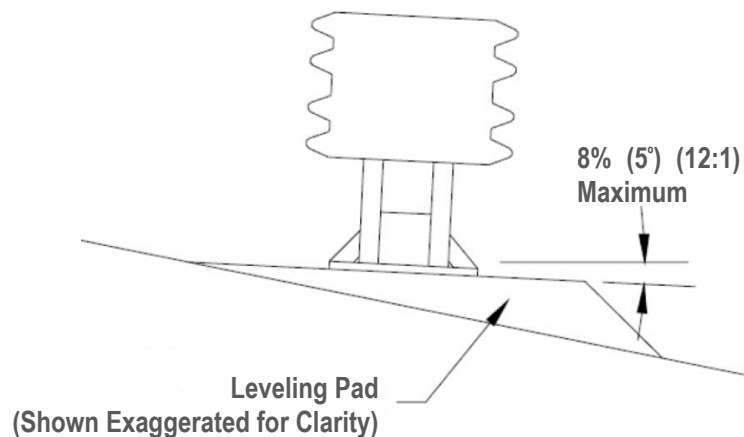
Existing concrete – Concrete must be at least 6" [150 mm] thick, reinforced 4000psi [28 MPa] Portland cement concrete (P.C.C.), or 8" [200 mm] thick non-reinforced 4000psi [28 MPa] P.C. Concrete Roadway, measuring at least 12'-0" [3.66 m] wide by 50'-0" [15.24 m] long. The concrete should be in good condition and be free of major cracks.

New concrete – If existing concrete does not meet these criteria, then a new concrete pad must be placed to properly secure the system. See concrete pad details supplied with the system and Concrete Pad Reference drawings (pp. 21, 22).

B. Is there a cross-slope at the construction site?

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**

4) 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.

5) Special Site Conditions

Contact Valtir Customer Service if you have any product questions (p. 3). Please have the following information available for your chosen site:

- A) **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® systems and as far back as the system's Backup. Any curbs that must remain should be 4" [100 mm] maximum and be mountable.
- B) If the construction site is a gore area (place where two roads diverge), **what is the angle of divergence?**
- C) **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?
- D) **Is there an existing barrier?** Where there is an existing guardrail or median barrier at the site, the QuadGuard® Backup should tie into it when possible.
- E) **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 road feature is necessary to prevent vehicle interaction (p.13).
- F) Are there any other unique features at the site that may affect positioning or performance

6) 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).

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.

The following charts represent the modified versions of the QuadGuard® length relative to impact speed of a 4400 lb. [2000 kg] pickup truck.

QuadGuard® Design Table (Average G deceleration values)									
Bays	Effective Length	Design km/h Velocity (mph)	40 (25)	50 (31)	60 (37)	70 (44)	80 (50)	90 (56)	100 (62)
6	6.30 m (20'-8")	100 (62)	---	---	---	---	4.7	5.9	7.3 (TL-3)
5*	5.38 m (17'-8")	90 (56)	---	---	---	4.2	5.5	7.0	8.6
4*	4.47 m (14'-8")	80 (50)	---		3.7	5.1	6.6	8.4	10.4
3	3.56 m (11'-8")	70 (44)	---	3.2	4.7	6.4 (TL-2)	8.3	10.5	---
2*	2.64 m (8'-8")	60 (37)	2.8	4.4 (TL-1)	6.3	8.6	11.2	---	---
1*	1.73 m (5'-8")	40 (25)	4.3	6.7	9.6	---	---	---	---

*System capacity estimated through calculation.

Average G deceleration values are based upon values calculated for vehicles 1800 to 4400 lbs. (820 to 2000 kg) that stop in a distance equal to 85% of the system length.



Warning: Shaded area denotes excessive decelerations based upon occupant risk recommendations outlined in NCHRP Report 350 for 4400 lb. [2000 kg] vehicles. Valtir does not recommend choosing systems from this area of the chart.

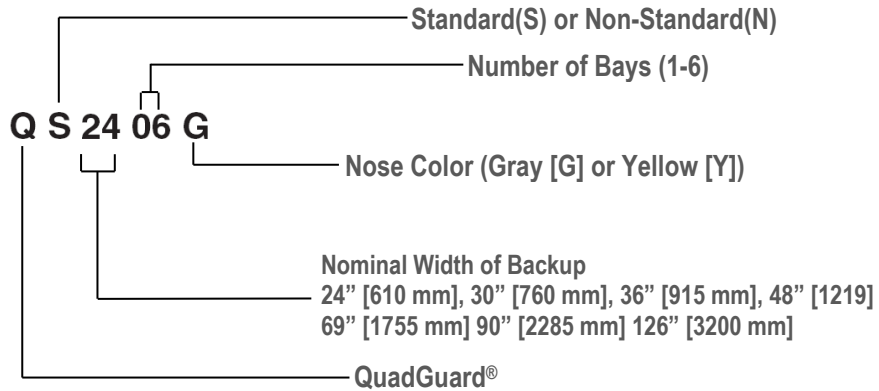
QuadGuard® Standard System Model Numbers

Number of Bays	Nominal Width				
	24" [610 mm]	30" [760 mm]	36" [915 mm]	69" [1755 mm]	90" [2285 mm]
1	QS2401PG or Y	QS3001PG or Y	QS3601PG or Y	NA	NA
2	QS2402PG or Y	QS3002PG or Y	QS3602PG or Y	NA	NA
3	QS2403PG or Y	QS3003PG or Y	QS3603PG or Y	QS6903PG or Y	QS9003PG or Y
4	QS2404PG or Y	QS3004PG or Y	QS3604PG or Y	QS6904PG or Y	QS9004PG or Y
5	QS2405PG or Y	QS3005PG or Y	QS3605PG or Y	QS6905PG or Y	QS9005PG or Y
6	QS2406PG or Y	QS3006PG or Y	QS3606PG or Y	QS6906PG or Y	QS9006PG or Y

QuadGuard® Non-Standard System Model Numbers

Number of Bays	Nominal Width	
	48" [1219 mm]	126" [3200 mm]
1	QN4801PG or Y	NA
2	QN4802PG or Y	NA
3	QN4803PG or Y	NA
4	QN4804PG or Y	NA
5	QN4805PG or Y	NA
6	QN4806PG or Y	QN12606PG or Y

Model Number Description



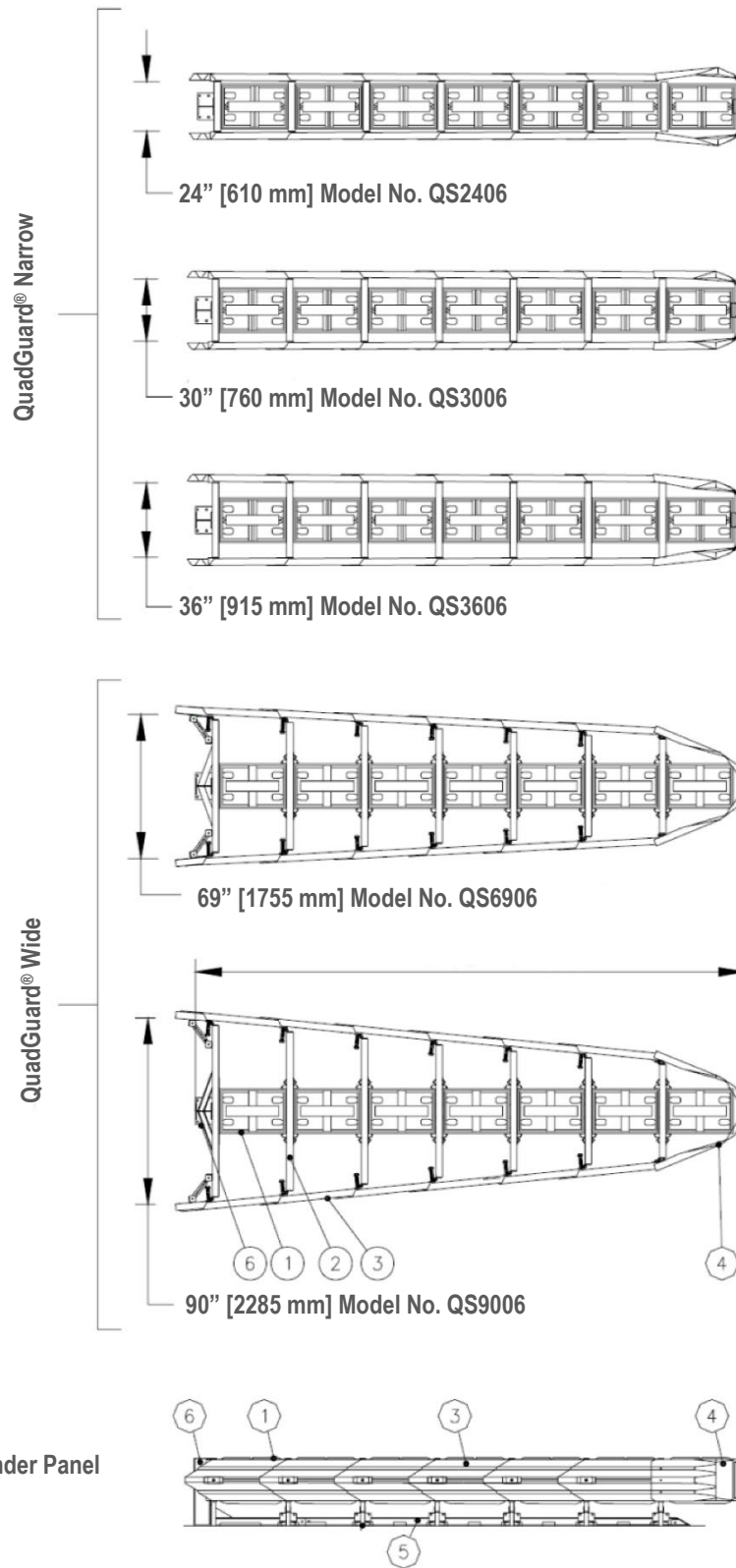


Figure 5
Plan and Elevation (Six Bay System with
Tension Strut Backup Shown)

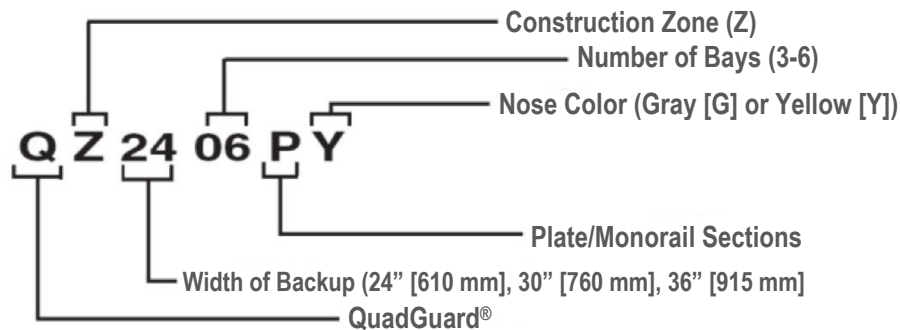
QuadGuard® CZ Design Criteria

This portable compact crash cushion is for construction zones. The QuadGuard® CZ is available in the same narrow sizes as permanent systems. Wide systems are not available.

The QuadGuard® CZ must be properly anchored. Reference the QuadGuard® Assembly Manual (PN 115348) for the recommended anchorage for various foundations.

QuadGuard® CZ Plate Model Numbers			
Number of Bays	Nominal Width		
	24" [610 mm]	30" [760 mm]	36" [915 mm]
3	QZ2403PG or Y	QZ3003PG or Y	QZ3603PG or Y
4	QZ2404PG or Y	QZ3004PG or Y	QZ3604PG or Y
5	QZ2405PG or Y	QZ3005PG or Y	QZ3605PG or Y
6	QZ2406PG or Y	QZ3006PG or Y	QZ3606PG or Y

Model Number Description



QuadGuard® CZ Table (Avg. G deceleration values)									
Bays	Effective Length	Design mph Velocity (kph)	25 (40)	31 (50)	37 (60)	44 (70)	50 (80)	56 (90)	62 (100)
6	20'-8" (6.30 m)	62 (100)	---	---	---	---	4.7	5.9	7.3 (TL-3)
5*	17'-8" (5.38 m)	56 (90)	---	---	---	4.2	5.5	7.0	8.6
4*	14'-8" (4.47 m)	50 (80)	---	---	3.7	5.1	6.6	8.4	10.4
3	11'-8" (3.56 m)	44 (70)	---	3.5	4.7	6.4 (TL-2)	8.3	10.5	---

*System capacity estimated through calculation.

Average G deceleration values are based upon average values calculated for vehicles 1800 to 4400 lbs. (820 to 2000 kg) that stop in a distance equal to 85% of the systems length.



Warning: Shaded area denotes excessive decelerations based upon occupant risk recommendations outlined in NCHRP Report 350 for 4400 lb. (2000 kg) vehicles. Valtir does not recommend choosing systems from this area of the chart.

Transitioning

Quad-Beam End Shoe

Transition Panel

The Quad-Beam End Shoe Panel transitions the QuadGuard® 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® 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® 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 354018L or R. For transitioning a wide system to barrier that runs parallel to the centerline of the system, transition assembly 354042L or R 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 to Single Slope style barriers and parapets, 6" and 8" offset transition panels are available. For transitioning a wide system to Single Slope style 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 6). Remember, when installing the QuadGuard® system 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 transition performance.

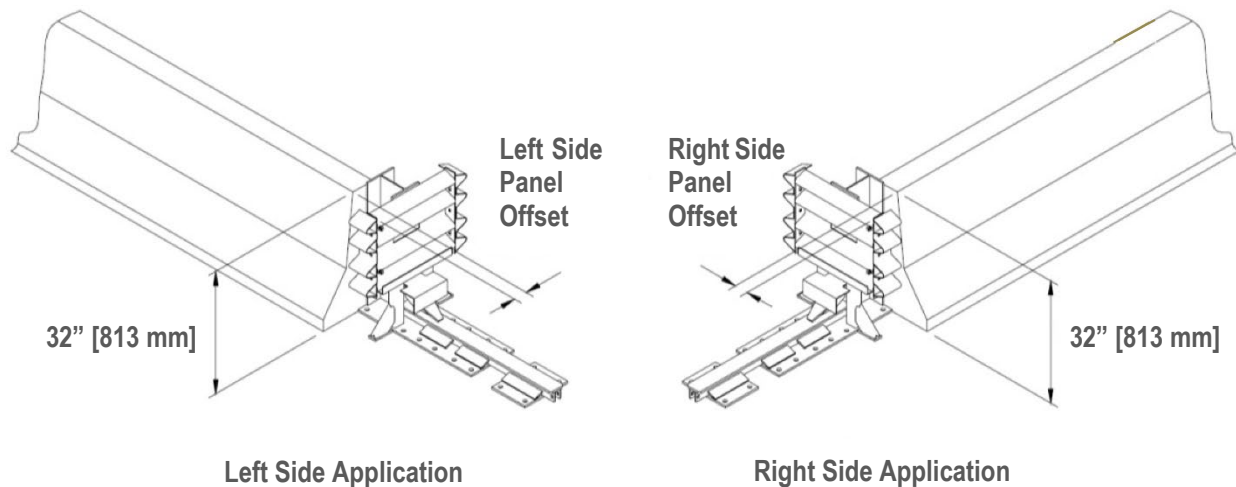


Figure 6
Transition Panel Offset

Transitions and Drawings

Note: The proper Transition Panel or Side Panel must be used for impact performance of the system. The correct Panel(s) to use will depend on traffic direction and roadside obstacle the QuadGuard® is shielding. Contact the Customer Service Department prior to deployment if you have any questions (p. 3).

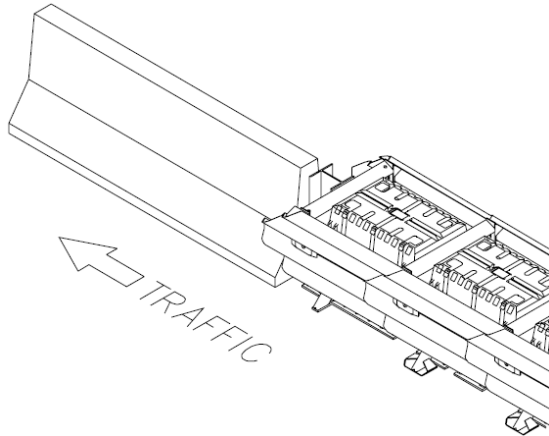


Figure 7
No Transition

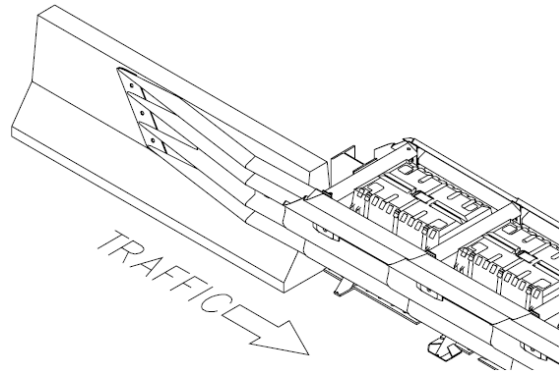


Figure 8
Quad-Beam to Safety Shape Barrier

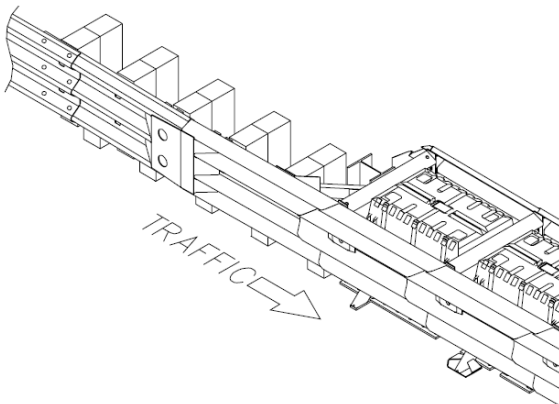


Figure 9
Quad-Beam to Thrie-Beam

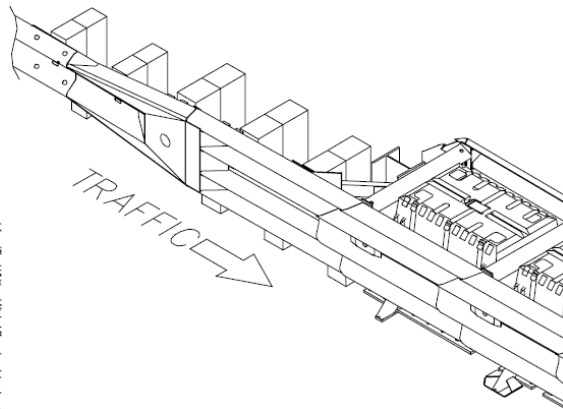


Figure 10
Quad-Beam to W-Beam

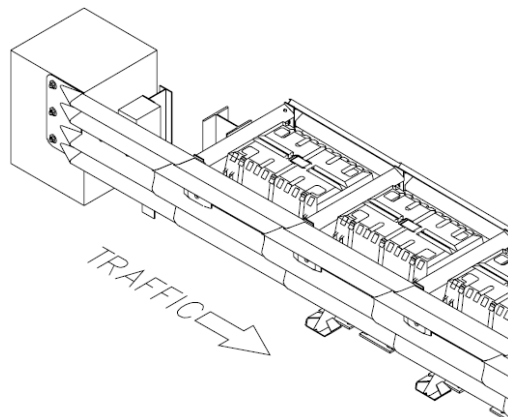


Figure 11
Quad-Beam End Shoe

PLAN

ELEVATION LEFT SIDE

NOTES:

- INSTALLANCE 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 28 MPa [4000 PSI] P.C. CONCRETE ROADWAY, MEASURING AT LEAST 3.68 m [12.07] WIDE BY 15.24 m [50.00] LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE SUCH AS A CONCRETE WALL OR ABUTMENT.
- SEE THE "QUADGUARD 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.
- WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY AN ADEQUATE TRANSITION FROM THE QUADGUARD SYSTEM TO THE OBJECT BEING SHIELDED.
- UNITS OF MEASUREMENT ARE MILLIMETERS (INCHES), UNLESS OTHERWISE NOTED.
- BACKUP AND NOSE ASSEMBLIES NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.
- THE NUMBER OF BAYS INDICATED IN THE TABLE IS BASED ON CALCULATED VALUES TO WITHSTAND THE FULL ENERGY OF A 2,000 kg VEHICLE TRAVELING AT THE SPEED INDICATED.
- THE SIX BAY SYSTEM HAS BEEN FULLY TESTED AT 100 km/h UNDER THE FULL 8 TEST MATRIX OF NCHRP 350 TL-3.

* G=GRAY OR Y=YELLOW

BAYS	762 [30"] WIDTH		814 [32"] WIDTH		SYSTEM LENGTH	EFFECTIVE LENGTH	PAD LENGTH	MAX RESON SPEED	# OF CARTRIDGES	
	MODEL #	MODEL #	m	ft-in					m	ft-in
1	OS2403*	OS3001*	2.16 [7'-1"]	1.73 [5'-8"]	2.74 [9'-0"]	40 [25]	2	0		
2	OS2403*	OS3602*	3.08 [10'-1"]	2.64 [8'-8"]	2.74 [9'-0"]	60 [37]	2	1		
3	OS2403*	OS3003*	4.00 [13'-1"]	3.56 [11'-8"]	3.66 [12'-0"]	70 [44]	3	1		
4	OS2404*	OS3604*	4.91 [16'-1"]	4.47 [14'-8"]	4.57 [15'-0"]	80 [50]	3	2		
5	OS2405*	OS3005*	5.83 [19'-1"]	5.38 [17'-8"]	5.49 [18'-0"]	90 [56]	4	2		
6	OS2406*	OS3606*	6.74 [22'-1"]	6.30 [20'-8"]	6.40 [21'-0"]	100 [62]	4	3		

TRAFFIC ←

← **TRAFFIC**

UNIDIRECTIONAL

QUADGUARD® SYSTEM WITH TENSION STRUT BACKUP

QSTSCVR-U (dw)

DO NOT SCALE DRAWING

OUTLINE OF P.C. CONCRETE PAD

SEE NOTE 5

SEE NOTE 6

SEE NOTE 7

SEE NOTE 1

SEE NOTE 2

SEE NOTE 3

SEE NOTE 4

SEE NOTE 5

DATE: 3/21/1996

DESIGNER: S. LEWIS

CHECKED: J. MACHADO

DATE: 6/7/1996

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.

625660

35-40-05

604570

35-40-08

35-40-11

N/A

N/A

DIAPHRAGM ASSY.

NOSE ASSEMBLY

BACKUP ASSEMBLY

MONORAIL ASSY.

CONCRETE PAD

TRANSITION ASSY.

WHEEL DEFLECTOR ASSY.

KEY

- ① CARTRIDGE
- ② DIAPHRAGM
- ③ FENDER PANEL
- ④ MONORAIL
- ⑤ NOSE ASSEMBLY
- ⑥ BACKUP

REFERENCES

SERIAL NO.

SALES ORDER

EH PROJECT

DESIGN SPEED

NOSE TYPE

NO. OF UNITS

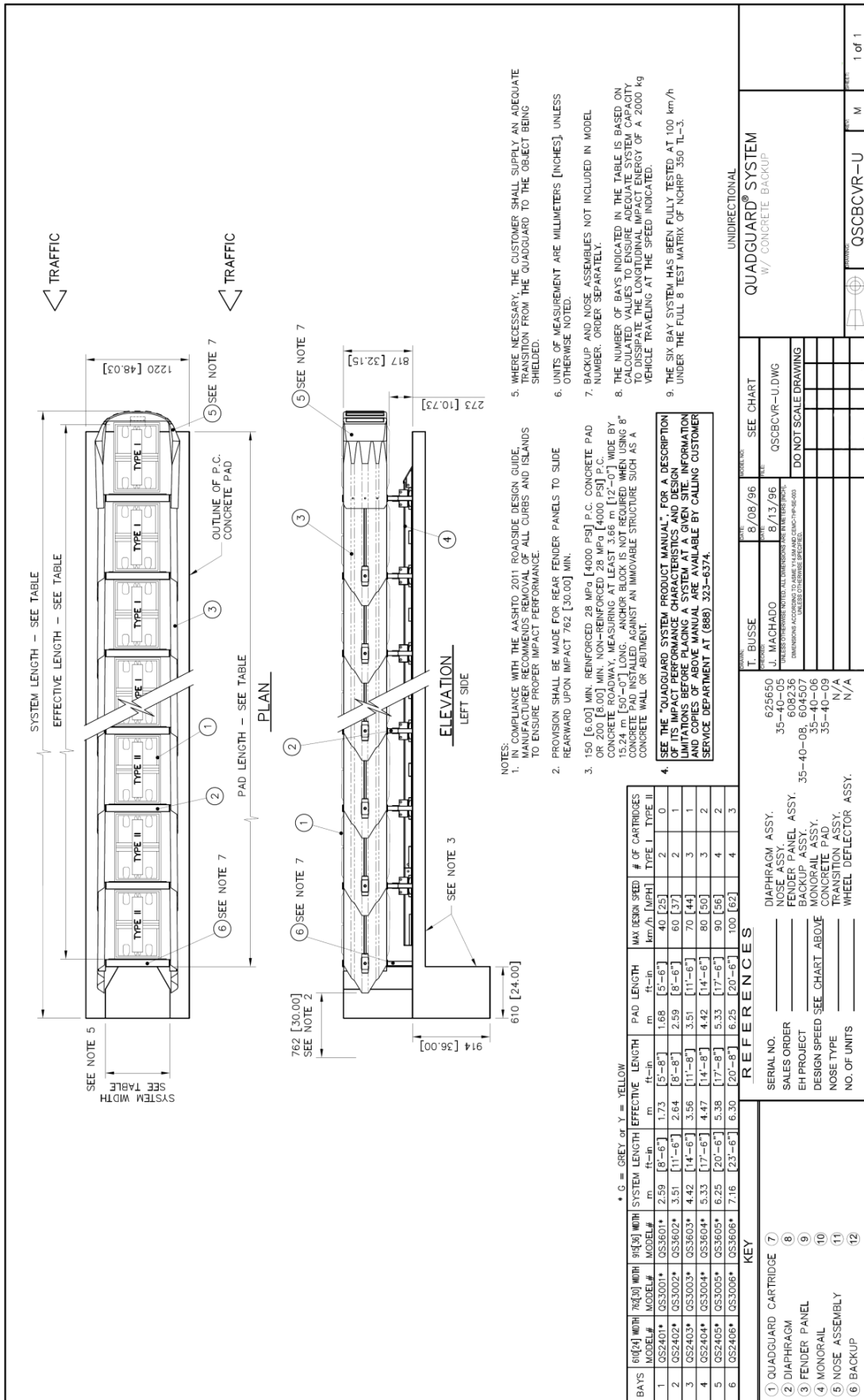
UNIDIRECTIONAL

QUADGUARD® SYSTEM WITH TENSION STRUT BACKUP

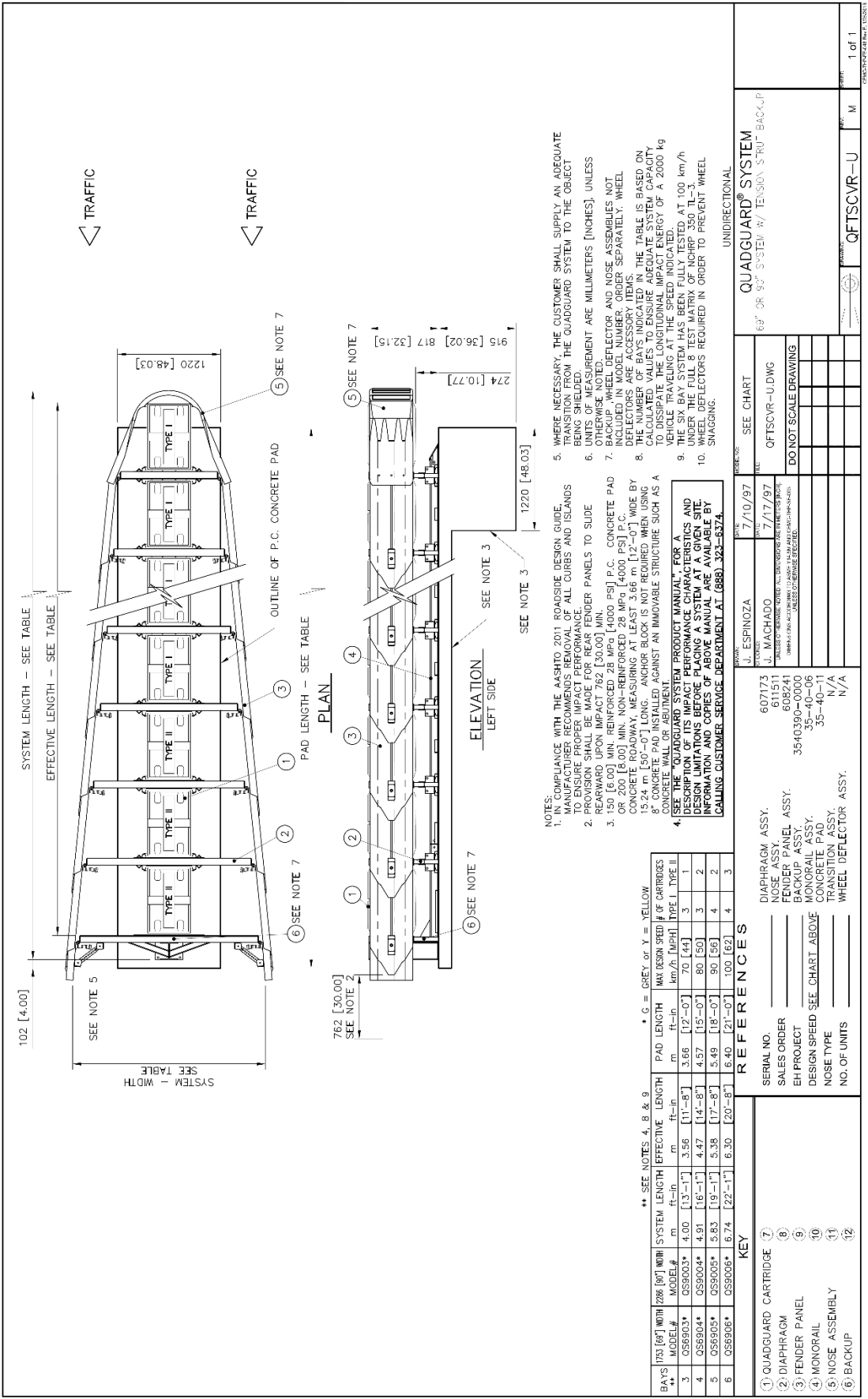
QSTSCVR-U

1 of 1

Revision B November 2022



QuadGuard® w/ Concrete Backup QSCBCVR-U



- NOTES:
- IN COMPLIANCE WITH THE AASHTO 2011 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS TO ENSURE PROPER IMPACT PERFORMANCE.
 - CONCRETE PAD SHALL BE REINFORCED UPON IMPACT 762 [30.00] MIN. REARWARD UPON IMPACT 762 [30.00] MIN.
 - OR 200 [8.00] MIN. NON-REINFORCED 28 MPa [4000 PSI] P.C. CONCRETE PAD 15.24 m [50'-0"] LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING CONCRETE ROADWAY, MEASURING AT LEAST 3.66 m [12'-0"] WIDE BY 8" CONCRETE WALL OR ABUTMENT.
 - CONCRETE PAD SHALL BE INSTALLED AGAINST AN IMMOVABLE STRUCTURE SUCH AS A CONCRETE WALL OR ABUTMENT.
- DESIGN LIMITATIONS FOR ITS IMPACT PERFORMANCE CHARACTERISTICS AND 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) 322-8374.
- WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY AN ADEQUATE TRANSITION FROM THE QUADGUARD SYSTEM TO THE OBJECT BEING SHIELDED.
 - ALL DIMENSIONS AND MEASUREMENTS ARE MILLIMETERS [INCHES], UNLESS OTHERWISE NOTED.
 - BACKUP, WHEEL DEFLECTOR AND NOSE ASSEMBLY NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY. WHEEL DEFLECTORS ARE ACCESSORY ITEMS.
 - ALL DIMENSIONS AND MEASUREMENTS IN THIS TABLE IS BASED ON CALCULATED VALUES TO ENSURE ADEQUATE SYSTEM CAPACITY TO DISSIPATE THE LONGITUDINAL IMPACT ENERGY OF A 2000 kg VEHICLE TRAVELING AT THE SPEED INDICATED.
 - THE SIX-BAY SYSTEM HAS BEEN FULLY TESTED AT 100 km/h UNDER THE FULL S TEST MATRIX OF NCHRP 350 II-3.
 - WHEEL DEFLECTORS REQUIRED IN ORDER TO PREVENT WHEEL SWAGING.

BAYS	MODEL #	WIDTH [90°]	SYSTEM LENGTH	EFFECTIVE LENGTH	PAD LENGTH	MAX DESIGN SPEED	# OF CARTRIDGES					
							TYPE I	TYPE II	TOTAL			
3	Q59903*	4.00	[13'-1"]	3.56	[11'-8"]	3.66	[12'-0"]	70	[44]	3	1	4
4	Q59904*	4.91	[16'-1"]	4.47	[14'-8"]	4.57	[15'-0"]	80	[50]	3	2	5
5	Q59905*	5.83	[19'-1"]	5.38	[17'-8"]	5.49	[18'-0"]	90	[56]	4	2	6
6	Q59906*	6.74	[22'-1"]	6.30	[20'-8"]	6.40	[21'-0"]	100	[62]	4	3	7

* G = GREY, Y = YELLOW

** SEE NOTES 4, 8 & 9

MODEL #	WIDTH [90°]	SYSTEM LENGTH	EFFECTIVE LENGTH	PAD LENGTH	MAX DESIGN SPEED	# OF CARTRIDGES
Q59903*	4.00	[13'-1"]	3.56	[11'-8"]	3.66	[12'-0"]
Q59904*	4.91	[16'-1"]	4.47	[14'-8"]	4.57	[15'-0"]
Q59905*	5.83	[19'-1"]	5.38	[17'-8"]	5.49	[18'-0"]
Q59906*	6.74	[22'-1"]	6.30	[20'-8"]	6.40	[21'-0"]

KEY

1	QUADGUARD CARTRIDGE	7
2	DIAPHRAGM	8
3	FENDER PANEL	9
4	MONORAIL	10
5	NOSE ASSEMBLY	11
6	BACKUP	12

REFERENCES

SERIAL NO.	DIAPHRAGM ASSY.	607173
SALES ORDER	NOSE ASSY.	611511
EH PROJECT	FENDER PANEL ASSY.	608241
DESIGN SPEED SEE CHART ABOVE	BACKUP ASSY.	35-40-06
NOSE TYPE	MONORAIL ASSY.	35-40-11
NO. OF UNITS	CONCRETE PAD	N/A
	TRANSITION ASSY.	N/A
	WHEEL DEFLECTOR ASSY.	N/A

DATE	BY	CHKD BY	DESCRIPTION
7/10/97	J. ESPINOZA		
7/17/97	J. MACHADO		
			DO NOT SCALE DRAWING

SEE CHART QFTSCVR-U.DWG

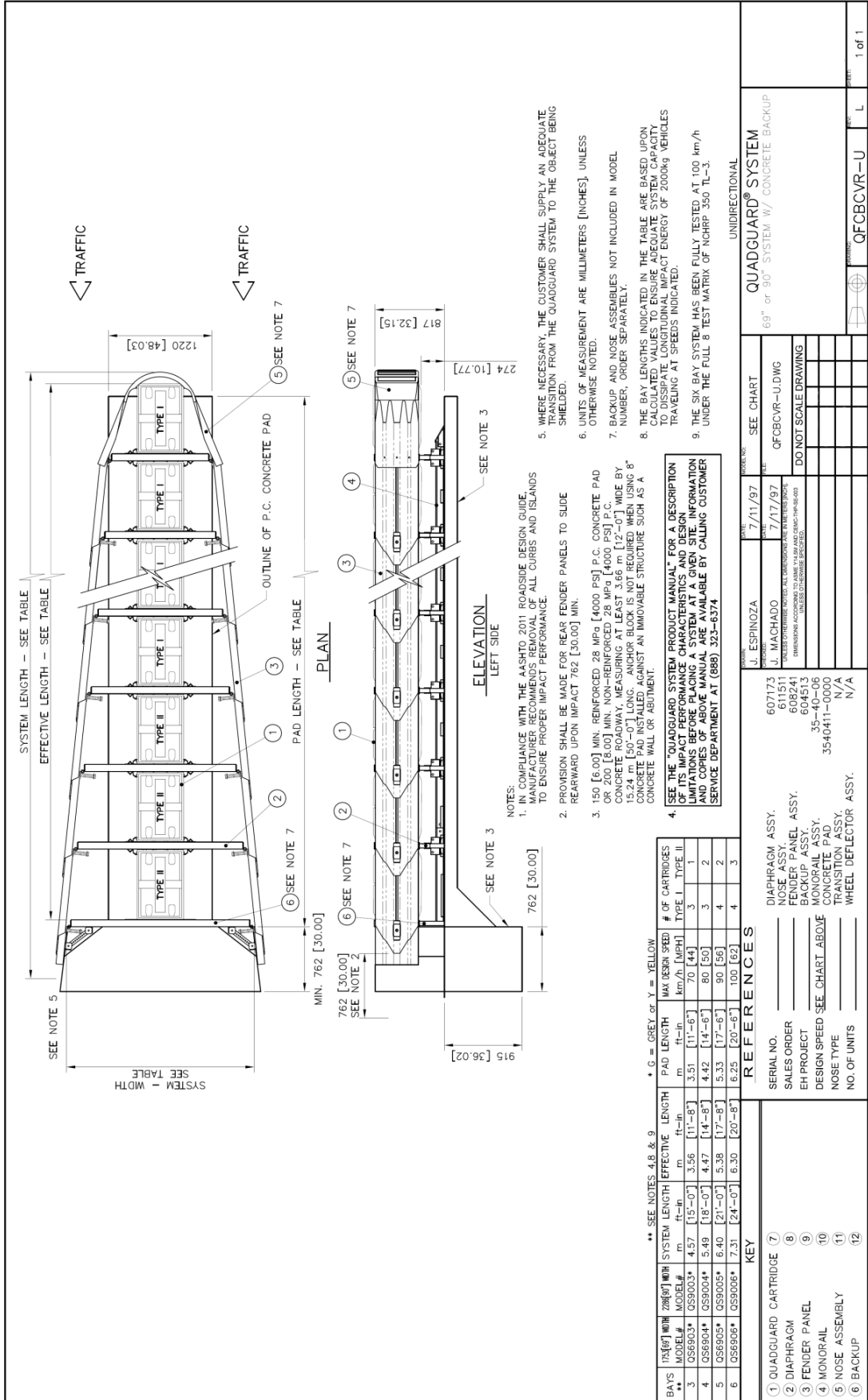
69" OR 90" SYSTEM w/ TENSION STRUT BACKUP

UNIDIRECTIONAL

QFTSCVR-U

1 of 1

69 or 90 System w/ Tension Strut Backup QFTSCVR-U



- 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 28 MPa [4000 PSI] P.C. CONCRETE ROADWAY. MEASURING AT LEAST 3.66 m [12'-0"] MIN. BY CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE SUCH AS A CONCRETE WALL OR ABUTMENT.
 - SEE THE "QUADGUARD SYSTEM PRODUCT MANUAL" FOR A DESCRIPTION OF THE SYSTEMS AVAILABLE AND THE LIMITATIONS OF EACH SYSTEM. COPIES OF THE MANUAL ARE AVAILABLE BY CALLING CUSTOMER SERVICE DEPARTMENT AT (888) 323-6374.
 - WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY AN ADEQUATE TRANSITION FROM THE QUADGUARD SYSTEM TO THE OBJECT BEING SHIELDED.
 - UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES], UNLESS OTHERWISE NOTED.
 - BACKUP AND NOSE ASSEMBLIES NOT INCLUDED IN MODEL NUMBER, ORDER SEPARATELY.
 - THE BAY LENGTHS INDICATED IN THE TABLE ARE BASED UPON CALCULATED VALUES TO ENSURE ADEQUATE SYSTEM CAPACITY TO DISSIPATE LONGITUDINAL IMPACT ENERGY OF 20000kg VEHICLES TRAVELING AT SPEEDS INDICATED.
 - THE SIX BAY SYSTEM HAS BEEN FULLY TESTED AT 100 km/h UNDER THE FULL 6 TEST MATRIX OF NCHRP 350 TL-3.

SEE THE "QUADGUARD SYSTEM PRODUCT MANUAL" FOR A DESCRIPTION OF THE SYSTEMS AVAILABLE AND THE LIMITATIONS OF EACH SYSTEM. COPIES OF THE MANUAL ARE AVAILABLE BY CALLING CUSTOMER SERVICE DEPARTMENT AT (888) 323-6374.

BAYS	TYPE I	TYPE II	MAX DESIGN SPEED	# OF CARTRIDGES	
				TYPE I	TYPE II
3	70 [44]	3	1		
4	80 [50]	3	2		
5	90 [56]	4	2		
6	100 [62]	4	3		

REFERENCES

SERIAL NO.	DESCRIPTION
607173	DIAPHRAGM ASSY.
611511	NOSE ASSY.
608241	FENDER PANEL ASSY.
604513	BACKUP ASSY.
35-40-06	MONORAIL ASSY.
3540411-0000	CONCRETE PAD
N/A	TRANSITION ASSY.
N/A	WHEEL DEFLECTOR ASSY.

KEY

QUADGUARD CARTRIDGE	DESCRIPTION
1	QUADGUARD CARTRIDGE
2	DIAPHRAGM
3	FENDER PANEL
4	MONORAIL
5	NOSE ASSEMBLY
6	BACKUP

QUADGUARD SYSTEM

DATE	BY	DESCRIPTION
7/11/97 <td>J. ESPINOZA <td>ISSUE NO. 1</td> </td>	J. ESPINOZA <td>ISSUE NO. 1</td>	ISSUE NO. 1
7/17/97 <td>J. MACHADO <td>ISSUE NO. 2</td> </td>	J. MACHADO <td>ISSUE NO. 2</td>	ISSUE NO. 2

DO NOT SCALE DRAWING

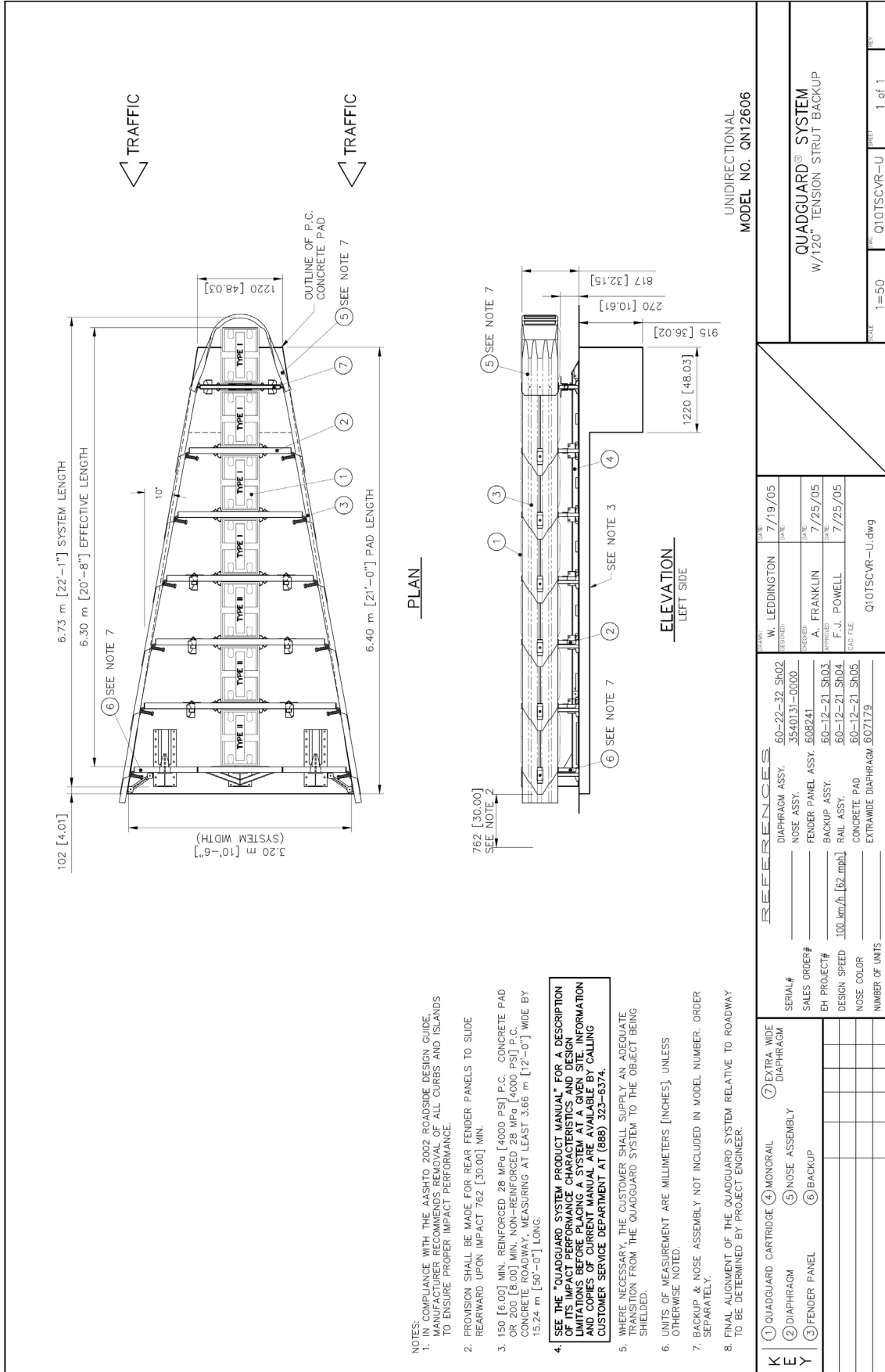
UNDIRECTIONAL

69" or 90" SYSTEM W/ CONCRETE BACKUP

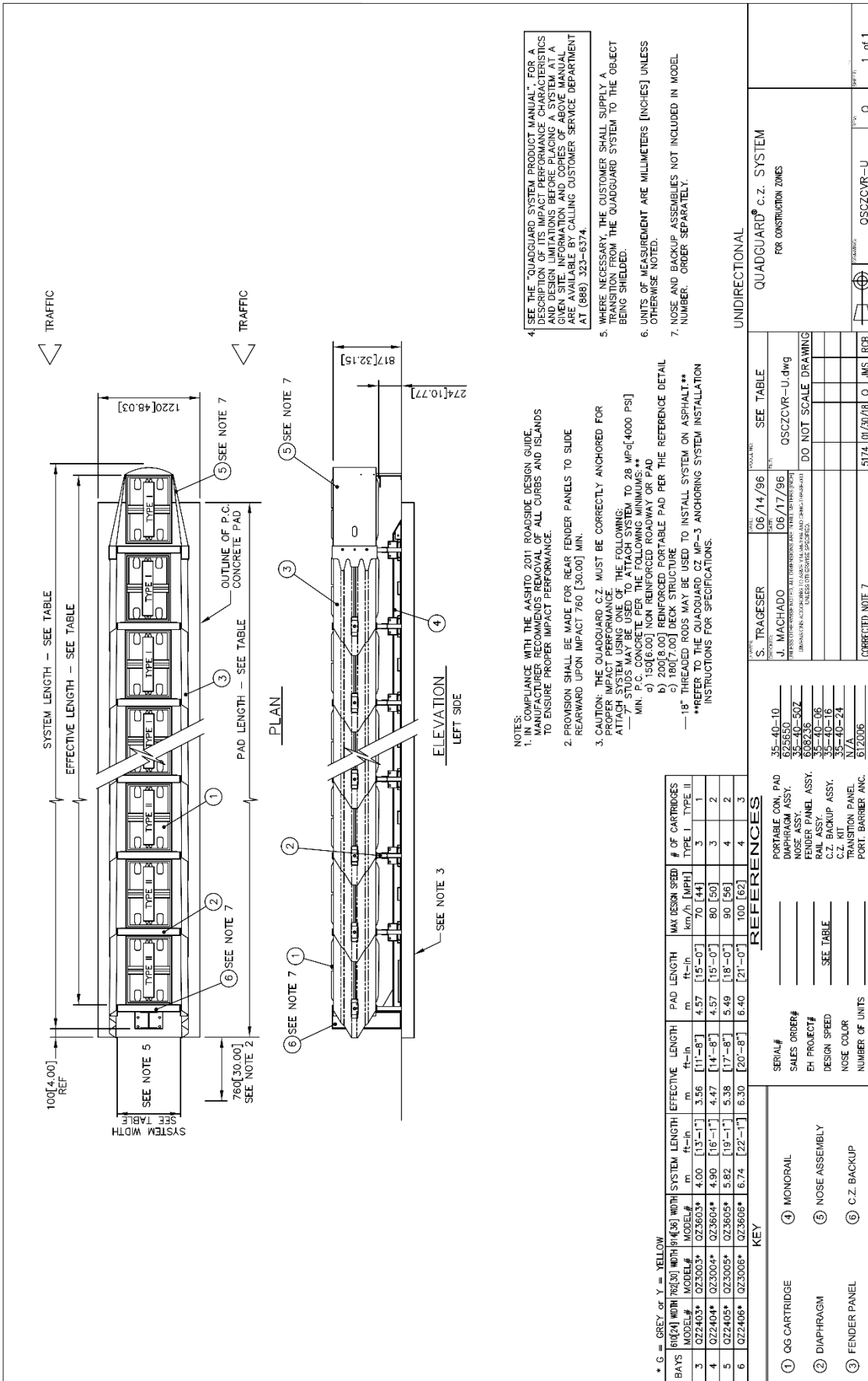
QFCBCVR-U

1 of 1

69 or 90 System w/ Concrete Backup QFCBCVR-U



120 System w/ Tension Strut Backup Q10TSCVR-U



SEE THE "QUADGUARD SYSTEM PRODUCT MANUAL" FOR A COMPLETE LIST OF PARTS AND SPECIFICATIONS 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.

WHERE NECESSARY, THE CUSTOMER SHALL SUPPLY A TRANSITION FROM THE QUADGUARD SYSTEM TO THE OBJECT BEING SHIELDED.
UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
NOSE AND BACKUP ASSEMBLIES NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.

NOTE: IN COMPLIANCE WITH THE ASHTO 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 750 [30.00] MIN.

CAUTION: THE QUADGUARD C.Z. MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE.
ATTACH SYSTEM USING ONE OF THE FOLLOWING:
a) MIN. P.C. CONCRETE PER THE FOLLOWING MINIMUMS:
i) 150(6.00) NON REINFORCED ROADWAY OR PAD
ii) 200(8.00) REINFORCED PORTABLE PAD PER THE REFERENCE DETAIL
c) 180(7.00) DECK STRUCTURE
d) 18" THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT.
**REFER TO THE QUADGUARD CZ MP-3 ANCHORING SYSTEM INSTALLATION INSTRUCTIONS FOR SPECIFICATIONS.

UNIDIRECTIONAL
QUADGUARD® c.z. SYSTEM
FOR CONSTRUCTION ZONES

KEY		REFERENCES	
1	OG CARTRIDGE	4	MONORAIL
2	DIAPHRAGM	5	NOSE ASSEMBLY
3	FENDER PANEL	6	C.Z. BACKUP
BAYS		PORTABLE CON. PAD	
6	02Z403*	02Z3003*	02Z3603*
3	02Z403*	02Z3003*	02Z3603*
4	02Z404*	02Z3004*	02Z3604*
5	02Z405*	02Z3005*	02Z3605*
6	02Z406*	02Z3006*	02Z3606*

DATE	BY	DESCRIPTION
06/14/96	S. TRAGESER	ISSUE 1
06/17/96	J. MACHADO	ISSUE 2
UNLESS OTHERWISE SPECIFIED:		
DIMENSIONS UNLESS OTHERWISE SPECIFIED		
DO NOT SCALE DRAWING		
CORRECTED NOTE 7		
DATE	BY	DESCRIPTION
06/14/96	S. TRAGESER	ISSUE 1
06/17/96	J. MACHADO	ISSUE 2
UNLESS OTHERWISE SPECIFIED:		
DIMENSIONS UNLESS OTHERWISE SPECIFIED		
DO NOT SCALE DRAWING		
CORRECTED NOTE 7		

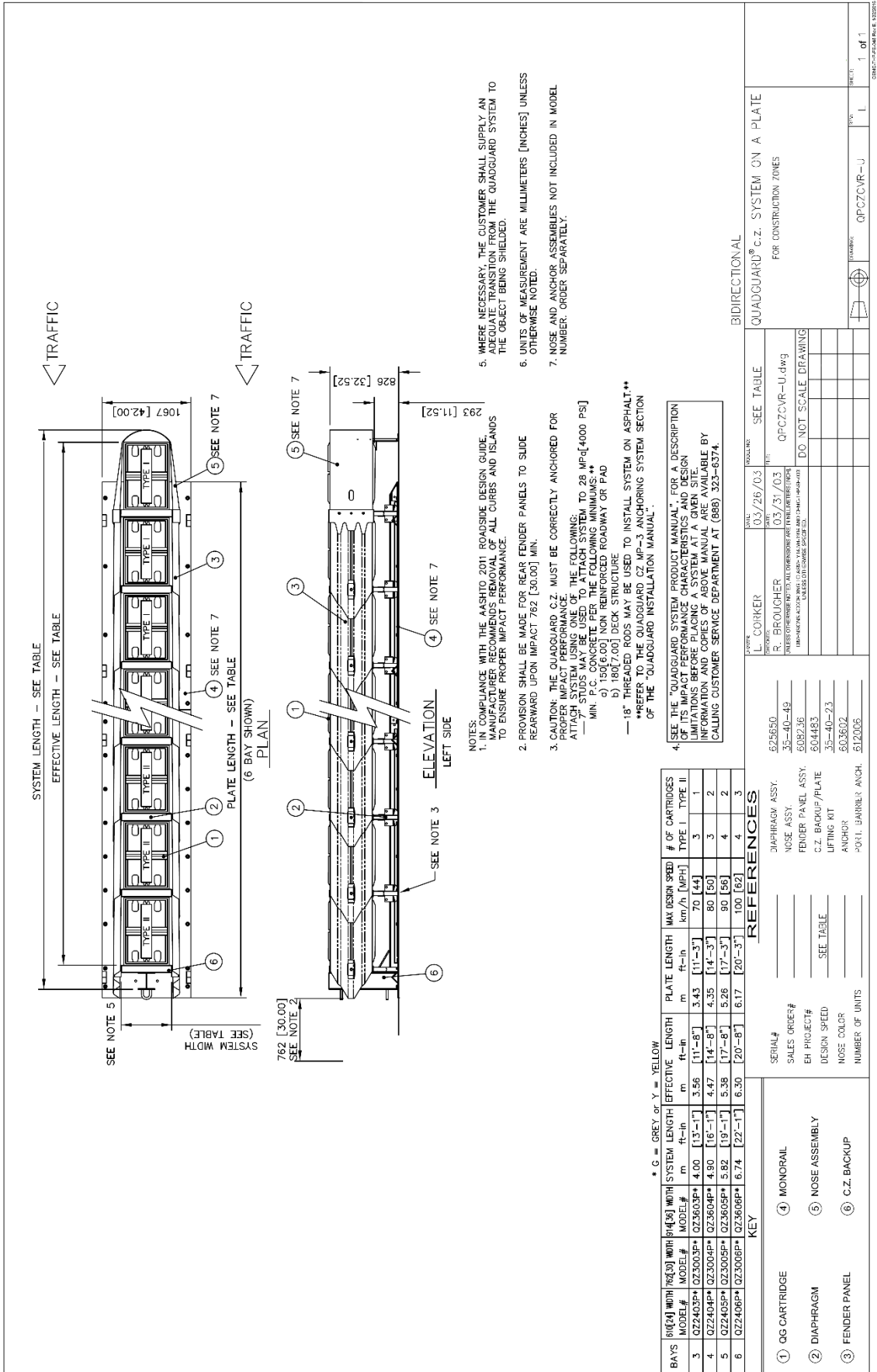
CZ for Construction Zones **QSCZCVR-U**

UNIDIRECTIONAL
QUADGUARD® c.z. SYSTEM
FOR CONSTRUCTION ZONES

DATE	BY	DESCRIPTION
06/14/96	S. TRAGESER	ISSUE 1
06/17/96	J. MACHADO	ISSUE 2
UNLESS OTHERWISE SPECIFIED:		
DIMENSIONS UNLESS OTHERWISE SPECIFIED		
DO NOT SCALE DRAWING		
CORRECTED NOTE 7		

DATE	BY	DESCRIPTION
06/14/96	S. TRAGESER	ISSUE 1
06/17/96	J. MACHADO	ISSUE 2
UNLESS OTHERWISE SPECIFIED:		
DIMENSIONS UNLESS OTHERWISE SPECIFIED		
DO NOT SCALE DRAWING		
CORRECTED NOTE 7		

UNIDIRECTIONAL
QUADGUARD® c.z. SYSTEM
FOR CONSTRUCTION ZONES



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. NOSE AND ANCHOR ASSEMBLIES NOT INCLUDED IN MODEL NUMBER. ORDER SEPARATELY.

1. IN COMPLIANCE WITH THE AASHTO 2011 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS TO ENSURE PROPER IMPACT PERFORMANCE.
2. PROMSION SHALL BE MADE FOR REAR FENDER PANELS TO SLIDE REARWARD UPON IMPACT 762 [30.00] MIN.
3. CAUTION, THE QUADGUARD C.Z. MUST BE CORRECTLY ANCHORED FOR PROPER IMPACT PERFORMANCE. ATTACH SYSTEM USING ONE OF THE FOLLOWING:
 - a) STUDS MAY BE USED TO ATTACH SYSTEM TO 28 MPa(4000 PSI) MIN. P.C. CONCRETE PER THE FOLLOWING MINIMUMS:**
 - b) 150(6.00) NON REINFORCED ROADWAY OR PAD
 - c) 100(7.00) DECK STRUCTURE
 - ** 18" THREADED RODS MAY BE USED TO INSTALL SYSTEM ON ASPHALT PER THE QUADGUARD C.Z. ANCHORING SYSTEM SECTION OF THE QUADGUARD INSTALLATION MANUAL.

4. SEE THE "QUADGUARD 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.

BAYS	WIDTH	WIDTH	WIDTH	EFFECTIVE LENGTH	PLATE LENGTH	MAX DESIGN SPEED	# OF CARTRIDGES	
	MODEL#	MODEL#	MODEL#	FT-IN	FT-IN	MPH	TYPE I	TYPE II
3	022403P*	023003P*	023603P*	4.00 [13'-1"]	3.43 [11'-3"]	70 [44]	3	1
4	022404P*	023004P*	023604P*	4.80 [16'-1"]	4.47 [14'-8"]	80 [50]	3	2
5	022405P*	023005P*	023605P*	5.82 [19'-1"]	5.26 [17'-8"]	90 [56]	4	2
6	022406P*	023006P*	023606P*	6.74 [22'-1"]	6.17 [20'-3"]	100 [62]	4	3

REFERENCES

DIAPHRAGM ASSY.	526650
NOSE ASSY.	35-40-49
FENDER PANEL ASSY.	508246
C.Z. BACKUP/PLATE	50483
LIFTING KIT	35-40-23
ANCHOR	503502
PORTL. BARRIER ANCH.	512005

KEY	DESCRIPTION
①	OG CARTRIDGE
②	DIAPHRAGM
③	FENDER PANEL
④	MONORAIL
⑤	NOSE ASSEMBLY
⑥	C.Z. BACKUP

REFERENCES

DATE	03/26/03	SCALE	AS SHOWN
DESIGNED BY	L. CORKER	DRAWING NO.	QPZCVR-U.dwg
CHECKED BY	R. BROUJER	DATE	03/29/03
APPROVED FOR RELEASE (DATE: 12/01/01)		FOR CONSTRUCTION ZONES	
DO NOT SCALE DRAWING			

BIDIRECTIONAL

QUADGUARD® C.Z. SYSTEM ON A PLATE

FOR CONSTRUCTION ZONES

DATE

DESIGNED BY

CHECKED BY

APPROVED FOR RELEASE (DATE: 12/01/01)

SCALE

DRAWING NO.

DATE

FOR CONSTRUCTION ZONES

DO NOT SCALE DRAWING

PROJECT

QUADGUARD® C.Z. SYSTEM ON A PLATE

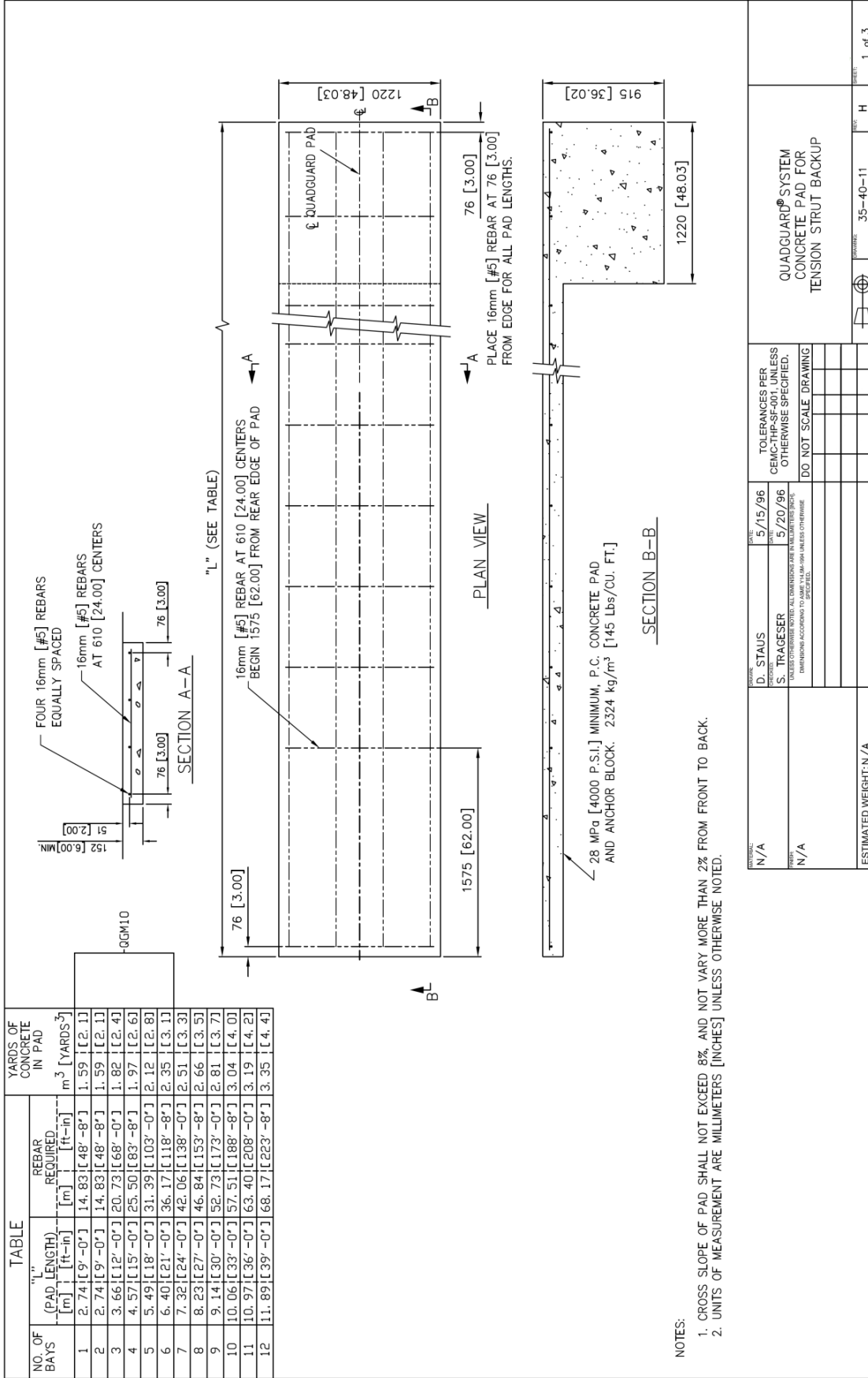
FOOTING

QPZCVR-U

SHEET

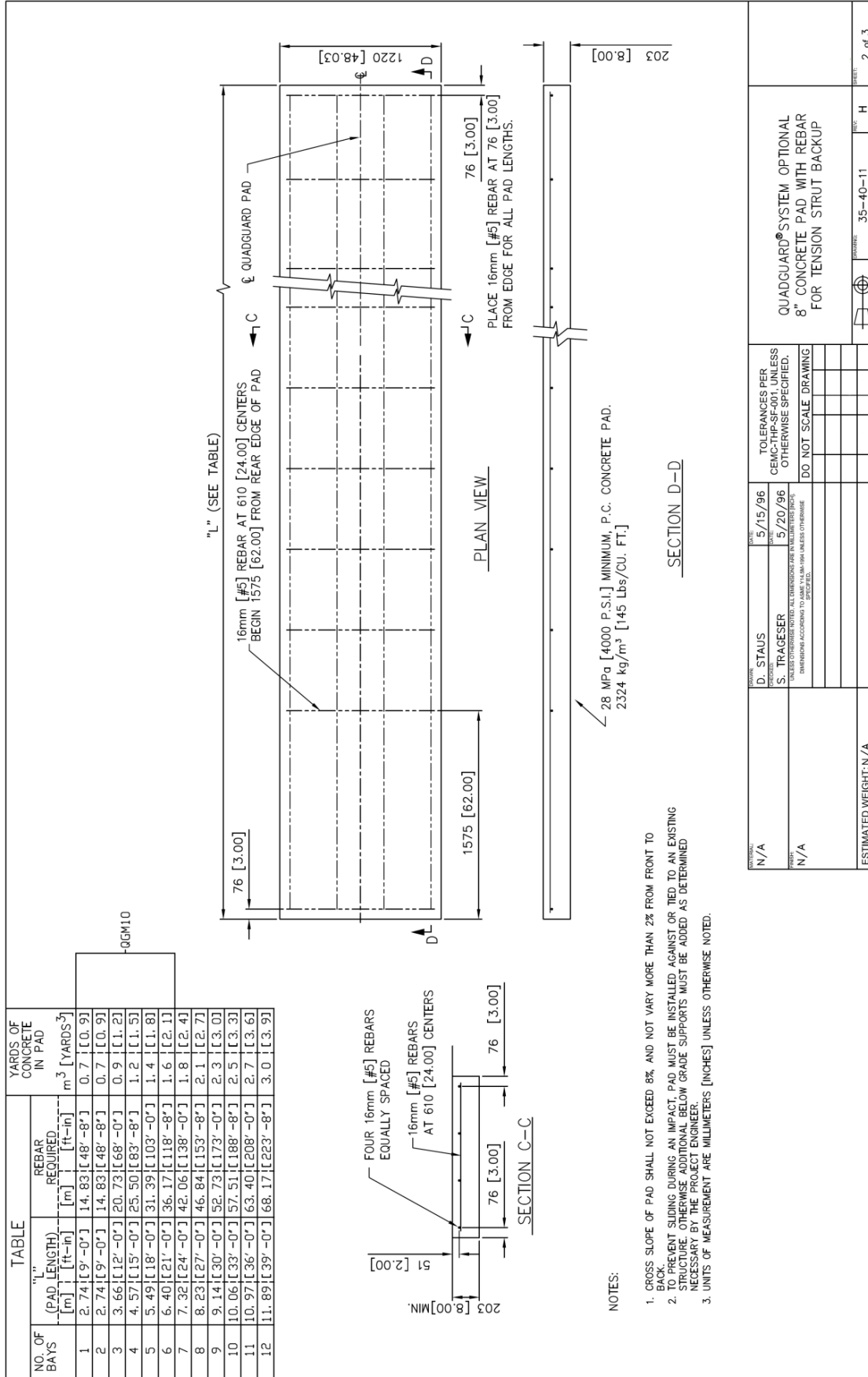
1 of 1

CZ System on a Plate QPCZVR-U



Concrete Pad for Tension Strut Backup 35-40-11

DATE: 5/15/96	TOLERANCES PER CEMC-THP-SF-001, UNLESS OTHERWISE SPECIFIED.	
DESIGNED BY: D. STAUS	DO NOT SCALE DRAWING	
CHECKED BY: S. TRACER		
DATE: 5/20/96		
SCALE: AS SHOWN		
PROJECT: QUADGUARD® SYSTEM CONCRETE PAD FOR TENSION STRUT BACKUP		
ESTIMATED WEIGHT: N/A		
REVISIONS:		
NO.	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		



Optional 8" Concrete Pad for Tension Strut Backup

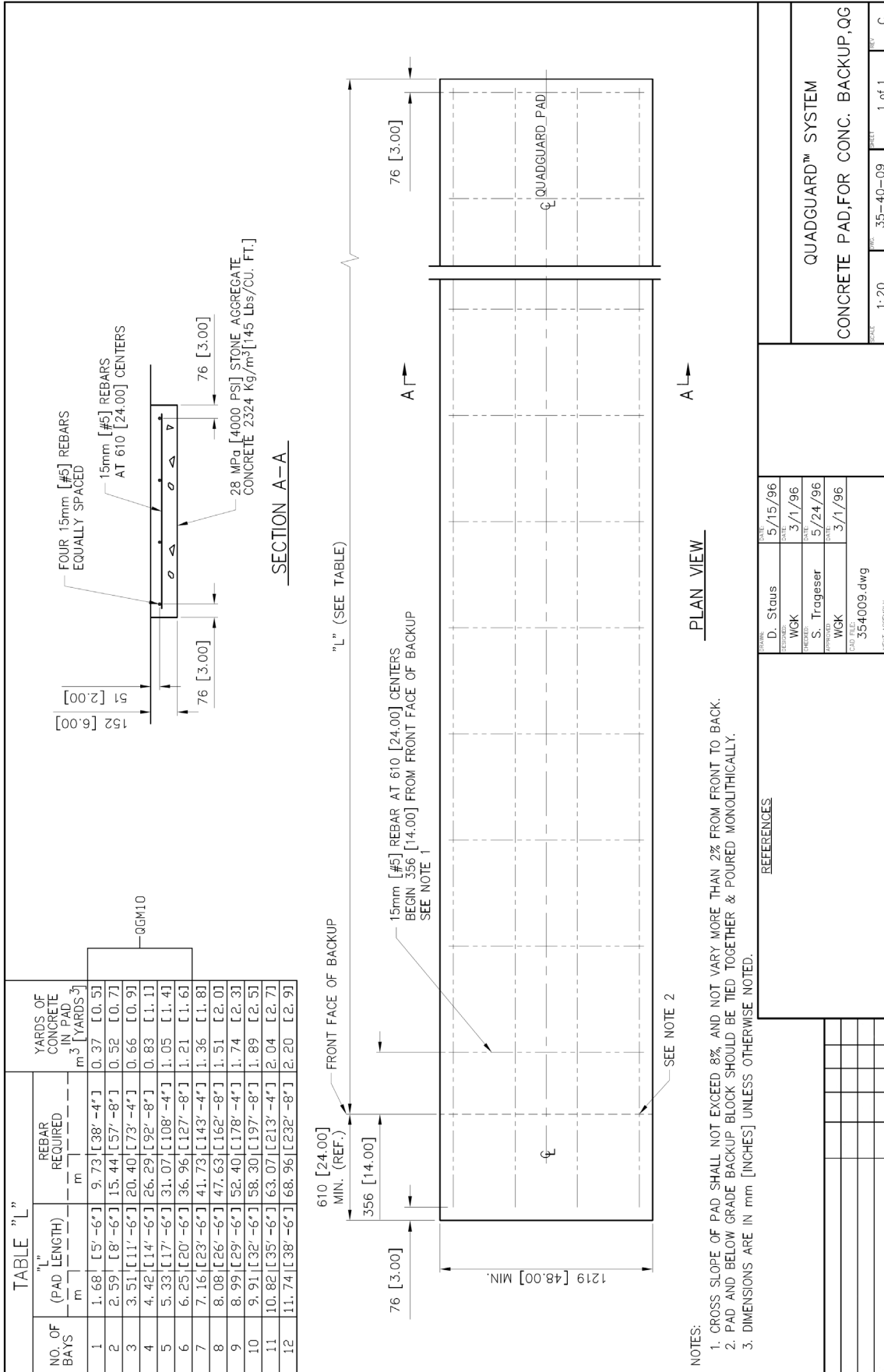
PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	RECD
1	SEE TABLE A	BACKUP, TS, QG, G	1.00
2	611898G	PANEL, SIDE, QG, G	2.00
9	603673B	ANCHOR, MP-3, PT-KIT, 3/AX7, VT	3.00
10	003340G	NUT, HX, 5/8, G, RAIL	4.00
11	003400G	BOLT, RAIL, 5/8X2, G	4.00
12	605447B	BRACKET, CARTRIDGE, SUPPORT, TS, B/U	1.00
13	611266B	LOCKING BAR, CARTRIDGE, SUPPORT	1.00

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

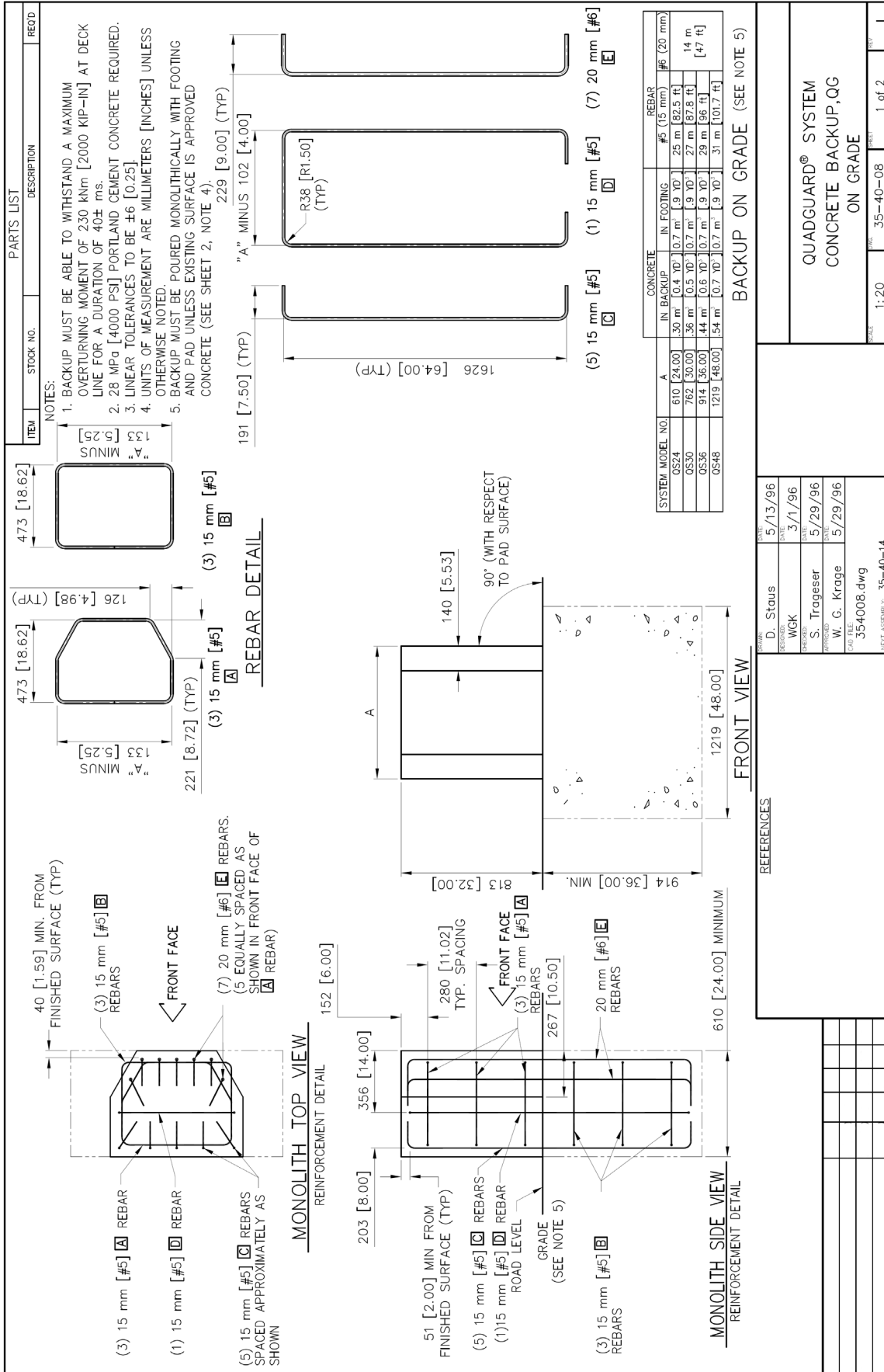
NOTES:
 1. WHEN TRANSITIONING QUADGUARD SYSTEM TO EXISTING BARRIER REFER TO THE TRANSITION ASSEMBLY DRAWINGS FOR PROPER USE OF SIDE PANEL PART NO. 611898G.

REFERENCES	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DATE</td> <td>4/22-96</td> </tr> <tr> <td>DESIGNED BY</td> <td>JWM/WHO</td> </tr> <tr> <td>DATE</td> <td>3-1-96</td> </tr> <tr> <td>ENGINEER</td> <td>S. Trageser</td> </tr> <tr> <td>DATE</td> <td>5/16/96</td> </tr> <tr> <td>APPROVED</td> <td>J. Machado</td> </tr> <tr> <td>DATE</td> <td>5/16/96</td> </tr> <tr> <td>CAD FILE</td> <td>354003.dwg</td> </tr> <tr> <td colspan="2">NEXT ASSEMBLY:</td> </tr> </table>	DATE	4/22-96	DESIGNED BY	JWM/WHO	DATE	3-1-96	ENGINEER	S. Trageser	DATE	5/16/96	APPROVED	J. Machado	DATE	5/16/96	CAD FILE	354003.dwg	NEXT ASSEMBLY:		ASSEMBLY NO. SEE TABLE A
DATE	4/22-96																			
DESIGNED BY	JWM/WHO																			
DATE	3-1-96																			
ENGINEER	S. Trageser																			
DATE	5/16/96																			
APPROVED	J. Machado																			
DATE	5/16/96																			
CAD FILE	354003.dwg																			
NEXT ASSEMBLY:																				
QUADGUARD® SYSTEM BACKUP ASSY, TS, QG																				
	SCALE: N.T.S.	TYP: 35-40-03																		
		1 of 1																		

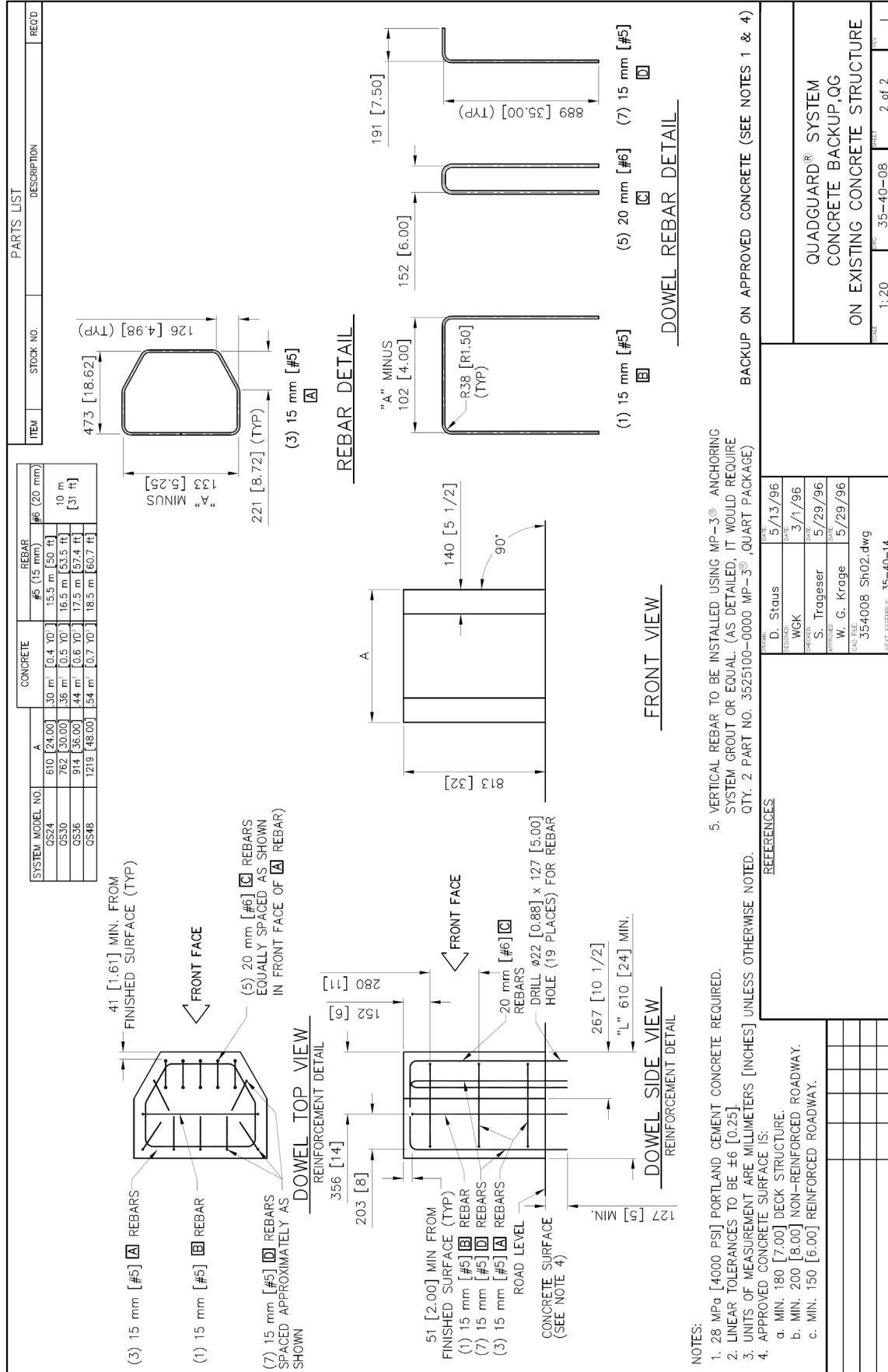
Backup Assembly, TS 35-40-03



Concrete Pad for Concrete Backup 35-40-09



Concrete Backup on Grade 35-40-08



Concrete Backup on Existing Concrete Structure

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	BACKUP CONCRETE FRONT FACE.OG	1
2	619315	ANCH KIT.HLT.3/4X6 1/2(4)	1
3	611888	PANEL SIDE.OG	2
10	603340	NUT.HX.5/8.G.RAIL	4
11	603400	BOLT.RAIL.5/8X2.G	4
15	619316	ANCHOR KIT.HLT.3/4X7.(4)	2
16	611370	MONORAIL.1 BAY.OG	1

TABLE		
ASSY NO.	DESCRIPTION	WIDTH
604507	BACKUP ASSY CONCRETE.24.OG	610 [24.0]
604508	BACKUP ASSY CONCRETE.30.OG	767 [30.0]
604509	BACKUP ASSY CONCRETE.36.OG	914 [36.0]
604511	BACKUP ASSY CONCRETE.48.OG	1219 [48.0]

NOTES:

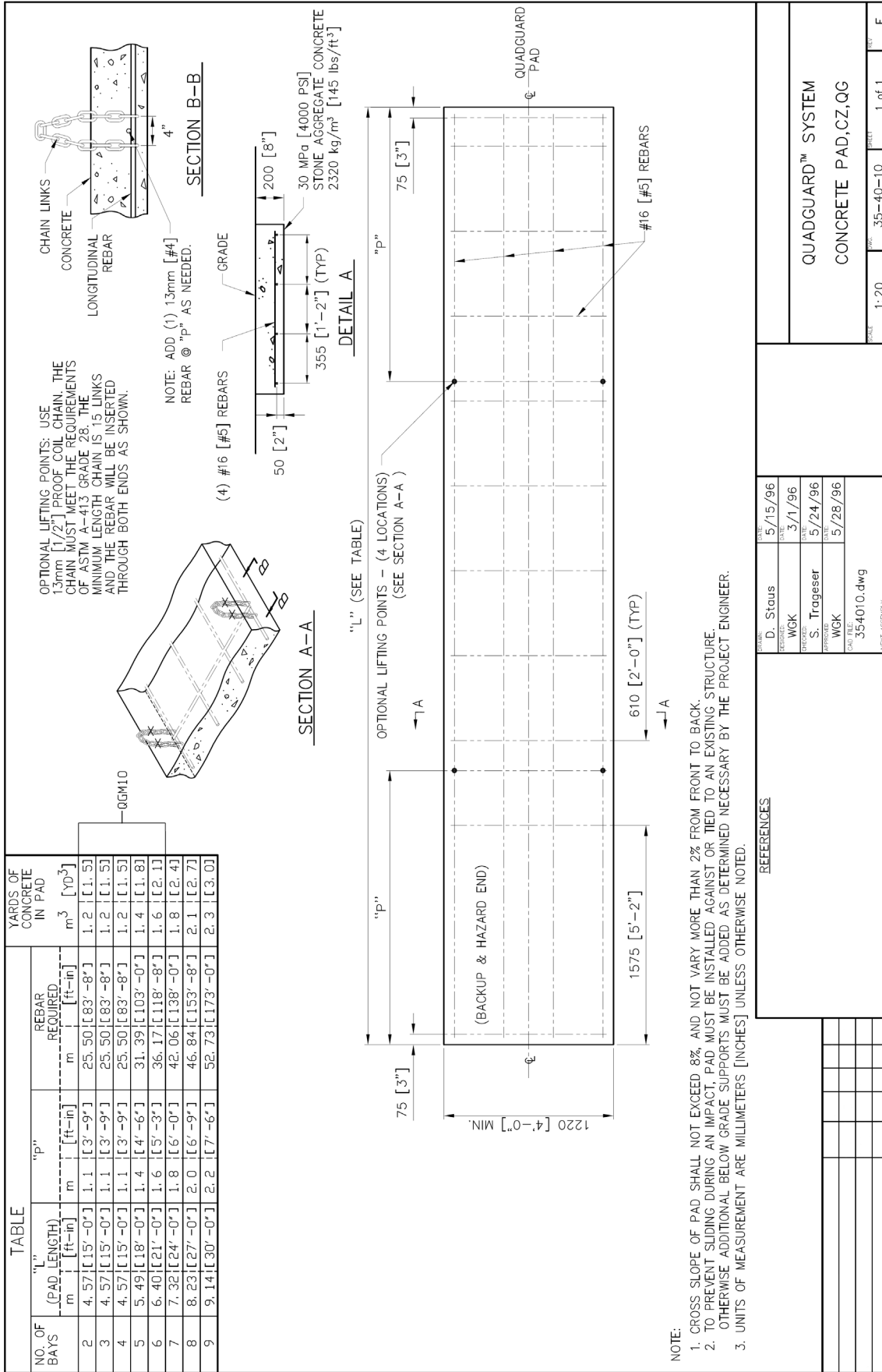
- USE ITEMS 1 AND 16 TO LOCATE HOLES IN CONCRETE.
- ITEMS 1 AND 16 TO BE CENTERED WITH CONCRETE BACKUP FACE.
- ANCHOR STUDS LOCATED IN UPPER VALLEY MUST EXTEND APPROXIMATELY 57 [2.25] FROM FACE OF CONCRETE TO FASTEN NUTS. WASHERS MAY BE OMITTED.
- ANCHOR STUDS LOCATED IN UPPER VALLEY MUST EXTEND APPROXIMATELY 57 [2.25] FROM FACE OF CONCRETE TO FASTEN NUTS. WASHERS MAY BE OMITTED.

REFERENCES	CONCRETE BACKUP.OG WIDE	35-40-08	DATE	BY
SERIAL NO.			5/24/1996	D. Stalus
SALES ORDER			6/5/1996	W. Krapp
EH PROJECT			UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS IN PARENTHESES ARE METRIC EQUIVALENTS. DIMENSIONS ARE NOT TO SCALE.	
DESIGN SPEED			DO NOT SCALE DRAWING	
NOSE TYPE				
NO. OF UNITS				

QUADGUARD[®] SYSTEM	
BACKUP ASSY, CONCRETE.OG	
	604507
1 of 1	K

Backup Assembly, Concrete 604507

11/10/2022 10:00 AM



NOTE:

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

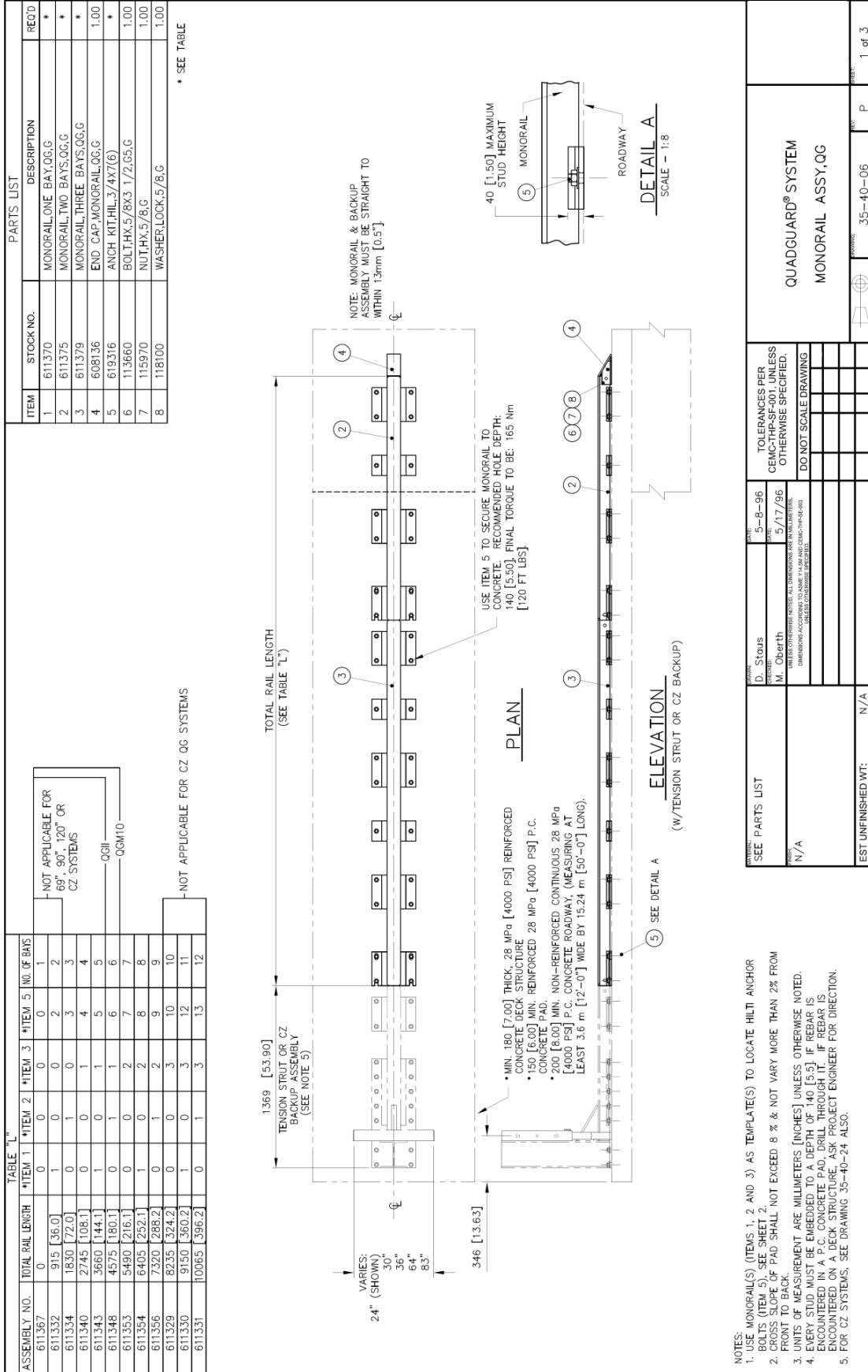
REFERENCES

DESIGNED BY	D. Staus	DATE	5/15/96
CHECKED BY	WGK	DATE	3/1/96
APPROVED BY	S. Trageser	DATE	5/24/96
DATE FILED	WGK	DATE	5/25/96
FILE NAME	354010.dwg		
SCALE	SEE ASSOCIATED		

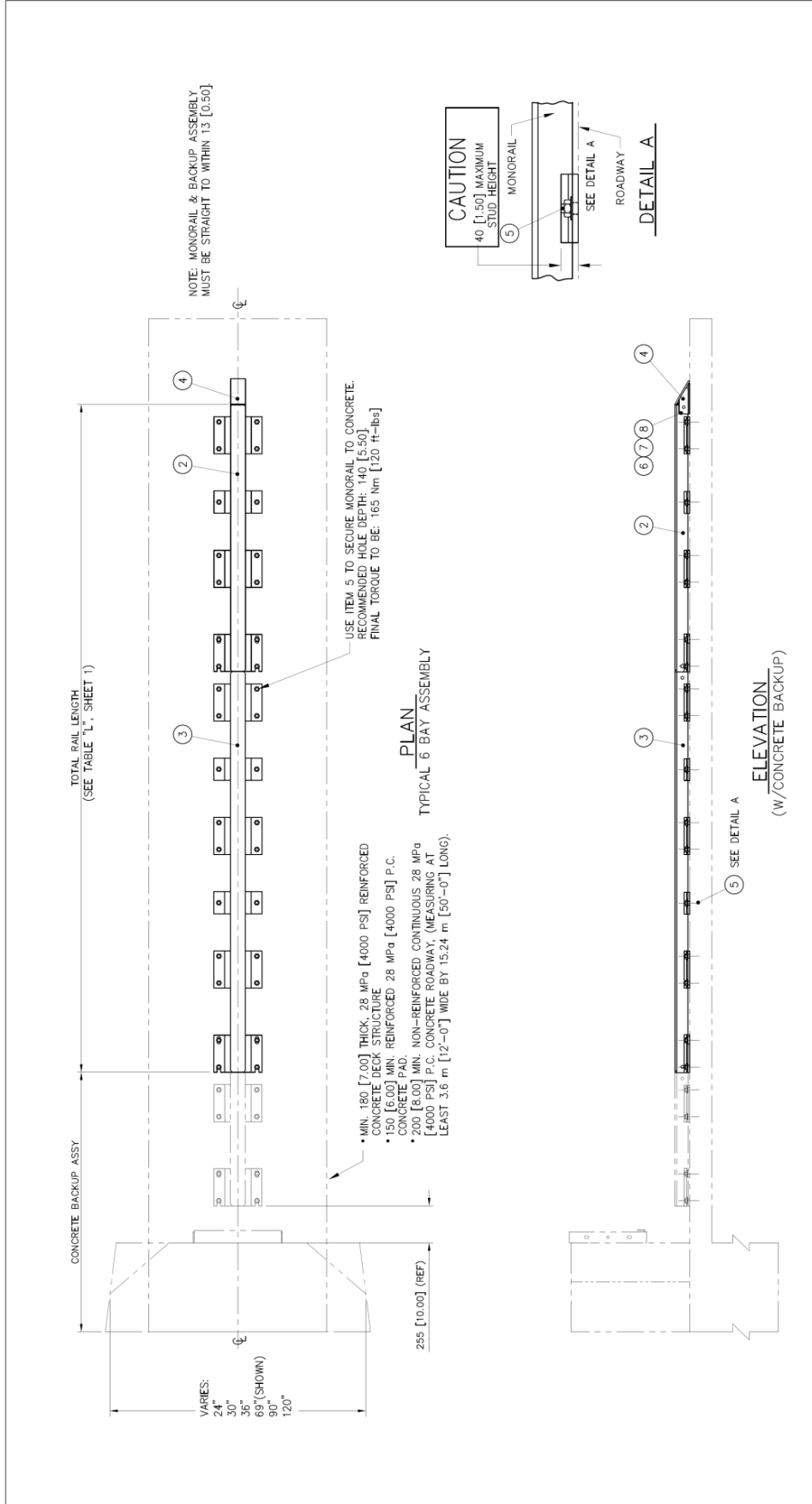
QUADGUARD™ SYSTEM
CONCRETE PAD,CZ,OG

SCALE: 1:20
PART: 35-40-10
REV: 1 of 1
F

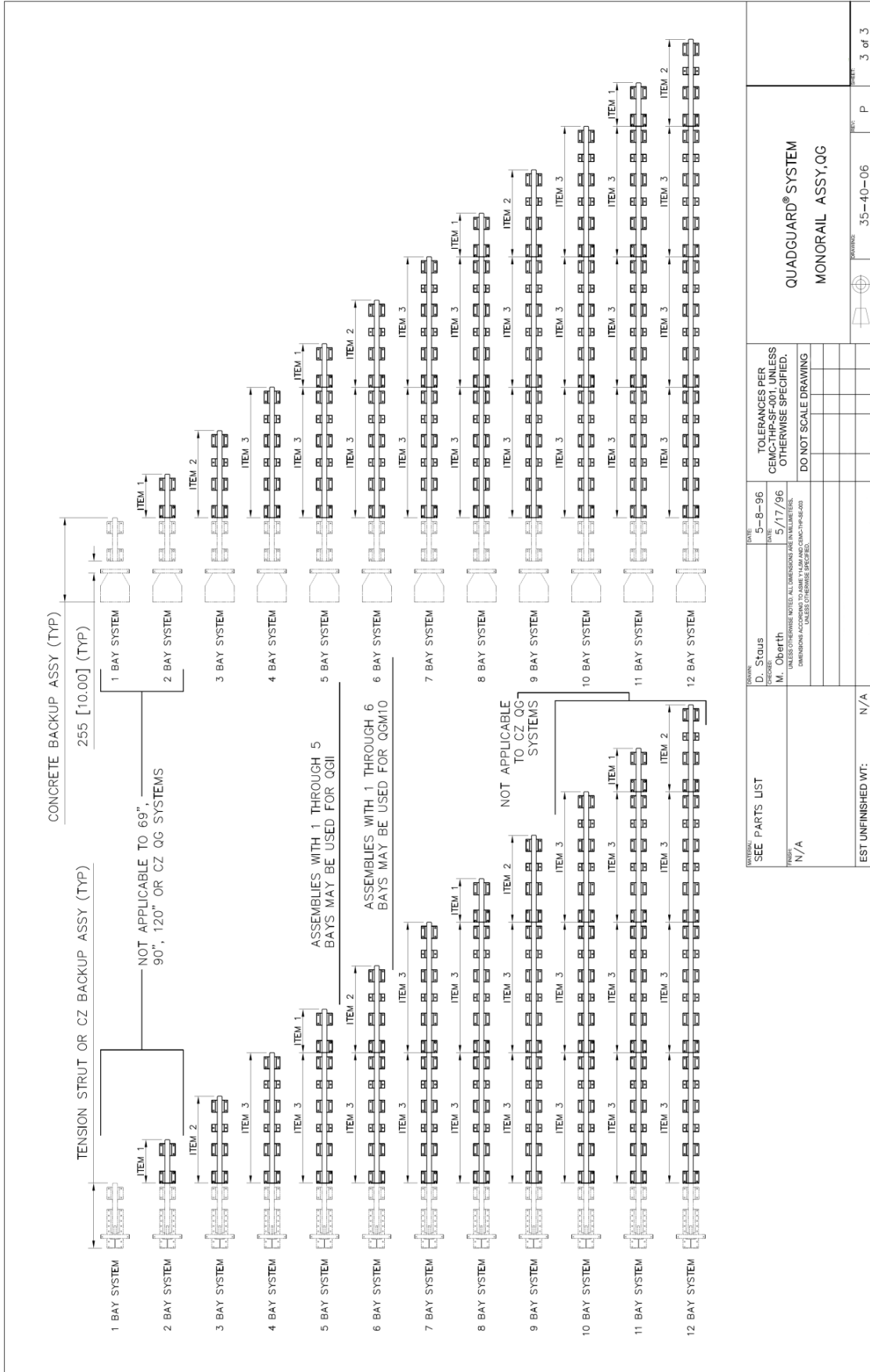
Concrete Pad, CZ 35-40-10



Monorail Assembly 35-40-06

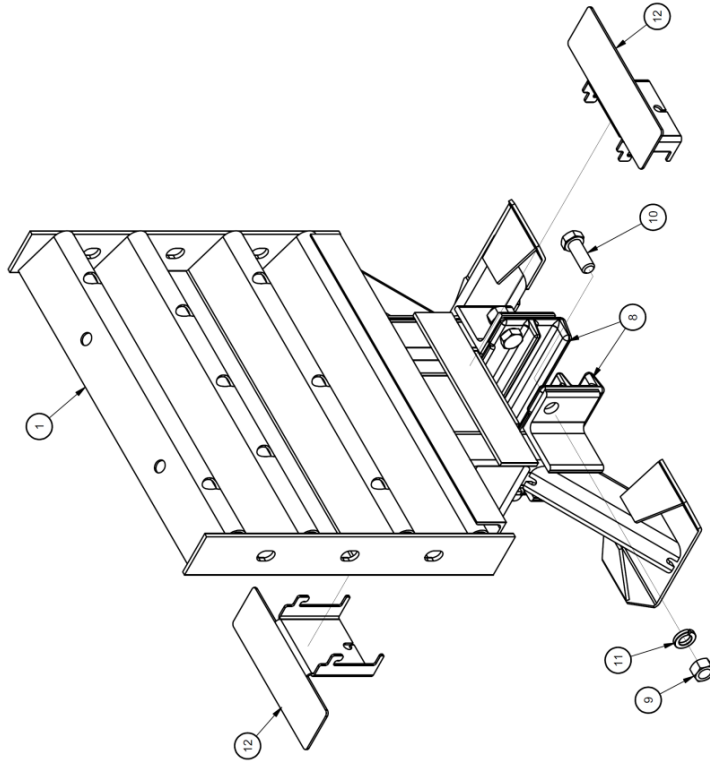


DATE: 5-8-96	DATE: 5/17/96	TOLERANCES PER CEMC-THP-SF-001, UNLESS OTHERWISE SPECIFIED.	
DRAWN: D. Staus	DESIGNED: M. Oberrath	DO NOT SCALE DRAWING	
CHECKED: M. Oberrath		DIMENSIONS ACCORDING TO ASME Y14.5M AND EN/C/ISO-8033 UNLESS OTHERWISE SPECIFIED.	
MATERIAL: SEE PARTS LIST		FINISH: N/A	
EST UNFINISHED WT: N/A		PAPER: 35-40-06	
N/A		SHEET: 2 of 3	



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	SEE TABLE	1
8	811388	MONORAIL GUIDE, QG.G	2
9	003704	3/4" HVY HEX NUT A563 DH	4
10	113555	BOLT, HX, 3/4X2, QG.G	4
11	118089	WASHER, LOCK, 3/4, G	4
12	805446	BRACKET, CARTRIDGE, SUPT, DIA, FOLDED, QG.G	2

ASSY. NO.	ITEM 1	DESCRIPTION	WIDTH
625650	625647	DIAPHRAGM, QB, 24, QG.G	610 [24.00]
625651	625648	DIAPHRAGM, QB, 30, QG.G	760 [30.00]
625652	625649	DIAPHRAGM, QB, 36, QG.G	915 [36.00]
606810	607638	DIAPHRAGM, QB, 48, QG.G	1215 [48.00]

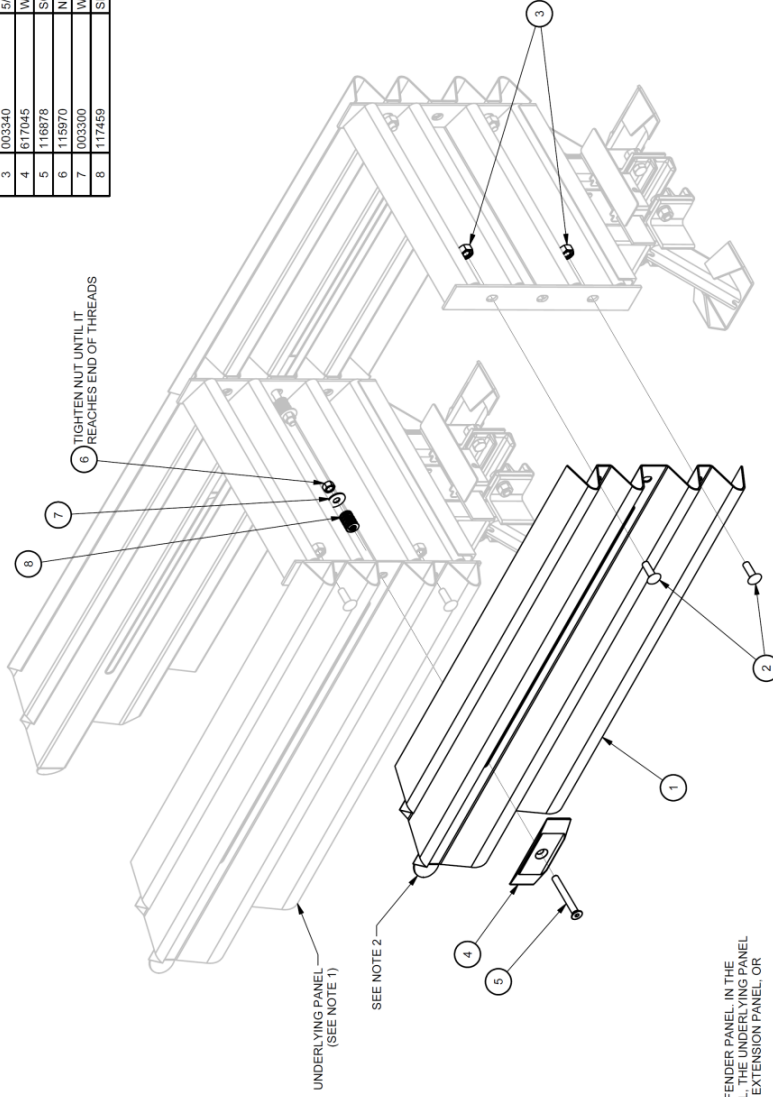


NOTE:
1. QUADGUARD II REQUIRES THE SHIM KIT. SEE 614050.

W. Laddington 4/13/2016 DATE		SEE TABLE 625650 idw	
A. Van Brocklin 4/28/2016 DATE		DO NOT SCALE DRAWING	
DIMENSIONS ACCORDING TO ASME Y14.5M AND Y14.5M-2009 UNLESS OTHERWISE SPECIFIED.			
PARTS LIST		PART B	
625650		1 of 3	

Diaphragm Assembly 625650

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	611832	PANEL,FENDER,QG	1
2	003400	BOLT,RAIL,5/8X2,G	2
3	003400	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	115970	NUT,HX,5/8,G	1
7	003300	WASHER,FLAT,5/8 X 1.314,G	1
8	117459	SPRING,DIE,1/4 ODX9/16X1-1/2,G	1



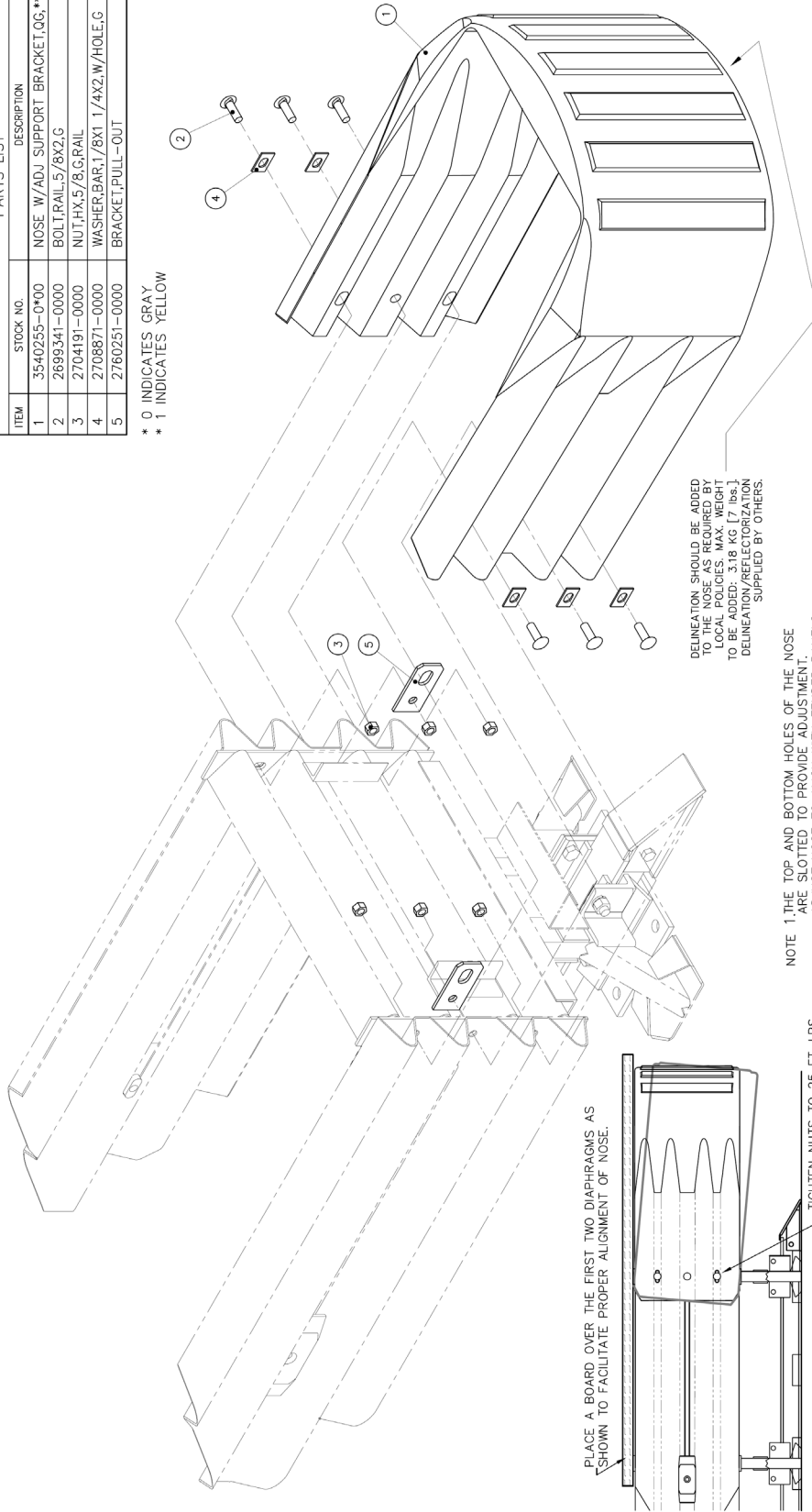
NOTES:
 1. UNDERLYING PANEL IS ANOTHER FENDER PANEL. IN THE CASE OF THE LAST FENDER PANEL, THE UNDERLYING PANEL COULD BE A BACKUP SIDE PANEL, EXTENSION PANEL, OR UNDERLYING PANEL.
 2. THERE IS TO BE A 201 (789) MAX. GAP BETWEEN ANY FENDER PANEL AND THE UNDERLYING PANEL.

QUADGUARD® FENDER PANEL, ASSY, QG		REV K	PART 1 of 1
DRAWN J. Espinoza	DATE 5/21/1996	CHECKED J. Machado	DATE 5/21/1996
TITLE 608236.dwg		DO NOT SCALE DRAWING	
DIMENSIONS ACCORDING TO AIAE, IFA, IMA AND SMC (IF APPLICABLE) UNLESS OTHERWISE SPECIFIED			
QUADGUARD® FENDER PANEL, ASSY, QG		PART NO. 608236	REV K

Fender Panel Assembly 608236

ITEM	STOCK NO.	DESCRIPTION	RECD.
1	3540255-0*00	NOSE W/ADJ SUPPORT BRACKET,QG,**	1.00
2	2699341-0000	BOLT,RAIL-5/8X2,G	6.00
3	2704191-0000	NUT,HX.5/8,G,RAIL	6.00
4	2708871-0000	WASHER,BAR,1/8X1 1/4X2,W/HOLE,G	6.00
5	2760251-0000	BRACKET,PULL-OUT	2.00

* 0 INDICATES GRAY
 ** 1 INDICATES YELLOW



PLACE A BOARD OVER THE FIRST TWO DIAPHRAGMS AS SHOWN TO FACILITATE PROPER ALIGNMENT OF NOSE.

TIGHTEN NUTS TO 25 FT-LBS AFTER ALIGNING NOSE AS SHOWN.

DETAIL "A"
 SCALE: 1:20

DELIMITATION SHOULD BE ADDED TO THE NOSE AS REQUIRED BY LOCAL POLICIES. MAX. WEIGHT TO BE ADDED: 3.18 KG [7 lbs.]. DELIMITATION/REFLECTORIZATION SUPPLIED BY OTHERS.

NOTE 1, THE TOP AND BOTTOM HOLES OF THE NOSE ARE SLOTTED TO PROVIDE ADJUSTMENT. ADJUST NOSE TO ALIGN WITH FENDER PANELS THEN TIGHTEN NUTS, SEE DETAIL "A".

ASSEMBLY NO. 3540050-0100 (YELLOW)
 ASSEMBLY NO. 3540050-0000 (GRAY)

REFERENCES	
DESIGNED BY	D. Staus
DATE	5/20/96
DESIGNED BY	MHO/JVM
DATE	3/1/96
APPROVED BY	S. Trageser
DATE	5/21/96
APPROVED BY	M. Oberth
DATE	5/22/96
CAD FILE	354005.dwg
PROJECT ASSEMBLY	

QUADGUARD® SYSTEM
 NOSE ASSY,QG

SCALE	1:10	REV	35-40-05	1 of 1	H
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Nose Assembly 35-40-05

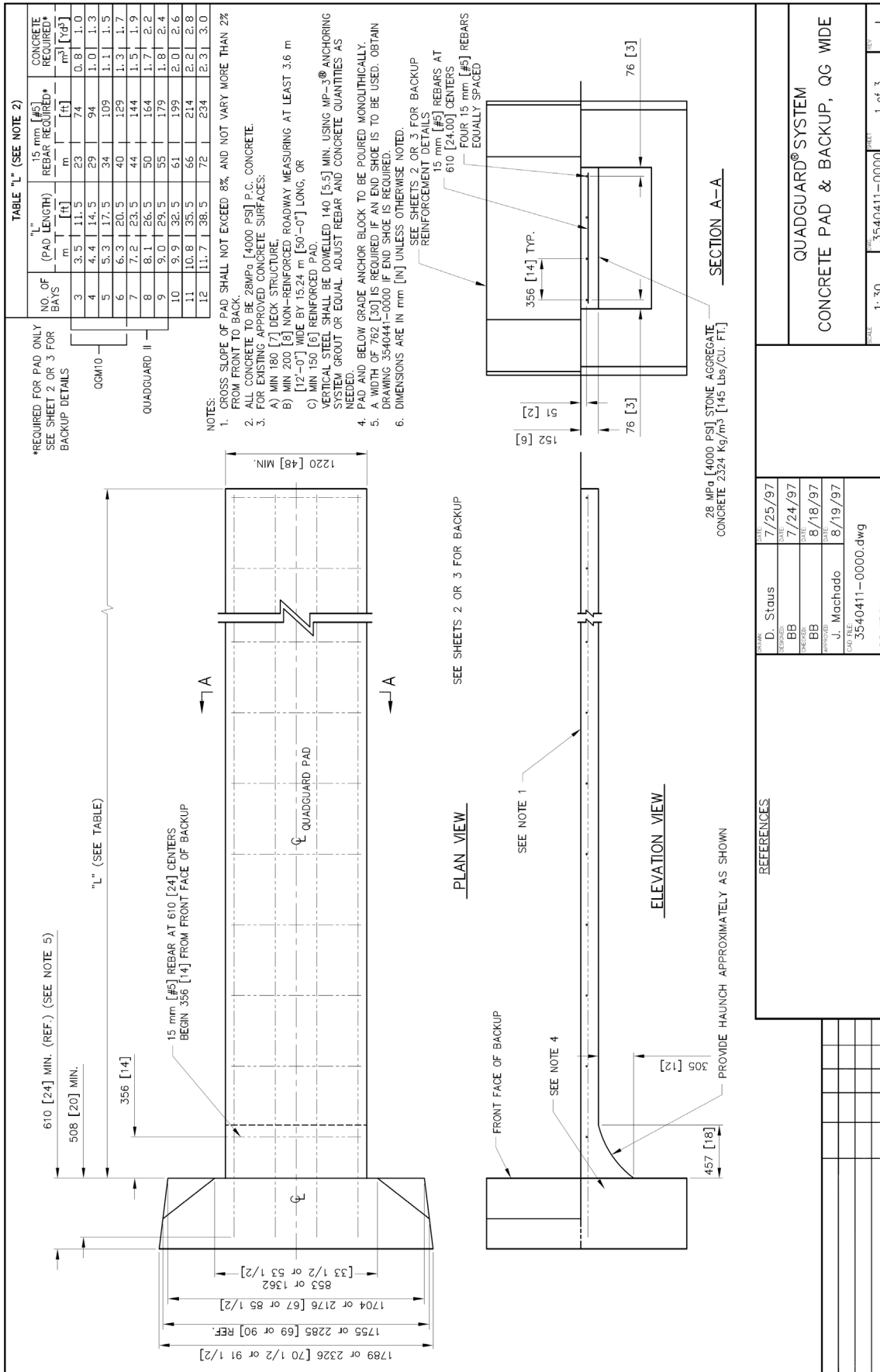
ITEM	DESCRIPTION	PARTS LIST
1	BACKUP TS.WIDE.WIDE/CAL	
2	PANEL.SIDE.OG.WIDE.G	
3	BOLT.HX.3/8X3.11Z.ALL.THREAD.OG.G	
4	NUT.HX.3/8.G	
5	WASHER.LOCK.3/8.G	
6	ANCHOR.KIT.HLT.1.330ml.3/4X7(4)	
7	NUT.HX.5/8.G.RAIL	
8	BOLT.HX.5/8X2.G	
9	BOLT.HX.5/8X4.GS.G	
10	WASHER.LOCK.5/8.G	
11	5/8" HVY HEX NUT A563A	
12	HINGE PLATE.FENDER.PANEL.OG	
13	TEL ST 1.34X1.34X12 GA.X10.H4S.G	
14	TEL ST 2X2X12 GA.X10.H4S.G	
15	BRACKET.CART SUPT.TS.BLU.OG	
16	LOCKING BAR.CARTRIDGE SUPT.OG	

TABLE			
SYSTEM	WIDTH	7" ANCHOR	18" ANCHOR
OG.OGII.OGHS	69"	604596	627519
OG.OGII.OGHS	90"	604599	627520
OG.M.WIDE	69"	627512	N/A
			627523

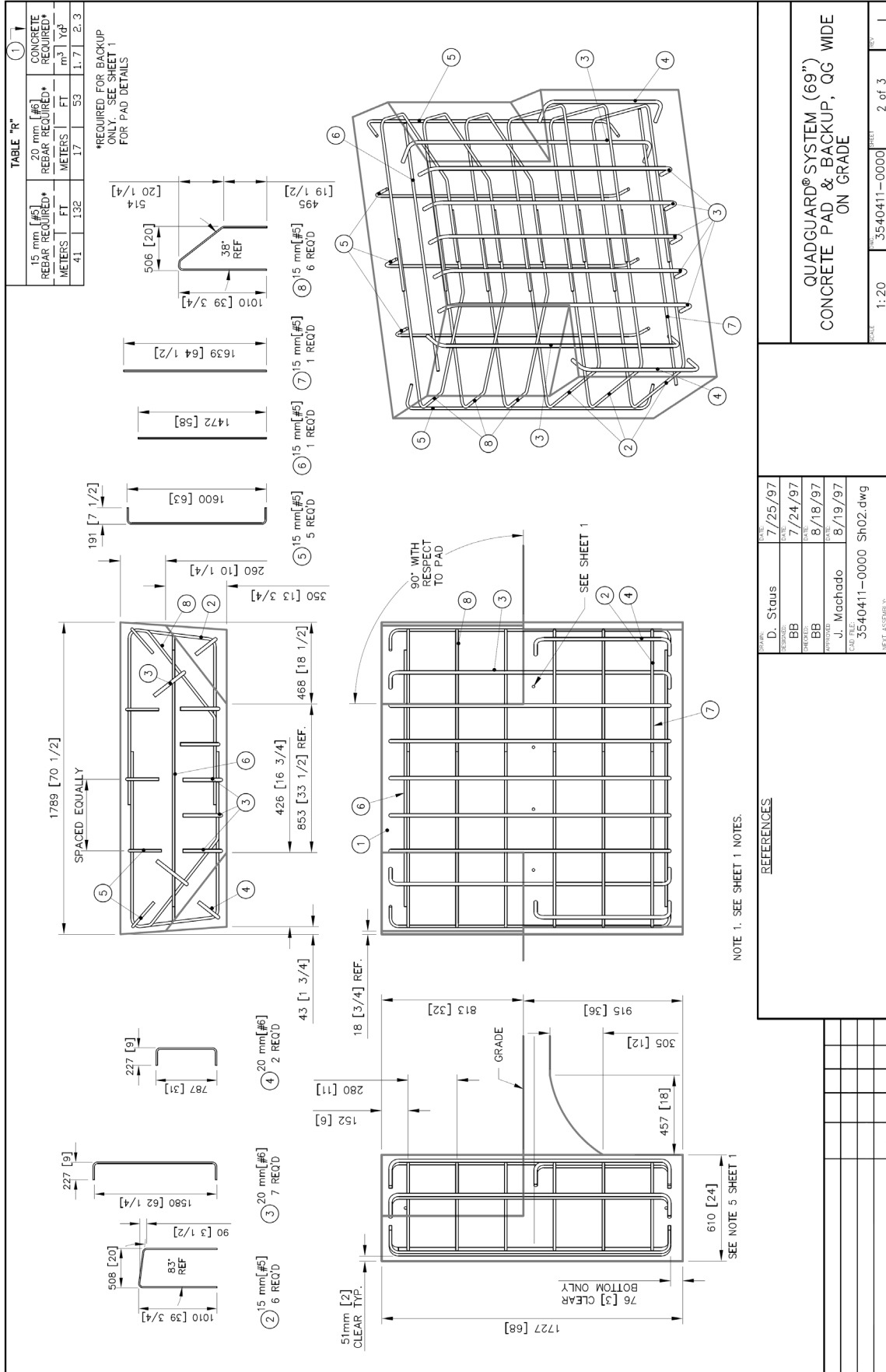
QUADGUARD FAMILY

DESIGNER D. Kohnfeld	DATE 2/18/2020	PROJECT NO. 627528.idw	QUADGUARD® FAMILY BACKUP ASSEMBLY, TENSION STRUT
CHECKER B. Eckert	DATE 2/25/2020	FILE 627528.idw	
THIS DRAWING IS UNLESS OTHERWISE SPECIFIED TO BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION INC. (AISC) SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS AND THE AISC COMPANION SPECIFICATIONS FOR STRUCTURAL TENSION MEMBERS.			
DO NOT SCALE DRAWING			
		SCALE 1" = 1"	SHEET NO. 627528
		TOTAL SHEETS 2	SHEET NO. 1 of 2

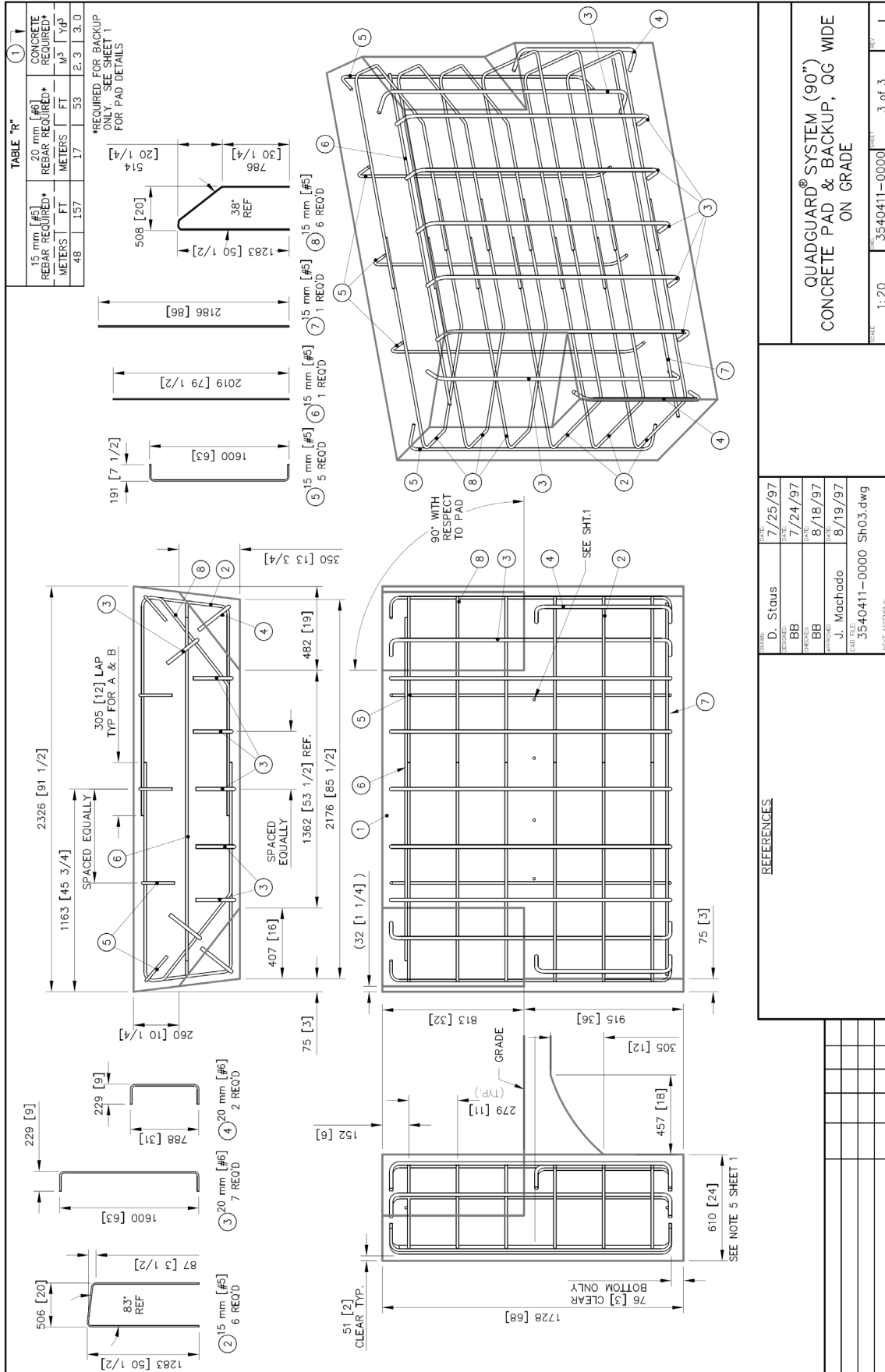
Tension Strut Backup Assembly (Wide) 627528



Concrete Pad & Backup (Wide) 3540411-0000



Concrete Pad & Backup on Grade 69



Concrete Pad & Backup on Grade 90

TABLE		DESCRIPTION		WIDTH
ASSY NO.	ITEM 1	DESCRIPTION		WIDTH
604513		BACKUP ASSY CONCRETE 83 LOG WIDE		1626 [64]
604515		BACKUP ASSY CONCRETE 83 LOG WIDE		2108 [83]
617585		BACKUP ASSY CONCRETE 120 LOG WIDE		3048 [120]

NOTES:
 1. USE ITEMS 1 AND 13 TO LOCATE HOLES IN CONCRETE.
 2. ITEMS 1 AND 13 TO BE LOCATED WITH CONCRETE BACKUP FACE.
 3. A REBAR CUTTING BIT MAY BE REQUIRED TO ACHIEVE PROPER ANCHOR INSTALLATION.

ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	BACKUP FACE, CONC, OG, WIDE, G	1
2	619315	ANCH KIT, HL, 3/4X6, 12/4	1
3	610172	HINGE PLATE, FENDER PANEL, OG	2
5	611900	PANEL, SIDE, OG, WIDE	2
6	115960	NUT, HK, 3/8, G	16
10	113666	BOLT, HK, 5/8X4, 95, G	6
11	118100	WASHER, LOCK, 5/8, G	6
12	619316	ANCHOR KIT, HL, TL, 3/4X7, (4)	2
13	611370	MONORAIL, 1 BAY, OG	1
14	003340	NUT, HK, 5/8, G, RAIL	4
15	003360	5/8" X 1, 25" GR BOLT	4
16	003354	5/8" Hvy HEX NUT A563A	6
17	615756	TEL ST, 1, 3/4 X 1, 3/4 X 1/2 GA X 10, HRS, G	4
18	615765	TEL ST, 2 X 2 X 1/2 GA X 10, HRS, G	4
19	113612	BOLT, HK, 3/8 X 3 1/2, ALL, THREAD, GS, G	16

SERIAL NO. SALES ORDER EH PROJECT DESIGN SPEED NOSE TYPE NO. OF UNITS	REFERENCES CONCRETE BACKUP, OG WIDE 35-40-41	DRAWN D. Sluis S. Trefseer	DATE 7/8/1987 7/17/1997
TITLE 604513, 60W		FILE 604513, 60W	
DO NOT SCALE DRAWING			

BACKUP ASSY, CONCRETE, XX, OG, WIDE	PART NO. 604513
-------------------------------------	-----------------

1 of 1

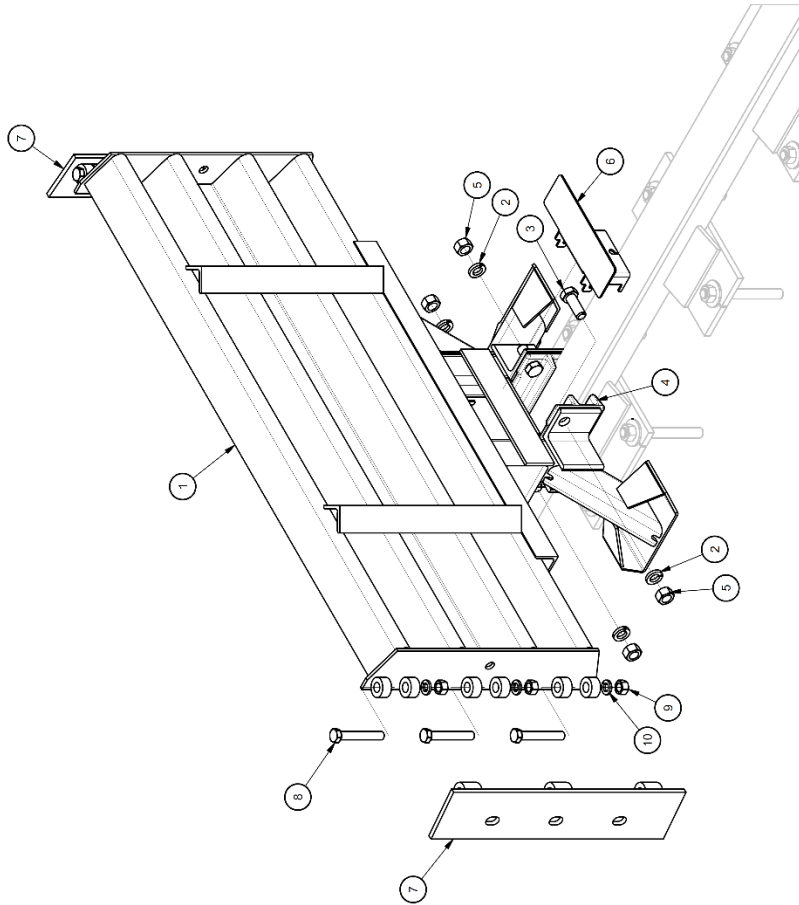
Backup Assembly, Concrete (Wide) 604513

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
11	SEE TABLE	DIAPHRAGM,QB,G	1
2	118089	WASHER,LOCK,3/4,G	4
3	113555	BOLT,HX,3/4X2,68,G	4
4	111368	MONORAIL GUIDE,QG,G	2
5	103704	3/4" HVY HEX NUT,4563,DH	4
6	605446	BRACKET,CARTRIDGE SUPT,DIAP,FOLDED,QG	2
7	610172	HINGE PLATE,FENDER PANEL,QG	2
8	113666	BOLT,HX,5/8X3/4,65,G	6
9	103354	3/8" HVY HEX NUT,4563A	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
*607164	DIAPHRAGM ASSY,QG,1953	607813
	DIAPHRAGM ASSY,QG,2033	607815

* NO LONGER AVAILABLE

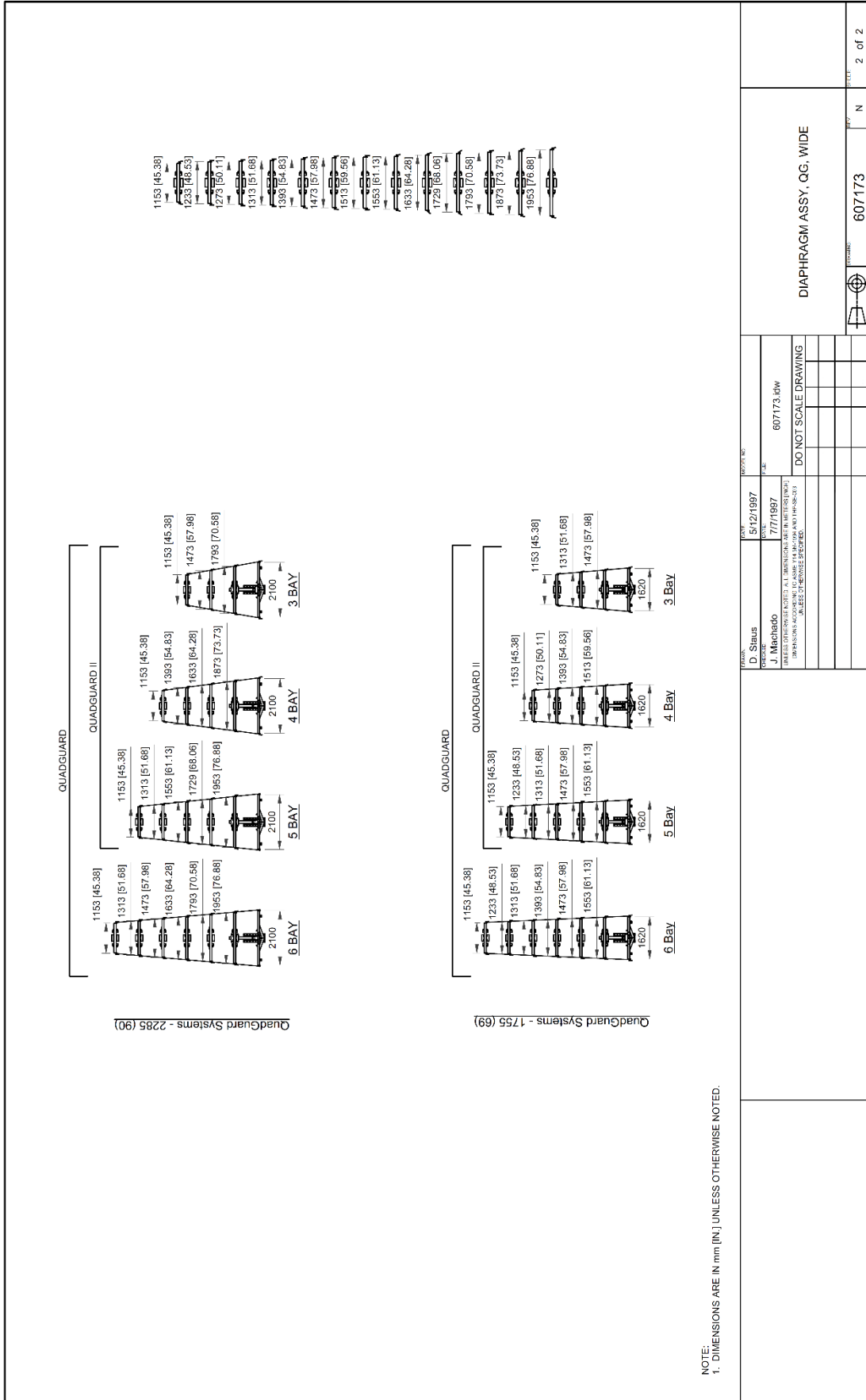
NOTE:
1. SEE DRAWING 614058.



DESIGNER: D. Staus CHECKER: J. Machado UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ARE GIVEN UNLESS OTHERWISE SPECIFIED. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE TO CENTERLINE.	DATE: 5/12/1997 Dwg No: 607173.dwg	TITLE: REF:
	DO NOT SCALE DRAWING	
PARTS LIST: DIAPHRAGM ASSY, QG, WIDE		
PART NO: 607173	REV: N	SHEET: 1 of 2

Diaphragm Assembly (Wide) 607173

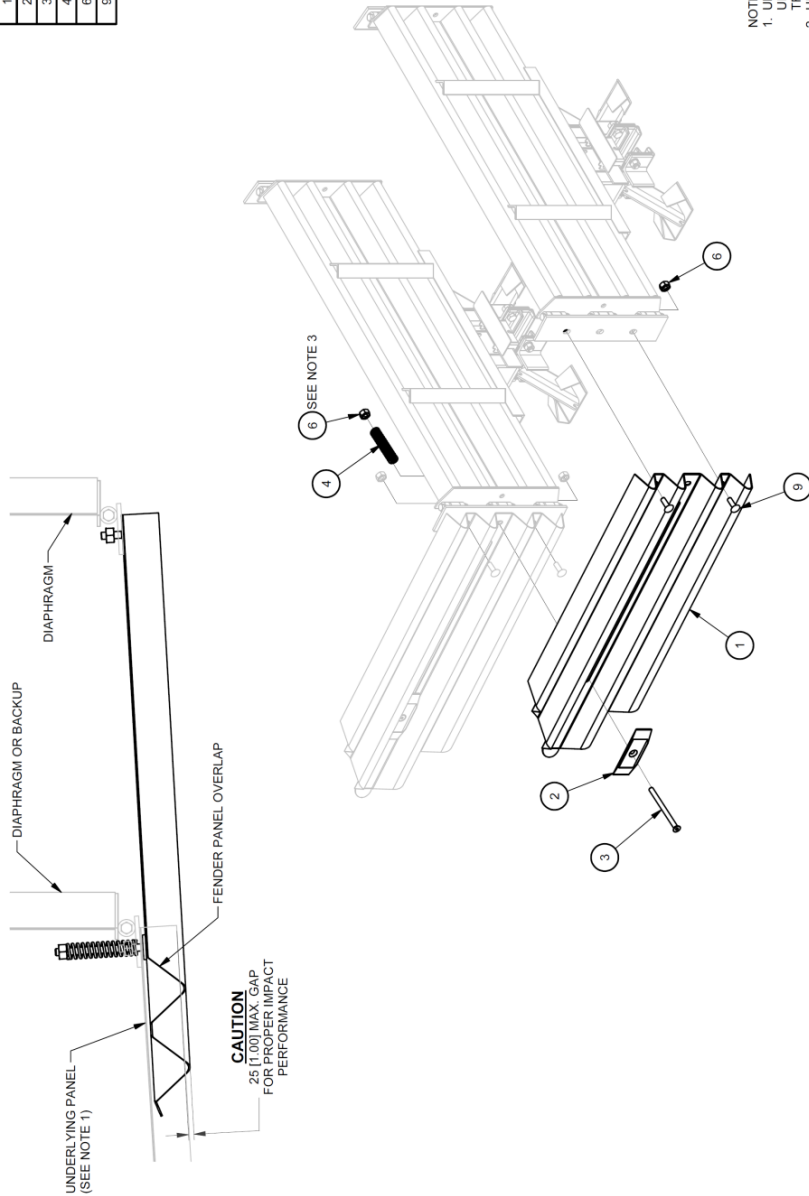
11/13/2018 11:50:00 AM



NOTE:
1. DIMENSIONS ARE IN mm [IN.] UNLESS OTHERWISE NOTED.

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	611832	PANEL,FENDER,OG	1
2	617045	WASHER,MUSHROOM,FORGED,OG,G	1
3	116879	SCREW,FL,5/8X8 1/2,GR8,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
CHECKED BY	J. Machado	DATE	4/10/1997
APPROVED BY	KRM	DATE	7/7/1997
FILE	J. Machado	DATE	7/7/1997
608241.dwg			

QuadGuard - Wide System
FENDER PANEL ASSEMBLY

SCALE	1 : 16	DRAWING NO.	608241	SHEET	1	OF	1	REV	J
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Fender Panel Assembly (Wide) 608241

ITEM	STOCK NO.	DESCRIPTION	QUANTITY
1	SEE TABLE	NOSE W/ADJ SUPPORT BRACKET, QG, **	1
2	113654	BOLT, HK.5/8X1.1/2, GS, C	4
3	003340	NUT, HK.5/8, G, RAIL	4
4	605535	BRACKET, PULLOUT, QG	2
5	003300	WASHER, FLAT, 5/8X1.3/4, G	20
6	118570	BOLT, HK.5/8X2.65, C	6
7	117976	WASHER, BAR, 1/8X1.1/4X2.1/4, HOLES	6
8	605522	BRACKET, NOSE ATTACHMENT, QG, WIDE	2

PARTS LIST

ASSY. NO.	DESCRIPTION	ITEM 1
611511	NOSE ASSY, G, QG WIDE	611647
611592	NOSE ASSY, Y, QG WIDE	611648

Table

DELINEATION SHOULD BE ADDED TO THE NOSE AS REQUIRED BY LOCAL POLICIES. MAX WEIGHT TO BE ADDED: 3.18 kg [7 LBS]

STEP 1 ATTACH PULLOUT BRACKETS TO DIAPHRAGM.

STEP 2 BOLT NOSE ATTACHMENT BRACKET BETWEEN HINGE AND FENDER PANEL. (RAIL BOLTS & RAIL NUTS FOR UPPER AND LOWER HOLES ARE SUPPLIED WITH THE FENDER PANEL ASSEMBLY.)

STEP 3 ATTACH FENDER PANEL ASSEMBLY TO DIAPHRAGM. SEE FENDER PANEL ASSEMBLY.

STEP 4 BOLT NOSE WRAP TO NOSE ATTACHMENT BRACKET. SEE NOTES 2 & 3.

PLACE A BOARD OVER THE FIRST TWO DIAPHRAGMS AS SHOWN TO FACILITATE PROPER ALIGNMENT OF NOSE.

TIGHTEN NUTS TO 25 FT-LBS AFTER ALIGNING NOSE AS SHOWN.

DETAIL "A"
SCALE: 1:30

SEE NOTE 3

NOTES:
1. PHANTOMS DEPICTED IN PHANTOM LINES ARE INCLUDED IN OTHER ASSEMBLIES.
2. THE TOP AND BOTTOM HOLES OF NOSE COVERS ARE SLOTTED TO PROVIDE ADJUSTMENT. ADJUST NOSE TO ALIGN WITH FENDER PANEL THEN TORQUE ALL SIX NUTS TO 35NM [25 FT-LBS]. SEE DETAIL "A".
3. BEND BRACKETS AT LONG SLOTS TO DESIRED ANGLE AND USE ITEM 5 AS NECESSARY TO ACHIEVE BEST FIT OF NOSE.

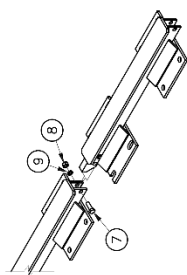
REVISED BY: D. Status	DATE: 5/16/97	REVISED BY: SEE TABLE
DESIGNED BY: J. Machado	DATE: 6/12/97	FILE: 611511.dwg
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.		
DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE TO CENTER UNLESS OTHERWISE SPECIFIED.		
DO NOT SCALE DRAWING		

NOSE ASSY, QG WIDE

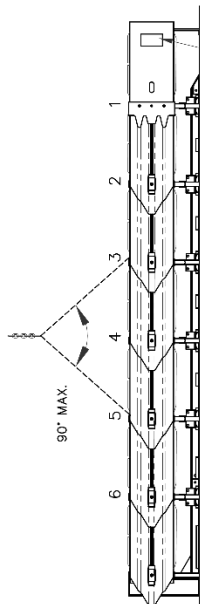
PART: 1 of 1
CADD: 611511

Nose Assembly (Wide) 611511

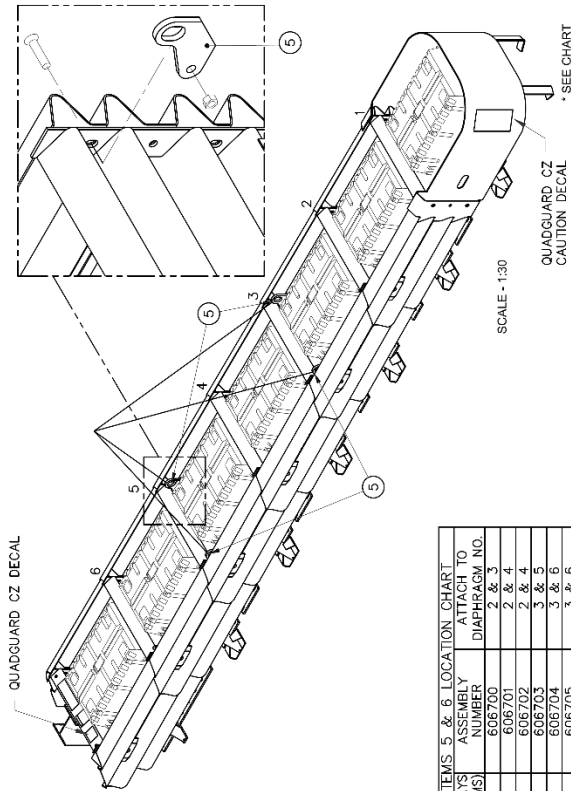
ITEM	STOCK NO.	DESCRIPTION	PARTS LIST								
			BAYS			REQD			REQD		
1	116799	ROD, THREADED, 3/4x18, 05, G	32	38	46	52	58	66	72	8	9
2	003704	NUT, HX, 3/4, G, GR, DH	32	38	46	52	58	66	72	8	9
3	116027	WASHER, FLAT, 3/4x2, HVY, G	32	38	46	52	58	66	72	8	9
4	118710	ADHESIVE, HY200, 330, HILT	16	19	23	26	29	33	36	4	4
5	611207	LIFTING BRACKET, QG, CZ, G	4	4	4	4	4	4	4	4	4
7	113660	BOLT, HX, 5/8x3 1/2, 05, G	1	1	2	2	2	2	3	3	3
8	003354	NUT, HX, 5/8, G	1	1	2	2	2	2	3	3	3
9	118100	WASHER, LOCK, 5/8, G	1	1	2	2	2	2	3	3	3
10	115394	INST. QG, CZ ANCHOR/LIFT, KIT	1	1	1	1	1	1	1	1	1
11	115501	LABEL, RATE, QG, CZ, LIFT, KIT	1	1	1	1	1	1	1	1	1
12	113797	HIT-RB 7/8" KIT	1	1	1	1	1	1	1	1	1



MONORAIL ATTACHMENT
SCALE - 1:25



EXAMPLE:
6 BAY QUADGUARD CZ
SCALE - 1:50



ITEMS 5, 6 & 6 LOCATION CHART	ASSEMBLY NUMBER	DIAPHRAGM NO.	ATTACH TO
3	606700	2 & 3	2 & 3
4	606701	2 & 4	2 & 4
5	606702	3 & 4	3 & 4
6	606703	3 & 5	3 & 5
7	606704	3 & 6	3 & 6
8	606705	3 & 6	3 & 6
9	606706	4 & 7	4 & 7

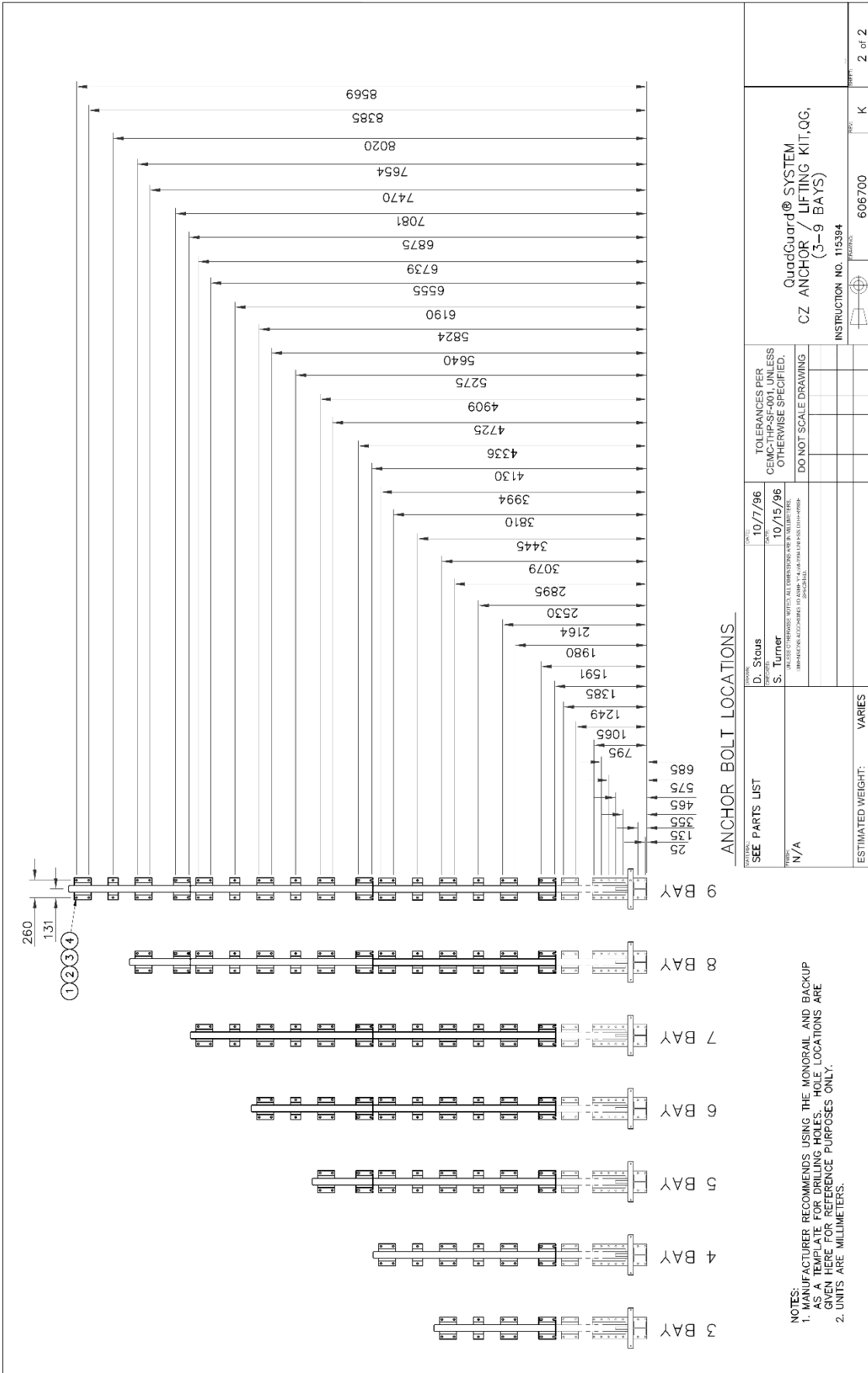
TO MOVE SYSTEM:

1. Verify monorail sections are bolted together.
2. Attach two lifting brackets each on diaphragms listed (four brackets total). See example.
3. Minimum sling length 3 meters (6 ft). Use fixed equal length slings.
4. Free unit from anchor bolts & ground prior to lifting the system. To accomplish this, start at the rear of the system and use pry bars to gradually raise the system off of the studs. Place the monorail on the studs 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.

SEE PARTS LIST N/A	DESIGNER: D. Staus CHECKED: S. Turner	DATE: 10/7/96 DATE OF REVISION: 10/15/96	TOLERANCES PER CEMC-THP-SF-001 UNLESS OTHERWISE SPECIFIED. DO NOT SCALE DRAWING	ASSEMBLY NO. 606700 QuadGuard® SYSTEM CZ ANCHOR / LIFTING KIT, QG, (3-9 BAYS) INSTRUCTION NO. 115394	PART NO.: 606700 REV: K	SHEET: 1 of 2
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CZ Anchor/Lifting Kit (3-9 Bays) 606700

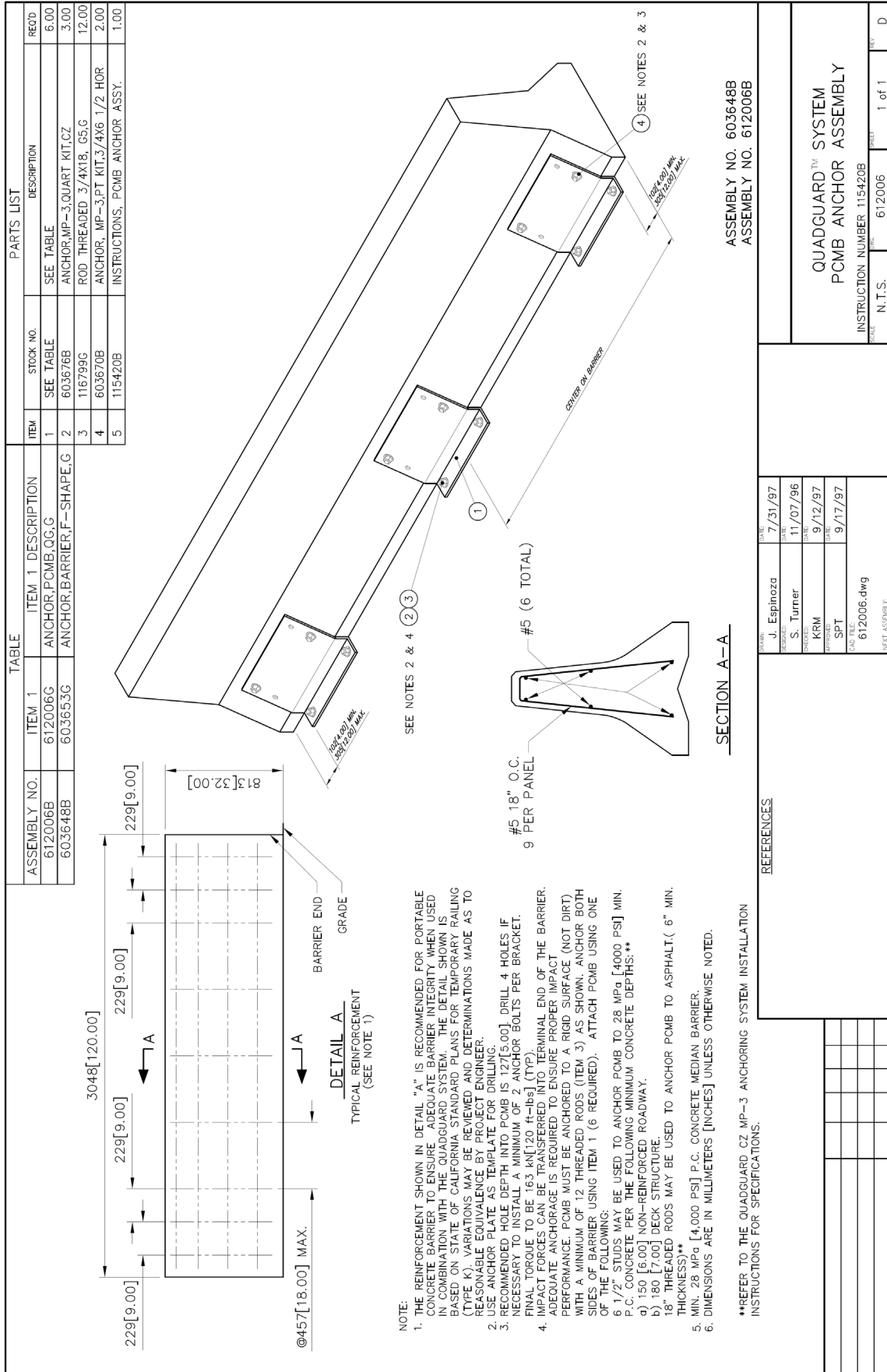
REVISIONS



NOTES:
 1. MANUFACTURER RECOMMENDS USING THE MONORAIL AND BACKUP AS A TEMPLATE FOR DRILLING HOLES. HOLE LOCATIONS ARE GIVEN HERE FOR REFERENCE PURPOSES ONLY.
 2. UNITS ARE MILLIMETERS.

ANCHOR BOLT LOCATIONS

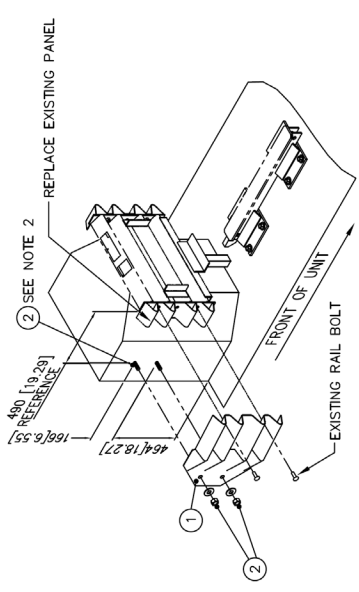
DESIGNER: D. Staus	DATE: 10/7/96	TOLERANCES PER CEMC-TPSF-001, UNLESS OTHERWISE SPECIFIED.
DRAWN BY: S. Turner	DATE: 10/15/96	DO NOT SCALE DRAWING
CHECKED BY: S. Turner	DATE: 10/15/96	
ESTIMATED WEIGHT: VARIES	REVISION: K	PROJECT: 606700
		INSTRUCTION NO. 115S94



PCMB Anchor Assembly 612006

- NOTE:**
1. THE REINFORCEMENT SHOWN IN DETAIL "A" IS RECOMMENDED FOR PORTABLE CONCRETE BARRIER TO ENSURE ADEQUATE BARRIER INTEGRITY WHEN USED IN COMBINATION WITH THE QUADGUARD SYSTEM. THE DETAIL SHOWN IS BASED ON STATE OF CALIFORNIA STANDARD PLANS FOR TEMPORARY RAILING (TYPE K). VARIATIONS MAY BE REVIEWED AND DETERMINATIONS MADE AS TO REASONABLE EQUIVALENCE BY PROJECT ENGINEER.
 2. USE ANCHOR PLATE AS TEMPLATE FOR DRILLING.
 3. RECOMMENDED HOLE DEPTH INTO PCMB IS 127[5.00]. DRILL 4 HOLES IF NECESSARY TO INSTALL A MINIMUM OF 2 ANCHOR BOLTS PER BRACKET. FINAL TORQUE TO BE 163 kN[120 ft-lbs] (TYP).
 4. IMPACT FORCES CAN BE TRANSFERRED INTO TERMINAL END OF THE BARRIER. ADEQUATE ANCHORAGE IS REQUIRED TO ENSURE PROPER IMPACT PERFORMANCE. PCMB MUST BE ANCHORED TO A RIGID SURFACE (NOT DIRT) WITH A MINIMUM OF 12 THREADED RODS (ITEM 3) AS SHOWN. ANCHOR BOTH SIDES OF BARRIER USING ITEM 1 (6 REQUIRED). ATTACH PCMB USING ONE OF THE FOLLOWING:
 - a. 1 1/2" STUDS MAY BE USED TO ANCHOR PCMB TO 28 MPa [4000 PSI] MIN. P.C. CONCRETE PER THE FOLLOWING MINIMUM CONCRETE DEPTHS:**
 - i. 150 [6.00] NON-REINFORCED ROADWAY.
 - ii. 180 [7.00] DECK STRUCTURE.
 - b. 18" THREADED RODS MAY BE USED TO ANCHOR PCMB TO ASPHALT (6" MIN. THICKNESS)**.
 5. MIN. 28 MPa [4,000 PSI] P.C. CONCRETE MEDIAN BARRIER.
 6. DIMENSIONS ARE IN MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
- **REFER TO THE QUADGUARD CZ MP-3 ANCHORING SYSTEM INSTALLATION INSTRUCTIONS FOR SPECIFICATIONS.

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	RECD
1	608122G	SIDE PANEL/END SHOE,OG,G	1.00
2	603670B	ANCHOR,MP-3,PT KIT,3/4X6 1/2 HOR	1.00



REPLACE EXISTING PANEL

2 SEE NOTE 2

480 [19.29] REFERENCE

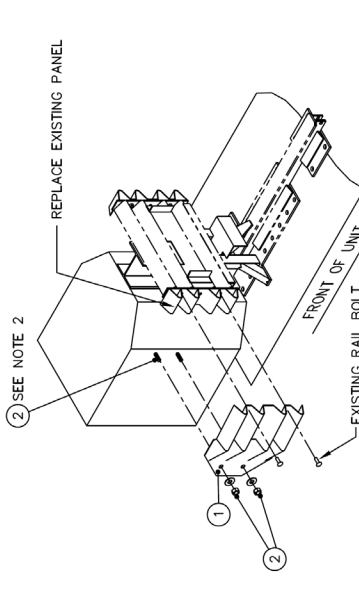
160 [6.53]

464 [18.27]

FRONT OF UNIT

EXISTING RAIL BOLT

CONCRETE BACKUP



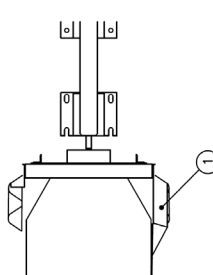
REPLACE EXISTING PANEL

2 SEE NOTE 2

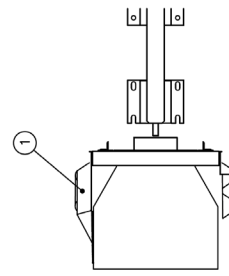
FRONT OF UNIT

EXISTING RAIL BOLT

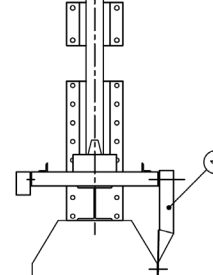
TENSION STRUT BACKUP



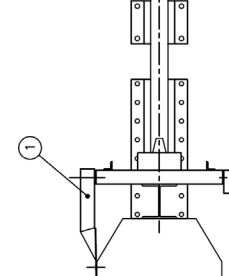
LEFT SIDE APPLICATION



RIGHT SIDE APPLICATION



LEFT SIDE APPLICATION



RIGHT SIDE APPLICATION

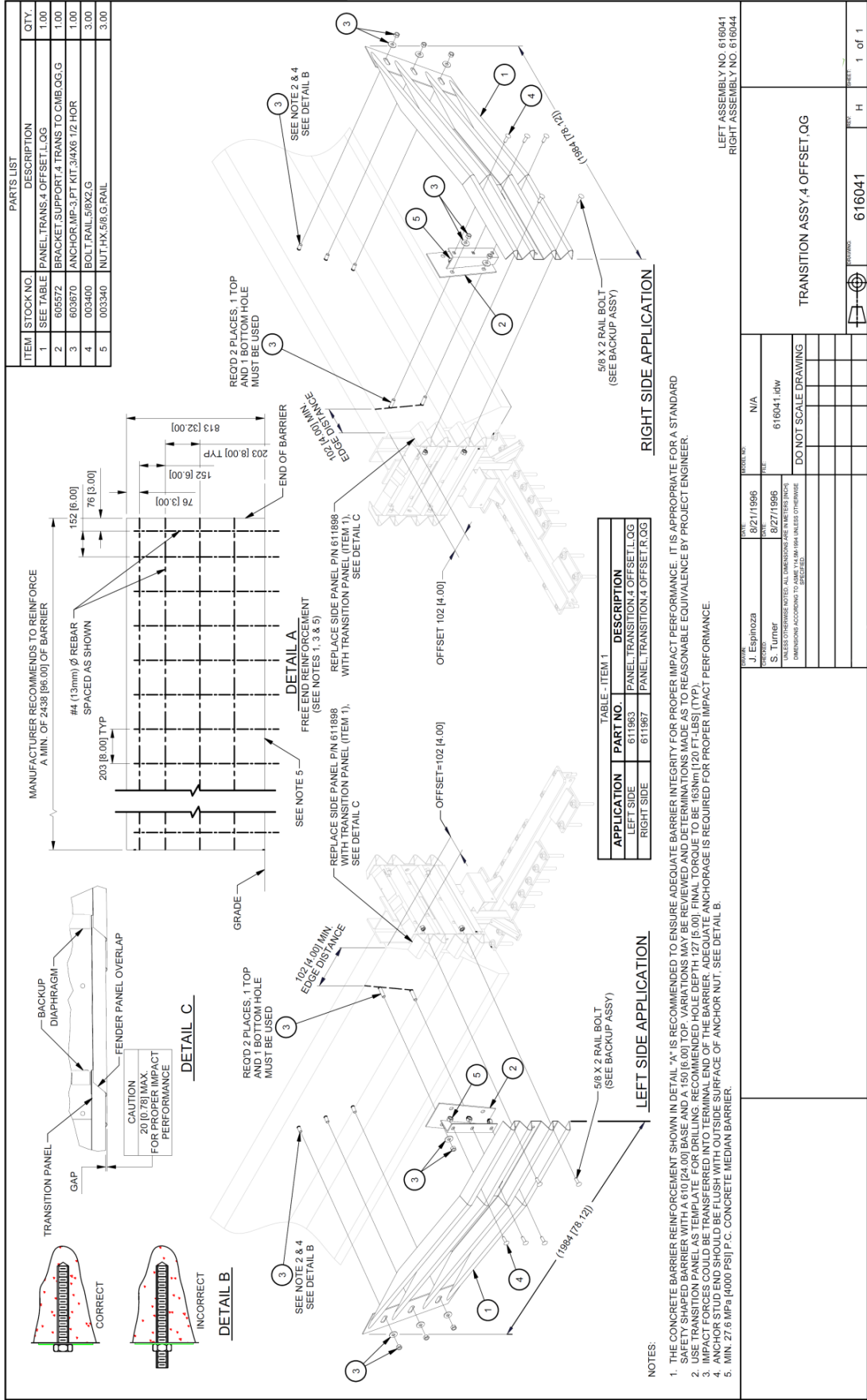
REV	DATE	BY	APP'D
1	6/24/96	WJK	
2	3/1/96	S. Trageser	
3	6/5/96	W. Krage	

REFERENCES ASSEMBLY NO. 608105B QUADGUARD® SYSTEM END SHOE ASSY,QQ	SCALE: N.T.S. DRAWING NO. 608105 PART 1 of 1 REV. 1
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NOTES:

- DIMENSIONS ARE IN MILLIMETERS [INCHES].
- 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.

End Shoe Assembly 608105

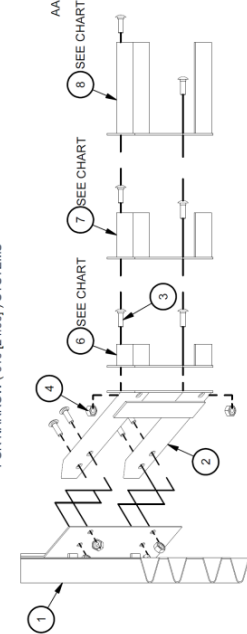
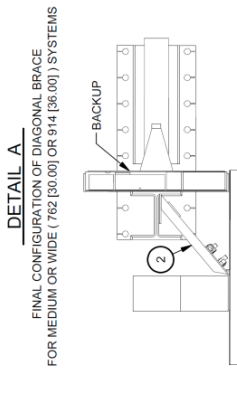
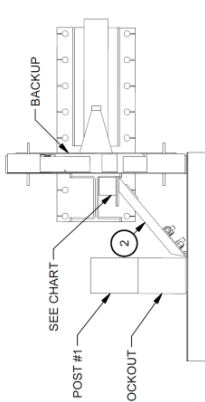
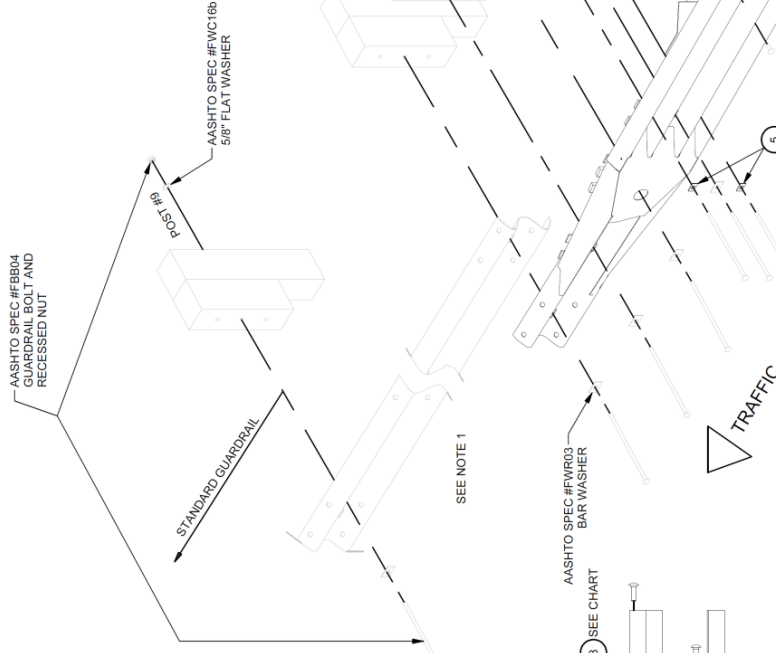


4" Offset Transition Assembly Narrow 616041

ITEM	STOCK NO.	PARTS LIST			REQD.		
		DESCRIPTION	N	M	W	48	
1	611963	PANEL TRANS. QUAD-W-BEAM O.G.G	1	1	1	1	
2	605338	BRACE DIAGONAL TRANSITION O.G.G	1	1	1	1	
3	009400	BOLT TRAIL 5/8X2.G	4	6	6	6	
4	003340	5/8 RECESSED HEX NUT	4	6	6	6	
5	117976	WASHER BAR 1/8X1 1/4X2.W/HOLE	2	2	2	2	
6	605334	BRACE BLOCKOUT 3.O.G.G	0	1	0	0	
7	605335	BRACE BLOCKOUT 6.O.G.G	0	0	1	0	
8	605333	BRACE BLOCKOUT 12.O.G.G	0	0	0	1	

SYSTEM WIDTH	ASSEMBLY NO.	BLOCKOUT
610 [24.00]	N	616108 NOT REQD
762 [30.00]	M	616107 ITEM #6*
914 [36.00]	W	616109 ITEM #7*
1219 [48.00]	48	616106 ITEM #8*

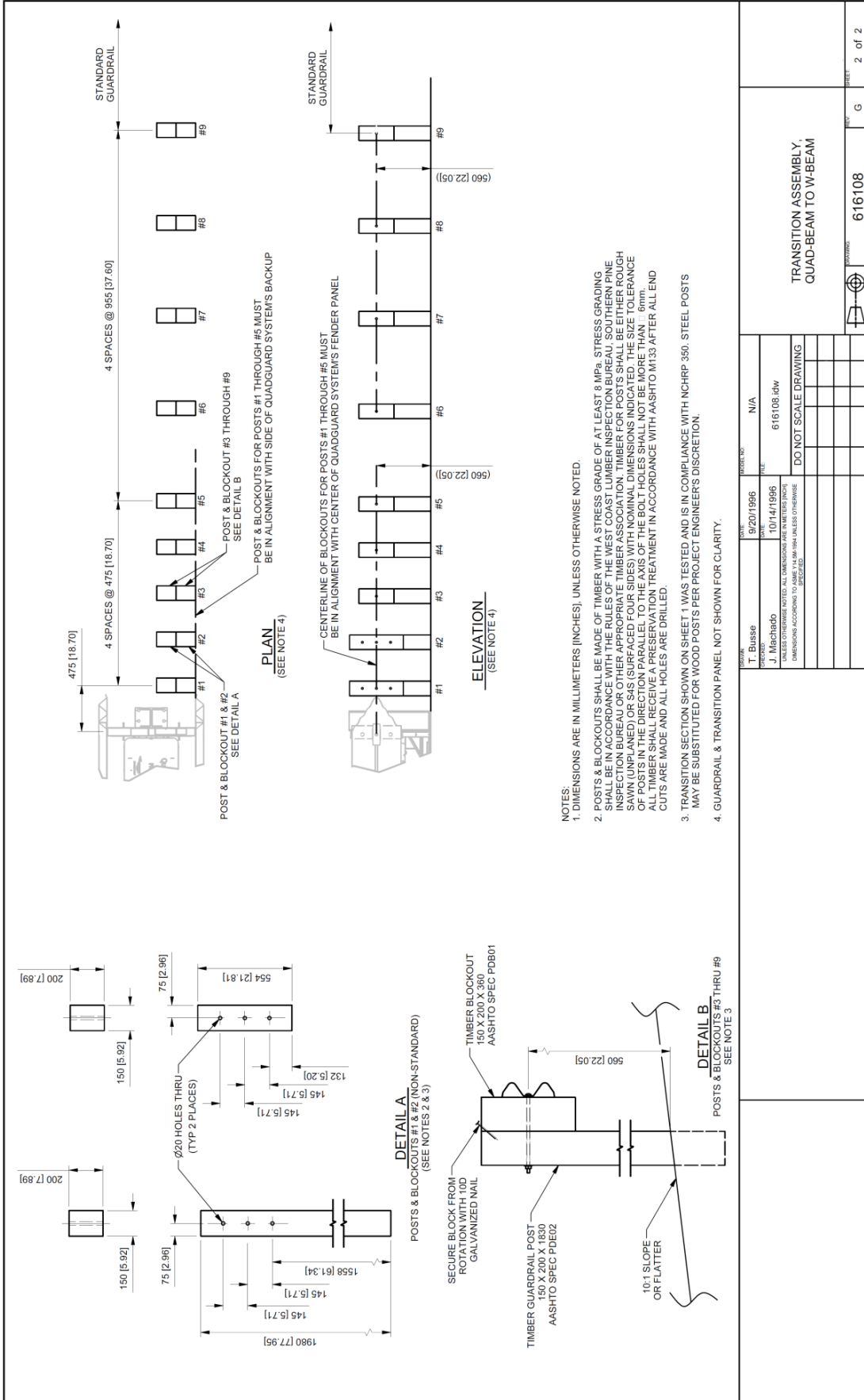
*SEE PARTS LIST ABOVE FOR QTY REQD



- NOTES:
- PANEL OVERLAP SHOWN IS FOR TRAFFIC DIRECTION SHOWN. ACTUAL OVERLAP SHALL BE DETERMINED BY THE SITE CONDITIONS AND PROJECT ENGINEER SHOWN. USE STANDARD GUARDRAIL CONNECTION.
 - RIGHT SIDE OF ROAD APPLICATION SHOWN. ASSEMBLY MAY BE USED ON EITHER OR BOTH SIDES FOR LEFT, RIGHT, MEDIAN AND SIDEWALK APPLICATIONS. THIS NOTE IS NOT TO BE USED IN THE PART NUMBER AND MUST BE ORDERED SEPARATELY.
 - EMERGENCY STOPPING STATION. SUPPLY THESE PARTS IN THE PART NUMBER ORDER FROM THE LOCAL HIGHWAY SUPPLY VENDORS OF THE DOWNSTREAM GUARDRAIL ARE STANDARD HIGHWAY MATERIALS AND MAY BE OBTAINED FROM YOUR LOCAL HIGHWAY SUPPLY VENDORS.
 - TRANSITION AND GUARDRAIL PANEL CONNECTIONS MAY BE SLOTTED IN ORDER TO ACCOMMODATE THERMAL EXPANSION AND CONTRACTION.

DESIGNED BY	T. Buisse	DATE	9/20/1996	PROJECT NO.	N/A		
CHECKED BY	J. Machard	DATE	10/14/1996	SCALE	616106 idw		
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN FEET AND INCHES							
DIMENSIONS ACCORDING TO SPECIFICATIONS							
DO NOT SCALE DRAWING							
TRANSITION ASSEMBLY, QUAD-BEAM TO W-BEAM							
REV					616108	REV	G
SHEET 1 of 2							

Quad-Beam to W-Beam Transition Assembly 616108



PARTS LIST		REQ'D				
ITEM	STOCK NO.	DESCRIPTION	N	M	W	48
1	611985	QuadGuard ₄ TO THREE-BEAM TRANS. PANL	1	1	1	1
2	605338	DIAGONAL BRACE	1	1	1	1
3	003400	BOLT,TRAIL,5/8X2,G	4	6	6	6
4	003340	NUT,HX,5/8,G,RAIL	4	6	6	6
5	117976	WASHER,BAR,1/8X1.1/4X2,W/HOLE	2	2	2	2
6	605334	BRACE,BLOCKOUT,3,0G,G	0	1	0	0
7	605335	BRACE,BLOCKOUT,6,0G,G	0	0	1	0
8	605333	BRACE,BLOCKOUT,12,0G,G	0	0	0	1

SYSTEM WIDTH	ASSEMBLY #	BLOCKOUT
610 [24.00]	N 616103	NOT REQD
762 [30.00]	M 616102	ITEM #6*
914 [36.00]	W 616104	ITEM #7*
1219 [48.00]	48 616105	ITEM #8*

*SEE PARTS LIST ABOVE FOR QTY REQD

NOTES:

- PANEL OVERLAP SHOWN IS FOR TRAFFIC DIRECTION SHOWN. ACTUAL OVERLAP SHALL BE DETERMINED BY THE SITE. USE STANDARD GUARDRAIL CONNECTION.
- RIGHT SIDE OF ROAD APPLICATION SHOWN. ASSEMBLY MAY BE USED ON EITHER OR BOTH SIDES FOR LEFT, RIGHT, MEDIUM OR CORE APPLICATIONS. SEE NOTE 1. THIS ASSEMBLY IS NOT INCLUDED IN THE MODEL NUMBER AND MUST BE ORDERED SEPARATELY.
- ENERGY ABSORPTION SYSTEMS, INC. SUPPLIES THE STOCK ITEMS SHOWN. THE CUTS, STRENGTHS, AND DIMENSIONS ARE HIGHWAY MATERIALS AND MAY BE OBTAINED FROM YOUR LOCAL HIGHWAY SUPPLY VENDORS.
- TRANSITION AND GUARDRAIL PANEL CONNECTIONS MAY BE SLOTTED IN ORDER TO ACCOMMODATE THERMAL EXPANSION AND CONTRACTION.

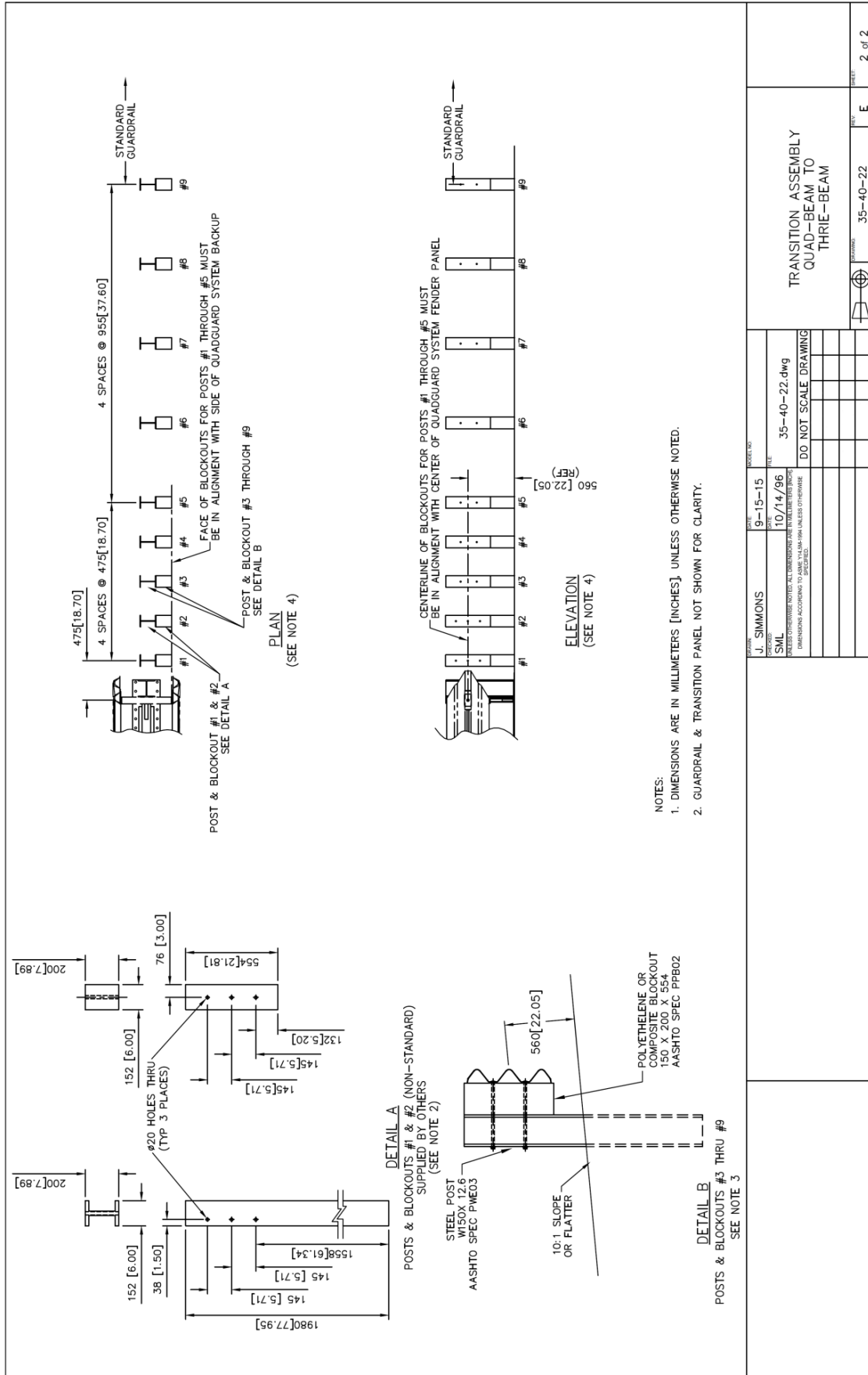
DETAIL A
FINAL CONFIGURATION OF DIAGONAL BRACE FOR MEDIUM & WIDE (762[30.00] OR 914[36.00]) SYSTEMS

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

DIAGONAL BRACE ASSEMBLY

Quad-Beam to Thrie-Beam Transition Assembly 616103

<p>DESIGNER: T. BUSSE DATE: 9/23/96 DRAWN: SWL DATE: 10/14/96 CHECKED: SWL DATE: 10/14/96 DIMENSIONS ACCORDING TO ASME Y14.5M (UNLESS OTHERWISE SPECIFIED)</p>	<p>PROJECT NO: 35-40-22 SHEET NO: 1 of 2</p>	<p>TRANSITION ASSEMBLY QUAD-BEAM TO THRIE BEAM</p>
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Notes:

Notes:



For more complete information on Valtir products and services, visit us on the web at 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.

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