

ASSEMBLY INSTRUCTION MANUAL

SINGLE GIRDER UNDER RUNNING BRIDGES WITH INDIVIDUAL MOTOR DRIVEN AND HAND GEARED TRUCKS

Rated Loads;

1 thru 10 tons / 2000 thru 20000 lbs.

1 thru 10 tonnes / 1000 thru 10000 kg.

Follow all instructions and warnings in building this bridge.

The building of any bridge presents some risk of personal injury or property damage. That risk is greatly increased if proper instructions and warnings are not followed. Before starting construction the builder should become thoroughly familiar with all warnings, instructions and recommendations in this manual.

Retain this manual for future reference and use.



TO BUILD UNDER RUNNING SINGLE GIRDER CRANE BRIDGES

THE INFORMATION CONTAINED IN THIS MANUAL IS FOR INFORMATIONAL PURPOSES ONLY AND THE MANUFACTURER DOES NOT WARRANT OR OTHERWISE GUARANTEE (IMPLIEDLY OR EXPRESSLY) ANYTHING OTHER THAN THE COMPONENTS MANUFACTURED AND ASSUMES NO LEGAL RESPONSIBILITY (INCLUDING, BUT NOT LIMITED TO CONSEQUENTIAL DAMAGES) FOR INFORMATION CONTAINED IN THIS MANUAL.

GENERAL - The assembly and manufacturing instructions in this manual are for use in conjunction with the manufacturers components identified by Catalog numbers listed under the two types of drives covered by this manual on pages 14,15 and 16.

Although the supplied components are designed to conform with the requirements of CMAA 74, Specification for Top Running & Under Running Single Girder Electric Overhead Traveling Cranes Utilizing Under Running Trolley Hoist, it is the installer's responsibility to assure that the finished crane assembly complies in total with all applicable local, state and national codes and standards including those mentioned herein. On a hand powered crane with an electric hoist, a fused safety disconnect switch should be provided and mounted on the bridge near the main collectors. Crane wiring should be done by a licensed electrician and be in accordance with the National Electric Code (ANSI/NFPA 70).

The crane bridges described in this manual are intended for normal indoor service. Bridges to be used for outdoor or unusual service require special consideration.

This manual illustrates specific configurations for the range of coverage shown, specifically from 10 foot through 60 foot spans and up to and including 10 tonne capacity. Minor deviations to the configurations shown (such as shaft bearing spacing, shaft lengths, etc.) may be made providing that any changes and/or alterations to those shown, be performed only by a properly qualified person. The manufacturer accepts no responsibility for any altered bridge configurations.

Material listed by catalog numbers on pages 14,15 and 16 are applicable only to crane configurations outlined in this manual, specifically limited to a maximum rated load of 10 tonnes and a maximum span of 60 feet.

Cataloged end trucks listed on page 14 will accommodate the beam sizes shown below. The crane builder must determine that the runway beam selected (including its lower flange) will support the resulting maximum wheel load.



WARNING

NON-FACTORY AUTHORIZATIONS OR MODIFICATION OF EQUIPMENT AND USE OF NON-FACTORY REPAIR PARTS CAN LEAD TO DANGEROUS OPERATION AND INJURY.

TO AVOID INJURY:

DO NOT alter or modify equipment without factory authorization.

DO use only factory provided replacement parts.

The 5 tonne end trucks have 6 1/2" diameter solid wheels (maximum allowable load is 9000 pounds per pair of wheels). 10 tonne end trucks have 8" diameter solid wheels (maximum allowable load is 16150 pounds per pair of wheels). Maximum wheel load is with the bridge beam centered on the wheelbase.

Runway Beam Requirements				
Truck Wheel Diameter	Minimum Flange Width	Maximum Flange Width	Minimum Actual Depth	Maximum Flange Thickness
6-1/2"	4-5/8"	12"	See Fig. 3	1"
8"	4-5/8"	12"	See Fig. 3	1-3/8"

RUNWAYS: Runway beams on which these cranes will operate must be amply strong to support crane bridge, hoisting equipment, and rated load. Runway beams must be in accordance with Table 1.4.1-1 of CMAA 74-latest edition. Runway stops must be positioned to contact both ends of the crane simultaneously.

MATERIAL TO BE PURCHASED LOCALLY TO COMPLETE A CRANE BRIDGE

STRUCTURAL STEEL: All structural steel should be first quality, free from rust and excessive mill scale, and conform to ASTM A 36, Standard Specification for Structural Steel.

For the drawing identifying all dimensions, material sizes, location of cross shafting, brackets, etc.; refer to the following chart:

Bridge Assembly	Page
Individual Drive	7
Hand Powered	8

BRIDGE BEAMS: For each rated load, span and type of bridge select bridge beam from the tables shown on pages 16 through 29.

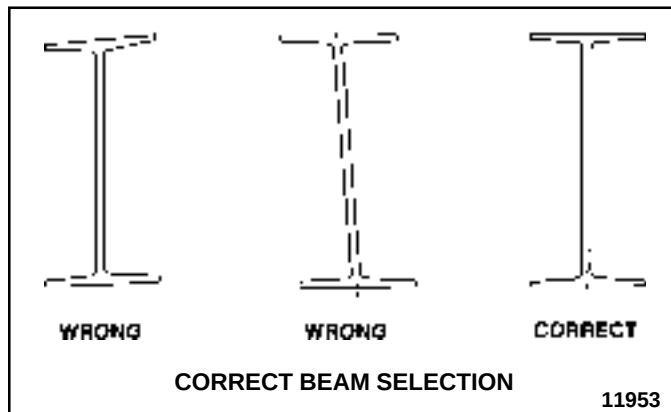


Figure 1.

The beam which is selected to be used for the bridge girder must be straight with flanges parallel to each other and flanges 90 degrees to the web. See Figure 1.

NOTICE

A. All of the tables used in selection of structural steel beams have been produced by our engineering department using well-established design guides for this type of crane bridge. IT IS IMPORTANT THAT ALL INSTRUCTIONS BE FOLLOWED AND THAT RECOMMENDED COMPONENT APPLICATION LIMITS NOT BE EXCEEDED.

B. Assembly of beam and channel requires welding. IT IS EXTREMELY IMPORTANT TO THE SAFETY OF THIS BRIDGE THAT THIS WELDING BE DONE BY A COMPETENT WELL-TRAINED WELDER. It is our strong recommendation that the welder used in this construction be qualified as prescribed by the American Welding Society (AWS) Specification for Welding Industrial and Mill Cranes D14.1 - latest issue.

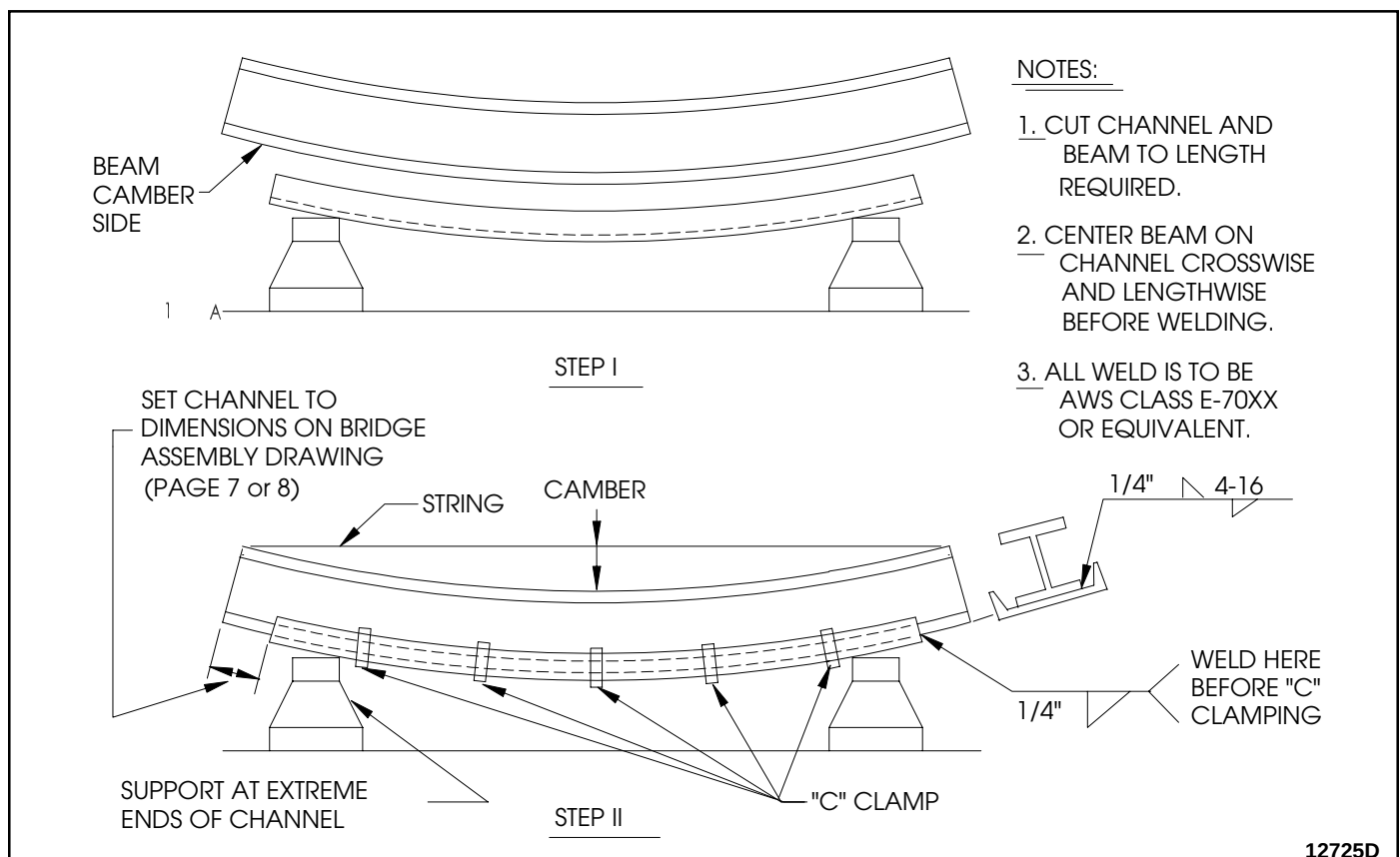


Figure 2.

FABRICATION OF GIRDER FOR BRIDGE BEAM WITH CAPPING CHANNEL

Refer to Figure 2. Place channel on supports as shown in Step 1. The beam is sighted for camber and placed with camber in direction shown in Step II. Weld one end of the channel to the beam. Clamp, with "C" clamps, the channel to the beam flange. Provide sufficient "C" clamps so as to hold the channel in contact with the beam.

Weld in accordance with the weld information given, starting at one end, staggering the weld from side to side, proceeding to the opposite end of the channel without interruption. It is important to stagger the weld from side to side in order to retain beam straightness. After welding, draw a taut string from end to end of beam as shown. Beam should either be parallel to string or have some camber. Camber should not exceed 1/888 of span.

CROSS SHAFTS: For hand geared cranes, cross shafts are required. The cross shafts are to be of AISI 1018 cold drawn steel, with standard mill tolerance of $+.000"$, $-.002"$. For shaft diameter and lengths, refer to Figure 9, Hand Geared Bridge Assembly. The builder must check that the cross shaft couplings clear cross shaft bearings.



WARNING

Omission of trolley stops (clip angles) can result in loss of crane bridge with resultant injury and damage.

TO AVOID INJURY OR DAMAGE:

Install trolley stops on both ends of bridge beam to prevent the hoist trolley from running off the end of the beam.

ASSEMBLING THE END TRUCKS

- Before assembling the girder to the end trucks, the trucks must be properly spaced. When ever possible, measure the widest flange width on the actual runway to be used. Use this flange width in Figure 3.
- Loosen the jam nut and position the wheels by turning the adjusting bolt to give the dimensions in Figure 3. Once the wheel is in the desired location retighten the jam nut.
- Once the wheels are in the desired location loosen the clamp collars on the cross shaft, position the cross shaft pinions such that they have full tooth contact with the geared drive wheels, then retighten the clamp collars.

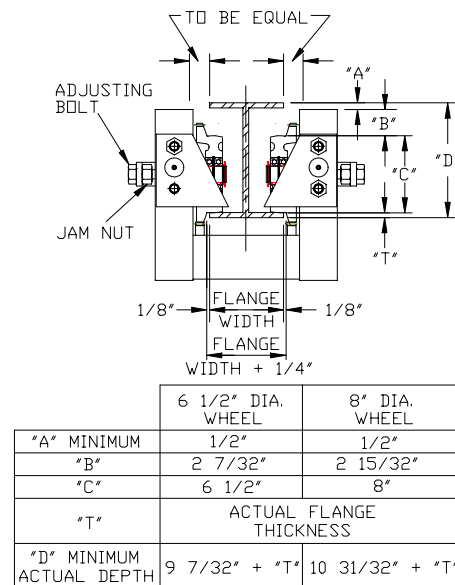


Figure 3.

ASSEMBLING BRIDGE GIRDER TO END TRUCKS

- Refer to Figure 4.,
- Support the bridge girder on level supports with the camber side (channel side) up.
- Layout and scribe the centerline (over the web) of the flange at each end of the girder.
- Turn the trucks upside down and scribe a line at the center (midway between the wheels).
- Across these centerlines scribe the gage of the truck channels, 1 1/2" from the back of the channel for 6 1/2" diameter wheel trucks and 1-3/4" from the back of the channel for 8" diameter wheel trucks.
- Scribe the girder gage parallel to the truck centerline (which is also the centerline of the girder). Gages for various girders are shown below. See Figure 6.

Gage Table For Girders

S-Beams		W-Beams	
Beam Depth	Gage	Beam Flange Width	Gage
7" & 8"	2-1/4"	Thru 4"	2-1/4"
10"	2-3/4"	Over 4" thru 5-3/4"	3-3/4"
12"	3"	Over 5-3/4" thru 7-1/2"	3-1/2"
15" & 18"	3-1/2"	Over 7-1/2" thru 13"	5-1/2"
20" & 24"	4"		

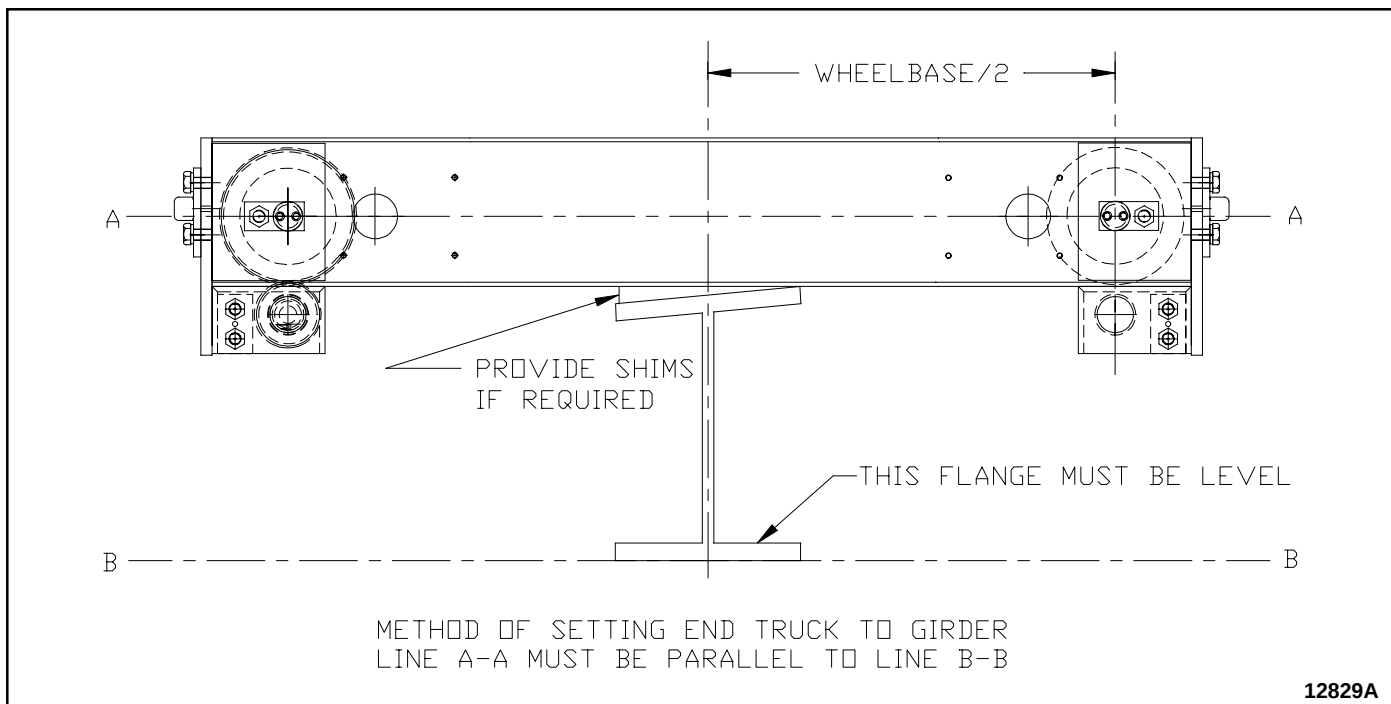


Figure 4.

7. Drill four holes (two in each channel flange) in each truck; drill 9/16" diameter holes in the 6 1/2" diameter wheel trucks and 11/16" diameter holes in the 8" diameter wheel trucks.

8. Turn the trucks over and place in position on the girder. Line up the girder and truck centerlines and line up the trucks on the girder span lines.

9. Square trucks on top of girder and securely clamp in place. Shim, if necessary to keep the bottom flange of the girder level (See Figure 4). To check the distance between trucks, measure from the back of the inside channel at one end of the span to the back of the outside channel at the other end of the span. This distance should equal the span. Check at both ends of the trucks to assure truck alignment.

10. As an alternate method there are measuring dimples available on the top flange of the truck above the axles. To check the squareness, use a spring scale on the end of a steel tape and measure diagonally across the crane. Then measure across the opposite diagonal with the same force on the scale. These dimensions should be within 1/16" of each other.

Any other method of squaring the trucks that gives comparable results may be used.

11. After squaring the truck double-check the span at both ends of the trucks. Using the holes in the truck channel flanges as templates, transfer punch the hole centers to the bridge beam and drill holes in the girders. Then ream the holes through the truck channel flanges and bridge girder simultaneously. Ream to 5/8" diameter in the 6 1/2" diameter wheel trucks and 3/4" diameter in the 8" diameter wheel trucks. To maintain alignment install proper fastener as each hole is reamed before proceeding to the next hole.

12. Bolt the connections as shown in Figure 6. Use ASTM A 325 high strength bolts with matching nuts. Put the bolt heads down. Tighten the connections per Section 8.d.1 of the AISC "Specifications for Structural Joints using ASTM A325 or 490 Bolts": tighten snug tight, then make 1/3 - 1/2 more turn of the nut. In this position if a nut works off then by regular inspection the bolt will be found and replaced.

INSTRUCTIONS FOR ASSEMBLING INDIVIDUAL DRIVE CRANE BRIDGES

1. Refer to Figure 7, Motor Driven Bridge Assembly.
2. Prepare bridge girder with capping channel, if required (See Page 4).
3. Follow instructions for assembling the end trucks and assembling the bridge girder to the end trucks as outlined on Page 4.
4. The gear case (with wheel pinion), motor and brake are shipped as an assembly. Bolt this assembly to the side of the truck with four socket head cap screws with hardened washers and lock washers. Install vent plug in place of pipe plug at top of the gear case.
5. The electrical enclosure and fused disconnect switch is to be mounted where required by the crane builder. Assure all clearances.
6. Locate and fasten trolley stop angles at the ends of the girder as shown on Figure 7.

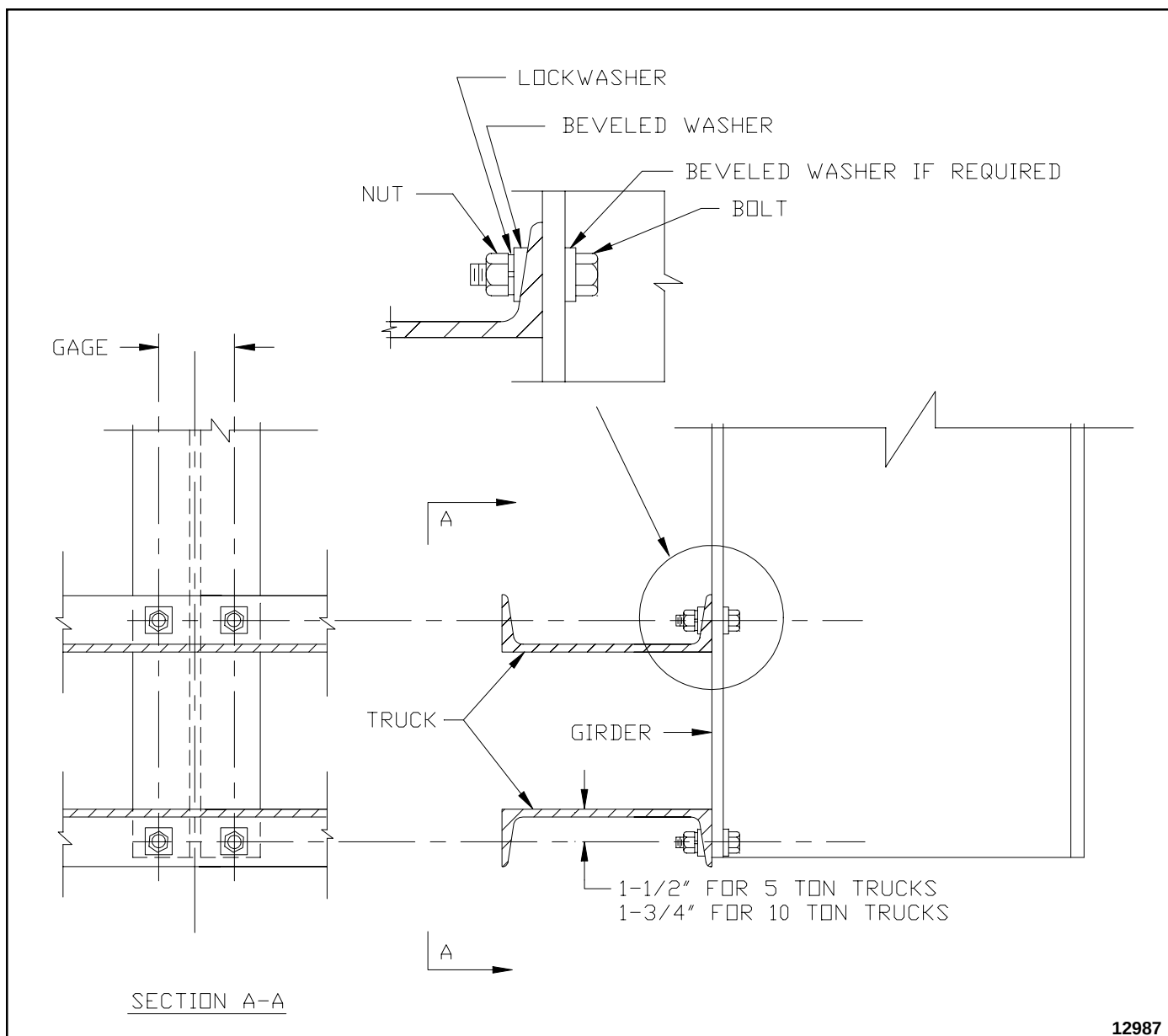
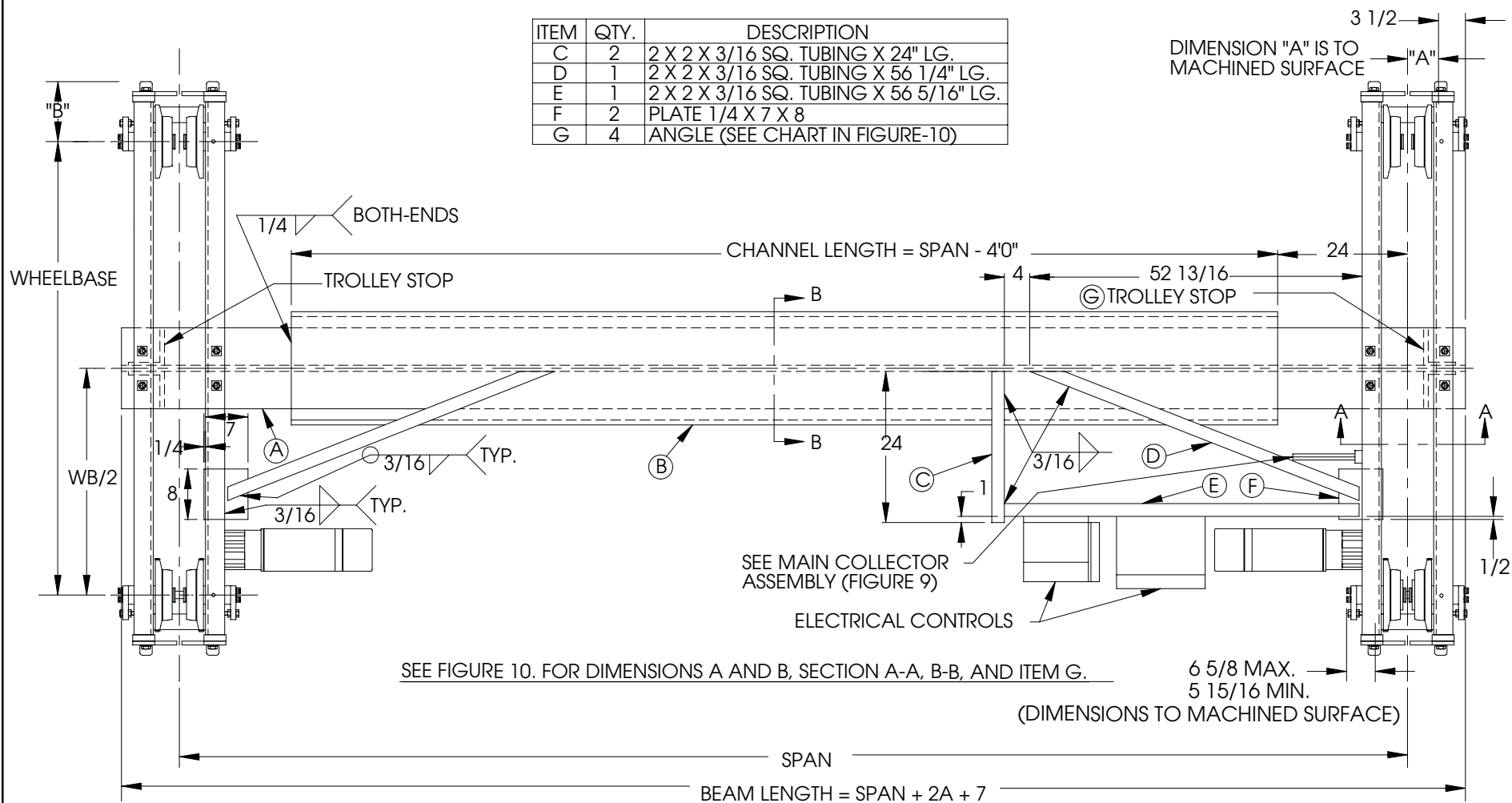
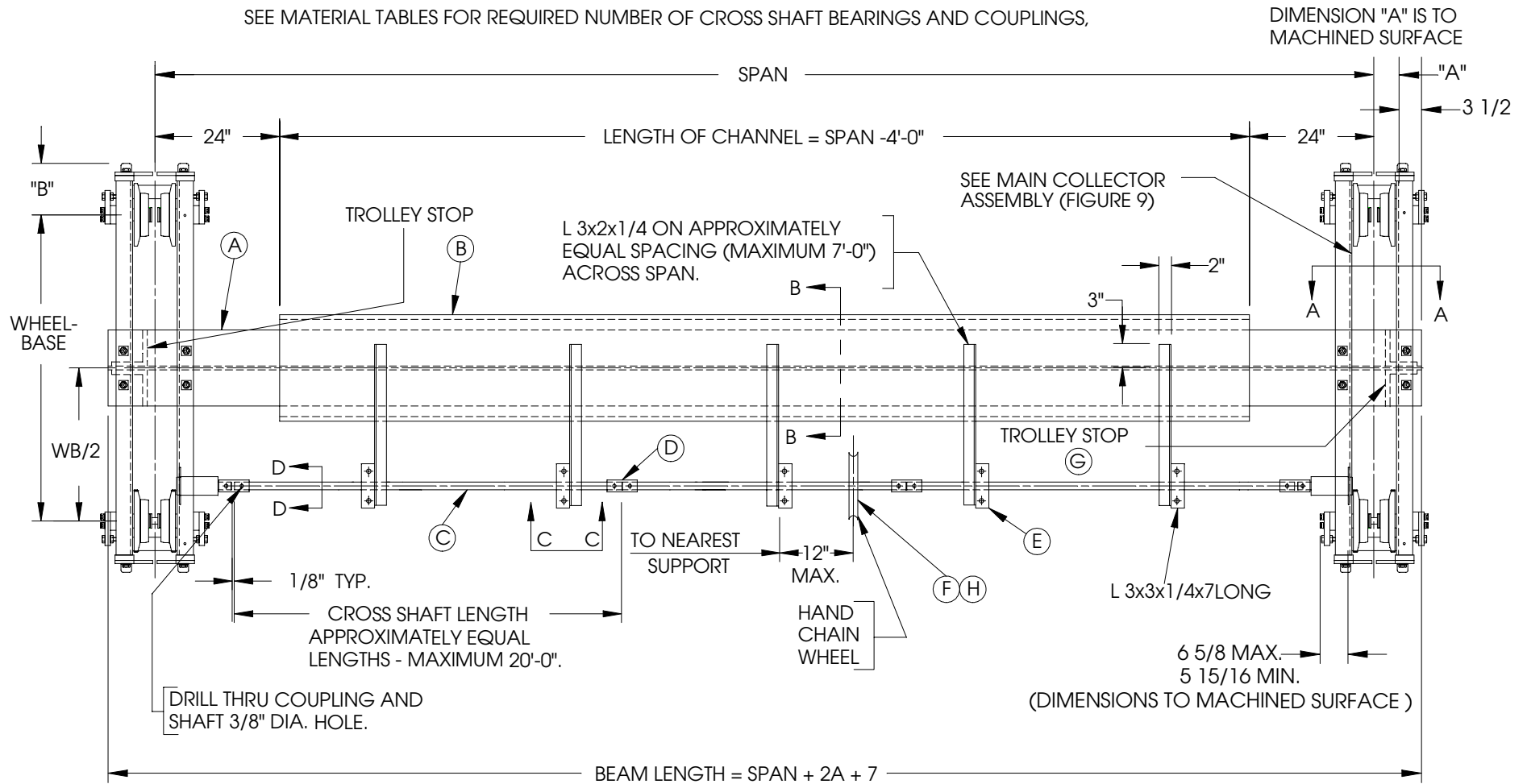


Figure 6.



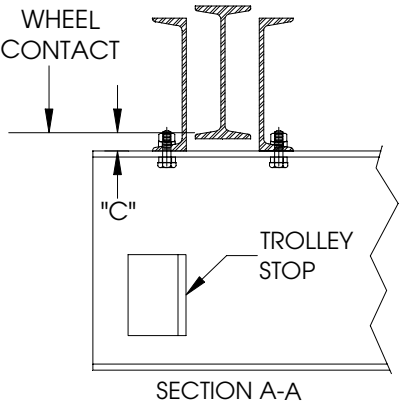
ITEM "C"	ITEM "D"	ITEM "E"	ITEM "F"	ITEM "H"
CROSS SHAFT DIAMETER	COUPLING CATALOG NUMBER	PILLOW BLOCK CAT. NO.	HAND CHAIN WHEEL CAT. NO.	HAND CHAIN CAT. NO.
1-3/16"	8280	904625	913115	8282

SEE MATERIAL TABLES FOR REQUIRED NUMBER OF CROSS SHAFT BEARINGS AND COUPLINGS,

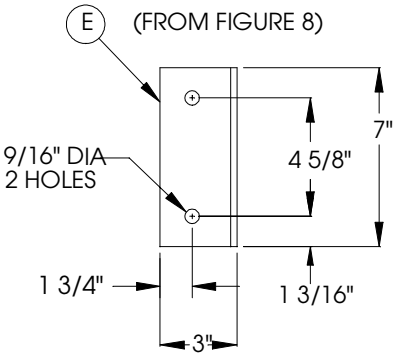
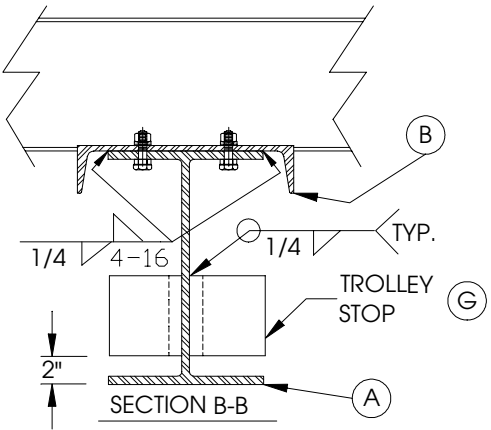


SEE FIGURE 10. FOR DIMENSIONS A AND B, SECTIONS A-A, B-B, C-C, D-D, AND ITEMS E AND G.

Figure 8. Hand Geared Bridge Assembly.



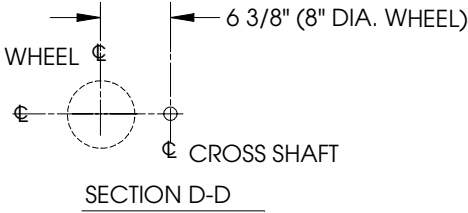
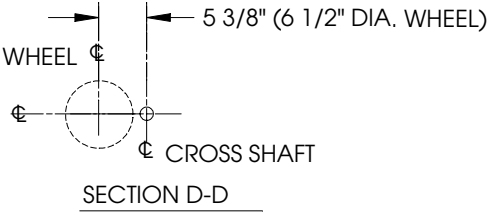
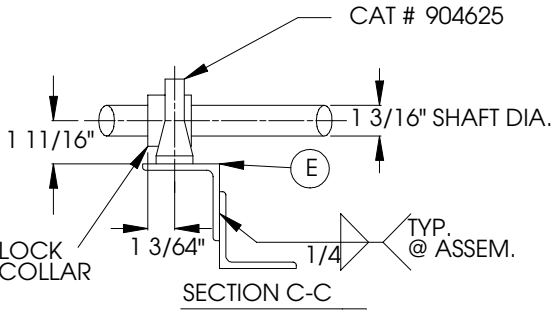
TROLLEY STOP < ITEM ⑥ >		4"
BRIDGE BEAM FLANGE WIDTH	ANGLE SIZE	
3-5/8" THRU 4"	3-1/2" x 3-1/2" x 1/2"	LONGEST SIDE OF ANGLE MOUNTED PERPENDICULAR TO GIRDER WEB
4-1/8" THRU 6-1/4"	5" x 3-1/2" x 1/2"	
6-5/8" THRU 8-1/4"	6" x 3-1/2" x 1/2"	
8-5/8" THRU 10-1/2"	7" x 4" x 1/2"	
10-5/8" THRU 13"	8" x 4" x 1/2"	



RUNWAY FLANGE WIDTH	SPACER BLOCK KIT PART NO.	DIMENSION "A" (FIGURES 7 & 8)
4-5/8" THRU 6"	232556-01	4 17/32"
6-1/8" THRU 7-1/2"	232556-02	5 9/32"
7-5/8" THRU 9"	232556-03	6 1/32"
9-1/8" THRU 10-1/2"	232556-04	6 25/32"
10-5/8" THRU 12"	232556-05	7 17/32"

DIMENSION "B" (FIGURES 7 & 8)		DIMENSION "C" *** (FIGURE 10)	
6 1/2" DIA. WHEEL	8" DIA. WHEEL	6 1/2" DIA. WHEEL	8" DIA. WHEEL
7 29/32"*	8 15/32"**	1 5/16"	1 1/2"

*ADD 1 15/16" FOR 232553-01 (SIZE 40) BUMPER KIT
 **ADD 2 1/8" FOR 232553-02 (SIZE 50) BUMPER KIT
 ***CLEARANCE = "C" - RUNWAY BEAM FLANGE THICKNESS



DETAILS AND DIMENSIONS FOR FIGURES 7 AND 8

Figure 10. Bridge Details.

INSTRUCTIONS FOR ASSEMBLING A HAND GEARED CRANE BRIDGE

1. Refer to Figure 8, Hand Geared Bridge Assembly.
2. Prepare bridge girder with capping channel, if required (See Page 4).
3. Follow instructions for assembling bridge girder to end trucks as outlined on Page 4.
4. Mount and bolt the hand geared drive adapter for the cross shaft to the side of the truck with four socket head cap screws with lock washers.
5. Locate and clamp cross shaft support angles to the girder. Recheck that angles are level and square and finish bolting according to Figure 8.
6. Form pillow block supports by mounting the angle and plate together as shown in Section C-C of Figure 8. Mount the completed assembly to the pillow blocks by bolting.
7. Place the proper number of pillow blocks (with support angles) and couplings on each shaft section. Check to insure that the vertical angle is in the correct relationship with the cross shaft support angle (back of angle to back of angle). Notice that the separate bearing locking collar has a counterbore on one side. This counterbore fits over the protruding inner race of the pillow block bearing. Place locking collar on the shaft properly.
8. Place the hand chain wheel and guide on the appropriate shaft section (near the center of the crane) within 12" of a bearing support.
9. Set shafting in place, align pillow blocks to cross shaft support angles and clamp in place.
10. Check horizontal and vertical alignment of the cross shaft by using a taut line. Weld pillow block support angles to the cross shaft support angles when alignment is assured.
11. Set space between cross shafts to 1/8". Position couplings and drill 3/8" diameter holes through the shaft and coupling using the holes in the coupling as a guide. The coupling has a predrilled hole through one side only. Hex head bolts with lock washers and nuts then secure the shaft and coupling.
12. Slide bearing locking collars into place next to pillow blocks. Make sure that the counterbore in the collar is fitted over the extended race of the bearing. Fasten to shaft with setscrew in locking collar.
13. Locate and fasten trolley stop angles at the ends of the girder as shown on Figure 8.

PAINTING

After all bolting is completed and prior to installing the cross conductors, wire brush all steel and remove all foreign matter. Grease spots are to be cleaned using commercially available solvent.

The electrical panel must be closed, and areas such as the switch handle, Off-On identification, wheel gear and pinion, and nameplate, etc., must be masked prior to painting.

Any national brand zinc-rich, chromate primer may be used and applied according to the manufacturer's directions. Final coat is recommended to be high gloss enamel, especially suited for steel surfaces and as recommended by any national brand paint manufacturer. Application must be in accordance with manufacturer's recommendations.

MARKINGS

Codes require that the capacity of the bridge be shown on both sides of the crane, legible from the floor. Normal practice for marking is to use capacity in tons. For example: 1 TON, 2 TON, etc. Stencil forms are readily available that may be used with brush on or spray-can paint. Commercially available block letters and numerals with adhesive backing could also be used. Selection of size should be such that the sign can be easily read from the operating floor.

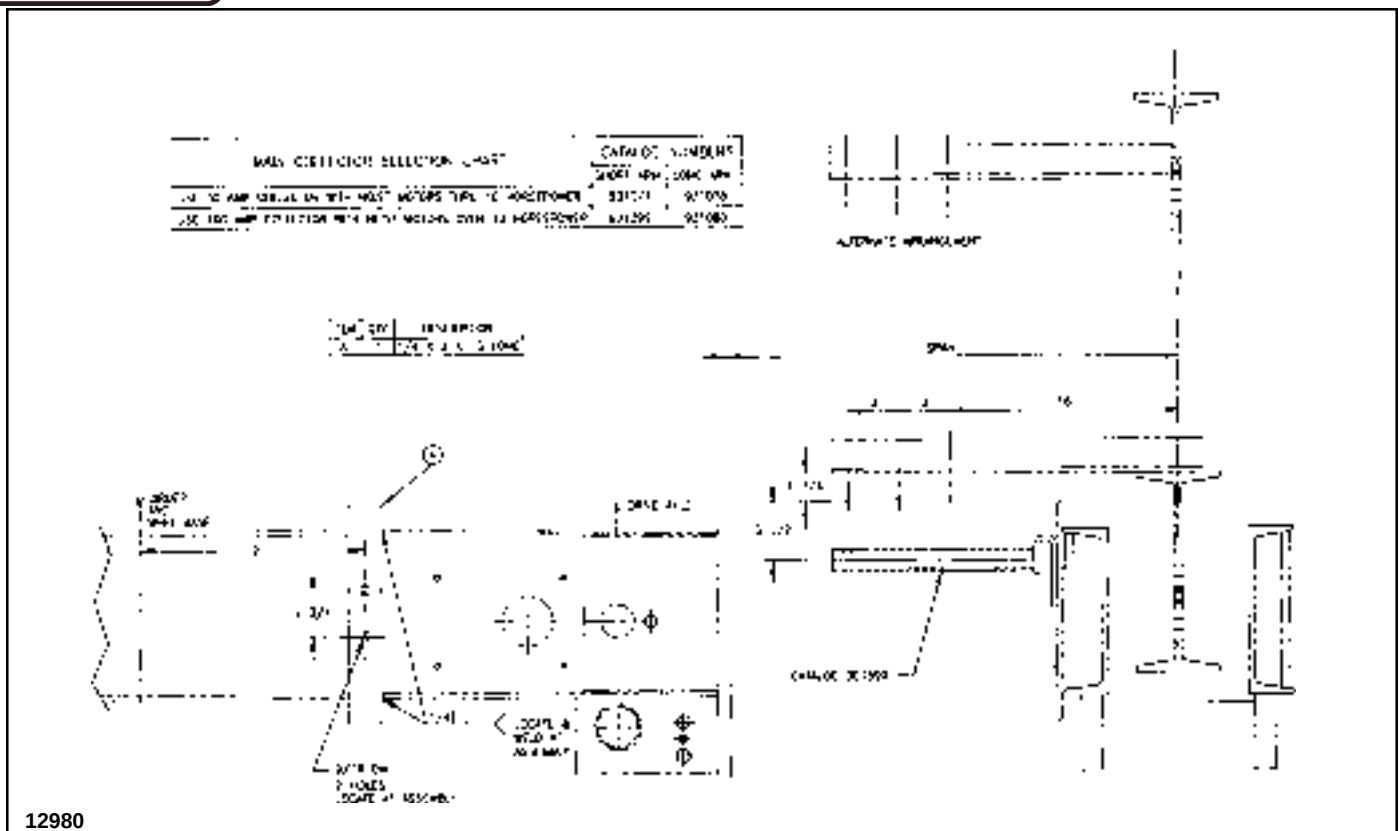


Figure 9. Main Collector Assembly.

The builder's name shall also be placed on the crane in a prominent location along with a serial number or other means of crane identification.

NOTICE

The crane builder and user are responsible for marking the crane and also to check for compliance with all local, state and national codes.

PUSH BUTTON SYSTEM

The preferred way of operating the controllers on the crane from the floor is a festooned system sold as a kit. This is to be installed as shown in the literature supplied with this system.

CROSS CONDUCTOR SYSTEM

A cross conductor system is a means of providing electric current from the main conductors to the moving hoist-trolley.

The preferred cross conductor system is a festooned system sold as a kit and it is to be installed as shown in the literature supplied with this system.

MAIN COLLECTOR ASSEMBLY

Refer to Figure 9, Main Collector Assembly.

The collectors listed (Catalog Numbers 931077, 931078, 931080 and 931099) are compatible with and will operate only on conductor bars listed as Catalog Numbers for Crane Runways on page 15. The builder must check to ensure that the proper spacing and location of the conductors will clear all obstructions in the building.



WARNING

Improper grounding may cause electrical shock to the operator.

TO AVOID INJURY OR DAMAGE:

This equipment must be effectively grounded according to applicable codes. Ordinarily the crane is grounded to the runway beam through contact with the wheels. Certain environments may prevent proper grounding by this means. In those cases, a 4th runway conductor should be provided to assure adequate grounding. This also applies to the cross conductors and the electrical contact between the trolley wheel and the bridge girder.

INSTALLATION OF THE CRANE BRIDGE

Only a qualified crane installer shall perform installation of the crane on the runway. For information regarding attaching and lifting or moving the loads during installation, refer to ANSI B30.11 - latest edition, Chapter 11-3 and other applicable codes.



WARNING

Working in or near exposed electrical equipment presents the danger of electric shock.

TO AVOID INJURY:

Before attempting any electrical connections, the main power switch feeding the runway must be locked in the open (off) position.

Prior to the start of any crane erection the building should be measured for span and clearances. These measurements should be checked against the corresponding crane measurements to insure correctness of "fit". After assurances that the crane fits the building, determine orientation of the crane position with respect to the runway.

Note: Minimum runway beam depth allows vertical clearance for the bridge wheels between the runway beam flanges. Encroachment of flange connections into this area may cause interference.

These types of cranes are usually lifted into position on the span in one piece.

1. Open End Runway. If one end of the crane runway is open and no interference is encountered the crane bridge can be placed on the end of the runway. First recheck the distance between the wheels. The distance between the inside faces of the wheel flanges should be the width of the bottom flange of the runway beam plus 1/4". See Figure 3. Note also that the dimensions from the flanges of the runway to the side of the truck should be equal as shown in Figure 3. If all dimensions are correct, lift the crane bridge so that the wheels are level with the contact surface on the runway beam. Carefully move the crane bridge onto the runway.



WARNING

For a Crane Bridge mounted on a runway beam, the omission of end stops can result in loss of bridge with resultant injury and damage.

TO AVOID INJURY AND DAMAGE:

Install end stops to prevent crane from running off the end of the beam.

2. Removable Runway Section. In some installations a removable section of runway may be available. If so, remove runway section, install crane bridge as in paragraph 1 and reinstall runway section.

3. Truck Side Removal. If the methods previously described are not possible, one half of each truck must be removed. The trucks should already have been adjusted for the proper runway width, as in "Assembling the End Trucks". Disassemble the outside half of one truck and the inside half of the other truck. Retain all bolts, lock washers, cross shaft, and other parts that need to be removed. Lift the crane bridge with the truck halves attached into place and carefully work onto the runway. Reassemble the truck halves with the proper bolts, lock washers, and cross shaft parts. Tighten the spacer block connections per Section 8.d.1 of the AISC "Specifications for Structural Joints using ASTM A325 or 490 Bolts": tighten snug tight, then make 1/3 more turn.



WARNING

End trucks not properly equipped with supplied safety drop lugs and high strength bolts can result in loss of crane bridge with resultant injury and damage.

TO AVOID INJURY AND DAMAGE:

Be certain that prior to crane use the safety lugs are firmly bolted in place using the supplied high strength bolts.

Note: It is suggested that the trolley and hoist be installed on the crane bridge at this time so that all wiring connections can be completed.

FUSE AND MAINLINE DISCONNECT PANELS

Mainline disconnect panels and fused bridge control panels are provided as options to assist users in complying with OSHA codes. When ordering with crane, they will be completely installed inside of electrical enclosures.

Electrical service is to be connected to the crane equipped with fused panels and mainline disconnect panels as shown in the proper wiring diagram. Wiring diagrams are in Part No. 113533-83, Wiring Diagrams for Bridge Control Panels.



WARNING

Improper power supply can damage electrical components.

TO AVOID DAMAGE:

Power supply must be the same voltage, frequency and phase as specified on the crane motor nameplates.

LUBRICATION

1. Wheel bearings are permanently lubricated and require no additional lubricant.
2. Drive wheel gears are to be lubricated with an open type gear grease which is heavy, plastic, extreme pressure and tack such as MOBILTAC 375 NC or equal.
3. The gear case lubricant should be changed every year or 2000 hours of service for moderate usage. The lubricant should be changed more frequently if the service is more severe. Use 17 ounces of AGMA extreme pressure lubricant number 5, compounded, (Mobilgear 630) if the ambient temperature is 15° to 60°F or AGMA lubricant number 7, compounded, (Mobilgear 634) if the ambient temperature is 50° to 125°F.
4. It is recommended that the areas of the cross shaft covered by bearings and couplings are coated with FEL-PRO C5-A, or equal, anti-seize lubricant.

Before crane operation the vent plug must be in the proper location in the gear case. The vent plug replaces the pipe plug in the highest location on the end of the gear case. See Part No. 113533-82, Operating Instructions and Parts List, Bridge Drive Gear Case, included with drive.

BRAKE

A separate piece of literature in the literature package covers parts and adjustment of the brake.

OPERATION

Prior to placing the crane into service, OSHA requires that the user performs and records certain tests including proof loading the crane. Refer to ANSI B30.11-latest edition for information concerning these requirements.

SPECIFICATIONS

Specifications may be purchased from:

Specification	Address
AGMA	American Gear Manufacturers Association 1500 King Street, Suite 201 Alexandria, VA 22314-2730
ANSI	American National Standards Institute 11 W. 42nd Street, 13th Floor New York, NY 10036
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191-4400
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428-2959
AWS	American Welding Society 550 N. W. LeJune Road Miami, FL 33126
CMAA	Material Handling Industry 8720 Red Oak Blvd., Suite 201 Charlotte, NC 28217-3992 (CMAA is Crane Manufacturers Association of America, Inc.)
NFPA	National Fire Protection Association 11 Tracy Drive Avon, MA 02322-9908
OSHA	Superintendent of Documents U. S. Government Printing Office Washington, DC 20402 (OSHA is Title 29 CFR Parts 1901.1 to 1910.999)

Material Listed Below is Required to Build These Bridge Cranes

These Trucks are Common to all Bridges

End Truck Assembly

(one right and one left hand truck half)

Quantity of (2) Per Crane

Rated Load Range (Tonnes)	Wheel Diameter (in)	For Spans Thru (ft)	Wheel Base	Catalog Number
1 thru 5	6-1/2	36	4' - 6"	446350-01
		48	6' - 0"	446350-05
		60	7' - 6"	446350-09
6 thru 10	8	36	4' - 6"	446353-01
		48	6' - 0"	446353-05
		60	7' - 6"	446353-09

Rated Load Range (Tonnes)	Wheel Diameter (in)	For Spans Thru (ft)	Wheel Base	Runway Flange Width (in)	Catalog Number
Spacer Block Kit - (one per truck)					
1 thru 10	Both	thru 60'	All	4-5/8 thru 6	232556-01
				6-1/8 thru 7-1/2	232556-02
				7-5/8 thru 9	232556-03
				9-1/8 thru 10-1/2	232556-04
				10-5/8 thru 12	232556-05
Cross Shaft Kit - (one per truck)					
1 thru 10	Both	thru 60'	All	4-5/8 thru 6	232552-01
				6-1/8 thru 7-1/2	
				7-5/8 thru 9	232552-02
				9-1/8 thru 10-1/2	
				10-5/8 thru 12	
Bumper Kit - (one per truck)					
1 thru 5	6-1/2	All	All	All	232553-01
6 thru 10	8				232553-02

Material Listed Below is Required to Build These Bridge Cranes

Hand Geared Bridge Components

Rated Load Range (Tonnes)	For Spans Thru (ft)	Cross Shaft Bearing Ass'y		Cross Shaft Coupling		Hand Chain Wheel and Guide 1 Ass'y Req'd	Hand Chain with Open Link (36 feet)
		Number Req'd	Catalog Number	Number Req'd	Catalog Number		
1 thru 10	12	1	904625	2	8280	913115	8282
	22	2		2			
	28	3		3			
	36	4		3			
	42	5		4			
	52	6		4			
	60	7		4			

1 End Truck Assembly - See Truck Chart.

1 Hand Geared Drive Adapter Assembly Per Truck (2 Required per crane): Catalog Number

Catalog Numbers Required for Optional Equipment

Festoon Systems

Description	Catalog Numbers for Bridge Span of				
	20'	30'	40'	50'	60'
Cross Conductors*	931089	931090	931091	931092	931093
Push Button (2) #16-8C	931104	911305	931106	931107	931108

*12 Conductor - Flat Cable (#14-4C & #16-8C)

#14 Power Cable Good for 10 HP @ 460V or 5 hp @ 230V (20 Amps)

Main Collectors

Description	Catalog Number
Collector Pole & Bracket	901590
30A Main Collectors	
Short Arm	931077
Long Arm	931078
100A Main Collectors	
Short Arm	931079
Long Arm	931080

90A Insulated Figure 8 Runway Conductors

Description	Catalog Number for Span of							
	50'	60'	70'	80'	90'	100'	150'	200'
Crane Runway Kit	931119	931120	931121	931122	931123	931124	931125	931126

MATERIAL LISTED BELOW IS REQUIRED TO BUILD THESE BRIDGE CRANES

INDIVIDUAL DRIVE - MOTOR DRIVEN BRIDGE COMPONENTS

1 Speed Motors

Motor HP	Motor RPM	230/460V 3Ph, 60Hz		575V, 3Ph, 60Hz	
		Motor Catalog Number	Brake Catalog Number	Motor Catalog Number	Brake Catalog Number
1/2	1200	330961-53	108461-F1	330961-54	108461-F2
3/4	1200	330961-73	913314	330961-74	913315
1	1200	330961-06	913314	330961-07	913315
1/2	1800	330961-51	108461-F1	330961-52	108461-F2
3/4	1800	330961-71	108461-F1	330961-72	108461-F2
1	1800	330961-01	108461-F1	330961-02	108461-F2
1-1/2	1800	329925-11	913314	329925-12	913315
2	1800	329925-21	913316	329925-22	913317

Traverse Gear Cases

Traverse Gear Case Catalog Number	Gear Ratio	Bridge FPM with 1200 RPM Motor	Bridge FPM with 1800 RPM Motor
444689-1	13.04	50	75
444689-2	8.96	Not Used	100
444689-3	6.97	Not Used	125

2 Speed Motors

Motor HP	Motor RPM	230V, 3Ph, 60Hz		460V, 3Ph, 60Hz		575V, 3Ph, 60Hz	
		Motor Catalog Number	Brake Catalog Number	Motor Catalog Number	Brake Catalog Number	Motor Catalog Number	Brake Catalog Number
.5/.25	1200/600	330962-57	108461-F1	330962-58	108461-F1	330962-59	108461-F2
.75/.38	1200/600	330962-77	913314	330962-78	913314	330962-79	913315
1/5	1200/600	330962-07	913314	330962-08	913314	330962-09	913315
.5/.17	1800/600	330962-52	108461-F1	330962-53	108461-F1	330962-54	108461-F2
.75/.25	1800/600	330962-72	108461-F1	330962-73	108461-F1	330962-74	108461-F2
1/33	1800/600	330962-02	108461-F1	330962-03	108461-F1	330962-04	108461-F2
1.5/5	1800/600	330031-12	913314	330031-13	913314	330031-14	913315
2/.67	1800/600	330031-22	913316	330031-23	913316	330031-24	913317

One Drive Assembly includes Two Motor, Brake and Reducer Assemblies

Controls (All 3Ph, 60Hz) (NA = Not Available or Not Applicable)

Control Total HP	230V Control	Dynamic Braking Resistor	460V Control	Dynamic Braking Resistor	575V Control
Variable Frequency Control					
1	446585-21	446485-A1	446585-41	446485-A0	NA
2	446585-22	446485-A2	446585-42	446485-A0	NA
3	446585-23	446485-A2	446585-43	446485-A0	NA
5	446585-24	446485-A4	446585-44	446485-A3	NA
7.5	446585-25	446485-A9	446585-45	446485-A7	NA
10	446585-26	446485-A9	446585-46	446485-A8	NA
1 Speed Control					
1	444231-21	NA	444231-41	NA	444231-51
2	444231-22	NA	444231-42	NA	444231-52
3	444231-23	NA	444231-43	NA	444231-53
5	444231-25	NA	444231-45	NA	444231-55
7.5	444231-27	NA	444231-47	NA	444231-57
10	444231-29	NA	444231-49	NA	444231-59
2 Speed Control					
1	444232-21	NA	444232-41	NA	444232-51
2	444232-22	NA	444232-42	NA	444232-52
3	444232-23	NA	444232-43	NA	444232-53
5	444232-25	NA	444232-45	NA	444232-55
7.5	444232-27	NA	444232-47	NA	444232-57
10	444232-29	NA	444232-49	NA	444232-59

Control Total HP	230V Control	Dynamic Braking Resistor	460V Control	Dynamic Braking Resistor	575V Control
1 Speed Control - with Soft Start					
1	444711-21	NA	444711-41	NA	444711-51
2	444711-22	NA	444711-42	NA	444711-52
3	444711-23	NA	444711-43	NA	444711-53
5	444711-25	NA	444711-45	NA	444711-55
7.5	NA	NA	444711-47	NA	444711-57
10	NA	NA	444711-49	NA	444711-59
2 Speed Control - with Soft Start					
1	444712-21	NA	444712-41	NA	444712-51
2	444712-22	NA	444712-42	NA	444712-52
3	444712-23	NA	444712-43	NA	444712-53
5	444712-25	NA	444712-45	NA	444712-55
7.5	NA	NA	444712-47	NA	444712-57
10	NA	NA	444712-49	NA	444712-59

1 End Truck Assembly - See Truck Chart

BEAM SIZE SELECTION FOR VARIOUS SPANS

ENGLISH MEASURE (TONS) - MOTOR DRIVEN BRIDGE

- Section designation is in accordance with AISC.
- Beam sizes listed are American standard (S) beams, wide flange (W) and channel (C) sections.
- Use ASTM A 36 grade steel, first quality, free of rust and excessive mill scale.
- The bridge is designed in accordance with CMAA Specification 74, revised 1994 and is based on the following assumptions:

Rated Load	Hoist + Trolley Dead Load	* Wheel Diameter	Allowable Flange Width	Allowable Flange Thickness
1 Ton	500#	4"	9-1/8"	11/16"
2	500	4	11-1/4	11/16
3	800	4	11	15/16
5	1100	6-1/2	11	1-5/32
7-1/2	1200	6-1/2	11	1-5/32
10	2500	8	13-3/4	1-1/2

*LTI four wheel trolleys (one per hoist) with the wheels equally loaded.

Tons are short tons.

DLFB, DLFT and HLF are assumed to be 1.1, 1.1 and .15 respectively.

IFD is assumed to be .1.

Assumed additional dead load (for cross conductors) is 6 #/.

The bridge is assumed to be an indoor bridge.

- If any of the above assumptions are exceeded contact the factory for beam selection.

- No additional loading such as footwalks, platforms, cabs, machinery, etc., is allowed.
- Beam substitution is allowed by going to an increased span, but **not** by going to an increased load.

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
2 Ton Rated Load						
10	10X 25.4	10X 25.4	7X 9.8	10X 26	12X 22	7X 9.8
12	12X 31.8	10X 25.4	7X 9.8	10X 26	12X 22	7X 9.8
14	12X 31.8	10X 25.4	7X 9.8	10X 30	12X 22	7X 9.8
16	12X 35.0	10X 25.4	8X 11.5	10X 30	12X 22	7X 9.8
18	12X 40.8	12X 31.8	8X 11.5	10X 30	10X 26	9X 13.4
20	12X 40.8	12X 31.8	8X 11.5	12X 35	16X 36	10X 15.3
22	12X 50.0	12X 31.8	8X 11.5	14X 38	16X 36	10X 15.3
24	— —	12X 31.8	8X 11.5	10X 39	16X 36	10X 15.3
26	— —	12X 31.8	9X 13.4	12X 40	16X 36	10X 15.3
28	— —	12X 40.8	7X 9.8	12X 45	16X 36	10X 15.3
30	— —	12X 40.8	7X 9.8	14X 48	16X 36	12X 20.7
32	— —	12X 40.8	9X 13.4	12X 50	12X 40	12X 20.7
34	— —	15X 42.9	8X 11.5	12X 53	12X 40	12X 20.7
36	— —	15X 42.9	9X 13.4	14X 61	14X 43	12X 20.7
38	— —	15X 42.9	9X 13.4	14X 61	14X 43	12X 20.7
40	— —	15X 42.9	10X 15.3	16X 67	18X 50	10X 15.3
42	— —	— —	— —	18X 76	18X 50	10X 15.3
44	— —	— —	— —	— —	18X 50	10X 15.3
46	— —	— —	— —	— —	16X 50	12X 20.7
48	— —	— —	— —	— —	18X 50	12X 20.7
50	— —	— —	— —	— —	18X 50	12X 20.7
52	— —	— —	— —	— —	21X 62	12X 20.7
54	— —	— —	— —	— —	21X 62	12X 20.7
56	— —	— —	— —	— —	21X 68	12X 20.7
58	— —	— —	— —	— —	21X 62	15X 33.9
60	— —	— —	— —	— —	21X 62	15X 33.9

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
1 TON RATED LOAD						
10	7X 15.3	7X 15.3	6X 8.2	8X 18	8X 15	7X 9.8
12	8X 18.4	7X 15.3	6X 8.2	8X 18	8X 15	7X 9.8
14	8X 18.4	7X 15.3	6X 8.2	8X 21	8X 15	7X 9.8
16	10X 25.4	7X 15.3	6X 8.2	8X 21	8X 18	8X 11.5
18	10X 25.4	8X 18.4	7X 9.8	8X 21	8X 18	8X 11.5
20	12X 31.8	8X 18.4	7X 9.8	8X 24	12X 22	7X 9.8
22	12X 40.8	8X 18.4	10X 15.3	8X 28	12X 22	7X 9.8
24	12X 40.8	10X 25.4	7X 9.8	10X 30	12X 22	7X 9.8
26	12X 40.8	10X 25.4	7X 9.8	10X 33	12X 22	7X 9.8
28	— —	10X 25.4	7X 9.8	10X 33	12X 22	7X 9.8
30	— —	12X 31.8	8X 11.5	10X 39	12X 22	7X 9.8
32	— —	12X 31.8	8X 11.5	12X 40	12X 22	7X 9.8
34	— —	12X 31.8	8X 11.5	12X 45	12X 26	10X 15.3
36	— —	12X 31.8	8X 11.5	12X 45	12X 26	10X 15.3
38	— —	12X 40.8	7X 9.8	12X 50	14X 30	9X 13.4
40	— —	15X 42.9	8X 11.5	14X 53	14X 30	9X 13.4
42	— —	15X 42.9	8X 11.5	— —	14X 30	12X 20.7
44	— —	15X 42.9	9X 13.4	— —	16X 36	10X 15.3
46	— —	15X 42.9	9X 13.4	— —	16X 36	10X 15.3
48	— —	15X 42.9	12X 20.7	— —	16X 36	10X 15.3
50	— —	— —	— —	— —	18X 50	10X 15.3
52	— —	— —	— —	— —	18X 50	10X 15.3
54	— —	— —	— —	— —	18X 50	10X 15.3
56	— —	— —	— —	— —	18X 50	12X 20.7
58	— —	— —	— —	— —	18X 50	12X 20.7
60	— —	— —	— —	— —	21X 62	12X 20.7

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
3 TON RATED LOAD						
10	12X 40.8	12X 31.8	8X 11.5	12X 35	10X 39	12X 20.7
12	12X 40.8	12X 40.8	7X 9.8	12X 35	10X 39	12X 20.7
14	12X 40.8	12X 40.8	7X 9.8	16X 40	10X 39	12X 20.7
16	18X 54.7	12X 40.8	7X 9.8	14X 43	10X 39	12X 20.7
18	18X 54.7	12X 40.8	7X 9.8	14X 48	12X 40	12X 20.7
20	20X 66.0	12X 40.8	7X 9.8	14X 48	14X 43	12X 20.7
22	20X 66.0	12X 40.8	9X 13.4	14X 48	14X 43	12X 20.7
24	24X 80.0	12X 40.8	12X 20.7	12X 50	18X 50	10X 15.3
26	24X 80.0	18X 54.7	9X 13.4	14X 53	18X 50	10X 15.3
28	20X 86.0	18X 54.7	9X 13.4	12X 58	18X 50	10X 15.3
30	20X 96.0	18X 54.7	9X 13.4	12X 58	18X 50	10X 15.3
32	— —	18X 54.7	9X 13.4	14X 61	18X 50	10X 15.3
34	— —	18X 54.7	9X 13.4	16X 67	16X 50	12X 20.7
36	— —	18X 54.7	12X 20.7	14X 68	16X 50	12X 20.7
38	— —	18X 54.7	12X 20.7	14X 74	16X 50	12X 20.7
40	— —	20X 66.0	12X 20.7	16X 89	16X 57	12X 20.7
42	— —	20X 66.0	12X 20.7	16X 89	16X 57	12X 20.7
44	— —	20X 66.0	12X 20.7	— —	18X 60	12X 20.7
46	— —	20X 66.0	12X 20.7	— —	18X 60	12X 20.7
48	— —	20X 66.0	15X 33.9	— —	21X 62	12X 20.7
50	— —	20X 66.0	15X 33.9	— —	21X 68	12X 20.7
52	— —	20X 66.0	15X 33.9	— —	21X 62	15X 33.9
54	— —	24X 80.0	15X 33.9	— —	21X 68	15X 33.9
56	— —	24X 80.0	15X 33.9	— —	21X 68	15X 33.9
58	— —	24X 80.0	15X 33.9	— —	21X 73	15X 33.9
60	— —	24X 80.0	15X 33.9	— —	24X 76	15X 33.9

ENGLISH MEASURE (TONS) - MOTOR DRIVEN BRIDGE

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
5 TON RATED LOAD						
10	18X 54.7	12X 40.8	7X 9.8	16X 50	18X 50	10X 15.3
12	18X 54.7	12X 40.8	8X 11.5	16X 50	18X 50	10X 15.3
14	20X 66.0	12X 40.8	12X 20.7	14X 53	12X 50	12X 20.7
16	20X 66.0	18X 54.7	9X 13.4	16X 57	16X 50	12X 20.7
18	20X 66.0	18X 54.7	9X 13.4	16X 57	16X 50	12X 20.7
20	24X 80.0	18X 54.7	10X 15.3	18X 65	24X 62	10X 15.3
22	20X 86.0	18X 54.7	12X 20.7	18X 65	16X 57	12X 20.7
24	20X 86.0	20X 66.0	9X 13.4	18X 71	16X 57	12X 20.7
26	24X106.0	20X 66.0	9X 13.4	14X 74	16X 57	12X 20.7
28	24X106.0	20X 66.0	9X 13.4	16X 77	18X 60	12X 20.7
30	24X106.0	20X 66.0	9X 13.4	14X 82	18X 65	12X 20.7
32	— —	20X 66.0	10X 15.3	14X 82	18X 65	12X 20.7
34	— —	20X 66.0	12X 20.7	16X 89	18X 71	12X 20.7
36	— —	20X 66.0	15X 33.9	16X 89	18X 71	12X 20.7
38	— —	20X 66.0	15X 33.9	16X 100	18X 71	12X 20.7
40	— —	24X 80.0	12X 20.7	16X 100	21X 83	12X 20.7
42	— —	24X 80.0	15X 33.9	— —	21X 83	12X 20.7
44	— —	24X 80.0	15X 33.9	— —	21X 83	12X 20.7
46	— —	24X 80.0	15X 33.9	— —	21X 93	12X 20.7
48	— —	24X 80.0	15X 33.9	— —	21X 83	15X 33.9
50	— —	24X 80.0	15X 33.9	— —	21X 83	15X 33.9
52	— —	24X 80.0	15X 33.9	— —	21X 83	18X 42.7
54	— —	24X 90.0	15X 40.0	— —	24X 84	18X 42.7
56	— —	24X106.0	15X 33.9	— —	24X 94	15X 33.9
58	— —	24X106.0	15X 33.9	— —	24X 94	15X 33.9
60	— —	24X106.0	15X 40.0	— —	24X 94	18X 42.7

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
10 TON RATED LOAD						
10	24X 80.0	20X 66.0	9X 13.4	21X 83	18X 71	12X 20.7
12	20X 86.0	20X 66.0	10X 15.3	16X 89	21X 83	12X 20.7
14	24X 106.0	24X 80.0	10X 15.3	21X 93	21X 83	12X 20.7
16	24X 106.0	24X 80.0	10X 15.3	16X 100	21X 93	12X 20.7
18	24X 106.0	24X 80.0	12X 20.7	16X 100	21X 93	12X 20.7
20	24X 106.0	24X 90.0	12X 20.7	18X 119	21X 93	12X 20.7
22	24X 121.0	24X 80.0	15X 33.9	18X 119	21X 93	15X 33.9
24	— —	24X 90.0	15X 33.9	18X 119	21X 93	15X 33.9
26	— —	24X 106.0	12X 20.7	24X 131	21X 93	18X 51.9
28	— —	24X 106.0	12X 20.7	21X 132	27X 114	15X 33.9
30	— —	24X 106.0	12X 20.7	33X 141	27X 114	15X 33.9
32	— —	24X 106.0	12X 20.7	24X 146	27X 114	18X 42.7
34	— —	24X 106.0	15X 33.9	24X 146	27X 114	18X 42.7
36	— —	24X 106.0	15X 33.9	24X 146	30X 132	15X 33.9
38	— —	24X 106.0	15X 40.0	24X 146	30X 132	15X 33.9
40	— —	24X 121.0	15X 40.0	24X 162	30X 132	15X 33.9
42	— —	24X 121.0	18X 42.7	24X 162	30X 132	18X 42.7
44	— —	— —	— —	— —	30X 132	18X 42.7
46	— —	— —	— —	— —	24X 146	18X 42.7
48	— —	— —	— —	— —	24X 146	18X 51.9
50	— —	— —	— —	— —	24X 162	18X 42.7
52	— —	— —	— —	— —	24X 162	18X 42.7
54	— —	— —	— —	— —	24X 162	18X 42.7
56	— —	— —	— —	— —	24X 162	18X 42.7
58	— —	— —	— —	— —	36X 170	18X 42.7
60	— —	— —	— —	— —	36X 170	18X 51.9

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
7½ TON RATED LOAD						
10	20X 75.0	20X 66.0	9X 13.4	18X 65	16X 57	12X 20.7
12	24X 80.0	20X 66.0	9X 13.4	18X 71	16X 57	12X 20.7
14	24X 80.0	20X 66.0	9X 13.4	18X 71	18X 65	12X 20.7
16	20X 86.0	20X 66.0	10X 15.3	14X 82	18X 65	12X 20.7
18	24X 106.0	20X 66.0	12X 20.7	14X 82	18X 71	12X 20.7
20	24X 106.0	24X 80.0	10X 15.3	10X 88	18X 71	12X 20.7
22	24X 106.0	24X 80.0	10X 15.3	16X 89	21X 83	12X 20.7
24	24X 106.0	24X 80.0	12X 20.7	21X 93	21X 83	12X 20.7
26	24X 121.0	24X 80.0	12X 20.7	16X 100	21X 83	12X 20.7
28	— —	24X 80.0	15X 33.9	16X 100	21X 93	12X 20.7
30	— —	24X 80.0	15X 33.9	27X 114	21X 93	12X 20.7
32	— —	24X 90.0	15X 33.9	30X 132	21X 93	12X 20.7
34	— —	24X 106.0	12X 20.7	— —	21X 93	12X 20.7
36	— —	24X 106.0	12X 20.7	— —	21X 93	15X 33.9
38	— —	24X 106.0	12X 20.7	— —	21X 93	15X 33.9
40	— —	24X 106.0	12X 20.7	— —	21X 93	18X 42.7
42	— —	24X 106.0	15X 33.9	— —	27X 102	18X 42.7
44	— —	24X 106.0	15X 33.9	— —	27X 114	15X 33.9
46	— —	24X 106.0	15X 33.9	— —	27X 114	15X 33.9
48	— —	24X 106.0	15X 33.9	— —	27X 114	15X 33.9
50	— —	24X 106.0	15X 40.0	— —	27X 114	15X 33.9
52	— —	24X 121.0	15X 40.0	— —	27X 114	18X 42.7
54	— —	24X 121.0	18X 42.7	— —	30X 124	15X 33.9
56	— —	24X 121.0	18X 58.0	— —	30X 132	15X 33.9
58	— —	— —	— —	— —	30X 124	18X 42.7
60	— —	— —	— —	— —	30X 132	18X 42.7

BEAM SIZE SELECTION FOR VARIOUS SPANS

ENGLISH MEASURE (TONS) - HAND GEARED BRIDGE

- Section designation is in accordance with AISC.
- Beam sizes listed are American standard (S) beams, wide flange (W) and channel (C) sections.
- Use ASTM A 36 grade steel, first quality, free of rust and excessive mill scale.
- The bridge is designed in accordance with CMAA Specification 74, revised 1994 and is based on the following assumptions:

Rated Load	Hoist + Trolley Dead Load	* Wheel Diameter	Allowable Flange Width	Allowable Flange Thickness
1 Ton	500#	4"	9-1/8"	11/16"
2	500	4	11-1/4	11/16
3	800	4	11	15/16
5	1100	6-1/2	11	1-5/32
7-1/2	1200	6-1/2	11	1-5/32
10	2500	8	13-3/4	1-1/2

*LTI four wheel trolleys (one per hoist) with the wheels equally loaded.

Tons are short tons.

DLFB, DLFT and HLF are assumed to be 1.1, 1.1 and .15 respectively.

IFD is assumed to be 0.

Assumed additional dead load (for cross conductors and cross shaft) is 13 #/.

The bridge is assumed to be an indoor bridge.

- If any of the above assumptions are exceeded contact the factory for beam selection.

- No additional loading such as footwalks, platforms, cabs, machinery, etc., is allowed.

- Beam substitution is allowed by going to an increased span, but **not** by going to an increased load.

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
2 TON RATED LOAD						
10	10X 25.4	10X 25.4	7X 9.8	10X 19	12X 22	7X 9.8
12	10X 25.4	10X 25.4	7X 9.8	12X 22	12X 22	7X 9.8
14	10X 25.4	10X 25.4	7X 9.8	12X 22	12X 22	7X 9.8
16	10X 25.4	10X 25.4	7X 9.8	10X 26	12X 22	7X 9.8
18	12X 31.8	10X 25.4	7X 9.8	10X 26	12X 22	7X 9.8
20	12X 31.8	12X 31.8	8X 11.5	10X 30	10X 26	9X 13.4
22	12X 35.0	12X 31.8	8X 11.5	10X 30	16X 36	10X 15.3
24	12X 40.8	12X 31.8	8X 11.5	14X 34	16X 36	10X 15.3
26	12X 40.8	12X 31.8	8X 11.5	12X 35	16X 36	10X 15.3
28	12X 50.0	12X 31.8	8X 11.5	12X 40	16X 36	10X 15.3
30	— —	12X 40.8	7X 9.8	12X 40	16X 36	10X 15.3
32	— —	15X 42.9	8X 11.5	14X 43	16X 36	10X 15.3
34	— —	15X 42.9	8X 11.5	14X 48	12X 40	12X 20.7
36	— —	15X 42.9	8X 11.5	14X 53	14X 43	12X 20.7
38	— —	15X 42.9	8X 11.5	14X 61	14X 43	12X 20.7
40	— —	15X 50.0	9X 13.4	14X 61	18X 50	10X 15.3
42	— —	— —	— —	16X 67	18X 50	10X 15.3
44	— —	— —	— —	16X 67	18X 50	10X 15.3
46	— —	— —	— —	16X 67	18X 50	10X 15.3
48	— —	— —	— —	18X 76	18X 50	10X 15.3
50	— —	— —	— —	18X 76	18X 50	12X 20.7
52	— —	— —	— —	— —	24X 62	10X 15.3
54	— —	— —	— —	— —	24X 62	10X 15.3
56	— —	— —	— —	— —	21X 62	12X 20.7
58	— —	— —	— —	— —	21X 62	12X 20.7
60	— —	— —	— —	— —	24X 62	12X 20.7

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
1 TON RATED LOAD						
10	7X 15.3	7X 15.3	6X 8.2	8X 15	8X 15	7X 9.8
12	7X 15.3	7X 15.3	6X 8.2	8X 15	8X 15	7X 9.8
14	7X 15.3	7X 15.3	6X 8.2	8X 15	8X 15	7X 9.8
16	8X 18.4	7X 15.3	6X 8.2	8X 18	8X 15	7X 9.8
18	8X 23.0	8X 18.4	7X 9.8	8X 18	8X 18	8X 11.5
20	10X 25.4	8X 18.4	7X 9.8	8X 21	12X 22	7X 9.8
22	10X 25.4	10X 25.4	7X 9.8	10X 26	12X 22	7X 9.8
24	12X 31.8	10X 25.4	7X 9.8	10X 26	12X 22	7X 9.8
26	12X 31.8	10X 25.4	7X 9.8	10X 30	12X 22	7X 9.8
28	12X 35.0	10X 25.4	7X 9.8	10X 30	12X 22	7X 9.8
30	12X 40.8	12X 31.8	8X 11.5	14X 34	12X 22	7X 9.8
32	12X 40.8	12X 31.8	8X 11.5	12X 35	12X 22	7X 9.8
34	15X 42.9	12X 31.8	8X 11.5	14X 38	12X 26	9X 13.4
36	— —	12X 31.8	9X 13.4	12X 40	14X 30	9X 13.4
38	— —	12X 40.8	9X 13.4	14X 43	14X 30	9X 13.4
40	— —	15X 42.9	8X 11.5	14X 48	14X 30	9X 13.4
42	— —	15X 42.9	8X 11.5	14X 48	16X 36	10X 15.3
44	— —	15X 42.9	8X 11.5	14X 53	16X 36	10X 15.3
46	— —	15X 42.9	8X 11.5	21X 62	16X 36	10X 15.3
48	— —	— —	— —	21X 68	16X 36	12X 20.7
50	— —	— —	— —	24X 76	18X 50	10X 15.3
52	— —	— —	— —	24X 76	18X 50	10X 15.3
54	— —	— —	— —	— —	18X 50	10X 15.3
56	— —	— —	— —	— —	18X 50	10X 15.3
58	— —	— —	— —	— —	24X 62	10X 15.3
60	— —	— —	— —	— —	24X 62	10X 15.3

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
3 TON RATED LOAD						
10	12X 31.8	12X 31.8	8X 11.5	10X 30	10X 39	12X 20.7
12	12X 35.0	12X 31.8	8X 11.5	10X 30	10X 39	12X 20.7
14	12X 40.8	12X 40.8	7X 9.8	12X 35	10X 39	12X 20.7
16	12X 40.8	12X 40.8	7X 9.8	12X 35	10X 39	12X 20.7
18	12X 40.8	12X 40.8	7X 9.8	12X 35	12X 40	12X 20.7
20	12X 40.8	12X 40.8	7X 9.8	14X 38	14X 43	12X 20.7
22	12X 40.8	12X 40.8	7X 9.8	16X 40	14X 43	12X 20.7
24	12X 50.0	12X 40.8	7X 9.8	14X 43	14X 43	12X 20.7
26	18X 54.7	15X 42.9	8X 11.5	12X 45	18X 50	10X 15.3
28	20X 66.0	15X 50.0	8X 11.5	14X 48	18X 50	10X 15.3
30	20X 66.0	18X 54.7	9X 13.4	14X 48	18X 50	10X 15.3
32	20X 66.0	18X 54.7	9X 13.4	14X 53	18X 50	10X 15.3
34	24X 80.0	18X 54.7	9X 13.4	14X 61	18X 50	10X 15.3
36	24X 80.0	18X 54.7	9X 13.4	18X 65	18X 50	10X 15.3
38	24X 80.0	18X 54.7	9X 13.4	16X 67	18X 50	10X 15.3
40	20X 86.0	18X 54.7	9X 13.4	16X 67	18X 50	10X 15.3
42	— —	18X 54.7	9X 13.4	16X 77	24X 62	10X 15.3
44	— —	18X 54.7	12X 20.7	16X 89	24X 62	10X 15.3
46	— —	20X 66.0	9X 13.4	16X 89	24X 62	10X 15.3
48	— —	20X 66.0	9X 13.4	27X 102	24X 62	10X 15.3
50	— —	20X 66.0	10X 15.3	27X 114	21X 62	12X 20.7
52	— —	24X 80.0	10X 15.3	27X 114	21X 62	12X 20.7
54	— —	24X 80.0	10X 15.3	27X 114	24X 62	12X 20.7
56	— —	24X 80.0	10X 15.3	30X 124	24X 68	12X 20.7
58	— —	24X 80.0	12X 20.7	— —	24X 68	12X 20.7
60	— —	24X 80.0	12X 20.7	— —	24X 68	12X 20.7

ENGLISH MEASURE (TONS) - HAND GEARED BRIDGE

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
5 TON RATED LOAD						
10	12X 40.8	12X 40.8	7X 9.8	10X 45	18X 50	10X 15.3
12	12X 40.8	12X 40.8	7X 9.8	16X 45	18X 50	10X 15.3
14	15X 42.9	12X 40.8	7X 9.8	18X 46	18X 50	10X 15.3
16	18X 54.7	12X 50.0	8X 11.5	18X 46	18X 50	10X 15.3
18	18X 54.7	18X 54.7	9X 13.4	18X 46	16X 50	12X 20.7
20	18X 54.7	18X 54.7	9X 13.4	16X 50	16X 50	12X 20.7
22	18X 54.7	18X 54.7	9X 13.4	18X 55	24X 62	10X 15.3
24	20X 66.0	18X 54.7	9X 13.4	16X 57	24X 62	10X 15.3
26	20X 66.0	18X 54.7	9X 13.4	16X 57	24X 62	10X 15.3
28	24X 80.0	20X 66.0	9X 13.4	18X 65	16X 57	12X 20.7
30	24X 80.0	20X 66.0	9X 13.4	14X 68	16X 57	12X 20.7
32	24X 80.0	20X 66.0	9X 13.4	24X 76	18X 60	12X 20.7
34	20X 96.0	20X 66.0	9X 13.4	16X 77	18X 65	12X 20.7
36	24X 106.0	20X 66.0	9X 13.4	16X 77	18X 65	12X 20.7
38	24X 106.0	20X 66.0	9X 13.4	16X 89	18X 65	12X 20.7
40	24X 106.0	20X 66.0	9X 13.4	24X 94	18X 71	12X 20.7
42	24X 106.0	20X 66.0	10X 15.3	27X 102	18X 71	12X 20.7
44	— —	24X 80.0	10X 15.3	27X 114	21X 73	12X 20.7
46	— —	24X 80.0	10X 15.3	27X 114	21X 73	12X 20.7
48	— —	24X 80.0	10X 15.3	30X 124	21X 83	12X 20.7
50	— —	24X 80.0	12X 20.7	30X 132	21X 83	12X 20.7
52	— —	24X 80.0	12X 20.7	— —	24X 84	12X 20.7
54	— —	24X 90.0	12X 20.7	— —	24X 84	12X 20.7
56	— —	24X 80.0	15X 33.9	— —	24X 84	12X 20.7
58	— —	24X 106.0	12X 20.7	— —	24X 94	12X 20.7
60	— —	24X 106.0	12X 20.7	— —	24X 94	15X 33.9

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
10 TON RATED LOAD						
10	20X 66.0	20X 66.0	9X 13.4	18X 71	18X 71	12X 20.7
12	20X 66.0	20X 66.0	9X 13.4	18X 71	18X 71	12X 20.7
14	20X 66.0	20X 66.0	9X 13.4	21X 83	21X 83	12X 20.7
16	20X 75.0	20X 66.0	9X 13.4	21X 83	21X 83	12X 20.7
18	24X 80.0	24X 80.0	10X 15.3	21X 93	21X 83	12X 20.7
20	24X 80.0	24X 80.0	10X 15.3	21X 93	21X 93	12X 20.7
22	24X 80.0	24X 80.0	10X 15.3	21X 93	21X 93	12X 20.7
24	20X 86.0	24X 80.0	10X 15.3	21X 93	21X 93	12X 20.7
26	24X 106.0	24X 80.0	12X 20.7	21X 93	21X 93	12X 20.7
28	24X 106.0	24X 100.0	10X 15.3	27X 114	21X 93	12X 20.7
30	24X 106.0	24X 106.0	12X 20.7	27X 114	27X 114	15X 33.9
32	24X 121.0	24X 106.0	12X 20.7	27X 114	27X 114	15X 33.9
34	— —	24X 106.0	12X 20.7	27X 114	27X 114	15X 33.9
36	— —	24X 106.0	12X 20.7	18X 119	27X 114	15X 33.9
38	— —	24X 106.0	12X 20.7	24X 131	27X 114	15X 33.9
40	— —	24X 106.0	12X 20.7	24X 131	27X 114	18X 42.7
42	— —	24X 106.0	12X 20.7	21X 132	30X 124	15X 33.9
44	— —	24X 106.0	12X 20.7	24X 146	30X 124	15X 33.9
46	— —	24X 121.0	12X 20.7	24X 146	30X 132	15X 33.9
48	— —	24X 121.0	15X 40.0	24X 146	30X 132	15X 33.9
50	— —	— —	— —	24X 162	30X 132	15X 33.9
52	— —	— —	— —	24X 162	30X 132	15X 33.9
54	— —	— —	— —	36X 210	30X 132	15X 33.9
56	— —	— —	— —	36X 210	33X 141	15X 33.9
58	— —	— —	— —	— —	36X 150	18X 42.7
60	— —	— —	— —	— —	36X 170	18X 42.7

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
7½ TON RATED LOAD						
10	20X 66.0	20X 66.0	9X 13.4	16X 57	16X 57	12X 20.7
12	20X 66.0	20X 66.0	9X 13.4	16X 57	16X 57	12X 20.7
14	20X 66.0	20X 66.0	9X 13.4	18X 65	16X 57	12X 20.7
16	20X 66.0	20X 66.0	9X 13.4	18X 65	18X 65	12X 20.7
18	20X 66.0	20X 66.0	9X 13.4	18X 65	18X 65	12X 20.7
20	20X 66.0	20X 66.0	9X 13.4	18X 71	18X 65	12X 20.7
22	24X 80.0	20X 66.0	9X 13.4	18X 71	18X 71	12X 20.7
24	24X 80.0	24X 80.0	10X 15.3	18X 71	18X 71	12X 20.7
26	24X 80.0	24X 80.0	10X 15.3	21X 83	18X 71	12X 20.7
28	20X 86.0	24X 80.0	10X 15.3	21X 83	21X 83	12X 20.7
30	24X 106.0	24X 80.0	10X 15.3	21X 83	21X 83	12X 20.7
32	24X 106.0	24X 80.0	10X 15.3	21X 93	21X 83	12X 20.7
34	24X 106.0	24X 80.0	10X 15.3	24X 94	21X 83	12X 20.7
36	24X 106.0	24X 90.0	10X 15.3	27X 102	21X 93	12X 20.7
38	— —	24X 106.0	12X 20.7	27X 114	21X 93	12X 20.7
40	— —	24X 106.0	12X 20.7	27X 114	21X 93	12X 20.7
42	— —	24X 106.0	12X 20.7	30X 132	21X 93	12X 20.7
44	— —	24X 106.0	12X 20.7	30X 132	21X 93	12X 20.7
46	— —	24X 106.0	12X 20.7	— —	24X 94	12X 20.7
48	— —	24X 106.0	12X 20.7	— —	27X 102	15X 33.9
50	— —	24X 106.0	12X 20.7	— —	27X 114	15X 33.9
52	— —	24X 106.0	12X 20.7	— —	27X 114	15X 33.9
54	— —	24X 106.0	15X 33.9	— —	27X 114	15X 33.9
56	— —	24X 106.0	15X 50.0	— —	27X 114	15X 33.9
58	— —	24X 121.0	18X 58.0	— —	27X 114	15X 33.9
60	— —	— —	— —	— —	27X 114	15X 33.9

BEAM SIZE SELECTION FOR VARIOUS SPANS

METRIC MEASURE (TONNES) - MOTOR DRIVEN BRIDGE

1. Section designation is in accordance with AISC.
2. Beam sizes listed are American standard (S) beams, wide flange (W) and channel (C) sections.
3. Use ASTM A 36 grade steel, first quality, free of rust and excessive mill scale.
4. The bridge is designed in accordance with CMAA Specification 74, revised 1994 and is based on the following assumptions:

Rated Load	Hoist + Trolley Dead Load	* Wheel Diameter	Allowable Flange Width	Allowable Flange Thickness
1 Tonne	227kg	4"	9-1/8"	11/16"
2	227	4	11-1/4	11/16
3	363	4	11	15/16
5	499	6-1/2	11	1-5/32
7-1/2	544	6-1/2	11	1-5/32
10	1134	8	13-3/4	1-1/2

*LTI four wheel trolleys (one per hoist) with the wheels equally loaded.

DLFB, DLFT and HLF are assumed to be 1.1, 1.1 and .15 respectively.

IFD is assumed to be .1.

Assumed additional dead load (for cross conductors) is 2.72 kg/".

The bridge is assumed to be an indoor bridge.

5. If any of the above assumptions are exceeded contact the factory for beam selection.

6. No additional loading such as footwalks, platforms, cabs, machinery, etc., is allowed.

7. Beam substitution is allowed by going to an increased span, but **not** by going to an increased load.

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
2 TONNE RATED LOAD						
10	12X 31.8	10X 25.4	7X 9.8	10X 26	12X 22	7X 9.8
12	12X 31.8	10X 25.4	7X 9.8	10X 30	12X 22	7X 9.8
14	12X 35.0	10X 25.4	9X 13.4	10X 30	12X 22	7X 9.8
16	12X 40.8	12X 31.8	8X 11.5	10X 30	10X 26	12X 20.7
18	12X 40.8	12X 31.8	8X 11.5	12X 35	16X 36	10X 15.3
20	12X 40.8	12X 31.8	8X 11.5	12X 35	16X 36	10X 15.3
22	---	12X 31.8	9X 13.4	10X 39	16X 36	10X 15.3
24	---	12X 40.8	7X 9.8	12X 40	16X 36	10X 15.3
26	---	12X 40.8	7X 9.8	14X 43	10X 39	12X 20.7
28	---	12X 40.8	7X 9.8	12X 45	10X 39	12X 20.7
30	---	12X 40.8	7X 9.8	12X 50	12X 40	12X 20.7
32	---	15X 42.9	8X 11.5	12X 53	12X 40	12X 20.7
34	---	15X 42.9	8X 11.5	12X 58	14X 43	12X 20.7
36	---	15X 42.9	9X 13.4	14X 61	14X 43	12X 20.7
38	---	15X 42.9	10X 15.3	14X 61	14X 43	12X 20.7
40	---	15X 50.0	12X 20.7	18X 76	18X 50	10X 15.3
42	---	---	---	18X 76	18X 50	10X 15.3
44	---	---	---	---	18X 50	10X 15.3
46	---	---	---	---	18X 50	12X 20.7
48	---	---	---	---	18X 50	12X 20.7
50	---	---	---	---	21X 62	12X 20.7
52	---	---	---	---	21X 62	12X 20.7
54	---	---	---	---	21X 68	12X 20.7
56	---	---	---	---	21X 62	15X 33.9
58	---	---	---	---	21X 62	15X 33.9
60	---	---	---	---	21X 62	15X 33.9

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
1 TONNE RATED LOAD						
10	8X 18.4	7X 15.3	6X 8.2	8X 21	8X 15	7X 9.8
12	8X 18.4	7X 15.3	6X 8.2	8X 21	8X 15	7X 9.8
14	8X 23.0	7X 15.3	6X 8.2	8X 21	8X 18	8X 11.5
16	10X 25.4	8X 18.4	7X 9.8	8X 21	8X 18	8X 11.5
18	12X 31.8	8X 18.4	7X 9.8	8X 24	12X 22	7X 9.8
20	12X 31.8	8X 18.4	7X 9.8	8X 24	12X 22	7X 9.8
22	12X 40.8	10X 25.4	7X 9.8	8X 28	12X 22	7X 9.8
24	12X 40.8	10X 25.4	7X 9.8	10X 33	12X 22	7X 9.8
26	12X 50.0	10X 25.4	7X 9.8	10X 33	12X 22	7X 9.8
28	— —	10X 25.4	7X 9.8	10X 33	12X 22	7X 9.8
30	— —	12X 31.8	8X 11.5	10X 39	12X 22	7X 9.8
32	— —	12X 31.8	8X 11.5	12X 40	12X 22	8X 11.5
34	— —	12X 31.8	8X 11.5	12X 45	12X 26	10X 15.3
36	— —	12X 31.8	10X 15.3	14X 48	14X 30	9X 13.4
38	— —	15X 42.9	8X 11.5	12X 50	14X 30	9X 13.4
40	— —	15X 42.9	8X 11.5	24X 76	14X 30	9X 13.4
42	— —	15X 42.9	8X 11.5	— —	16X 36	10X 15.3
44	— —	15X 42.9	9X 13.4	— —	16X 36	10X 15.3
46	— —	15X 42.9	10X 15.3	— —	16X 36	10X 15.3
48	— —	— —	— —	— —	16X 36	12X 20.7
50	— —	— —	— —	— —	18X 50	10X 15.3
52	— —	— —	— —	— —	18X 50	10X 15.3
54	— —	— —	— —	— —	18X 50	12X 20.7
56	— —	— —	— —	— —	18X 50	12X 20.7
58	— —	— —	— —	— —	21X 62	12X 20.7
60	— —	— —	— —	— —	21X 62	12X 20.7

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
3 TONNE RATED LOAD						
10	12X 40.8	12X 40.8	7X 9.8	12X 35	10X 39	12X 20.7
12	12X 40.8	12X 40.8	7X 9.8	18X 40	10X 39	12X 20.7
14	18X 54.7	12X 40.8	7X 9.8	10X 45	12X 40	12X 20.7
16	18X 54.7	12X 40.8	7X 9.8	10X 45	14X 43	12X 20.7
18	18X 54.7	12X 40.8	8X 11.5	14X 48	14X 43	12X 20.7
20	20X 66.0	12X 40.8	10X 15.3	14X 48	18X 50	10X 15.3
22	20X 75.0	18X 54.7	9X 13.4	12X 50	18X 50	10X 15.3
24	24X 80.0	18X 54.7	9X 13.4	14X 53	18X 50	10X 15.3
26	20X 86.0	18X 54.7	9X 13.4	14X 53	18X 50	10X 15.3
28	20X 86.0	18X 54.7	9X 13.4	14X 61	18X 50	10X 15.3
30	— —	18X 54.7	10X 15.3	14X 61	16X 50	12X 20.7
32	— —	18X 54.7	12X 20.7	16X 67	16X 50	12X 20.7
34	— —	18X 54.7	12X 20.7	14X 68	16X 50	12X 20.7
36	— —	20X 66.0	9X 13.4	14X 74	16X 57	12X 20.7
38	— —	20X 66.0	10X 15.3	14X 82	16X 57	12X 20.7
40	— —	20X 66.0	12X 20.7	16X 89	16X 57	12X 20.7
42	— —	20X 66.0	12X 20.7	16X 89	18X 60	12X 20.7
44	— —	20X 66.0	12X 20.7	— —	18X 60	12X 20.7
46	— —	20X 66.0	15X 33.9	— —	18X 65	12X 20.7
48	— —	20X 66.0	15X 33.9	— —	21X 68	12X 20.7
50	— —	20X 66.0	15X 33.9	— —	21X 68	15X 33.9
52	— —	24X 80.0	15X 33.9	— —	21X 68	15X 33.9
54	— —	24X 80.0	15X 33.9	— —	21X 68	15X 33.9
56	— —	24X 80.0	15X 33.9	— —	21X 73	15X 33.9
58	— —	24X 80.0	15X 33.9	— —	24X 76	15X 33.9
60	— —	24X 80.0	15X 33.9	— —	24X 76	15X 33.9

METRIC MEASURE (TONNES) - MOTOR DRIVEN BRIDGE

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
5 TONNE RATED LOAD						
10	18X 54.7	12X 40.8	8X 11.5	16X 50	12X 50	12X 20.7
12	20X 66.0	18X 54.7	9X 13.4	16X 57	12X 50	12X 20.7
14	20X 66.0	18X 54.7	9X 13.4	16X 57	16X 50	12X 20.7
16	20X 66.0	18X 54.7	9X 13.4	18X 60	16X 57	12X 20.7
18	24X 80.0	18X 54.7	12X 20.7	18X 65	16X 57	12X 20.7
20	24X 80.0	20X 66.0	9X 13.4	18X 65	16X 57	12X 20.7
22	20X 86.0	20X 66.0	9X 13.4	18X 71	16X 57	12X 20.7
24	20X 96.0	20X 66.0	9X 13.4	14X 74	18X 60	12X 20.7
26	24X 106.0	20X 66.0	9X 13.4	14X 82	18X 65	12X 20.7
28	24X 106.0	20X 66.0	10X 15.3	14X 82	18X 65	12X 20.7
30	24X 121.0	20X 66.0	12X 20.7	16X 89	18X 71	12X 20.7
32	— —	24X 80.0	10X 15.3	16X 89	18X 71	12X 20.7
34	— —	24X 80.0	10X 15.3	16X 89	18X 71	12X 20.7
36	— —	24X 80.0	12X 20.7	16X 100	21X 83	12X 20.7
38	— —	24X 80.0	12X 20.7	16X 100	21X 83	12X 20.7
40	— —	24X 80.0	15X 33.9	— —	21X 83	12X 20.7
42	— —	24X 80.0	15X 33.9	— —	21X 83	12X 20.7
44	— —	24X 80.0	15X 33.9	— —	21X 93	12X 20.7
46	— —	24X 80.0	15X 33.9	— —	21X 93	12X 20.7
48	— —	24X 80.0	15X 40.0	— —	21X 83	18X 42.7
50	— —	24X 90.0	15X 40.0	— —	21X 93	15X 33.9
52	— —	24X 106.0	15X 33.9	— —	21X 93	15X 33.9
54	— —	24X 106.0	15X 33.9	— —	24X 94	15X 33.9
56	— —	24X 106.0	15X 33.9	— —	24X 94	15X 33.9
58	— —	24X 106.0	15X 40.0	— —	24X 94	18X 42.7
60	— —	24X 106.0	15X 40.0	— —	27X 102	18X 42.7

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
10 TONNE RATED LOAD						
10	20X 86.0	20X 66.0	12X 20.7	21X 93	21X 83	12X 20.7
12	24X 106.0	24X 80.0	10X 15.3	21X 93	21X 93	12X 20.7
14	24X 106.0	24X 80.0	10X 15.3	18X 119	21X 93	12X 20.7
16	24X 106.0	24X 80.0	12X 20.7	18X 119	21X 93	12X 20.7
18	24X 106.0	24X 80.0	15X 33.9	18X 119	21X 93	15X 33.9
20	— —	24X 106.0	12X 20.7	18X 119	21X 93	15X 33.9
22	— —	24X 106.0	12X 20.7	18X 119	21X 93	18X 51.9
24	— —	24X 106.0	12X 20.7	21X 132	27X 114	15X 33.9
26	— —	24X 106.0	12X 20.7	24X 146	27X 114	15X 33.9
28	— —	24X 106.0	12X 20.7	24X 146	27X 114	18X 42.7
30	— —	24X 106.0	15X 33.9	24X 146	30X 132	15X 33.9
32	— —	24X 106.0	15X 33.9	24X 146	30X 132	15X 33.9
34	— —	24X 106.0	15X 40.0	24X 162	30X 132	15X 33.9
36	— —	24X 121.0	18X 42.7	24X 162	30X 132	15X 33.9
38	— —	24X 121.0	18X 45.8	24X 162	30X 132	18X 42.7
40	— —	— —	— —	24X 162	24X 146	18X 42.7
42	— —	— —	— —	24X 162	24X 146	18X 51.9
44	— —	— —	— —	— —	24X 162	18X 42.7
46	— —	— —	— —	— —	24X 162	18X 42.7
48	— —	— —	— —	— —	24X 162	18X 42.7
50	— —	— —	— —	— —	24X 162	18X 42.7
52	— —	— —	— —	— —	36X 170	18X 42.7
54	— —	— —	— —	— —	36X 170	18X 42.7
56	— —	— —	— —	— —	36X 170	18X 42.7
58	— —	— —	— —	— —	36X 170	18X 51.9
60	— —	— —	— —	— —	36X 182	18X 51.9

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
7½ TONNE RATED LOAD						
10	24X 80.0	20X 66.0	9X 13.4	18X 71	18X 65	12X 20.7
12	24X 80.0	20X 66.0	9X 13.4	18X 71	18X 65	12X 20.7
14	20X 86.0	20X 66.0	12X 20.7	14X 82	18X 71	12X 20.7
16	24X 106.0	24X 80.0	10X 15.3	21X 83	18X 71	12X 20.7
18	24X 106.0	24X 80.0	10X 15.3	16X 89	21X 83	12X 20.7
20	24X 106.0	24X 80.0	12X 20.7	21X 93	21X 83	12X 20.7
22	24X 106.0	24X 80.0	12X 20.7	21X 93	21X 83	12X 20.7
24	24X 106.0	24X 80.0	15X 33.9	16X 100	21X 93	12X 20.7
26	— —	24X 80.0	15X 33.9	16X 100	21X 93	12X 20.7
28	— —	24X 106.0	12X 20.7	27X 114	21X 93	12X 20.7
30	— —	24X 106.0	12X 20.7	30X 132	21X 93	12X 20.7
32	— —	24X 106.0	12X 20.7	— —	21X 93	15X 33.9
34	— —	24X 106.0	12X 20.7	— —	21X 93	15X 33.9
36	— —	24X 106.0	12X 20.7	— —	21X 93	18X 42.7
38	— —	24X 106.0	12X 20.7	— —	27X 114	15X 33.9
40	— —	24X 106.0	15X 33.9	— —	27X 114	15X 33.9
42	— —	24X 106.0	15X 33.9	— —	27X 114	15X 33.9
44	— —	24X 106.0	15X 33.9	— —	27X 114	15X 33.9
46	— —	24X 121.0	15X 33.9	— —	27X 114	18x 42.7
48	— —	24X 121.0	18X 42.7	— —	30X 124	15X 33.9
50	— —	24X 121.0	18X 51.9	— —	30X 132	15X 33.9
52	— —	— —	— —	— —	30X 132	15X 33.9
54	— —	— —	— —	— —	30X 132	15X 33.9
56	— —	— —	— —	— —	30X 132	18x 42.7
58	— —	— —	— —	— —	30X 132	18x 42.7
60	— —	— —	— —	— —	30X 132	18x 58.0

BEAM SIZE SELECTION FOR VARIOUS SPANS

METRIC MEASURE (TONNES) - HAND GEARED BRIDGE

- Section designation is in accordance with AISC.
- Beam sizes listed are American standard (S) beams, wide flange (W) and channel (C) sections.
- Use ASTM A 36 grade steel, first quality, free of rust and excessive mill scale.
- The bridge is designed in accordance with CMAA Specification 74, revised 1994 and is based on the following assumptions:

Rated Load	Hoist + Trolley Dead Load	* Wheel Diameter	Allowable Flange Width	Allowable Flange Thickness
1 Tonne	227kg	4"	9-1/8"	11/16"
2	227	4	11-1/4	11/16
3	363	4	11	15/16
5	499	6-1/2	11	1-5/32
7-1/2	544	6-1/2	11	1-5/32
10	1134	8	13-3/4	1-1/2

*LTI four wheel trolleys (one per hoist) with the wheels equally loaded.
DLFB, DLFT and HLF are assumed to be 1.1, 1.1 and .15 respectively.
IFD is assumed to be 0.
Assumed additional dead load (for cross conductors and cross shaft) is 5.90 kg'/.
The bridge is assumed to be an indoor bridge.

- If any of the above assumptions are exceeded contact the factory for beam selection.

- No additional loading such as footwalks, platforms, cabs, machinery, etc., is allowed.
- Beam substitution is allowed by going to an increased span, but **not** by going to an increased load.

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
2 TONNE RATED LOAD						
10	10X 25.4	10X 25.4	7X 9.8	12X 22	12X 22	7X 9.8
12	10X 25.4	10X 25.4	7X 9.8	12X 22	12X 22	7X 9.8
14	10X 25.4	10X 25.4	7X 9.8	12X 22	12X 22	7X 9.8
16	12X 31.8	12X 31.8	8X 11.5	10X 26	12X 22	7X 9.8
18	12X 31.8	12X 31.8	8X 11.5	10X 30	16X 36	10X 15.3
20	12X 31.8	12X 31.8	8X 11.5	10X 30	16X 36	10X 15.3
22	12X 40.8	12X 31.8	8X 11.5	10X 30	16X 36	10X 15.3
24	12X 40.8	12X 31.8	8X 11.5	12X 35	16X 36	10X 15.3
26	12X 40.8	12X 40.8	7X 9.8	14X 38	16X 36	10X 15.3
28	— —	12X 40.8	7X 9.8	12X 40	16X 36	10X 15.3
30	— —	12X 40.8	7X 9.8	14X 43	12X 40	12X 20.7
32	— —	15X 42.9	8X 11.5	14X 48	12X 40	12X 20.7
34	— —	15X 42.9	8X 11.5	14X 48	14X 43	12X 20.7
36	— —	15X 42.9	8X 11.5	14X 53	14X 43	12X 20.7
38	— —	15X 42.9	8X 11.5	14X 61	18X 50	10X 15.3
40	— —	15X 50.0	12X 20.7	16X 67	18X 50	10X 15.3
42	— —	— —	— —	16X 67	18X 50	10X 15.3
44	— —	— —	— —	16X 67	18X 50	10X 15.3
46	— —	— —	— —	16X 67	18X 50	10X 15.3
48	— —	— —	— —	18X 76	18X 50	10X 15.3
50	— —	— —	— —	— —	24X 62	10X 15.3
52	— —	— —	— —	— —	24X 62	10X 15.3
54	— —	— —	— —	— —	24X 62	10X 15.3
56	— —	— —	— —	— —	21X 62	12X 20.7
58	— —	— —	— —	— —	21X 62	12X 20.7
60	— —	— —	— —	— —	24X 62	12X 20.7

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
1 TONNE RATED LOAD						
10	7X 15.3	7X 15.3	6X 8.2	8X 15	8X 15	7X 9.8
12	7X 15.3	7X 15.3	6X 8.2	8X 15	8X 15	7X 9.8
14	7X 15.3	7X 15.3	6X 8.2	10X 17	8X 15	7X 9.8
16	8X 18.4	7X 15.3	7X 9.8	8X 18	8X 18	8X 11.5
18	8X 23.0	8X 18.4	7X 9.8	8X 21	12X 22	7X 9.8
20	10X 25.4	8X 18.4	7X 9.8	10X 22	12X 22	7X 9.8
22	10X 25.4	10X 25.4	7X 9.8	10X 26	12X 22	7X 9.8
24	12X 31.8	10X 25.4	7X 9.8	10X 26	12X 22	7X 9.8
26	12X 31.8	10X 25.4	7X 9.8	10X 30	12X 22	7X 9.8
28	12X 40.8	10X 25.4	8X 11.5	10X 30	12X 22	7X 9.8
30	12X 40.8	12X 31.8	8X 11.5	14X 34	12X 22	7X 9.8
32	12X 40.8	12X 31.8	8X 11.5	12X 35	12X 22	8X 11.5
34	12X 50.0	12X 31.8	8X 11.5	12X 40	12X 26	9X 13.4
36	— —	12X 40.8	7X 9.8	14X 43	14X 30	9X 13.4
38	— —	15X 42.9	8X 11.5	14X 43	14X 30	9X 13.4
40	— —	15X 42.9	8X 11.5	14X 48	14X 30	9X 13.4
42	— —	15X 42.9	8X 11.5	14X 48	16X 36	10X 15.3
44	— —	15X 42.9	8X 11.5	21X 62	16X 36	10X 15.3
46	— —	15X 50.0	9X 13.4	21X 68	16X 36	10X 15.3
48	— —	— —	— —	21X 68	18X 50	10X 15.3
50	— —	— —	— —	24X 76	18X 50	10X 15.3
52	— —	— —	— —	— —	18X 50	10X 15.3
54	— —	— —	— —	— —	18X 50	10X 15.3
56	— —	— —	— —	— —	18X 50	12X 20.7
58	— —	— —	— —	— —	24X 62	10X 15.3
60	— —	— —	— —	— —	24X 62	10X 15.3

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
3 TONNE RATED LOAD						
10	12X 40.8	12X 40.8	7X 9.8	10X 30	10X 39	12X 20.7
12	12X 40.8	12X 40.8	7X 9.8	12X 35	10X 39	12X 20.7
14	12X 40.8	12X 40.8	7X 9.8	12X 35	10X 39	12X 20.7
16	12X 40.8	12X 40.8	7X 9.8	14X 38	14X 43	12X 20.7
18	12X 40.8	12X 40.8	7X 9.8	16X 40	14X 43	12X 20.7
20	12X 40.8	12X 40.8	7X 9.8	18X 40	14X 43	12X 20.7
22	12X 50.0	12X 40.8	7X 9.8	10X 45	18X 50	10X 15.3
24	18X 54.7	12X 50.0	8X 11.5	16X 45	18X 50	10X 15.3
26	18X 54.7	18X 54.7	9X 13.4	14X 48	18X 50	10X 15.3
28	20X 66.0	18X 54.7	9X 13.4	14X 48	18X 50	10X 15.3
30	20X 66.0	18X 54.7	9X 13.4	14X 53	18X 50	10X 15.3
32	20X 75.0	18X 54.7	9X 13.4	18X 60	18X 50	10X 15.3
34	24X 80.0	18X 54.7	9X 13.4	18X 65	18X 50	10X 15.3
36	24X 80.0	18X 54.7	9X 13.4	16X 67	16X 50	12X 20.7
38	20X 86.0	18X 54.7	9X 13.4	16X 67	16X 50	12X 20.7
40	20X 96.0	20X 66.0	9X 13.4	16X 77	24X 62	10X 15.3
42	— —	20X 66.0	9X 13.4	16X 77	24X 62	10X 15.3
44	— —	20X 66.0	9X 13.4	16X 89	24X 62	10X 15.3
46	— —	20X 66.0	9X 13.4	24X 94	24X 62	10X 15.3
48	— —	20X 66.0	9X 13.4	27X 102	21X 62	12X 20.7
50	— —	20X 80.0	10X 15.3	27X 114	21X 62	12X 20.7
52	— —	24X 80.0	10X 15.3	27X 114	24X 62	12X 20.7
54	— —	24X 80.0	10X 15.3	30X 124	21X 68	12X 20.7
56	— —	24X 80.0	12X 20.7	— —	24X 76	12X 20.7
58	— —	24X 80.0	12X 20.7	— —	24X 76	12X 20.7
60	— —	24X 80.0	12X 20.7	— —	24X 76	12X 20.7

METRIC MEASURE (TONNES) - HAND GEARED BRIDGE

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
5 TONNE RATED LOAD						
10	12X 40.8	12X 40.8	7X 9.8	18X 46	18X 50	10X 15.3
12	12X 50.0	12X 40.8	7X 9.8	18X 46	12X 50	12X 20.7
14	18X 54.7	18X 54.7	9X 13.4	18X 46	16X 50	12X 20.7
16	18X 54.7	18X 54.7	9X 13.4	16X 50	16X 50	12X 20.7
18	18X 54.7	18X 54.7	9X 13.4	18X 55	14X 53	12X 20.7
20	18X 54.7	18X 54.7	9X 13.4	16X 57	24X 62	10X 15.3
22	20X 66.0	18X 54.7	9X 13.4	16X 57	16X 57	12X 20.7
24	20X 66.0	20X 66.0	9X 13.4	16X 57	16X 57	12X 20.7
26	20X 75.0	20X 66.0	9X 13.4	18X 60	16X 57	12X 20.7
28	24X 80.0	20X 66.0	9X 13.4	18X 65	18X 60	12X 20.7
30	24X 80.0	20X 66.0	9X 13.4	18X 71	18X 65	12X 20.7
32	20X 86.0	20X 66.0	9X 13.4	16X 77	18X 65	12X 20.7
34	24X 106.0	20X 66.0	9X 13.4	16X 77	18X 65	12X 20.7
36	24X 106.0	20X 66.0	9X 13.4	16X 89	18X 71	12X 20.7
38	24X 106.0	24X 80.0	10X 15.3	24X 94	18X 71	12X 20.7
40	24X 106.0	24X 80.0	10X 15.3	16X 100	18X 71	12X 20.7
42	24X 121.0	24X 80.0	10X 15.3	27X 114	21X 83	12X 20.7
44	— —	24X 80.0	10X 15.3	27X 114	21X 83	12X 20.7
46	— —	24X 80.0	10X 15.3	30X 124	21X 83	12X 20.7
48	— —	24X 80.0	12X 20.7	30X 132	21X 83	12X 20.7
50	— —	24X 80.0	12X 20.7	— —	24X 84	12X 20.7
52	— —	24X 80.0	12X 20.7	— —	24X 84	12X 20.7
54	— —	24X 80.0	15X 33.9	— —	24X 94	12X 20.7
56	— —	24X 106.0	12X 20.7	— —	24X 94	12X 20.7
58	— —	24X 106.0	12X 20.7	— —	24X 94	15X 33.9
60	— —	24X 106.0	15X 33.9	— —	27X 102	15X 33.9

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
10 TONNE RATED LOAD						
10	20X 66.0	20X 66.0	9X 13.4	21X 83	21X 83	12X 20.7
12	20X 66.0	20X 66.0	9X 13.4	21X 83	21X 83	12X 20.7
14	24X 80.0	24X 80.0	10X 15.3	21X 93	21X 83	12X 20.7
16	24X 80.0	24X 80.0	10X 15.3	21X 93	21X 93	12X 20.7
18	24X 80.0	24X 80.0	10X 15.3	21X 93	21X 93	12X 20.7
20	24X 80.0	24X 80.0	10X 15.3	21X 93	21X 93	12X 20.7
22	24X 106.0	24X 90.0	10X 15.3	21X 93	21X 93	12X 20.7
24	24X 106.0	24X 106.0	12X 20.7	27X 114	21X 93	18X 42.7
26	24X 106.0	24X 106.0	12X 20.7	27X 114	27X 114	15X 33.9
28	24X 106.0	24X 106.0	12X 20.7	27X 114	27X 114	15X 33.9
30	24X 106.0	24X 106.0	12X 20.7	27X 114	27X 114	15X 33.9
32	— —	24X 106.0	12X 20.7	30X 124	27X 114	15X 33.9
34	— —	24X 106.0	12X 20.7	30X 124	30X 124	15X 33.9
36	— —	24X 106.0	12X 20.7	21X 132	30X 124	15X 33.9
38	— —	24X 106.0	12X 20.7	33X 141	30X 124	15X 33.9
40	— —	24X 106.0	15X 33.9	24X 146	30X 132	15X 33.9
42	— —	24X 121.0	15X 33.9	24X 146	30X 132	15X 33.9
44	— —	— —	— —	24X 146	30X 132	15X 33.9
46	— —	— —	— —	24X 146	30X 132	15X 33.9
48	— —	— —	— —	24X 162	33X 141	15X 33.9
50	— —	— —	— —	24X 162	24X 146	18X 42.7
52	— —	— —	— —	36X 194	24X 162	18X 42.7
54	— —	— —	— —	36X 210	24X 162	18X 42.7
56	— —	— —	— —	— —	24X 162	18X 42.7
58	— —	— —	— —	— —	36X 170	18X 42.7
60	— —	— —	— —	— —	36X 170	18X 42.7

Span Thru (ft)	S	Sw/C		W	Ww/C	
		S	C		W	C
7½ TONNE RATED LOAD						
10	20X 66.0	20X 66.0	9X 13.4	16X 57	16X 57	12X 20.7
12	20X 66.0	20X 66.0	9X 13.4	18X 65	18X 65	12X 20.7
14	20X 66.0	20X 66.0	9X 13.4	18X 65	18X 65	12X 20.7
16	20X 66.0	20X 66.0	9X 13.4	18X 71	18X 71	12X 20.7
18	24X 80.0	20X 66.0	9X 13.4	18X 71	18X 71	12X 20.7
20	24X 80.0	24X 80.0	10X 15.3	18X 71	18X 71	12X 20.7
22	24X 80.0	24X 80.0	10X 15.3	21X 83	21X 83	12X 20.7
24	24X 80.0	24X 80.0	10X 15.3	21X 83	21X 83	12X 20.7
26	24X 80.0	24X 80.0	10X 15.3	21X 83	21X 83	12X 20.7
28	20X 96.0	24X 80.0	10X 15.3	21X 83	21X 83	12X 20.7
30	24X 106.0	24X 90.0	10X 15.3	21X 93	21X 93	12X 20.7
32	24X 106.0	24X 106.0	12X 20.7	21X 93	21X 93	12X 20.7
34	24X 106.0	24X 106.0	12X 20.7	16X 100	21X 93	12X 20.7
36	24X 121.0	24X 106.0	12X 20.7	27X 114	21X 93	12X 20.7
38	— —	24X 106.0	12X 20.7	27X 114	21X 93	12X 20.7
40	— —	24X 106.0	12X 20.7	30X 124	24X 94	12X 20.7
42	— —	24X 106.0	12X 20.7	30X 132	27X 114	15X 33.9
44	— —	24X 106.0	12X 20.7	— —	27X 114	15X 33.9
46	— —	24X 106.0	12X 20.7	— —	27X 114	15X 33.9
48	— —	24X 106.0	12X 20.7	— —	27X 114	15X 33.9
50	— —	24X 106.0	12X 20.7	— —	27X 114	15X 33.9
52	— —	24X 106.0	15X 33.9	— —	27X 114	15X 33.9
54	— —	24X 121.0	15X 33.9	— —	27X 114	15X 33.9
56	— —	24X 121.0	15X 50.0	— —	30X 124	15X 33.9
58	— —	— —	— —	— —	30X 124	15X 33.9
60	— —	— —	— —	— —	30X 124	15X 33.9

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[illegible]



This image shows a full page of blank, lined paper. It features approximately 28 evenly spaced horizontal grey lines across its entire width, providing a template for handwriting practice or general note-taking. The margins are consistent on all sides.



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P.O. Box 769
Muskegon, Michigan 49443-0769
(800) 742-9269 Phone
(800) 742-9270 Fax

WARRANTY

WARRANTY AND LIMITATION OF REMEDY AND LIABILITY

A. Seller warrants that its products and parts, when shipped, and its work (including installation, construction and start-up), when performed, will meet applicable specifications, will be of good quality and will be free from defects in material and workmanship. All claims for defective products or parts under this warranty must be made in writing immediately upon discovery and, in any event, within one (1) year from shipment of the applicable item unless Seller specifically assumes installation, construction or start-up responsibility. All claims for defective products or parts when Seller specifically assumes installation, construction or start-up responsibility, and all claims for defective work must be made in writing immediately upon discovery and, in any event, within one (1) year from completion of the applicable work by Seller, provided, however, all claims for defective products and parts made in writing no later than eighteen (18) months after shipment. Defective items must be held for Seller's inspection and returned to the original f.o.b. point upon request. THE FOREGOING IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS.

B. Upon Buyer's submission of a claim as provided above and its substantiation, Seller shall at its option either (i) repair or replace its product, part or work at either the original f.o.b. point of delivery or at Seller's authorized service station nearest Buyer or (ii) refund an equitable portion of the purchase price.

C. This warranty is contingent upon Buyer's proper maintenance and care of Seller's products, and does not extend to normal wear and tear. Seller reserves the right to void warranty in event of Buyer's use of inappropriate materials in the course of repair or maintenance, or if Seller's products have been dismantled prior to submission to Seller for warranty inspection.

D. The foregoing is Seller's only obligation and Buyer's exclusive remedy for breach of warranty, and is Buyer's exclusive remedy hereunder by way of breach of contract, tort, strict liability or otherwise. In no event shall Buyer be entitled to or Seller liable for incidental or consequential damages. Any action for breach of this agreement must be commenced within one (1) year after the cause of action has accrued.