

Refer to: HSA-10/ WZ-100 Amendment #3

Mr. Bill Korman
Korman Signs, Incorporated
3029 Lincoln Avenue
Richmond, VA 23228

Dear Mr. Korman:

This is in response to your letters of April 17 and June 16, 2003, requesting Federal Highway Administration (FHWA) acceptance of variations to a number of your company's portable sign stands as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letter were descriptions and drawings of the devices, and references to the crash tests you believe substantiate your requests. You asked that we find these devices acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features." As many of the stands are already covered under FHWA Acceptance Letter WZ-100, originally issued on June 20, 2002, WZ-100, Amendment #1, dated January 23, 2003, and Amendment #2, dated April 21, 2003, you asked that we consider this a request to amend WZ-100 with the updated information.

Introduction

The FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "INFORMATION: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices were those lightweight devices which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer mounted lighted signs, arrow panels, etc. The second guidance memorandum was issued on August 28, 1998, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This later memorandum lists devices that are acceptable under Categories I, II, and III.

A brief description of your requests, including designation of the sign stands and the sizes and substrates you wish to use follows.

Request Number 1:

Stands: Any Type III Barricade that is NCHRP Report 350 accepted
 Signs: 60x60-inch or smaller diamond or square
 48x60-inch or smaller rectangle, or
 25 square feet or smaller for any combination of multiple signs in any arrangement of mounting heights that meets the mounting height requirements below.
 Substrates: 2 mm thick Alpolic® 350
 Mounting Ht: Variable:
 Minimum: 12 inches above the roadway
 Maximum: The bottom of the sign(s) shall be no higher than the bottom of the top rail of the barricade. Signs will be mounted directly to the rails.
 Other: Ballast will be acceptable.

Request Number 2:

Stands: SS560EE, SS560AEE
 Signs: 60x60 inch or smaller diamond or square (at lower mounting heights)
 48x48 inch or smaller diamond or square (at dual mounting heights)
 48x60 or smaller rectangle
 Substrates: 0.100 inch and 0.080 inch Aluminum
 5/8 inch or 1/2 inch plywood
 6.35 mm SP, Endurance, HDPE,
 10 mm CP, Roll Up,
 Alpolic ® 350, 3-4 mm Reynobond ®, Dibond ®, or equivalent ACS
 Dual
 Mounting Ht: 84 inches and 60 inches for diamond
 88 inches and 64 inches for rectangle,
 21 inches for supplemental
 Other: With or without 48x30 inch or smaller supplementary panels using 10 mm CP,
 Alpolic ® 350, or roll up
 With or without flags, lights, or ballast.

Request Number 3:

Stands: SS548EE, SS548AEE
 Signs: 60x60 inch or smaller diamond or square (at lower mounting heights)
 48x48 inch or smaller diamond or square (at dual mounting heights)
 48x60 or smaller rectangle
 Substrate: 0.100 inch and 0.080 inch Aluminum
 5/8 inch and 1/2 inch plywood
 6.35 mm SP, Endurance, HDPE, (all rigid at 60 inch mounting height only)
 Alpolic ® 350, 3-4 mm Reynobond ®, Dibond ®, or equivalent ACS at dual mounting heights

Dual

Mounting Ht: 60 inches and 19 to 21 inches for diamond, 63 inches and 22 inches for rectangle, and 25 inches for supplemental signs.

Other: With or without 48x30 inch or smaller supplementary panels using 10 mm CP, Alpolic ® 350, or roll up
With or without flags, lights, or ballast.

Request Number 4:

Stands: SS560, SS560A, SS560E, SS560AE

Signs: 60x60 inch or smaller diamond or square for SS560E and SS560AE
48x48 inch or smaller diamond or square for SS560 and SS560A
48x60 or smaller rectangle for all

Substrate: Roll up

Mounting Ht: 84 inches for diamond and rectangle
21 inches for supplemental

Other: With or without 48x30 inch or smaller supplementary panels using 10 mm CP, Alpolic ® 350, or roll up
With or without flags, lights, or ballast.

Request Number 5:

Stands: SS1 (Tripod)

Signs: 48x48 inch or smaller diamond or square
48x60 or smaller rectangle for all

Substrate: 0.100 and 0.080 Aluminum, 5/8 and 1/2 inch plywood, Endurance ®, 6.35 mm SP, HDPE, 10 mm CP, Alpolic ®, roll up, and 3-4 mm aluminum composite signs.

Mounting Ht: 13 to 14 inches for diamond, 24 inches for rigid rectangle
13 to 28 inches for roll up rectangle signs measuring 48x60 and 48x24 inches

Other: With or without flags, ballast, or a light.

Request Number 6:

Barricade: The Korman Model WBT3 Type III Barricade, framed with 14 gage, 1 3/4 inch to 2 inch PSST or Qwik Punch uprights, legs, and optional crossbar with tubing connections made by bolted splice plates and/or stub receivers

Rails: 8 inch wide extruded plastic or Alpolic ® 350

Height: 5 feet or 7 feet high

Length: 4 feet to 12 feet long

Signs: 60x60 inch or smaller diamond or square for SS560E and SS560AE
48x48 inch or smaller diamond or square for SS560 and SS560A
48x60 or smaller rectangle for all
Up to 33 total square feet or smaller for any combination of multiple signs in any arrangement of mounting heights that meet the mounting height requirements below.

Substrate: 2 mm thick Alpolic ® 350 for the signs
 Mounting Ht: Minimum 12 inches above the pavement
 Maximum the bottom of the sign shall be no higher than the bottom of the top rail of the barricades. Signs may be mounted directly to the rails
 Other: Barricade may be used with or without sand bags as ballast, or with or without conventional warning lights.

The purpose of **Request #1** is to clarify the intent of WZ-100 Request which was to accept the use of up to 25 square feet of Alpolic ® 350 sign or combination of signs mounted directly to the rails of any NCHRP Report 350 accepted Type III barricade and be more specific about the physical mounting height limitations.

The purpose of **Request #2** is to alter the SS560E and SS560AE stands so that they may accommodate 84" mounting heights as well as the previously accepted 60" height. The upper mast is 15" longer to allow this taller placement.

The purpose of **Request #3** is to alter the SS548E and SS548AE stands so that they can accommodate Alpolic ® 350 and 0.100 Aluminum signs at 60 inches. They have been tested at 19 and 21 inches with substrates from roll ups to rigid. The SS560 sign stand family has also been tested with solid aluminum signs mounted at 60 inches (where the sign detaches and goes over the vehicle.) Unmodified, they can accommodate a rollup sign by attaching the vertical fiberglass spreader to the top of the mast. Your request is to extend the upright and add a mounting bracket so that this stand can accommodate signs at the 60 inch mounting height in addition to the 19 to 21 inch mounting heights.

The purpose of **Request #4** is to allow the use of the SS560, SS560A, SS560E, and SS560AE stands with the rollup signs at 84 inches simply by raising the pivot point of the fiberglass spreaders to the top of the mast, rather than having the top of the sign affixed to the top of the mast. The upper portion of the mast will separate from the stand and pass over the vehicle.

The purpose of **Request #5** is to include the warning light that was recently tested and was found to perform acceptably. During the tests, (impacts 103A and 103B) the lights detached shortly after impact and passed harmlessly over the vehicle.

The purpose of **Request #6** is to broaden the acceptance of the Korman Type III barricade from the original configuration (impacts 2A, 3B, 58A, 59B, 60A) to a wider range of heights, widths, and sign mountings tested recently (impacts 101A, 101B, 102A, 104B, and 105A.) The tests, summarized below, did not result in any penetration of the windshield.

Length: 8 feet	Height: 5 feet,	Plastic Rails: No windshield
damage		
Length: 8 feet	Height: 5 feet,	Alpolic Rails: No windshield

contact

Length: 12 feet	Height: 7 feet,	Plastic Rails: Moderate cracking
Length: 12 feet	Height: 5 feet,	Plastic Rails: Moderate cracking

The 12 foot long, 5 foot high barricade replicates the general design of the barricade tested for the Michigan Department of Transportation (MDOT) that failed using wood rails. The testing conducted for MDOT impacted the device head on and at an angle of 90 degrees. As the head-on test was the one that failed, the Korman Type III 12 foot x 5 foot barricade was tested head on with successful results. Note that heights between 5 and 7 feet should be avoided.

The following enclosures detail the sign and barricade designs, plus summarize the requested changes and the crash testing that has been done to support the requests.

Enclosure 1 is a drawing showing the clarifications of sign sizes and placement on Type III Barricades.

Enclosure 2 is a SS560EE drawing showing the 84" mounting height for rigid signs.

Enclosure 3 is a SS560EE drawing showing the 84" mounting height for rollup signs.

Enclosure 4 is a SS560AEE drawing showing the 84" mounting height for rigid signs.

Enclosure 5 is a SS560AEE drawing showing the 84" mounting height for rollup signs.

Enclosure 6 is a SS548EE drawing showing the 60" mounting height for rigid signs.
(60" mounting height accepted by WZ-100, Request 3 for Roll Up Signs)

Enclosure 7 is a SS548AEE drawing showing the 60" mounting height for rigid signs.
(60" mounting height accepted by WZ-100, Request 3 for Roll Up Signs)

Enclosure 8 is a SS560 drawing showing the 84" mounting height for rollup signs.

Enclosure 9 is a SS560A drawing showing the 84" mounting height for rollup signs.

Enclosure 10 is a SS560E drawing showing the 84" mounting height for rollup signs.

Enclosure 11 is a SS560AE drawing showing the 84" mounting height for rollup signs.

Enclosure 12 is an updated product description and glossary summarizing the additional items.

Enclosure 13 is a Summary of Requests Chart.

Enclosure 14 is a Summary of Accepted Devices Chart.

Enclosure 15 is a drawing showing the construction details of Model WBT3 Type III barricades and clarifications of sign sizes and placement.

Enclosure 16 is a SS1 drawing showing the stand with a light attached.

Enclosure 17 is a summary of crash tests conducted.

Enclosure 18 is a drawing of the light bracket for barricades.

Enclosure 19 is a drawing of the light bracket for the SS1 tripod sign stand.

Findings

We concur in your requests as they are based on current testing, prior testing, or logical

extrapolation. Therefore, the devices described in the various requests above and detailed in the enclosed tables and drawings are acceptable for use on the NHS under the range of conditions tested, when proposed by a State. Please note that Enclosure #14 summarizes all acceptable sign stands that were accepted by WZ-100 and this Amendment and all prior Amendments.

Please note the following standard provisions that apply to FHWA letters of acceptance:

- ! Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- ! Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- ! Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- ! You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- ! You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that they will meet the crashworthiness requirements of FHWA and NCHRP Report 350.
- ! To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-100 Amendment #3 shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.

The Korman sign stands may include patented components and if so are considered "proprietary." The use of proprietary work zone traffic control devices in Federal-aid projects is generally of a temporary nature. They are selected by the contractor for use as needed and removed upon completion of the project. Under such conditions they can be presumed to meet requirement "a" given below for the use of proprietary products on Federal-aid projects. On the other hand, if proprietary devices are specified for use on Federal-aid projects, except exempt, non-NHS projects, they: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with

existing highway facilities or that no equally suitable alternative exists or; (c) they must be used

for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed.

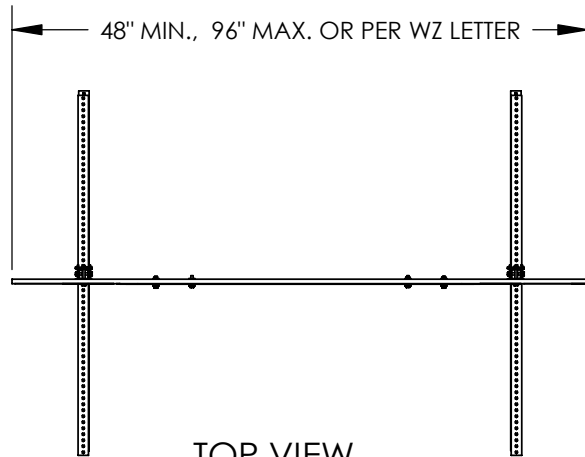
Sincerely yours,

Michael S. Griffith
Acting Director, Office of Safety Design
Office of Safety

Enclosures

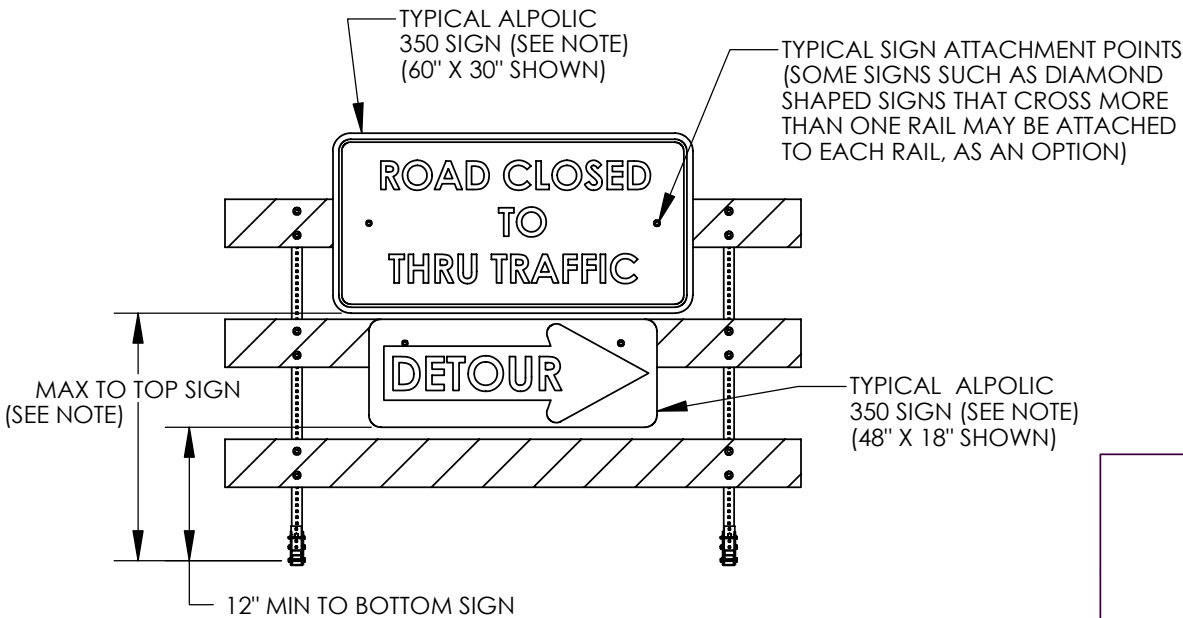
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cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;
R.Powers, HSA-10)

WZ-100, AMENDMENT 3, ENCLOSURE 1




TOP VIEW

TYPICAL FHWA ACCEPTED, NCHRP 350 CRASHWORTHY TYPE III BARRICADE SUCH AS WZ-51 & WZ-85 BASED KORMAN SIGNS MODEL KSIBTIII-133Z (WZ-85 BASED KORMAN SIGNS MODEL KSIBTIII-SW SHOWN)



FRONT VIEW

NOTE: 2 MM ALPOLIC 350 SIGN UP TO 25 SQ.FT. OR ANY COMBINATION OF SIGNS UP TO 25 SQ.FT. TOTAL. 12" MINIMUM AND 41" MAXIMUM FROM GROUND TO BOTTOM OF BOTTOM SIGN (EXCEPT BOTTOM OF RECTANGULAR SIGNS CAN BE AS HIGH AS BOTTOM OF TOP RAIL).



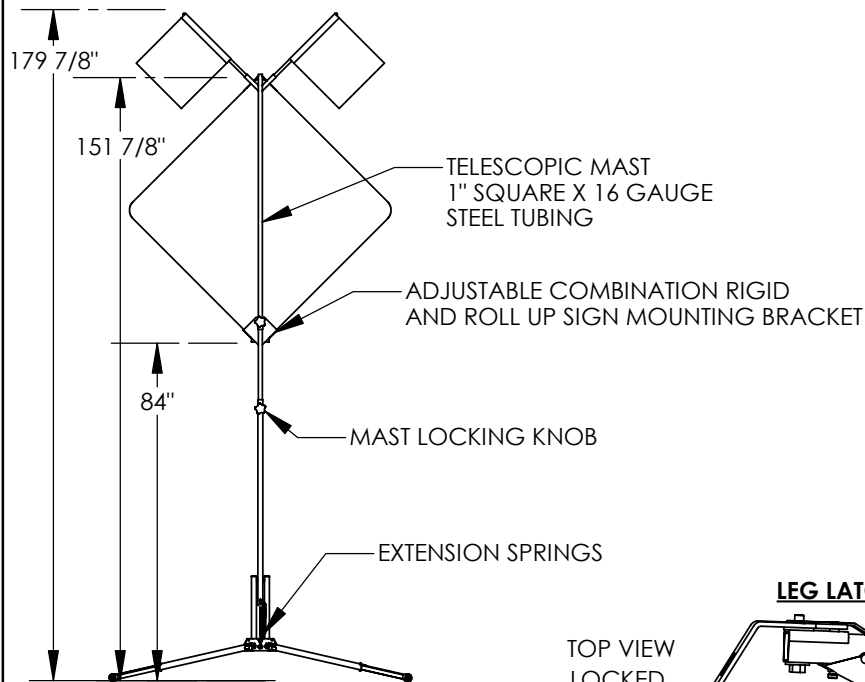
Korman Signs
INC.

TYPICAL NCHRP 350 APPROVED TYPE III BARRICADE WITH ALPOLIC 350 SIGNS

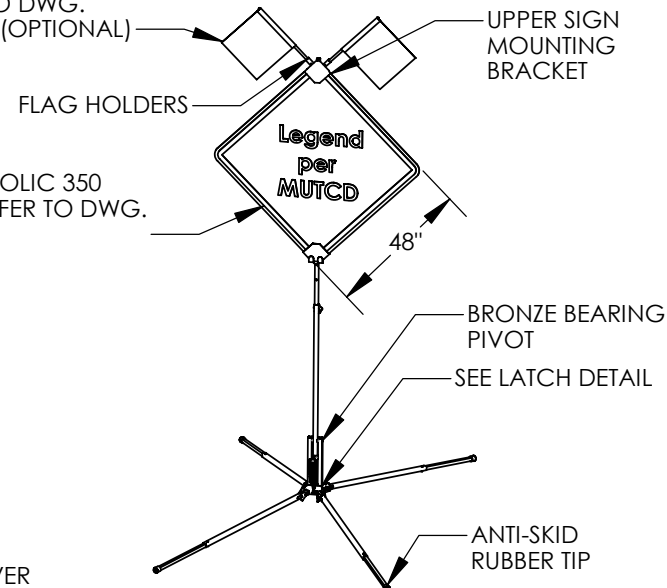
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SS560EE

BACK VIEW

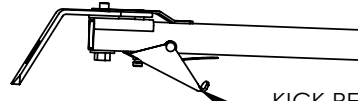


FLAGS
REFER TO DWG.
K9239A (OPTIONAL)

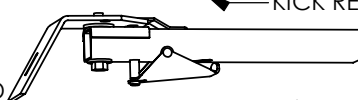


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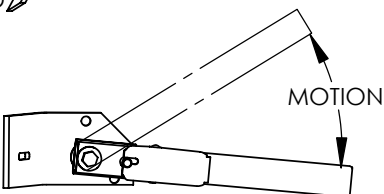
TOP VIEW
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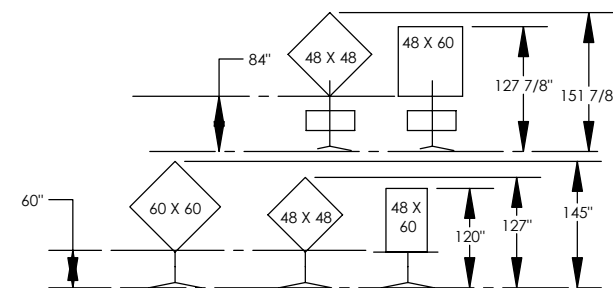
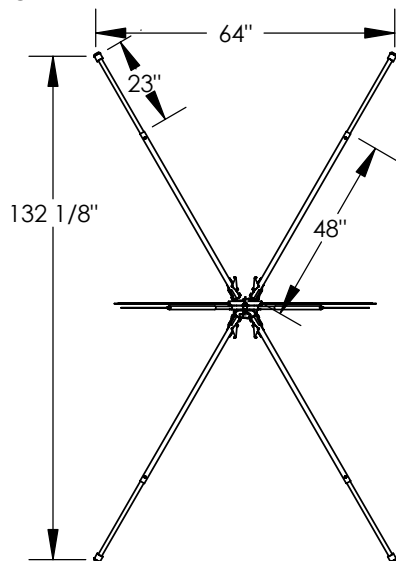
TOP VIEW
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SIDE VIEW



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH
3/16" THICK STEEL LEG MTG. FLANGES

LEGS:
TELESCOPING 1 1/4" & 1" X 14 & 16 GAUGE
THICK SQUARE STEEL TUBING

TELESCOPIC MAST -- 1" X 16 GAUGE SQUARE
STEEL TBG.

SPRINGS -- EXTENSION TYPE

FINISH -- ZINC/ZINC PLATED/YELLOW CHROMATE

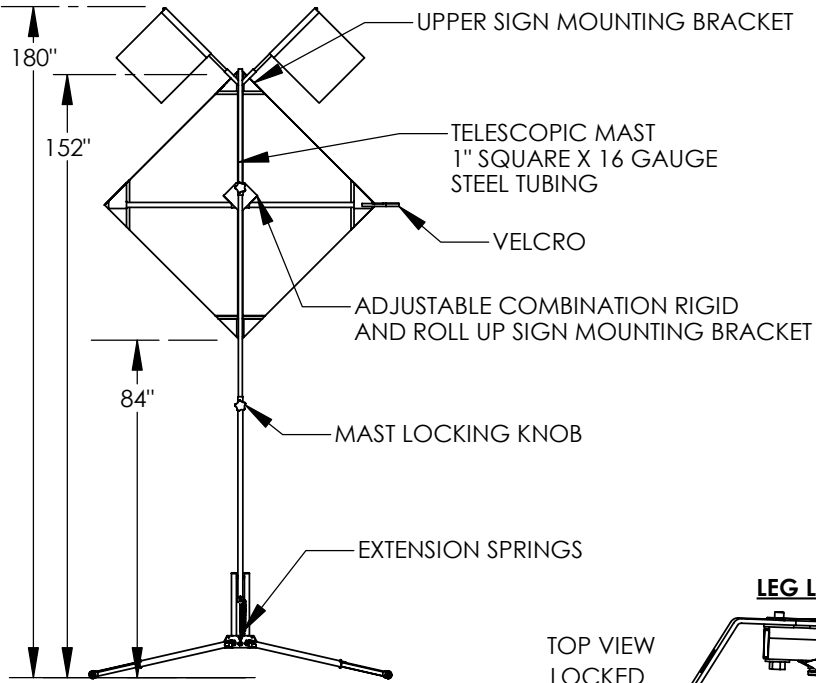


SCHEMATIC DRAWING FOR MODEL SS560EE
SIGN STAND WITH A 48X48 ALPOLIC SIGN AT 84"

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SS560EE

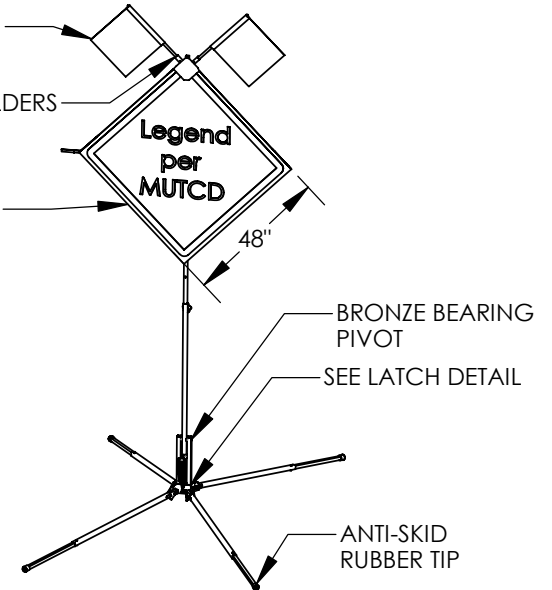
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FLAGS
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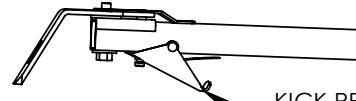
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ROLL UP SIGN
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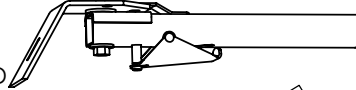
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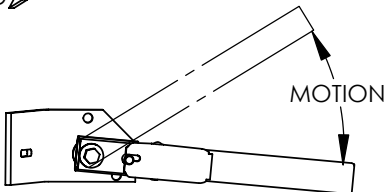


KICK RELEASE LEVER

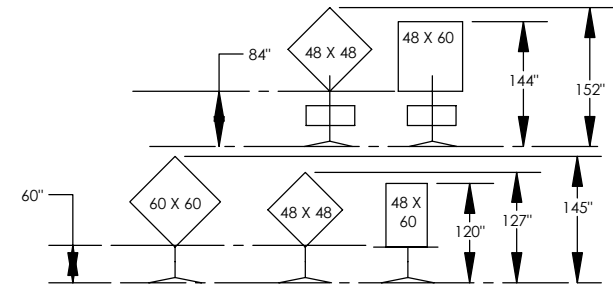
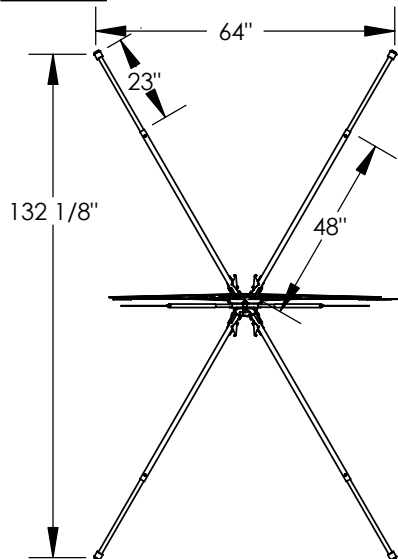
TOP VIEW
UN-LOCKED



SIDE VIEW



TOP VIEW



BASE:
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3/16" THICK STEEL LEG MTG. FLANGES

LEGS:
TELESCOPING 1 1/4" & 1" X 14 AND 16 GAUGE,
RESPECTIVELY, SQUARE STEEL TUBING

TELESCOPIC MAST -- 1" X 16 GAUGE SQUARE
STEEL TBG.

SPRINGS -- EXTENSION TYPE

FINISH -- ZINC/ZINC PLATED/YELLOW CHROMATE



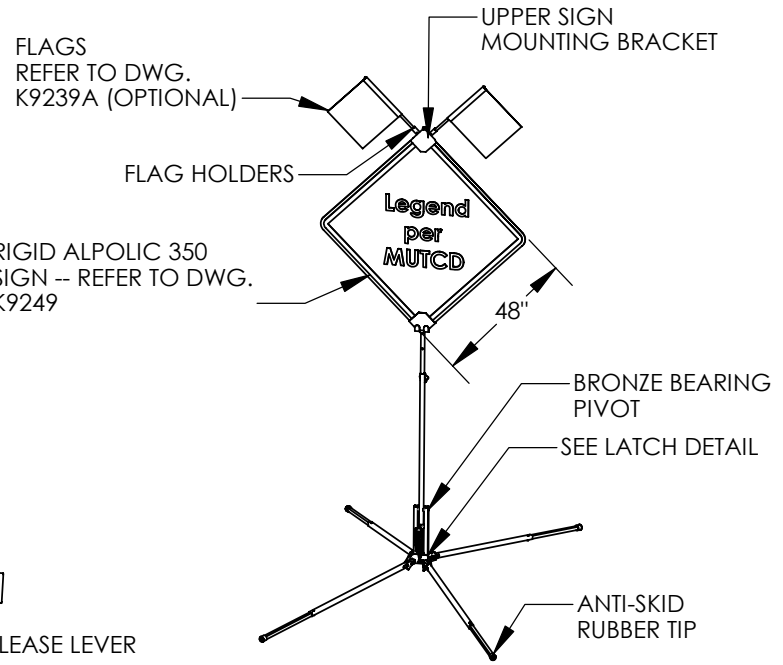
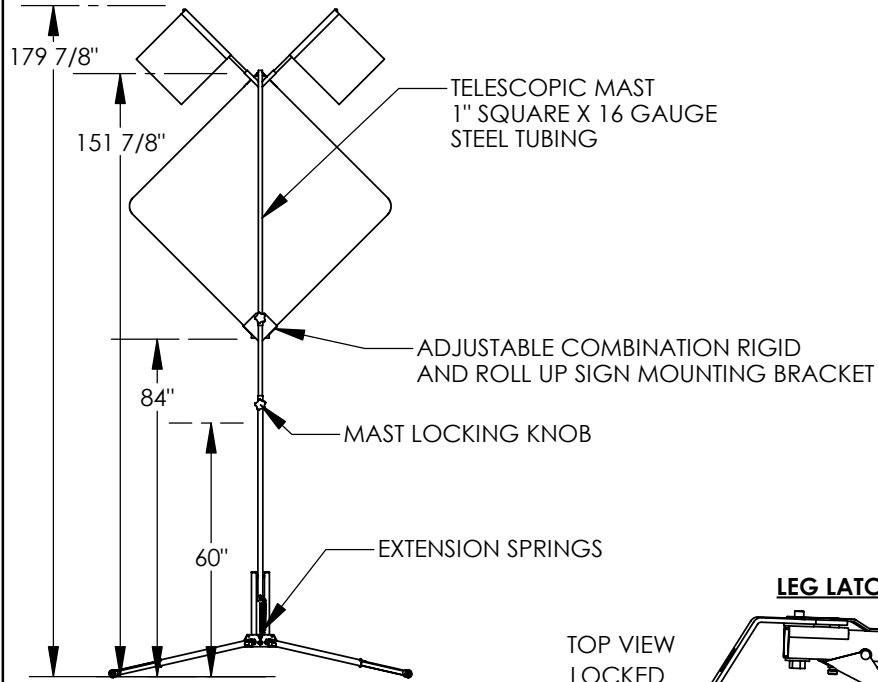
Korman Signs
INC.

SCHEMATIC DRAWING FOR MODEL SS560EE
SIGN STAND WITH A 48X48 ROLL UP SIGN AT 84"

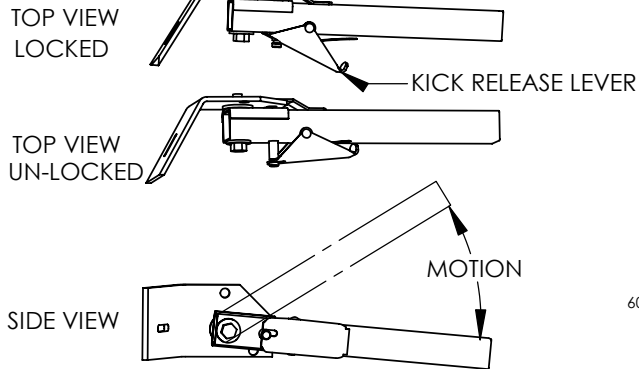
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SS560AEE

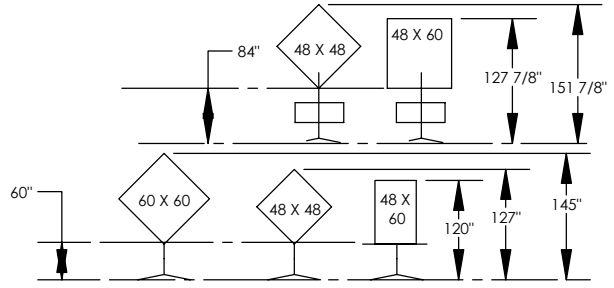
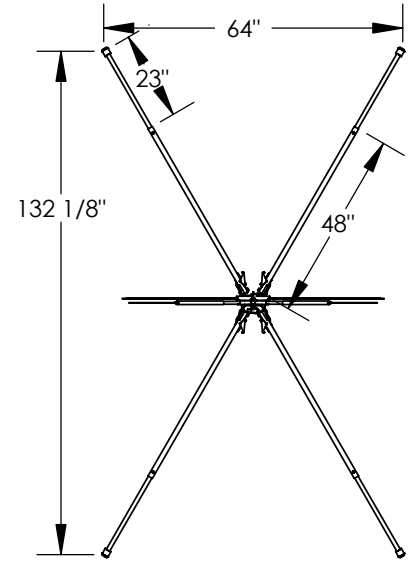
BACK VIEW



LEG LATCH DETAIL



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH
3/16" THICK STEEL LEG MTG. FLANGES

LEGS:
TELESCOPING -- 1 1/4" & 1" X 0.100"
THICK SQUARE ALUMINUM TUBING

TELESCOPIC MAST -- 1" X 16 GAUGE SQUARE
STEEL TBG.

SPRINGS -- EXTENSION TYPE

FINISH -- ZINC/ZINC PLATED/YELLOW CHROMATE/
ALUMINUM

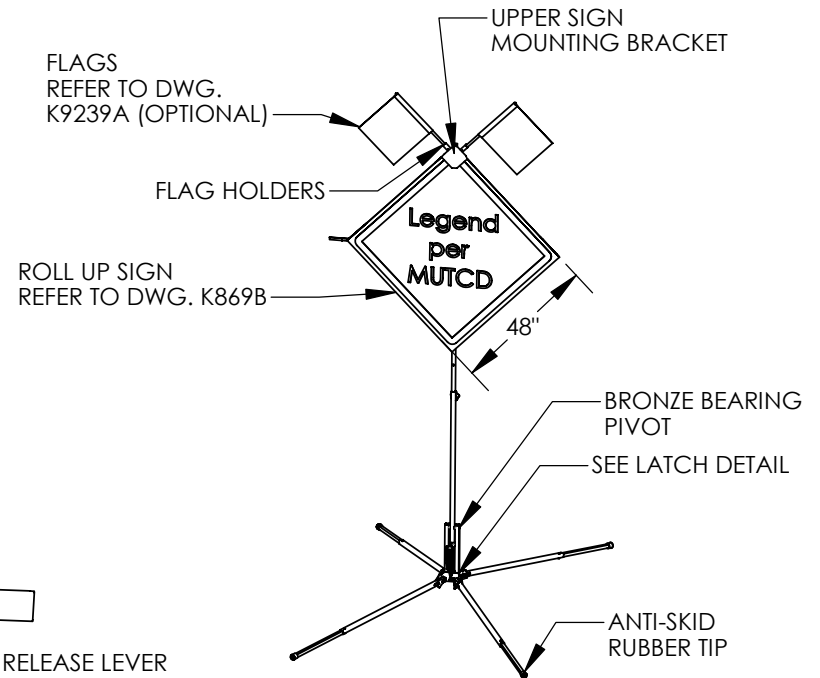
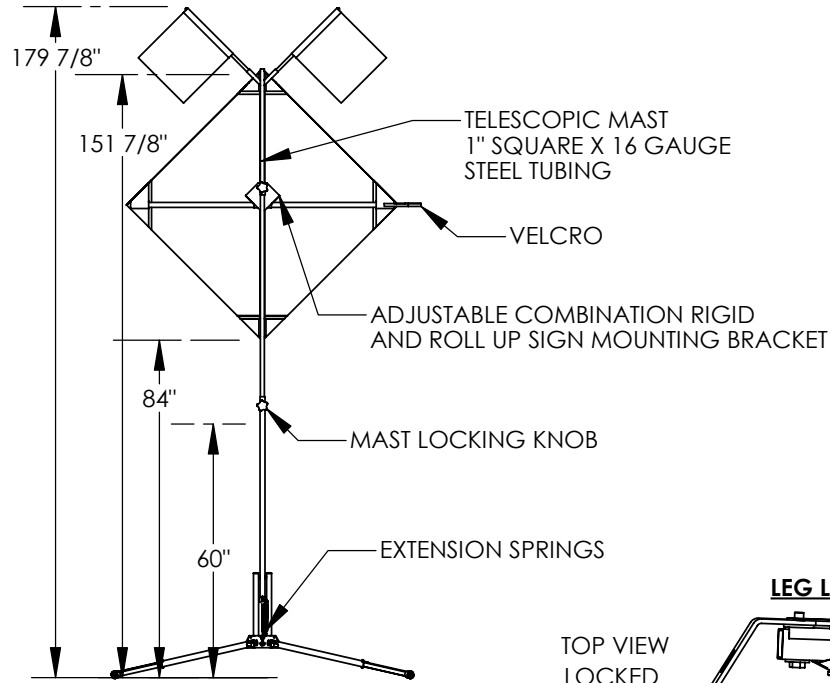


SCHEMATIC DRAWING FOR MODEL SS560AEE
SIGN STAND WITH A 48X48 ALPOLIC SIGN AT 84"

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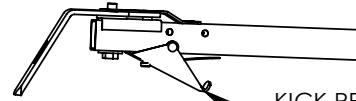
SS560AEE

BACK VIEW

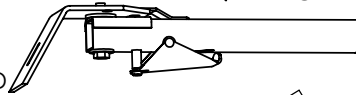


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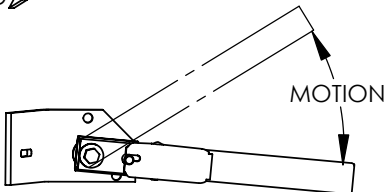
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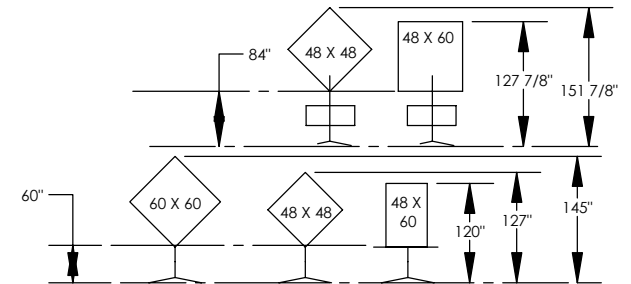
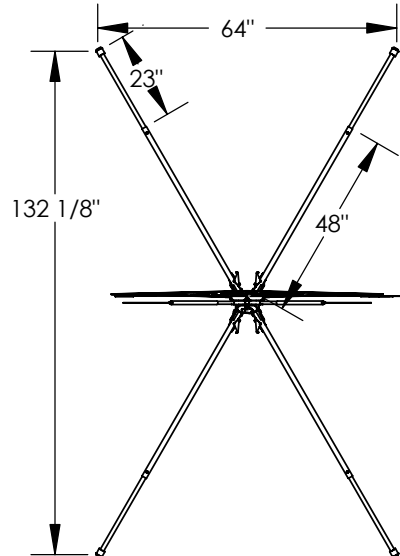
TOP VIEW UN-LOCKED



SIDE VIEW



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH
3/16" THICK STEEL LEG MTG. FLANGES

LEGS:
TELESCOPING 1 1/4" & 1" X 0.100"
THICK ALUMINUM TUBING

TELESCOPIC MAST -- 1" X 16 GAUGE SQUARE
STEEL TBG.

SPRINGS -- EXTENSION TYPE

FINISH -- ZINC/ZINC PLATED/YELLOW CHROMATE
ALUMINUM



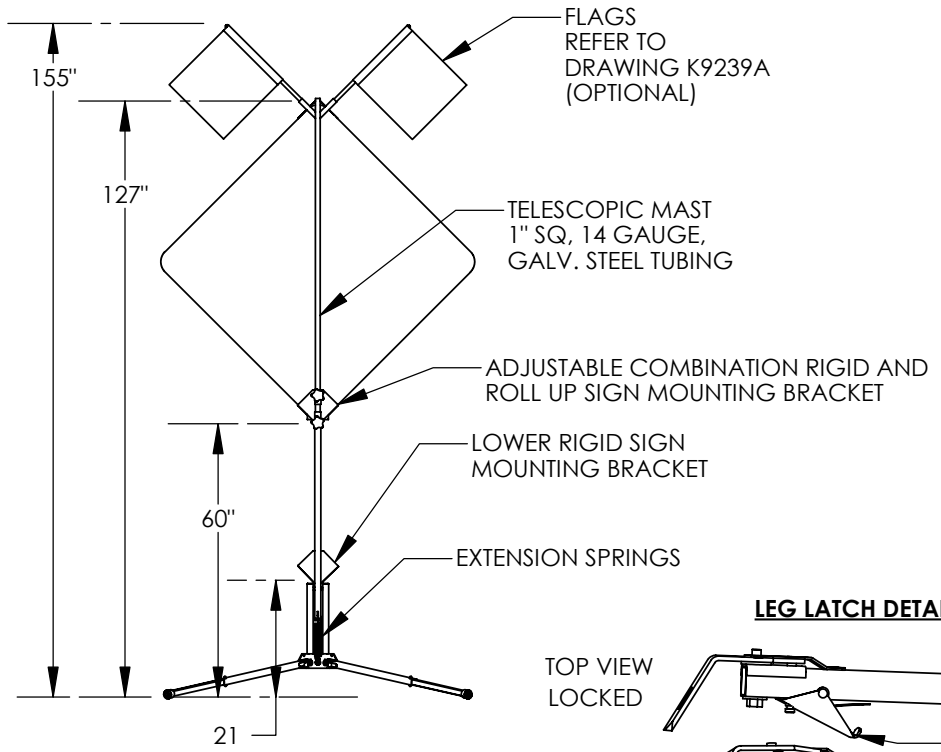
Korman Signs
INC.

SCHEMATIC DRAWING FOR MODEL SS560AEE
SIGN STAND WITH A 48X48 ROLL UP SIGN AT 84"

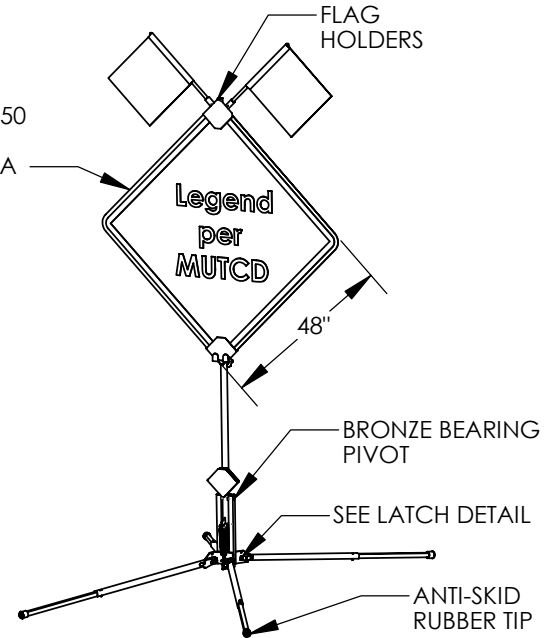
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SS548EE

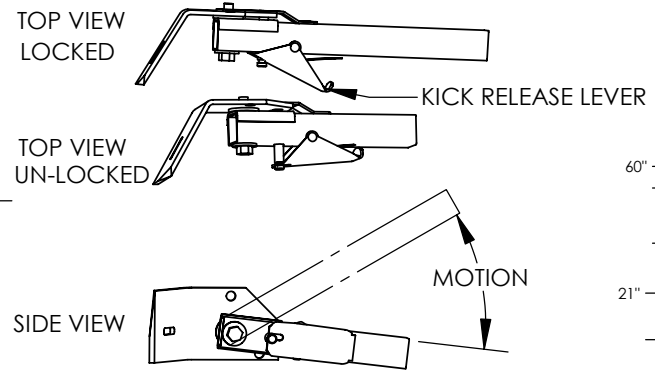
BACK VIEW



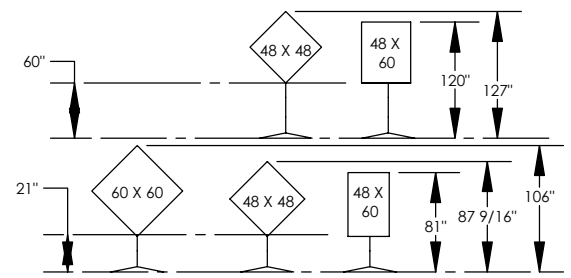
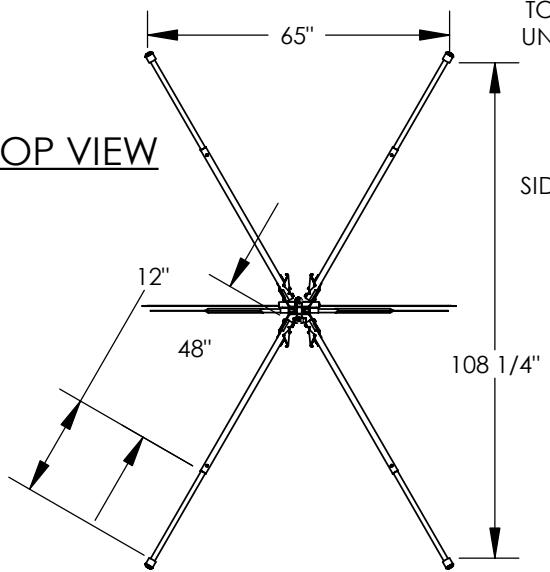
RIGID ALPOLIC 350 SIGN REFER TO DRAWING K9249A



LEG LATCH DETAIL



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH 3/16" THICK STEEL LEG MTG. FLANGES

TELESCOPIC LEGS:
1 1/4" AND 1" X 14 GAUGE AND 1 1/2" X 14 GAUGE RESPECTIVELY, SQUARE STEEL TUBING

TELESCOPIC MAST -- 1" X 14 GAUGE SQUARE STEEL TUBING

SPRINGS -- EXTENSION TYPE

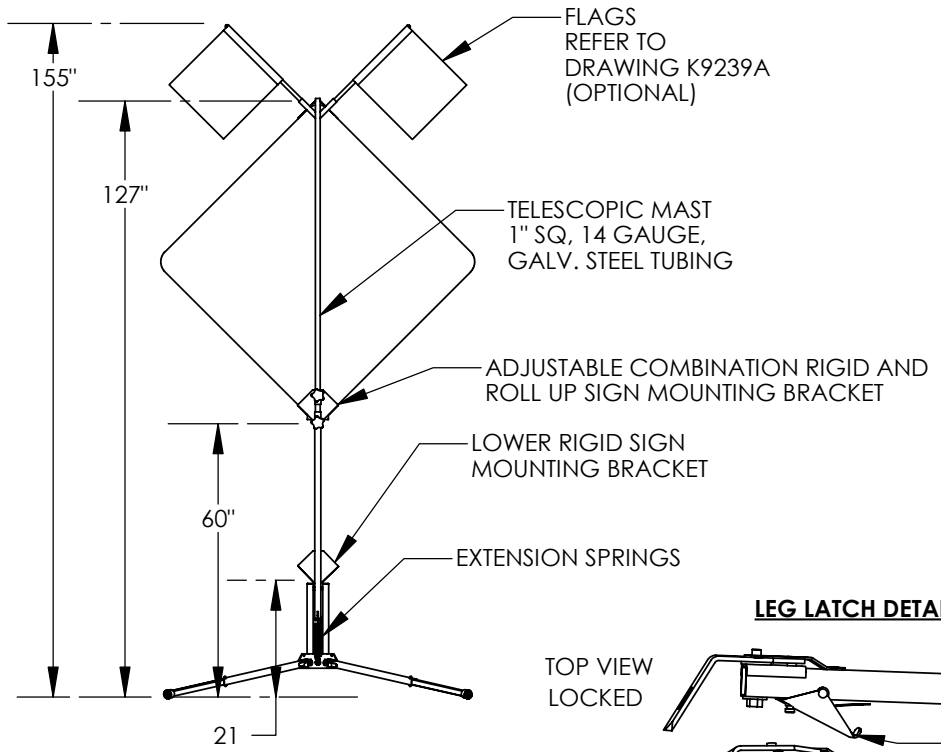
FINISH -- ZINC/PLATED ZINC/YELLOW CHROMATE



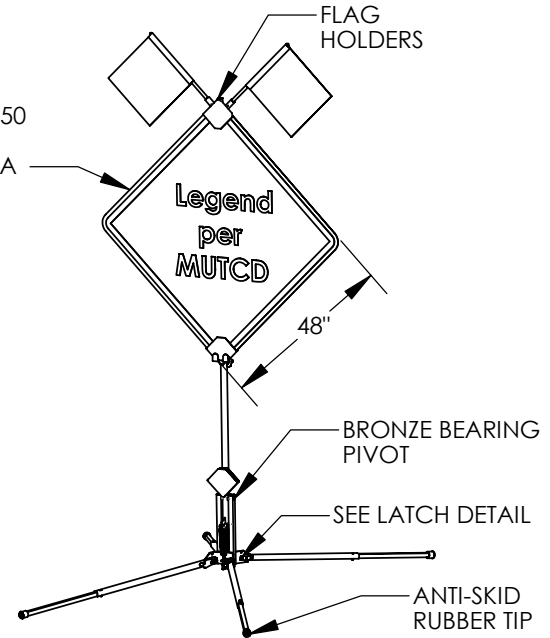
SCHMATIC DRAWING FOR MODEL SS548EE SIGN STAND WITH A 48"x48" ALPOLIC 350 SIGN AT 60"

SS548EE

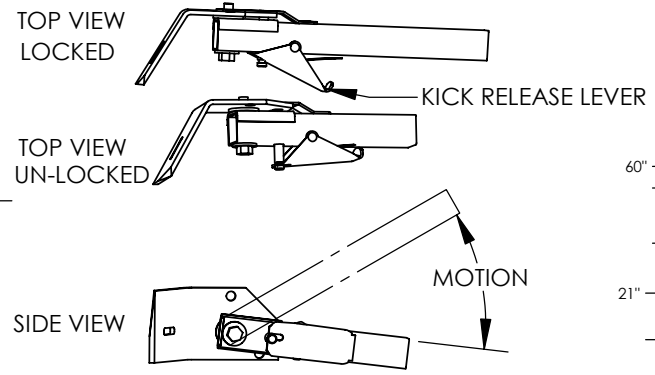
BACK VIEW



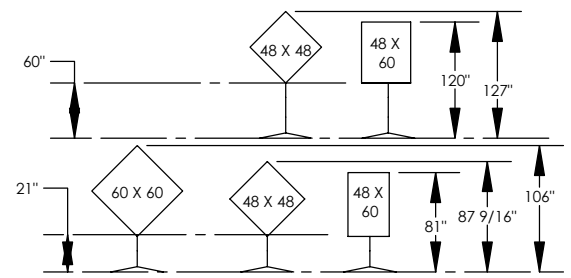
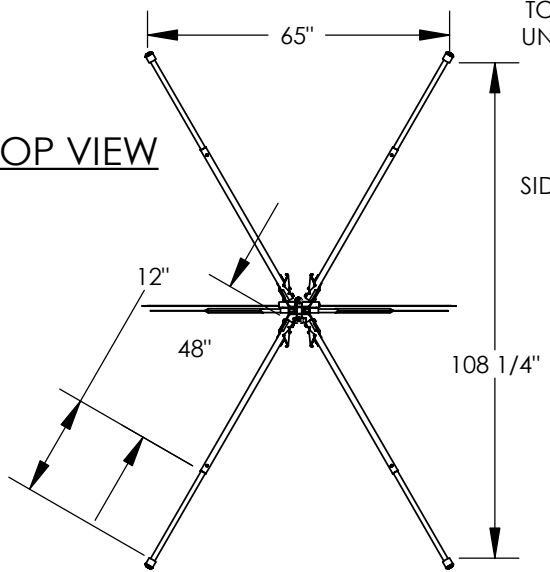
RIGID ALPOLIC 350 SIGN REFER TO DRAWING K9249A



LEG LATCH DETAIL



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH 3/16" THICK STEEL LEG MTG. FLANGES

TELESCOPIC LEGS:
1 1/4" AND 1" X 14 GAUGE AND 1 1/2" X 14 GAUGE RESPECTIVELY, SQUARE STEEL TUBING

TELESCOPIC MAST -- 1" X 14 GAUGE SQUARE STEEL TUBING

SPRINGS -- EXTENSION TYPE

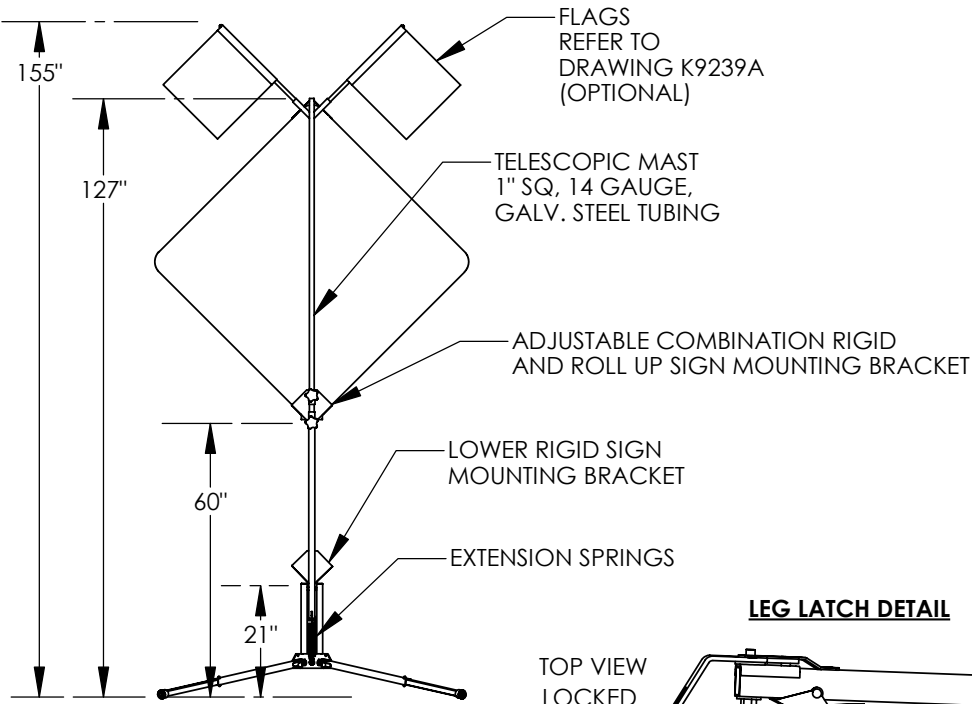
FINISH -- ZINC/PLATED ZINC/YELLOW CHROMATE



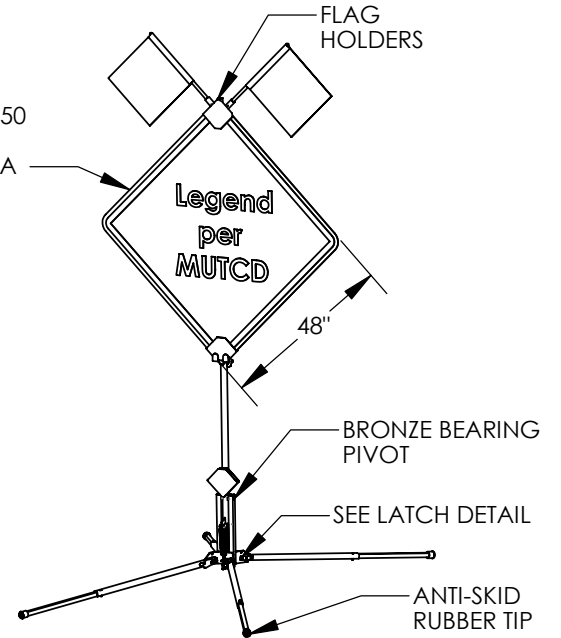
SCHMATIC DRAWING FOR MODEL SS548EE SIGN STAND WITH A 48"x48" ALPOLIC 350 SIGN AT 60"

SS548AEE

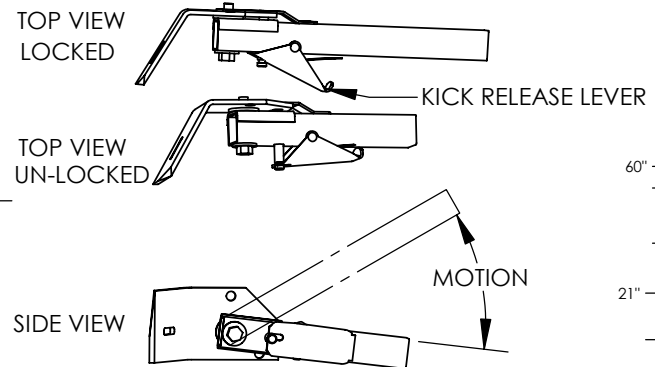
BACK VIEW



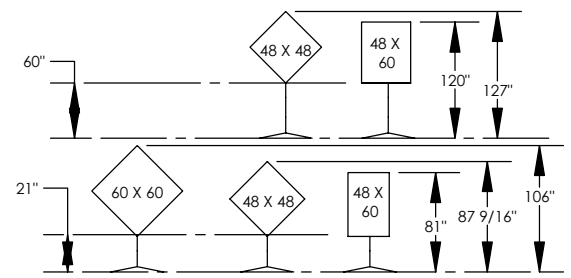
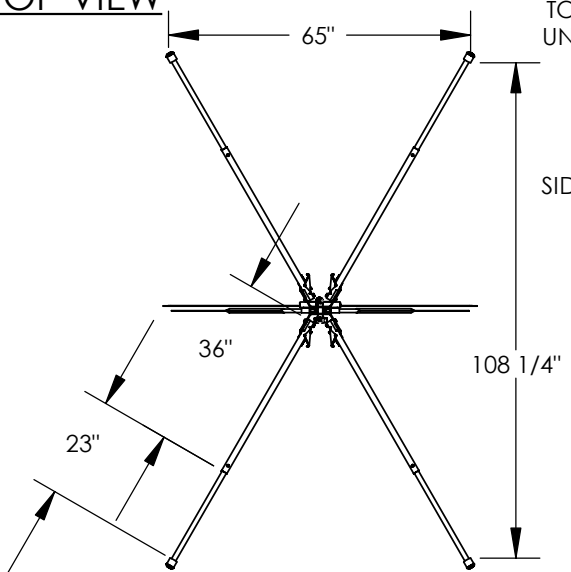
RIGID ALPOLIC 350 SIGN REFER TO DRAWING K9249A



LEG LATCH DETAIL



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH 3/16" THICK STEEL LEG MTG. FLANGES

TELESCOPIC LEGS:
1 1/4" AND 1" X .100" THICK SQUARE ALUMINUM TUBING

TELESCOPIC MAST -- 1" X 14 GAUGE SQUARE STEEL TBG.

SPRINGS -- EXTENSION TYPE

FINISH -- ZINC/ALUMINUM

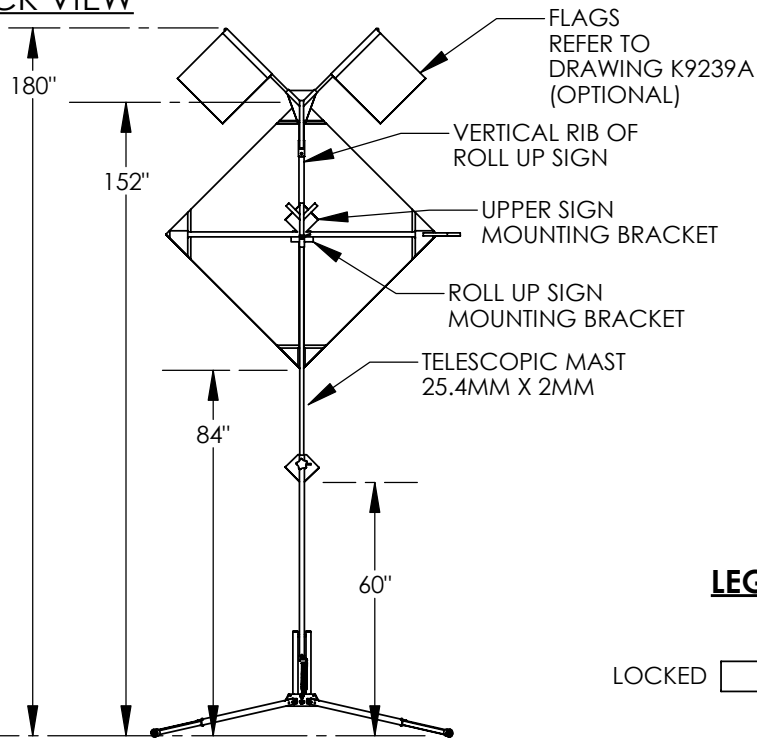


SCHMATIC DRAWING FOR MODEL SS548AEE SIGN STAND WITH A 48"x48" ALPOLIC 350 SIGN AT 60"

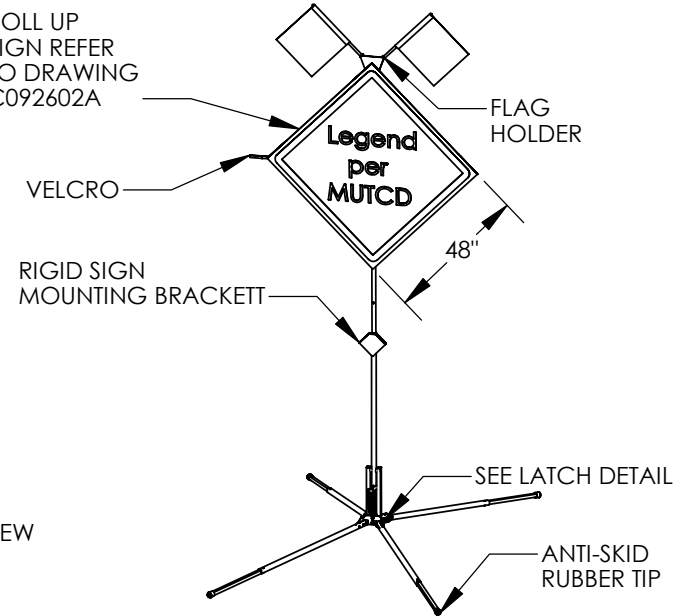
SCALE: NOT TO SCALE	DATE: 3/7/03	DRAWN BY: DCC	DWG. NO. C030703A
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SS560

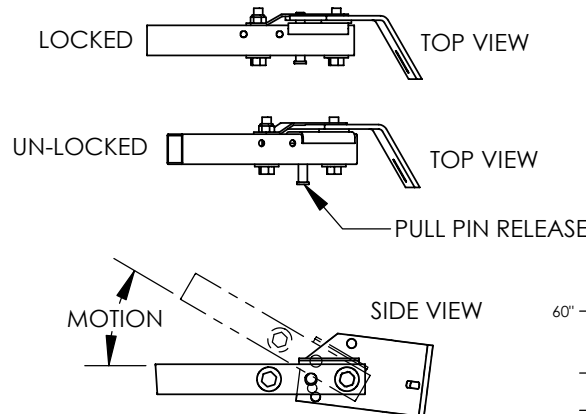
BACK VIEW



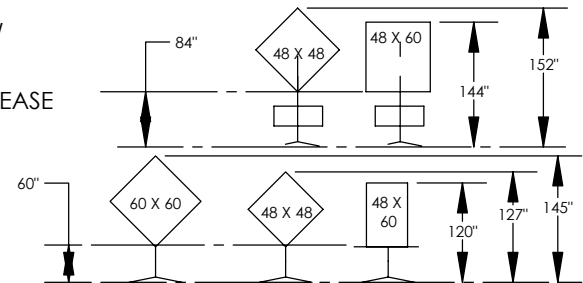
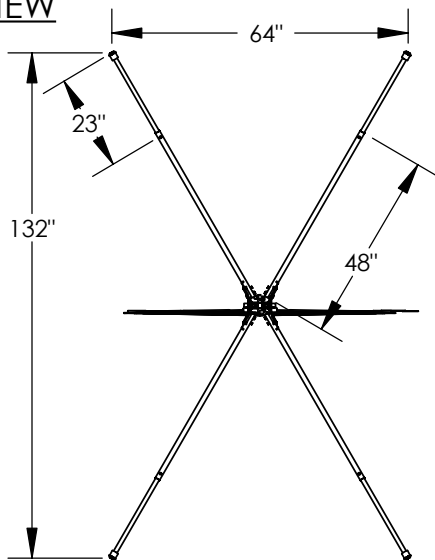
ROLL UP SIGN REFER TO DRAWING C092602A



LEG LATCH DETAIL



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH 3/16" THICK STEEL LEG MTG. FLANGES

LEGS:
TELESCOPING 1 1/4" AND 1" SQUARE STEEL TUBING WITH 14 GAUGE AND 16 GAUGE THICKNESS, RESPECTIVELY

TELESCOPIC MAST -- 1" X 16 GAUGE SQUARE STEEL TUBING

FINISH -- ZINC/PLATED ZINC/YELLOW CHROMATE

SPRINGS -- VERTICAL EXTENSION TYPE



Korman Signs
INC.

SCHEMATIC DRAWING FOR MODEL SS560 WITH A 4848DFUC ROLL UP SIGN AT 7 FEET FROM SURFACE

SCALE: NOT TO SCALE | REV: | APPROVED:

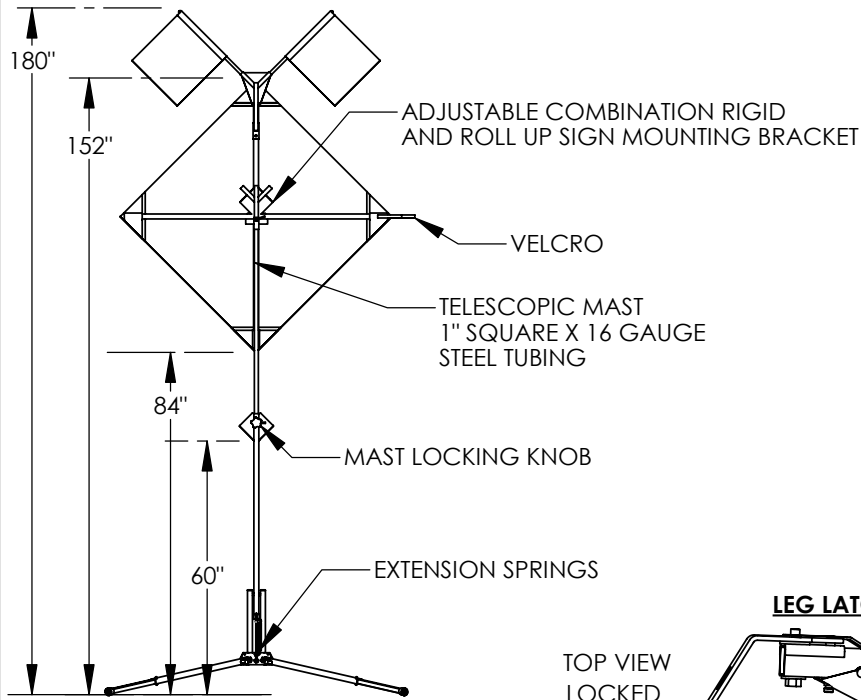
DATE: 3/31/03 | DRAWN BY: DCC

DWG. NO. C033103A

Enclosure 9

SS560A

BACK VIEW



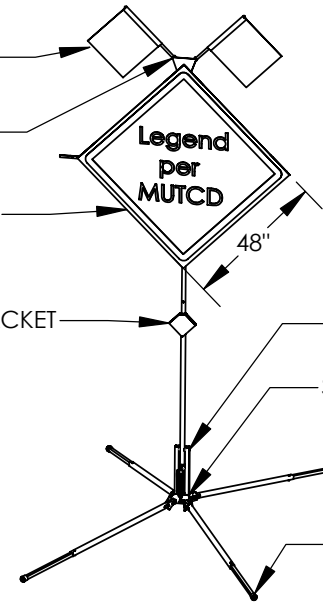
FLAGS
REFER TO DWG.
K9239A (OPTIONAL)

FLAG HOLDERS
ROLL UP SIGN
REFER TO DWG. K869B

RIGID SIGN
MOUNTING BRACKET

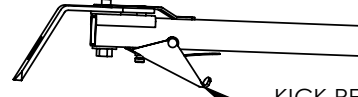
BRONZE BEARING
PIVOT
SEE LATCH DETAIL

ANTI-SKID
RUBBER TIP



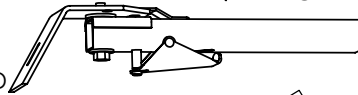
LEG LATCH DETAIL

TOP VIEW
LOCKED



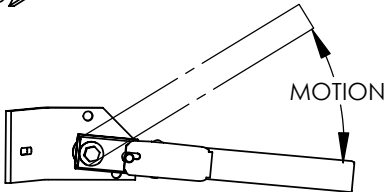
KICK RELEASE LEVER

TOP VIEW
UN-LOCKED

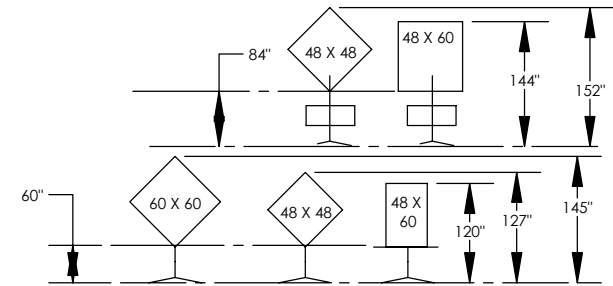
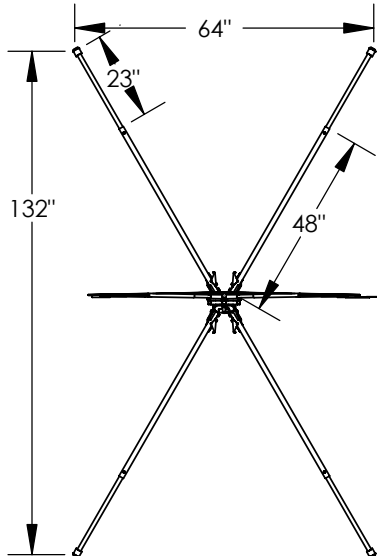


MOTION

SIDE VIEW



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH
3/16" THICK STEEL LEG MTG. FLANGES

LEGS:
TELESCOPING 1 1/4" & 1" X 0.100"
THICK ALUMINUM TUBING

TELESCOPIC MAST -- 1" X 16 GAUGE SQUARE
STEEL TBG.

SPRINGS -- EXTENSION TYPE

FINISH -- ZINC/ZINC PLATED/YELLOW CHROMATE
ALUMINUM

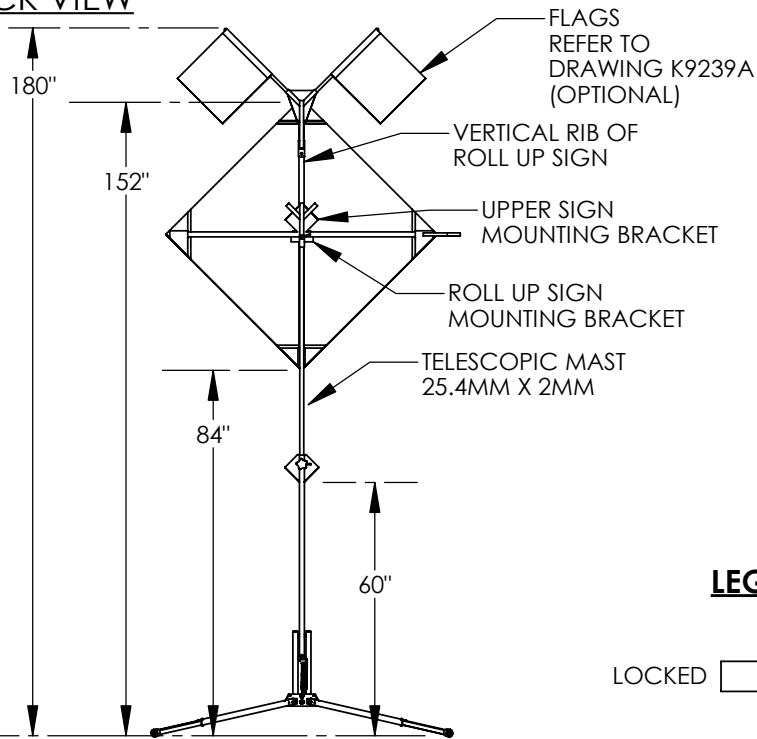


SCHEMATIC DRAWING FOR MODEL SS560A
SIGN STAND WITH A 48X48 ROLL UP SIGN AT 84"

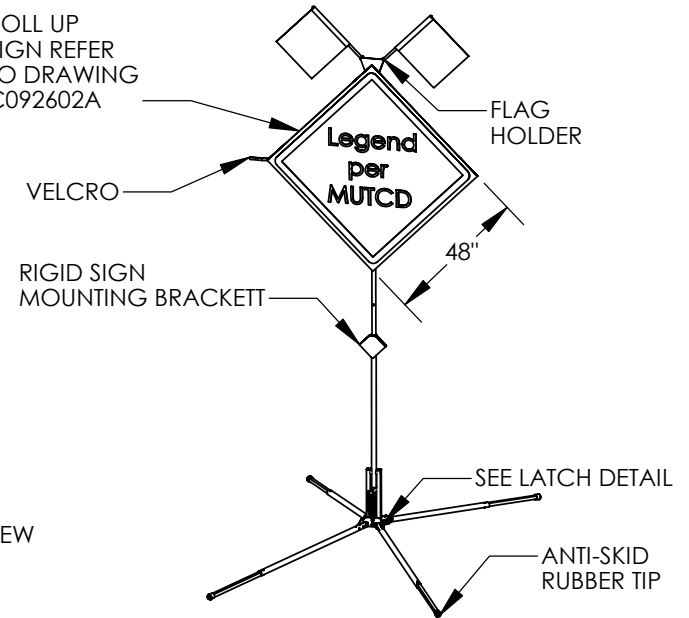
SCALE: NOT TO SCALE	REV.	APPROVED:
DATE: 3/31/03	DRAWN BY: DCC	DWG. NO. C033103B

SS560E

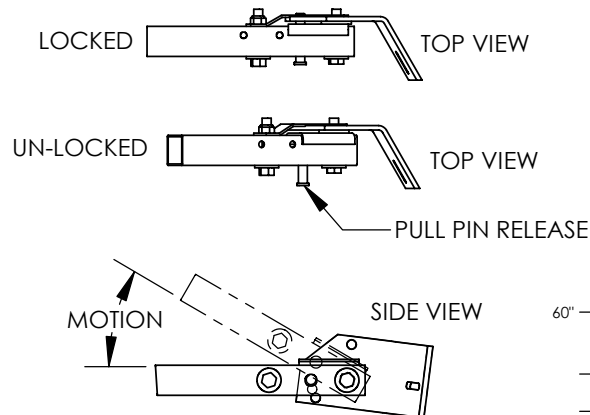
BACK VIEW



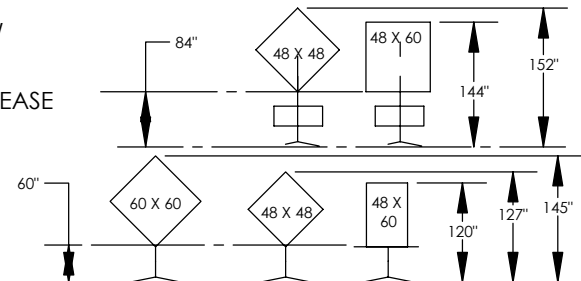
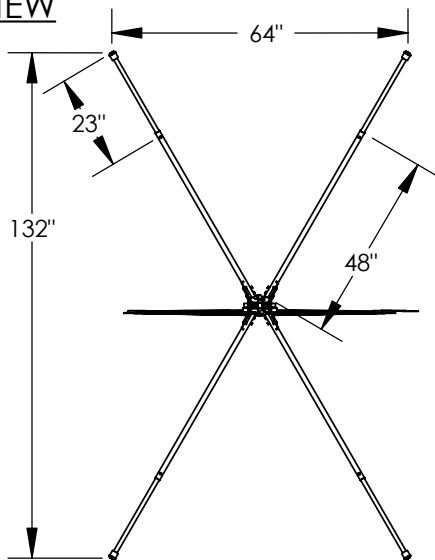
ROLL UP SIGN REFER TO DRAWING C092602A



LEG LATCH DETAIL



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH 3/16" THICK STEEL LEG MTG. FLANGES

LEGS:
TELESCOPING 1 1/4" AND 1" SQUARE STEEL TUBING WITH 14 GAUGE AND 16 GAUGE THICKNESS, RESPECTIVELY

TELESCOPIC MAST -- 1" X 16 GAUGE SQUARE STEEL TUBING

FINISH -- ZINC/PLATED ZINC/YELLOW CHROMATE

SPRINGS -- VERTICAL EXTENSION TYPE



Korman Signs
INC.

SCHEMATIC DRAWING FOR MODEL SS560E WITH A 4848DFUC ROLL UP SIGN AT 7 FEET FROM SURFACE

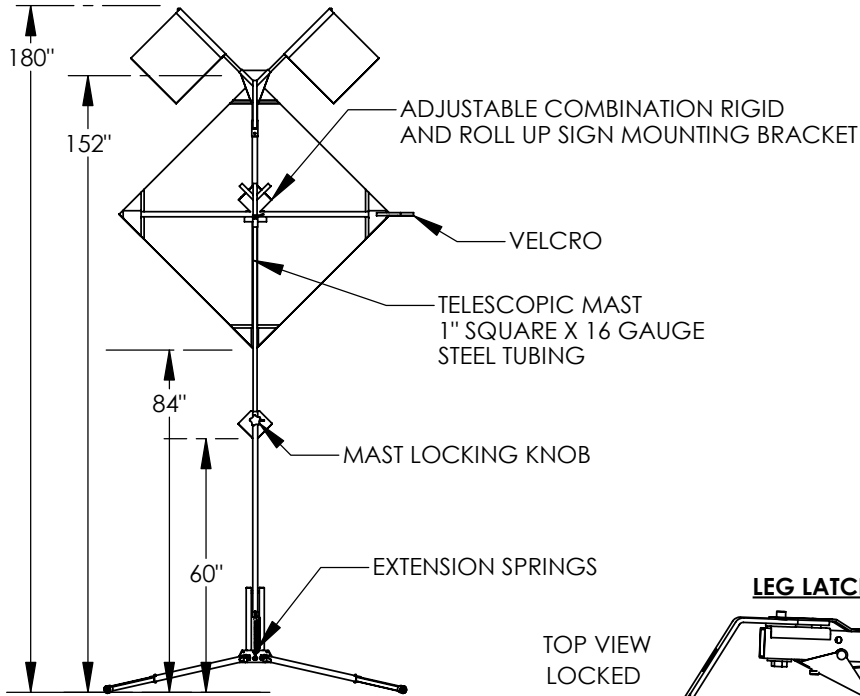
SCALE: NOT TO SCALE REV: APPROVED:

DATE: 4/16/03 DRAWN BY: DCC

DWG. NO. C041603B

SS560AE

BACK VIEW



FLAGS REFER TO DWG. K9239A (OPTIONAL)

FLAG HOLDERS
ROLL UP SIGN REFER TO DWG. K869B

RIGID SIGN MOUNTING BRACKET

BRONZE BEARING PIVOT
SEE LATCH DETAIL

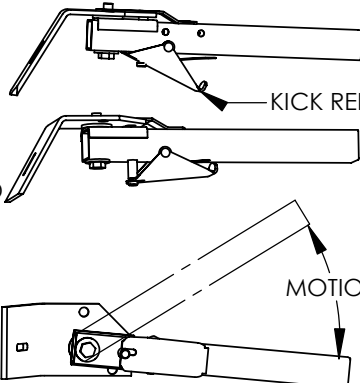
ANTI-SKID RUBBER TIP

LEG LATCH DETAIL

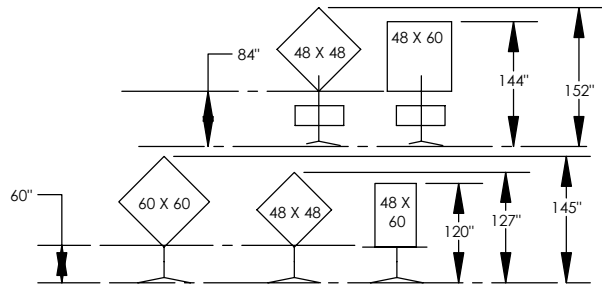
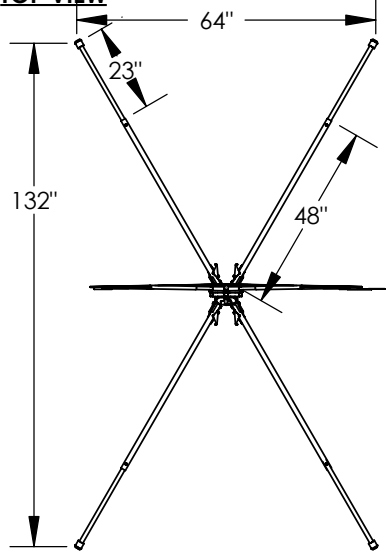
TOP VIEW LOCKED

TOP VIEW UN-LOCKED

SIDE VIEW



TOP VIEW



BASE:
1 1/4" X 14 GAUGE SQUARE STEEL TUBING WITH
3/16" THICK STEEL LEG MTG. FLANGES

LEGS:
TELESCOPING 1 1/4" & 1" X 0.100"
THICK ALUMINUM TUBING

TELESCOPIC MAST -- 1" X 16 GAUGE SQUARE
STEEL TBG.

SPRINGS -- EXTENSION TYPE

FINISH -- ZINC/ZINC PLATED/YELLOW CHROMATE
ALUMINUM



SCHMATIC DRAWING FOR MODEL SS560AE
SIGN STAND WITH A 48X48 ROLL UP SIGN AT 84"

SCALE: NOT TO SCALE	REV.	APPROVED:
DATE: 4/16/03	DRAWN BY: DCC	DWG. NO. C041603A

Product Description and Glossary of Terms

SS560: X footprint stand with telescopic steel square tube legs. The sign support assembly consists of a pivoting steel tube upright that contains a telescopic steel tube mast topped with 3 flag holders, built in rigid and roll up sign holders, and is connected to the base via two vertically positioned extension springs. This stand supports rigid or roll up signs at a normal operating height of 60 inches (1524mm) above the ground.

SS560A: Same X footprint stand as SS560 but the telescopic leg assemblies are square aluminum tubing instead of steel.

SS560E: Same as SS560 except telescopic mast is longer to accommodate a 60" x 60" sign.

SS560EE: Same as SS560 except the mast is taller and instead of the fixed lower sign holder there is an adjustable one to achieve the 84 inch as well as the 60 inch mounting heights for both rigid and roll up signs.

SS560AE: Same as SS560A except telescopic mast is longer to accommodate a 60" x 60" sign.

SS560AEE: Same as SS560EE but the telescopic leg assemblies are square aluminum tubing instead of steel.

SS548EE: Based on the SS548 model X footprint stand with the additions of telescopic steel square tube legs, an extra adjustable lower sign holder, taller upright and a taller mast. The sign support assembly consists of a pivoting steel tube upright that contains a telescopic steel tube mast topped with 3 flag holders, built in rigid and roll up sign holders, and is connected to the base via two vertically positioned extension springs. This stand supports rigid or roll up signs at the normal operating heights of 21 inches (533mm) or at 60 inches (1524mm) above the ground.

SS548AEE: Same as SS548EE except the telescopic leg assemblies are aluminum square tubing.

WBT3SWH Type III Barricade: Welded stub receivers on the legs for the uprights and a horizontal cross-brace, range from 4 feet to 12 feet long and heights of 5 feet and 7 feet with either hollow extruded plastic or Alpolic 350 rails, up to 33 square feet of Alpolic 350 signs attached to rails, with or without warning lights.

WBT3SW: Same as WBT3SWH except no horizontal cross-brace

WBT3BRH: Same as WBT3SWH except splice plate brackets are used to join steel members

WBT3BR: Same as WBT3BRH except no horizontal cross-brace

Alpolic: Signs with this designation are manufactured from Alpolic® 350, a 2mm aluminum composite material manufactured by Mitsubishi Chemical America and normally covered with 3M reflective sheeting.

Roll Up: Signs with this designation indicate either mesh fabric, 3M RS34 or 3M RS24 roll up material with cloth or plastic pockets and either two or three cross braces (ribs) depending on the sign shape and application.

Flags: 24x24 vinyl flags mounted on a ¾ diameter wooden dowel 36 in. long. Model VFO2436

Ballast: Sand Bags weighing 45 to 50 lbs.

3-4mm ACS: An aluminum composite material similar to ALPOLIC® 350 its thickness is 3 or 4mm.

Request #	Stands	Max. Sign Size(s)	Mounting Heights	.125 Al.	.100 Al.	.080 Al.	5/8 Plywood	1/2 Plywood	6.35mm SP	Endurance	HDPE	Alpolic 350	10mm CP	Roll Up	3-4mm ACS	w/Supp. Panel	w/wo Flags	w/wo Light	w/wo Ballast	Test Reference	
WZ-100, AMENDMENT 3																					
1	Any NCHRP 350 accepted Type III Barricade	60x60 or 25 square feet	12 min. or max. bot. of top sign at bot. of top rail									√							√	58A, 59B, 60A, 2A, 3B	
2	SS560EE SS560AEE	60x60	60		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	4B	
		48x48	60, 84		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		
		48x60	64, 88		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		
		48x30 Supp.	21									√	√	√	√	√	√	√	√		
3	SS548EE SS548AEE	60x60	19									√	√	√	√	√	√	√	√	4B, 8A, 8B	
		48x60	22									√	√	√	√	√	√	√	√		
		48x48	60		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		
		48x60	63		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		
		48x30 Supp.	25									√	√	√	√	√	√	√	√		
4	SS560 SS560A SS560E SS560AE	60x60	60											√			√		√	4B	
		48x48	84											√			√		√		
		48x60	84											√			√		√		
														√			√		√		
		48x30 Supp.	22									√	√	√		√	√	√	√		
5	SS1 w/wo sand bag	48x48 rigid	14		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	103A, 103B, 66A, 66B, 73B, 87A, 87B, WZ-78A,WZ-103	
		48x48 roll up	16																		
		48x60 rigid	24																		
		48x60 roll up	24																		
6	WBT3SWH, WBT3SW, WBT3BRH and WBT3BR Type III Barricades	60x60 or 33 square feet	12 min. or max. bot. of top sign at bot. of top rail									√				√		√	√	101A, 101B, 102A, 102B, 104B, 105A, 58A, 59B, 60A, 2A, 3B	

Request #	Stands	Max. Sign Size(s)	Mounting Heights	.125 Al.	.100 Al.	.080 Al.	5/8 Plywood	1/2 Plywood	6.35mm SP	Endurance	HDPE	Alpolc 350	10mm CP	Roll Up	3-4mm ACS	w/Supp. Panel	w/wo Flags	w/wo Light	w/wo Ballast	Test Reference
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WZ-100, AMENDMENT 2

1	SS548ETL	48x48	21									√	√	√	√	√	√	√	√	WZ-21,29,100	
	SS548ETL	48x48	60											√							
	SS548AETL	48x48	21									√	√	√	√	√	√	√	√		
	SS548AETL	48x48	60											√							

WZ-100, AMENDMENT 1

1	SS548UC	60x60	21									√					√		√	100A, 100B, 5A, 5B, 37A, 37B, 48B
	SS548UCA	48x60																		
2	SS548UCR	60x60	13									√					√		√	
	SS548UCRA	48x60										√					√		√	7A, 7B,
	SS560UCR											√					√		√	23A, 23B, 48A
	SS560UCRA	60x60										√					√		√	
3	SS548SSUC	48x60	21									√		√			√		√	100A, 100B,
	SS548SSUCA											√		√			√		√	5A, 5B, 37A, 37B, 48B

WZ-100

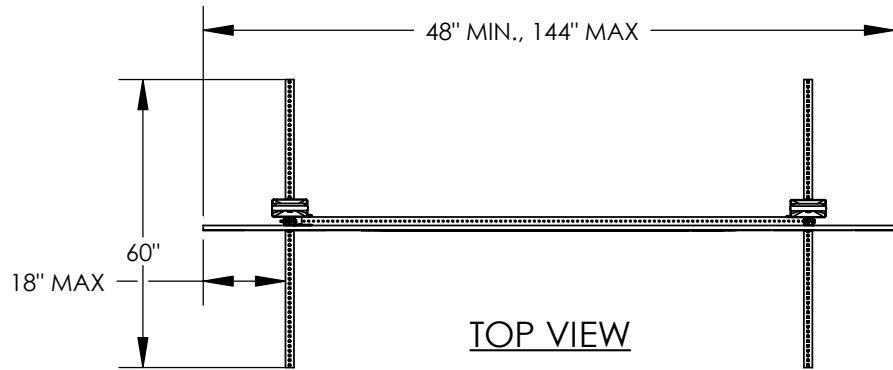
1	SS560	60x60	60	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	4A, 4B 56A, 56B 55A, 55B		
	SS560A	48x60		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			
	SS560E			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			
	SS560AE	48x30 Supp.	21	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			
2	SS548	48x60	21 to 24									√	√	√	√		√	√	√	86B 69B 61A 8A, 8B		
	SS548A											√	√	√	√		√	√	√			
	SS548E													√	√	√	√		√		√	√
	SS548AE													√	√	√	√		√		√	√
	SS548C													√	√	√	√		√		√	√
	SS548CE													√	√	√	√		√		√	√
	SS548CA													√	√	√	√		√		√	√
	SS548CAE													√	√	√	√		√		√	√
3	SS548E	60x60	48 min.											√		√	√		√	56A, 56B		
	SS548AE													√		√	√		√	73B, 85B		
	SS548CE													√		√	√		√	1A, 1B		
	SS548CAE	48x30 Supp.	21											√		√	√		√	4A, 4B,		

Korman Signs Inc.
Summary of Accepted Devices
By Mounting Height

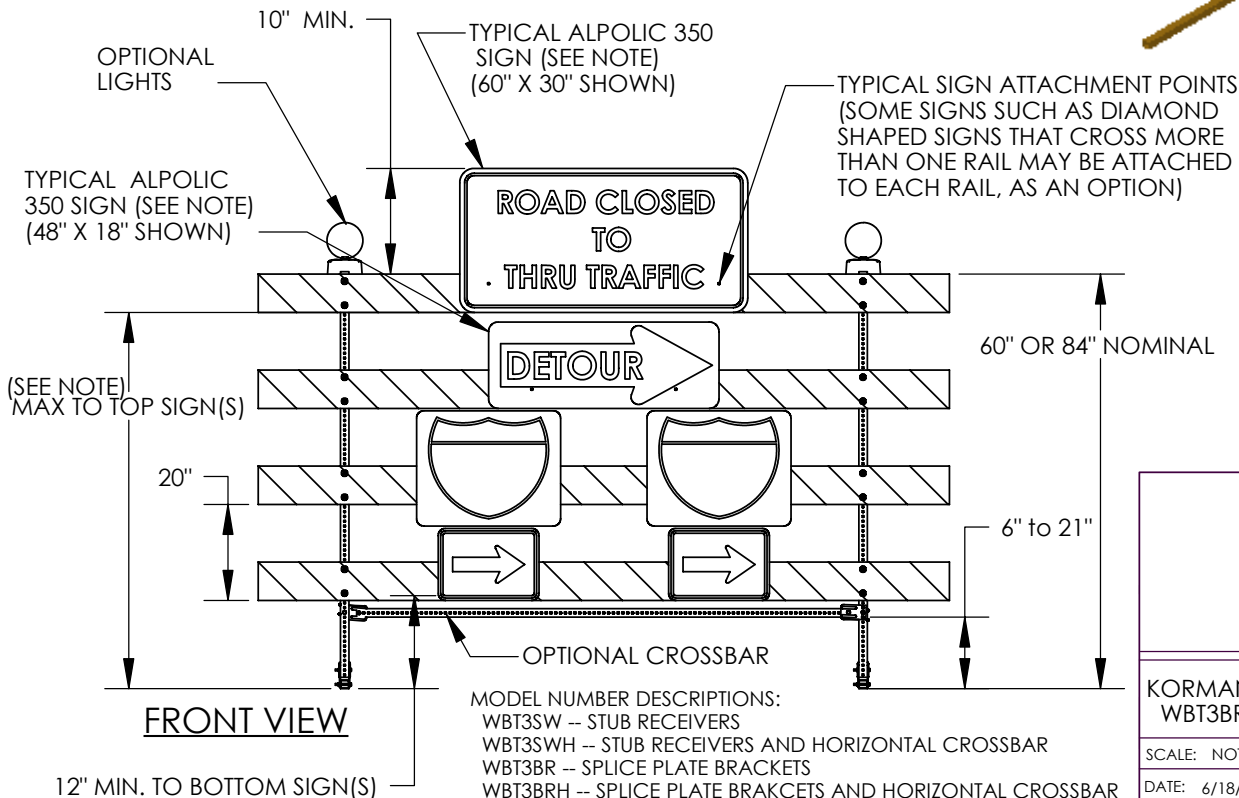
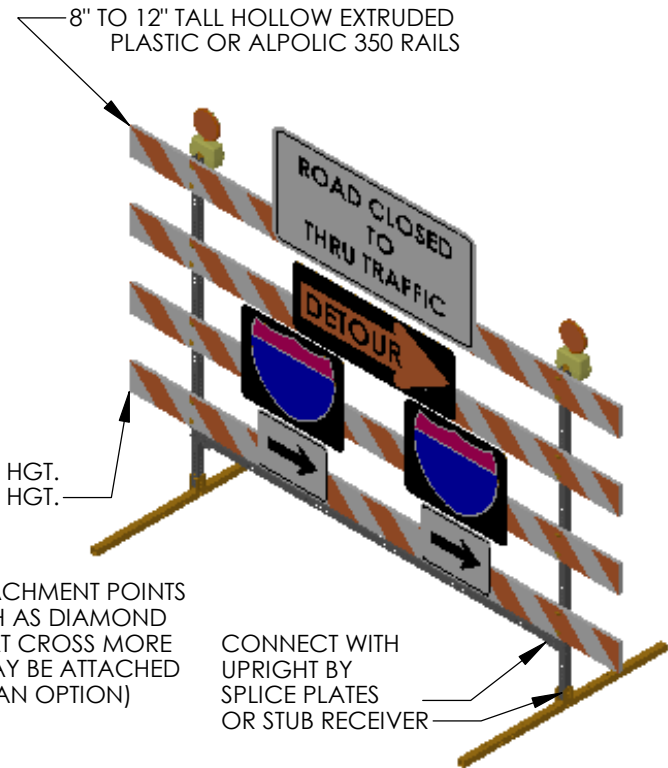
		.125 AI	.100 AI	.080 AI	5/8 Plywood	1/2 Plywood	Endurance	6.35 mm SP	10mm CP	HDPE	3-4mm ACS	Alpolic 350	Roll up	w/Supl. Panel	w/wo Flags	w/Light	w/wo Ballast
1	SS560	60	60	60	60	60	60	60	60	60	60	60	60-84	21	yes	yes	yes
2	SS560E	60	60	60	60	60	60	60	60	60	60	60	60-84	21	yes	yes	yes
3	SS560EE	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	21	yes	yes	yes
4	SS560A	60	60	60	60	60	60	60	60	60	60	60	60-84	21	yes	yes	yes
5	SS560AE	60	60	60	60	60	60	60	60	60	60	60	60-84	21	yes	yes	yes
6	SS560AEE	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	60-84	21	yes	yes	yes
7	SS560UC												60	21	yes		yes
8	SS560UCX												60	21	yes		yes
9	SS560UCA												60	21	yes		yes
10	SS560UCAX												60	21	yes		yes
11	SS560UCR												13		yes		yes
12	SS560UCRX												13		yes		yes
13	SS560UCRA												13		yes		yes
14	SS560UCRAX												13		yes		yes
15	SS548			19			19	19	19-21	19-21	19-21	19-21	19-21		yes	yes	yes
16	SS548E			19			19	19	19-21	19-21	19-21	19-21	48-60	21	yes	yes	yes
17	SS548ETL			19			19	19	19-21	19-21	19-21	19-21	48-60	21	yes	yes	yes
18	SS548EE		60	19, 60	19, 60	19, 60	19, 60	19, 60	19-21, 60	19-21, 60	19-21, 60	19-21, 60	19-21, 60	21	yes	yes	yes
19	SS548A			19			19	19	19-21	19-21	19-21	19-21	19-21		yes	yes	yes
20	SS548AE			19			19	19	19-21	19-21	19-21	19-21	48-60	21	yes	yes	yes
21	SS548AETL			19			19	19	19-21	19-21	19-21	19-21	48-60	21	yes	yes	yes
22	SS548AEE		60	19, 60	19, 60	19, 60	19, 60	19, 60	19-21, 60	19-21, 60	19-21, 60	19-21, 60	19-21, 60	21	yes	yes	yes
23	SS548C			19			19	19	19-21	19-21	19-21	19-21	19-21		yes	yes	yes
24	SS548CE			19			19	19	19-21	19-21	19-21	19-21	48-60	21	yes	yes	yes
25	SS548CA			19			19	19	19-21	19-21	19-21	19-21	19-21		yes	yes	yes
26	SS548CAE			19			19	19	19-21	19-21	19-21	19-21	48-60	21	yes	yes	yes
27	SS548UC												21		yes		yes
28	SS548UCX												21		yes		yes
29	SS548UCA												21		yes		yes
30	SS548UCAX												21		yes		yes
31	SS548UCR												13		yes		yes
32	SS548UCRX												13		yes		yes
33	SS548UCRA												13		yes		yes
34	SS548UCRAX												13		yes		yes
35	SS1		14	14	14	14	14	14	14	14	14	14	13		yes	yes	yes
36	WBT3SWH, WBT3SW, WBT3BRH and WBT3BR Type III Bar.											yes		yes		yes	yes

Notes: Maximum Sign size = 60x60 diamond/square, or 48x60 rectangle
Check Product Literature for actual capacity
Rigid rectangular signs mounting height is usually 2-3 inches higher than diamond shape

Revised 6/16/03



MATERIALS: UPRIGHTS, LEGS AND CROSSBARS -- 1-3/4" OR 2" QWIKPUNCH OR 12 OR 14 GAUGE P.S.T.

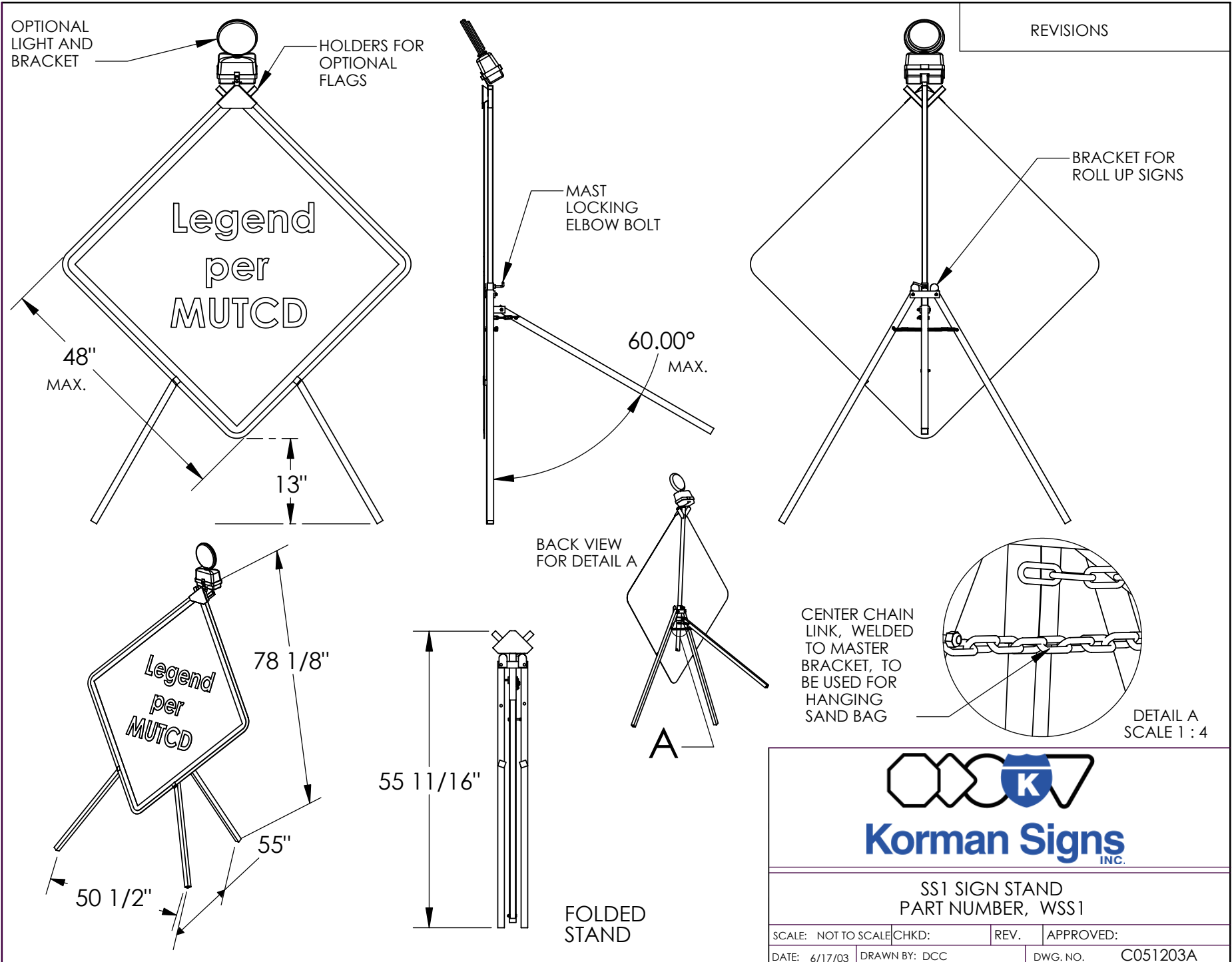


NOTE: SINGLE 2 MM ALPOLIC 350 SIGN UP TO 25 SQ.FT. OR ANY COMBINATION OF SIGNS UP TO 33 SQ.FT. TOTAL. 12" MINIMUM FROM GROUND TO BOTTOM OF BOTTOM SIGN (BOTTOM OF RECTANGULAR SIGNS CAN BE AS HIGH AS BOTTOM OF TOP RAIL).



KORMAN SIGNS MODELS WBT3SW, WBT3SWH, WBT3BR AND WBT3BRH TYPE III BARRICADES WITH ALPOLIC 350 SIGNS

SCALE: NOT TO SCALE	REV. B	
DATE: 6/18/03	DRAWN BY: DCC	DWG. NO. C061603A



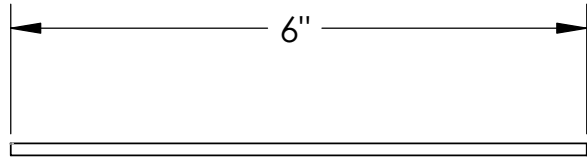
SS1 SIGN STAND
PART NUMBER, WSS1

SCALE: NOT TO SCALE	CHKD:	REV.	APPROVED:
DATE: 6/17/03	DRAWN BY: DCC	DWG. NO.	C051203A

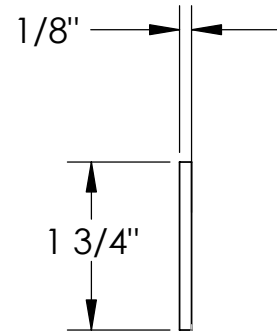
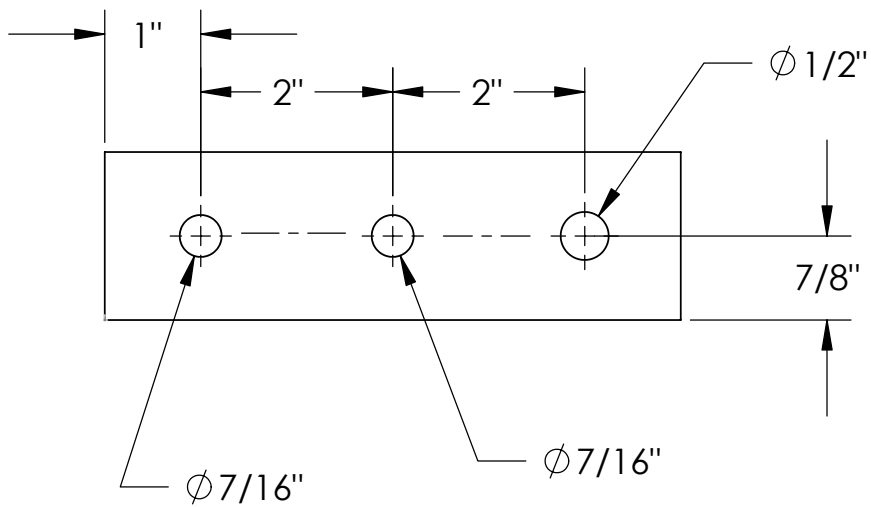
Request Number	12	12	9, 10, 11	9, 10, 11	1,2,3	1,2,3
Test Reference	10A	10B	99A	99B	100A	100B
Stand	SS548	SS548	SS548UCRAX	SS548UCRAX	SS548UCA	SS548UCA
Sign Size	48x48	48x48	48x48	48x48	48x48	48x48
Sign Type	.08 Al	.08 Al	Roll Up	Roll Up	Alpolic 350	Alpolic 350
Orientation	Head On	90 Degree	Head On	90 Degree	Head On	90 Degree
Height to Bottom	19	19	13	13	21	21
Height to Top	86	86	80	80	86	86
Height to Top of Mast	86	86	18	18	33	33
Stand Weight	40	40	14	15**	24	24
Sign Weight	18	18	6	7	11	11
Rib Thickness			1/4, 1/4	3/16, 3/8	3/16, 3/8	3/16, 3/8
Vehicle Damage	Minor	Minor	Slight	Slight	Minor	Minor
Windshield Damage	Cracking*	Cracking*	Cracking	Cracking	Cracking	Cracking
Intrusion	None	None	None	None	None	None
Flags						
Flag Weight						
Light						
Light Weight						
Ballast	No	No	No	No	No	No
Test Facility	GTL	GTL	KSI	KSI	KSI/AE	KSI/AE
Date of Test	10/18/2001	10/18/2001	5/6/2002	5/6/2002	11/13/2002	11/13/2002
Related WZ Letters	WZ-29, 78	WZ-29, 78	WZ-21, 29	WZ-21, 29	WZ-21, 29,100	WZ-21, 29,100
* Interpretation: Windshield had minor cracking prior to this test.						
**Longer legs on this stand						

Request Number	5	5	5	5	6	6	5	6
Test Reference	101A	101B	102A	102B	103A	103B	104B	105A
Stand	WBT3BR***	WBT3BR***	WBT3BR***	WBT3BR***	SS1	SS1	WBT3BRH***	WBT3BR***
Sign Size	60x30,48x18, 30x24,21x15	60x30,48x18,3 0x24,21x15	48x18,30x24, 21x15	48x18,30x24, 21x15	48x48	48x48		
Sign Type	Alpolic 350	Alpolic 350	Alpolic 350	Alpolic 350	Alpolic 350	Alpolic 350		
Orientation	Head On	90 Degree	Head On	90 Degree	Head On	90 Degree	90 Degree	Head On
Height to Bottom	12	13	12	12	14-1/2	15		
Height to Top	101	101	70	70	72	72		
Height to Top of Mast	86-3/8	86-3/8	62-3/8	62-3/8	72	72	61-1/2	63-3/4"
Stand Weight	71	71	49	49	20	20	52	59
Sign Weight	19	19	15	15	9	9		
Rib Thickness								
Vehicle Damage	Slight	Slight	Slight	Slight	Minor	Minor	Slight	Slight
Windshield Damage	Cracking	Cracking	None	None	None	Cracking	Cracking*	Cracking
Intrusion	None	None	None	None	None	None	None	None
Flags								
Flag Weight								
Light	2	2			2	2	1	2
Light Weight	9 lb.	9 lb.			9 lb.	9 lb.	9 lb.	9 lb.
Ballast	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Test Facility	KSI/AE	KSI/AE	KSI/AE	KSI/AE	KSI/AE	KSI/AE	KSI/AE	KSI/AE
Date of Test	6/6/2003	6/6/2003	6/6/2003	6/6/2003	6/6/2003	6/6/2003	6/6/2003	6/16/2003
Related WZ Letters	WZ-100	WZ-100	WZ-100	WZ-100	WZ-29, 100, 103	WZ-29, 100, 103	WZ-100	WZ-100
* Interpretation: Windshield had minor cracking prior to this test.								
**Longer legs on this stand								
*** Type III Barricade								

ENCLOSURE 18



MATERIAL: .125" ALUMINUM

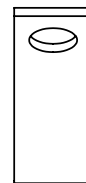
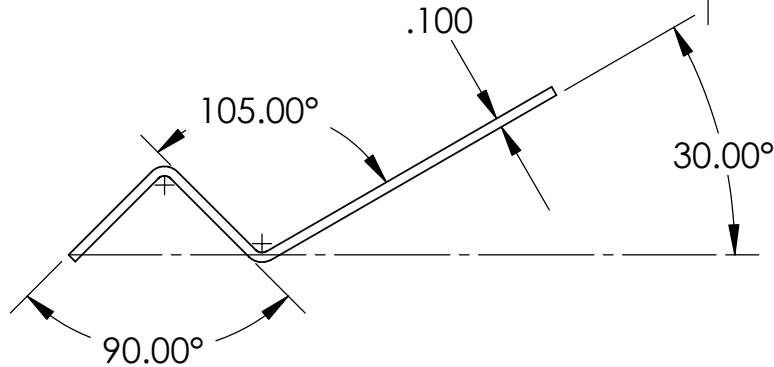
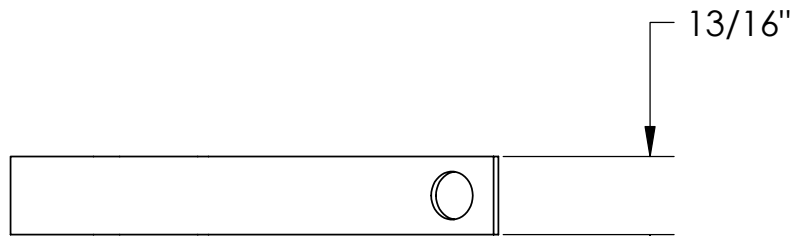
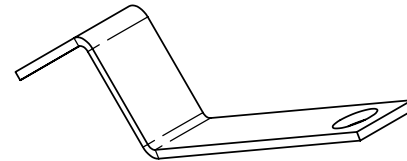
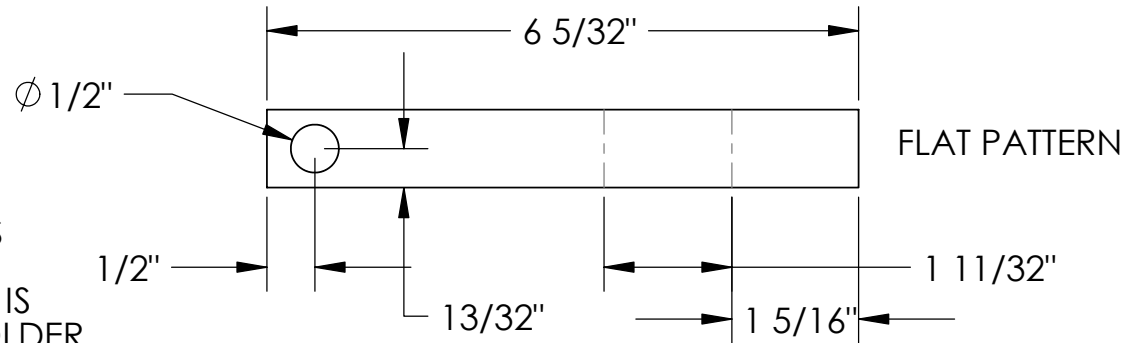


Korman Signs
INC.

BRACKET, LIGHT FOR BARRICADE

SCALE: HALF	REV.	APPROVED:
DATE: 6/18/03	DRAWN BY: DCC	DWG. NO. C061803B

NOTE:
 THIS BRACKET ATTACHES
 WITH SINGLE BOLT SUPPLIED
 WITH LIGHT USING 1/2" WASHERS
 AS SPACERS.
 THEN THE 90 DEGREE BEND PART IS
 INSERTED INTO CENTER FLAG HOLDER
 OF SS-1 SIGN STAND SO THAT THE LIGHT
 IS IN THE VERTICAL ORIENTATION



MATERIAL: 0.100 ALUMINUM



Korman Signs
INC.

BRACKET, MOUNTING FOR LIGHT ON
 MODEL SS-1 SIGN STAND

SCALE: HALF	REV.	APPROVED:
DATE: 6/18/03	DRAWN BY: DCC	DWG. NO. C061803A