NOTICE OF MEETING

The Leland Dam Authority will be conducting a meeting beginning at 10:00 a.m. on Wednesday, December 13, 2023, in the Commissioner Meeting Room of the Leelanau County Government Center, 8527 E. Government Center Dr., Suttons Bay, Michigan.

(Please silence all electronic/cellular devices)

(Proceedings of the meeting are being recorded and are not the official record of the meeting, the formally approved/accepted written copy of the minutes will be the official record of the meeting.)

AGENDA

CALL TO ORDER

PLEDGE OF ALLEGIANCE

MOMENT OF SILENCE/SILENT PRAYER

ROLL CALL

APPROVAL OF AGENDA / LATE ADDITIONS OR DELETIONS

PUBLIC COMMENT *(3 minutes)*

Action Items:	**Pg. No.:**
1. Approval of Meeting Minutes – September 13, 2023, Regular Session, *no attachment.*	
2. Review of Approved FY 2024 Leland Dam Authority Budget.	2
3. Dam Adjustment Procedures/Operations Policy Manual – Update/Discussion:	
a. Manual Name.	
b. Potential Purchase of Replacement Hydraulic Cylinder.	3
i. Hydraulic System Maintenance Update.	4-17
4. Leland Dam Walkway.	18-28
5. Lake Leelanau Lake Levels – Sensor Calibration.	29
6. Update on Sensor Calibrations.	

PUBLIC COMMENT *(5 minutes)*

COMMISSIONER COMMENTS

ADJOURNMENT

2024 ADOPTED BUDGET

County of Leelanau

Period Ending Date: September 30, 2023

Fund 805 Special Assmt Cap. Proj Fund
Department

Account Number / Account Name	2021 Audited	2022 Audited	2023 Year-to-Date	2023 Adopted Budget	2023 Amended Budget	2024 Proposed Budget	2024 BOC Changes & Dept Requests	2024 Adopted Budget
Fund 805 Special Assmt Cap. Proj Fund								
Fiscal Year 2023								
Revenues								
000000-401.000 Fund Balance Forward	0.00	0.00	0.00	0.00	11,908.00	11,908.00	0.00	0.00
000000-699.101 Transfer In - General Fund	39,100.00	29,000.00	22,000.00	22,000.00	22,000.00	22,000.00	21,000.00	21,000.00
Revenues Total	**39,100.00**	**29,000.00**	**22,000.00**	**22,000.00**	**33,908.00**	**33,908.00**	**21,000.00**	**21,000.00**
Expenses								
000000-727.000 Office/Operating Supplies	795.32	852.33	2,060.22	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
000000-775.000 Repair and Maintenance	3,273.73	1,750.29	2,473.17	4,950.00	4,950.00	4,950.00	4,950.00	4,950.00
000000-801.000 Contractual Services	5,100.00	6,400.00	2,410.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00
000000-850.000 Telephone	2,648.08	2,673.78	3,670.69	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00
000000-920.000 Utilities (Light-Oil)	3,569.53	3,684.94	2,509.41	6,000.00	6,000.00	6,000.00	5,000.00	5,000.00
000000-942.000 Copy Machine Charges (Rental)	8.72	222.04	43.28	50.00	50.00	50.00	50.00	50.00
000000-970.000 Capital Outlay	29,936.96	15,168.00	0.00	0.00	11,908.00	11,908.00	0.00	0.00
Expenses Total	**45,332.34**	**30,751.38**	**13,166.77**	**22,000.00**	**33,908.00**	**33,908.00**	**21,000.00**	**21,000.00**
	-6,232.34	**-1,751.38**	**8,833.23**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Revenues Total	**39,100.00**	**29,000.00**	**22,000.00**	**22,000.00**	**33,908.00**	**33,908.00**	**21,000.00**	**21,000.00**
Expenses Fund Total	**45,332.34**	**30,751.38**	**13,166.77**	**22,000.00**	**33,908.00**	**33,908.00**	**21,000.00**	**21,000.00**
Net (Rev/Exp)	**-6,232.34**	**-1,751.38**	**8,833.23**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Grand Total for Revenues	**38,865,709.24**	**37,836,088.55**	**10,434,596.73**	**12,954,902.00**	**14,600,761.56**	**13,761,246.56**	**13,906,075.00**	**14,233,932.00**
Grand Total for Expenses	**38,181,217.64**	**37,605,892.44**	**10,398,026.04**	**12,954,902.00**	**14,600,761.56**	**13,761,246.56**	**13,906,075.00**	**14,233,932.00**
Grand Total Net Rev/Exp	**684,491.60**	**230,196.11**	**36,570.69**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Chesterfield Office
25340 Terra Industrial Dr
New Baltimore MI 48051
United States

12/08/2023

Quote

Bill To

Leland Dam Authority
8527 E Government Center Dr # 103
Suttons Bay MI 49682
United States

Ship To

Leland Dam Authority
8527 E Government Center Dr # 103
Suttons Bay MI 49682
United States

Quote#
Q1048037

Location	Terms	Expires	Shipping Method
Chesterfield	Due Upon Receipt	01/07/2024	Delivery

L#	QTY	ITEM	EST. DATE	PRICE (EA)	EXT. PRICE
1	1 EA	**ITEM #** 1H3H0A00346533 **DESCRIPTION:** Parker 3H Heavy Duty Replacement Cylinder 7.00" Bore 58" Stroke (1"Stop Tube) #20 SAE Ports	01/25/2024	$9,873.11	$9,873.11

Subtotal	$9,873.11
Shipping Cost	$0.00
Tax Total (%)	$592.39
Total	$10,465.50

Expected delivery date will be confirmed after receipt of order.

Please note: Leelanau is tax-exempt

Advancing Motion Control through our locations in Michigan and Northern Indiana:
Chesterfield, Holland, Jackson, Grand Rapids, Mount Pleasant, Portage, West Branch & Fort Wayne

Q1048037

Pump

ORIGINAL PUMP P102RU10GM

SAE AA 2BOLT FLANGE/.12 IN^3/REV/½DX1.5LONGW/¼SQ KEY #8 SUCTION/#6 DISCHARGE ROTATION?

REPLACEMENT PUMP 1AG24O2R

SAE AA 2BOLT FLANGE/.12 IN^3/REV/½DX1.5" LONG W/¼SQ KEY #8 SUCTION/#6 DISCHARGE ROTATION DOES R = Right Hand

MUST VERIFY ELECTRIC MOTOR ROTATION.

ON PUMP ROTATION IS DETERMINED by VIEWING the END OF THE PUMP SHAFT

FOR ELECTRIC MOTOR VIEW END OF MOTOR (FAN END

$$\frac{.12\,in^3/REV \times 1725 RPM}{231} = GPM_T \qquad GPM_T \times VOL\,EFF = GPM_a$$

.896 .896 $896 \times .90 =$ .80 GPM ACTUAL

Pump RV Setting

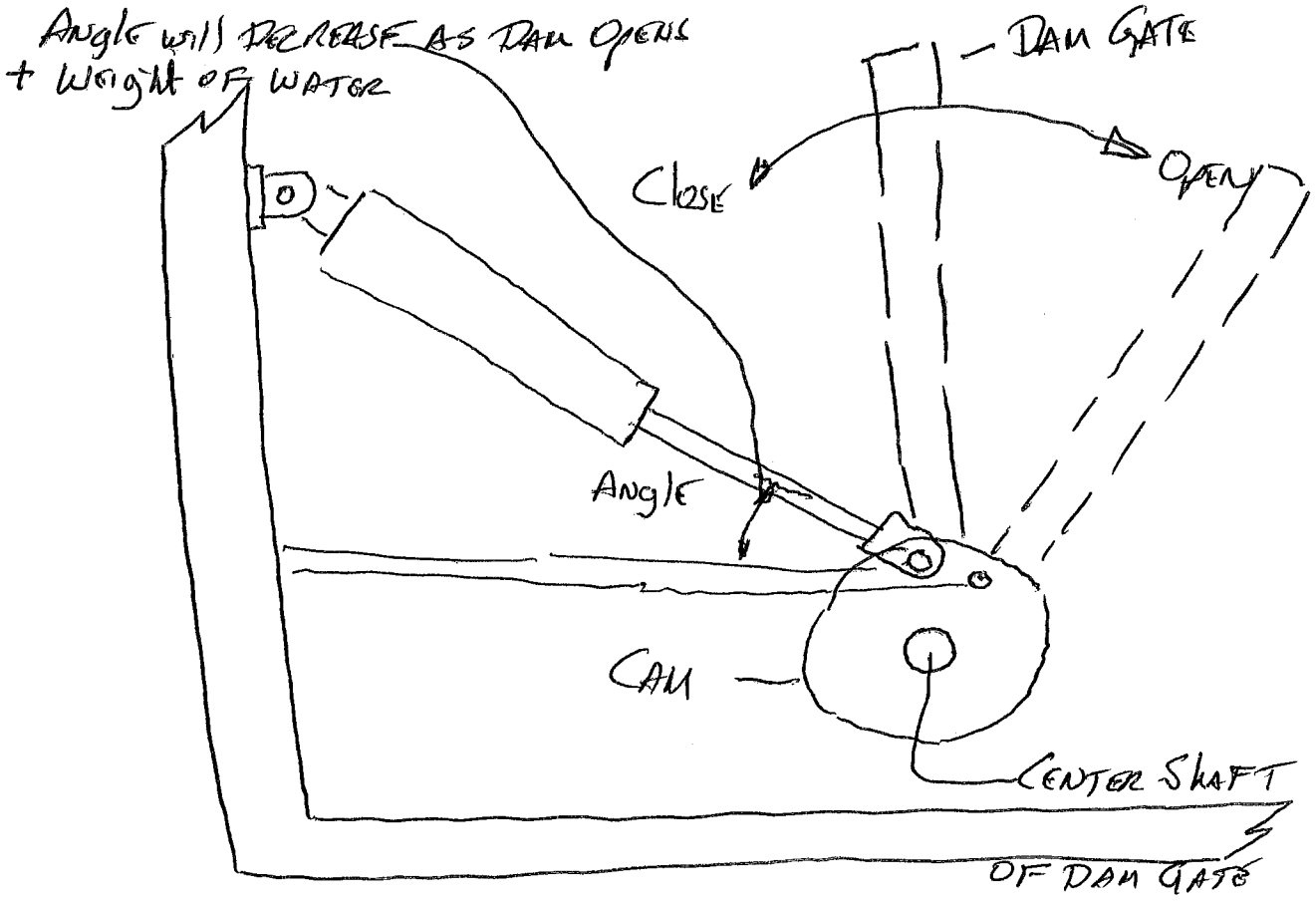
$$\frac{.896\ GPM \times 1000 PSI}{1714} = HP_T \qquad HP_T \div MECH\ EFF = HP\ ACTUAL$$

$$\frac{.522}{.85} = .615\ HP\ ACTUAL$$

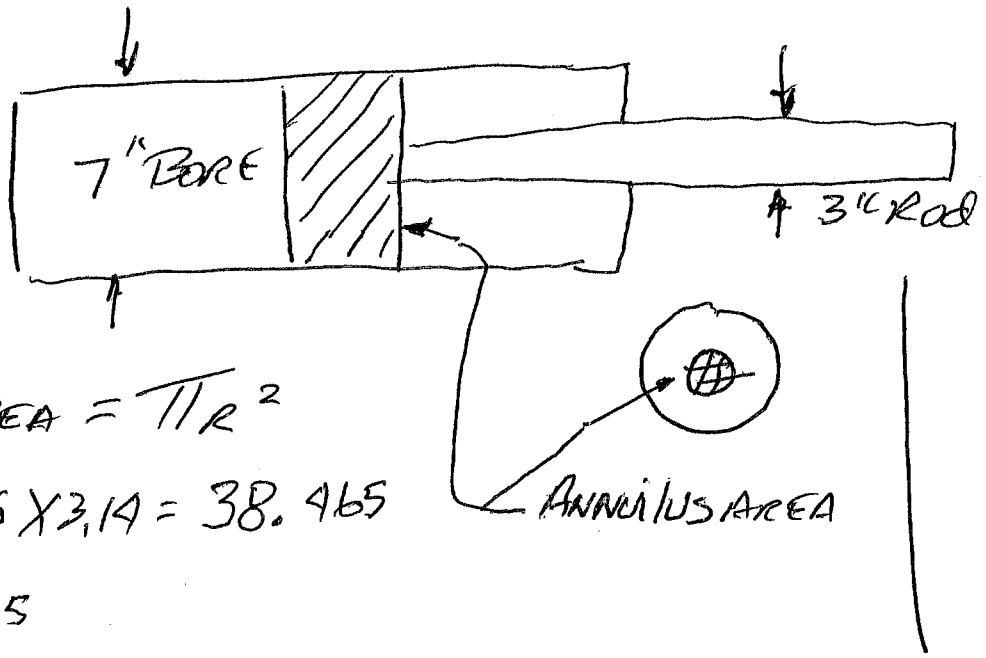
.522 HP_T

ON MY VISIT TO THE HYDRAULIC POWER UNIT ROOM THE SYSTEM PRESSURE AT the hydraulic CYLINDER WAS 600 PSI. POSITION OF DAM UNKNOWN. ASSUME 50% OF TRAVEL. MAIN PUMP RELIEF IS SET AT 1000 PSI ASSUMING YOU WANT to RUN ONE CYLINDER to HANDLE The load, 600 PSI X 2 = 1200 + 1.15% FOR RELIEF VALVE The RELIEF VALVE would have to BE ADJUSTED UP TO 1380 PSI

AS THE DAM TRAVELS toward full open, the PRESSURE REQUIRED to RETURN the DAM To 50% OF TRAVEL will INCREASE.



FORCE = PRESSURE X AREA
LBS Pounds/sq in X IN²



AREA = πR^2

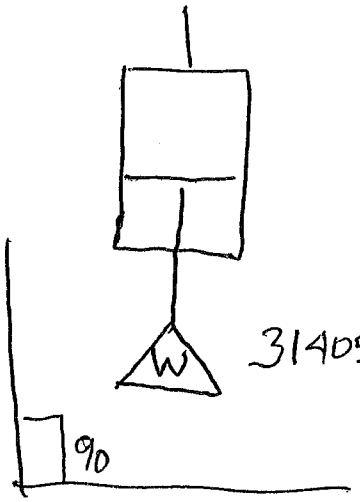
3.5 X 3.5 X 3.14 = 38.465

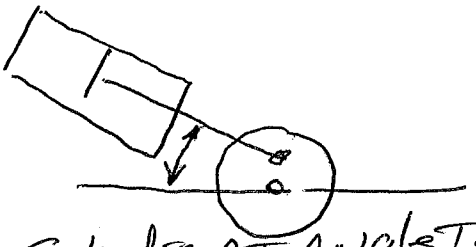
38.465

1.5 X 1.5 X 3.14 = 7.06

38.465 − 7.06 = 31.405 Annulus

31.405 X 1000 = 31,405 pounds / Cylinder at Relief Valve Setting on a straight Vertical Lift





Cylinder at Angle To The load lifts Less

Single Pump Running one Cylinder with Relief Valve set at 1380PSI

$$\frac{.896 \times 1380}{1714} = .7214 \qquad \frac{.7214}{.85} = .848 \text{ HPa}$$

Assume Relief Valve is set upto 2875PSI or 2500PSI working Pressure

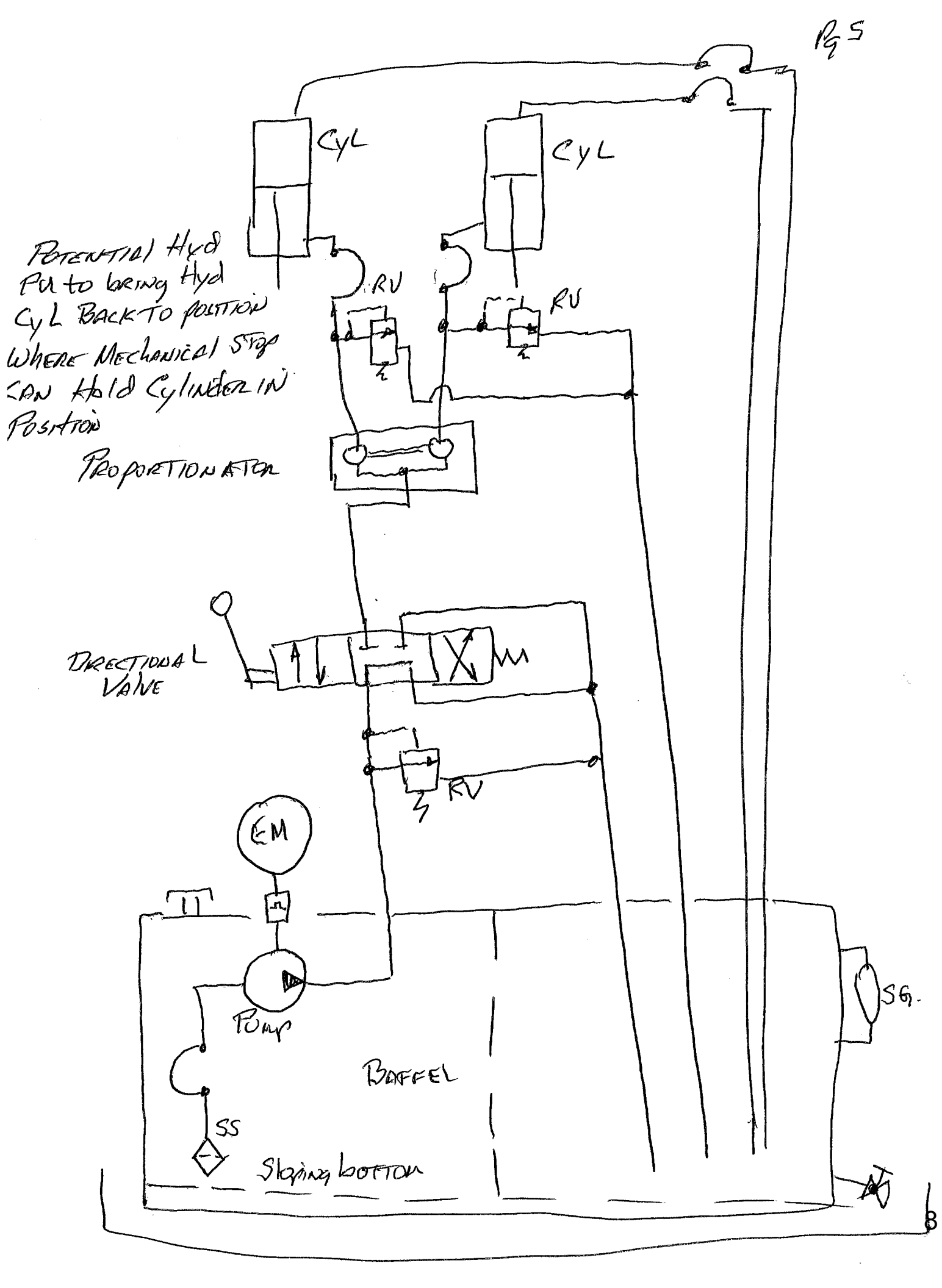
$$\frac{.896 \times 2875}{1714} = 1.5 \text{ HPT} \qquad \frac{1.5}{.85} \; 1.76$$

Motor has a 1.15 Service Factor $1 \times 1.15 = 1.15$

$$\frac{.896 \times 1869 \text{PSI}}{1714} = .977 \text{ HP}_T \qquad \frac{\text{HP}_T}{.85} = 1.149 \text{ HPa}$$

1869 RV Setting is the highest Available RV Setting which is 1625 PSI Working Pressure

$$\begin{array}{r} 31.405 \\ \times\ 1625 \\ \hline 51,033 \text{ LBS Vertical Lift w/ one Cylinder} \end{array}$$


CyL
CyL
POTENTIAL Hyd PU to bring Hyd Cyl BACK TO POSITION WHERE MECHANICAL STOP CAN Hold Cylinder IN Position
RV
RV
PROPORTIONATOR
DIRECTIONAL VALVE
RV
EM
PUMP
SG.
BAFFEL
SS
Sloping bottom

A. IF THE FULL LOAD IS PLACED ON ONE hydraulic Cylinder, CAN the Clevis plate Bolted To the WALL handle the FULL load

B. IF THE FULL LOAD IS PLACED ON the MECHANICAL STOP, CAN the clevis plate bolted to the WALL handle the FULL load.

C. The ADDITION OF A STOP TUBE in the hydraulic Cylinder will PREVENT the DAM FROM going to a FULL open position

D SEALS typically FAIL for SOME specific REASONS.

i NOT COMPATIBLE with the oil

ii AMBIENT/AND OR SYSTEM temperatures, OR PRESSURES EXCEED CAPABILITIES OF ELASTOMERS. HARDENING

iii DYNAMIC SEALS MAY BECOME CUT by DIRT IN the SYSTEM. ABRASION IS the MOST COMMON CAUSE OF SEAL FAILURE IN Hyd. Cylinder. SCORING CAUSED by DIRTY OI

iv EROSION

v IMPROPER INSTALLATION

E. SEALS in the DAM Hydraulic Cylinders ARE PARKER CLASS I

NITRILE OR POLYURETHANE -10F to PLUS 165F

NITRILE -50F to + 150F <u>NITRILE ALONE</u>

F. VALVE VITON Higher TEMPERATURE OPERATIONS & LONG OPERATIO

NOT A COMPLETE LIST OF ITEMS REQUIRING ATTENTION

1. BUY SPARE VALVES SEALS AND VALVES

2. BUY SPARE CYLINDERS SEALS AND hydraulic CYLINDERS. CONSIDER ADDING STOP TUBES

3 BUY SPARE hoses

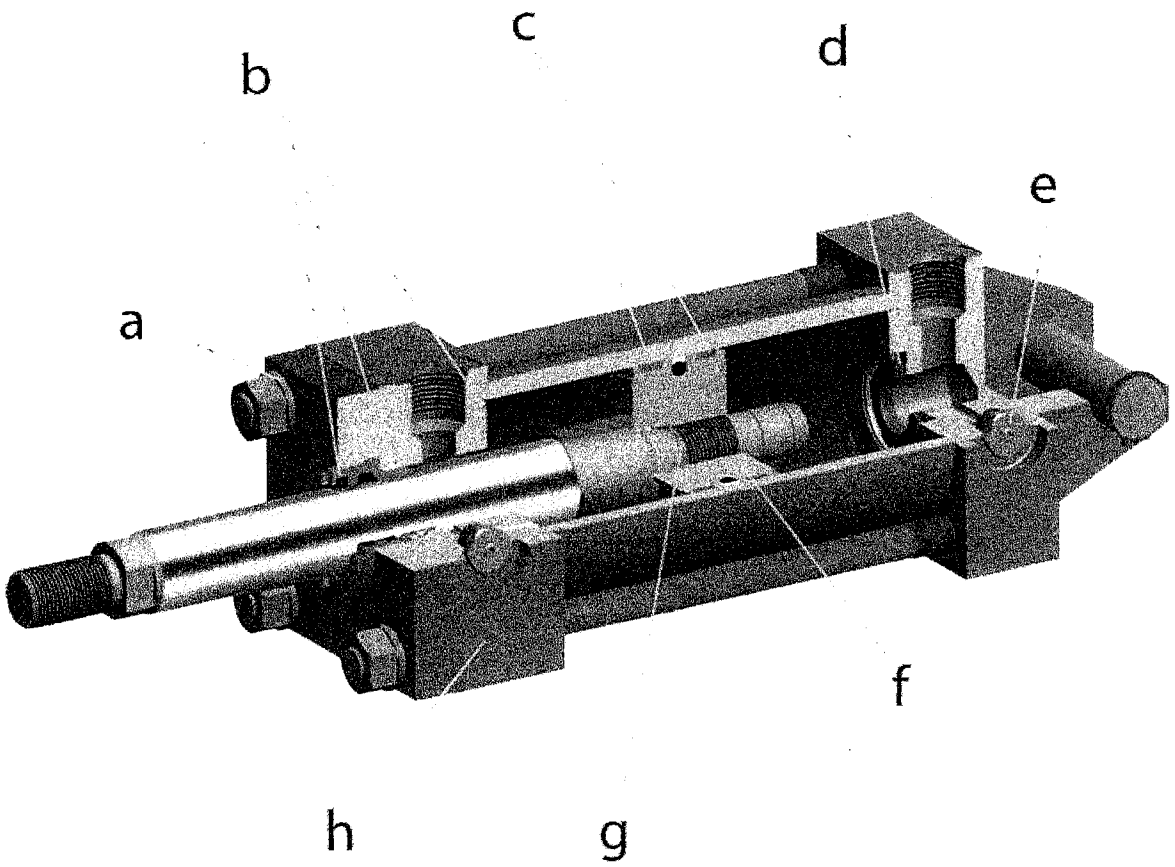
4 BUY SPARE PUMPS

5 CONSIDER DEVELOPING A TEST TO ASSIST IN DETERMING IF SEALS ARE LEAKING IN THE Hydraulic Cylinders. IMPLEMENT the TEST

6. CONSIDER developing A plan to DETERMINE how to get the cylinders BACK TO AN ACCEPTABLE POSITION IF ONE OF the ~~Cylinders~~ PUMPS FAILS OR A hydraulic CYLINDER OR CYLINDER SEAL FAILS

7. BUY two SPARE PRESSURE gauges [CERTIFIED]

8 HAVE AN ARCHITECTURAL ENGINEER determine IF the WALL MOUNTED CLEVISES will handle the full LOAD OF the DAM INDIVIDUALLY



Series 3H Design Improvements Increase Reliability

a) Hardened washers under each tie rod nut prevent galling, ensuring correct tie rod pre-stress and pressure envelope integrity.

b) Class 1 service polyurethane rod wiperseal and o-rings as body end seals and rod gland static seal offer superior abrasion and extrusion resistance for longer service life.

c) High compressive strength non-metallic piston wear rings, that minimize tube scoring, are standard on all configured piston selections.

d) Cap cushion performance options are selectable as floating check bushing type for normal applications or solid orifice style for more demanding high speed and load operation.

e) Cartridge style needle valve with captive micro adjust screw for precision cushion tuning.

f) One common piston is used for 4 piston seal styles. When changing

operating conditions require a different seal style, the piston and rod assembly is unchanged.

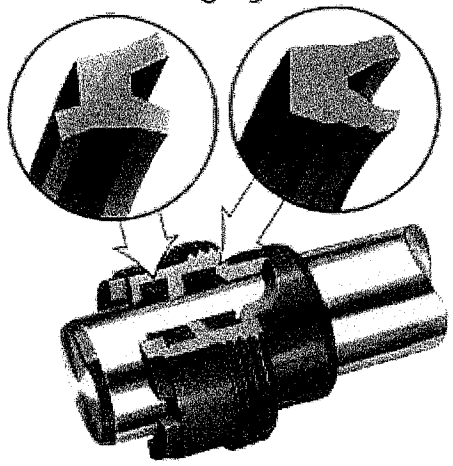
g) Piston-to-rod connection is pre-stressed to maximize fatigue life. An o-ring on the piston ID ensures a leak free joint and anaerobic adhesive further secures the threaded connection.

h) Steel head and cap blocks are precision size, finished on all sides and are bored and grooved for concentric alignment of mating parts.

Parker Series 3H Heavy Duty Hydraulic Cylinder | 7" & 8" Bore

3H 7.00" & 8.00" bore cylinders set the standard for performance, durability, and trouble free operation. Parker's superior design, the use of high quality materials and stringent manufacturing practices provide all customers with long cylinder service life and reduced operating costs. Design features such as the "Jewel" rod gland, hard chrome plated piston rods, and stepped cushions provide increased machine productivity through reduced downtime, faster cycle times, and improved system efficiency. Every Parker cylinder is individually tested before leaving our plant to assure proper performance and leak free operation. All Parker Cylinder products carry an eighteen month warranty. Select Parker Series 2H and 3H cylinders for your hydraulic cylinder requirements. Parker Series 2H and 3H will provide the value and performance you need for all of your industrial hydraulic application demands.

Parker "Jewel" Gland with TS2000 Sealing System



Standard Specifications | 7" & 8" Bore

- Heavy Duty Service – ANSI/(NFPA) T3.6.7R3 - 2009
- Specifications and Mounting Dimension Standards
- Standard Construction – Square Head – Tie Rod Design
- Nominal Pressure – 3000 psi[1]
- Standard Fluid – Hydraulic Oil
- Standard Temperature – -10°F to +165°F[2]
- Piston Diameters – 3.000" through 5.500"
- Mounting Styles – 17 standard styles at various application ratings
- Strokes – Available in any practical stroke length
- Cushions – Optional at either end or both ends of stroke.
- Rod Ends – Four Standard Choices – Specials to Order

[1] If hydraulic operating pressure exceeds 3000 psi, send application data for engineering evaluation and recommendation. See Section H for actual design factors.

In line with our policy of continuing product improvement, specifications in this catalog are subject to change.

Parker Hannifin Corporation
Cylinder Division
500 South Wolf Road
Des Plaines, IL 60016 USA
Phone: 847 298 2400
Fax: 847 294 2655

ENGINEERING YOUR SUCCESS.

P

6 WEEKS ARO
FOB GOODLAND IN

PARKER Cylinder
2H/3H / 2HD/3HD / 2HB/3HB / 2HX/3HX / 2HDX/3HDX / 2HBX/3HBX

2H/3H / 2HD/3HD / 2HB/3HB / 2HX/3HX / 2HDX/3HDX / 2HBX/3HBX Heavy Duty Hydraulic Cylinder
Model Number: 7.00BB3HKNAT1S14A58.000

Interactive 3D graphic, click to activate and rotate

Parker's customizable, full-featured, precision Heavy Duty 3000* psi NFPA Hydraulic Cylinders offer unprecedented Tie-Rod and Non Tie-Rod design choices, along with four easily interchangeable piston seal options for maximum performance.

- Heavy Duty Service - ANSI/(NFPA) T3.6.7R3 - 2009
- Nominal Pressure Rating - 3000* psi.
- Bore Diameters - 1.50" through 20.00"
- Piston Rod Diameters - 0.625" through 10.00"
- Square Head Design - for maximum flexibility and serviceability
- Mounting Styles - 19 standard mounts to adapt to your application
- Universal Piston Design - with 4 different seal configurations to satisfy any demand
- Strokes - available in any practical stroke length
- Cushions - captive design, optional at either end or both ends of stroke
- Rod Ends - four standard choices with specials to the order
- Global Design Support – for service to you and your customer around the world

*Pressure deratings may apply for mounting, length, or other features. Please see catalog for specific rating information.

http://www.parker.com/Literature/Industrial%20Cylinder/cylinder/cat/english/Gen%20II_HY08-1314-1_NA_2H_3H_Family.pdf

For more information on cylinder safety, go to the Cylinder Division Products Safety Guide on http://www.parker.com/safety

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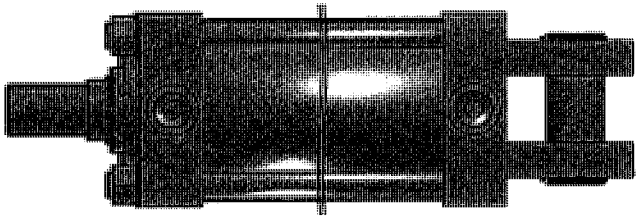
Technical Data	
Part No.	7.00BB3HKNAT1S14A58.000
Cylinder	Cylinder
Bore	7.00
Cushion Head	No Cushion Head
Double	Single Rod
Mounting	BB - Cap Fixed Clevis (NFPA MP1)
Mounting Modification	No Mounting Modification
Combination Mounting	No Combination Mounting
Series	3H - 7" & 8" Bore Heavy Duty Hydraulic Tie Rod (Jewel Gland Style)
Piston Seal	K - KP Filled PTFE Piston Seal
Piston Magnet	N - No Magnet
Gland and Seal	A - Threaded Jewel Gland with Lipseal
Port Type	T - SAE Straight Thread O-Ring
Seals	Standard (Class 1)
Special	S - Special Modification
Piston Rod Number	1 - 3.00 Inch INCH
Piston Rod End	4 - Style 4 Small Male
Piston Rod End Alternate Thread	No Alternate Threads
Piston Rod End Thread	A - Imperial Integral Cut Threads (UNF, UNC, UN, BSF)
Piston Rod Number - End 2	N/A
Rod End Style (End 2)	N/A
Piston Rod End Alternate Thread - End 2	N/A
Piston Rod End Thread - End 2	N/A
Cushion Cap (or Second Head)	No Cushion Cap
Stroke	58 INCH
Valve Manifold	N/A
Valve Pattern Group	N/A
Valve Location	N/A
Feedback Option	N/A
Feedback Furnished	N/A
Feedback Protective Enclosure	N/A
LRT Electrical Connector Location	N/A
WaveScale Electrical Box Location	N/A
Valve & Feedback Code	N/A
XI Dimension	N/A
BB Dimension - Head	N/A
BB Dimension - Cap (or Second Head)	N/A
Port Size - Head	#20 SAE
Port Location - Head	Position 1
Additional Port - Head	No Additional Port - Head
Port Size - Cap (or Second Head)	#20 SAE
Port Location - Cap (or Second Head)	Position 1

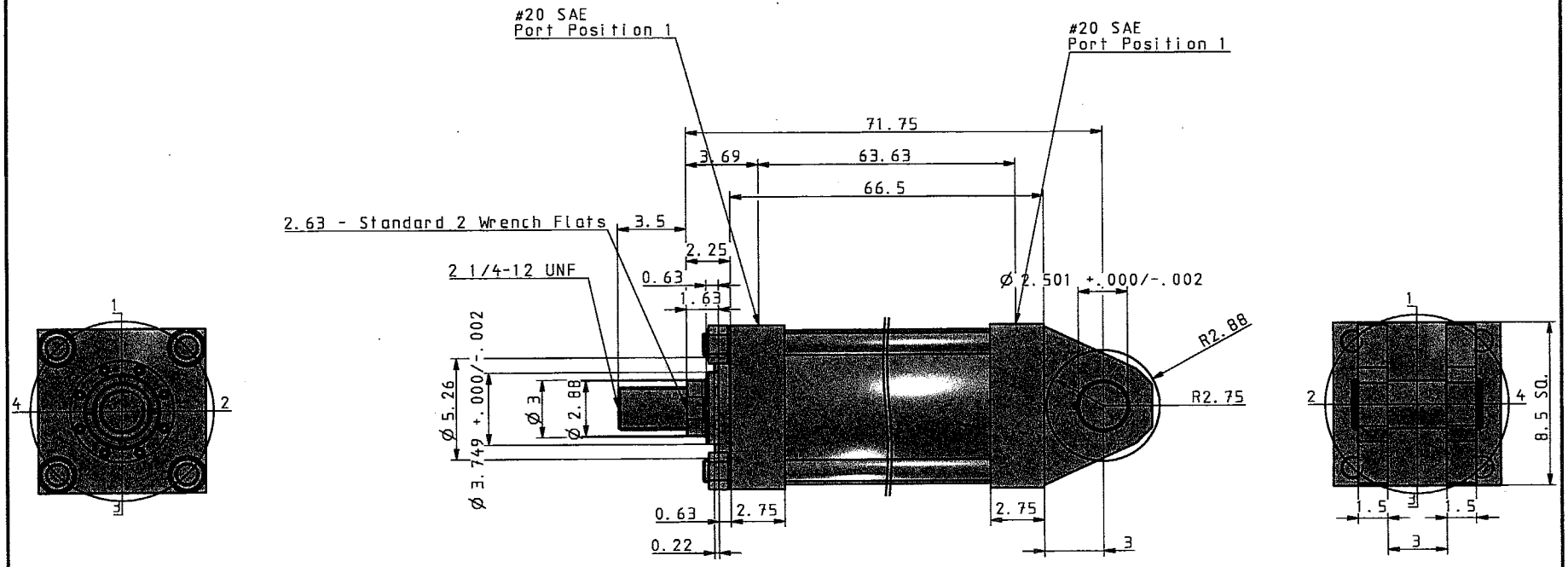
Technical Data	
Additional Port - Cap (or Second Head)	No Additional Port - Cap
Proximity Switch - Head	No Switch Head
Switch Location - Head	N/A
Switch Orientation - Head	N/A
Actuation Point - Head	N/A
Proximity Switch - Cap (or Second Head)	No Switch Cap
Switch Location - Cap (or Second Head)	N/A
Switch Orientation - Cap (or Second Head)	N/A
Actuation Point - Cap (or Second Head)	N/A
Switch Code	-
Needle Location - Head	N/A
Needle Location - Cap (or Second Head)	N/A
Check Location - Head	N/A
Check Location - Cap (or Second Head)	N/A
Gland Drain	No Gland Drain
Gland Drain Position	N/A
Piston Rod Wiper	Standard Wiperseal
Gland Wear Ring	No Wear Ring Gland
Piston Rod End Thread Type	Male Piston Rod Thread
Piston Rod End Thread (KK-CC)	Standard
Piston Rod End A Dimension	Standard
Piston Rod Wrench Flats	Standard 2 Wrench Flats
Piston Rod NA Turndown	Standard
Piston Rod End Extension Length	Standard
Piston Rod End Extension - Catalog Designation	Standard
Piston Rod End Type - End 2	N/A
Piston Rod End Thread (KK-CC) - End 2	N/A
Piston Rod End A Dimension - End 2	N/A
Piston Rod Wrench Flats - End 2	N/A
Piston Rod NA Turndown - End 2	N/A
Piston Rod End Extension Length - End 2	N/A
Piston Rod End Extension - Catalog Designation - End 2	Standard
Piston Rod Material	Standard Piston Rod Material
Piston Rod Plating	Standard Rod Plating
Piston-to-Rod Pinning	Standard Piston-To-Rod Connection
Stop Tube	Stop Tube
Stop Tube Length	1 INCH
Net Stroke	57 INCH
Retract Stroke Adjustment	N/A
Retract Stroke Adjustment Length	N/A
Controlled Piston Bypass	No Piston Bypass Option
Air Bleed Ports	No Air Bleed Ports
Air Bleed Port Location	N/A
Pivot Pin Options	Standard Ring Retained Pivot Pin
Extra Tie Rod Nuts	N/A
Submersible Option	Not Available (With Warning Msg)
Corrosion Protection	N/A
Cylinder Body Material	Standard Steel Body Material
Cylinder Body I.D. Chrome Plate Thickness	N/A
Paint	Standard Paint
Submersible Code	N/A

P

NOTES

- Piston - K - KP Filled PTFE Piston Seal
- Gland/Seal - A - Threaded Jewel Gland with Lipseal
- Standard Steel Body Material
- Seals - Standard (Class 1)
- Stop Tube Length=1
- Net Stroke=57
- Valve & Feedback Code - N/A

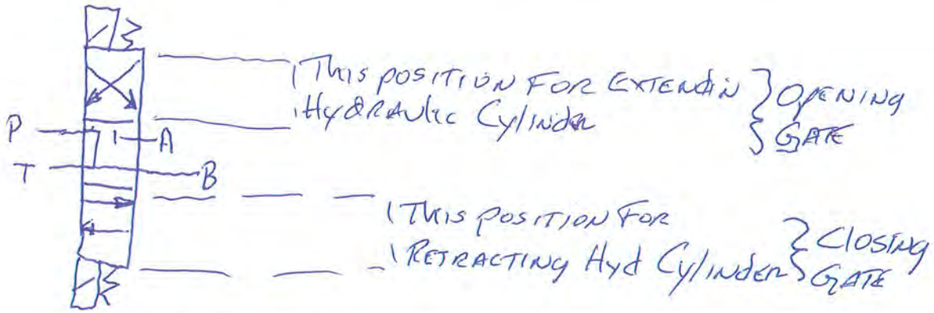


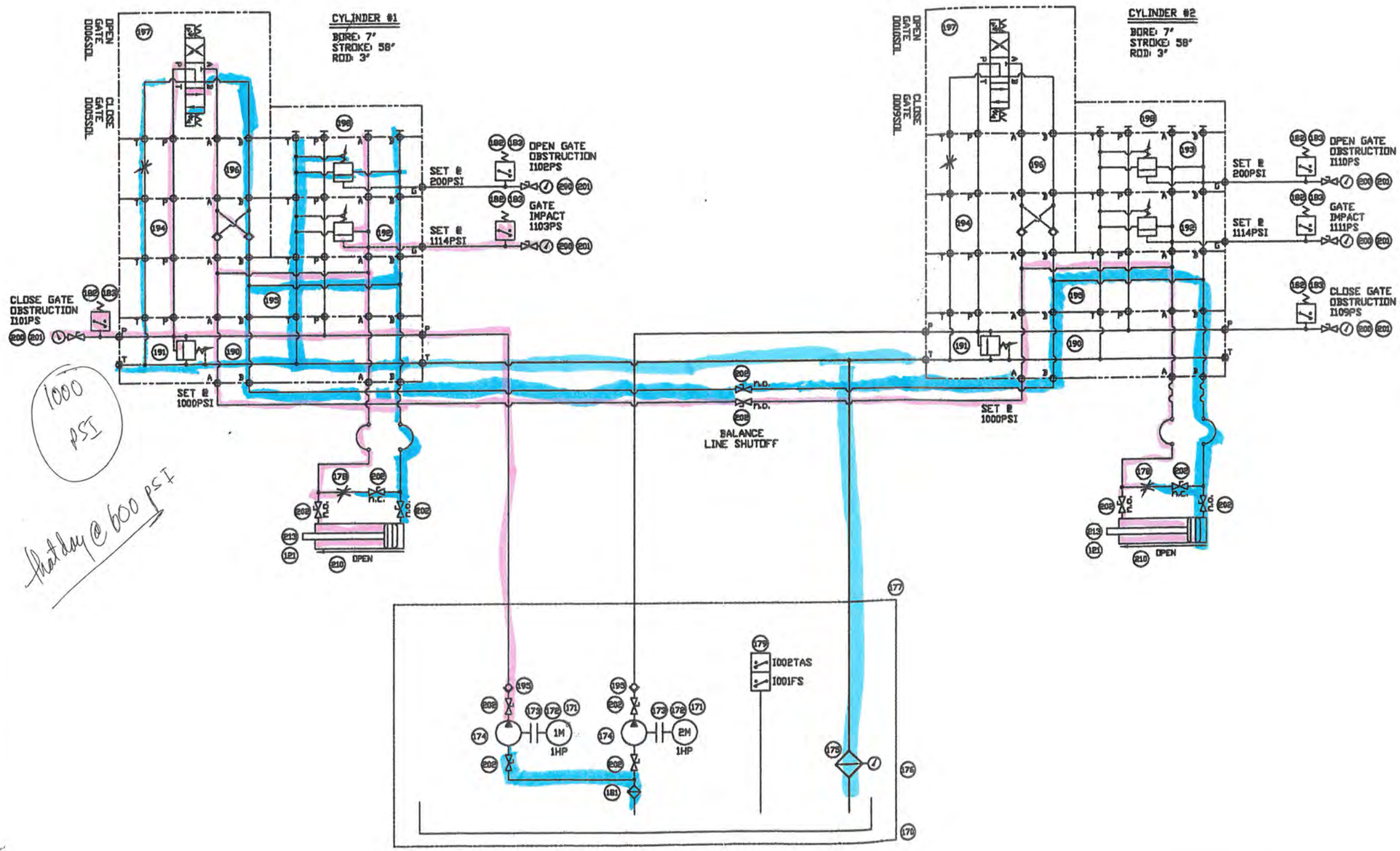


⚠ **WARNING:** FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. For more information on cylinder safety, go to the Cylinder Division Products Safety Guide on http://www.parker.com/safety

Parker

Model#
7.00BB3HKNAT1S14A58.000
CPN# undefined





ITEM	QTY	DESCRIPTION
170	1	MFP HYDRAULIC RESERVOIR #VL-35
171	2	BALDOR 1 HP 1800RPM ELECTRIC MOTOR #VL3510
172	2	VESCOR C-FACE BRACKET #152199
173	2	WOODS PUMP COUPLING #R075 5/8 x 7/8
174	2	HONDR GEAR PUMP .95 GPM #P102RU10GM
175	1	PARKER RETURN FILTER #25AT
176	1	PARKER SIGHT/LEVEL GAUGE #HSG55
177	1	PARKER FILLER / BREATHER #HC120
178	2	PARKER NEEDLE VALVE #N800S
179	1	FLUID PRODUCTS TEMP / LEVEL SWITCH #LS1308-150
180		
181	1	FLO-EZY INLET LINE STRAINER #HPFS 5 RV3
182	6	EFECTOR PRESSURE SWITCH #PK6220
183	6	EFECTOR SWITCH COVER #E30094
184		
185		
186		
187		
188		
189		
190	2	DAMAN MANIFOLD #AD03P022S/C
191	2	PARKER RELIEF VALVE #RAH101S30
192	2	SUN "A" PORT RELIEF VALVE #RDDA-LAN-FBA
193	2	SUN "B" PORT RELIEF VALVE #RDDA-LDN-FBA
194	2	PARKER DOUBLE P.O. CHECK VALVE #CPDM2DDN
195	2	DAMAN A&B PORT TAP PLATE #AD03TP022AB
196	2	PARKER NEEDLE VALVE #K2ACATWPNNVH1D1S
197	2	PARKER SOLENOID VALVE #D1VW007CNJC56
198	2	PARKER COVER PLATE #SPD2C1EN35
199		
200	6	PARKER GAUGE #LFG253000SSAE
201	6	PARKER 1/4" BALL VALVE #BVH0250S1111DMIC
202	12	PARKER 1/2" BALL VALVE #BVH0500S1111DMIC
203		
204		
205		
206		
207		
208		
209		
210	2	PARKER HYDRAULIC CYLINDER #7.00BB3HLTS14Ax58.00 S= 1" STOP TUBE ON ROD END
211	2	PARKER MOUNTING PLATE #85364
212	REF	PARKER CLEVIS PIN #68374
213	2	BECI FEMALE ROD CLEVIS #M50207-01
214		
215		
216		
217		
218		
219		

B & B Controls Inc.
Industrial Automation Systems

CUST: LELAND DAM AUTHORITY	
MACH: LELAND DAM	
MACH:	
BY: MBB	REV: 1.2
DATE: 9/12/05	DWG #
SCALE: NONE	M50207-15

Laurel Evans

From: Steve Christensen
Sent: Monday, December 11, 2023 3:20 PM
To: Laurel Evans
Subject: FW: Analysis
Attachments: Leland Dam Walkway Analysis Report - 11.14.23.pdf

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From: Zeddies, Daniel P. <danielz@spicergroup.com>
Sent: Tuesday, November 14, 2023 12:18 PM
To: Steve Christensen <schristensen@leelanau.gov>
Cc: Kathrens, Richard D. <rich.kathrens@spicergroup.com>; Middleton, Shawn P. <shawnm@spicergroup.com>
Subject: RE: Analysis

Steve,

We have completed the analysis and have a summary letter attached. The bridge is in good condition and we were able to apply 130 psf of live load to the walkway without any issues. The AASHTO minimum load necessary for pedestrian bridges is 90 psf so there is plenty of capacity in the walkway.

We do recommend a field inspection of the beams to be completed during the next dam inspection to verify beam sizes since we were only able to do some of the field checks necessary to verify the sizes.

Please let me know if you have any questions or comments about the summary. Thank you.

Daniel Zeddies, P.E. | Project Manager I
SPICER GROUP, INC.
Office: (989) 921-5534 | Cell: (989) 245-1468
www.spicergroup.com
Stronger. Safer. Smarter. *Spicer*

From: Kathrens, Richard D. <rich.kathrens@spicergroup.com>
Sent: Monday, November 13, 2023 4:00 PM
To: Zeddies, Daniel P. <danielz@spicergroup.com>
Subject: FW: Analysis

Rich Kathrens, P.E.| Senior Project Manager
SPICER GROUP, INC.
Cell | Text: 517-749-4274
www.spicergroup.com
Stronger. Safer. Smarter. *Spicer*

From: Kathrens, Richard D.
Sent: Monday, November 13, 2023 1:09 PM
To: Middleton, Shawn P. <shawnm@spicergroup.com>; Steve Christensen <schristensen@leelanau.gov>
Subject: RE: Analysis

Steve,

Shawn is correct, we are 95% complete with the analysis and have a summary letter prepared. We noticed some minor differences in the drawings vs. the pics, and I happened to be in the area this weekend, so I grabbed some quick measurements. We will incorporate those changes and will send you a summary by the end of this week.

Rich Kathrens, P.E.| Senior Project Manager
SPICER GROUP, INC.
Cell | Text: 517-749-4274
www.spicergroup.com
Stronger. Safer. Smarter. *Spicer*

From: Middleton, Shawn P. <shawnm@spicergroup.com>
Sent: Monday, November 13, 2023 1:07 PM
To: Steve Christensen <schristensen@leelanau.gov>
Cc: Kathrens, Richard D. <rich.kathrens@spicergroup.com>
Subject: RE: Analysis

Steve,

I have copied Rich. I know he had to go out and take a couple of measurements on Friday. I believe there was some differences in the As-built condition versus the plans.
Rich can elaborate and provide better idea on his schedule.

Thanks,

Shawn
Shawn P. Middleton, P.E., CFM
Sr Project Mgr | Vice President
SPICER GROUP, INC.
Office: 231-794-5620 Cell: 989-928-8027
www.spicergroup.com

From: Steve Christensen <schristensen@leelanau.gov>
Sent: Monday, November 13, 2023 11:57 AM
To: Middleton, Shawn P. <shawnm@spicergroup.com>
Subject: analysis

Hi Shawn,

We have a meeting on December 13th and I'm wondering if the analysis could be done by then?
Hope all is well for you!
Thanks
Steve C

November 14, 2023

Steve Christensen, Leelanau County Drain Commissioner
Leelanau County Drain Commission
112 W Philip St.
Lake Leelanau, Michigan 49653

RE: Leland Dam Walkway Structural Analysis
Leelanau County Drain Commission

Steve:

Spicer Group was requested to complete a structural analysis of the existing pedestrian walkway over the Leland Dam. The walkway consists of a galvanized I-beam main girder system that is in good condition with a timber deck and timber railings. The analysis was completed using beam sizes and details shown in the existing plans supplied by Leelanau County and with some field measurements taken on 11/10/23.

The analysis was completed using a Finite Element Analysis (FEA) model to recreate the walkway and apply the loads to the main structural system per the current governing code for pedestrian bridges. The code used for this analysis is the AASHTO Pedestrian Bridge Specification which states that pedestrian bridges must be designed for a 90 psf live load and have a deflection limit of L/360 with the service loads. The walkway safely carries the specified 90 psf live load. We also increased the live load to the limit of the bridge, and we were able to increase it to a 130 psf live load. With this 130 psf live load, we only saw a deflection of L/488 which is above the limit of L/360 and passes the governing AASHTO code.

With this analysis, it was assumed that the sizes of the beams in the drawings are correct. A field inspection of the walkway beams should be completed at the next dam inspection to ensure the beam sizes and layout are correct for the model. The splice plate was not taken into account during the analysis. A snow load for the walkway was not considered due to the live load being larger than any possible snow load on the walkway. Also, the AASHTO code does not consider snow loads for the design of a pedestrian bridge. It is also assumed that the beams are in good condition based on the photos provided for the walkway and have no deterioration.

The analysis outputs are provided in the Appendix.

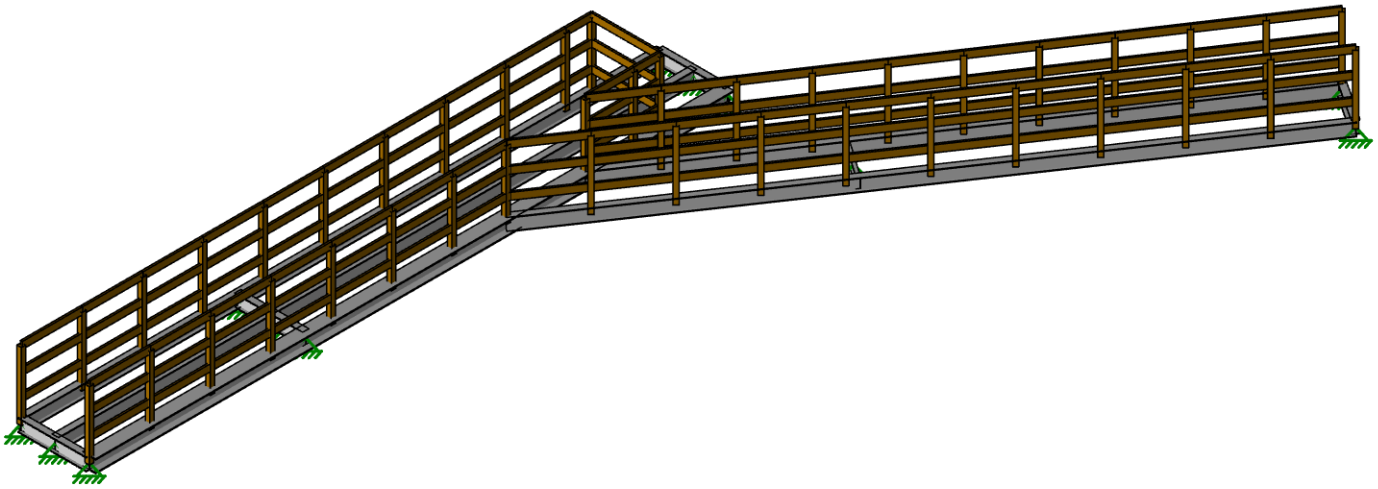
Thank you for the opportunity to work with you on this project. We deeply appreciate your confidence in using Spicer Group

Sincerely,

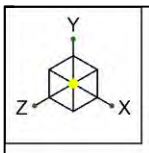
Daniel Zeddies, P.E.
Project Manager I

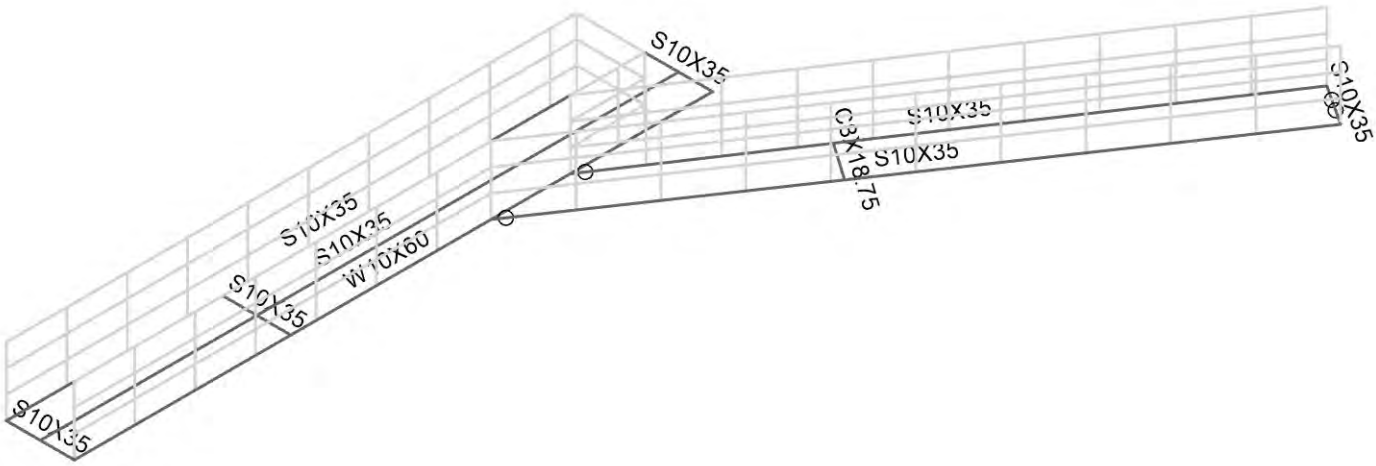
SPICER GROUP, INC
230 S. Washington Ave.
Saginaw, MI 48607
Phone: (989) 245-1468
E-mail: danielz@spicergroup.com

Copy: SGI File: 135308SG2023



Spicer Group, Inc.	Leland Walkway	SK-1
GTF		Nov 13, 2023
135308SG2023		Leeland Walkway.r3d





Spicer Group, Inc.	Leland Walkway	SK-2	
GTF		Nov 13, 2023	
135308SG2023		Leeland Walkway.r3d	24

Load Combinations

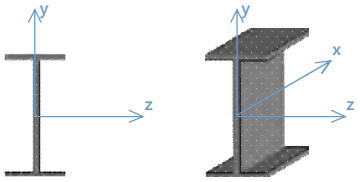
	Description	Solve	P-Delta	BLC	Factor	BLC	Factor
1	DL	Yes	Y	1	1		
2	DL + LL	Yes	Y	1	1	2	1

Envelope AISC 15th (360-16): ASD Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
1	M196	S10X35	0.726	14.523	2	0.062	14.523	y	2	4.853	222.036	9.658	30.61	1.669	H1-1b
2	M2	S10X35	0.478	14.523	2	0.037	14.523	y	2	4.853	222.036	9.658	31.25	1.703	H1-1b
3	M176	C8X18.75	0.404	1.512	2	0.139	1.481	y	2	97.84	118.778	2.882	24.97	1.317	H1-1b
4	M3	S10X35	0.397	12.416	2	0.043	12.792	y	2	6.641	222.036	9.658	45.625	2.121	H1-1b
5	M4	S10X35	0.392	23.629	2	0.046	24.051	y	2	5.28	222.036	9.658	40.722	2.127	H1-1b
6	M174	S10X35	0.184	4.5	2	0.108	2.25	z	2	183.523	222.036	9.658	63.593	1.29	H1-1b
7	M1	W10X60	0.143	30.367	2	0.077	14.523	y	2	67.83	381.557	62.874	134.012	1.568	H1-1b
8	M173	S10X35	0.078	4.5	2	0.045	2.25	z	2	183.523	222.036	9.658	63.593	1.484	H1-1b
9	M172	S10X35	0.012	0	2	0.007	2.25	z	2	183.523	222.036	9.658	63.593	1.139	H1-1b
10	M175	S10X35	0	3.184	2	0.008	3.184	z	2	201.838	222.036	9.658	63.593	1.136	H1-1b*

Detail Report: M196

Load Combination: Envelope **Code check:** 0.726 (LC 2)



Input Data

Shape:	S10X35	**I Node:**	N2
Member Type:	Beam	**J Node:**	N8
Length (ft):	42.25	**I Release:**	Fixed
Material Type:	Hot Rolled Steel	**J Release:**	Fixed
Design Rule:	Typical	**I Offset:**	N/A
Internal Sections:	97	**J Offset:**	N/A
Design Code:	AISC 15th (360-16): ASD	**T/C Only:**	Both Way

Material Properties

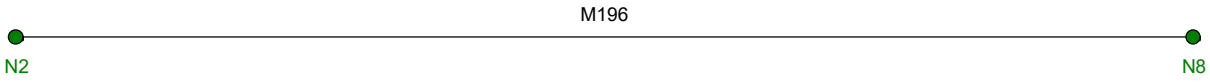
Material:	A36 Gr.36	**Therm. Coeff. (/1E5 F):**	0.65	**F_u (ksi):**	58
E (ksi):	29000	**Density (k/ft^3):**	0.49	**R_t:**	1.2
G (ksi):	11154	**F_y (ksi):**	36		
Nu:	0.3	**R_y:**	1.5		

Shape Properties

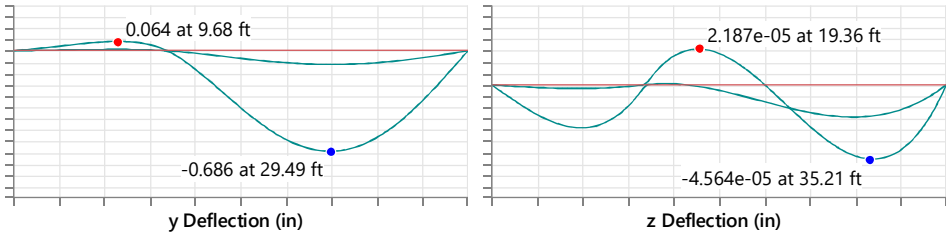
d (in):	10	**Area (in^2):**	10.3	**r_T (in):**	1.222
b_f (in):	4.94	**Z_{yy} (in^3):**	6.19	**J (in^4):**	1.29
t_f (in):	0.491	**Z_{zz} (in^3):**	35.4	**k_{det} (in):**	1.125
t_w (in):	0.594	**C_w (in^6):**	188	**k_{des} (in):**	1.13
I_{yy} (in^4):	8.3	**W_{no} (in^2):**	11.8		
I_{zz} (in^4):	147	**S_w (in^4):**	7.13		

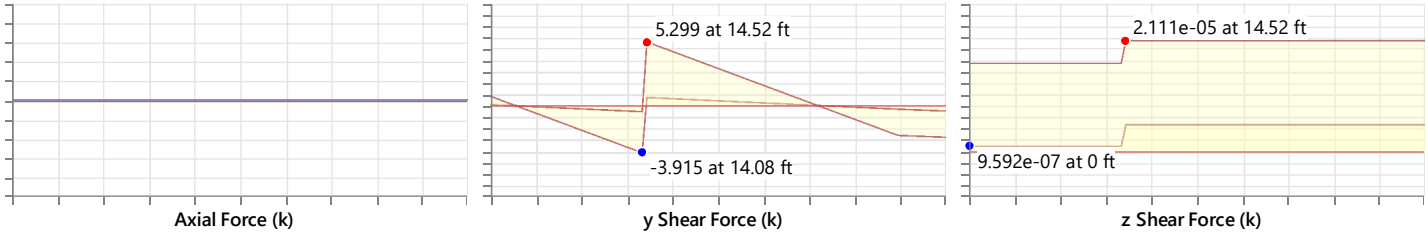
Design Properties

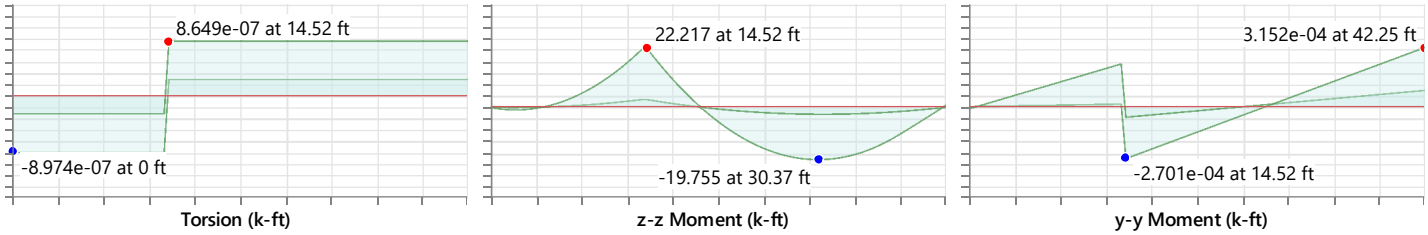
$L_{b\ y\text{-}y}$ (ft):	42.25	**$K_{y\text{-}y}$:**	1	**Seismic DR:**	None
$L_{b\ z\text{-}z}$ (ft):	42.25	**$K_{z\text{-}z}$:**	1	**Max Defl Ratio:**	L/488
$L_{comp\ top}$ (ft):	42.25	**y sway:**	No	**Max Defl Location:**	29.487
$L_{comp\ bot}$ (ft):	42.25	**z sway:**	No	**Span:**	2
L_{torque} (ft):	42.25	**Function:**	Lateral	**τ_b:**	1

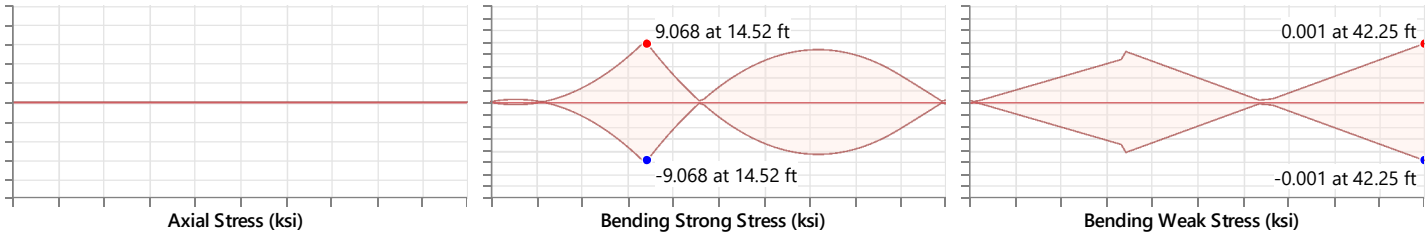


Diagrams:





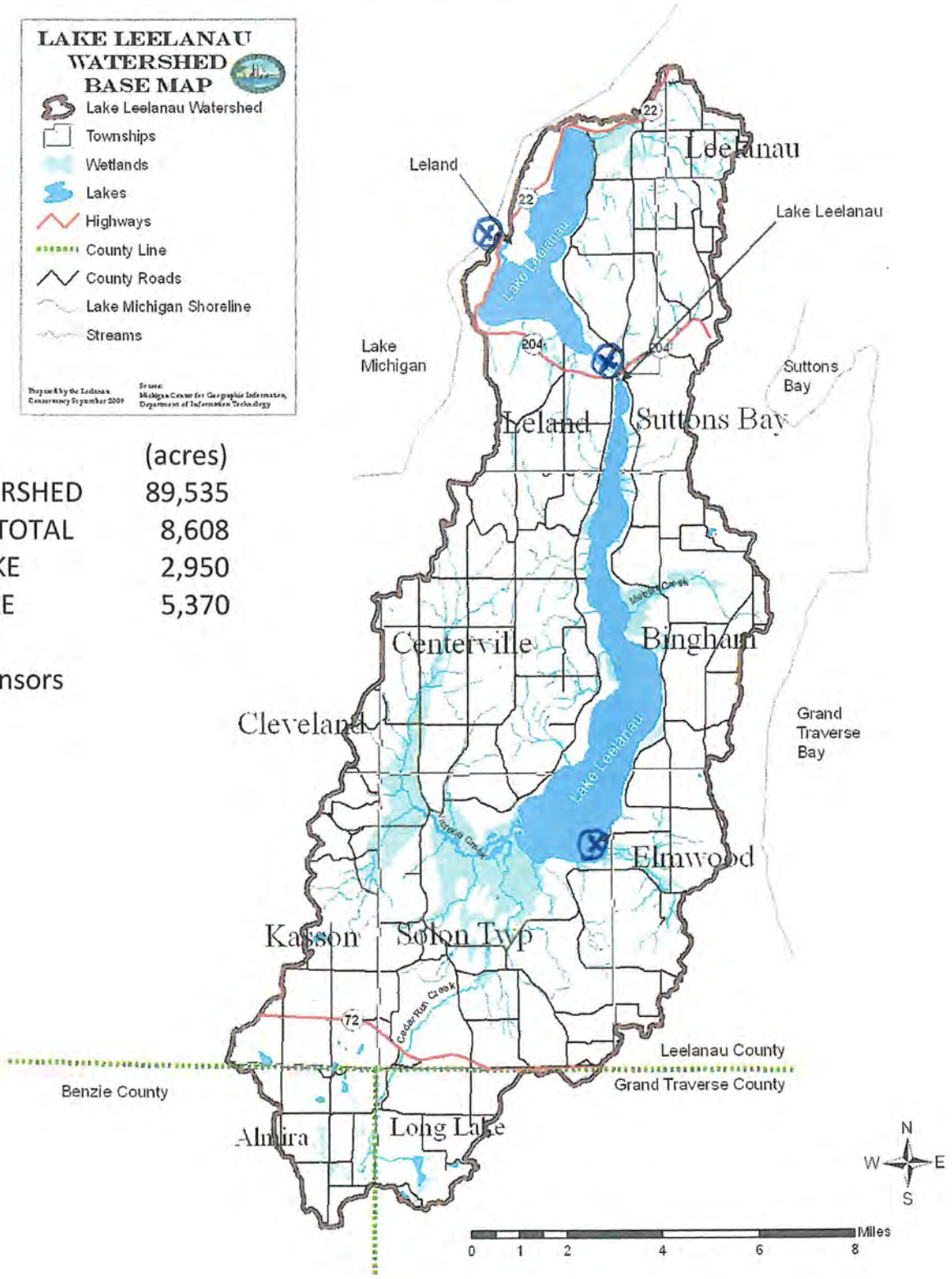




AISC 15th (360-16): ASD Code Check

Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	2	-	-	-	-
Applied Loading - Shear + Torsion	2	-	-	-	-
Axial Tension Analysis	2	0 k	222.036 k	-	-
Axial Compression Analysis	2	0 k	4.853 k	-	-
Flexural Analysis (Strong Axis)	2	22.217 k-ft	30.61 k-ft	-	-
Flexural Analysis (Weak Axis)	2	0.0002701 k-ft	9.658 k-ft	-	-
Shear Analysis (Major Axis y)	2	5.299 k	85.536 k	**0.062**	**PASS**
Shear Analysis (Minor Axis z)	2	4.027e-5 k	62.745 k	**6.418e-7**	**PASS**
Bending & Axial Interaction Check (UC Bending Max)	2	-	-	**0.726**	**PASS**

Figure 1: Lake Leelanau Watershed – Base Map



	(acres)
WATERSHED	89,535
LAKE TOTAL	8,608
N. LAKE	2,950
S. LAKE	5,370

X = sensors