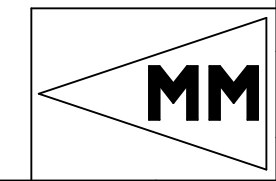
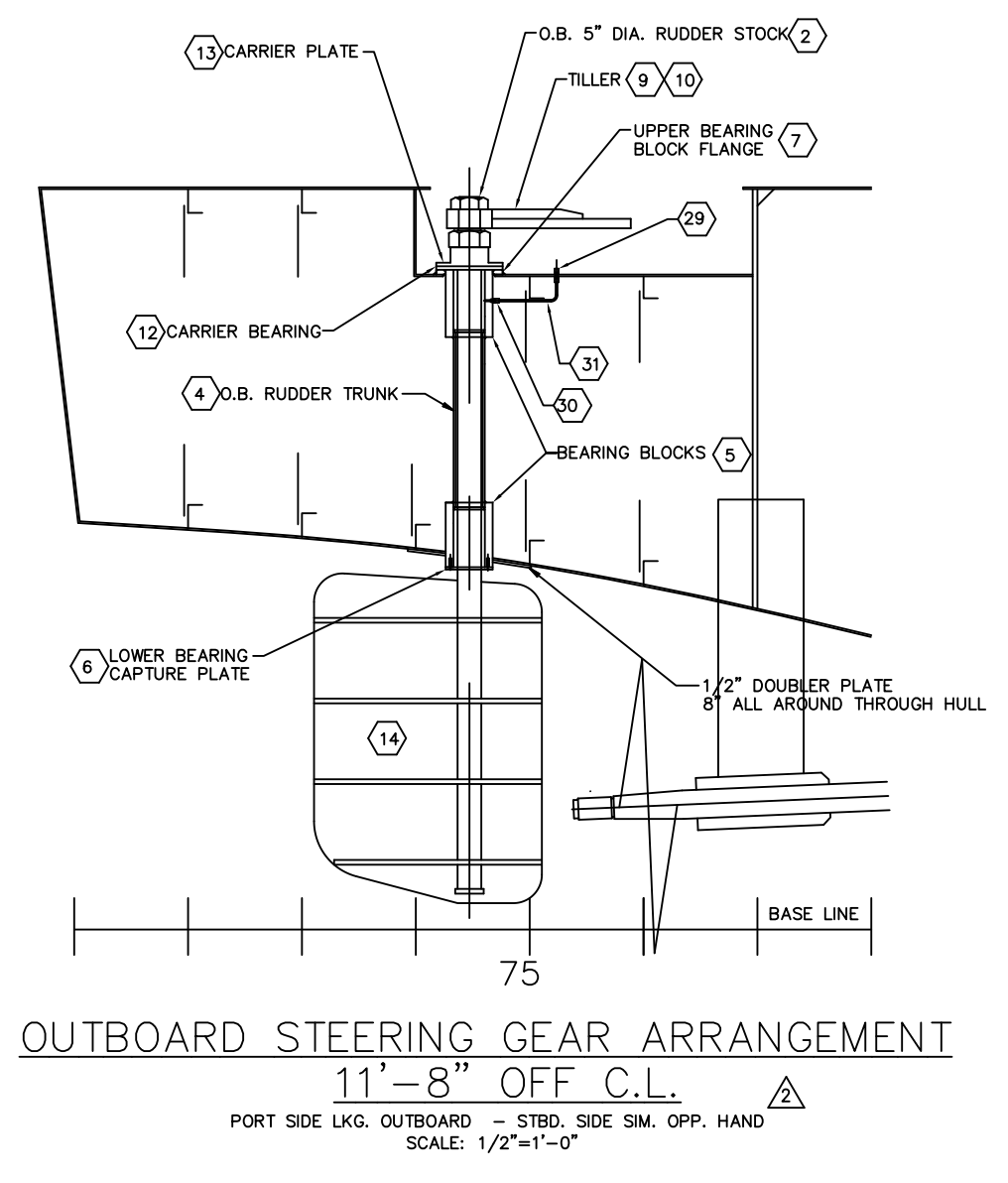
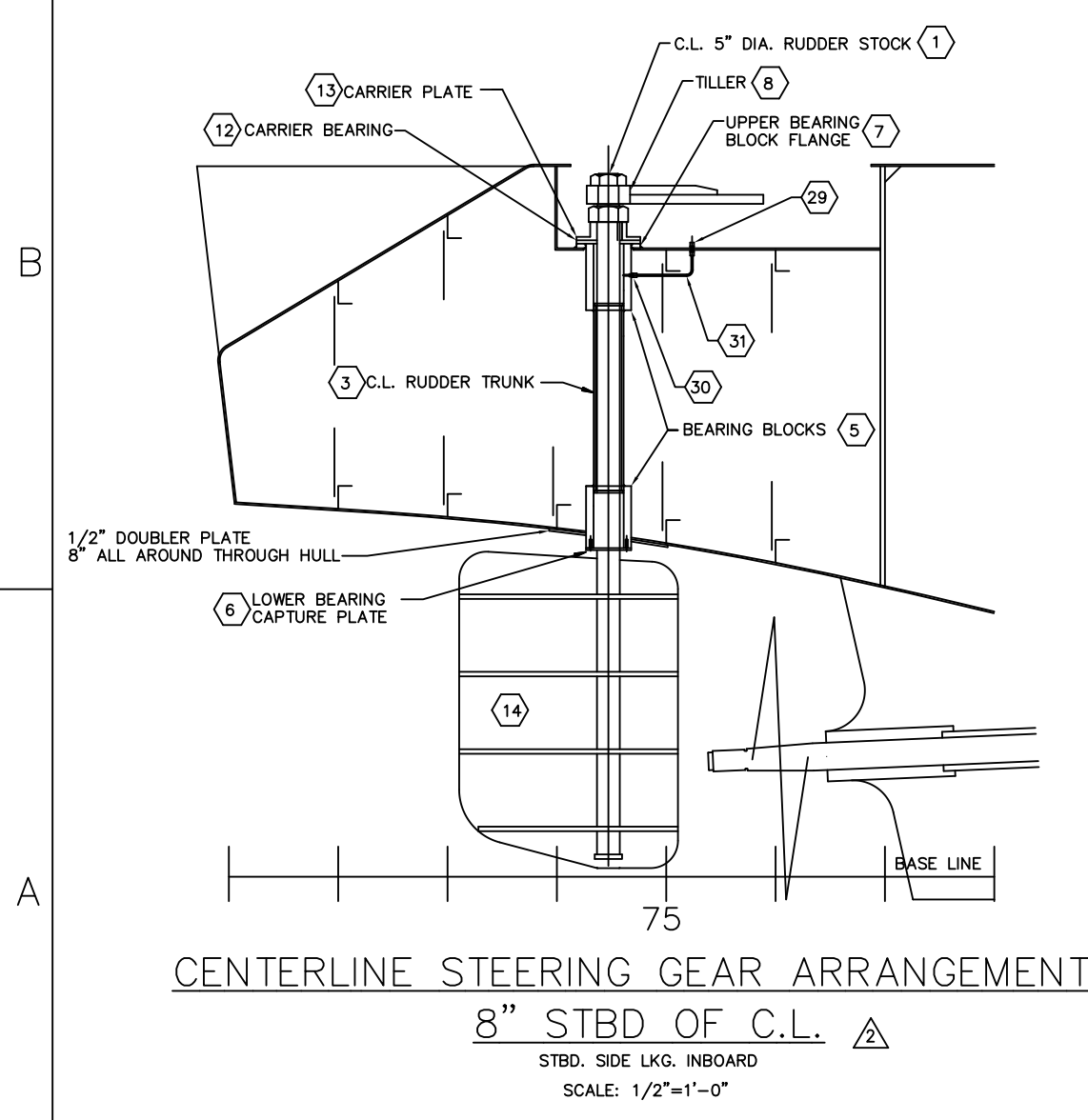


BILL OF MATERIALS		
MK	QTY	DESCRIPTION
1	1	C.L. RUDDER STOCK, 5" O.D. X 12'-0" LNG., AQUAMET 17 OR EQUAL
2	2	OUTBOARD RUDDER STOCK, 5" O.D. X 12'-0" LNG., AQUAMET 17 OR EQUAL
3	1	CL TRUNK, 6" SCHEDULE 80 EXTRA HEAVY PIPE, 3'-5" LNG.
4	2	OUTBOARD TRUNK, 6" SCHEDULE 80 EXTRA HEAVY PIPE, 3'-3 3/8" LNG.
5	6	BUSHING BLOCK, 10" O.D. X 6.5" I.D. X 1'-1 3/4" LNG. ROUND MECHANICAL TUBING STOCK
6	3	LOWER BEARING CAPTURE PLATE, 10" DIA. 1/2" THK. PLATE, ASTM A-36
7	3	UPPER BEARING CAPTURE PLATE, 1'-2" DIA. 1" THK. PLATE, ASTM A-36
8	1	CENTER TILLER ARM ASSEMBLY; ASTM A-36 STEEL OR EQUAL
9	1	PORT TILLER ARM ASSEMBLY; ASTM A-36 STEEL OR EQUAL
10	1	STARBOARD TILLER ARM ASSEMBLY; ASTM A-36 STEEL OR EQUAL
11	6	RUDDER BUSHING - MC901 NYLON
12	3	CARRIER BEARING, NYLON, 1/2" X 5" ID X 1'-2" OD
13	3	CARRIER PLATE, ASTM A-36 STEEL
14	3	RUDDER, 1" STEEL PLATE, ASTM A-36 STEEL
15	3	RUDDER FINs, 1" STEEL PLATE, ASTM A-36
16	6	KEY, 3.998" X 1.368" X .888", 1 3/8" KEY STOCK BRASS
17	48	1/2" DIA. X 2" LNG. CAP SCREWS, HEX HEAD, MATERIAL: 316L
18	1	JOCKEY BAR; 4" SCHEDULE 40 STEEL PIPE
19	12	1" GRADE 8, HEX HEAD BOLTS, FINE THREAD
20	12	1" NYLOCK NUTS, FINE THREAD
21	5	BRONZE BUSHINGS; 2.5" OD X 2" ID X 2.5" LONG
22	10	BRONZE SPACERS; 4" OD X 2.5" ID X THICKNESS TO SUIT
23	5	2" DIA CLEVIS PINS; PROVIDED BY HYDRAULIC RAM SUPPLIER
24	3	5" 4 TPI UNC HEAVY HEX; 3.5" DEEP; STEEL
25	3	4.5" 4 TPI UNC HEAVY HEX; 2.5" DEEP; STEEL
26	2	CLEVIS; GULF COAST AIR & HYDRAULICS PART# JTC-48
27	2	ATLAS CYLINDERS; PRT # H-050- -PB2-0250-1-NC-N-P-24.000
28	2	BRACKETS; GULF COAST HYDRAULICS PART# EB 200
29	3	PARKER FLUID CONNECTORS PRT# 6 WBU BULKHEAD UNION, SS
30	3	PARKER FLUID CONNECTORS PRT # 6 F5BU STRAIGHT THREAD CONN, SS
31	3	3/8" SS TUBING, LENGTH TO FIT.
32	2	RUDDER STOPS, 1" X 6" A-36 STAINLESS STEEL BAR STOCK

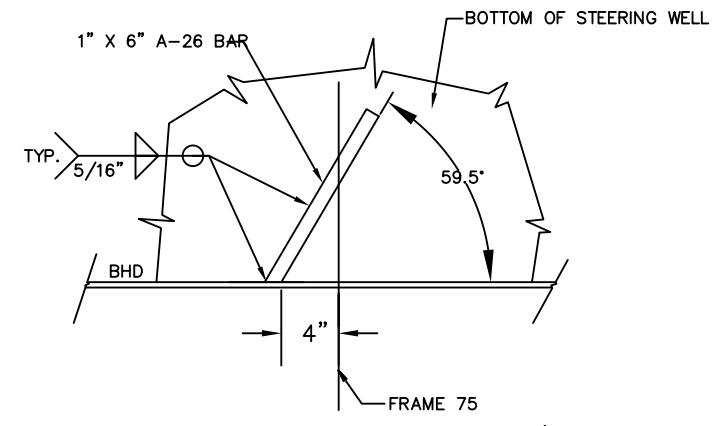
**NOTE:**  
ALL WELDING AND WORKMANSHIP IN ACCORDANCE WITH ABS RULES FOR BUILDING & CLASSING STEEL VESSELS UNDER 90 METERS (295 FEET) IN LENGTH.



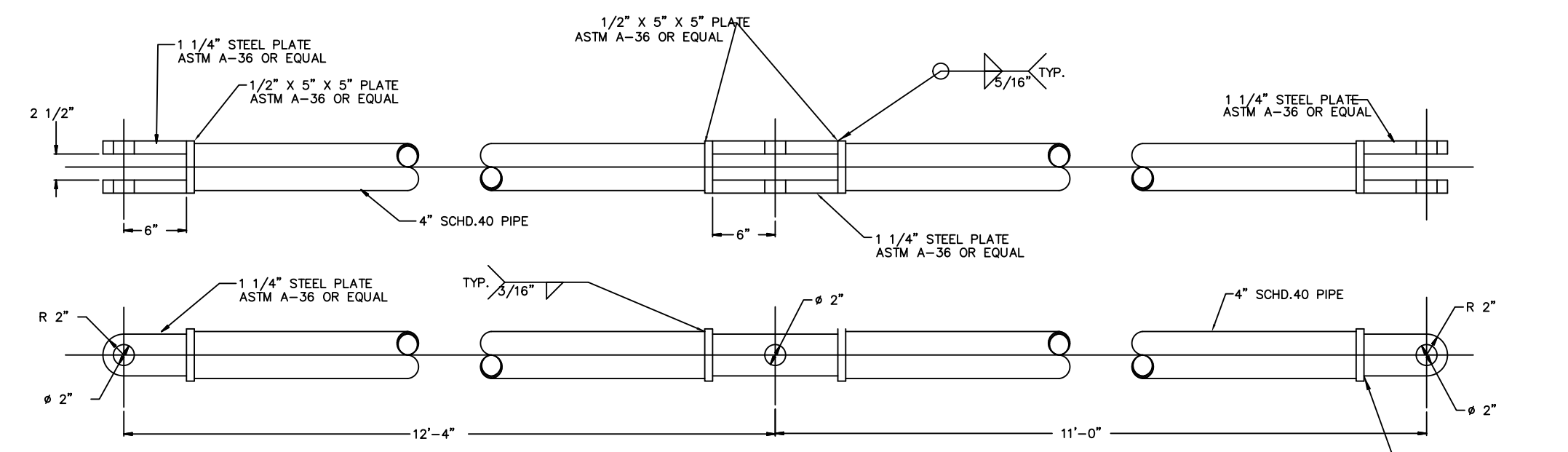
DRAWN BY: PDSI -JFK	DATE: 4/20/99
CHECKED BY:	DATE:
APPROVED BY:	DATE:
APPROVED BY:	DATE:
SCALE: AS SHOWN	CONTRACT NO: S-185-32
This drawing and its contents, specifications and design concept are proprietary information and may not be wholly or partially reproduced, transferred or used for manufacture without written consent from: MARINE MANAGEMENT INCORPORATED OR ROBERT L. PAYNE. Copyright 1997	
DWG. NO: S-185-M2	

2	1. MODIFIED BILL OF MATERIAL (SHT1). 2. REVISED RUDDER DETAIL TO SHOW AS BUILT (SHT1). 3. REVISED TILLER HEAD ASSY DET. TO AS BUILT (SHT1). 4. REVISED STEERING GEAR ARRANGEMENTS TO AS BUILT (SHT1). 5. CREATED UPPER BUSHING BLOCK FLANGE (SHT2). 6. MODIFIED LOWER BUSHING CAPTURE PL (SHT2). 7. MODIFIED BUSHING & BUSHING BLOCKS (SHT2). 8. REVISED LENGTH OF RUDDER STOCK (SHT2). 9. REVISED LENGTH OF RUDDER TRUNKS (SHT2). 10. REVISED RUDDER STOPS TO AS BUILT (SHT3). 11. CHANGED SIZE OF CARRIER PLATE FLANGE (SHT3).	RLP 11/14/99
1	ISSUED FOR CONSTRUCTION.	RLP 4/28/99
NO.	ALTERATIONS	BY/DATE
TITLE: 160'x40'x13' RESEARCH VESSEL <b>STEERING ARRANGMENT AND RUDDER DETAILS</b>		
PREPARED FOR: CAMERON OFFSHORE BOATS, INC CAMERON, LOUISIANA		
MARINE MANAGEMENT INC. MARINE DESIGNERS and SURVEYORS		SHT: 1 OF: 3
P.O. Box: 1803 Ocean Springs, MS 39566-1803 Ph: 601-872-2846 Fax: 601-872-0606 Online: rpayne@mmataync.com		ALT NO: 2

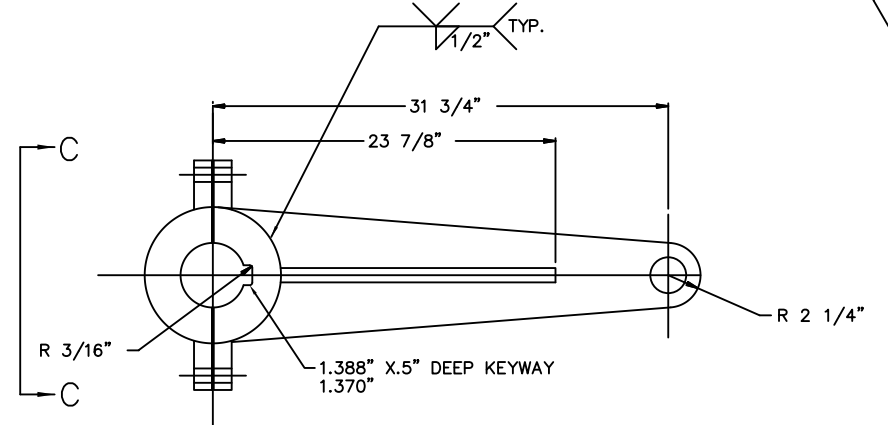
S-185-M2  
ALT. 2



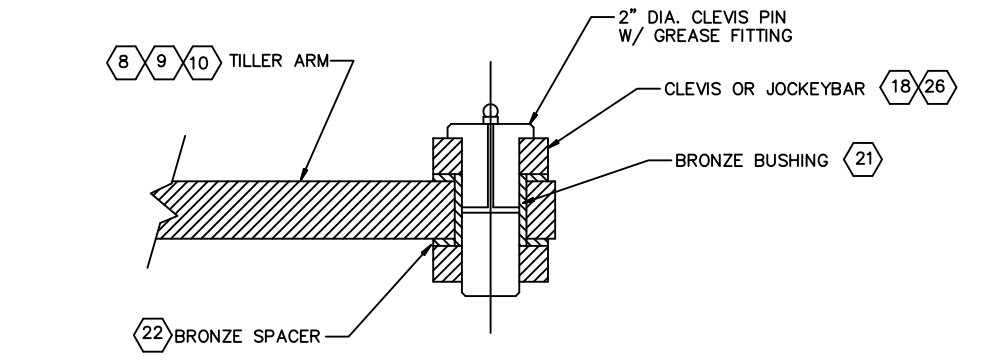
**32 RUDDER STOPS**  
STBD. SHOWN PORT SIM. OPP. HAND  
SCALE: 1 1/2"=1'-0"



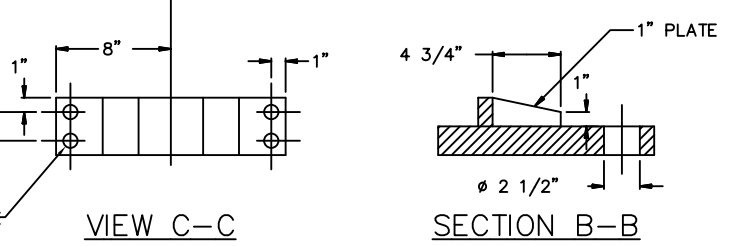
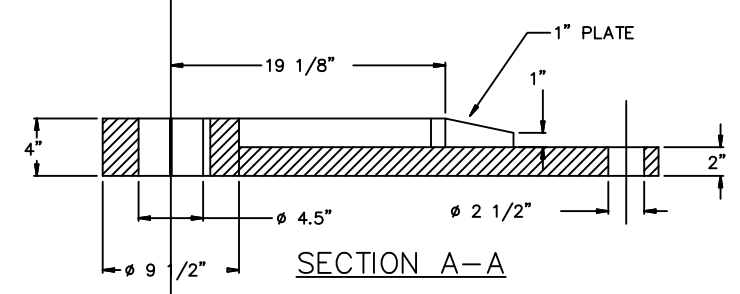
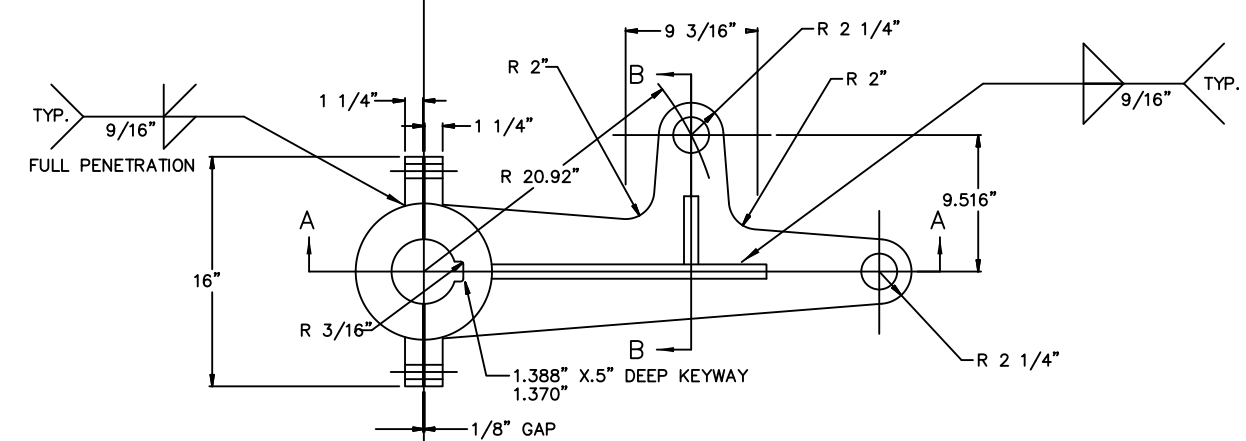
**18 JOCKEY BAR**  
SCALE: 1 1/2"=1'-0"



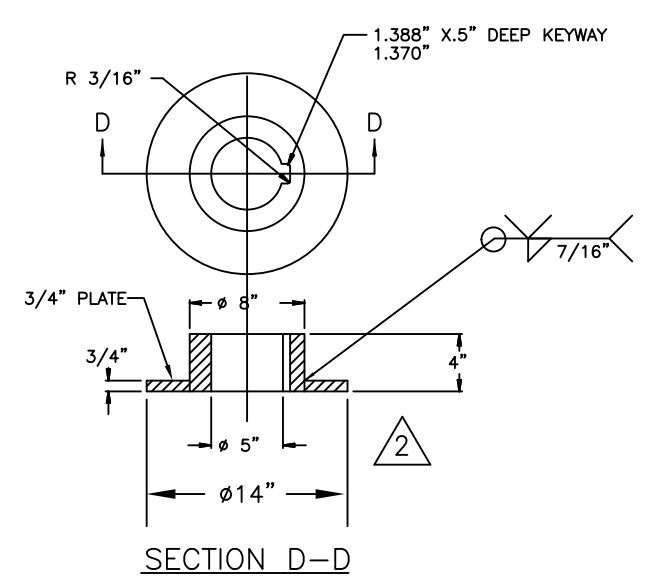
**8 CENTER TILLER ARM**  
SCALE: 1 1/2"=1'-0"



**21 22 BUSHING DETAIL**  
SCALE: 3"=1'-0"

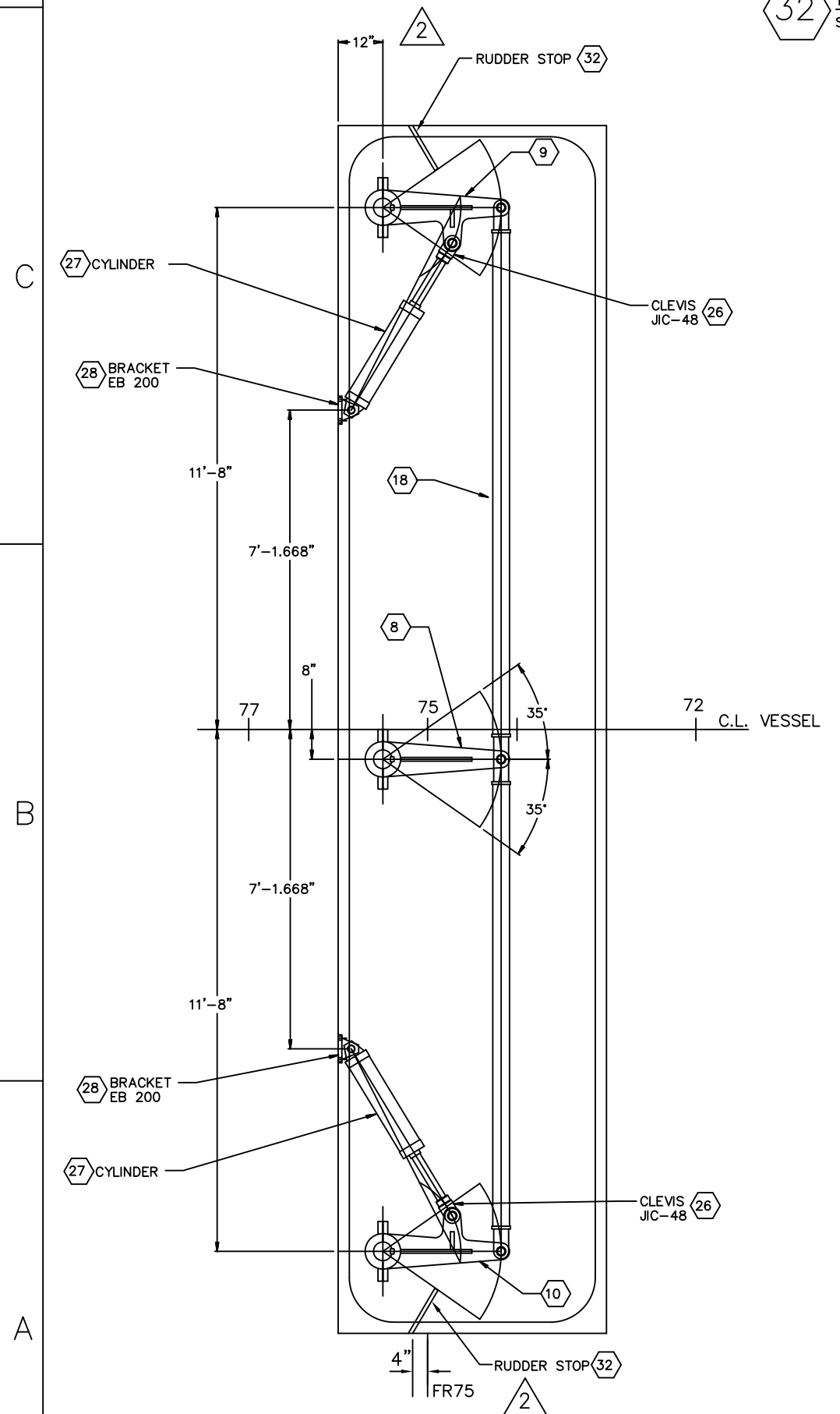


**9 10 TILLER ARM**  
STARBOARD TILLER (9) SHOWN  
PORT TILLER SIM TO OPP HAND  
SCALE: 1 1/2"=1'-0"



**13 CARRIER PLATE**  
SCALE: 1 1/2"=1'-0"

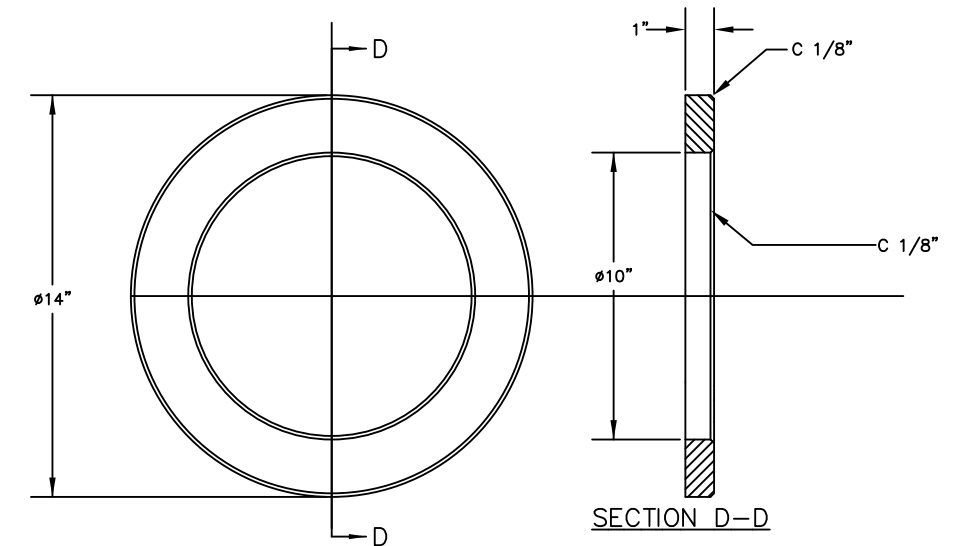
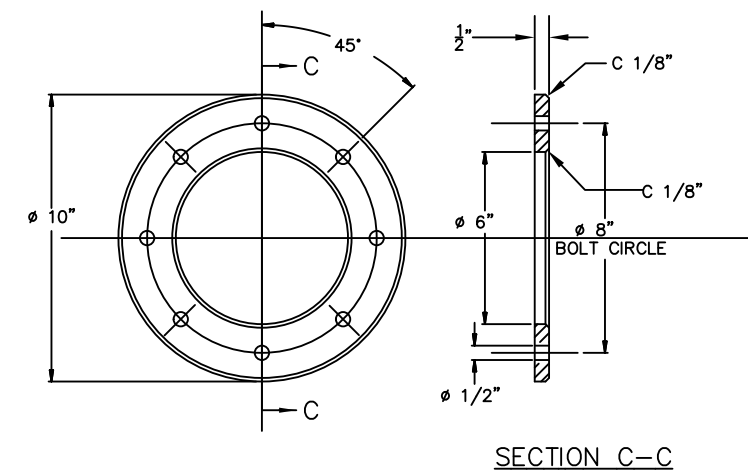
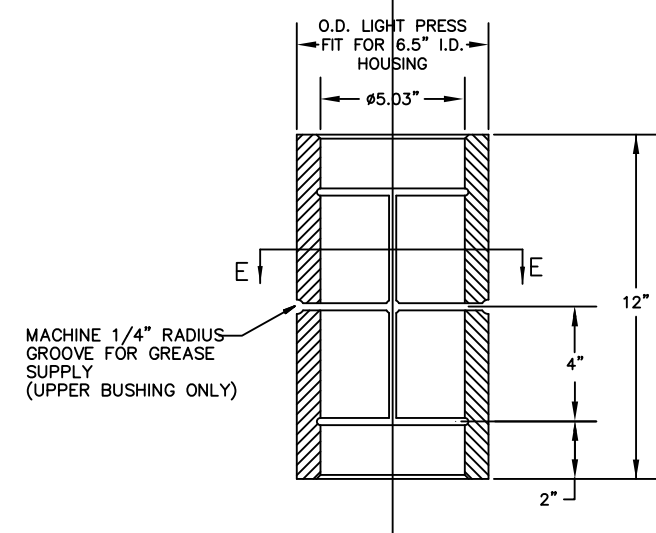
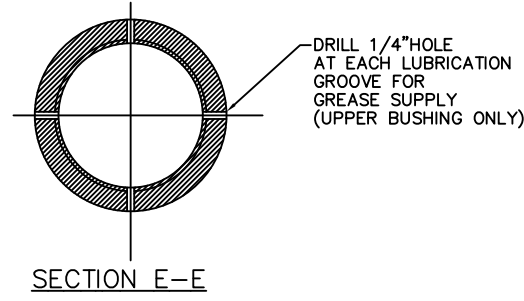
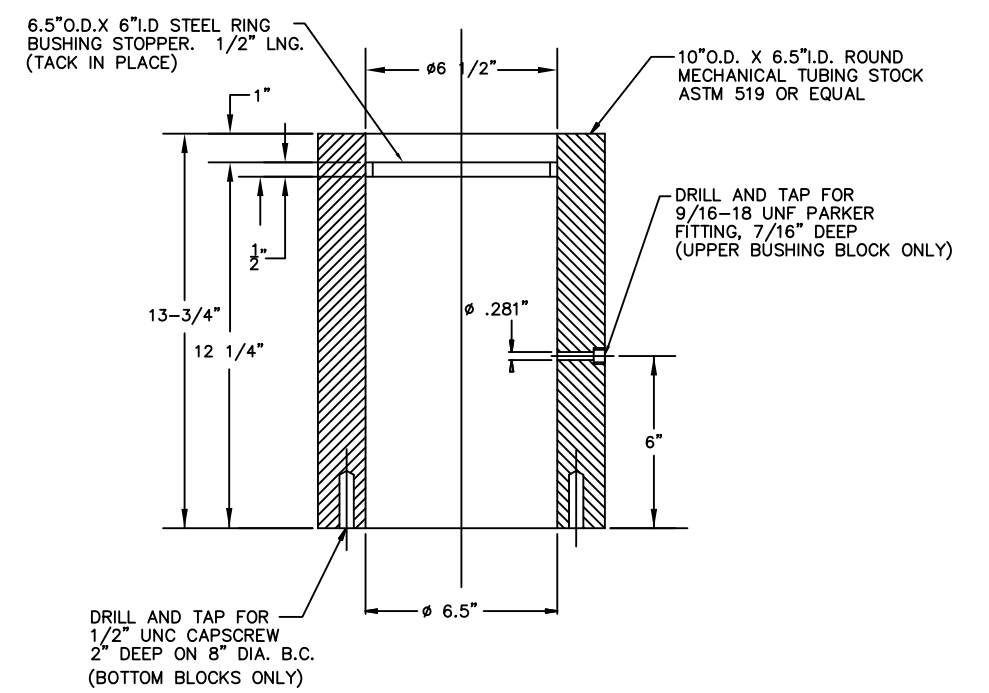
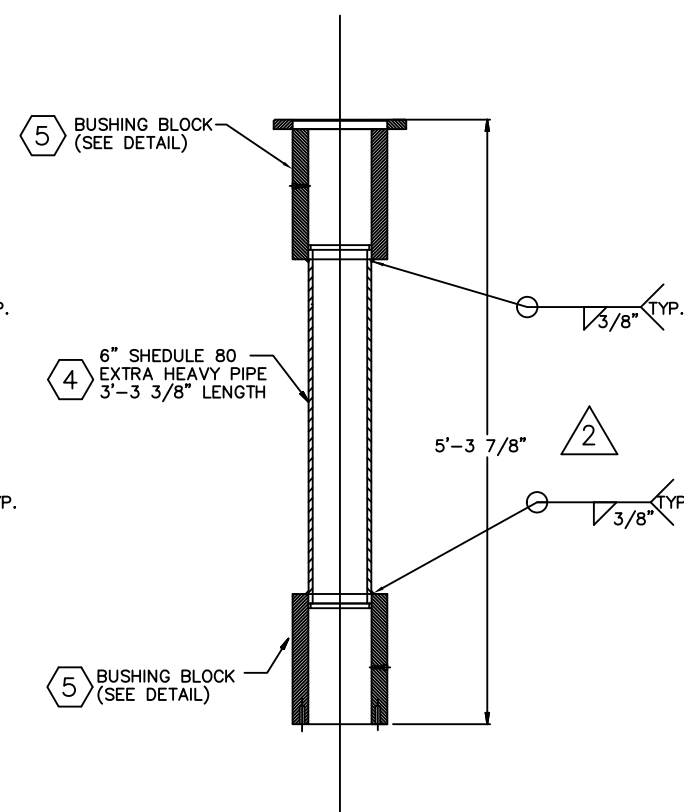
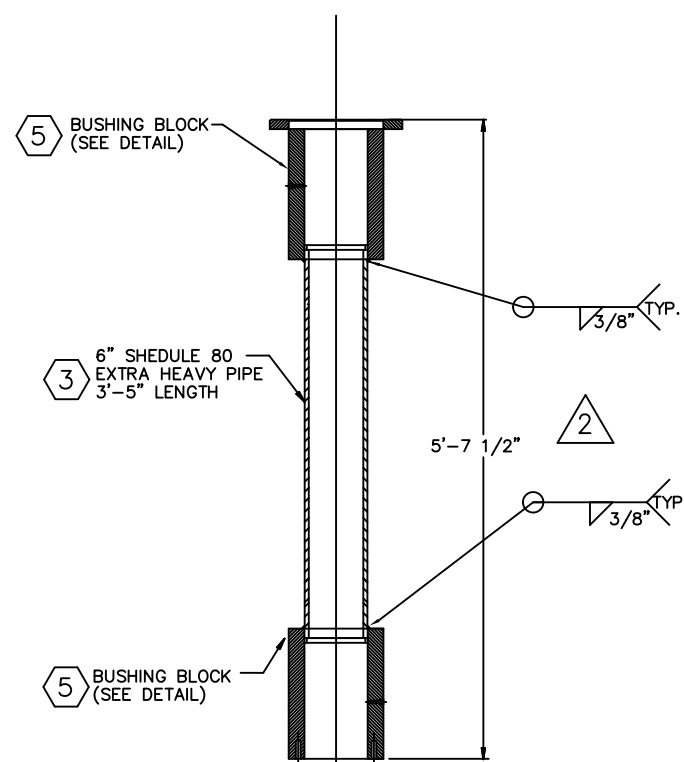
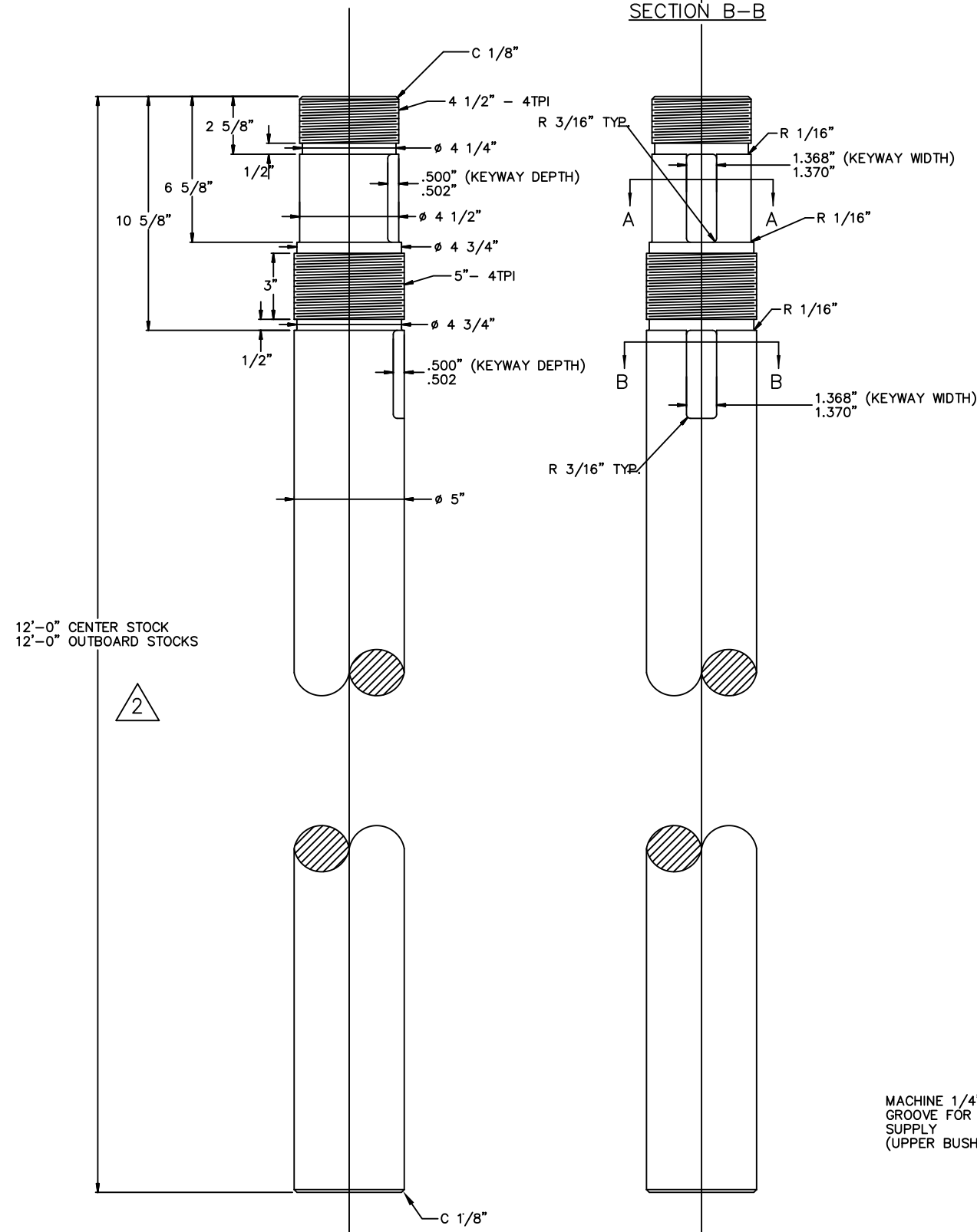
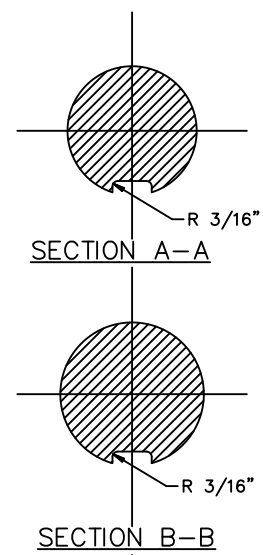
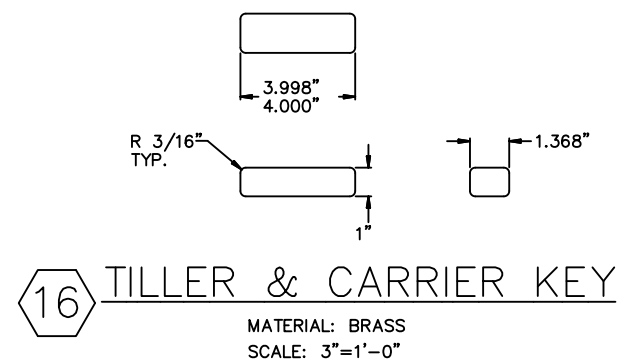
**NOTE:**  
ALL WELDING AND WORKMANSHIP IN ACCORDANCE WITH  
ABS 'RULES FOR BUILDING & CLASSING  
STEEL VESSELS UNDER 90 METERS (295 FEET) IN LENGTH.



**TILLER ARRANGEMENT**  
SCALE: 1/2"=1'-0"

SCALE: AS NOTED		TITLE: 160'x40'x13' RESEARCH VESSEL	
		<b>STEERING ARRANGEMENT AND RUDDER DETAILS</b>	
		MARINE MANAGEMENT INC. MARINE DESIGNERS and SURVEYORS	
P.O. Box: 1803 Ocean Springs, MS 39566-1803 Ph: 601-872-2846 Fax: 601-872-0606 Online: rpayne@mmatadync.com		SHT: 3	OF: 3
		ALT NO: 2	

ALT. 2  
S-185-M2



NOTE:  
ALL WELDING AND WORKMANSHIP IN ACCORDANCE WITH ABS RULES FOR BUILDING & CLASSING STEEL VESSELS UNDER 90 METERS (295 FEET) IN LENGTH.

SCALE: AS NOTED		TITLE: 160'x40'x13' RESEARCH VESSEL	
		STEERING ARRANGEMENT AND RUDDER DETAILS	
		MARINE MANAGEMENT INC.	
MARINE DESIGNERS and SURVEYORS		SHT: 2	OF: 3
P.O. Box: 1803 Ocean Springs, MS 39566-1803		ALT NO: 2	
Ph: 601-872-2846 Fax: 601-872-0606 Online: rpayne@mmataync.com			

ALT. 2  
S-1185-M2