

## Burlington Canal Lift Bridge Mechanical Maintenance and Lubrication Manual Lube Schedule by Component

Component	Oil / Grease	Lubricant	Method	Frequency	Remarks
<b>Counterweight Ropes &amp; Guides</b>					
Main Counterweight Ropes	Grease	Chevron 100 NC	Drip Trays/Hand Swab	Twice / Year	Corrosion Protection
Auxiliary Counterweight Ropes	Grease	Chevron 100 NC	Hand Swab	Twice / Year	Corrosion Protection
Main Counterweight Guides	Grease	Chevron Starplex EP 2	Hand	Every 6 Weeks	
Auxiliary Counterweight Guides	Oil	Oil 10W30	Oil Can	6 Months	
Auxiliary Counterweight Guides Wheel Axles	Grease	Chevron Starplex EP 2	Grease Gun	Monthly	
Auxiliary Counterweight Hitch Assembly	Grease	Chevron Starplex EP 2	Grease Gun	Monthly	
Auxiliary Counterweight Sheaves	Grease	Chevron Starplex EP 2	Grease Gun	Monthly	
<b>Main Counterweight Sheaves</b>					
SKF Spherical Roller Bearings	Grease	Petro-Canada Peerless OG2 Red	Hand	Every 4 Years	Do Not Overlubricate, Open Cover and Re-Lubricate (Hand remove old grease and hand pack with new grease)
<b>Span Drive Machinery</b>					
Main Motor Bearings	Grease	Mobil Polyrex EM NLGI #2	Use Grease Fitting	Approx Every 5 Years	When lubricating the motor bearings, remove the drain plug, pump in new grease and allow old lubricant to escape from the open port. This will avoid developing a pressure buildup that damage the seals. Do Not Overlubricate
Thruster Brake Tank Linkage Flexible Couplings	Oil Oil	Shell Morlina 10 S2 BL10 Oil 10W30	Maintain Oil Level Oil Can	Change Oil Every 2 Years As Required	See Parts Manual
Ameridrive FS204	Grease	Chevron Starplex EP 2	Grease Gun	Grease Gun - Remove Plug, Grease and Replace Plug.	
Falk Brakewheel 15BW	Grease	Chevron Starplex EP 2	Grease Gun	Grease Gun - Remove Plug, Grease and Replace Plug.	Clean any leakage from seals, ensure that grease does not contaminate friction surface.
Primary Reducer	Oil	Shell Omala S2 G 150	Maintain Oil Level	Sample oil annually and replace if deemed necessary based on oil analysis	Do not over lubricate, remove plug/relief fitting opposite of fitting prior to introducing new grease. Twice / Week (High Speed Shafts)
Primary Reducer Input and Output Shaft Seals Shaft Bearings Second Reduction & Equalizer Bearings	Grease Grease Grease	Chevron Starplex EP 2 Chevron Starplex EP 2 Chevron Starplex EP 2	Grease Gun Grease Gun Grease Gun	12 Months Weekly (Low Speed Shafts) Monthly	Scrape excess grease off and add lubricant as needed. (Switch to 29W during the winter operational season) Scrape excess grease off and add lubricant as needed. (Switch to 29W during the winter operational season) Scrape excess grease off and add lubricant as needed. (Switch to 29W during the winter operational season)
Second Reduction Open Gears	Open Gear Grease	Anderol Moly 29 or Moly 29W	Hand Swab	Weekly as Needed	
Second Reduction, Equalizer Open Gears	Open Gear Grease	Anderol Moly 29 or Moly 29W	Hand Swab	Monthly	
Sheave Ring Gear & Pinion Open Gears	Open Gear Grease	Anderol Moly 29 or Moly 29W	Hand Swab	Weekly as Needed	
<b>Span Position Equipment</b>					
Branch Gear Train Mitre Gearbox Boston R137 Universal Joints	Open Gear Grease Oil Oil	Anderol Moly 29 or Moly 29W Chevron Meropa 320 Oil 10W30	Hand Swab Maintain Oil Level Oil Can	Monthly Change Oil Every 5 Years Monthly	Apply Sparingly

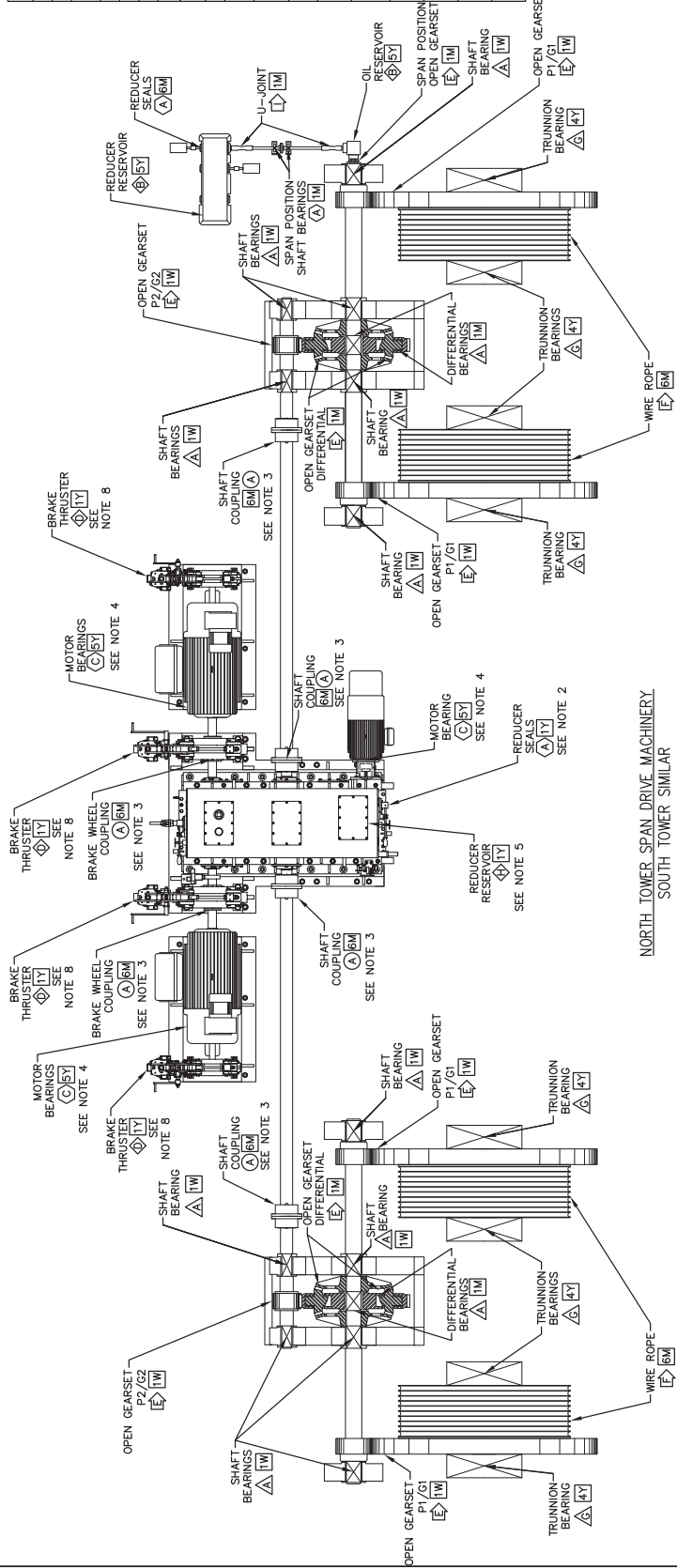
## Burlington Canal Lift Bridge Mechanical Maintenance and Lubrication Manual Lube Schedule by Component

Component	Oil / Grease	Lubricant	Method	Frequency	Remarks
Shaft Bearings Speed Distribution Box Seals Flexible Couplings Lovejoy Resolvers	Grease	Chevron Starplex EP 2	Grease Gun	Monthly	Apply Sparingly 4 litres
	Oil	Chevron Meropa 320	Maintain Oil Level	Change Oil Every 5 Years	
	Grease	Chevron Starplex EP 2	Grease Gun	6 Months	Apply Sparingly
		None Needed None Needed	None		
<b>Span Guide Brackets</b> Guide Roller Bushings	Grease	Chevron Starplex EP 2	Grease Gun	Monthly	
<b>Air Buffers</b> Inside Air Cylinder Piston Rod (Plunger) Bearings	Oil Oil	Oil 10W30 Oil 10W30	Inject Through Top Plug Hand Application	Monthly Weekly	Clean & Rotate Weekly
<b>Span Locks</b> Motors 5 hp	Grease	Chevron Texaco Polystar RB 2	Factory Packed	Re-packing Not Necessary for Life of Bearing	Check yearly and add as needed.
Flexible Coupling Falk 6F	Grease	Chevron Starplex EP 2	Grease Gun & Hand	Re-pack Yearly	
Span Lock Gear Reducer	Oil	Chevron Meropa 320	Maintain Oil Level	Sample oil annually and replace if deemed necessary based on oil analysis	Do not over lubricate, remove plug/relief fitting opposite of fitting prior to introducing new grease.
Gear Reducer Input and Output Shaft Seals	Grease	Chevron Starplex EP 2	Grease Gun	12 Months	
	Open Gear Grease	Anderol Moly 29 or Moly 29W	Hand Swab	Monthly	
	Grease	Chevron Starplex EP 2	Grease Gun	Every 2 Weeks	
	Grease	Chevron Starplex EP 2	Grease Gun	Every 2 Weeks	
	Grease	Chevron Starplex EP 2	Grease Gun	Every 2 Weeks	
	Grease	Chevron Starplex EP 2	Grease Gun	Every 2 Weeks	
<b>Span Seat &amp; Centering Devices</b> Lift Span Saddle Seat (South End) Rocker Expansion Support (North End)	Grease Oil	Chevron Starplex EP 2 Oil 10W30	Hand Application Hand Application	Every 2 Weeks Monthly	Lift Span approx 1 ft. Apply Oil Both Sides of Pin & Rock Casting to Increase Penetration.
Centering Device (Both Ends)	Grease	Chevron Starplex EP 2	Hand Application (Brush)	Every 2 Weeks	
<b>Gates</b> Barrier Gates B&B VR-6RL Traffic Gates B&B VW-2 Traffic Gates B&B VW-4 Connecting Rod Ends Gate Arm Shaft Bearings	Oil Oil Oil Grease Grease	Mobil SHC 629 Mobil SHC 629 Mobil Glygoyle 460 Chevron Starplex EP 2 Chevron Starplex EP 2	Maintain Oil Level Maintain Oil Level Maintain Oil Level Grease Gun Grease Gun	Every 6 Months Every 6 Months	Change oil if Discolored, Milky, or Dirty. Change oil if Discolored, Milky, or Dirty. Change oil if Discolored, Milky, or Dirty.
<b>Cable Reel</b> Gleason S28 Span Lighting Gleason WB	Grease	Chevron Starplex EP 2 None Needed	Grease Gun	Monthly	Adjust frequency as needed

LUBRICATION LEGEND	
SYMBOL	APPLICATION
◇	OIL RESERVOIR - POUR OR PUMP
○	GREASE GUN - REMOVE PLUG, GREASE AND REPLACE PLUG
△	GREASE GUN - FITTING BOTTOM HEAD
◇	GREASE GUN - FITTING
◇	GREASE GUN - ZEM FITTING
◇	WEEKS (NO. MONTHS (M), YEARS (Y))

LUBRICANT LIST			
CODE	SPEC.	LUBRICANT	REMARKS
A	NLG #2	CHEVRON STARPLEX EP 2	BEARINGS/SEALS/COUPLINGS
B	AGMA 6 /ISO 320	TEXACO MEROPA 320	REDUCER
C	NLG #2	MOBIL POLYREX	SPAN DRIVE MOTOR BEARINGS
D	-	SHELL MORINA TO S2 BLD	BRAKE THRUSTERS
E	-	AMBEROL MOLY 29 OR SEE NOTE 6.	OPEN GEARS
F	-	CHEVRON 100 NC	COUNTERWEIGHT ROPES
G	NLG #2	PETRO-CANADA PEERLESS OS2 RED	TRUNNION BEARINGS
H	AGMA 4 /ISO 150	SHELL OMAHA S2 0150	SPAN DRIVE REDUCER
I	LIGHT OL	OL	U-JOINT



- NOTES:**
- WHENEVER USING/INSTALLING A GREASE FITTING OR REMOVING A GREASE PLUG, CLEAN THE GREASE FITTINGS, PLUGS, AND SURROUNDING AREAS WITH A RAG TO REMOVE DIRT PRIOR TO USE.
  - WHEN LUBRICATING REDUCER SEALS, TAKE CARE TO REMOVE PLUG/RELIEF FITTING OPPOSITE OF GREASE FITTING PRIOR TO INTRODUCING NEW GREASE INTO THE THE CAVITY. AS NEW GREASE IS PUMPED IN, ALLOW OLD LUBRICANT TO ESCAPE FROM THE OPEN PORT. THIS WILL AVOID DEVELOPING A PRESSURE BUILDUP THAT MAY DAMAGE THE SEALS. REMOVE THE SEALS WHENEVER THE OIL BECOMES DISCOLORED, MILKY, OR DIRTY. CHANGE THE OIL.
  - WHEN LUBRICATING THE GREASE FITTING AND LEAVE OPEN PLUG, IN NEW GREASE AND ALLOW OLD LUBRICANT TO ESCAPE FROM THE OPEN PORT. THIS WILL AVOID DEVELOPING A PRESSURE BUILDUP THAT MAY DAMAGE THE SEALS.
  - WHEN LUBRICATING THE MOTOR BEARINGS, REMOVE THE DRAIN PLUG, PUMP IN NEW GREASE AND ALLOW OLD LUBRICANT TO ESCAPE FROM THE OPEN PORT. THIS WILL AVOID DEVELOPING A PRESSURE BUILDUP THAT MAY DAMAGE THE SEALS.
  - REDUCER OILS SHOULD BE CHECKED EVERY TWELVE MONTHS. REMOVE INSPECTION COVER AND TAKE A SAMPLE. SEND TO LAB FOR ANALYSIS AND FLUSH AND REPLACE OIL IF DEEMED NECESSARY BASED ON OIL ANALYSIS.
  - SCRAPE OFF EXCESS LUBRICANT AND ADD AS NEEDED TO COAT GEAR TEETH. USE 29W DURING THE WINTER OPERATIONAL SEASON.
  - CHECK BRAKE THRUSTER OIL LEVEL YEARLY AND TOP OFF AS NECESSARY. TAKE CARE TO ENSURE THRUSTER IS NOT OVER-FILLED. IF THE OIL BECOMES DISCOLORED, MILKY, OR DIRTY, CHANGE THE OIL.

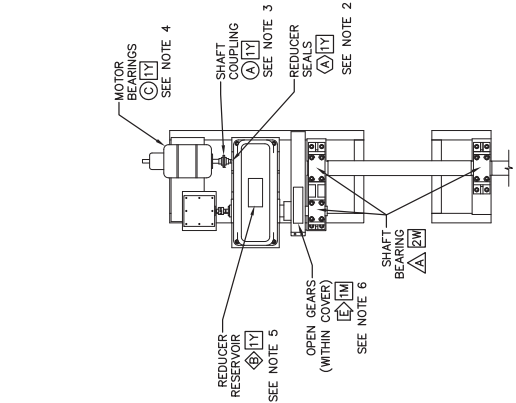
BRIDGE		DRAWING NO.													
LUBRICATION SCHEMATIC 1		L-1													
NORTH SPAN DRIVE MACHINERY ASSEMBLY		BURLINGTON CANAL VERTICAL LIFT BRIDGE													
SHEET TITLE		HAMILTON, ONTARIO													
Stanford Bondine Engineering, Inc. Doylestown, PA 18002 <a href="http://www.stengr.com">www.stengr.com</a>															
<table border="1" style="width: 100%;"> <thead> <tr> <th>DATE</th> <th>REV</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>				DATE	REV	DESCRIPTION									
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- NOTES:**
- WHENEVER USING/INSTALLING A GREASE FITTING OR REMOVING A GREASE PLUG, CLEAN THE GREASE FITTINGS, PLUGS, AND SURROUNDING AREAS WITH A RAG TO REMOVE DIRT PRIOR TO USE.
  - WHEN LUBRICATING REDUCER SEALS, TAKE CARE TO REMOVE PLUG/RELIEF FITTING OPPOSITE OF GREASE FITTING PRIOR TO LUBRICATING. AFTER LUBRICATING, REINSTALL PLUG/RELIEF FITTING AND TIGHTEN TO SPECIFICATION TO PREVENT LEAKAGE FROM THE OPEN PORT. THIS WILL AVOID DEVELOPING A PRESSURE BUILDUP THAT MAY DAMAGE THE SEALS.
  - WHEN LUBRICATING COUPLINGS, AT A GIVEN HUB, REMOVE ONE PLUG AND INSTALL A GREASE FITTING. REMOVE THE PLUG OPPOSITE THE GREASE FITTING AND LEAVE OPEN. PUMP IN NEW GREASE AND ALLOW OLD LUBRICANT TO ESCAPE FROM THE OPEN PORT. THIS WILL AVOID DEVELOPING A PRESSURE BUILDUP THAT MAY DAMAGE THE SEALS.
  - WHEN LUBRICATING MOTOR BEARINGS, AT A GIVEN HUB, REMOVE ONE PLUG AND INSTALL A GREASE FITTING. REMOVE THE PLUG OPPOSITE THE GREASE FITTING AND LEAVE OPEN. PUMP IN NEW GREASE AND ALLOW OLD LUBRICANT TO ESCAPE FROM THE OPEN PORT. THIS WILL AVOID DEVELOPING A PRESSURE BUILDUP THAT MAY DAMAGE THE SEALS. CHECK LUBRICANT YEARLY AND ADD GREASE SPARINGLY.
  - REDUCER OILS SHOULD BE CHECKED EVERY TWELVE MONTHS. REMOVE INSPECTION COVER AND TAKE A SAMPLE. SEND TO LAB FOR ANALYSIS AND FLUSH AND REPLACE OIL IF DEMAILED NECESSARY BASED ON OIL ANALYSIS.
  - WHEN SWITCHING LUBRICANTS, PURGE OR CLEAN OLD LUBRICANT PRIOR TO INSTALLING OR APPLYING NEW LUBRICANT. OPERATIONAL SEASONS LUBRICANT AND ADD AS NEEDED TO COAT GEAR TEETH. USE Z9W DURING THE WINTER OPERATIONAL SEASONS.
  - WHEN SWITCHING LUBRICANTS, PURGE OR CLEAN OLD LUBRICANT PRIOR TO INSTALLING OR APPLYING NEW LUBRICANT.
  - FLUSH WITH OIL AS NEEDED TO ENSURE PISTON ROD (PLUNGER) DESCENDS FREELY.

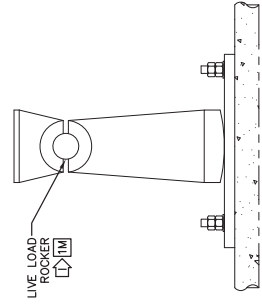
LUBRICATION LEGEND	
SYMBOL	APPLICATION
◇	OIL RESERVOIR - FOUR OR PUMP
○	GREASE GUN - REMOVE PLUS OR GREASE AND APPLY TO FITTING
△	GREASE GUN - LEAVE BOTTOM HEAD FITTING
□	BRUSH, SPRAY OR SWAB
◇	GREASE GUN - ZERK FITTING
□	SERVICE FREQUENCY IN WEEKS (W), MONTHS (M), YEARS (Y)

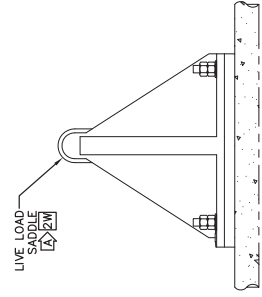
LUBRICANT LIST			
CODE	SPEC.	LUBRICANT	REMARKS
A	NLG #2	CHEVRON STARPLEX BEARINGS/SEALS/COUPLINGS	
B	AGMA 6 /ISO 320	TEXACO MEROPA 320	REDUCER
C	NLG #2	CHEVRON POLYSTAR RB2 SPAN LOCK MOTOR BEARINGS	
D	-	SHELL MORUNA 10 S2 BLVO	BRAKE THRUSTERS
E	-	ANGEROL MOLY 29 OR SEE NOTE 6.	OPEN GEARS
F	-	CHEVRON 100 NC	COUNTERWEIGHT ROPES
G	NLG #2	PETRO-CANADA PEERLESS OS2	TRUNION BEARINGS
H	AGMA 1 /ISO 150	SHELL OMALA S2 150	SPAN DRIVE REDUCER
I	10W50	OIL	AIR BUFFER



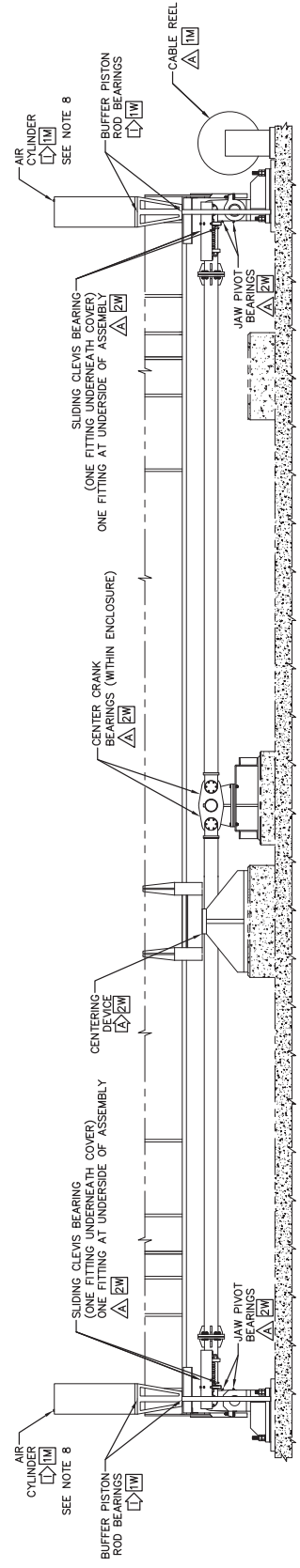
**PLAN VIEW**  
SPAN LOCK MACHINERY - HIGH SPEED  
CENTRAL ENCLOSURE NOT SHOWN FOR CLARITY



**ELEVATION VIEW**  
LIVE LOAD ROCKER - NORTH PIER ONLY



**ELEVATION VIEW**  
LIVE LOAD SADDLE - SOUTH PIER ONLY



**ELEVATION VIEW - SOUTH PIER SHOWN, NORTH PIER SIMILAR**  
SPAN LOCK MACHINERY - CRANK AND LATCH ASSEMBLIES  
ENCLOSURES NOT SHOWN FOR CLARITY

<b>REVISIONS</b>		<b>BRIDGE</b> BURLINGTON CANAL VERTICAL LIFT BRIDGE HAMILTON, ONTARIO	DRAWING NO. L-2
DATE	REV		
SHEET TITLE		LUBRICATION SCHEMATIC 2 SPAN LOCK MACHINERY, CENTERING DEVICES, LIVE LOAD SUPPORTS, AND BUFFERS	
 <b>STERLING ENGINEERING</b> Sterling Engineering, Inc. Doylestown, PA 18022 www.sterlingeng.net			

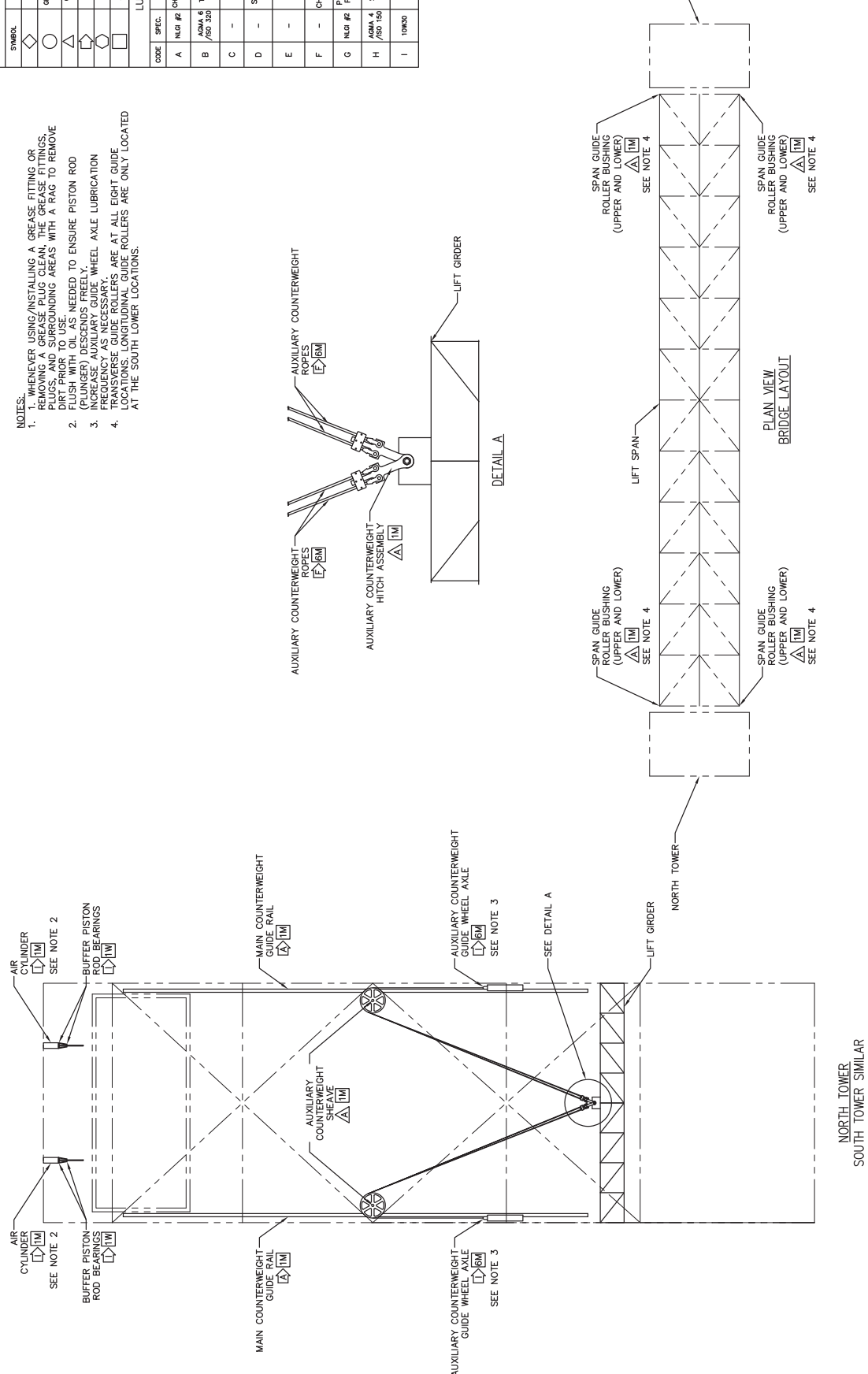
- NOTES.**
- WHENEVER USING/INSTALLING A GREASE FITTING OR PLUG, CLEAN THE GREASE FITTING, PLUGS, AND SURROUNDING AREAS WITH A RAG TO REMOVE DIRT PRIOR TO USE.
  - FLUSH WITH OIL AS NEEDED TO ENSURE PISTON ROD (PLUNGER) DESCENDS FREELY.
  - INCREASE AUXILIARY GUIDE WHEEL AXLE LUBRICATION FREQUENCY TO 1 YEAR.
  - TRANSVERSE GUIDE ROLLERS ARE AT ALL EIGHT LOCATIONS. LONGITUDINAL GUIDE ROLLERS ARE ONLY LOCATED AT THE SOUTH LOWER LOCATIONS.


**LUBRICATION LEGEND**

SYMBOL	APPLICATION
◇	OIL RESERVOIR - POLE OR PUMP
○	GREASE GUN - REMOVE PLUS GREASE AND REAPPLY GREASE PLUS GREASE GUN
△	BRUSH, SPRAY OR SWAB
□	GREASE GUN - FITTING
◇	GREASE GUN - ZERK FITTING
○	WEEKS (W), MONTHS (M), YEARS (Y)

**LUBRICANT LIST**

CODE	SPEC.	LUBRICANT	REMARKS
A	NLG #2	CHEVRON STARPLEX EP 2	BEARINGS/SEALS/COUPLINGS
B	AGMA 6 /ISO 320	TEXACO MEROPA 320	RENDER
C	-	-	-
D	-	SHELL MORLINA 10 S2 BL10	BRAKE THRUSTERS
E	-	ANDEROL MOLY 29 OR SEE NOTE 6.	OPEN GEARS
F	-	CHEVRON 100 NC	COUNTERWEIGHT ROPES
G	NLG #2	PETRO-CANADA PEERLESS 052	TRUNNION BEARINGS
H	NLG #1 /ISO 150	SHELL OMALA RED	SPAN GUIDE ROLLER ASSEMBLY
I	10W50	OIL	AIR BUFFER



<p>BRIDGE: BURLINGTON CANAL VERTICAL LIFT BRIDGE HAMILTON, ONTARIO</p>		<p>DRAWING NO. L-3</p>						
<p>LUBRICATION SCHEMATIC 3 TOWER AND LIFT SPAN MACHINERY</p>								
<p>SHEET TITLE</p>								
<p>   <b>STERLING BONDING ENGINEERS</b>          Sterling Bonding Engineering, Inc.          Doylestown, PA 18002          www.stengineering.net       </p>								
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