













SCHEME B - SEQUENCE OF OPERATION

-LEAD AND SUBSEQUENT FUELING PUMPS STARTED AND STOPPED AUTOMATICALLY

SYSTEM IN "AUTOMATIC" MODE - IDLE CONDITION

THE SCHEME B SYSTEM IS INTENDED TO REMAIN CONTINUOUSLY PRESSURIZED WHILE IN THE IDLE CONDITION. THIS ALLOWS THE SYSTEM TO RESPOND AUTOMATICALLY/ IMMEDIATELY TO AIRCRAFT REFUELING MISSION REQUIREMENTS.

PERIODICALLY, WHILE IN THE IDLE CONDITION WITH NO AIRCRAFT REFUELING DEMANDS. THE SYSTEM WILL LOSE MINIMUM PRESSURE REQUIREMENTS. WHEN THIS OCCURS, THE CONTROL SYSTEM WILL AUTOMATICALLY RE-PRESSURIZE IN THE FOLLOWING SEQUENCE:

1. AS SYSTEM PRESSURE AT PRESSURE INDICATING TRANSMITTER PIT-1 OR PIT-2 DROPS BELOW SET POINT OF 60 PSIG, THE CONTROL SYSTEM WILL START THE SELECTED LEAD FUELING PUMP, AND CONTROL SIGNALS WILL BE INITIATED FOR THE FOLLOWING FUNCTIONS:

- THE BACK PRESSURE CONTROL VALVE (BPCV) SOLENOID "A" WILL BE ENERGIZED TO ENABLE BPCV TO MODULATE OPEN AT ITS SET POINT.
-THE PRESSURE CONTROL VALVE (PCV) SOLENOID WILL BE ENERGIZED TO HOLD PCV CLOSED WHILE ANY PUMP IS RUNNING.

2. THE LEAD FUELING PUMP WILL ESTABLISH A FLOW OF 600+/- GPM THRU THE SYSTEM ISSUE VENTURI, AND THE PRESSURE UPSTREAM OF THE BPCV WILL INCREASE UNTIL THE BPCV SET POINT OF 80 PSIG (AS DETERMINED BY HYDRAULICS OF THE SYSTEM) IS REACHED. AT THIS PRESSURE, THE BPCV WILL START TO OPEN AND THE VALVE WILL MODULATE AS REQUIRED TO MAINTAIN PRESSURE UPSTREAM OF THE VALVE.

3. WITH NO FUELING DEMAND, THE RETURN VENTURI WILL SEE TOTAL FLOW OF 600 +/- GPM FROM THE LEAD PUMP. IF DPT-3 OR DPT-4 SENSES DIFFERENTIAL PRESSURE CORRESPONDING TO A FLOW RATE GREATER THAN 560 GPM FOR A PERIOD OF 60 SECONDS (ADJUSTABLE), THE CONTROL SYSTEM WILL INITIATE CONTROL SIGNALS FOR THE FOLLOWING FUNCTIONS:

- THE SOLENOID "A" WILL BE DE-ENERGIZED (PRIOR TO LEAD PUMP SHUT-OFF) TO CLOSE THE BPCV. SIGNAL TO STOP LEAD PUMP SHALL OCCUR WHEN PRESSURE INDICATING TRANSMITTER PIT-1 OR PIT-2 RISES ABOVE SET POINT OF 110 PSIG FOR A PERIOD OF 2 SECONDS (AS DETERMINED BY HYDRAULICS OF THE SYSTEM).

- THE PCV SOLENOID WILL BE DE-ENERGIZED (SIMULTANEOUSLY WITH SIGNAL TO DE-ENERGIZE THE BPCV SOLENOID "A" TO BLEED SYSTEM PRESSURE TO 75 PSIG.

AT THIS POINT THE SYSTEM HAS RETURNED TO A PRESSURIZED IDLE CONDITION.

SYSTEM IN "AUTOMATIC" MODE - REFUELING CONDITION

TO INITIATE AN AIRCRAFT REFUELING OPERATION, AN OPERATOR CONNECTS PANTOGRAPH EQUIPMENT TO AN AIRCRAFT. REFUELING CONTROL VALVES HAVE HYDRAULIC LINE PRESSURE "DEADMAN" CONTROL SYSTEMS. WHEN THE OPERATOR OPENS THE REFUELING CONTROL VALVE BY USE OF THE DEADMAN, THE FOLLOWING SEQUENCE OCCURS:

1. AS SYSTEM PRESSURE AT PRESSURE INDICATING TRANSMITTER PIT-1 OR PIT-2 DROPS BELOW SET POINT OF 60 DUE TO DEPRESSING OF THE "DEADMAN" CONTROL, CONTROL SIGNALS WILL BE INITIATED FOR THE FOLLOWING FUNCTIONS:

- THE BACK PRESSURE CONTROL VALVE (BPCV) SOLENOID "A" WILL BE ENERGIZED TO ENABLE BPCV TO MODULATE OPEN TO ITS SET POINT.

- THE PRESSURE CONTROL VALVE (PCV) WILL BE ENERGIZED TO HOLD THE PCV CLOSED WHILE ANY PUMP IS RUNNING.

2. THE LEAD FUELING PUMP WILL ESTABLISH A FLOW OF 600+/- GPM THROUGH THE SYSTEM ISSUE VENTURI AND THE PRESSURE UPSTREAM OF THE BPCV WILL INCREASE UNTIL THE BPCV SET POINT OF 80 PSIG (AS DETERMINED BY HYDRAULICS OF THE SYSTEM) IS REACHED. AT THIS PRESSURE, THE BPCV WILL START TO OPEN AND THE VALVE WILL MODULATE AS REQUIRED TO PASS SUFFICIENT FLOW THROUGH THE RETURN VENTURI TO MAINTAIN PRESSURE UPSTREAM OF THE VALVE.

3. WITH DPT-1 OR DPT-2 SENSING DIFFERENTIAL PRESSURE CORRESPONDING TO A FLOW RATE OF 600+/- GPM THROUGH THE ISSUE VENTURI AND DPT-3 OR DPT-4 SENSING DIFFERENTIAL PRESSURE CORRESPONDING TO A FLOW RATE THROUGH THE RETURN VENTURI OF GREATER THAN 40+/- GPM AND LESS THAN 560+/- GPM, THE LEAD FUELING PUMP WILL CONTINUE TO RUN AND THE BPCV WILL CONTINUE MODULATING TO PASS FLOW AS NECESSARY TO MAINTAIN UPSTREAM PRESSURE REQUIREMENT AND NO ADDITIONAL CONTROL FUNCTIONS WILL BE INITIATED UNTIL SYSTEM OPERATING CONDITIONS CHANGE.

A. IF DPT-3 OR DPT-4 SENSES A DIFFERENTIAL PRESSURE CORRESPONDING TO A FLOW RATE THRU THE RETURN VENTURI OF GREATER THAN 560+/- GPM FOR 60 SECONDS (ADJUSTABLE), THE CONTROL SYSTEM WILL INITIATE CONTROL SIGNALS FOR THE FOLLOWING FUNCTIONS:

- THE BPCV SOLENOID "A" WILL BE DE-ENERGIZED TO CLOSE THE BPCV. SIGNAL TO STOP LEAD PUMP SHALL OCCUR WHEN PRESSURE INDICATING TRANSMITTER PIT-1 OR PIT-2 RISES ABOVE SET POINT OF 110 PSIG (AS DETERMINED BY HYDRAULICS OF THE SYSTEM).

- THE PCV SOLENOID WILL BE DE-ENERGIZED (SIMULTANEOUSLY WITH SIGNAL TO DE-ENERGIZE THE BPCV SOLENOID "A" ) TO BLEED SYSTEM PRESSURE TO 75 PSIG.

4. WITH DPT-1 OR DPT-2 SENSING DIFFERENTIAL PRESSURE CORRESPONDING TO A FLOW RATE OF 600+/- GPM THROUGH THE ISSUE VENTURI AND DPT-3 OR DPT-4 SENSING DIFFERENTIAL PRESSURE CORRESPONDING TO A FLOW RATE OF LESS THAN 40+/- GPM THROUGH THE RETURN VENTURI FOR A PERIOD OF 10 SECONDS A SECOND PUMP WILL BE STARTED.

5. WITH DPT-1 OR DPT-2 SENSING DIFFERENTIAL PRESSURE CORRESPONDING TO A FLOW RATE OF 1200+/- GPM THROUGH THE ISSUE VENTURI AND DPT-3 OR DPT-4 SENSING DIFFERENTIAL PRESSURE CORRESPONDING TO A FLOW RATE GREATER THAN 40+/- GPM BUT LESS THAN 700+/- GPM, THE LEAD FUELING PUMP AND SECOND FUELING PUMP WILL CONTINUE TO RUN AND THE BPCV WILL CONTINUE MODULATING TO PASS FLOW AS NECESSARY TO MAINTAIN UPSTREAM PRESSURE REQUIREMENT AND NO ADDITIONAL CONTROL FUNCTIONS WILL BE INITIATED UNTIL SYSTEM OPERATING CONDITIONS CHANGE.

A. IF DPT-3 OR DPT-4 SENSES A DIFFERENTIAL PRESSURE CORRESPONDING TO A FLOW RATE THROUGH THE RETURN VENTURI OF GREATER THAN 700+/- GPM FOR 15 SECONDS, THE CONTROL SYSTEM WILL INITIATE CONTROL SIGNALS TO SHUT DOWN THE SECOND FUELING PUMP, LEAVING THE SYSTEM TO OPERATE AS DESCRIBED IN PARAGRAPH 3.

NOTE:

\*[THE REMAINING SUBSEQUENT FUELING PUMPS WILL BE STARTED USING DPT-1 OR DPT-2 AND STOPPED AS DESCRIBED HEREIN BEFORE IN PARAGRAPH 4, 5, 5A.] THE LEAD FUELING PUMP SHUT DOWN AND RETURN TO IDLE CONDITION WILL BE AS DESCRIBED IN PARAGRAPH 3A.

- \*DESIGNER NOTE: DELETE BRACKETS AND INCLUDE NOTE IF MORE THAN TWO (2) PUMPS CAN OPERATE AUTOMATICALLY.

IN THE EVENT A FUELING PUMP IS AUTOMATICALLY CALLED ON AND FAILS TO START OR FAILS AFTER SUCCESSFULLY STARTING (AS INDICATED BY OPEN CONTACTS ON THE ASSOCIATED PUMP DISCHARGE FLOW SWITCH FOR A 15 SECOND INTERVAL). THE AFFECTED FUELING PUMP WILL BE CALLED OFF AND THE NEXT IDLE FUELING PUMP IN THE PREDETERMINED SEQUENCE OF PUMPS WILL BE CALLED ON AUTOMATICALLY.

SYSTEM "LOOP FLUSH" MODE

UPON ESTABLISHING A REQUIREMENT TO FLUSH THE PIPING DISTRIBUTION SYSTEM "LOOP", PERFORM THE FOLLOWING SEQUENCE:

1. PLACE FUELING PUMPS HAND-OFF-AUTO SELECTOR SWITCHES (LOCATED IN CONTROL ROOM) TO THE "OFF" POSITIONS.

2. PLACE THE MODE SELECTOR SWITCH (LOCATED IN THE CONTROL ROOM) IN THE "LOOP FLUSH" MODE. THIS WILL ENERGIZE THE BPCV SOLENOIDS "A" AND "B" (OPENING THE BPCV).

3. POSITION MANUALLY OPERATED VALVES IN THE SYSTEM TO REQUIRED POSITIONS TO DIRECT FUEL THROUGH THE DESIRED FLOW PATH (I.E. TRANSFERRING FUEL FROM ONE OPERATING TANK TO ANOTHER, FLUSHING SUSPECT FUEL FROM LOOP PIPING AND ROUTING THIS FUEL THRU THE RECEIVING FILTER SEPARATOR'S, ETC.)

4. SELECT PUMP TO BE USED FOR FLUSHING. PLACE THE FUELING PUMP'S HAND-OFF-AUTO SELECTOR SWITCH IN THE "HAND POSITION. THIS WILL START THE PUMP.

NOTE: THE SECOND PUMP MAY BE STARTED MANUALLY TO OBTAIN A GREATER FLUSHING FLOW RATE.

5. FOLLOWING THE FLUSHING PROCEDURE, PLACE FUELING PUMP(S) HAND-OFF-AUTO SELECTOR SWITCH(ES) IN THE "OFF" POSITION. POSITION MANUALLY OPERATED VALVES TO THEIR NORMALLY OPENED OR CLOSED POSITIONS.

6. PLACE THE MODE SELECTOR SWITCH IN THE "AUTOMATIC" MODE FROM THE "LOOP FLUSH" MODE, AND ALL FUELING PUMP SELECTOR SWITCHES BACK IN THE "AUTO" POSITIONS.

7. OBSERVE SYSTEM OPERATION TO ENSURE SYSTEM RETURNS TO PRESSURIZED IDLE CONDITION.

SYSTEM IN TIGHTNESS TEST MODE (SEE NOTE TO DESIGNER #1)

TO INITIATE A SYSTEM TIGHTNESS TEST:

1. PLACE THE MODE SELECTOR SWITCH IN THE "TIGHTNESS TEST" MODE. THIS WILL ENERGIZE THE PRESSURE TEST PANEL. ELECTRIC MOTOR OPERATORS CLOSE VALVES V-7 AND V-8 AND OPEN V-6.

2. FOLLOWING THE TEST PROCEDURES, SWITCH THE MODE SELECTOR SWITCH TO "AUTO" POSITION. THE ELECTRIC MOTOR OPERATORS CLOSE VALVE V-6, OPEN VALVES V-7 AND V-8, AND THE SYSTEM WILL RUN THROUGH A NORMAL SHUTDOWN PROCEDURE.

----- FOR CONTINUATION SEE FOLLOWING SHEET 2 OF 2 -----



US ARMY CORPS OF ENGINEERS OMAHA DISTRICT

Table with 4 columns: MARK, DESCRIPTION, DATE, APPR.

Table with 4 columns: DESIGNED BY, DATE, DWN BY, CND BY, SUBMITTED BY, FILE NAME, FILE NUMBER, PLOT SCALE, PLOT DATE.

DOD, STANDARDS PRESSURIZED HYDRANT DIRECT FUELING SYSTEM SEQUENCE OF OPERATION SCHEME B SHEET 1 OF 2

SHEET IDENTIFICATION NUMBER M-203b

NOTES TO DESIGNER:

1. THE SYSTEM IN TIGHTNESS TEST MODE ASSUMES V-7 AND V-8 HAVE ELECTRIC MOTOR OPERATORS. IF DIRECTED BY THE COMMAND SERVICE HEADQUARTERS TO USE MANUAL VALVES. RE-WRITE TEST MODE ACCORDINGLY.









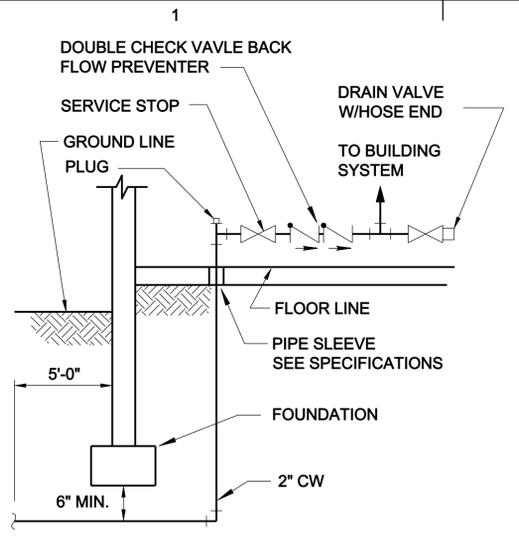


DATE	DESCRIPTION	APPR.	MARK

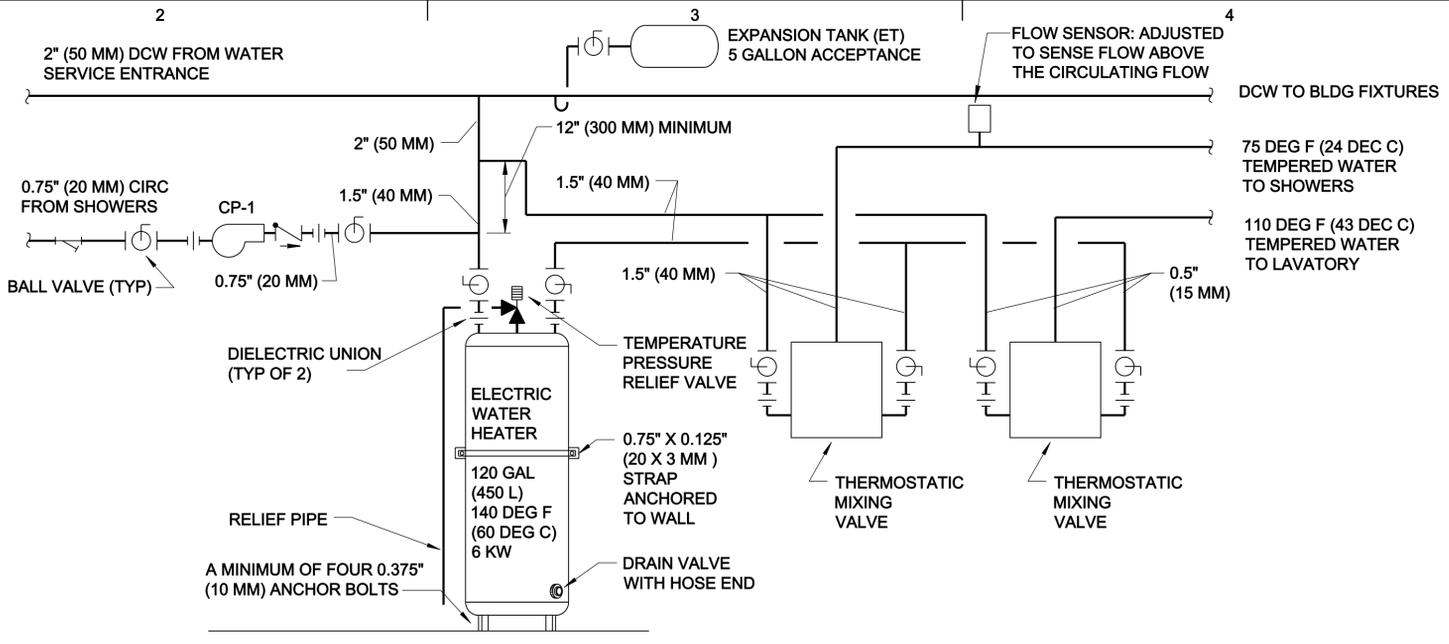
DESIGNED BY: J. J. P.	DATE: JULY 2010
DRAWN BY: J. J. P.	SOLICITATION NO.:
CHECKED BY: J. J. P.	CONTRACT NO.:
APPROVED BY: J. J. P.	FILE NUMBER:
PROJECT: M. T. SMITH	PLOT DATE: 7/9/2010
FILE NAME: 0038MH501.dwg	PLOT SCALE: 0'-1" = 1'-0"
SIZE: 33.1x22	

DOD STANDARDS PRESSURIZED HYDRANT DIRECT FUELING SYSTEM PUMPHOUSE MECHANICAL DETAILS

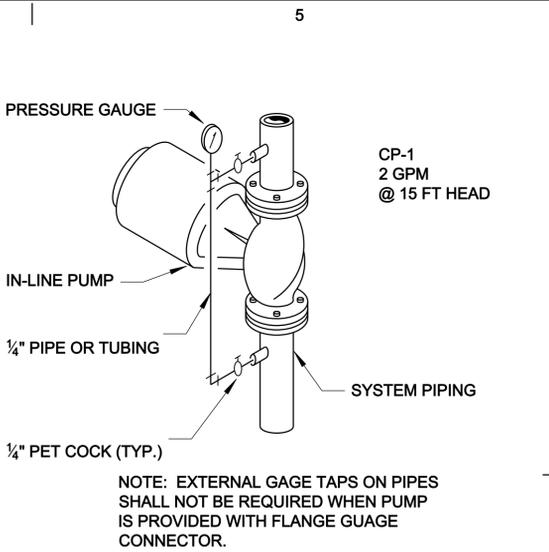
SHEET IDENTIFICATION NUMBER MH501



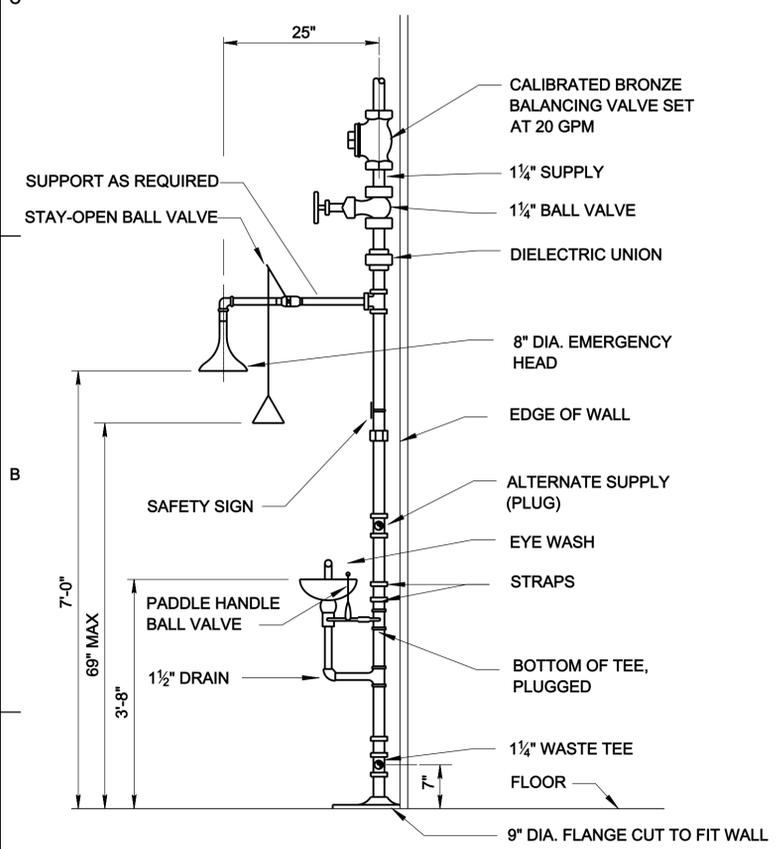
**WATER SERVICE ENTRANCE**  
NO SCALE  
MH-101 | MH-501



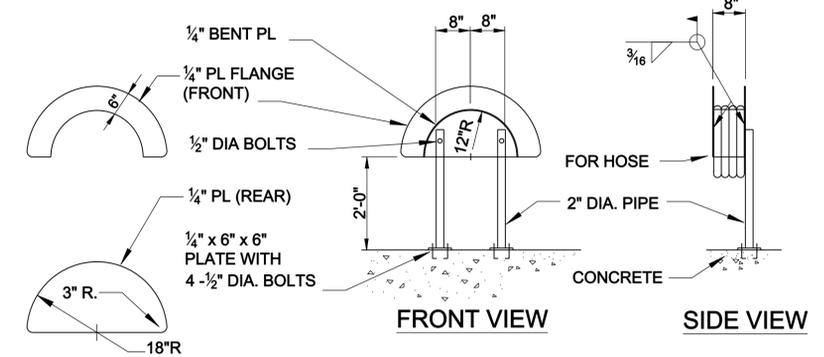
**ELECTRIC WATER HEATER DETAIL**  
NO SCALE  
MH-101 | MH-501



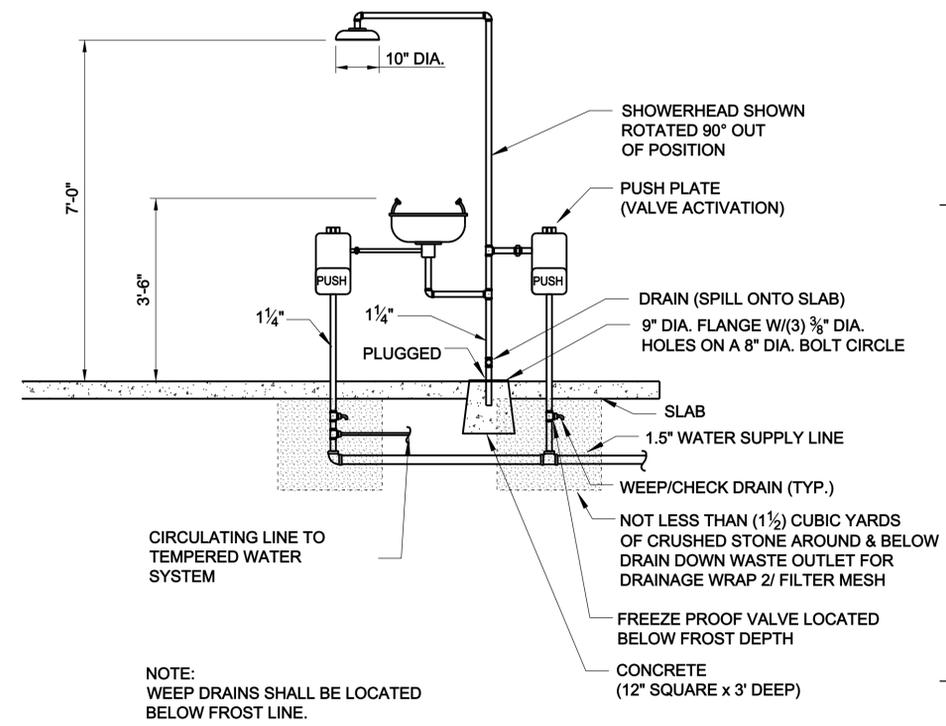
**CIRCULATING PUMP DETAIL**  
NO SCALE  
MH-101 | MH-501



**FROST PROOF EMERGENCY EYE/FACE WASH AND SHOWER DETAIL (PUMP ROOM)**  
NO SCALE  
MH-101 | MH-501



**HOSE RACK DETAILS**  
SCALE: 1/2 INCHES = 1 FOOT  
MH-101 | MH-501



**EXTERIOR EMERGENCY SHOWER AND EYE/FACE WASH DETAIL**  
NO SCALE  
GEN | MH-501

**NOTE TO DESIGNER:**  
IN AREAS SUBJECT TO FREEZING CONDITIONS SHOWER AND APPURTENANCES SHALL BE HEAT TRACED (WITH THERMOSTATIC CONTROL), INSULATED, AND COVERED BY MOLDED ABS PLASTIC JACKETING, ALL OF WHICH SHALL BE A STANDARD PRODUCT OF THE SHOWER MANUFACTURER. HOSE BIBB ADJACENT TO SHOWER SHALL BE HEAT TRACED ALSO.

**NOTE TO DESIGNER:**  
1. RECOMMENDED SHOWER AND EYEWASH IN UNHEATED PUMP SHELTERS WHERE FREEZING COULD OCCUR.  
2. EMERGENCY SHOWER/EYEWASH NOT REQUIRED AT TRUCK FILLSTANDS OR HHT CHECKOUT, BUT AT A MINIMUM A PORTABLE EYEWASH IS REQUIRED (COULD BE LOCATED IN TRUCK)

