



QuadGuard[®] HS

CRASH CUSHIONS

PRODUCT DESCRIPTION MANUAL



PN 116512

REVISION D NOVEMBER 2022

QuadGuard® HS

The QuadGuard® HS has been tested pursuant to National Cooperative Highway Research Program (“NCHRP”) Report 350 specifications. The QuadGuard® HS 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® HS. Failure to fulfill these **RESPONSIBILITIES** with respect to the assembly, maintenance, and repair of the QuadGuard® HS 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® HS information available to Valtir at the time of printing. We reserve the right to make changes at any time. Please contact Valtir or visit Valtir.com 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® HS, 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, in compliance with NCHRP Report 350 “Recommended Procedures for the Safety Performance of Highway Safety Features”, contracts with FHWA approved testing facilities to perform crash tests, evaluation of tests, and submittal of results to the FHWA for review.

The QuadGuard® HS has been approved by FHWA as meeting the requirements and guidelines of NCHRP Report 350 TL-3 (at speeds of 70 mph [113 kph]). These tests typically evaluate product performance by conducting testing pursuant to parameters set forth in NCHRP Report 350 and accepted by FHWA which include a range of vehicles from lightweight cars (approx. 1800 lb. [820 kg]) to full size pickup trucks (approx. 4400 lb. [2000 kg]) as specified by the FHWA. The QuadGuard® HS is certified to the Test Level(s) as shown below:

Test Level 3 Plus: 113 km/h [70 mph]

These FHWA directed tests are not intended to represent system performance 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® HS 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® HS, through crash testing, has been shown to be a potentially reusable, re-directive, non-gating crash cushion, within NCHRP Report 350 criteria, for road features ranging in width from 24" – 90" [610 - 2285 mm]. It 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 appropriate highway authority.

The QuadGuard® HS utilizes two types of cartridges in a staged configuration and empty Bays to address both lighter cars and heavier high center-of-gravity vehicles.

Impact Performance

The 9 Bay QuadGuard® HS has successfully passed the requirements stipulated in NCHRP Report 350, Test Level 3 tests with both the light car and pickup at speeds of 70 mph [113 kph] at angles up to 20 degrees.

During head-on impacts, within NCHRP Report 350 criteria, the QuadGuard® HS has been shown that it compresses rearward and crushes to absorb the energy of impact. When impacted from the side, it safely redirects the vehicle back toward its original travel path and away from the roadside feature.

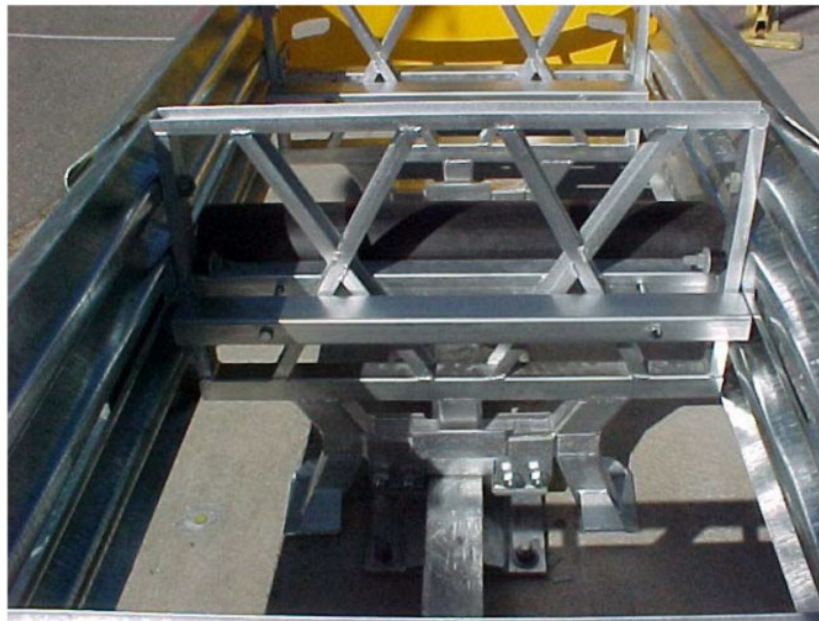


Figure 1
Light Weight Space Frame Diaphragms for QuadGuard® HS

How to Determine Left/Right

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

Description of a Bay

One Bay consists of one Diaphragm, two Fender Panels, etc. (Figure 2).

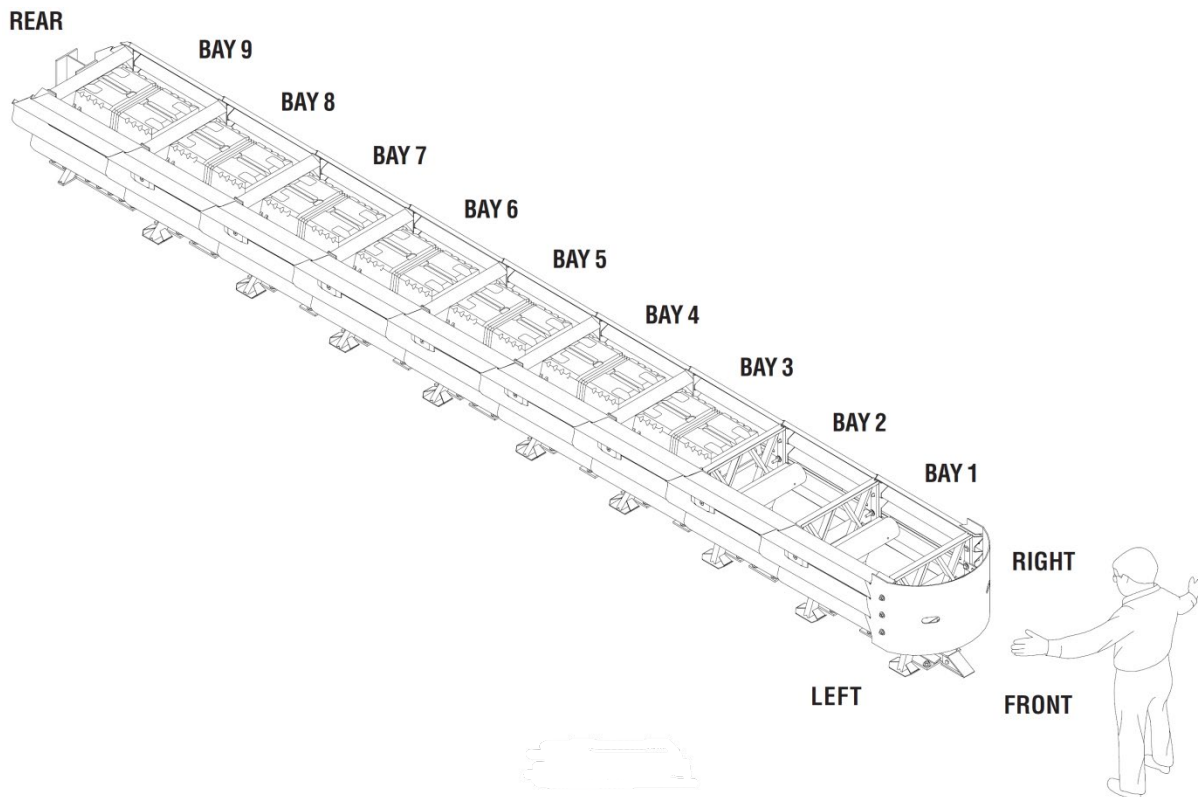


Figure 2
System Orientation

Measuring the Width

The QuadGuard® HS is available in five nominal widths:

- 24" [610 mm]
- 30" [760 mm]
- 36" [915 mm]
- 69" [1755 mm]
- 90" [2285 mm]

System width is the distance between Side Panels attached to the Backup as shown below. The outside width of the system is approximately 6" [150 mm] wider than this measurement.

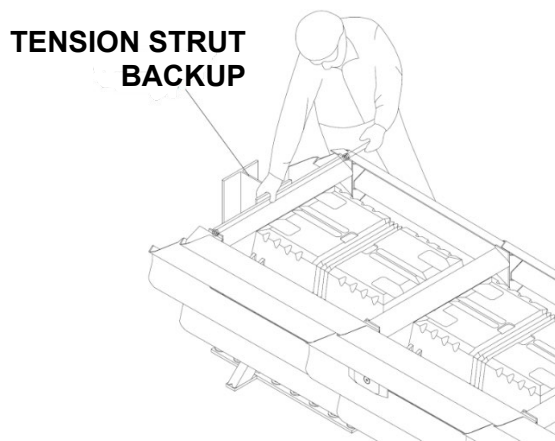


Figure 3
Tension Strut Backup Width

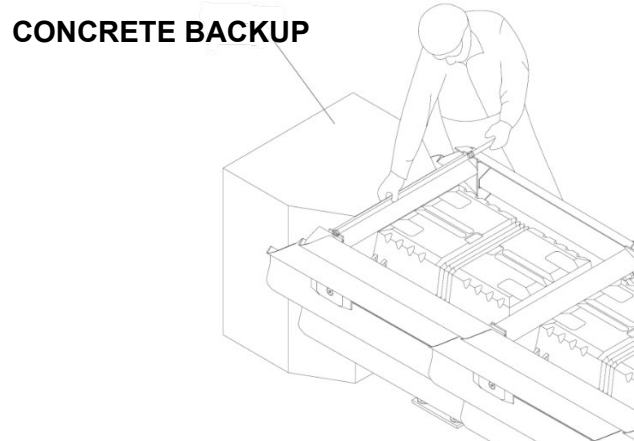


Figure 4
Concrete Backup Width



Warning: Location of the Backup in relation to nearby road objects will affect the operation of the attenuator. Upon impact, the Fender Panels telescope rearward and extend beyond Backups as much as 30" [760 mm] from the pre-impact position. Place the Backup so the back ends of the closest Panels are a minimum of 30" [760 mm] forward of objects that would otherwise interfere with Panel movement. Failure to comply with this requirement is likely to result in system performance which had not been crash tested pursuant to NCHRP Report 350 criteria and may also cause component damage which will necessitate maintenance or replacement of the system.

System Criteria

Proper model selection is essential for system performance. Review the following questions and then contact Valtir Customer service for specific input (p. 3).

1) Width Specification

Select the narrowest width that properly shields the roadside obstacle (p. 6).

2) Approved Foundations

- 6" Reinforced Concrete with Anchor Block
- 8" Reinforced Concrete without Anchor Block
- 8" Non-reinforced Concrete without Anchor Block
- 3" Asphalt over 3" Concrete (**Narrow system only**)
- 6" Asphalt over 6" Compacted Subbase (**Narrow system only**)
- 8" Asphalt (**Narrow system only**)

The system must be anchored. Refer to the QuadGuard® HS Assembly Manual (PN 115310) for detailed instructions and foundation specifications.

3) 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.

4) Special Site Conditions

- 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 approximately 50' [15 m] in front of the QuadGuard® HS 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 Backup of the QuadGuard® HS 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 both sides? Is the system on the side of the road where crossover traffic is a concern? A Transition from the back of the system to the roadside feature is necessary to prevent vehicle interaction (p. 9).
- F. **Any other unique features at the site that may affect positioning or performance of the QuadGuard® HS must be disclosed.**

5) Other Factors that May Affect Your Deployment:

- A. The existence of drain inlets.
- B. Junction boxes or other appurtenances located near the road feature.
- C. Insufficient space for the length preferred.
- D. The location and movement of expansion joints.

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

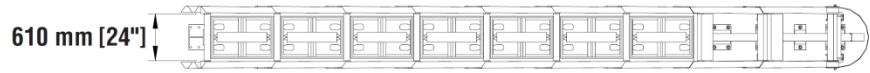
Model (s)

Bays	Width				
9	24" [610 mm]	30" [760 mm]	36" [915 mm]	69" [1755 mm]	90" [2255 mm]
Model	QH2409G or Y	QH3009G or Y	QH3609G or Y	QH6909G or Y	QH9009G or Y

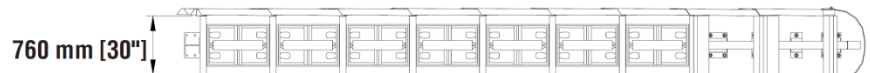
Q H 24 09 G

Nose Color (Gray [G] or Yellow [Y])
 Number of Bays
 Nominal Width of Backup
 High Speed
 QuadGuard

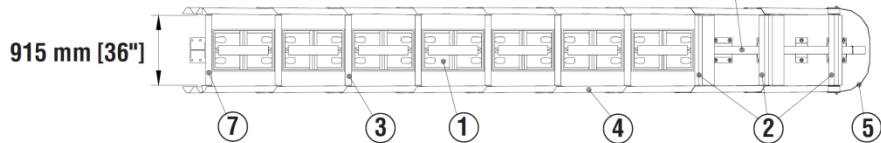
Figure 6
Model Number Key



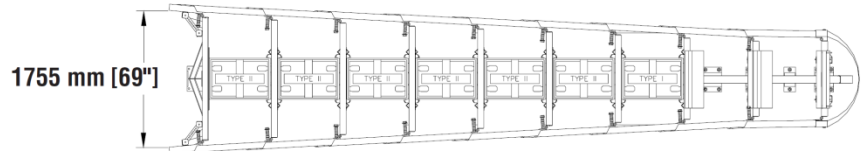
MODEL NO. QH2409



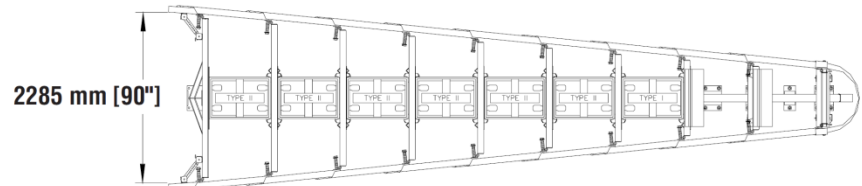
MODEL NO. QH3009



MODEL NO. QH3609



MODEL NO. QH6909



MODEL NO. QH9009

Key

- 1) Cartridge
- 2) Space-Frame Diaphragm (Bays 1-3)
- 3) Diaphragm (Bays 4 – 9)
- 4) Quad-Beam Fender Panel
- 5) Nose Belt
- 6) Monorail
- 7) Backup

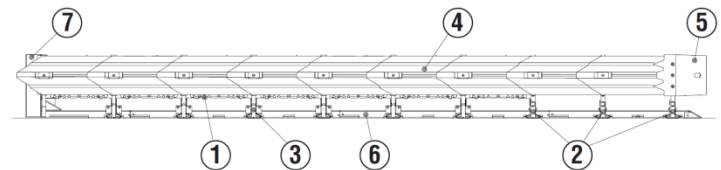
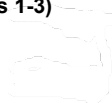


Figure 7
Plan and Elevation
(QuadGuard® HS with Tension Strut Backup shown)

Transitioning

Quad-Beam End Shoe Transition Panel

The Quad-Beam End Shoe transitions the QuadGuard® HS to a concrete Backup or vertical faced obstacle (Figure 9). Extended End Shoes are available. When obstacle corners are not chamfered wheel deflectors may be required 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® HS to new and existing runs of standard guardrail (Figures 10 & 11).

Quad-Beam to Safety Shape Barrier Transition Panel

There are several options available when transitioning the QuadGuard® HS to a barrier or guardrail depending on site specifications (p. 10).

When transitioning to barriers with a “New Jersey” safety barrier profile, the 4" offset Transition Panel is most commonly used (Figure 12). For transitioning to barriers that are in line with the side of the system, use transition assembly drawing 616041. Drawing 616048 is used when transitioning a wide system that runs parallel to the centerline of the system. 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 offsets are determined by measuring the distance between the face of the barrier and the top edge of the Backup at 32" above grade level (Figure 8). Remember, the correct Transition is chosen by the specified offset and obstacle.

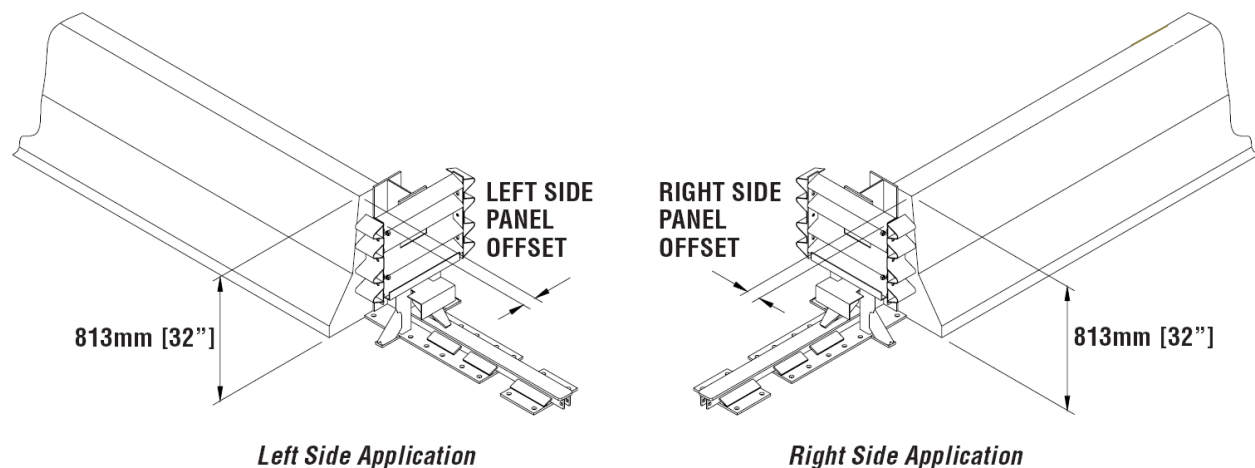


Figure 8
Transition Panel Offset

Transitions

A Transition is required if traffic will be approaching from the rear of the system. Figures 9 - 12 show standard Transitions. There are variations on each standard. The proper Transition will depend on site specific conditions for Valtir Customer Service to make appropriate recommendations.

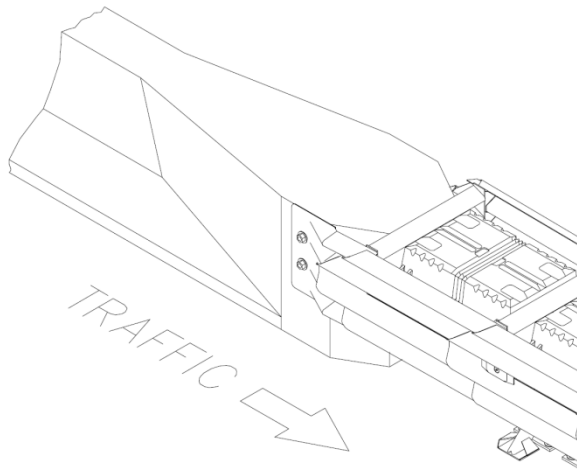


Figure 9
Quad-Beam End Shoe Transition

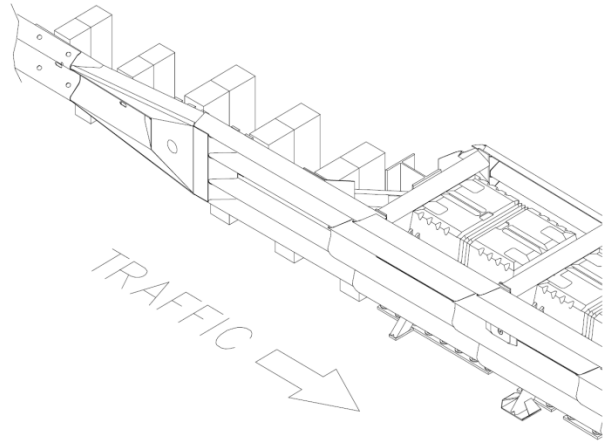


Figure 10
Quad-Beam to W-Beam Transition Panel

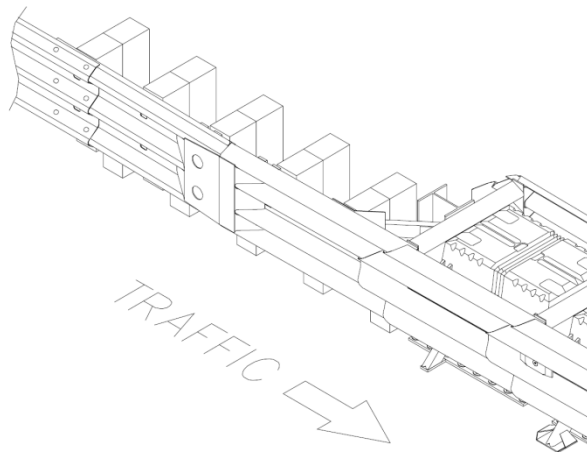


Figure 11
**Quad-Beam to Thrie-Beam
Transition Panel**

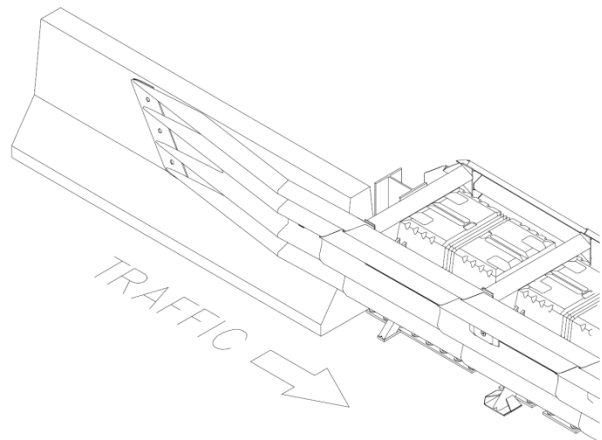
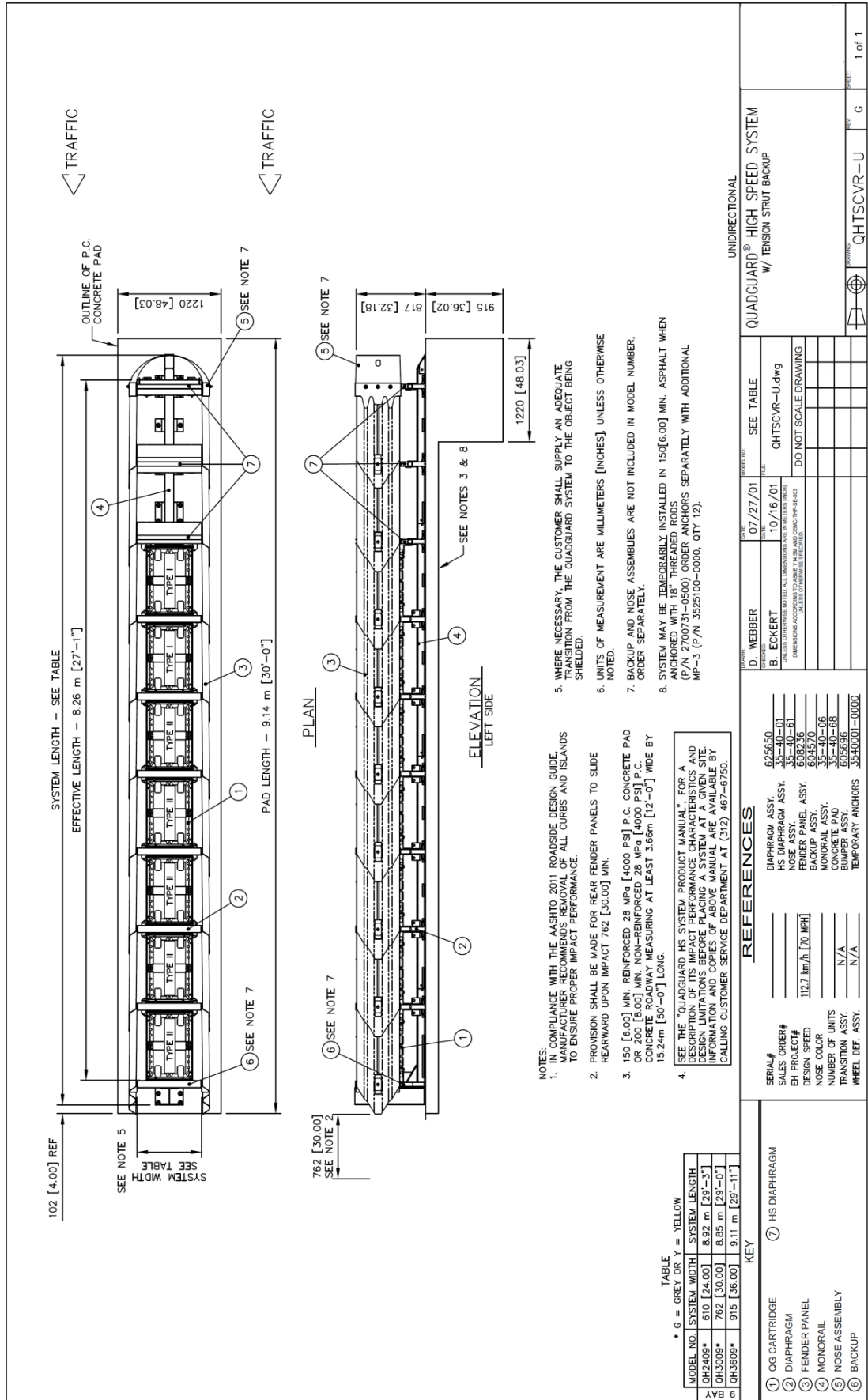
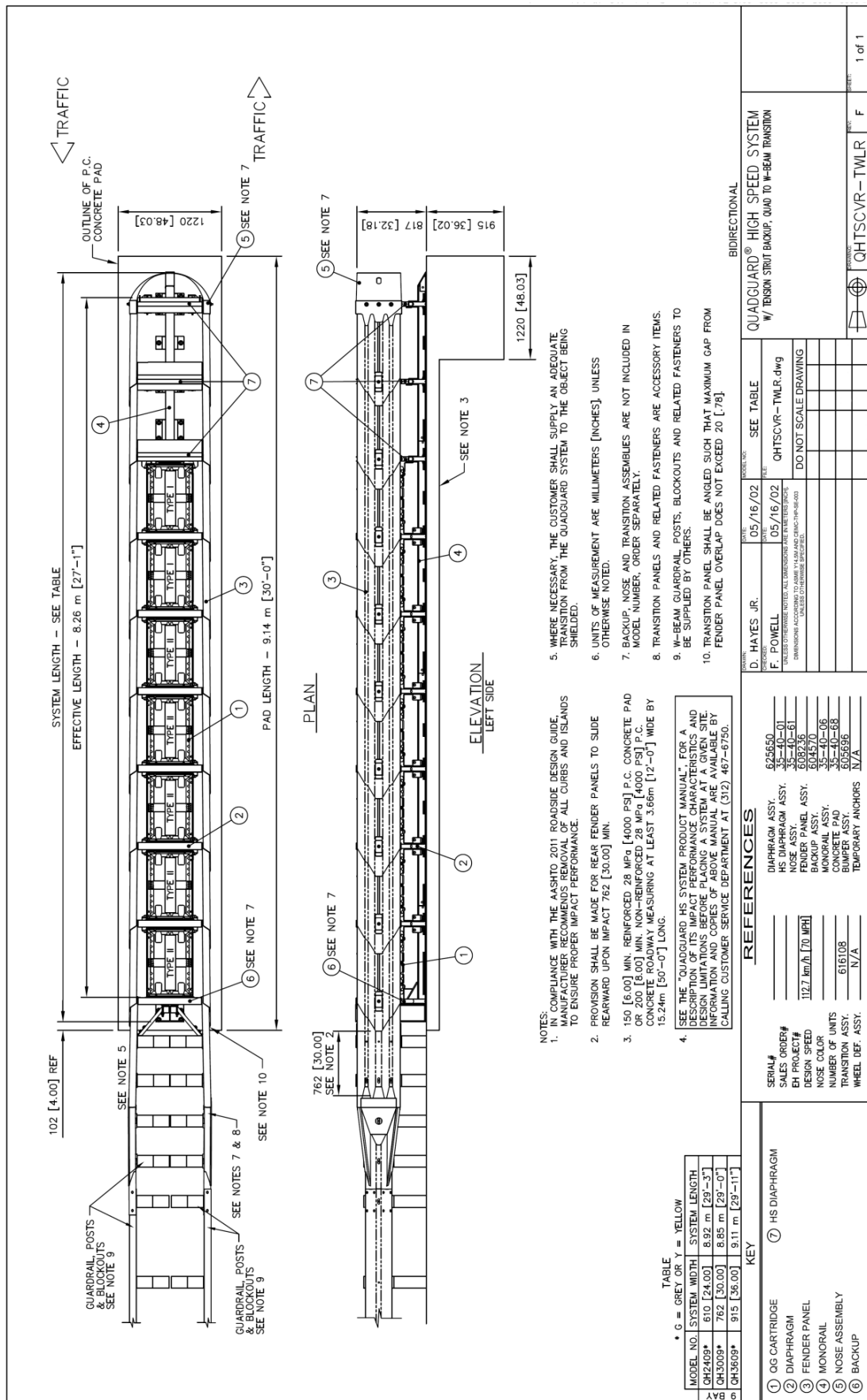


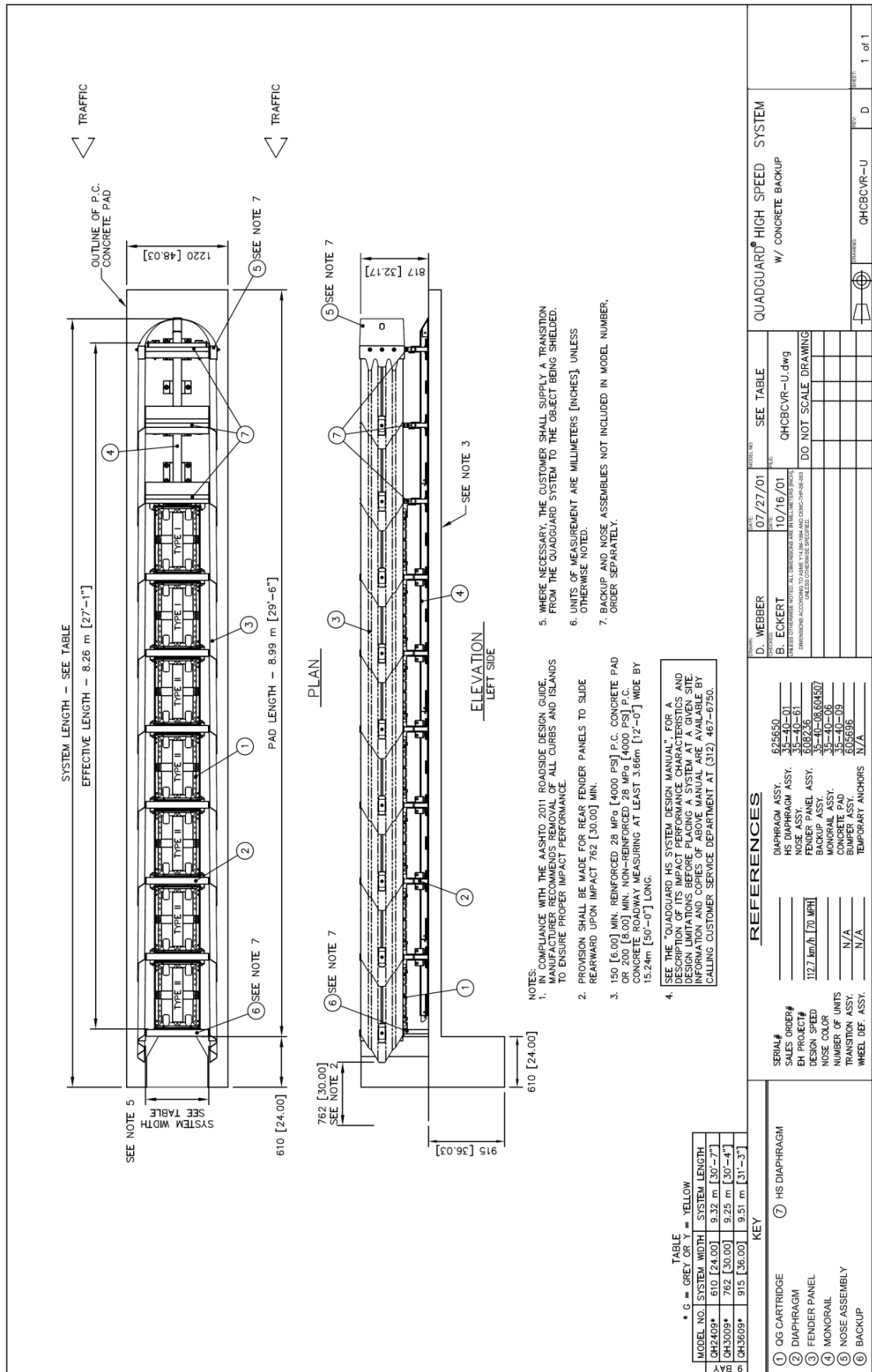
Figure 12
**Quad-Beam to Safety Shape
Barrier Transition Panel**

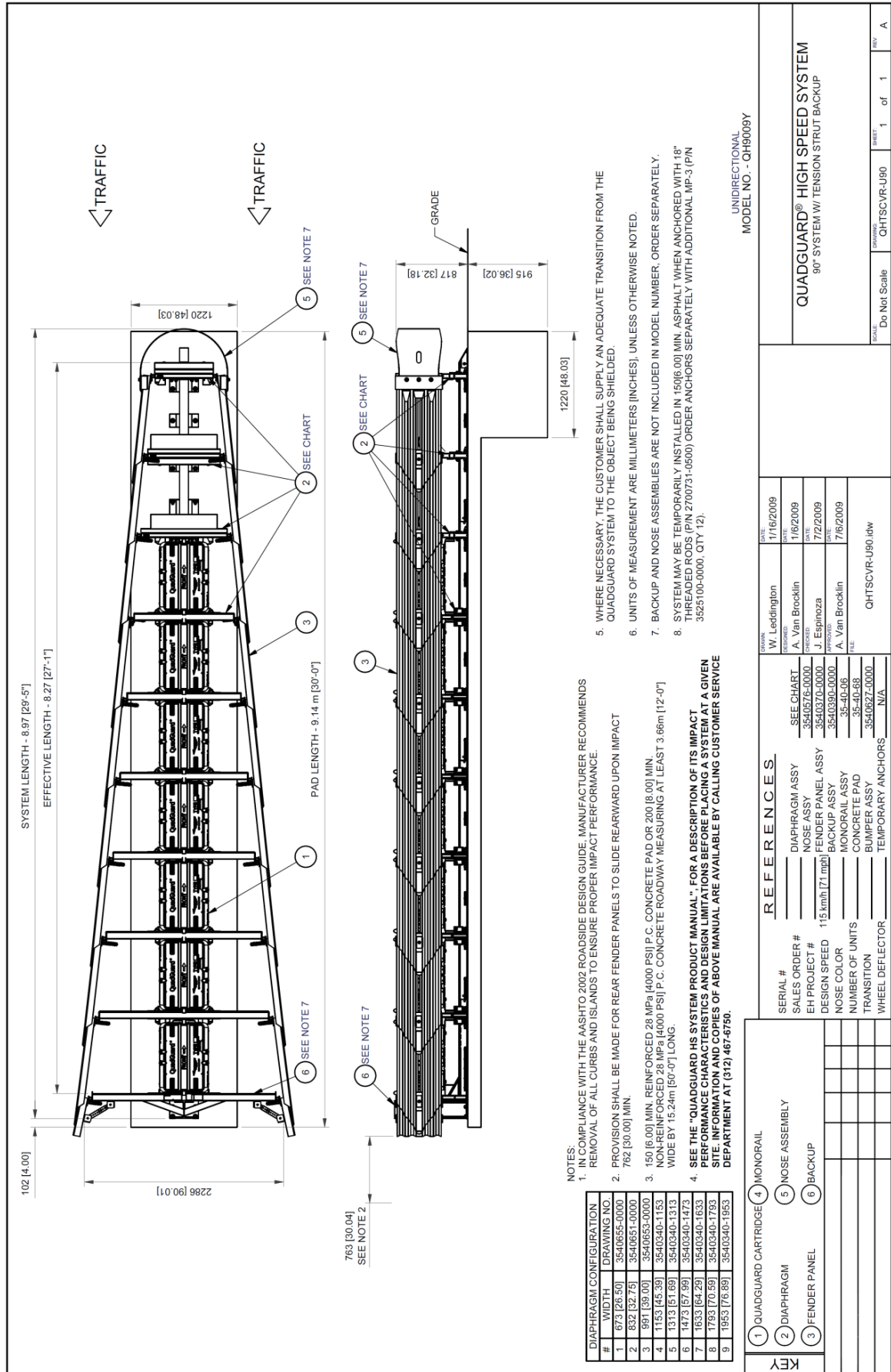


Important: After an impact, always follow the “Post-Impact Instructions” in the maintenance section of the QuadGuard® HS Assembly Manual.

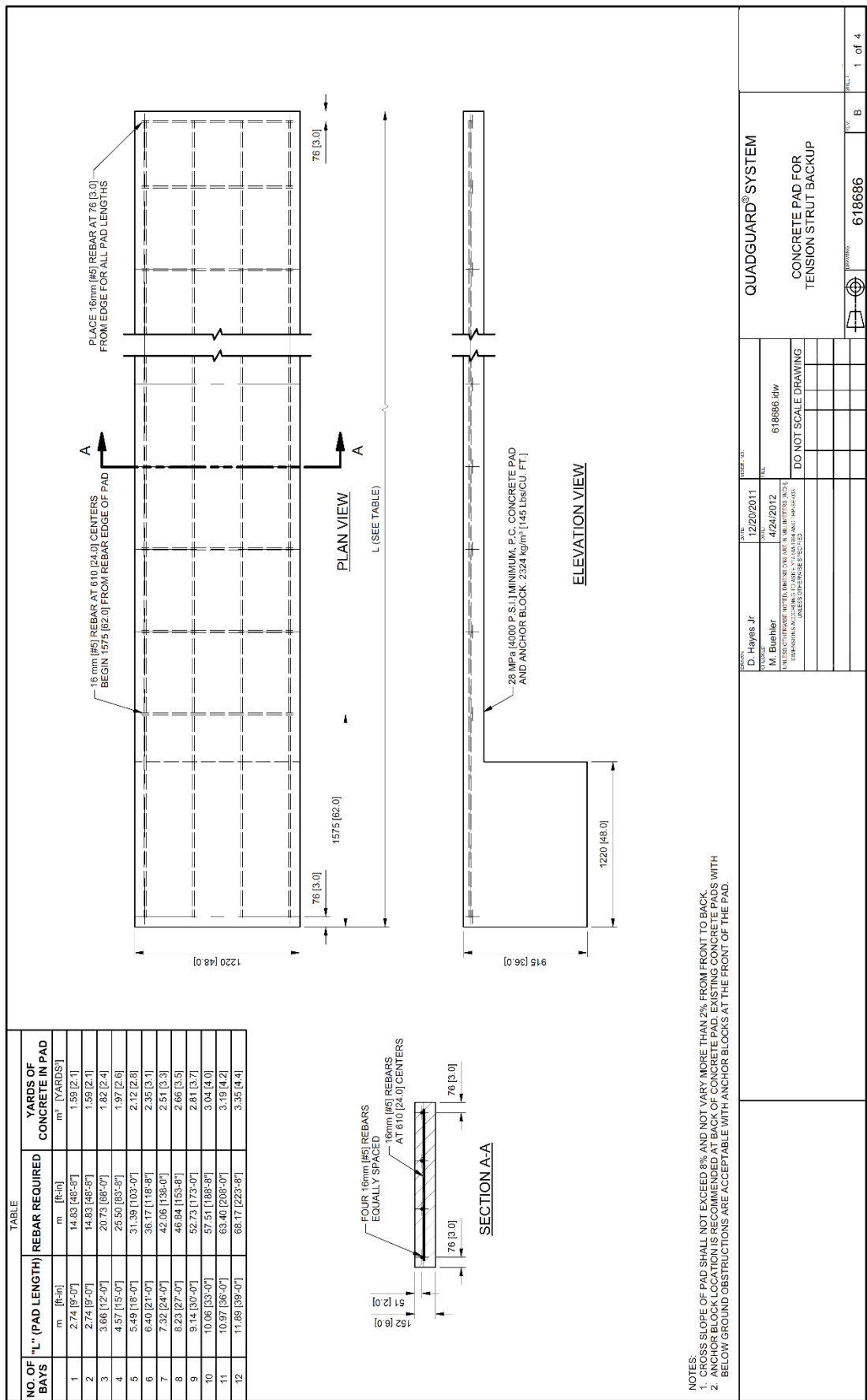




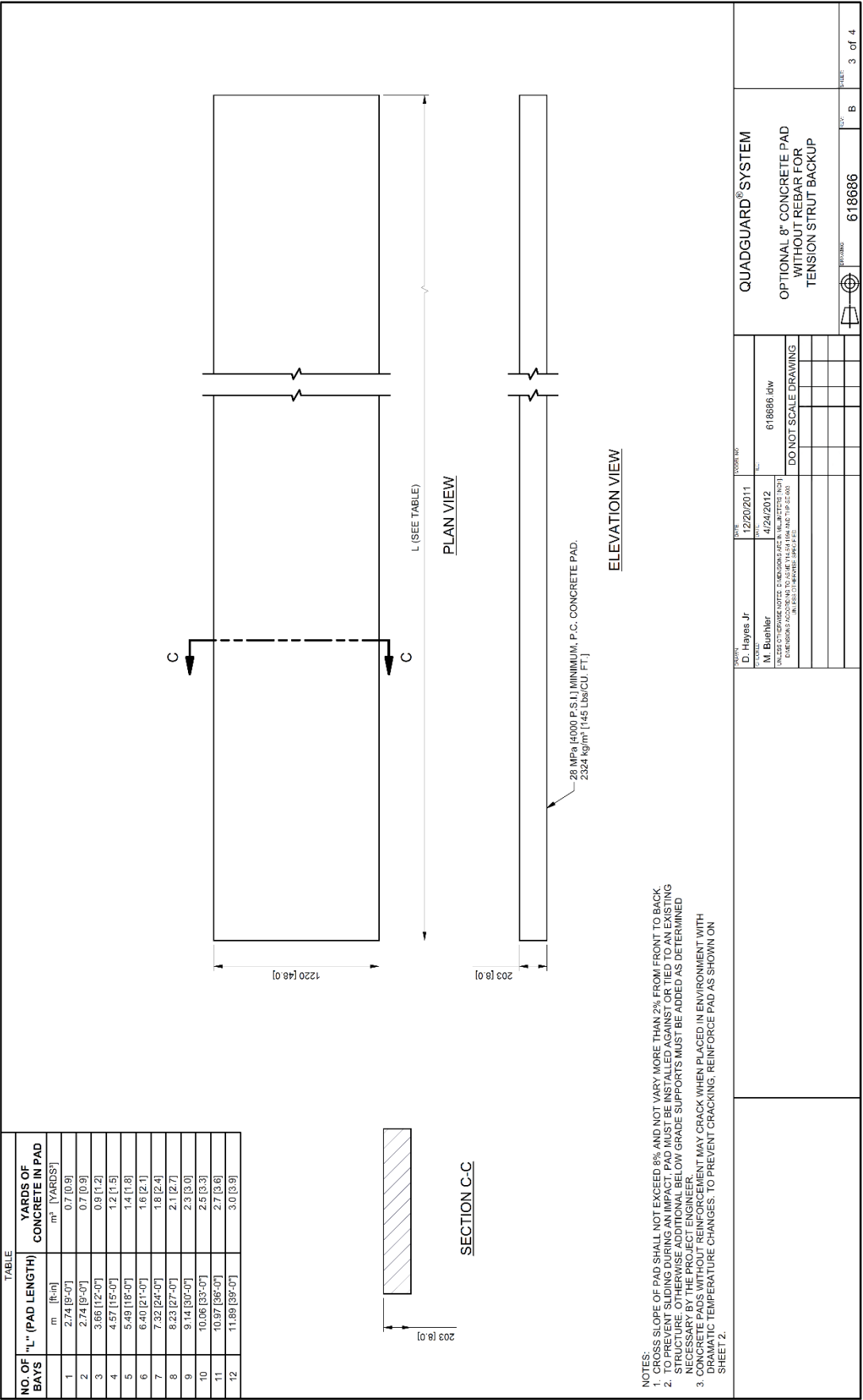




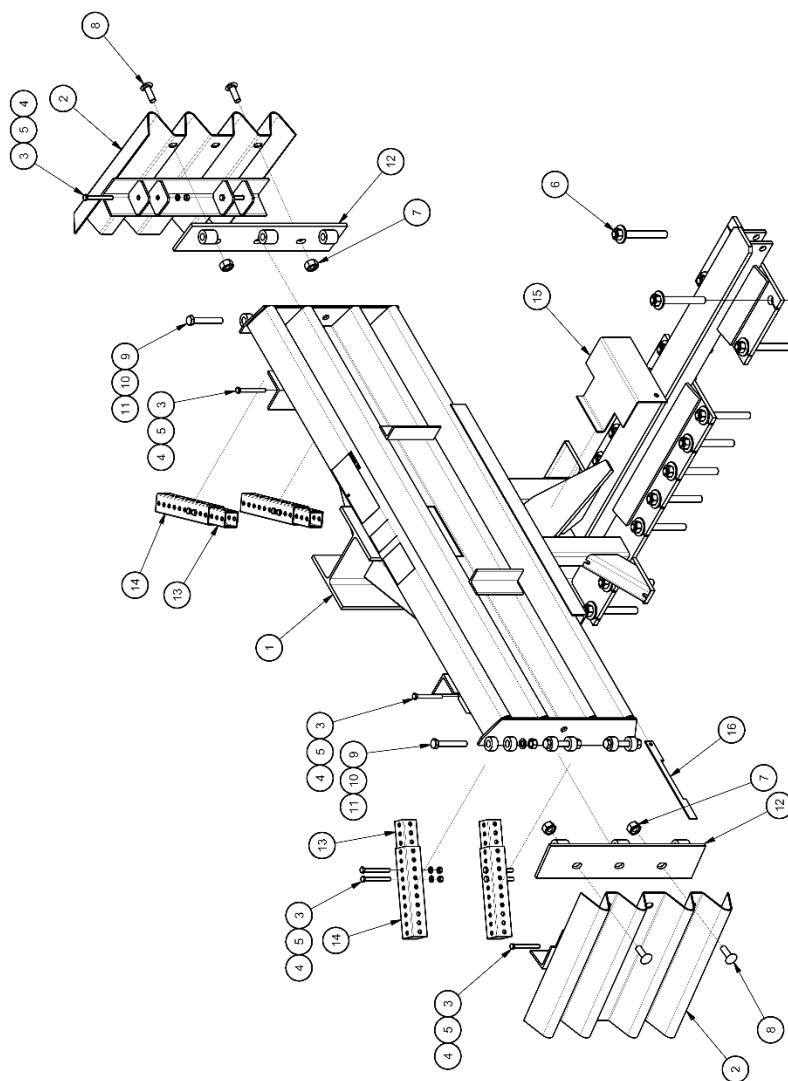
QG HS 90" w/Tension Strut Backup QHTSCVR-U90



TS Concrete Pad 618686



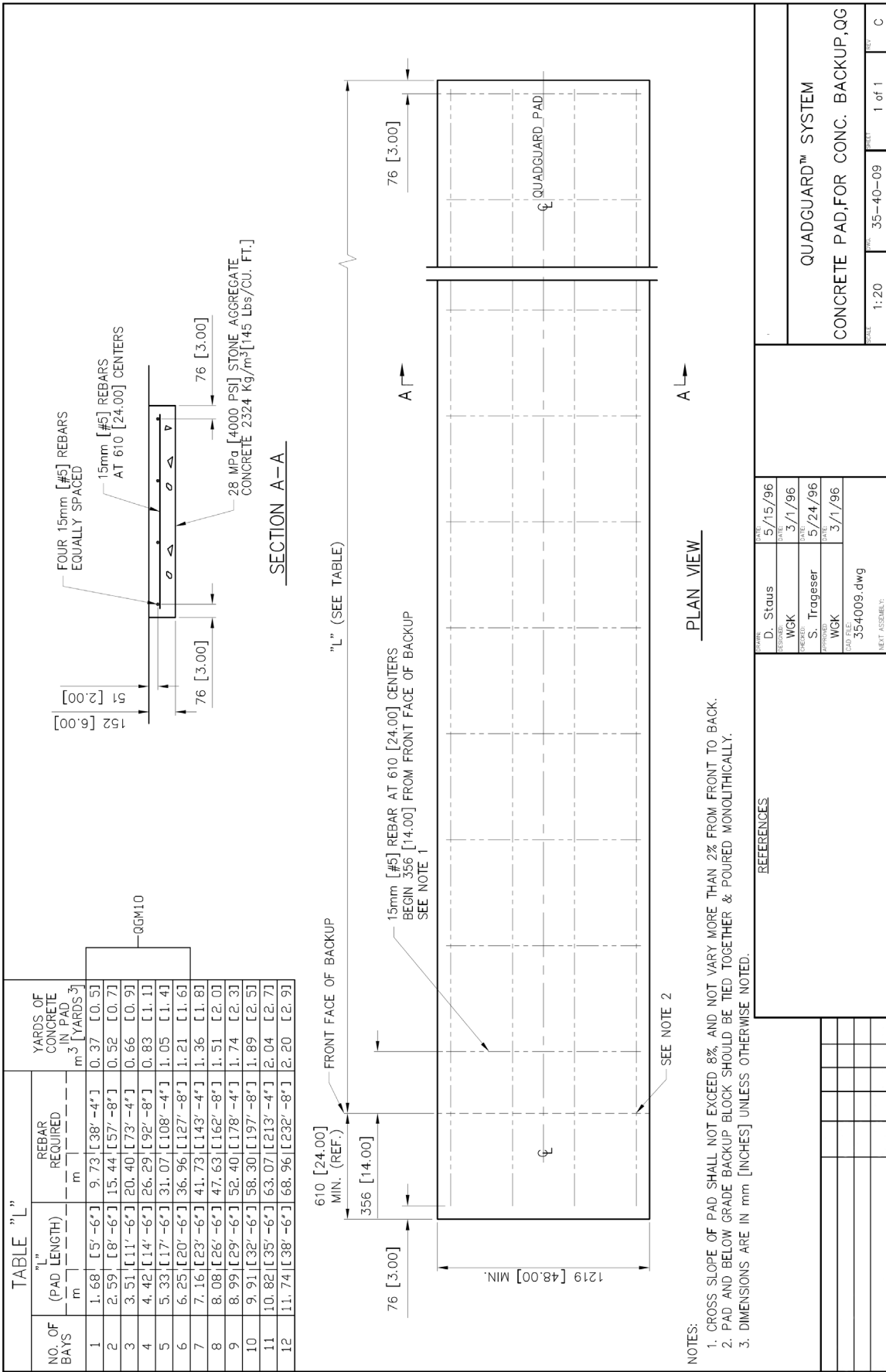
TS Concrete Pad 8" wo/Rebar 618686



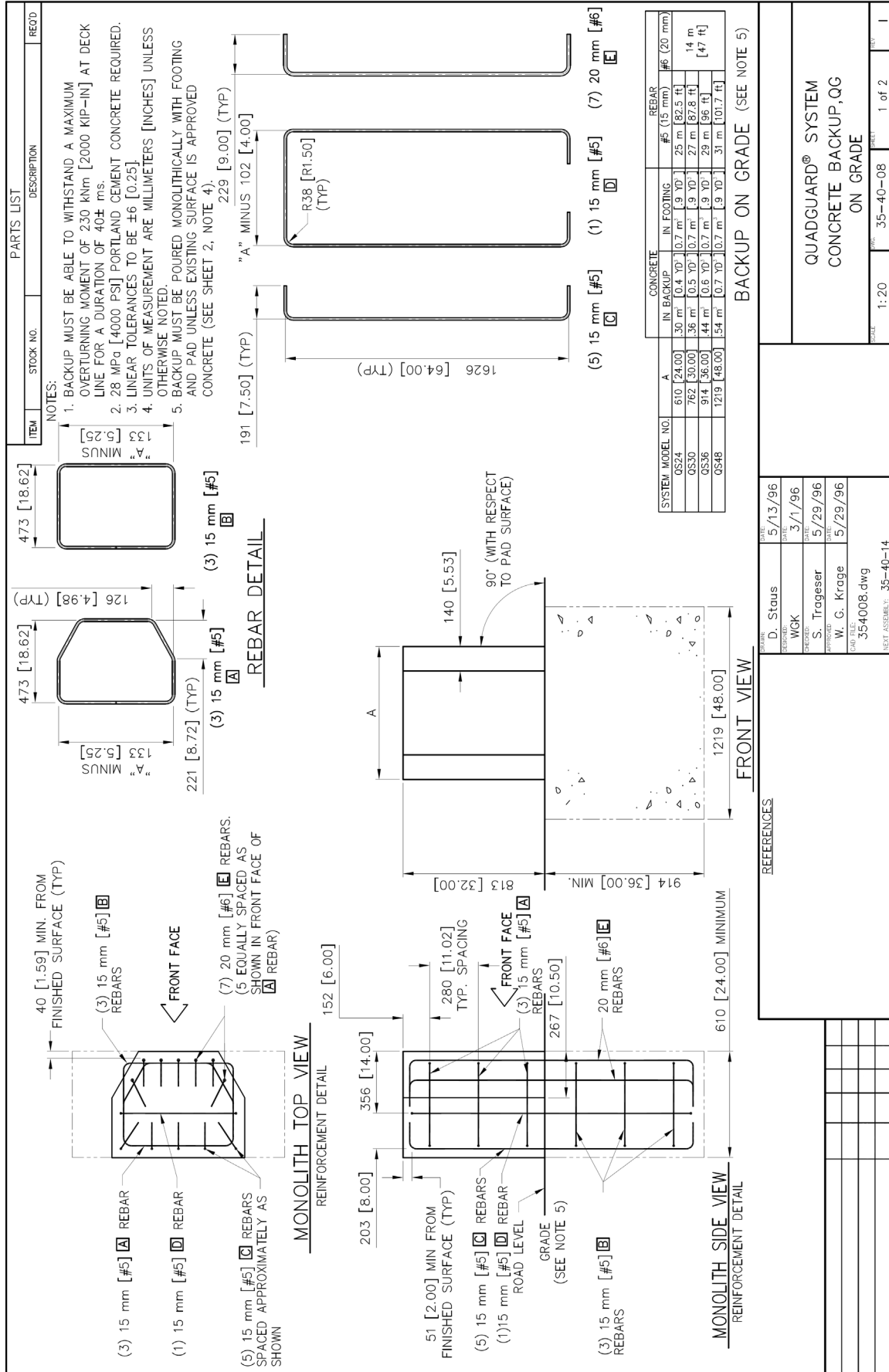
ITEM	PARTS LIST
1	BACKUP T5 WIDE W/DECAL
2	PANEL SIDE QG WIDE QG
3	BOLT 1/8 3/8X3 1/2 ALL THREAD G5 G
4	NUT 1/8 3/8 G
5	WASHER LOCK 3/8 G
6	ANCHOR KIT HLT1.330ml 3/4X7 (4)
7	NUT 1/8 5/8 G RAIL
8	BOLT RAIL 5/8X2 G
9	BOLT 1/8 5/8X3 G5 G
10	WASHER LOCK 5/8 G
11	5/8" HEX NUT A653A
12	HING PLATE/FENDER PANEL QG
13	TEL ST 1 3/4X1 3/4X1/2 GA X10 HAS G
14	TEL ST 22X21 1/2 GA X10 HAS G
15	BRACKET CART SUPT T5 BU QG
16	LOCKING BAR CARTRIDGE SUPT QG

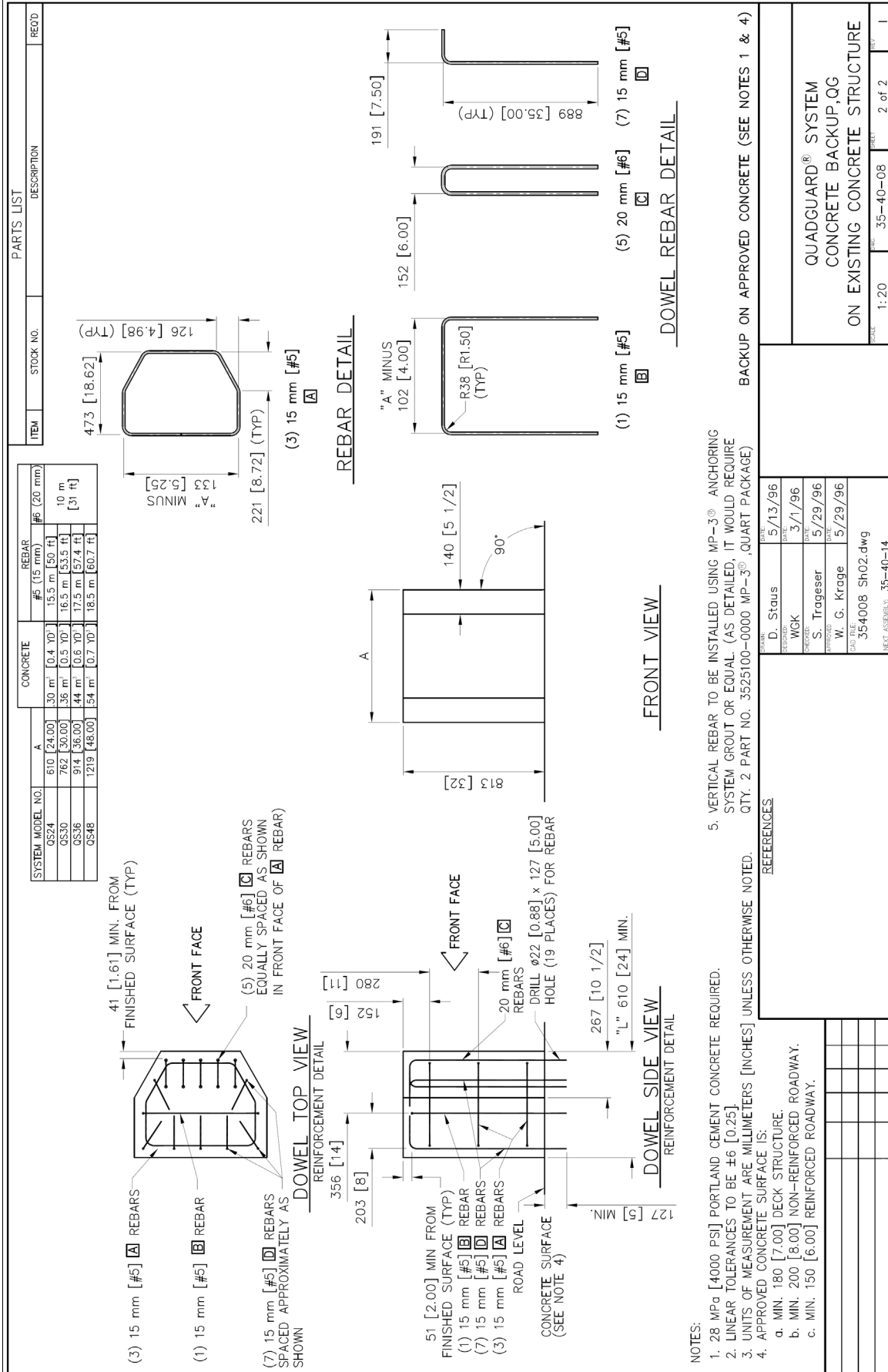
TABLE				
	WIDTH	7" ANCHOR	18" ANCHOR	NO ANCHOR
QG, QGII, QGHS	69"	604596	628520	627519
QG, QGII, QGHS	90"	604599	628521	627520
QG M WIDE	69"	627512	N/A	627523

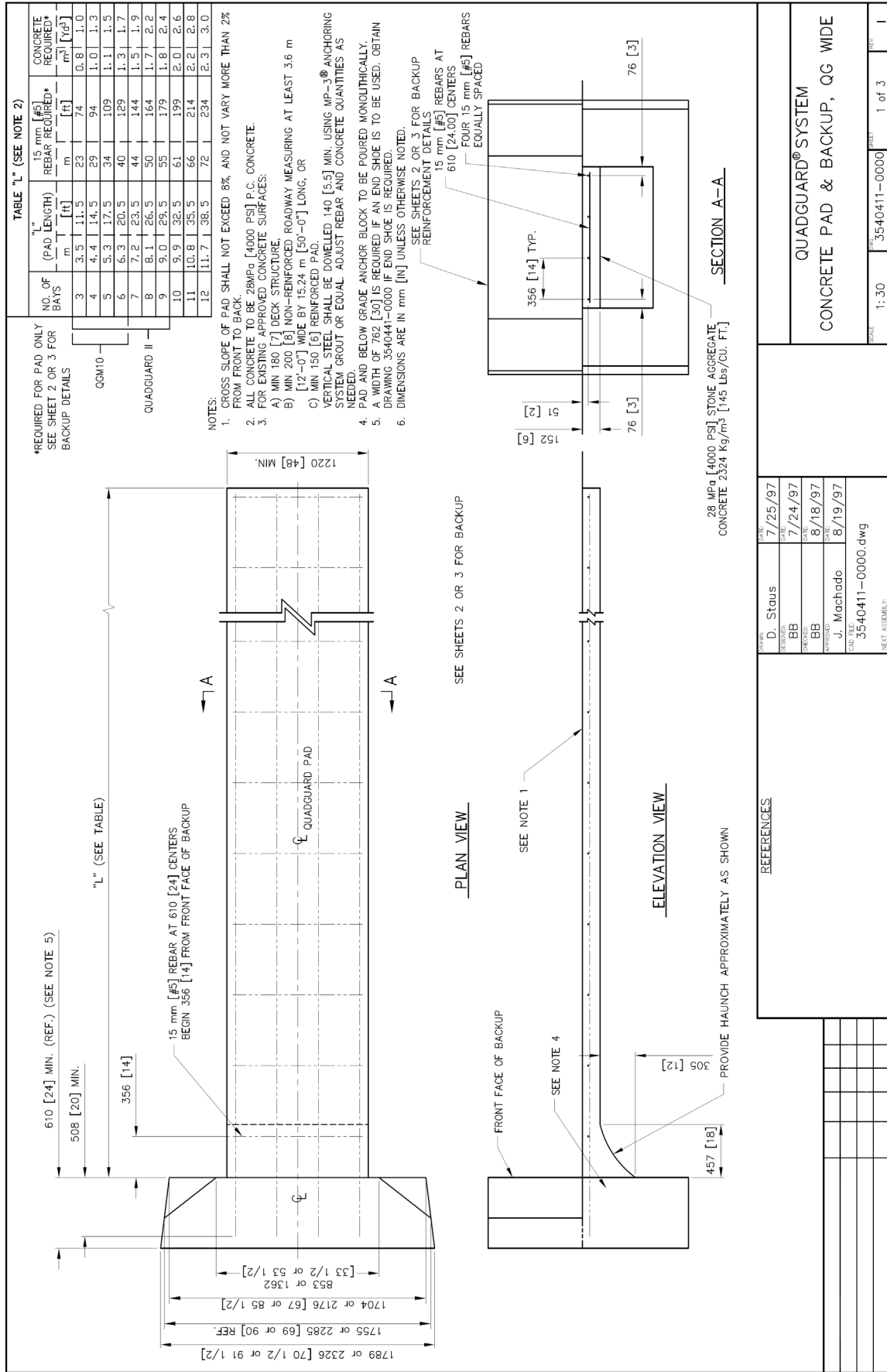
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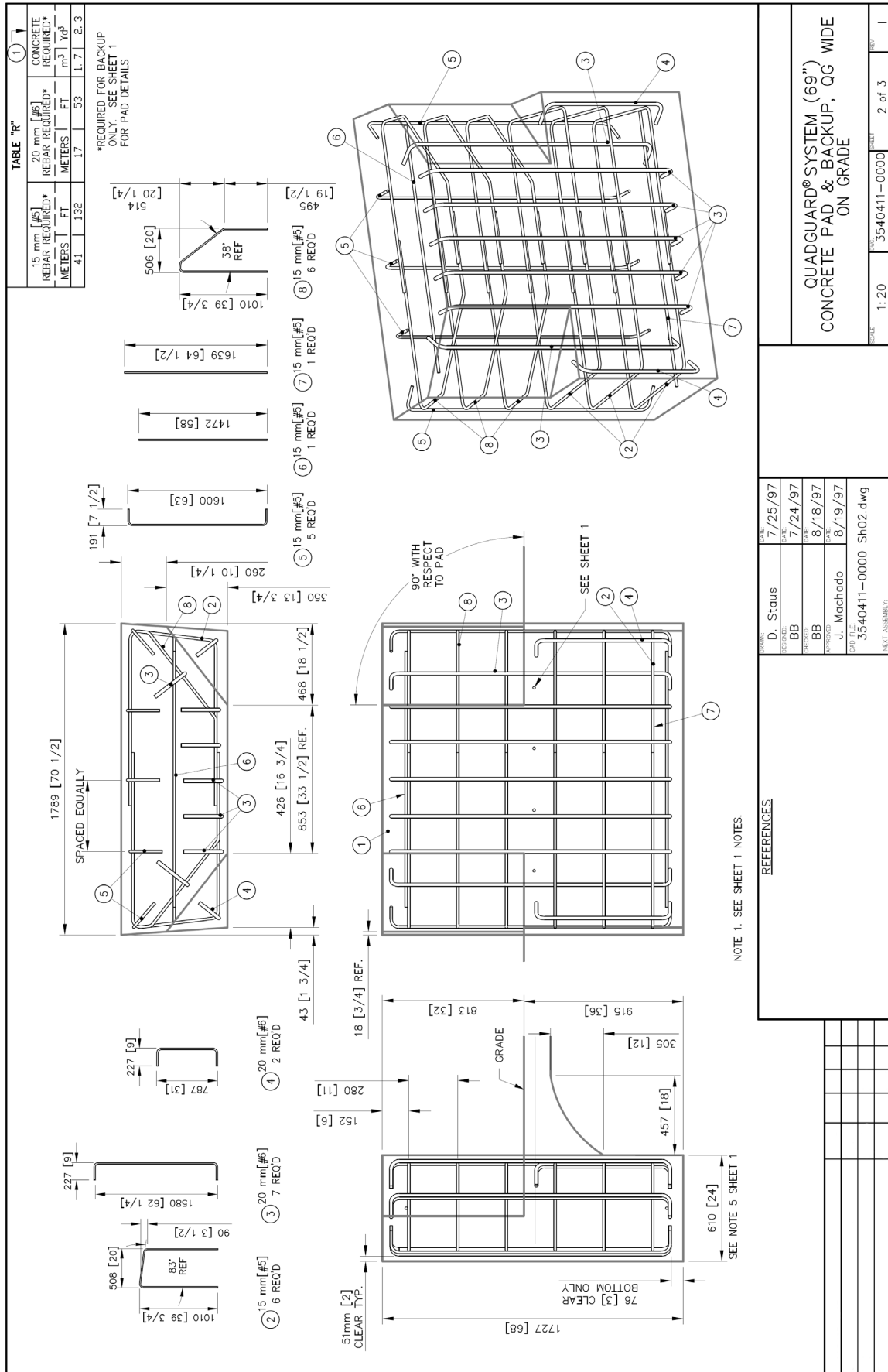
Concrete Pad for Concrete Backup 35-40-09

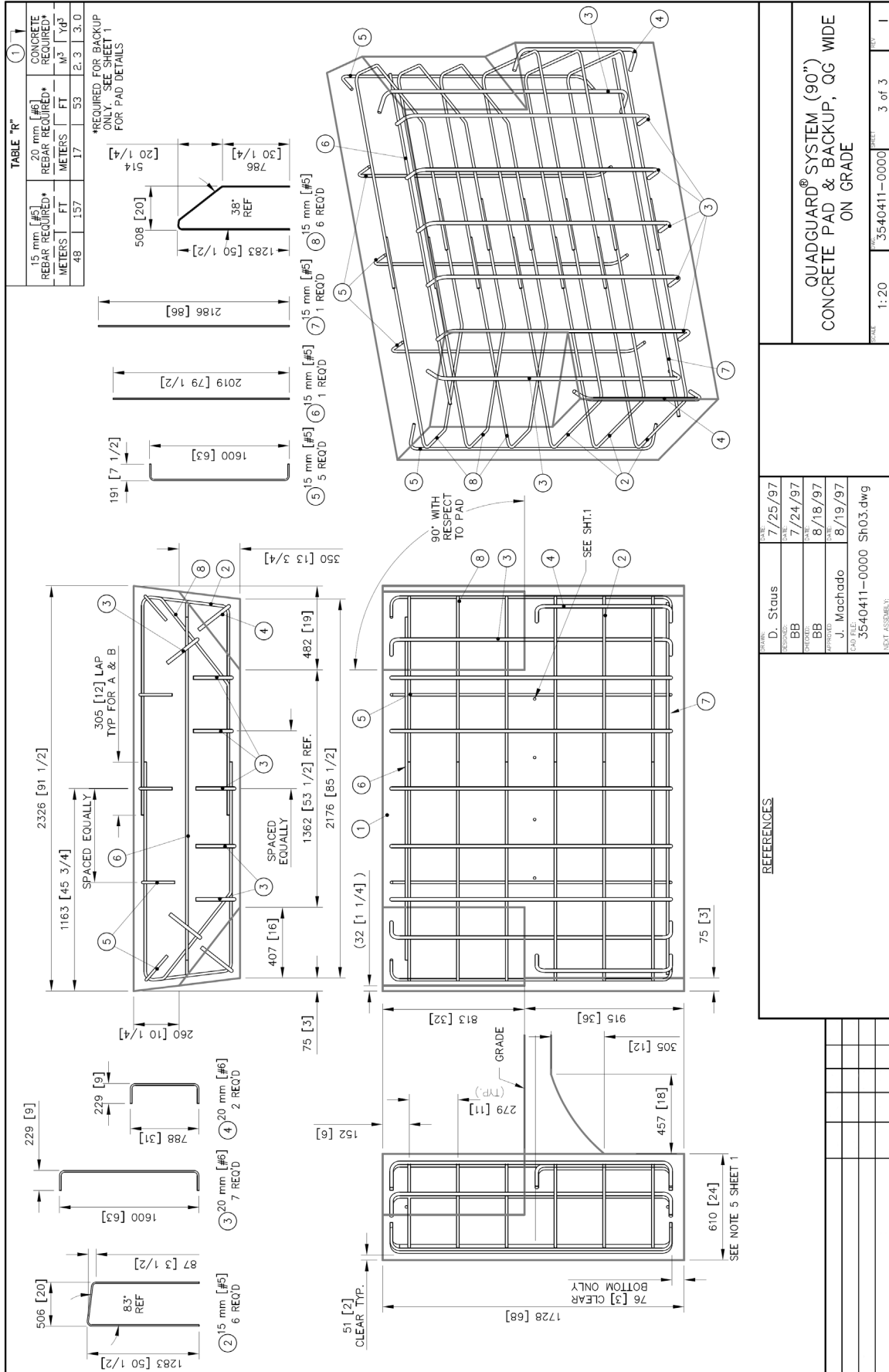


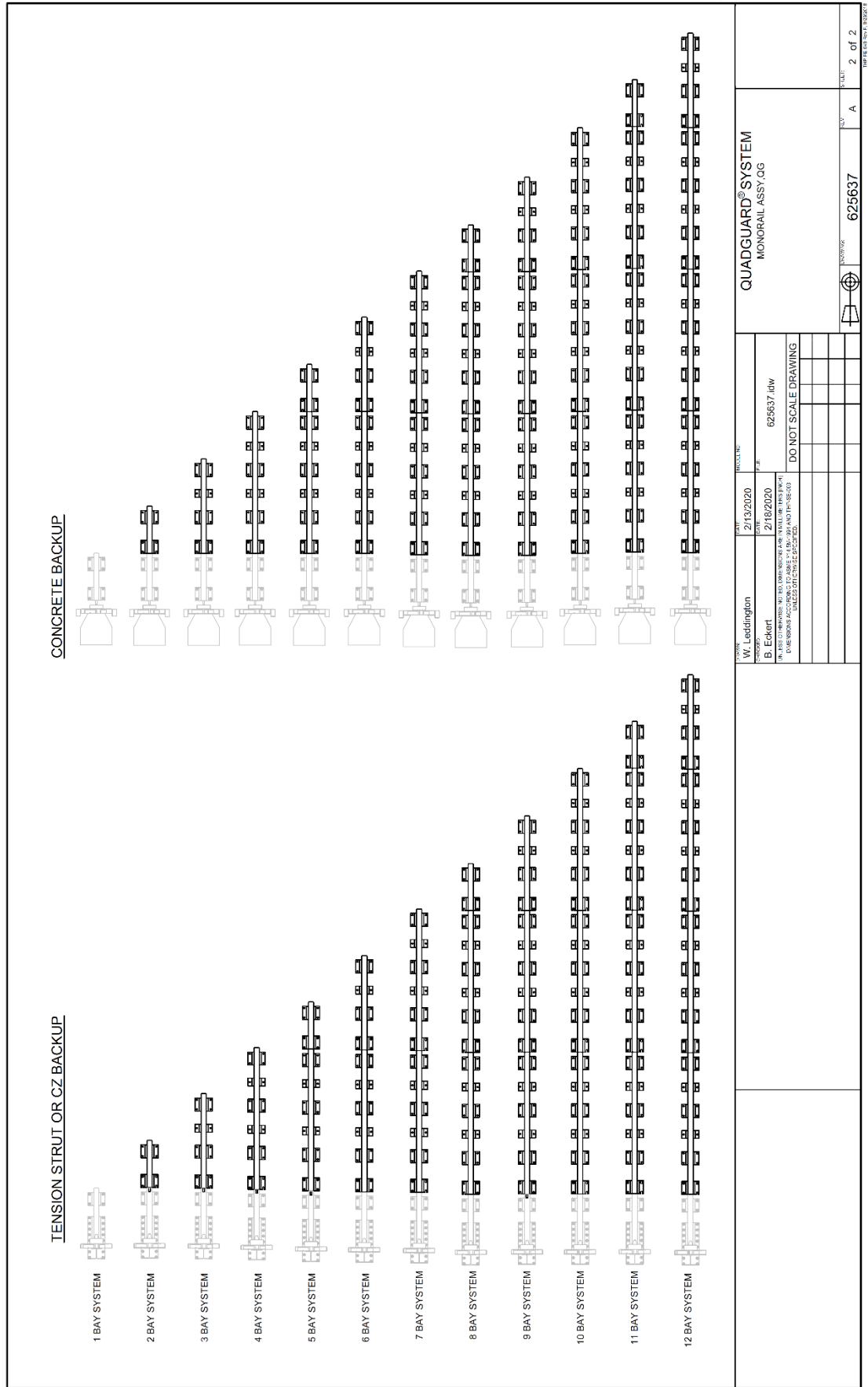


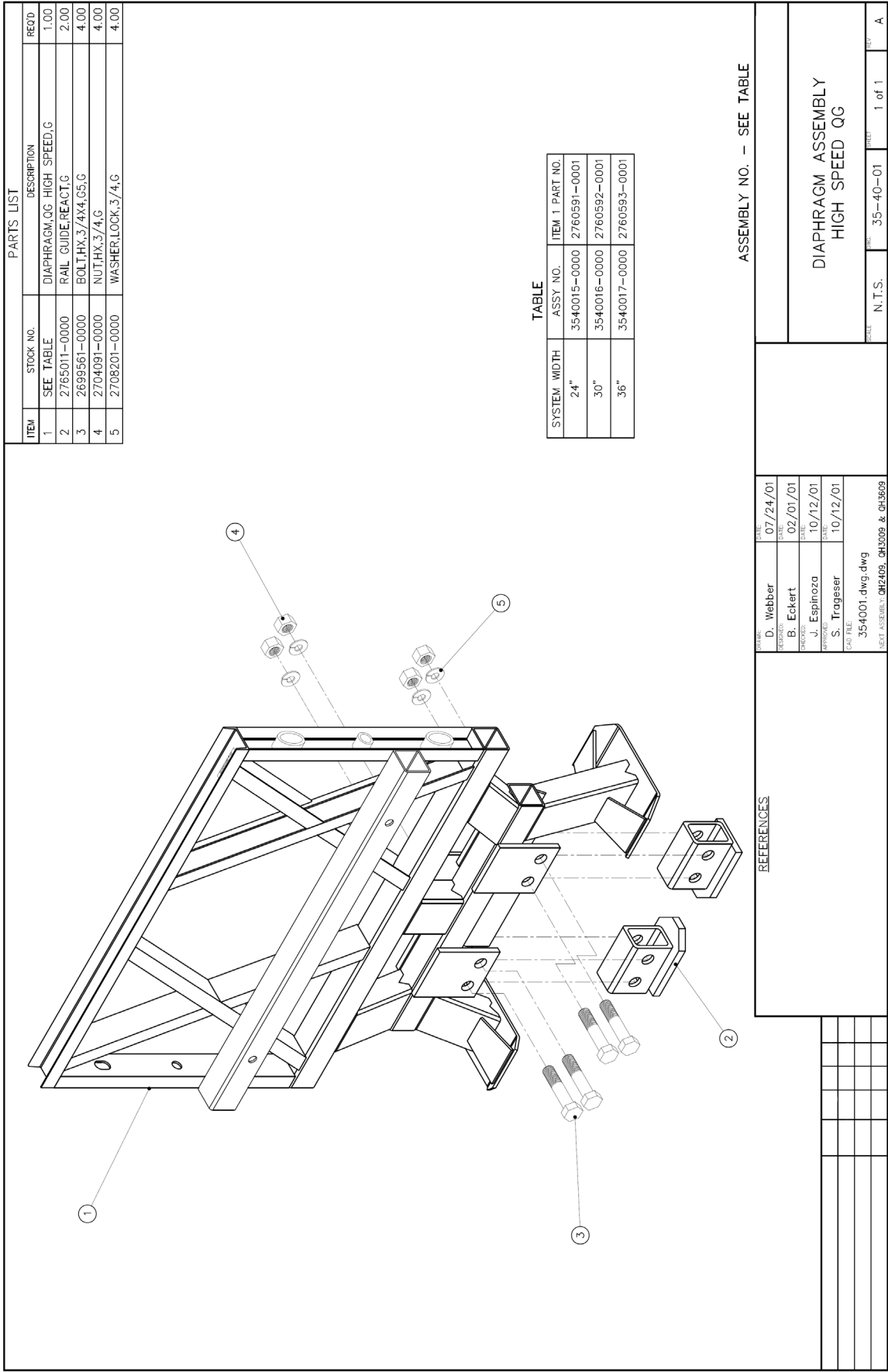


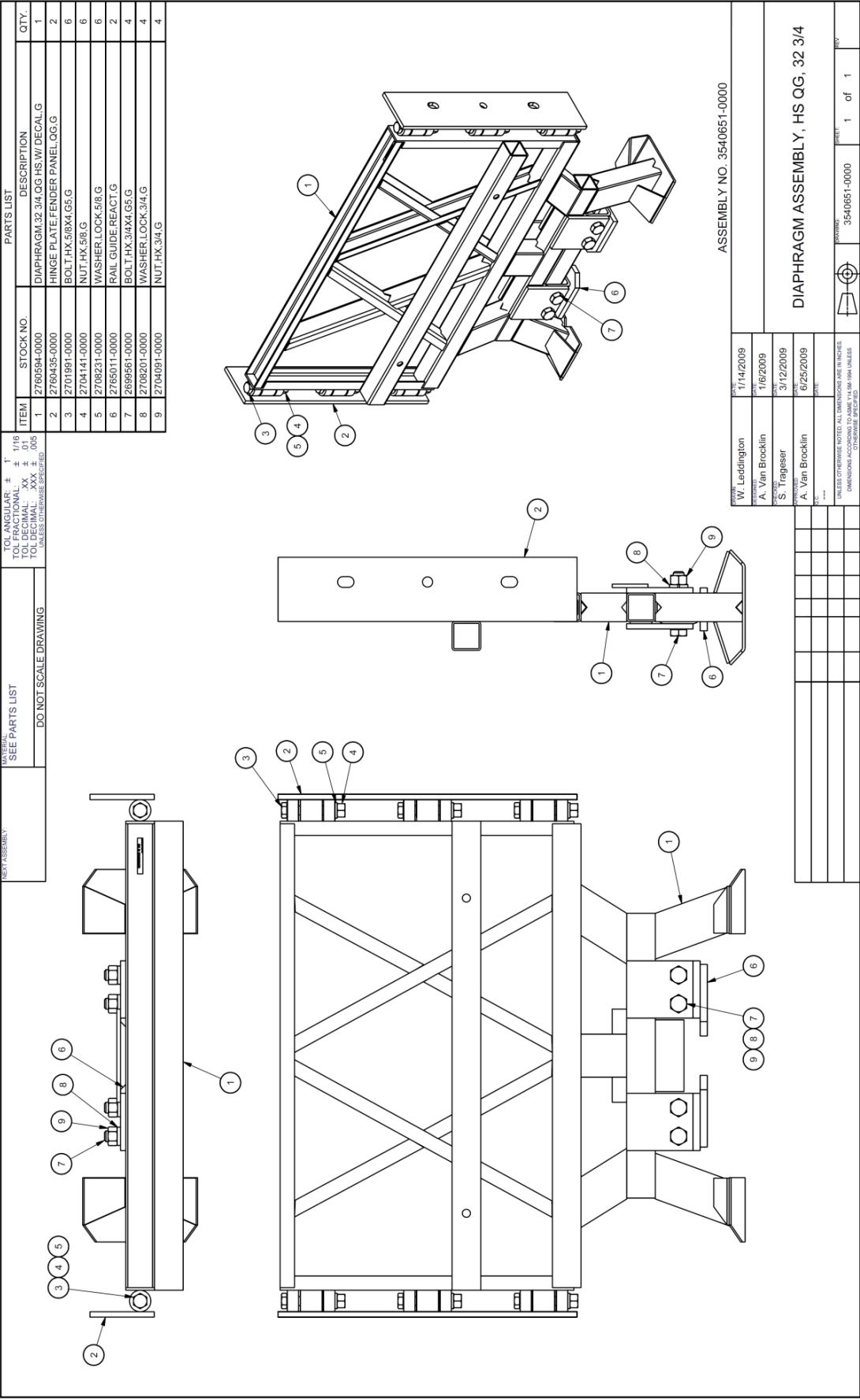
Concrete Pad & Backup, Wide 3540411



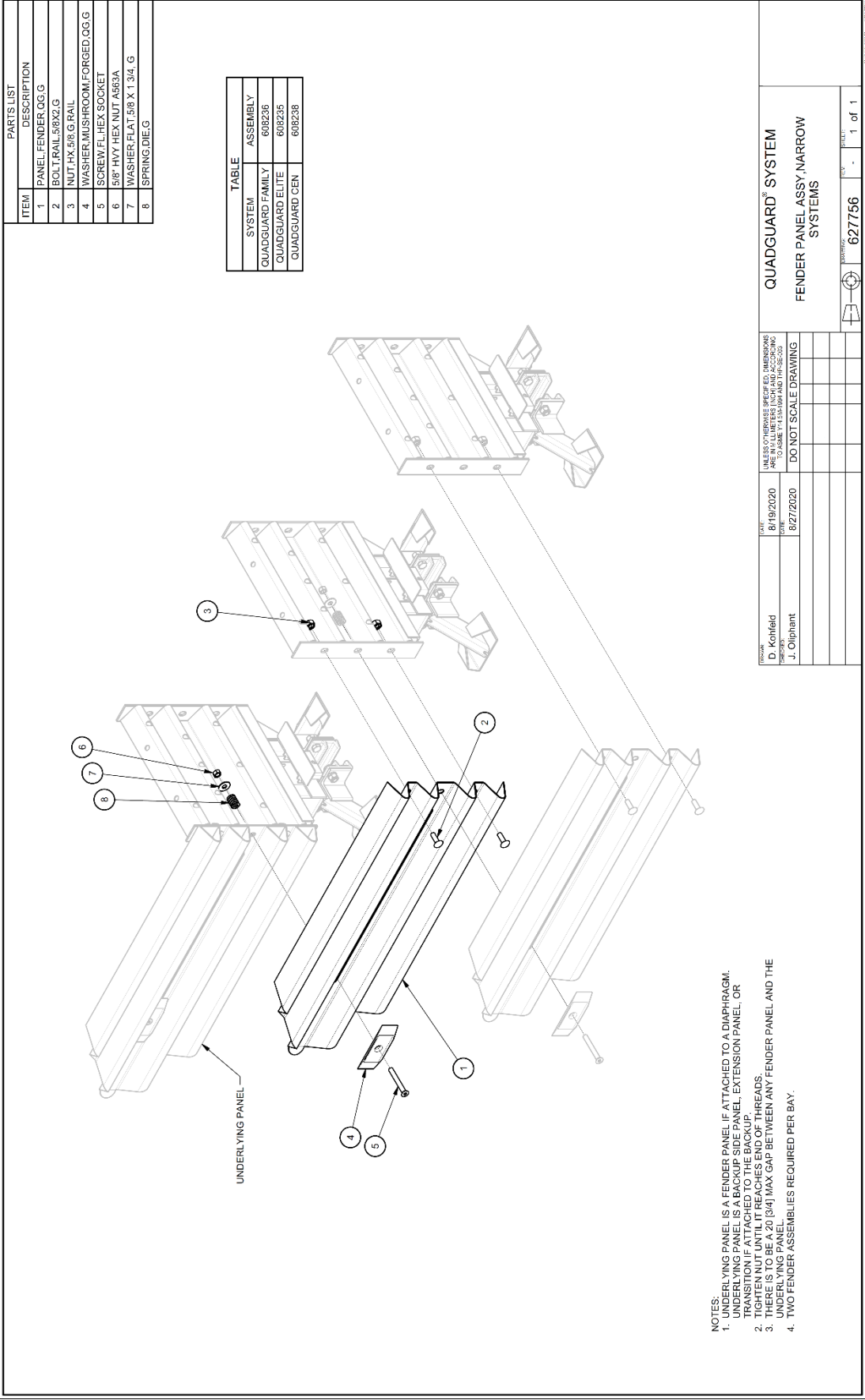








Diaphragm Assembly, 32 3/4" 607120



Fender Panel Assembly, Parallel 627756

REF. ASSEMBLY:
QH2409, QH3009
& QH3609

EXP. REF. PARTS LIST
SEE PARTS LIST

TOL. ANGULAR: ± 1°
TOL. LINEAR: ± 1/16"
UNLESS OTHERWISE NOTED.

ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	SEE TABLE	SPACER, DIAPHRAGM, QG HIGH SPEED, G	2.00
2	SEE TABLE	BUMPER HDPE, QUADGUARD, HIGH SPEED	2.00
3	113495	BOLT, HX, 1/2X8, G2, G, ALL THREAD	4.00
4	118009	WASHER, FLAT, 1/2X1 3/8, G	4.00
5	115939	NUT, HX, 1/2, G	6.00
6	113476	BOLT, HX, 1/2X3, G2, G	2.00
7	605446	BRACKET, CARTRIDGE SUPT, DIA, QG, G	1.00

DIAPHRAGM 1

DIAPHRAGM 2

DIAPHRAGM 3

SYSTEM WIDTH	ASSY NO.	ITEM 1 PART NO.	ITEM 2 PART NO.
24"	605696	614513	605711
30"	605697	614515	605712
36"	605698	614518	605713

ASSEMBLY NO. - SEE TABLE

QUADGUARD SYSTEM
BUMPER ASSY, QG HIGH SPEED

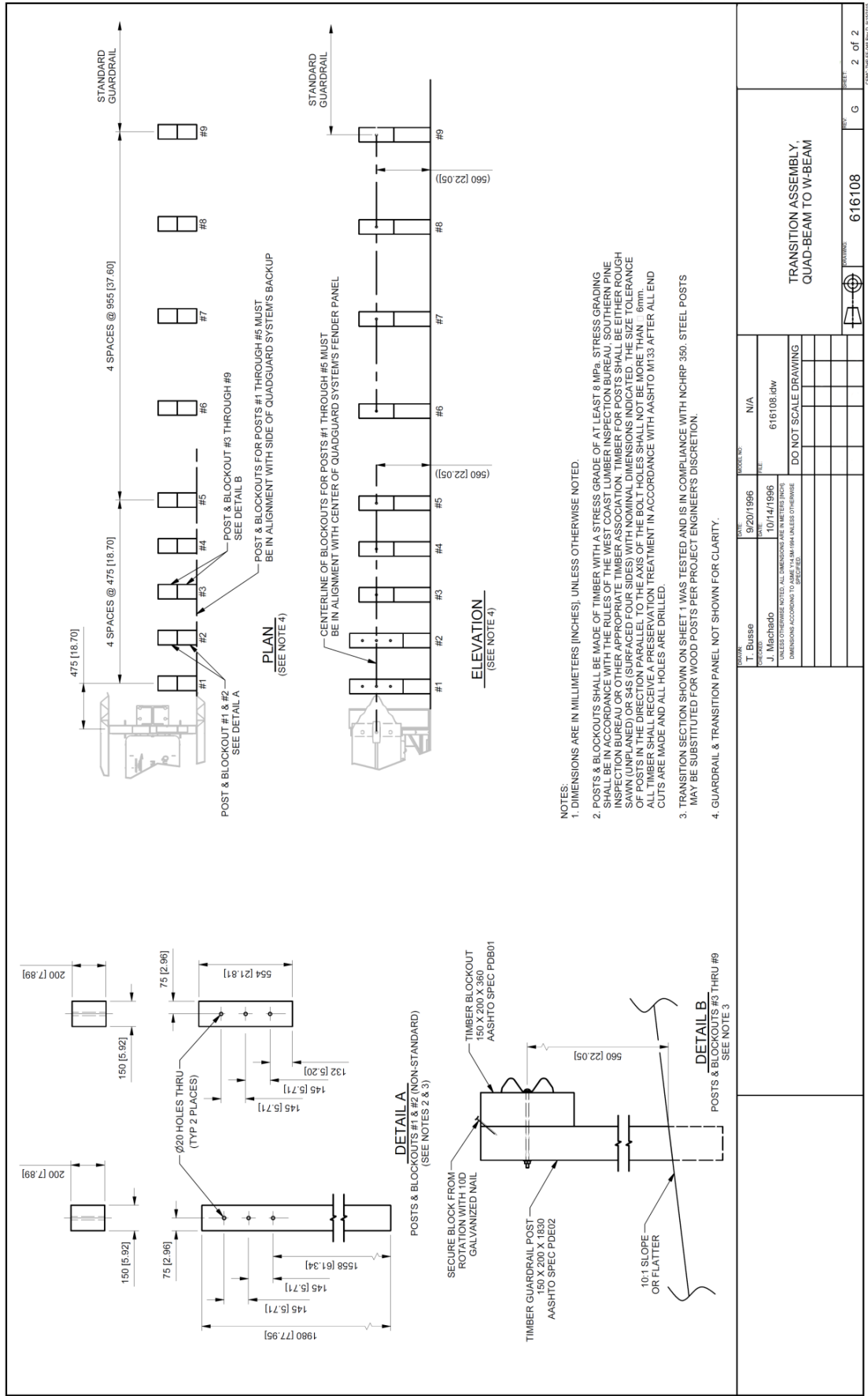
DATE	DESIGNED	CHECKED	DATE	DATE	DATE	SCALE	1 of 1	B
7/26/01	D. Webber		3/6/01					
10/12/01	B. Eckert		10/12/01					
10/12/01	Bret Eckert		10/12/01					
10/12/01	S. Trageser		10/12/01					

605696.dwg

Bumper Assembly

605696

Nose Assembly, 69" & 90"



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.

WWW.VALTIR.COM
1.888.323.6374

