



SYMBOLS	
	ELECTRICAL CABLE
	PIPING, HYDRAULIC
	PIPING, HYDRAULIC DRAIN
	FLOW
	VALVE, BALL
	VALVE, CHECK
	FLEXIBLE HOSE
	COMPONENT BOUNDARY/ENCLOSURE

BILL OF MATERIAL			
PC NO.	QTY	DESCRIPTION	MATERIAL/SPECIFICATION/REMARKS
1	1	FFU AMPLIFIER	KOBELT, 7173-K
2	2	RUDDER ANGLE INDICATOR	KOBELT, 7175-MY, WITH BACKLIGHT DIMMER
3	1	STACKED FFU LEVER	KOBELT, 7195-B
4	2	RUDDER FEEDBACK UNITS	KOBELT, 7174-B
5	1	CROSS PORT BYPASS VALVE	KOBELT, 7120 (SET 1500 PSI)
6	AS REQ	HOSE 3/4" ID	SAE J1942, SWIVEL END FITTINGS
7	AS REQ	HOSE, 1/2" ID	SAE J1942, SWIVEL END FITTINGS
8	AS REQ	HOSE, 1 1/2" ID	SAE J1942, SWIVEL END FITTINGS
9	AS REQ	PIPE 1/2", SCHED 40	STEEL, ASTM A106 GR B, BLACK
10	AS REQ	PIPE 1 1/2", SCHED 40	STEEL, ASTM A106 GR B, BLACK
11	AS REQ	PIPE 3/4", SCHED 80	STEEL, ASTM A106 GR B, BLACK
12	AS REQ	PIPE 1 1/4", SCHED 80	STEEL, ASTM A106 GR B, BLACK
13	2	BALL VALVE, 1 1/2" FLANGED	SS, MSS-SP-72, NIBCO F-510-56-R-66-FS OR EQUAL
14	1	SOLENOID VALVE MANIFOLD	SEE NOTE 1 (KOBELT SUPPLY)
15	1	RESERVOIR, 50-GAL	SEE SHEET 233-101 (KOBELT SUPPLY)
16	2	PUMP, AXIAL PISTON TYPE	SEE SHEET 233-101 (KOBELT SUPPLY)
17	2	CHECK VALVE, 1 1/4"	ALUMINUM BODY, RATED 3000 PSI, SUN MODEL ICF, OR EQUAL
18	2	JUNCTION BOX, 10 TERMINAL	PAULUHN 568T10 OR EQUAL

- NOTES:**
- HYDRAULIC SOLENOID VALVE MANIFOLD CONSISTS OF FOLLOWING PACKAGE MOUNTED ON AND PIPED TO THE RESERVOIR (PC 15):  
 A. (2) VALVE BASES WITH SAE O-RING PORTS  
 B. (2) 12VDC SOLENOID VALVES (CLOSED CENTER, SOFT SHIFT)  
 C. (2) DUAL PILOT-OPERATED CHECK VALVES  
 D. (2) FLOW CONTROL VALVES, ADJUSTABLE  
 E. OIL FILLED PRESSURE GAUGE AND ISOLATOR  
 F. LOW PRESSURE SWITCH
  - SYSTEM OPERATING PRESSURE IS 1500PSIG. ENTIRE SYSTEM, EXCEPT FOR VENTED RESERVOIR AND SUCTION PIPING BETWEEN RESERVOIR AND PUMPS IS TO HAVE MAX ALLOWABLE WORKING PRESSURE OR AT LEAST 1500PSIG.
  - MINIMUM PIPE BEND RADIUS IS 4 TIMES OUTSIDE DIAMETER. MINIMUM HOSE BEND RADIUS IS TO BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
  - HYDRAULIC PIPING SHALL BE INSTALLED WITH ISOLATION HANGERS LOCATED TO MINIMIZE VIBRATION AND CONTROL MOVEMENT OF LINES.
  - PIPE PENETRATION OF BULKHEAD AND DECK SHALL BE WATERTIGHT.
  - INSTALLATION AND FILTRATION SHALL BE ADEQUATE TO MAINTAIN SYSTEM CLEANLINESS (CONTAMINATION STANDARD) AT SAE CLASS 4 (ISO CLASS 16/13) OR CLEANER.
  - PROVIDE ONE MADE-UP SPARE OF EACH SIZE AND LENGTH OF HYDRAULIC HOSE, INCLUDING END FITTINGS.
  - REFER TO DRAWING 321-101 FOR ELECTRICAL INSTALLATION REQUIREMENTS.
  - INSTALL A 2A IN LINE FUSE ON EACH BACKLIGHT POSITIVE WIRE IN THE STEERING POWER BOX.

**HYDRAULIC STEERING SYSTEM PIPING & WIRING DIAGRAM**  
SCALE: NTS



FILE NAME =	USER NAME =	DESIGNED -- A. WINKLEY	REVISED --
		DRAWN -- R. MANANSALA	REVISED --
		CHECKED -- P. MARTIN	REVISED --
		DATE -- 7/19/2011	REVISED --

STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

IDOT BRUSSELS FERRY  
HYDRAULIC STEERING SYSTEM DIAGRAM  
SCALE: NONE SHEET NO. OF SHEETS STA. TO STA.

F.A.P. RTE. 304	SECTION 21-3	COUNTY JERSEY	TOTAL SHEETS 47	SHEET NO. 40
DRAWING NO. CEIDT001PB-556-101		CONTRACT NO. 76D29		
FED. ROAD DIST. NO.		ILLINOIS FED. AID PROJECT		