



February 6, 2026

In Reply Refer To:
HSST-1/CC-152A

Mr. Frederick Mauer
Gregory Industries
4100 13th Street, SW
Canton, OH 44710

Dear Mr. Mauer:

We received your correspondence on September 4, 2024, requesting issuance of a Federal-aid reimbursement eligibility letter under the Federal-aid highway program for the roadside safety system, device, design, product, or hardware (collectively “device”) described below. We write to inform you that the device Truck-Trailer Mounted Attenuator (TTMA) 200 is eligible for Federal-aid reimbursement. This letter supersedes the original letter CC-152 (signed March 5, 2019) for the Truck-Trailer Mounted Attenuator (TTMA) 200. This letter is assigned Federal Highway Administration (FHWA) control number CC-152A.

ELIGIBILITY LETTERS

The FHWA issues Federal-aid reimbursement eligibility letters for new roadside safety devices that are crash tested in accordance with the industry standard of the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH).

FHWA, the Department of Transportation, and the United States (government) do not regulate roadside safety devices, crash test facilities, or the manufacturing industry. Issuance of eligibility letters is discretionary and provided only as a service to the states. FHWA may, at its discretion, decline to issue, revise, or rescind an eligibility letter. Eligibility letters are only issued by the FHWA Office of Safety.

Eligibility letters are issued only as notice to the states that a device is eligible for reimbursement under the Federal-aid highway program. They do not establish approval or certification for any other purpose. Issuance of an eligibility letter is not a prerequisite or requirement for state transportation agencies seeking to use Federal-aid funds for roadside safety devices. State agencies may use a device for which an eligibility letter has not been issued and seek Federal-aid reimbursement.

FEDERAL-AID REIMBURSEMENT

The request for issuance of this letter certified the device was crash tested in accordance with the industry standard of AASHTO’s MASH. This eligibility letter is based on that certification and

the material offered in support of its issuance. The device described below is eligible for reimbursement under the Federal-aid highway program.

Name of system: Truck-Trailer Mounted Attenuator (TTMA) 200
Type of system: Truck-Trailer Mounted Attenuator
Test Level: MASH Test Level - 3
Testing conducted by: Applus IDIADA KARCO Engineering, LLC.
Date of request: September 4, 2024

Information about the device, including material such as the eligibility request, crash test reports, drawings, or images are included in one or more attachment(s) to this letter.

Eligibility letter CC-152A is inapplicable to devices, optional equipment, alternate materials, or other features that were not crash tested in accordance with AASHTO's MASH.

This letter is issued only for the subject device as crash tested under AASHTO's MASH. Later modification(s) of the device are not eligible for Federal-aid reimbursement under this letter. Notice of later modification(s) should be given to transportation agencies, facility owners, and operators (collectively "agencies").

Agencies should be provided appropriate information about the device's design, installation, maintenance, materials, and mechanical properties.

Issuance of this letter is discretionary, and it may be revised or rescinded at FHWA's discretion. This letter is not a determination of compliance with the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) or ownership of any intellectual property rights.

This eligibility letter is not a determination by the government that a crash involving the subject device will result in any particular outcome. It is limited to only the device's eligibility for Federal-aid reimbursement.

INTELLECTUAL PROPERTY

Issuance of this eligibility letter does not convey property rights of any sort nor any exclusive privilege. This letter is not authorization or consent by the government for the use, manufacture, or sale of any patented or proprietary system, device, design, product, or hardware for which the requester is not the patent owner. Eligibility letters are not an expression of any view, position, or determination by the government as to the validity, scope, or ownership of any intellectual property rights to a specific device. These letters do not grant, impute, suggest, or otherwise establish any ownership, distribution, or licensing rights to the requester. The government expresses no opinion about the intellectual property rights relating to any device for which this or any other eligibility letter is issued.

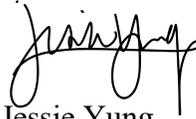
PUBLIC DISCLOSURE

To prevent any misunderstanding, and as discussed above, this Federal-aid eligibility letter is assigned FHWA control number CC-152A. It should only be reproduced in full with its attachment(s). This Federal-aid eligibility letter and the material offered by the requester supporting its issuance is public information. All eligibility letters and supporting material are subject to public disclosure under the Freedom of Information Act (FOIA). Eligibility letters are available to the public at

https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/.

If you have any questions please contact Paul LaFleur at Paul.LaFleur@dot.gov.

Sincerely,



Jessie Yung
Director, Office of Safety Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Submitter	Date of Request:	September 05, 2024	<input type="radio"/> New <input checked="" type="radio"/> Resubmission
	Name:	Alex Beltran	
	Company:	Applus IDIADA KARCO Engineering, LLC.	
	Address:	9270 Holly Road, Adelanto, CA 92301	
	Country:	United States of America	
To:	Michael S. Griffith, Director FHWA, Office of Safety Technologies		

I request the following devices be considered eligible for reimbursement under the Federal-aid highway program.

Device & Testing Criterion - Enter from right to left starting with Test Level

!-!-!

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'CC': Truck-Mounted Attenuators (TMA)	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	TTMA-200	AASHTO MASH	TL3

By submitting this request for review and evaluation by the Federal Highway Administration, I certify that the product(s) was (were) tested in conformity with the AASHTO Manual for Assessing Safety Hardware and that the evaluation results meet the appropriate evaluation criteria in the MASH.

Individual or Organization responsible for the product:

Contact Name:	Frederick Mauer	Same as Submitter <input type="checkbox"/>
Company Name:	Gregory Industries	Same as Submitter <input type="checkbox"/>
Address:	4100 13th Street SW Canton OH 44710	Same as Submitter <input type="checkbox"/>
Country:	United States of America	Same as Submitter <input type="checkbox"/>

Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.

Gregory Industries is the manufacturer and marketer of the TTMA-200.

Applus IDIADA KARCO Engineering, LLC (IDIADA KARCO) is an independent research and testing laboratory having no affiliation with any other entity. IDIADA KARCO is actively involved in data acquisition and compliance/certification testing for a variety of government agencies and equipment manufacturers. The principals and staff of IDIADA KARCO have no past or present financial, contractual or organizational interest in any company or entity directly or indirectly related to the products that KARCO tests. If any financial interest should arise, other than receiving fees for testing, reporting, etc., with respect to any project, the company will provide, in writing, a full and immediate disclosure to the FHWA.

PRODUCT DESCRIPTION

- New Hardware or Significant Modification
 Modification to Existing Hardware

The TTMA-200 is trailer attenuator designed to dissipate the kinetic energy of an impacting vehicle to reduce the severity of a crash. As the impact head and mandrel are pushed forward into the first tube, the tapered mandrel bursts the first tube at the corners into four (4) straps. The bursting of the first tube dissipates the kinetic energy of the impacting vehicle. The trailer attenuator has a length of 23.6ft (7.2 m) with an optional hitch extension its total tested length was 24.9 ft. (7.6 m) and a max width of 8.0 ft. (2.4 m). The TTMA-200 is supported by a wheel and axle assembly and is attached to the support truck with a lunette ring.

All testing of the TTMA-200 was conducted with an optional 4.0 ft. x 8.0 ft. (1.2 m x 2.4 m) arrow board and arrow board frame that attached to the trailer frame assembly. The arrow board frame was attached to the trailer frame assembly with two (2) 5/8" grade 5 bolts and six (6) 1/2" grade 5 bolts. The arrow board was secured to the arrow board frame with five (5) 3/8" grade 5 bolts. An optional 16.0 in. (406 mm) hitch extension bolted to the trailer frame assembly with four (4) 5/8" grade 5 bolts. The TTMA-200 lunette ring was inserted into a standard 8-ton pintle hitch mounted on the support truck at a height of 19.5 in. (495 mm). Complete detail of the assemblies can be found in the manufacturer's drawings.

Test Chronology and Design Modifications:

Tests 3-51, 52, and 53 were conducted from 07/23/18 through 07/26/18.

Test 3-50 was conducted on 03/11/20.

Test 3-54 was conducted on 07/24/20.

Throughout the series, the TTMA-200 was tested with some optional accessories, one being a light bar at the rear of the TMA. The mounting method of the optional light bar accessory was changed during the test series. Tests 3-52 and 3-53 were tested with the revised mounting method of the accessory. The new mounting method used four (4) pieces of 0.75 in. (19 mm) galvanized steel hanger strap to secure the light bar. Test 3-50 and 3-54 replaced the galvanized steel strap with a stainless steel strap to add longevity to the attachment component. These changes had no impact on performance of the system.

Test 3-50 and 3-54 were run with a heavier duty spindle. This change added an additional 0.9 lbs (0.4 kg) per axle. In addition, Test 3-50 and 3-54 were also run using an optional electrically operate braking package to the axle. This change added an additional 8.1 lbs (3.7 kg) per axle. The total change in axle weight was 18 lbs (8.2 kg). Test 3-50 was performed with this modification to the axle because a 1100C vehicle is the most susceptible to seeing a change in occupant impact velocities and ridedown acceleration than the heavier 2270P vehicle used in Tests 3-51, 3-52, and 3-53. Therefore, Test 3-50 represents the worst case test for this design modification.

During Test 3-50, the occupant struck the dashboard at time 0.1016 s. Since the impact head engaged the axle push rods at 0.125 s, it can be concluded that the occupant impact velocity was not affected by this change. The time of maximum ridedown acceleration occurred between times 0.1252 s and 0.1352 s. The maximum ridedown acceleration was -17.8 g's, which is well below the MASH allowable ridedown acceleration of 20 g's therefore this modification had a minimal effect on the performance of the TTMA-200.

CRASH TESTING

By signature below, the Engineer affiliated with the testing laboratory, agrees in support of this submission that all of the critical and relevant crash tests for this device listed above were conducted to meet the MASH test criteria. The Engineer has determined that no other crash tests are necessary to determine the device meets the MASH criteria.

Engineer Name:	Alex Beltran	
Engineer Signature:		Digitally signed by Alex Beltran DN: cn=Alex Beltran, o=IDIADA KARCO, ou=Lab, email=Alex.Beltran@idiada.com, c=US Date: 2024.03.05 17:08:54 -08'00'
Address:	9270 Holly Rd, Adelanto, CA 92301	Same as Submitter <input type="checkbox"/>
Country:	United States of America	Same as Submitter <input type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-50 (1100C)	<p>DIADA KARCO Test Number P40080-01. An 1100C test vehicle impacting the TTMA-200 at a nominal impact speed and angle of 62 mph and 0°, respectively. The primary intent of this test is to evaluate the impact performance of the TTMA-200 during small car impacts. The support vehicle was blocked against forward movement. The support vehicle was also placed in second gear with the parking brake engaged and the front wheels were centered with no steering angle. The test vehicle, 2015 Kia Rio impacted the TTMA-200 at a speed and angle of 61.64 mph (99.20 km/h) and 1.2°. The TTMA-200 brought the vehicle to a controlled stop. There was no penetration into the occupant compartment and the deformation limits were not exceeded. The Occupant Impact Velocities (OIV) in the longitudinal and lateral directions were 32.8 ft/s (10.0 m/s) and 1.0 ft/s (0.3 m/s), respectively. The Ridedown acceleration in the longitudinal and lateral directions were -17.8 g and -2.2 g, respectively. The TTMA-200 met all the requirements for MASH Test 3-50.</p> <p>RESULT = PASS</p>	

Required Test Number	Narrative Description	Evaluation Results
3-51 (2270P)	<p>DIADA KARCO Test Number P38076-01. An 2270P test vehicle impacting the TTMA-200 at a nominal impact speed and angle of 62 mph and 0°, respectively. The primary intent of this test is to evaluate the energy dissipation capacity of the TTMA-200, structural adequacy and occupant risk. The support vehicle was blocked against forward movement. The support vehicle was also placed in second gear with the parking brake engaged and the front wheels were centered with no steering angle. The test vehicle, 2012 RAM 1500 impacted the TTMA-200 at a speed and angle of 64.11 mph (103.18 km/h) and 0.3°. The TTMA-200 brought the vehicle to a controlled stop. There was no penetration into the occupant compartment and the deformation limits were not exceeded. The Occupant Impact Velocities (OIV) in the longitudinal and lateral directions were 29.2 ft/s (8.9 m/s) and 0.7 ft/s (0.2 m/s), respectively. The Ridedown acceleration in the longitudinal and lateral directions were -14.9 g and -3.1 g, respectively. All the occupant risk values were below the preferred values in MASH. The TTMA-200 met all the requirements for MASH Test 3-51.</p> <p>RESULT = PASS</p>	

3-52 (2270P)	<p>IDIADA KARCO Test Number P38078-01. An 2270P test vehicle impacting the TTMA-200 offset 1/3 the vehicles overall width at a nominal impact speed and angle of 62 mph and 0°, respectively. The primary intent of this test is to evaluate structural adequacy and occupant risk. The support vehicle was blocked against forward and lateral movement. The support vehicle was also placed in second gear with the parking brake engaged and the front wheels were centered with no steering angle. The test vehicle, 2013 RAM 1500 impacted the TTMA-200 at a speed and angle of 62.99 mph (101.37 km/h) and 0.1°. The TTMA-200 brought the vehicle to a controlled stop. There was no penetration into the occupant compartment and the deformation limits were not exceeded. The Occupant Impact Velocities (OIV) in the longitudinal and lateral directions were 28.2 ft/s (8.6 m/s) and 2.0 ft/s (0.6 m/s), respectively. The Ridedown acceleration in the longitudinal and lateral directions were -16.4 g and 2.5 g, respectively. The TTMA-200 met all the requirements for MASH Test 3-52.</p> <p>RESULT = PASS</p>	
3-53 (2270P)	<p>DIADA KARCO Test Number P38075-02. An 2270P test vehicle impacting the TTMA-200 offset 1/4 the vehicles overall width at a nominal impact speed and angle of 62 mph and 10°, respectively. The primary intent of this test is to evaluate structural adequacy and occupant risk. The support truck weighed 10,337 lbs and was tested with the parking brake engaged, transmission placed in second gear and the front wheels centered with no steering angle. The test vehicle, 2012 RAM 1500 impacted the TTMA-200 at a speed and angle of 63.49 mph (102.18 km/h) and 10.1°. The TTMA-200 brought the vehicle to a controlled stop. There was no penetration into the occupant compartment and the deformation limits were not exceeded. The Occupant Impact Velocities (OIV) in the longitudinal and lateral directions were 26.6 ft/s (8.1 m/s) and 1.3 ft/s (0.4 m/s), respectively. The Ridedown acceleration in the longitudinal and lateral directions were -9.8 g and -4.0 g, respectively. The support vehicle had a maximum roll ahead measurement 34.8 ft. (10.6 m). The TTMA-200 met all the requirements for MASH Test 3-53.</p> <p>RESULT = PASS</p>	

3-54 (1500A)	<p>IDIADA KARCO Test Number P40206-01. An 1500A test vehicle impacting the TTMA-200 at a nominal impact speed and angle of 62 mph and 0°, respectively. The primary intent of this test is to evaluate the impact performance of the TTMA-200 during mid-size car impacts. The support vehicle was blocked against forward movement. The support vehicle was also placed in second gear with the parking brake engaged and the front wheels were centered with no steering angle. The test vehicle, 2014 Chevrolet Malibu impacted the TTMA-200 at a speed and angle of 66.60 mph (107.19 km/h) and 0.2°. The TTMA-200 brought the vehicle to a controlled stop. There was no penetration into the occupant compartment and the deformation limits were not exceeded. The Occupant Impact Velocities (OIV) in the longitudinal and lateral directions were 30.5 ft/s (9.3 m/s) and 0.0 ft/s (0.0 m/s), respectively. The Ridedown acceleration in the longitudinal and lateral directions were -20.0 g and 5.0 g, respectively. The TTMA-200 met all the requirements for MASH Test 3-54.</p> <p>RESULT = PASS</p>	
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Full Scale Crash Testing was done in compliance with MASH by the following accredited crash test laboratory (cite the laboratory's accreditation status as noted in the crash test reports.):

Laboratory Name:	Applus IDIADA KARCO Engineering, LLC.	
Laboratory Signature:		<small>Digitally signed by Alex Beltran DN: cn=Alex Beltran, o=IDIADA KARCO, ou=Lab, email=Alex.Beltran@idiada.com, c=US Date: 2024.03.05 17:09:10 -08'00'</small>
Address:	9270 Holly Road, Adelanto, CA,92301	Same as Submitter <input type="checkbox"/>
Country:	United States of America	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	TL 371: April 27, 2022 - April 27, 2025	

Submitter Signature*: Alex Beltran

Digitally signed by Alex Beltran
DN: cn=Alex Beltran, o=Applus IDIADA,
ou=Engineering,
email=alex.beltran@idiada.com, c=US
Date: 2024.09.05 09:49:38 -07'00'

Submit Form

ATTACHMENTS

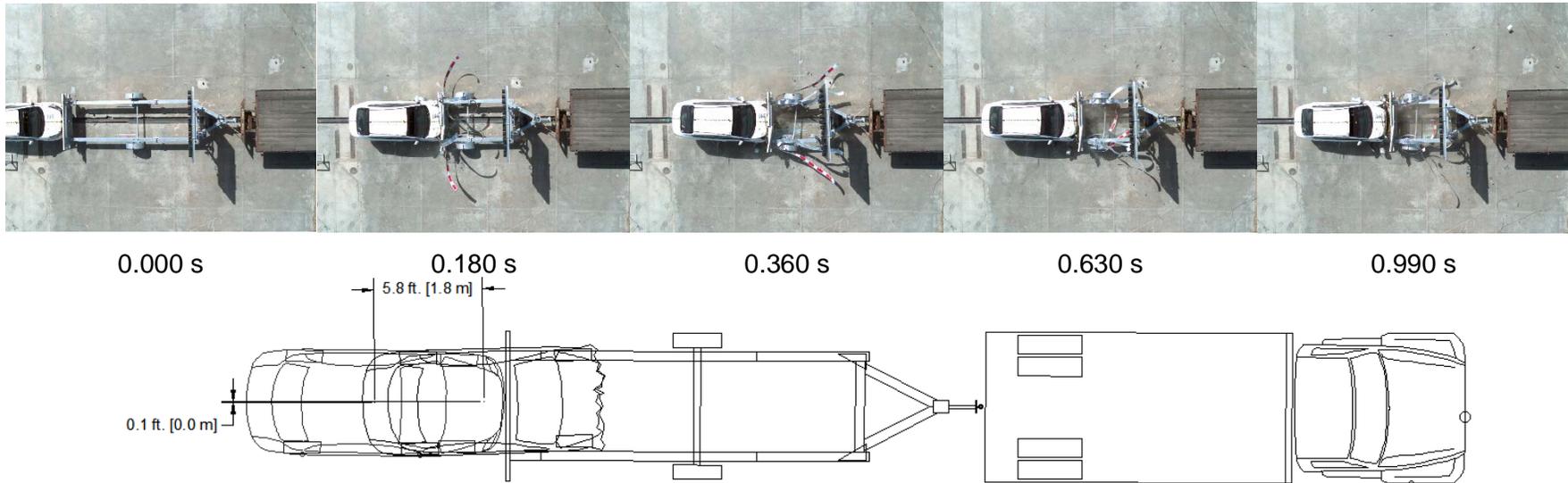
Attach to this form:

- 1) Additional disclosures of related financial interest as indicated above.
- 2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 3) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [[Hardware Guide Drawing Standards](#)]. For proprietary products, a single isometric line drawing is usually acceptable to illustrate the product, with detailed specifications, intended use, and contact information provided on the reverse. Additional drawings (not in TF-13 format) showing details that are relevant to understanding the dimensions and performance of the device should also be submitted to facilitate our review.

FHWA Official Business Only:

Eligibility Letter		
Number	Date	Key Words

MASH 2016 Test 3-50 Summary



<p>General Information</p> <p>Test Agency..... Applus IDIADA KARCO Test No..... P40080-01 Test Designation..... 3-50 Test Date..... 03/11/20</p> <p>Test Article</p> <p>Name / Model..... TTMA-200 Type..... Crash Cushion Crash Cushion Length..... 24.9 ft. (7.6 m) Road Surface..... Smooth, clean concrete</p> <p>Test Vehicle</p> <p>Type / Designation..... 1100C Year, Make, and Model..... 2015 Kia Rio Curb Mass..... 2,559.5 lbs (1,161.0 kg) Test Inertial Mass..... 2,462.5 lbs (1,117.0 kg) Gross Static Mass..... 2,635.6 lbs (1,195.5 kg)</p>	<p>Impact Conditions</p> <p>Impact Velocity..... 61.64 mph (99.20 km/h) Impact Angle..... 1.2° Location / Orientation..... 0.6 in (15 mm) left Kinetic Energy..... 312.8 kip-ft (424.1 kJ)</p> <p>Exit Conditions</p> <p>Exit Velocity..... N/A Exit Angle..... N/A Final Vehicle Position..... 5.8 ft. (1.8 m) downstream 0.1 ft. (0 m) left Support Truck Rollahead..... 0.0 ft (0 m) Vehicle Snagging..... None Vehicle Pocketing..... None Vehicle Stability..... Satisfactory Maximum Roll Angle..... -2.9° Maximum Pitch Angle..... 3.2° Maximum Yaw Angle..... 2.6°</p>	<p>Occupant Risk</p> <p>Longitudinal OIV..... 32.8 ft/s (10.0 m/s) Lateral OIV..... 1.0 ft/s (0.3 m/s) Longitudinal RA..... -17.8 g Lateral RA..... -2.2 g THIV..... 32.8 ft/s (10.0 m/s) PHD..... 17.8 g ASI..... 1.21</p> <p>Test Article Deflections</p> <p>Static..... 9.9 ft. (3.0 m) Dynamic..... 10.7 ft. (3.3 m) Working Width..... N/A Debris Field..... N/A</p> <p>Vehicle Damage</p> <p>Vehicle Damage Scale..... 12-FD-5 CDC..... 12FDEW3 Maximum Intrusion..... 0.1 in. (3 mm) at toe pan</p>
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Figure 4 Summary of Test 3-50

MASH 2016 Test 3-54 Summary



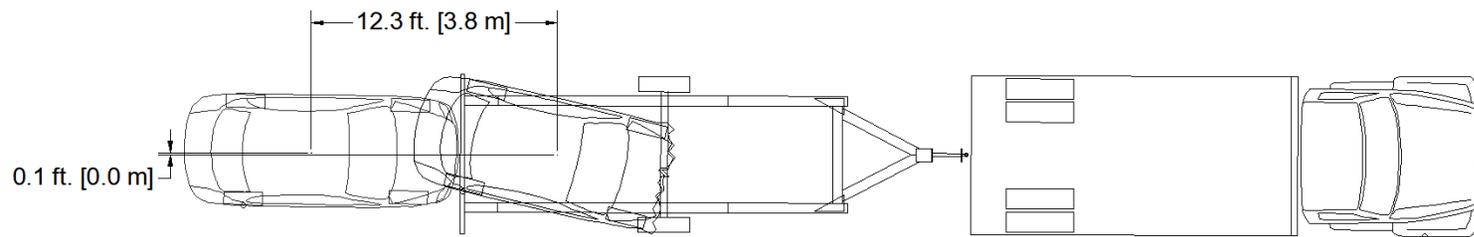
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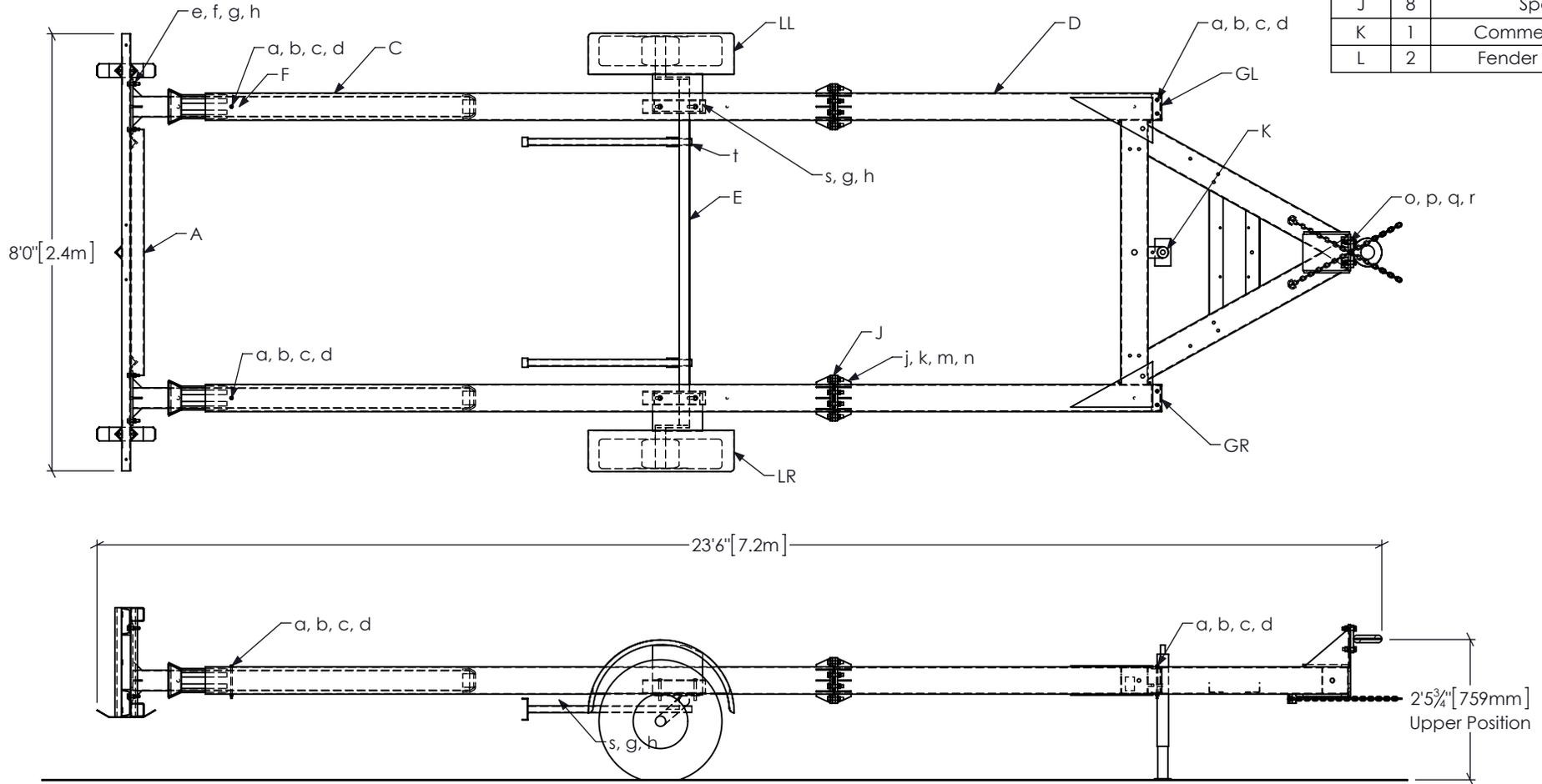


<p>General Information</p> <p>Test Agency..... Applus IDIADA KARCO Test No..... P40206-01 Test Designation..... 3-54 Test Date..... 07/24/20</p> <p>Test Article</p> <p>Name / Model..... TTMA-200 Type..... Truck-Mounted Attenuator (TMA) Crash Cushion Length..... 24.9 ft. (7.6 m) Road Surface..... Smooth, clean concrete</p>	<p>Impact Conditions</p> <p>Impact Velocity..... 66.60 mph (107.19 km/h) Impact Angle..... 0.2° Location / Orientation..... Center of TTMA Kinetic Energy..... 490.7 kip-ft (665.4 kJ)</p> <p>Exit Conditions</p> <p>Exit Velocity..... N/A Exit Angle..... N/A Final Vehicle Position..... 12.3 ft. (3.8 m) downstream 0.1 ft. (0 m) right</p> <p>Exit Box Criteria Met..... N/A Vehicle Snagging..... None Vehicle Pocketing..... None Vehicle Stability..... Satisfactory Maximum Roll Angle..... 6.8 ° Maximum Pitch Angle..... 5.3 ° Maximum Yaw Angle..... -6.3 °</p>	<p>Occupant Risk</p> <p>Longitudinal OIV..... 30.5 ft/s (9.3 m/s) Lateral OIV..... 0.0 ft/s (0.0 m/s) Longitudinal RA..... -20.0 g Lateral RA..... 5.0 g THIV..... 30.2 ft/s (9.2 m/s) PHD..... 20.0 g ASI..... 1.52</p> <p>Test Article Deflections</p> <p>Static..... 10.9 ft. (3.3 m) Dynamic..... 12.1 ft. (3.7 m) Working Width..... N/A Debris Field..... N/A</p> <p>Vehicle Damage</p> <p>Vehicle Damage Scale..... 12-FD-5 CDC..... 12FDEW3 Maximum Intrusion..... 0.2 in. (5 mm) at toe pan</p>
<p>Test Vehicle</p> <p>Type / Designation..... 1500A Year, Make, and Model.... 2014 Chevrolet Malibu Curb Mass..... 3,356.5 lbs (1,522.5 kg) Test Inertial Mass..... 3,309.1 lbs (1,501.0 kg) Gross Static Mass..... 3,309.1 lbs (1,501.0 kg)</p>		

Figure 4 Summary of Test 3-54

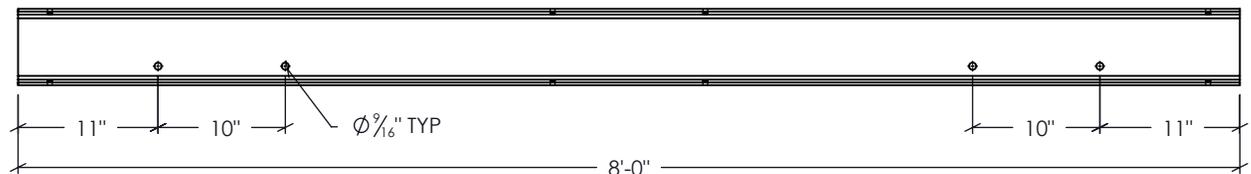
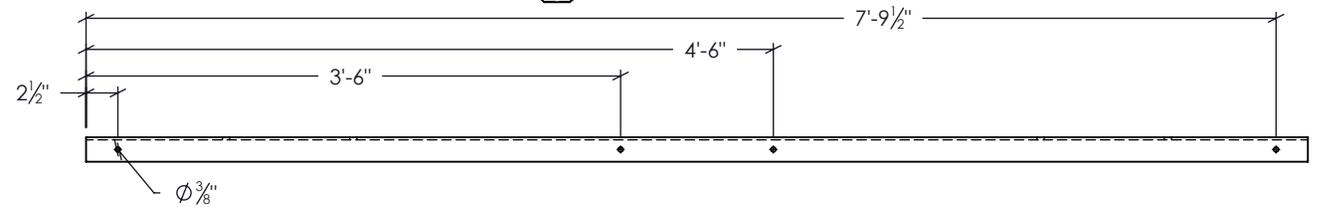
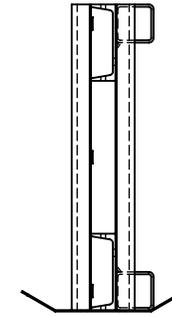
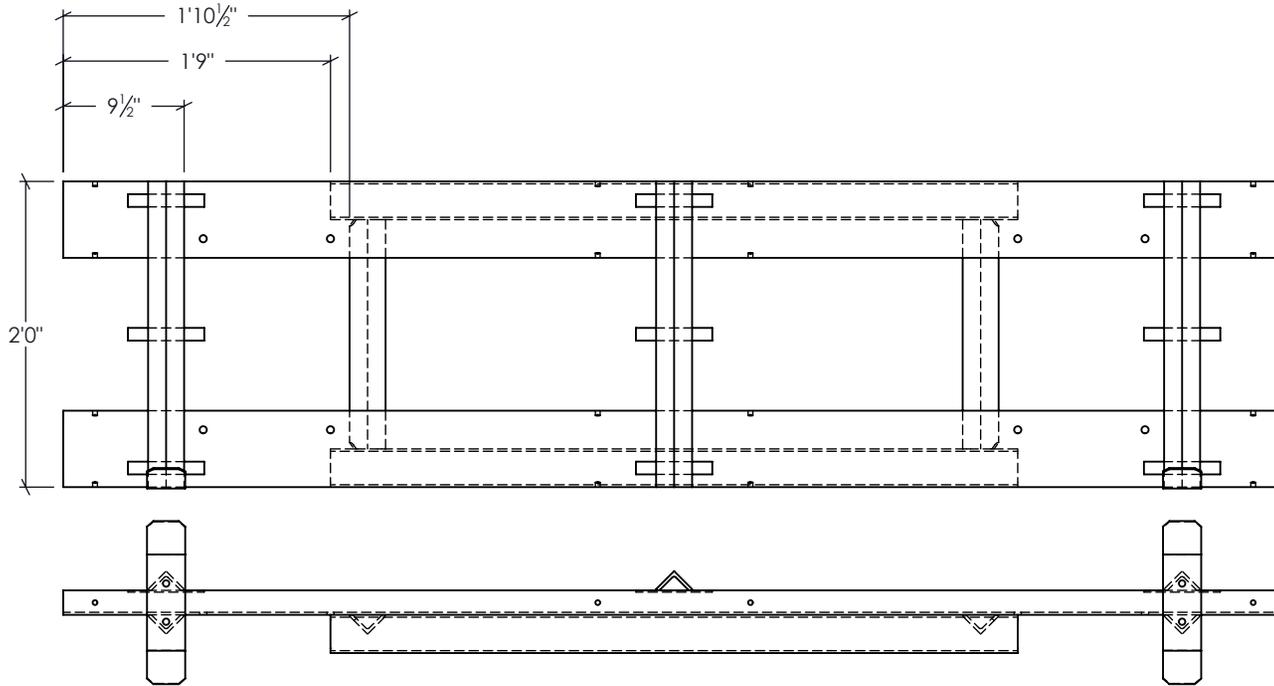
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
a	6	5/16" x 7" Grd 5 Hex Bolt	g	12	1/2" Heavy Lock Washer	o	4	5/8" x 2 1/2" Grd 5 Hex Bolt*
b	6	5/16" Washer	h	12	1/2" Grd 5 Hex Nut	p	4	5/8" Washer
c	6	5/16" Heavy Lock Washer	j	16	9/16" x 3" Grd 5 Hex bolt	q	4	5/8" Heavy Lock Washer
d	6	5/16" Grd 5 Hex Nut	k	16	9/16" SAE Washer	r	4	5/8" Grd 5 Hex Nut
e	8	1/2" x 2.25" Grd 5 Hex Bolt	m	16	9/16" Heavy Lock Washer	s	4	Retaining Clip for 1/2" Bolt
f	8	1/2" Washer	n	16	9/16" Grd 5 hex Nut	t	2	Square Tubing Plug

ITEM	QTY	DESCRIPTION
A	1	impact Head
B	2	Bursting Mandrel
C	2	First Tube
D	1	Trailer Frame
E	1	Axle Assembly
F	4	Plastic Guide Plates
G	2	End caps
H	1	Hitch Assembly
J	8	Spacer
K	1	Commercial Jack
L	2	Fender Assembly

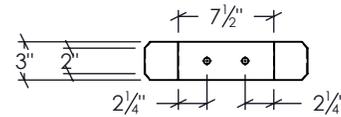
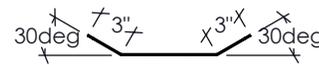


 Gregory Industries, Inc. 4100 13th Street, SW Canton, Ohio 44710 Phone: 330-447-4800x123	TTMA-200 Assembly	Sheet:	100
		Date:	3/20/2018
Drawing Name: TTMA-200	Scale: NONE	By: JMS	Rev: 

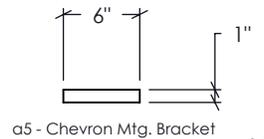
ITEM	QTY	DESCRIPTION	MATERIAL
A	1	Impact Head	
a1T	1	Front Plate - Top	C6X8.2 Channel
a1B	1	Front Plate - Bottom	C6X8.2 Channel
a2	5	Vertical Supports	2"x2"x1/4" Angle
a3	2	Vertical Supports	2"x2"x1/4" Angle
a4	2	Front Plate Stiffener	3"x3"x3/16" Tube
a5	9	Chevron Mounting Bracket	12 Gage
a6	2	Bumper Skid	1/4" A36 Plate



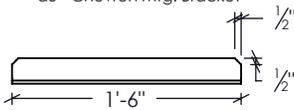
a1T & a1B- Front Plate
C6X8.2 Channel



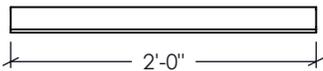
a6- Bumper Skid
1/4" A36 Plate



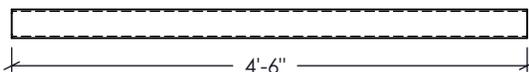
a5 - Chevron Mtg. Bracket



a3 - Vertical Support
2"x2"x1/4" Angle



a2 - Vertical Support
2"x2"x1/4" Angle



a4-Front Plate Stiffener
3"x3"x3/16" Tube

Gregory
 Gregory Industries, Inc.
 4100 13th Street, SW
 Canton, Ohio 44710
 Phone: 330-447-4800x123

TTMA-200
Impact Head Assembly

Drawing Name:
TTMA-200

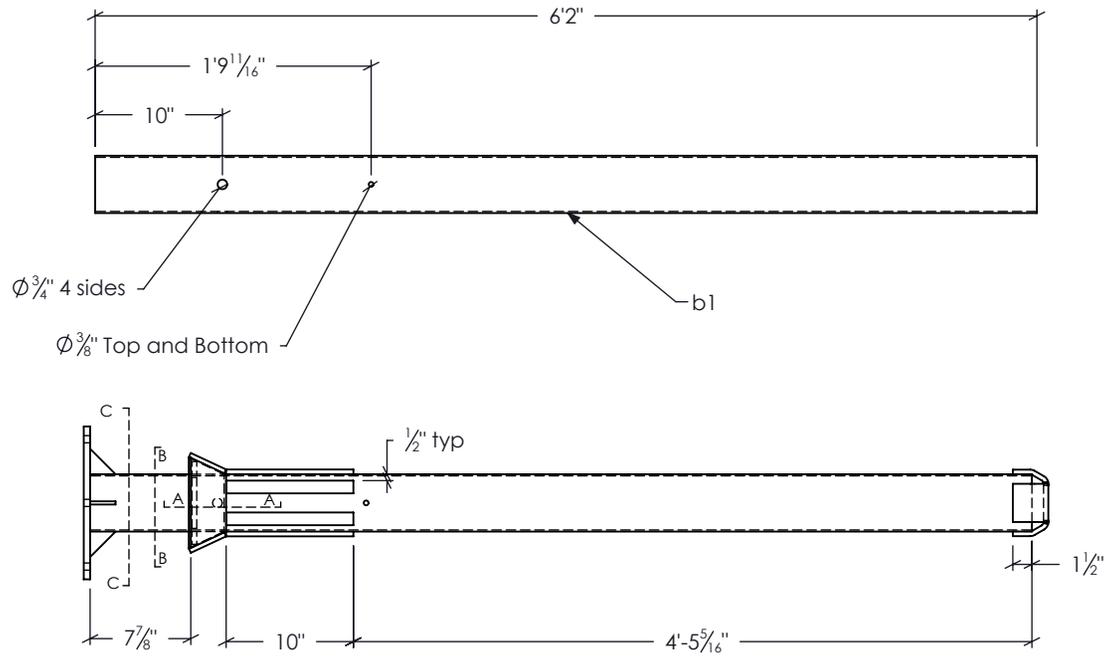
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Sheet:
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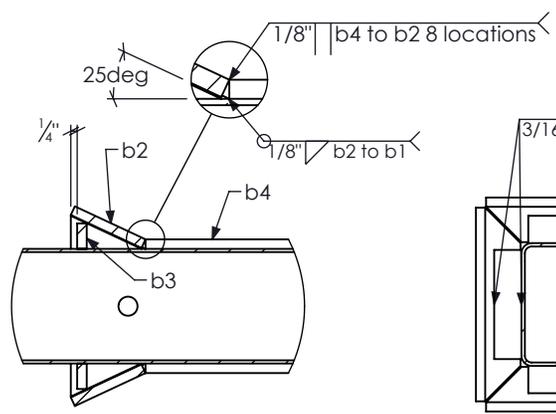
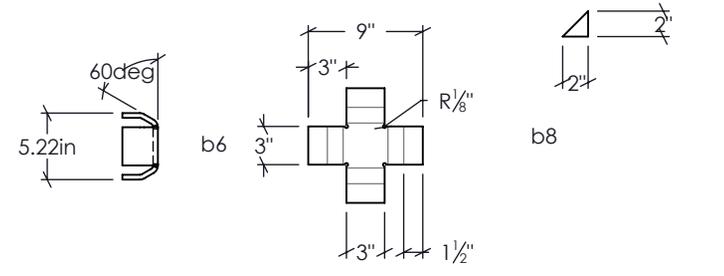
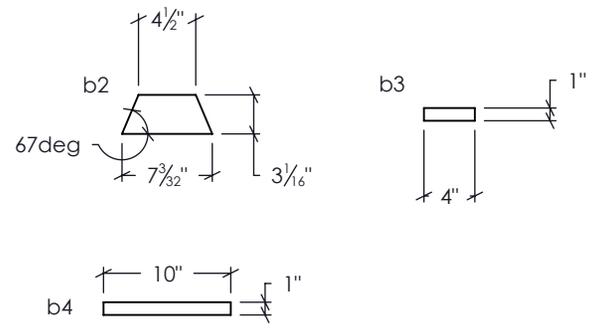
Date:
3/20/2018

By:
JMS

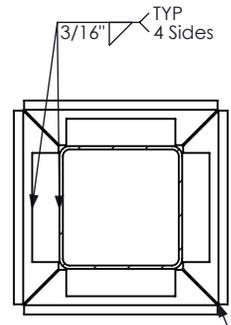
Rev:
A



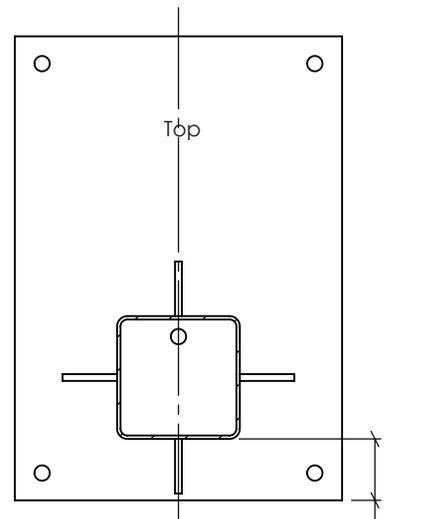
ITEM	QTY	DESCRIPTION	MATERIAL
B	2	Bursting Mandrel	
b1	2	Mandrel Tube	4.5"x4.5"x1/8" A500 B
b2	8	Burster Plate	3/8" AR360-400
b3	8	Burster Support	3/8" A36
b4	16	Guide Strap	3/8" A36
b6	2	End Plate	3/8" A36
b7	2	Mandrel End Plate	1/2" A36
b8	8	Gusset Plate	1/4" A36
F	4	Plastic Guide	3/16" UHMW



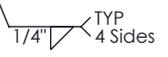
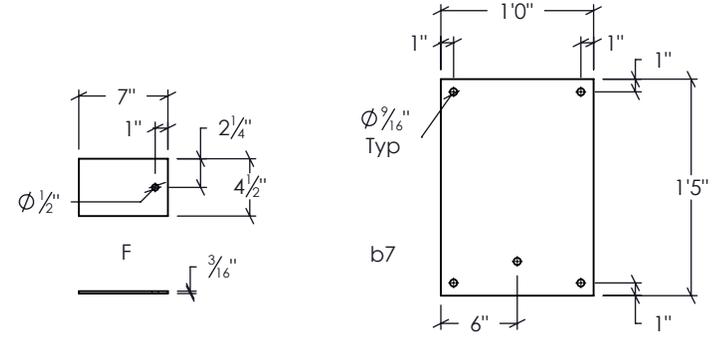
DETAIL "A-A"
 Note: Positioning of b3 is critical to maintain the angle of the burster plate b2



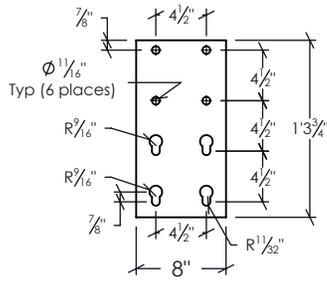
SECTION "B-B"
 SCALE 1 : 7



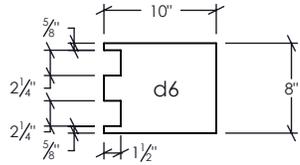
SECTION "C-C"
 Bottom



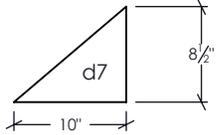
 Gregory Industries, Inc. 4100 13th Street, SW Canton, Ohio 44710 Phone: 330-447-4800x123	TTMA-200 Mandrel Assembly	Sheet: 102 Date: 3/20/2018
	Drawing Name: TTMA-200 Scale: NONE	By: JMS Rev:



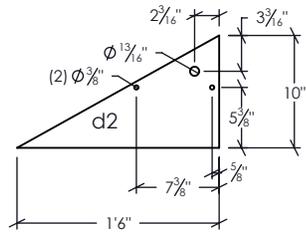
d5



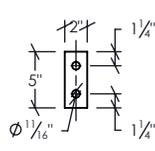
d6



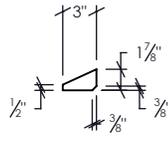
d7



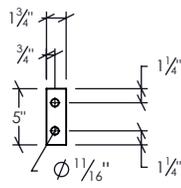
d2



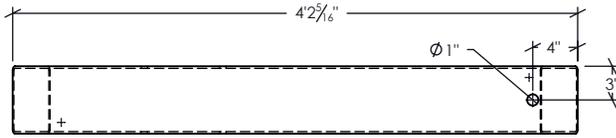
d8



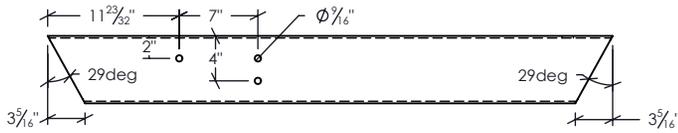
d9



d10



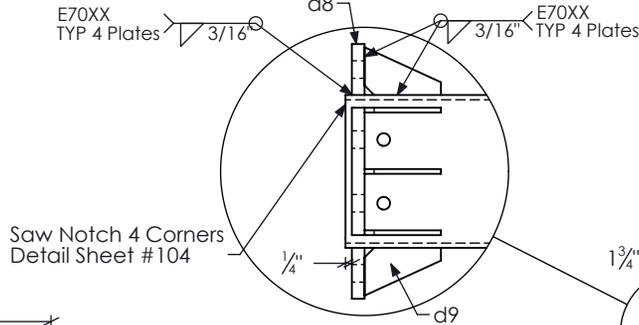
d4



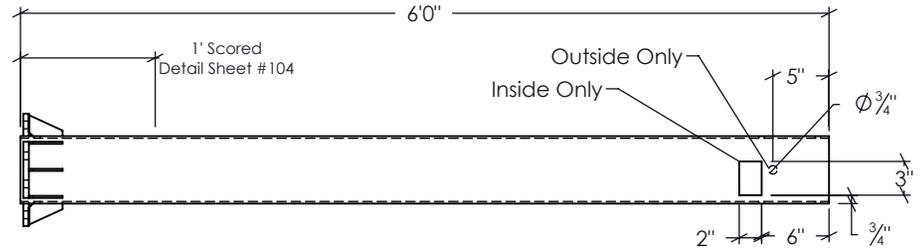
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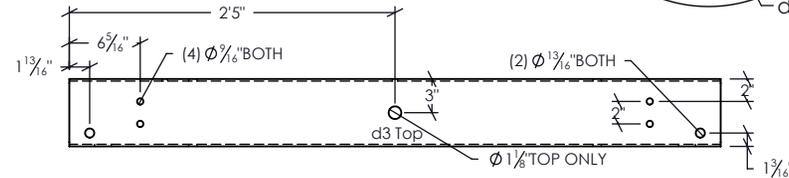
d4



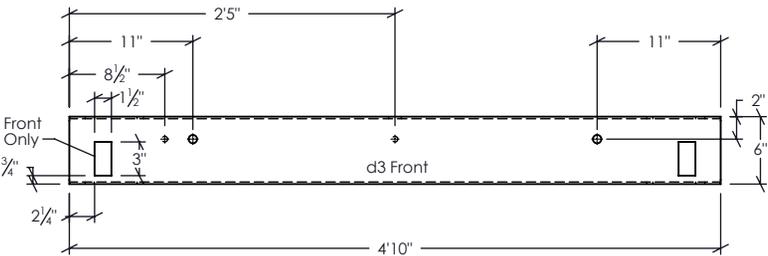
Saw Notch 4 Corners
Detail Sheet #104



d1- Frame Tube



d3 Top



d3 Front

ITEM	QTY	DESCRIPTION	MATERIAL
d1	2	Frame Tube	6"x6"x3/16" A500 B
d2	4	Gusset Plate	1/4" A36
d3	1	Cross Tube	6"x6"x3/16" A500 B
d4	2	Hitch Tube	6"x6"x3/16" A500 B
d5	1	Hitch Plate	1/2" A36
d6	2	Hitch Support Plate	1/2" A36
d7	2	Hitch Gusset	1/2" A36
d8	8	Splice Gusset Plate (4 For Part C)	1/2" A36
d9	24	Splice Gusset Plate (12 for Part C)	3/16" A36
d10	8	Space	5/8" A36

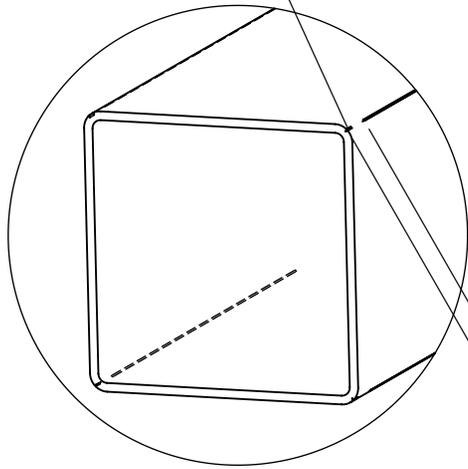
Gregory
 Gregory Industries, Inc.
 4100 13th Street, SW
 Canton, Ohio 44710
 Phone: 330-447-4800x123

TTMA-200
Trailer Frame Parts

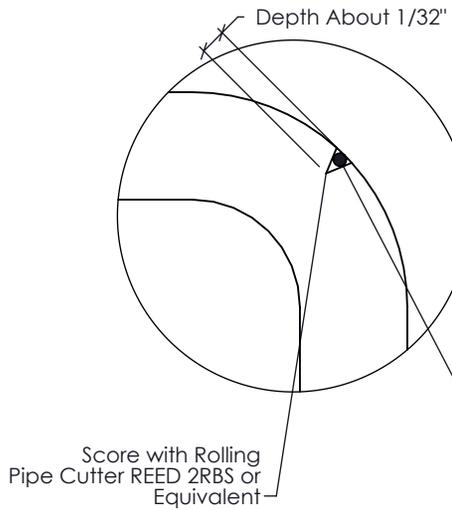
Sheet: **103**
 Date: **3/20/2018**
 Drawing Name: **TTMA-200** Scale: **NONE**
 By: **JMS** Rev: **1**

ITEM	QTY	DESCRIPTION	MATERIAL
D		Trailer Frame Assembly	

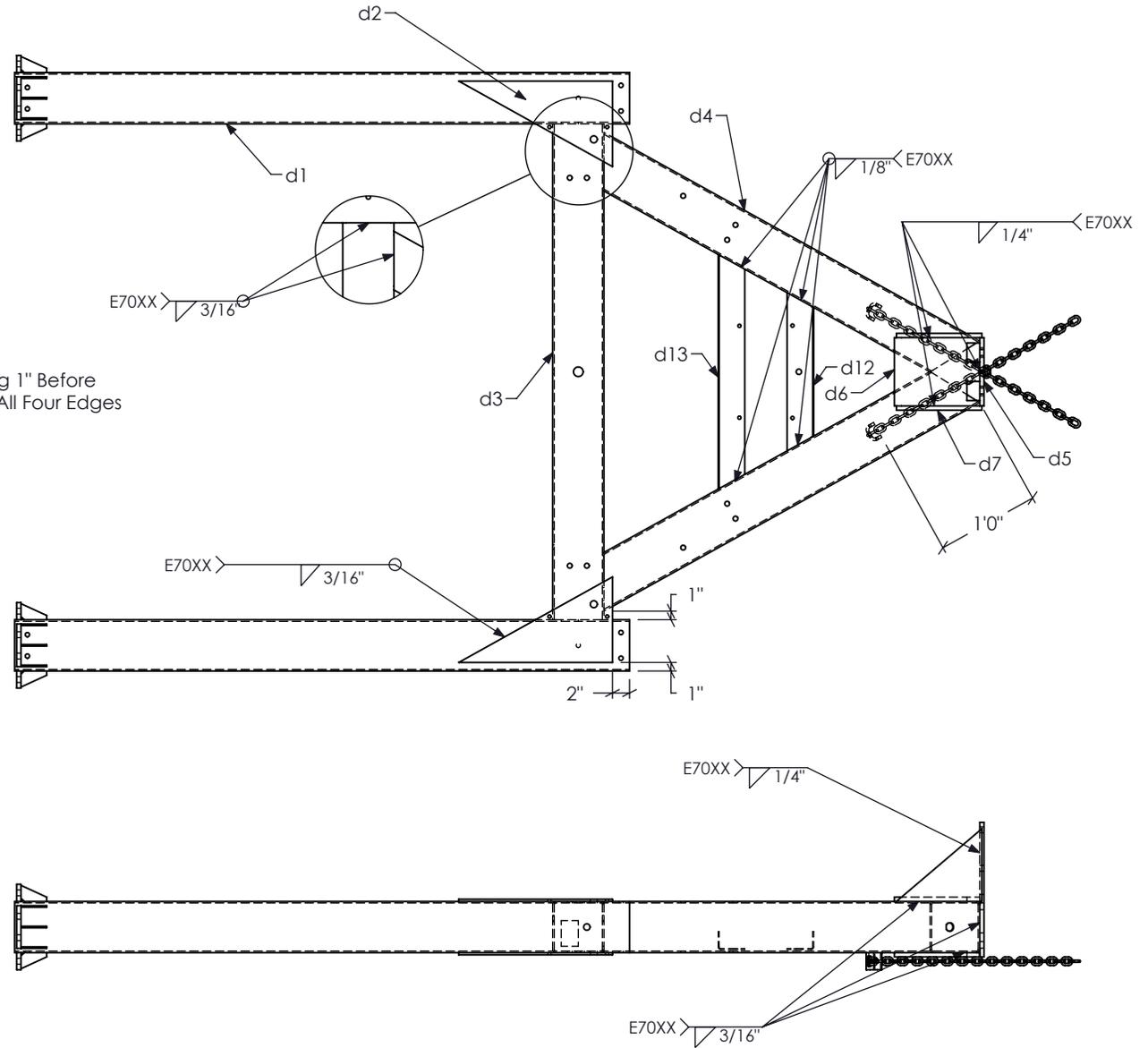
45 Degree Saw Cut to Depth of Tube all Four Corners after Galvanizing



End Scoring 1" Before End of Tube. All Four Edges



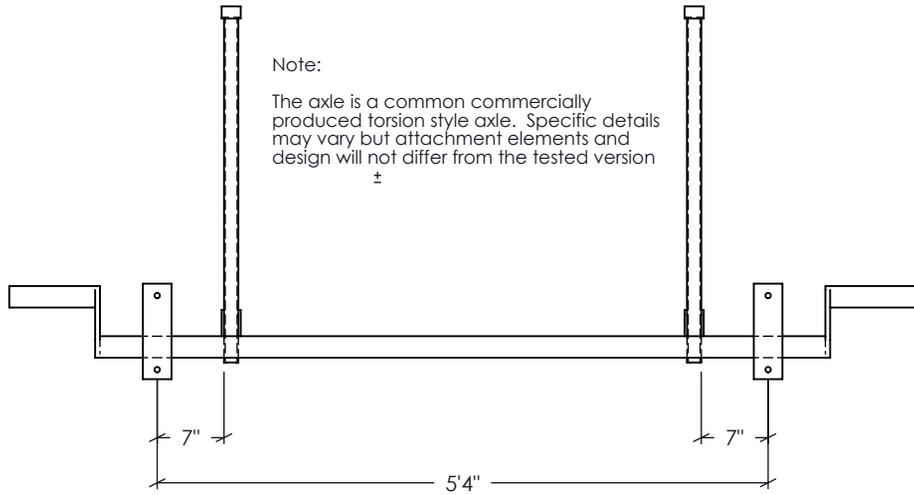
Gage Depth with Flush Insertion of 0.025" Wire



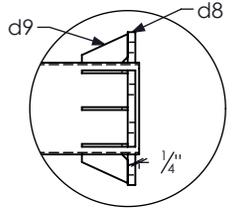
<p>Gregory Industries, Inc. 4100 13th Street, SW Canton, Ohio 44710 Phone: 330-447-4800x123</p>	<p>TTMA-200 Trailer Frame Assembly and Scoring Details</p>	Sheet:	104
		Date:	3/20/2018
Drawing Name:	TTMA-200	Scale:	NONE
By:	JMS	Rev:	

Note:

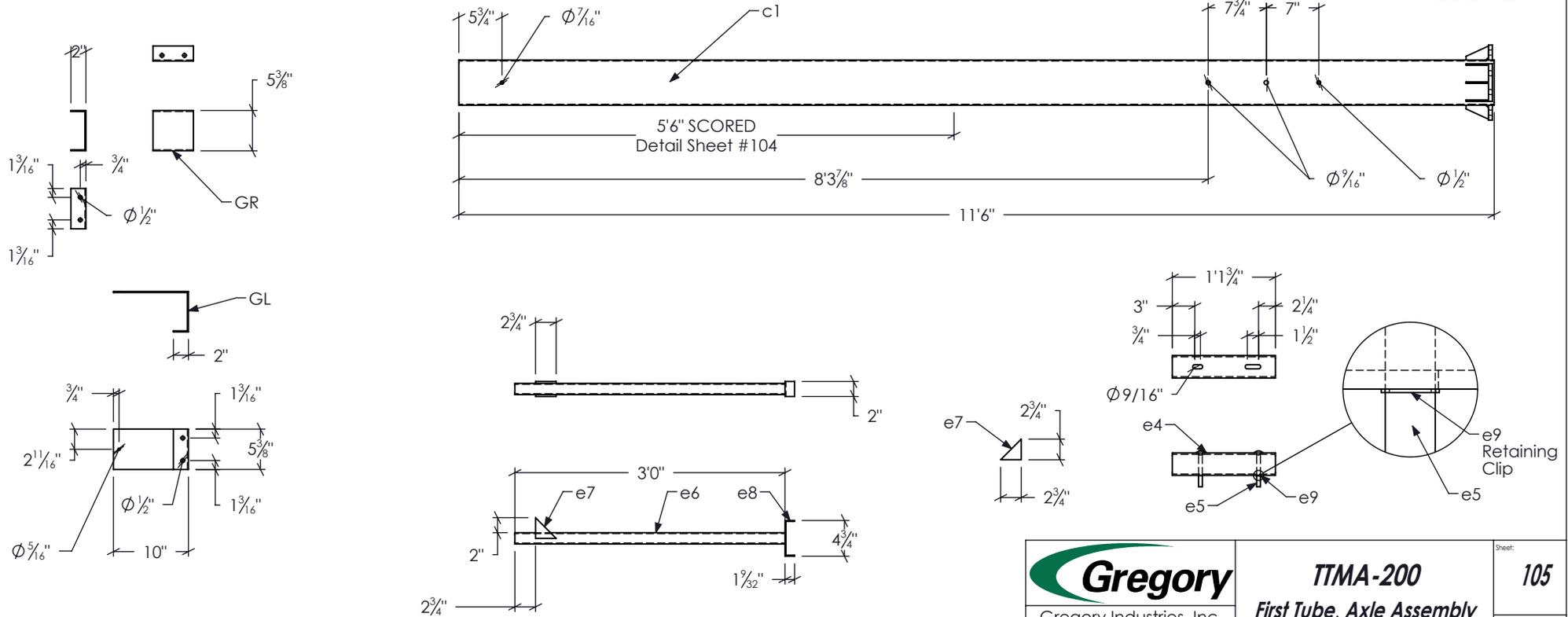
The axle is a common commercially produced torsion style axle. Specific details may vary but attachment elements and design will not differ from the tested version
±



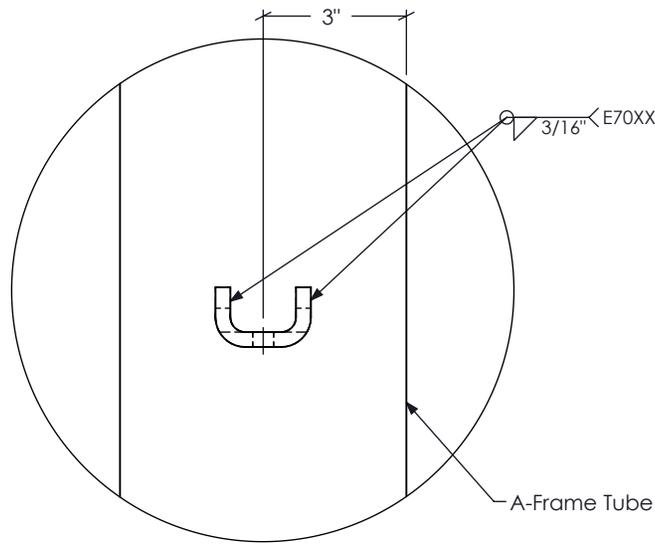
ITEM	QTY	DESCRIPTION	Material
C	2	First Tube	
c1	2	Bursting Tube	6"x6"x1/8" A500 B
E	1	Axle Assembly	
e4	2	Axle Shear Connector	3"x3"x3/16" A500 B
e5	4	Shear Bolts	1/2" x 4 1/2" Carriage Bolt Grd 5
e6	2	Axle Push Tubes	1 1/2"x1 1/2"x11 Gage A500 B
e7	4	Gusset Plate	1/4" A36
e8	2	End Plate	10 Gage A36
e9	4	Retaining Ring	1/2"
GR	1	PS End Tube Cover	18 Pre-Galvanized Gage A36
GL	1	DS End Tube Covers	18 Pre-Galvanized Gage A36



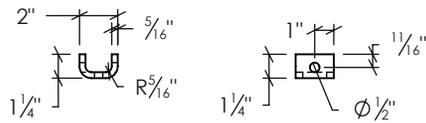
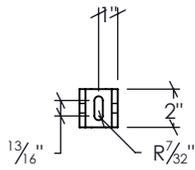
DETAIL A
SCALE 2 : 25



<p>Gregory Industries, Inc. 4100 13th Street, SW Canton, Ohio 44710 Phone: 330-447-4800x123</p>	<p>TTMA-200 First Tube, Axle Assembly and Front End Covers</p>	Sheet:	105
		Date:	3/20/2018
Drawing Name:	TTMA-200	Scale:	NONE
By:	JMS	Rev:	

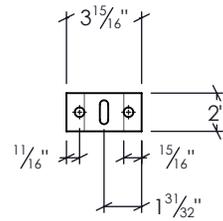


Chain Attachment Detail
NOT TO SCALE

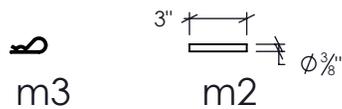


Bend Diagram

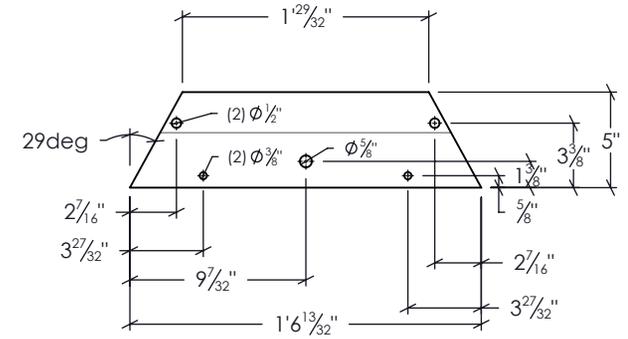
m1



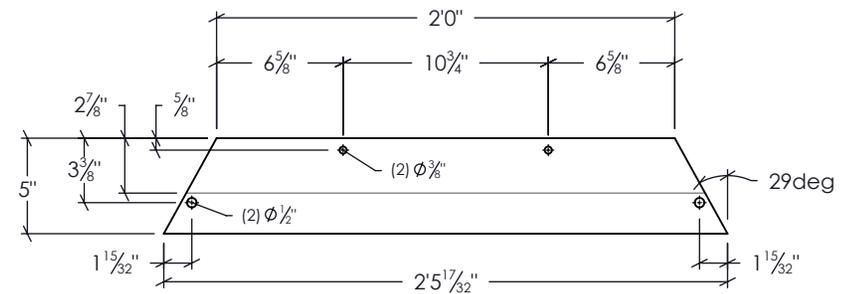
Flat Pattern



ITEM	QTY	DESCRIPTION	MATERIAL
m1	2	Chain Bracket	5/16" A36
m2	2	Retainer Rod	Ø 3/8" Cold Rolled A36 Rod
m3	2	Cotter Pin	Ø 3/32" Hairpin Cotter
d12	1	Front battery Mount - 18.5"x5"	1/8" A36
d13	1	Rear Battery Mount 27.5" x 5"	1/8" A36



d12

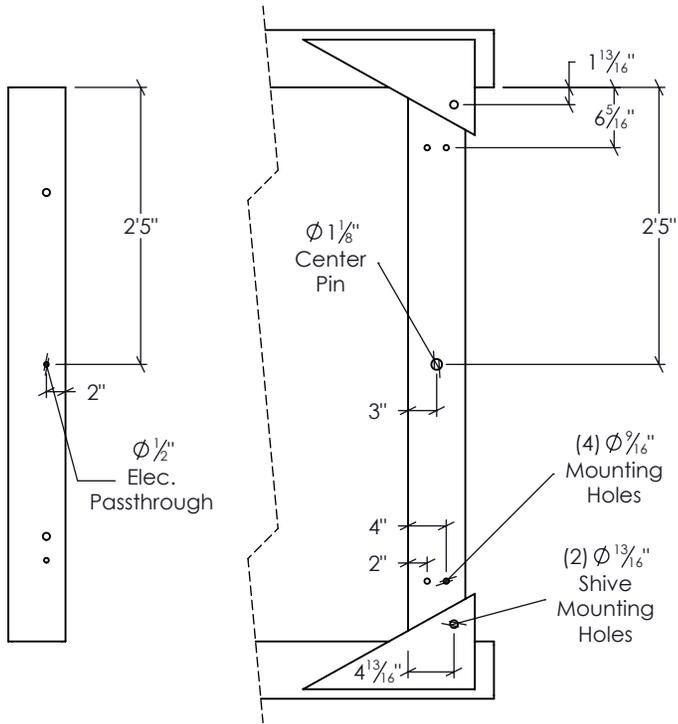


d13

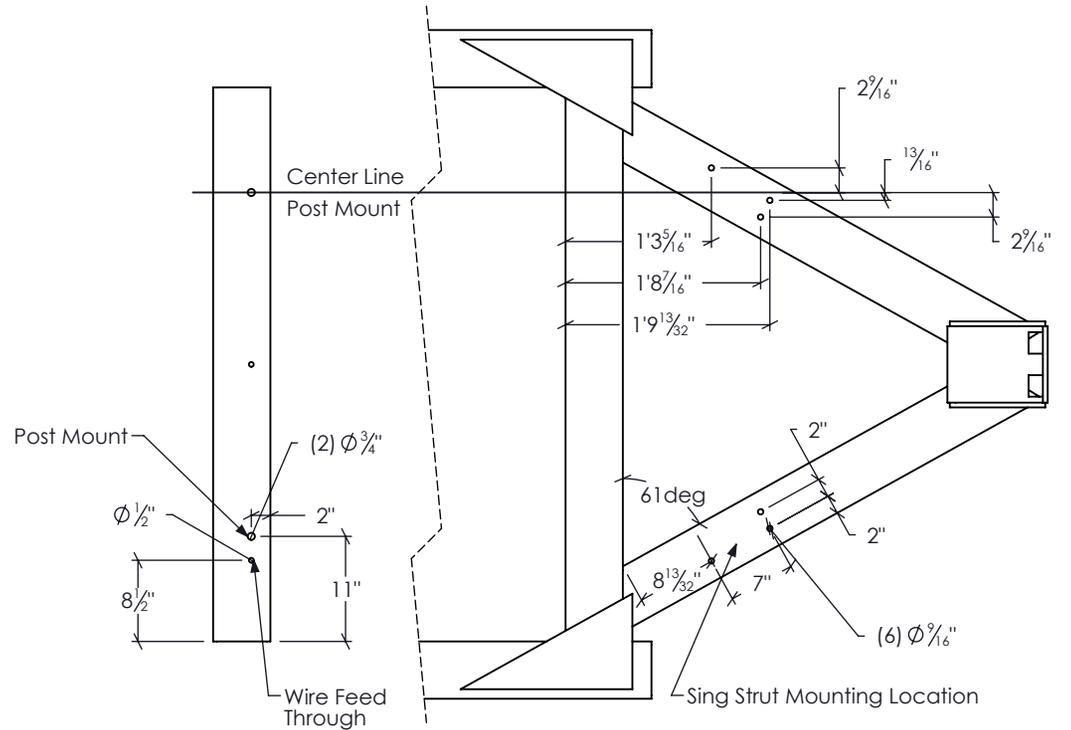
Gregory
 Gregory Industries, Inc.
 4100 13th Street, SW
 Canton, Ohio 44710
 Phone: 330-447-4800x123

TTMA-200
Safety Chain
Attachment Details

Sheet: 106	Date: 3/20/2018
Drawing Name: TTMA-200	Scale: NONE
By: JMS	Rev:



Reverse Guidance Mounting Detail



Arrow Board Mounting Detail

 Gregory Industries, Inc. 4100 13th Street, SW Canton, Ohio 44710 Phone: 330-447-4800x123	TTMA-200 Arrow Board and Reverse Guidance Mounting Detail	Sheet:	107
		Date:	3/20/2018
Drawing Name: TTMA-200	Scale: NONE	By:	JMS
		Rev:	