GUAM POWER AUTHORITY	SPECIFICATION No. E-053	October 8, 2024
PREPARED BY THE ENGINEERING DEPARTMENT		REV.1

GUAM POWER AUTHORITY
P.O. BOX 2977
AGANA, GUAM 96932

TRANSMISSION & DISTRIBUTION SPECIFICATION

SPECIFICATION NO. E-053

FOR

FIBERGLASS CROSSARM

EFFECTIVE DATE: 10-8-24	ISSUED:	APPROVED:

FIBERGLASS CROSSARM

TABLE OF CONTENTS

1.0 SCOPE

1.1 This specification covers GPA requirements for fiberglass crossarms and associated hardware used in GPA's Transmission and Distribution System.

1.2 The crossarms are intended for use in tropical weather conditions with a corrosive sea air atmosphere, sustained winds of 155 miles per hour with gusts to 180 miles per hour, and subject to moderate to severe earthquakes.

2.0 APPLICABLE PUBLICATIONS

The equipment covered by this specification shall be designed, manufactured, assembled, and tested in accordance with the latest version of the standards listed below:

2.1 ASTM (American Society for Testing and Materials)

ASTM A123-13 Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products

ASTM F2329-13 Standard Specification for Zinc Coating, Hot Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners

ASTM D8019-15 Standard Test Methods for Determining the Full Section Flexural Modulus and Bending Strength of Fiber Reinforced Polymer Crossarms Assembled with Center Mount brackets

ASTM D578/D578M 2005 (R2011) Standard Specification for Glass Fiber Strands

ASTM G154-12a Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

3.0 DEVIATIONS AND NON-CONFORMANCE REQUIREMENTS

3.1 All deviations from this specification must be specified in writing by the vendor and submitted as part of their bid submittal prior to bid opening. Failure to provide this information may be grounds for immediate bid rejection.

3.2 Deviations from this specification or changes in the material or design after the purchase order has been placed must be approved by the GPA Engineering Department and acknowledged by a Purchase Order Amendment issued by GPA.

3.3 Units received with deviations or non-conformance that are not acknowledged per Section 3.1 are subject to rejection. The Supplier of rejected units is responsible for any corrective action including but not limited to materials, labor and transportation necessary to dispose of or make the units conform to the specification.

3.4 Notification of defective units discovered before or after installation that are believed to be inherent to manufacturing problems or workmanship shall be made and forwarded to the Supplier. The description of the item, documentation of the problem and information, disposition and/or follow-up (as appropriate) that GPA expects from the Supplier will be specified. The Supplier's response shall be made within thirty (30) days unless an extension is acknowledged and approved in writing by the GPA Manager of Engineering.

4.0 SUBMITTALS

4.1 The bidder shall provide with their bid catalog cuts, part numbers, shop drawings, and other relevant information necessary to evaluate the submittal.

4.2 Upon award of bid, vendor shall provide final shop drawings to GPA for review and approval. GPA shall be allowed two (2) weeks to review and approve documents without affecting the shipping date. Delays in delivery due to drawings that are disapproved during this review period are the responsibility of the Vendor/Supplier.

4.3 Documents returned to the Vendor/Supplier as approved shall be considered authorization to proceed with the work. The approval of GPA shall in no way abrogate the requirements of this specification.

5.0 DESIGN

All fiberglass crossarms shall comply with this specification. No changes shall be made that will reduce performance or alter framing without approval.

5.1 Materials and Manufacturing Specification

(a) All crossarms shall be manufactured from a pultruded reinforced composite profile.

(b) Fiberglass crossarms shall be manufactured from continuous glass fibers and a thermoset resin system using the pultrusion process. Chopped fibers are not permitted.

(c) Fiberglass roving and mat shall be boron-free electrical grade glass (E-glass) or corrosion resistant electrical grade glass (E-CR glass), per ASTM D578-05.

(d) A polyester veil shall be used on the outer surface of the crossarm in order to create a resin-rich surface.

5.2 Cutting to Length

(a) When required and/or specified, cutting of members shall be done in such a manner as to produce clean, smooth, and even cut surfaces.

(b) Overall arm length tolerance: +/- 0.25 inches.

5.3 Manufactured Holes

Crossarms shall be supplied pre drilled as specified by GPA.

(a) The dimensions and drilling details of crossarms must conform to the drawings as shown in Figures 1, 2, 3, and 4 (Pages 9 to 12).

(b) Holes shall be drilled in such a manner that avoids damage to the crossarm in the areas surrounding the holes. Holes shall be smoothly bored with burrs removed. Holes shall show no signs of splintering or mounding in the areas immediately around holes.

5.4 Foam Fill

(a) Crossarms shall be fully filled with non-conductive, closed cell foam to seal the interior of the crossarm and prevent water ingress.

(b) After foaming, all exterior crossarm surfaces, end caps, and pre-drilled holes shall be clean and free of any excess foam.

5.5 End Caps

(a) End caps shall be securely fastened to each end of the crossarm and be designed to last the life of the crossarm.

(b) End caps shall not degrade due to UV and environmental exposure.

(c) The endcaps shall resist damage during handling and shall not loosen during transportation or shipping.

(d) End caps shall be marked with manufacturer I.D. or model number.

5.6 Hardware and Brackets

(a) The dimensions and drilling details of mounting brackets must conform to the drawing as shown in Figures 1, 2, 3, and 4 (Pages 9 and 12).

(b) Crossarms shall utilize center mounting bracket that will allow installation of the crossarm onto the pole. Crossarms shall have provisions that allow mounting the crossarm to pole with 1-3/4" pole banding straps, unless otherwise specified by the customer.

(c) Bracket shall be designed for installation on wood, fiberglass, concrete or metal utility poles.

(d) Center mounting brackets may be made of hot dipped galvanized steel. Steel and iron mounts shall be galvanized per ASTM A123-13 or ASTM F2329-13.

(e) Standard holes for mounting the deadend and tangent crossarms to the pole shall be 13/16" to allow use of 3/4" bolts unless otherwise specified by GPA.

(f) The top hole shall be a key hole to allow easy installation with the bottom hole being either a hole or a slot unless otherwise specified. When bottom hole is slot an additional hole shall be provided to install lag screw.

(g) Hardware used to attach beam to center mounting bracket shall provide provisions to prevent the nut from loosening over time.

(h) Center mounting brackets on dead end crossarms shall include a double eyed guy plate. Ultimate guy tension at 45 degrees shall be 30,000lbs if applied to each guy eye separately, or if used together.

(i) The extension bracket shall be made of hot dipped galvanized steel and shall conform to design criteria shown in Figure 5 (Page 13).

(j) Deadend crossarms shall come provided with hot dipped galvanized deadend eyenuts as shown in Figure 1 and Figure 3.

5.7 Product Markings

(a) All crossarm assemblies should have legible markings designed to last the life of the crossarm.

(b) Markings should include manufacturer name or symbol and year of manufacture.

6.0 MECHANICAL AND WEATHERING/UV PROTECTION

6.1 Strength

(a) Ultimate load of the crossarms shall conform to values in Figures 1, 2, 3, and 4 and shall be tested in accordance with ASTM D8019-15.

(b) Manufacturer shall report crossarm strengths as an average ultimate load capacity and a 5% LEL value per ASTM D8019-15.

(c) Unless otherwise requested by the customer, calculated loading information is acceptable provided that correlation to actual test data can be established.

(d) Manufacturer shall provide deflection information in terms of inches per 1000 pounds of load, per wire.

(e) Any hardware deformation that takes place under standard working load conditions which would prevent the crossarm from returning to its original pre-loaded position shall not be accepted.

6.2 Pin Torque

Ultimate pin torque capacity shall be supplied upon request and reported in terms of an applied moment.

6.3 Crush Resistance

The fiberglass crossarm shall have crush resistance at each hole suitable for field installation by the line crew.

6.4 UV Protection

The fiberglass crossarm shall include effective UV protection against fiber blooming and shall maintain that protection throughout the service life of the crossarm. At a minimum, no evidence of fiber blooming shall be found after samples of production intent crossarm material is subjected to accelerated UV testing per ASTM G154 for a minimum of 10,000hrs.

6.5 Flame Resistivity

At a minimum, fiberglass crossarms shall pass a Horizontal Burn flame rating, when tested in accordance with ASTM D635-14.

6.6 Service Environment

(a) The fiberglass crossarm shall be designed to be durable for typical utility field work, handling, and installation.

(b) The fiberglass crossarm shall be designed for a minimum 60 year continuous use service life in all weather conditions.

7.0 DIMENSIONAL DRAWINGS

7.1 Crossarms

(a) Drawings shall include factory drilled hole size and location.

(b) Loading information shall be listed on the manufacturer's drawing.

7.2 Mounts

Drawings shall include size and location of holes for attaching crossarm to structure.

8.0 QUALITY CONTROL

8.1 The Supplier shall have a quality control program to ensure compliance with the requirements of this specification. The program shall be documented and available for GPA's review if requested.

8.2 Documentation of the quality control program shall indicate where in the production and manufacturing process the quality checks are taken, describe the purpose of the checks, and describe the nature of the check, e.g. if check is visual only or if electrical or mechanical testing is used.

9.0 WARRANTY

All products shall come with a minimum five (5) year warranty on all parts and labor associated with the product. At time of bid, Vendor shall submit with his/her bid the contact information for warranty implementation complete with a copy of any forms required to fulfill warranty requirements.

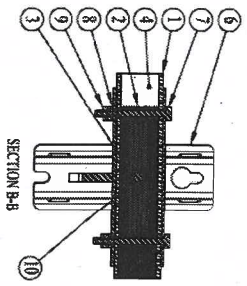
10.0 PACKING AND SHIPPING

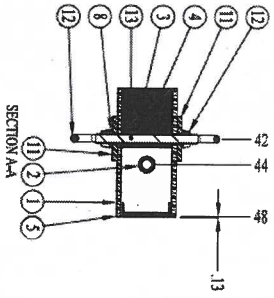
10.1 The equipment shall be placed and crated with suitable material to prevent damage and injury during shipment and handling operations. Crossarms shall be palletized, securely fastened, and

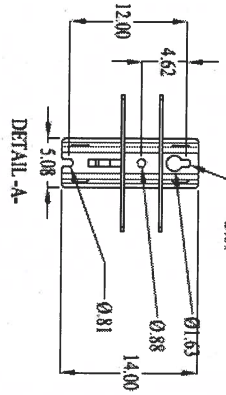
packaged in a manner that reduces damage during shipping and handling. Special care shall be taken to eliminate abrasion between arms.

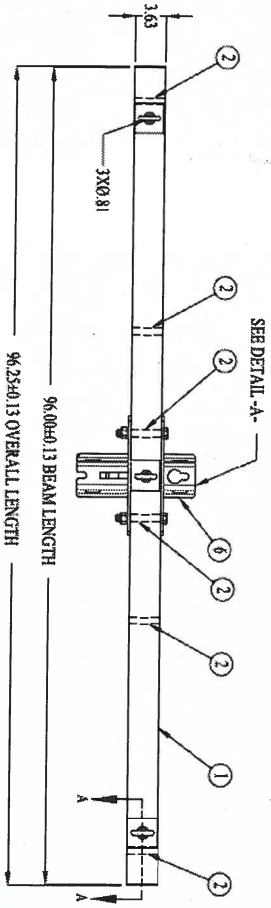
10.2 The equipment shall be securely blocked to prevent shifting during transit. Pallet banding straps shall be reinforced polymer bands that do not damage the crossarm surface quality. Metal banding straps are not allowed.

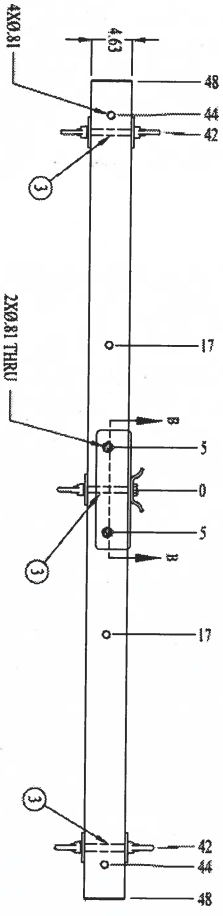
10.3 Instructions for handling, shipping, packaging, and storing shall be provided by the manufacturer to prevent damage, loss, deterioration, and substitution of the crossarms.

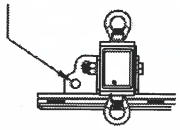










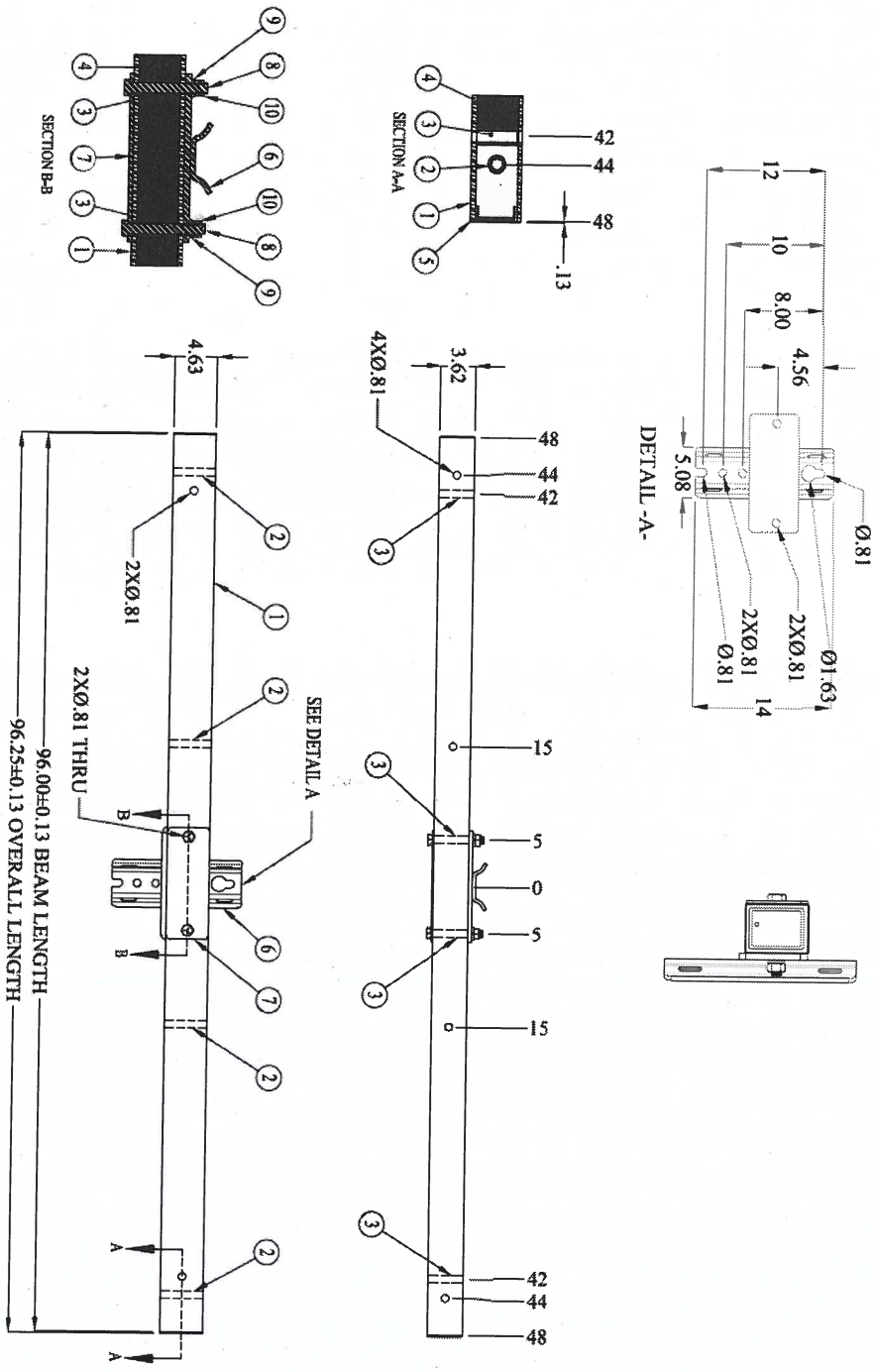


ITEM NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	BEAM, PULTRUDED STOCK	SERIES 3000 x 96 in, GRAY	1
2	BUSHING	13/16 in x 3 in	6
3	BUSHING	13/16 in x 3-15/16 in	3
4	-	-	1
5	END CAP	SERIES 3000, GRAY	2
6	MOUNT ASSEMBLY, DEADEND	HDLH	1
7	HEX BOLT	3/4 in - 10 x 5-1/2 in	2
8	LOCK WASHER	3/4 in	5
9	HEX NUT	3/4 in - 10	2
10	HEX BOLT	3/4 in - 10 x 7 in	1
11	SQUARE WASHER	13/16 in, 3-1/2 in x 3/8 in	5
12	EYE NUT	3/4 in - 10	5
13	THREADED ROD	3/4 in - 10 x 8 in	2

NOTES:
1. CENTER OF MOUNT HOLE(S) TO HOLES TOLERANCE ± 0.06
2. CALCULATED AVERAGE ULTIMATE VERTICAL LOAD = 6,500 LBS PER WIRE, 2 WIRES
3. CALCULATED AVERAGE ULTIMATE LONGITUDINAL LOAD = 14,000 LBS PER WIRE, 2 WIRES
4. CALCULATED AVERAGE ULTIMATE TRANSVERSE LOAD = 12,000 LBS PER SIDE
5. RECOMMENDED MAXIMUM WORKING LOAD OF 50% OF AVERAGE ULTIMATE STRENGTH

---UNLESS OTHERWISE SPECIFIED---
DIMENSIONS ARE IN INCHES
INTERPRET DIM AND TOL PER ASME Y14.5-2009
ANGULAR: MACH ± 2°
BEND ± 2°
ONE PLACE DECIMAL ± 0.1
TWO PLACE DECIMAL ± 0.02

FIGURE 1. 8 FOOT DEADEND CROSSARM



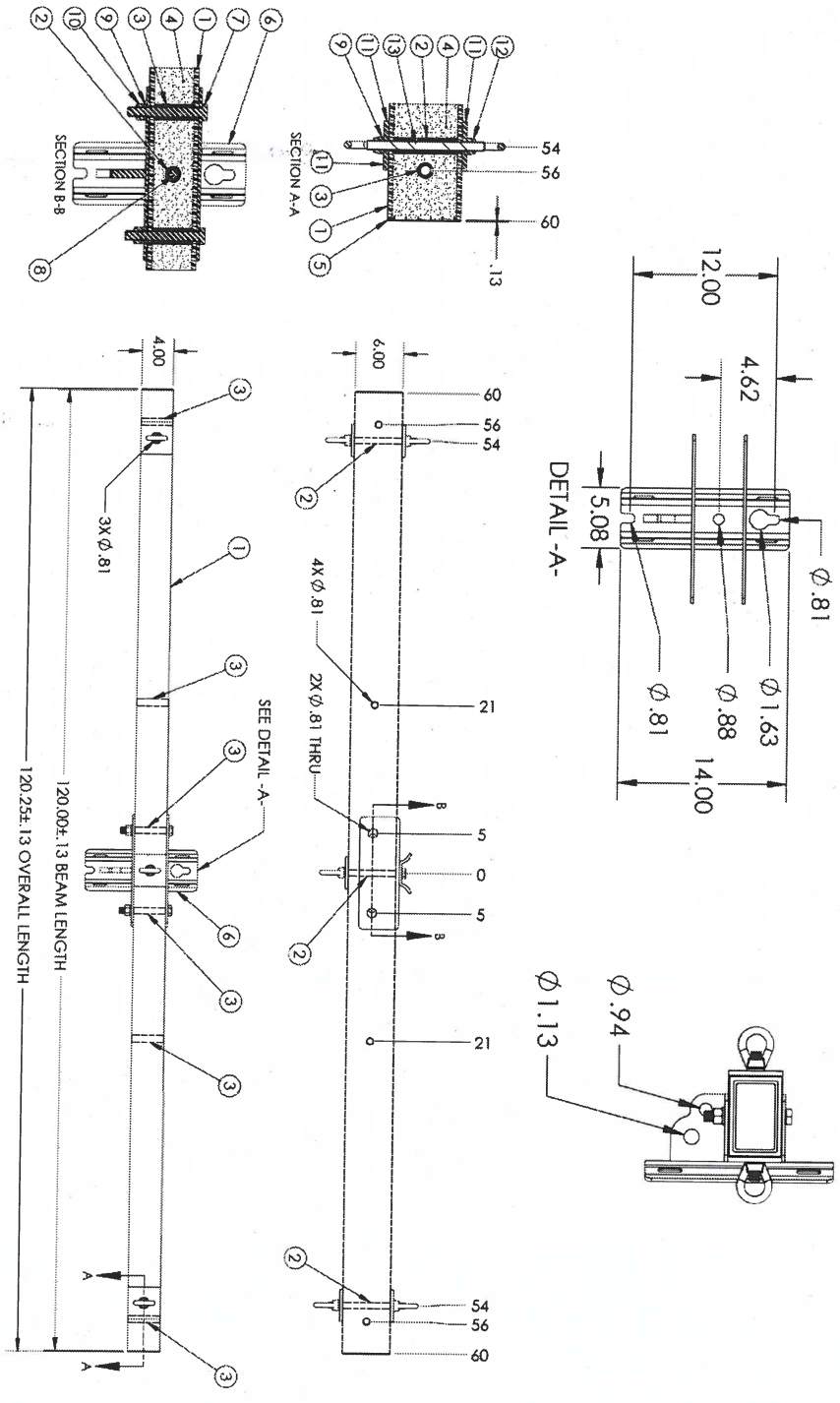
ITEM NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	BEAM, PULTRUDED STOCK	SERIES 3000 x 96 in, GRAY	1
2	BUSHING	13/16 in x 3-15/16 in	4
3	BUSHING	13/16 in x 3 in	4
4	-	-	1
5	END CAP	SERIES 3000, GRAY	2
6	MOUNT ASSEMBLY, TANGENT	HDLH	1
7	PLATE, FRONT		1
8	HEX BOLT	3/4 in - 10 x 5-1/2 in	2
9	LOCK WASHER	3/4 in	2
10	HEX NUT	3/4 in - 10	2

NOTES:
1. CENTER OF MOUNT HOLE(S) TO HOLES TOLERANCE ±.06
2. CALCULATED AVERAGE ULTIMATE VERTICAL LOAD=9,750 LBS PER WIRE, 2 WIRES AT ±4
= 5,000 LBS PER WIRE, 4 WIRES AT ±5 & ±4
3. CALCULATED AVERAGE ULTIMATE LONGITUDINAL LOAD=6,500 LBS PER WIRE, 2 WIRES AT ±4
= 3,250 LBS PER WIRE, 4 WIRES AT ±5 & ±4
4. CALCULATED AVERAGE ULTIMATE TRANSVERSE LOAD = 12,000 LBS PER SIDE
5. RECOMMENDED MAXIMUM WORKING LOAD OF 50% OF AVERAGE ULTIMATE STRENGTH

---UNLESS OTHERWISE SPECIFIED---
DIMENSIONS ARE IN INCHES
INTERPRET DIM AND TOL PER ASME Y14.5-2009
ANGULAR: MACH ± 2°
BEND ± 2°
ONE PLACE DECIMAL ± 0.1
TWO PLACE DECIMAL ± 0.02

FIGURE 2. 8 FOOT TANGENT CROSSARM

EFFECTIVE DATE: 10-8-24	ISSUED:	APPROVED:

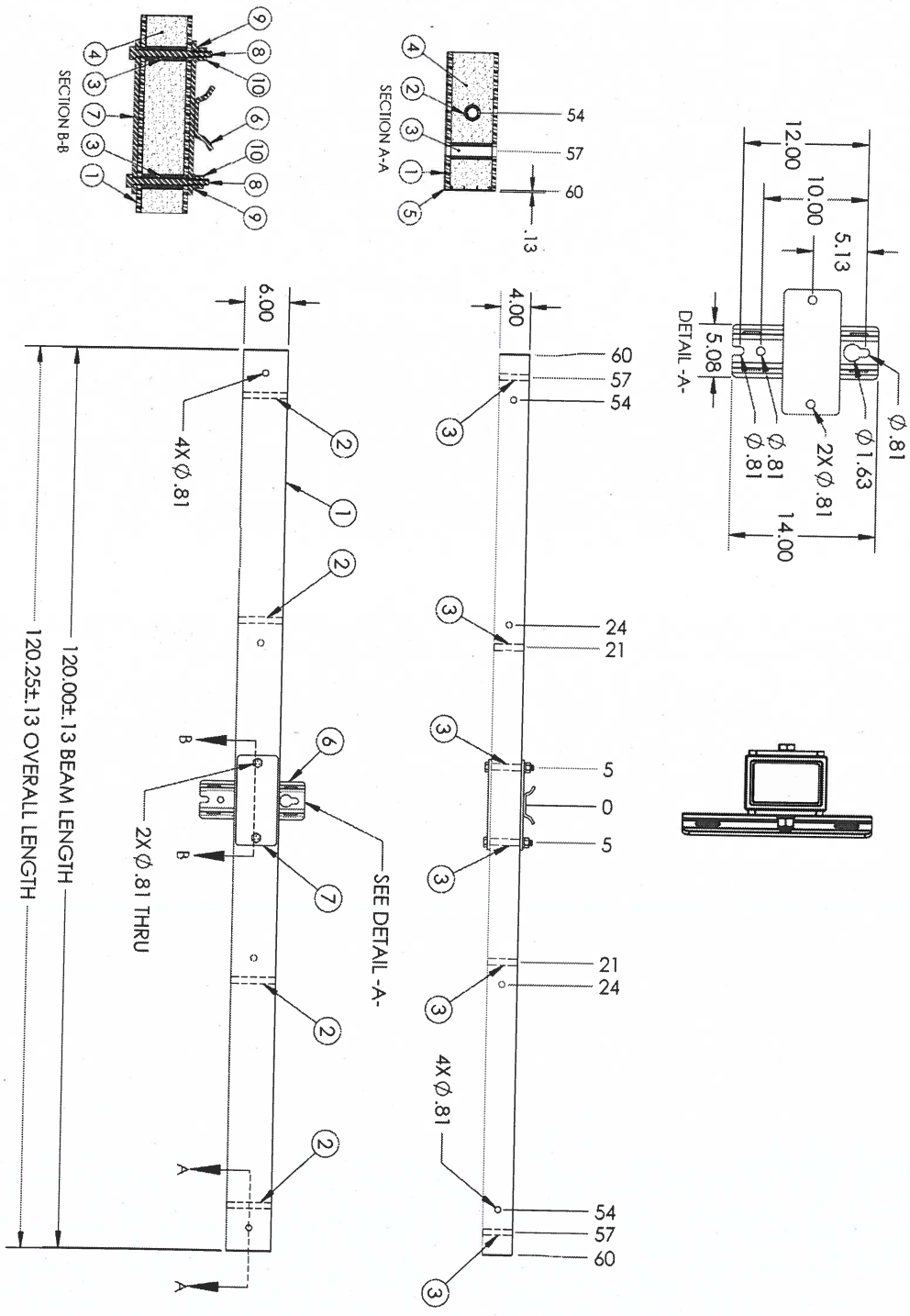


ITEM NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	BEAM, PULTRUDED STOCK	SERIES 4000 x 120 in, GRAY	1
2	BUSHING	13/16 in x 5-1/4 in	3
3	BUSHING	13/16 in x 3-1/4 in	6
4	-	-	1
5	END CAP	SERIES 4000, GRAY	2
6	MOUNT ASSEMBLY, DEADEND	4KLH	1
7	HEX BOLT	3/4 in - 10 x 6 in	2
8	HEX BOLT	3/4 in - 10 x 8 in	1
9	LOCK WASHER	3/4 in	5
10	HEX NUT	3/4 in - 10	2
11	SQUARE WASHER	13/16 in, 4 in x 3/8 in	5
12	EYE NUT	3/4 in - 10	5
13	THREADED ROD	3/4 in - 10 x 9-1/2 in	2

NOTES:
1. CENTER OF MOUNT HOLE(S) TO HOLES TOLERANCE±0.06
2. CALCULATED AVERAGE ULTIMATE VERTICAL LOAD = 6,750 LBS PER WIRE, 2 OR 3 WIRES
3. CALCULATED AVERAGE ULTIMATE LONGITUDINAL LOAD = 15,750 LBS PER WIRE, 2 OR 3 WIRES
4. CALCULATED AVERAGE ULTIMATE TRANSVERSE LOAD = 12,750 LBS PER SIDE
5. GEOTEK RECOMMENDS MAXIMUM APPLIED LOAD PER WIRE DOES NOT EXCEED 50% OF THE AVERAGE ULTIMATE STRENGTH PER WIRE OF THE CROSSARM.

---UNLESS OTHERWISE SPECIFIED---
DIMENSIONS ARE IN INCHES
INTERPRET DIM AND TOL PER ASME Y14.5-2009
ANGULAR: MACH± 2°
BEND ± 2°
ONE PLACE DECIMAL± 0.1
TWO PLACE DECIMAL± 0.02

FIGURE 3. 10 FOOT DEADEND CROSSARM



ITEM NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	BEAM, PULTRUDED STOCK	SERIES 4000 x 120 in, GRAY	1
2	BUSHING	13/16 in x 5-1/4 in	4
3	BUSHING	13/16 in x 3-1/4 in	6
4	-	-	1
5	END CAP	SERIES 4000, GRAY	2
6	MOUNT ASSEMBLY, TANGENT	4KLH	1
7	PLATE, FRONT		1
8	HEX BOLT	3/4 in - 10 x 6 in	2
9	LOCK WASHER	3/4 in	2
10	HEX NUT	3/4 in - 10	2

NOTES:
1. CENTER OF MOUNT HOLE(S) TO HOLES TOLERANCE ±0.06
2. CALCULATED AVERAGE ULTIMATE VERTICAL LOAD = 12,000 LBS PER WIRE, 2 WIRES AT ±54
= 6,000 LBS PER WIRE, 4 WIRES AT ±24 & ±54
3. CALCULATED AVERAGE ULTIMATE LONGITUDINAL LOAD = 8,750 LBS PER WIRE, 2 WIRES AT ±54
= 4,250 LBS PER WIRE, 4 WIRES AT ±24 & ±54
4. GEOTEK RECOMMENDS THAT FULLY FACTORED DESIGN TENSION AND WEIGHT PER WIRE, INCLUDING ALL OVERLOAD FACTORS, DOES NOT EXCEED 50% OF THE AVERAGE ULTIMATE STRENGTH PER WIRE OF THE CROSSARM

---UNLESS OTHERWISE SPECIFIED---
DIMENSIONS ARE IN INCHES
INTERPRET DIM AND TOL PER ASME Y14.5-2009
ANGULAR: MACH ± 2°
BEND ± 2°
ONE PLACE DECIMAL ± 0.1
TWO PLACE DECIMAL ± 0.02

FIGURE 4. 10 FOOT TANGENT DEADEND CROSSARM

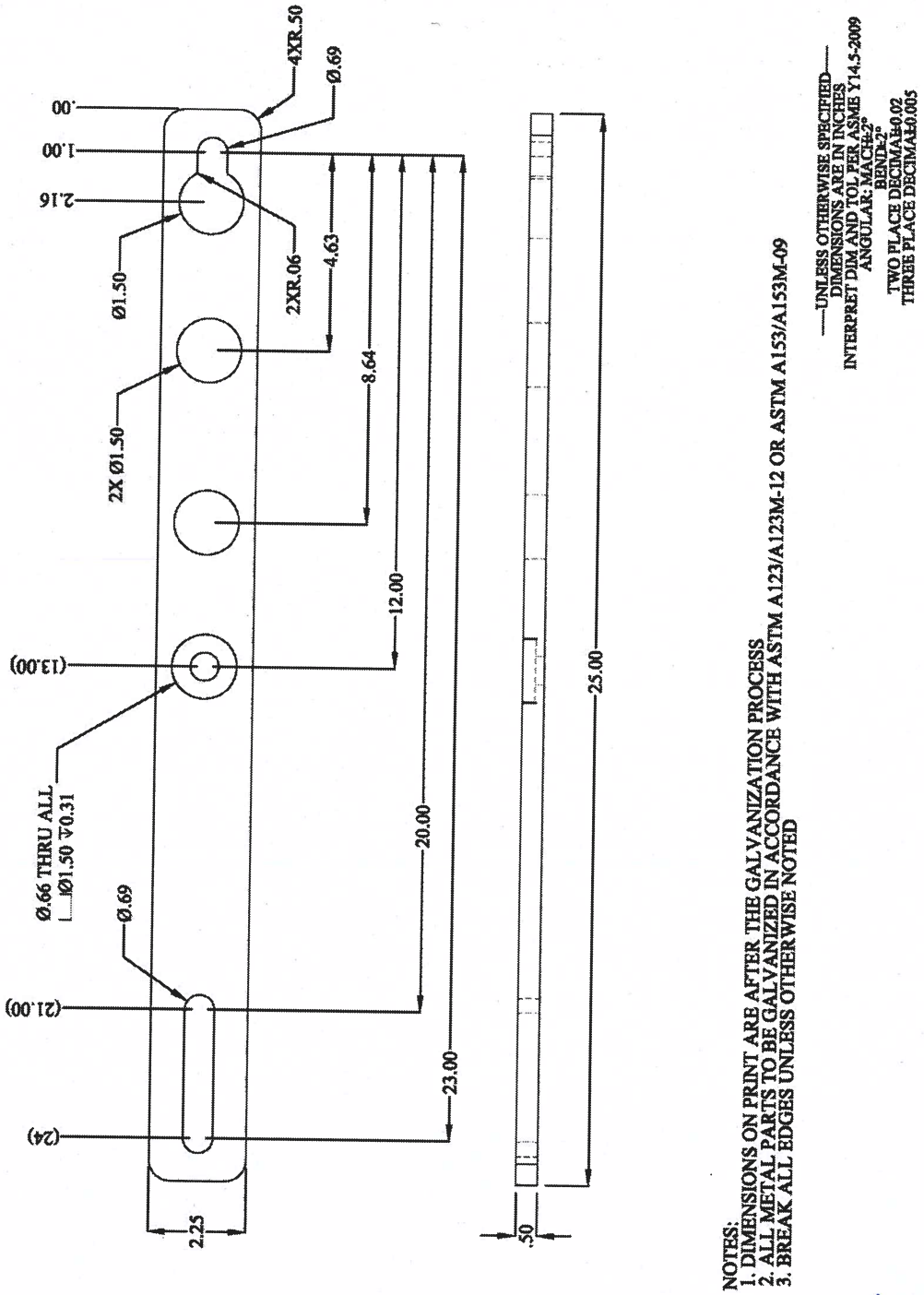


FIGURE 5. EXTENSION BRACKET