



April 17, 2024

Mr. Steve Christensen  
Leland Dam Authority  
8527 E. Government Center Dr  
Suttons Bay, MI 49682

Re: Leland Dam Specification Assistance  
ME Project No: 24065

Dear Steve:

Machin Engineering, Inc. (MEI) was retained to assist in the development of bid specifications for the repair/modifications to the hydraulic power system (HPS) at the Leland Dam. As part of our work, we reviewed the system schematics, preliminary design development documents provided by the Leland Dam Authority and visited the site with Jerry Culman from facilities. After visiting the site, we contacted the original HPS equipment provider, Michigan Fluid Power (MFP) of Hudsonville, Michigan, and discussed the issues and observations with Mr. Marc Peterson of MFP.

In summary, our work yielded the following minimum recommended modifications and/or repairs to address associated concerns.

	<b>Concern</b>	<b>Recommendation</b>
1	Flexible line break and cylinders allowing free flow opening of gate	Install a dual balance valve for each cylinder
2	Flexible line break	Reduce the lineal footage of flexible lines from the pump to each cylinder, add a minimum of two Unistrut wall hanging brackets with line straps to support the lines
3	Oil leakage at pump	Remove and replace all pressure gauges and replace a manifold gasket. Check for additional leaks.
4	Provide secondary containment of hydraulic fluids	Provide a replacement oil that is both compliant with the system and bio-degradable. This is standard for hydraulic systems in and around water resources.
5	Rebuild cylinders	Not necessary unless there is active leakage. With none observed and very low duty cycles and low operation pressures, this is not required.

	Concern	Recommendation
6	Replacement cylinder kept on hand by County	Not recommended as unused cylinders will experience drying of the seals and leak upon replacement. Current cylinders are "on the shelf".
7	Replace pumps	Current pumps are gear driven and not necessary to replace as they have long life expectancies when compared to other pump types. Replacement pumps are available "on the shelf". Electric motors are "on the shelf" as well each with replacement times of < 1/2 hr.
8	Manual operation of the gate in an emergency	The gates may be operated by hand using the installed lock out device with proper operation by opening of a single fitting to allow pressure in the system to bleed away.

Current operations provide for up to seven different redundancies between two pumps and two cylinders. Each pump can operate any one or both cylinders at a time, although at a reduced flow rate. Use of the lock-out device could provide an eighth level of redundancy. Given the low duty cycle of the system, the equipment appears to be in good working order with only minor repairs or modifications being recommended. Any replacement parts and pieces are "off the shelf" ready for immediate use.

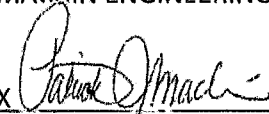
Given the overall scope of the repairs coupled with the familiarity MFP has with the system, we recommend the Leland Dam Authority and ultimately, the County Board, contract with MFP for the work. Through our research and discussions, as a service provided, we have found MFP to contain the proper qualifications to perform the work. And further, in our opinion, would be the most cost effective approach to addressing the reliability concerns of the Authority.

Furthermore, additional processes and procedures should be put into place to allow the operations staff to visualize proper operations in case of an emergency.

Should you have any questions please contact us at (855) 935-1530.

Sincerely,

MACHIN ENGINEERING, INC.

x 

Patrick J. Machin, P.E.  
 Principal