

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615601 – MONTHLY MAINTENANCE CHECKLIST – PAGE 1 OF 3**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Trunnion Bearings - Sections 8.1.1, 11.1 (Component ID # 19 & 20), 11.2, & 11.4.1		
Purge old grease by pumping new lubricant into the grease fittings. There are four grease fittings per trunnion bearing. Remove excess grease from the inboard and outboard sides of the trunnion bearings after lubricating. The lubricant should be Mobil Mobilux EP-2 grease or equivalent.		
Remove any debris that has accumulated on and around the trunnion assemblies and the portions of the bascule girders near the trunnions.		

Motor Brakes - Sections 8.2.1, 11.1 (Component ID # 4 & 6), 11.2, 11.4.2, 11.7.3, & 11.7.4		
Perform brake test. Refer to Section 4.10 for the brake test procedure.		

Couplings - Sections 8.2.2, 11.1 (Component ID # 3, 7, 9, 14, 16 & 29), 11.2, 11.4.3, & 11.7.6		
Inspect key and keyways at all couplings for grease leakage, tightness, and cracking. Check coupling flange bolts for corrosion and tightness. Tighten loose fasteners.		
Inspect for leaks at seals and gaskets. If the seal is leaking, inspect for damage. Notify the Engineer if the seal is damaged.		
Inspect jaw couplings for cracking or damage.		

Primary Reducers – Sections 8.2.3, 11.1 (Component ID # 8), 11.2, 11.4.4, & 11.7.1		
Visually inspect the oil level in the sight gauge and bearing reservoirs before operating the leaf. Add oil to the reducer if the oil level in the sight glass is more than ¼" below the oil level line on the lubrication plate.		
Listen for unusual noises during operation of the machinery. Report any unusual noises to bridge management.		
Inspect the breather. Replace the breather if it is saturated or damaged.		

Bearings - Sections 8.2.4, 11.1 (Component ID # 13, 21, 23, 24, 26, 31, 32, 35 & 37), 11.2, & 11.4.1		
Fill with new grease, as required to completely purge the bearing of the existing grease. Remove excess purged grease. Use Mobil Mobilux EP-2 or equivalent.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
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Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Open Gearing - Sections 8.2.5, 11.1 (Component ID # 25, 28, 33, 34, 36, 38, 39 & 40), 11.2, & 11.4.5		
Lubricate teeth using Mobil Mobiltac 325 NC or equivalent grease.		
Lock Bars, Guides, and Receivers - Sections 8.3.1, 11.1 (Component ID # 43, 44, 47 & 48), 11.2, & 11.4.7		
Remove existing lubricant and brush or swab the lock bar and receiving socket sliding surfaces with Mobil Mobilux EP-2 grease or equivalent.		
Visually inspect guides and sockets, lock bars, fasteners and shims for damage. With traffic on the span, observe the lock bars, guides, and receiving sockets for relative vertical movement, resulting in the lock bars impacting the top or bottom of the guide or receiving socket sliding surfaces.		
Span Lock Reducers - Sections 8.3.2, 11.1 (Component ID # 49), 11.2, 11.4.7, & 11.7.2		
Before operating the span lock machinery, temporarily loosen / remove the oil level plug and check the oil level inside the reducer housing. Add oil to the reducer if the oil level is more than ¼" below the oil level plug.		
Listen for unusual noises during operation of the machinery. Report any unusual noises to bridge management.		
Inspect the breather. Replace the breather if it is saturated or damaged.		
Span Lock Motor Coupling - Sections 8.3.3, 11.1 (Component ID # 50), 11.2, 11.4.7, & 11.7.5		
Inspect keys and keyways at all couplings for grease leakage, tightness and cracking. Check coupling flange bolts for corrosion and tightness. Tighten loose fasteners.		
Inspect for leaks at seals and gaskets. If coupling is leaking grease from seals, remove coupling cover to inspect seal. Notify the Engineer if the seal is damaged. If coupling covers are removed, replace lubricant.		
Span Lock Rack and Pinion - Sections 8.3.4, 11.1 (Component ID # 45 & 46), 11.2, & 11.4.7		
Lubricate teeth using Mobil Mobiltac 325 NC or equivalent grease.		
Centering Device and Centering Guide - Sections 8.3.5, 11.1 (Component ID # 53 & 54), 11.2, & 11.4.8		
Apply grease to the sliding surfaces of the centering device and guide. Remove existing lubricant and brush or swab the centering device and centering guide wear plates with Mobil Mobilux EP-2 grease or equivalent.		
Visually inspect centering device, centering guide, wear plates, and fasteners for excessive wear, deformation, fit, or damage.		
Navigation Lights - Section 8.6.1		
Check navigation lights for proper operation.		
Replace lamps if damaged or nonfunctional.		
Interior/Exterior Lights - Section 8.6.2		
Check for burned-out lamps. Replace burned-out lamps. Verify light switches function properly.		
Traffic Signals - Section 8.6.3		
Check lights for proper illumination and replace burned out bulbs.		
Verify proper operation during marine and maintenance openings.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615601 – MONTHLY MAINTENANCE CHECKLIST – PAGE 3 OF 3**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Traffic Gate Arm Lights - Section 8.6.4		
Check traffic gate arm lights for proper operation. Replace burned out bulbs.		

Siren - Section 8.9.1		
Perform a general visual inspection of the equipment and check for the proper operation of the system.		

Heating and Air Conditioning Systems - Section 8.9.2		
Check all air filters. Replace dirty or damaged filters.		
Check all cooling coils, seals, fittings, ducting connections and pipelines for leaks.		
Check surfaces of casing for signs of corrosion. Retreat or repaint areas of corrosion.		
Inspect the condition of all safety devices for deterioration.		
Check performance of equipment related to temperature and humidity control.		

Sump Pumps - Section 8.9.3		
Dump buckets of water or run water from a hose into the sump to test the pump's response and look for leaks. Verify that water is pumped out from sump and there is no back-flow. Do not flood the surrounding floor or area.		
Check that the motor is free of all debris.		
During operation, examine motor for smooth running and absence of excessive vibration.		

Hot Water Heater - Section 8.9.4		
Check the unit and associated piping for leaks.		
Turn the hot water on at the sink and verify that the water turns hot.		

Notes:

Contractor Signature: _____ Date: _____

Inspector Signature: _____ Date: _____
(DelDOT's Representative)

Signing this form certifies that the above work was satisfactorily completed and payment for this item can be made.

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615602 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 1 OF 4**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
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Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Live Load Bearings - Sections 8.1.2 & 11.1 (Component ID # 56)		
Check that all live load bearings are in contact with their bearing plates when the span is closed and the span locks are driven. There should be no movement of the live load bearing plate when heavy traffic loads cross the span.		
Clean debris from all supporting members and plates		

Span Lock Rack and Pinion - Sections 8.3.4, 11.1 (Component ID # 45 & 46), 11.2, & 11.4.7		
Check rack mounting fasteners for tightness. Tighten loose fasteners.		

Motor Control Cabinets - Section 8.5.1		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DexoIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture.		
Examine connections for poor or loose connections and evidence of overheating.		
Lubricate door hinges and latches.		
Check circuit breaker disconnects for proper operation.		
Inspect terminal block screws and hand tighten loose connections.		
Inspect wiring from unit terminal blocks for deterioration of insulation		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Check all starter contacts. Note when nearly all of the silver tip is gone and the contact tip support is exposed. Do not file the contacts. Filing or otherwise dressing the contacts only results in lost tip material and reduces starter life.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615602 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 2 OF 4**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Motor Control Cabinets - Section 8.5.1 (Cont.)		
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the motor control center. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Inspect fuse clips for dirt and verify that the clips provide a tight fit.		
Verify enclosure lights turn on when doors are open. Replace burned out bulbs.		
Verify enclosure heaters and thermostats are functioning properly.		
Check the condition of gaskets and replace if damaged.		

Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.2		
Drive Cabinets - Open and clean with a vacuum cleaner.		
Drive Cabinets - Remove accumulation of dirt, grease, and gum with DexoIT D5 contact cleaner or equivalent.		
Drive Cabinets - Check for corrosion and moisture.		
Drive Cabinets - Lubricate door hinges and latches.		
Drive Cabinets - Inspect and test terminal block screws for tightness. Hand tighten all loose connections.		
Drive Cabinets - Inspect wiring from unit terminal blocks for deterioration of insulation.		
Drive Cabinets - Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Drive Cabinets - Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the motor control center. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Drive Cabinets - Inspect all relays and tighten loose connections.		
Drive Cabinets - Verify enclosure heaters are functioning.		
Drive Cabinets - Verify enclosure lights turn on when doors are open. Replace burned out bulbs.		
Drive Cabinets - Change the master drive on each leaf to the slave drive (Refer to Section 4.12).		

Relay Cabinets - Section 8.8.1		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DexoIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture.		
Lubricate door hinges and latches.		
Inspect terminal block screws and tighten all loose connections.		
Inspect wiring from unit terminal blocks for deterioration of insulation.		

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ITEM # 615602 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 3 OF 4**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Relay Cabinets - Section 8.8.1 (Cont.)		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the relay control cabinet. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Inspect all relays and tighten loose connections.		
During operation, verify each relay lamp turns on. Replace non-operational bulbs.		
Verify enclosure heaters are functioning.		
Verify enclosure lights turn on when doors are open. Replace burned out bulbs.		
Check the condition of gaskets and replace if damaged.		

Control Console - Section 8.8.2		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DexoIT D5 contact cleaner or equivalent.		
Check components for corrosion and evidence of moisture. Replace corroded hardware.		
Lubricate door hinges and latches.		
Inspect terminal block screws and tighten all loose connections.		
Inspect wiring from unit terminal blocks for deterioration of insulation		
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the control console. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Check all pushbuttons, selector switches and meters for damage and proper operation.		
Check all indicating lights by pushing each light and verifying that it illuminates. Replace burned out bulbs.		
Verify enclosure lights turn on when doors are open. Replace burned out bulbs.		
Check condition of gaskets and replace if damaged.		

Notes:

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615603 – SEMI-ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
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Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Live Load Bearings - Sections 8.1.2 & 11.1 (Component ID # 56)		
Remove debris from the area surrounding the connection of the live load anchor to concrete foundation.		
Clean and spot paint areas of corrosion to the live load bearing assembly and anchorage. The live load bearing components shall be painted using the paint system specified by the DeIDOT standard Specifications for painting existing structural steel.		

Couplings - Sections 8.2.2, 11.1 (Component ID # 3, 7, 9, 14, 16 & 29), 11.2, 11.4.3, & 11.7.6		
For gear couplings, purge lubricant and replace with new Mobil Mobilux EP-0 or equivalent.		
Visually inspect couplings and brakewheel couplings for relative movement between coupling components during operation of the span drive machinery.		

Instrumentation Drive Equipment - Sections 8.2.6, 11.1 (Component ID # 12), 11.2, & 11.4.9		
Lubricate the instrumentation drive chain using CRC TAC 2 Adhesive Chain Lubricant or equivalent lubricant. Remove any excess lubricant from components.		

Warning Gates - Sections 8.4.1, 11.1 (Component ID # 60, 62, 64, 67 & 71), 11.2, & 11.8.1		
Check the transmission oil level. If oil is low check seals for evidence of leaks and add oil until the oil is up to the appropriate level. Use Mobil 600W Cylinder Oil or equivalent.		
Lubricate shaft bearings and rod ends until clean grease is purged from the bearing or rod end. Use Mobil Mobilux EP-2 or equivalent.		
Lubricate the rotary cam limit switch roller chain with CRC TAC 2 Adhesive Chain Lubricant or equivalent.		
Check the roller chain tension and tighten if loose.		

Traffic Gate Arm Lights - Section 8.6.4		
Check gate arm lights and wiring for damage.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615604 – ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 10**

Dates: _____	Maintenance Personnel: _____

Checklist Notes

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Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Trunnion Bearings - Sections 8.1.1, 11.1 (Component ID # 19 & 20), 11.2, & 11.4.1		
Check housing and supporting steel for signs of corrosion. Clean and spot paint areas of corrosion.		
Check housing cap bolts and base bolts for tightness. Tighten loose fasteners.		
Observe the trunnion bearings during opening and closing operations of the leaf. Note any unusual movements, binding, or abnormal sounds.		

Live Load Bearings - Sections 8.1.2 & 11.1 (Component ID # 56)		
Check that all fasteners are tight. Tighten loose fasteners.		
Check the contacting surfaces between the strike plate and bearing plate for deformations and wear. There should be no corrosion on the contact areas of either plate. If corrosion is present, clean the bearing surfaces.		

Counterweight - Section 8.1.3		
Check counterweight balance pockets for proper drainage and clean out debris.		
From the counterweight pit floor and platforms/walkways, visually check the counterweight concrete for spalling, cracks, and signs of structural distress.		
Check for shifting of balance blocks. Neatly restack blocks or plates that have fallen over or shifted out of position.		

Motor Brakes - Sections 8.2.1, 11.1 (Component ID # 4 & 6), 11.2, 11.4.2, 11.7.3, & 11.7.4		
Inspect brake shoes and brakewheel for wear, dust, dirt, grease and proper adjustment. Check the brake pad thickness. Notify the Engineer if the remaining thickness is less than 1/16 inch.		
Check clearance between the brake shoe and brakewheel. The measured gap shall have a minimum of 1/64 inch clearance between brake shoe and brakewheel when hand released. If clearances need to be adjusted, the linkages shall be adjusted in accordance with Section 11.7.3. If adjustments are made to the linkages, the reserve stroke and spring length should be verified and adjusted as well. Adjustment procedures are located within Section 11.7.3.		
Inspect mechanical linkages for wear, broken parts and tightness of nuts and bolts. Check for freedom of moving parts (no binding or sticking).		
Check for excessive heating of parts evident by discoloration of metal parts.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615604 – ANNUAL MAINTENANCE CHECKLIST – PAGE 2 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Motor Brakes - Sections 8.2.1, 11.1 (Component ID # 4 & 6), 11.2, 11.4.2, 11.7.3, & 11.7.4 (Cont.)		
Check operations of the brake during test operations of the bridge. Check for any unusual odor and excessive vibration.		
Check the brake housing and linkages for evidence of water dripping on the brake and corrosion.		
Check adjustment of limit switches and hand release devices and adjust for proper operation.		
Check brake actuator reserve stroke is approximately 0.8 inches +/- 1/16 inch. As the brake pads wear, the reserve stroke becomes shorter. If the reserve stroke is less than 1/4 inch, adjust linkages as specified in Section 11.7.3.		
Check the brake spring length. Use a tape measure to measure the length of the spring. Adjustment procedure for adjusting the spring length as well as corresponding brake torque data graphs are located in Section 11.7.3. The spring length shall be adjusted to within 1/16 inch. At the time this Manual was created, the spring lengths were measured to be 6 7/8 +/- 5/16 inch. Table 3 in Section 11.7.3 shows the existing motor brake torque range is 550 ft-lbs to 750 ft-lbs.		
Lubricate bearing pins using Mobil Mobilgear 600 XP 220 or equivalent lubricant. Lubricate pins using an oil can and applying a couple of drops to the brake pins. Cycle brakes manually using the hand release lever while applying the lubricating oil. Do not allow oil to drip onto the brake wheel. Remove any oil residue that drips from the brake pins.		
Check for loose brake terminations. Tighten loose connections.		
During winter months, verify that the brake pads are not frozen to the brakewheel.		
Primary Reducers – Sections 8.2.3, 11.1 (Component ID # 8), 11.2, 11.4.4, & 11.7.1		
Check for excessive leakage at the seals.		
Check fasteners for tightness. Tighten loose fasteners.		
Bearings - Sections 8.2.4, 11.1 (Component ID # 13, 21, 23, 24, 26, 31, 32, 35 & 37), 11.2, & 11.4.1		
Check bearing cap and base fasteners for tightness. Tighten loose fasteners.		
Open Gearing - Sections 8.2.5, 11.1 (Component ID # 25, 28, 33, 34, 36, 38, 39 & 40), 11.2, & 11.4.5		
Replace open gear lubricant using Mobil Mobiltac 325 NC or equivalent.		
Verify that fasteners connecting the rack to the rack support are secure and free of corrosion. Tighten loose fasteners. Clean and spot paint areas of corrosion on the rack support and fasteners.		
Inspect keys and keyways for tightness and cracking.		
Observe the open gearing during raising and lowering operations. Note excessive vibrations, binding, and unusual noises.		
Lock Bars, Guides, and Receivers - Sections 8.3.1, 11.1 (Component ID # 43, 44, 47 & 48), 11.2, & 11.4.7		
Check the guide and socket fasteners for tightness. Tighten loose fasteners.		
The socket guide and housings shall be checked for cracking (Refer to Photos 9.3D and 9.3E). Inspect the areas where the housing changes shape (flange radii). One way a crack is observed is a thin line of corrosion emanating from the stress concentrations (flange radii).		
Check sockets and guides for paint failure. Clean flaking paint from components and spot paint areas of corrosion.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615604 – ANNUAL MAINTENANCE CHECKLIST – PAGE 3 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Span Lock Reducers - Sections 8.3.2, 11.1 (Component ID # 49), 11.2, 11.4.7, & 11.7.2		
Check for excessive leakage at the seals.		
Check fasteners for tightness. Tighten loose fasteners. Refer to Section 11.7.2 for torque specifications.		

Span Lock Rack and Pinion - Sections 8.3.4, 11.1 (Component ID # 45 & 46), 11.2, & 11.4.7		
Replace rack and pinion lubricant with Mobil Mobiltac 325 NC.		
Inspect keys and keyways for tightness and cracking.		
Observe the open gearing during operation of the span lock machinery. Note excessive vibrations, binding, and unusual noises.		

Centering Device and Centering Guide - Sections 8.3.5, 11.1 (Component ID # 53 & 54), 11.2, & 11.4.8		
Visually inspect centering device and centering guide components at flange radii and mounting connections. Components should be checked for cracks, rust and section loss. Mounting connections should be checked for corrosion and tightness. All components should have flaking paint brushed clean and spot painted. Do not paint the wear plate contacting surfaces.		

Warning Gates - Sections 8.4.1, 11.1 (Component ID # 60, 62, 64, 67 & 71), 11.2, & 11.8.1		
Replace warning gate transmission oil with Mobil 600W Cylinder Oil or equivalent.		
Check hardware for damage and corrosion. Replace damaged hardware.		
Check electrical connections and tighten loose connections.		
Remove excess grease, oil and debris from equipment.		
Check gate housing for corrosion. Clean and spot paint areas of corrosion on the housing.		
Check condition of gaskets and replace if damaged.		

Motor Control Cabinets - Section 8.5.1		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.		
Operate the motor controller/contacter without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contacter without load, remove power to the MCC cabinet and with a non-conductive object, press the button on the contactor. The button is usually located on the front or bottom of the housing.		
Operate the motor controller/contacter under load and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		
Measure and record current draw on load side of contactor. An elevated reading may indicate a poor connection. If the recorded current (excluding the current at startup) exceeds the full load current on the motor nameplate, notify bridge management.		

Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.2		
Check the condition of filters. Replace dirty or damaged filters.		
Verify enclosure fan is functioning.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615604 – ANNUAL MAINTENANCE CHECKLIST – PAGE 4 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.2 (Cont.)		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware.		
Operate the motor controller/contacter without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contacter without load, remove power to the cabinet, and with a non-conductive object, press the button on the contactor. The button is usually located on the front or bottom of the housing.		
Operate the motor controller/contacter normally (under load) from the control desk during a vessel or maintenance opening and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		
Measure and record current draw on load side of contactor. An elevated reading may indicate poor connection. If the recorded current (excluding the current at startup) exceeds the full load current on the motor name plate, notify bridge management.		
Open and clean resistor enclosure with a vacuum cleaner.		
Check hardware for corrosion.		
Check condition of gaskets and replace if damaged.		

Panelboards - Section 8.5.3		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DexoIT D5 contact cleaner or equivalent.		
Check for moisture and corrosion. Replace corroded hardware.		
Examine bus bar connections for poor or loose connections and evidence of overheating. If necessary, pop out, but do not disconnect the circuit breakers.		
Lubricate door hinges and latches.		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Measure resistance to ground at each panelboard using a ground test kit. Verify resistance is 25 ohms or less.		

Transformers - Section 8.5.4		
Open and clean with vacuum cleaner.		
Check for corrosion and moisture. Replace corroded hardware.		
Verify all hardware is secure. Tighten loose fasteners.		
Check transformer components (terminals, insulation, etc.) for evidence of overheating.		

Standby Emergency Generator Receptacle - Section 8.5.5		
Using an off-site portable generator, start and run each leaf individually for one complete opening (Refer to instructions under Chapter 4.)		
Visually inspect the generator receptacle and associated equipment for wear or damage.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615604 – ANNUAL MAINTENANCE CHECKLIST – PAGE 5 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Safety (Manual Transfer) and Disconnect Switches - Section 8.5.6		
Remove accumulation of dirt, grease, and gum with DexoIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture. Replace corroded hardware.		
Examine for excessive heating of parts, discoloration of metal parts, charred insulation, odor, or blistering.		
Check for freedom of moving parts.		
Check for worn or broken mechanical parts.		
Tighten loose mountings and connections.		
Check contacts for wear and pitting.		
Check for excessive arcing.		
Check condition of gaskets (for dust-tight or watertight units). Replace damaged gaskets.		
For fused units, inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Test the manual transfer switch with operation of the portable generator.		

Electrical Conductors - Section 8.5.7		
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.		
Check tightness at each conductor termination at each terminal box. Tighten loose connections.		
Check the strain relief fittings for signs of distress.		
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.		

Droop Cables - Section 8.5.8		
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.		
Check tightness of each conductor termination at each terminal box. Tighten loose connections.		
Check the strain relief fittings for signs of distress.		
Check cables for any wear or abrasions on the outer jacket.		
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.		

Submarine Cables - Section 8.5.9		
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.		
Check the tightness of each conductor termination at each terminal box. Tighten loose connections.		
Check the strain relief fittings for signs of distress.		
Visually inspect the submarine cable and watch for signs of cracks, deterioration and discoloration of the cable jacket.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615604 – ANNUAL MAINTENANCE CHECKLIST – PAGE 6 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Navigation Lights - Section 8.6.1		
Check gaskets and replace if damaged.		
Tighten loose connections.		
Check for corrosion of metal parts. Replace corroded hardware.		
Check for worn or broken mechanical parts. Check for cracked lenses.		
Replace lamps.		
Interior/Exterior Lights - Section 8.6.2		
Clean luminaire lenses, interior surfaces, and weep holes (where applicable).		
Check gaskets for damage and cracks. Replace damaged gaskets.		
Tighten loose connections.		
Inspect for corrosion of metal parts. Clean and spot paint corroded components.		
Check parts for wear or damage.		
Traffic Signals - Section 8.6.3		
Clean all reflectors, lenses and spot paint heads.		
Lock Motors - Sections 8.7.1, 11.1 (Component ID # 51), 11.2, & 11.4.6		
Motor - Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Motor - Verify that shaft end-play is normal.		
Motor - Inspect and tighten loose electrical connections on motor.		
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
Motor - During operation, examine motor for smooth running and absence of vibration.		
Motor - During operation, check motor and bearings for overheating.		
Motor - Check painted surfaces for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		
Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		
Solenoid Brake - Check electrical connections. Tighten loose connections.		
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).		
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the components of dirt, gum, water, and corrosion.		
Solenoid Brake - Observe the brake during operation of the span locks. Check for excessive vibration or unusual noise during operation.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615604 – ANNUAL MAINTENANCE CHECKLIST – PAGE 7 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Main Leaf (Span) Motor - Sections 8.7.2, 11.1 (Component ID # 5), 11.2, & 11.4.6		
Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Verify that shaft end-play is normal.		
Inspect and tighten loose electrical connections on motor.		
Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
During operation, examine motor for smooth running and absence of vibration.		
During operation, check motor and bearings for overheating.		
Lubricate main leaf motor bearings.		
Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		
Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		

Traffic Gate Motors - Sections 8.7.3, 11.1 (Component ID # 59), & 11.2		
Motor - Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Motor - Verify that shaft end-play is normal.		
Motor - Inspect and tighten loose electrical connections on the motor.		
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
Motor - During operation, examine motor for smooth running and absence of vibration.		
Motor - During operation, check motor and bearings for overheating.		
Motor - Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		
Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		
Solenoid Brake - Check electrical connections. Tighten loose connections.		
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).		
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the components of dirt, gum, water, and corrosion.		
Solenoid Brake - Observe the brake during operation of the traffic gate. Check for excessive vibration or unusual noise during operation.		

Relay Cabinets - Section 8.8.1		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for heat damage.		
Manually operate each relay and contactor with associated circuit breakers off and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a relay or contactor with the associated circuit breaker off, verify that power is off, and with a non-conductive object, press the button on the relay or contactor. The button is usually located on the front or bottom of the housing.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615604 – ANNUAL MAINTENANCE CHECKLIST – PAGE 8 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Relay Cabinets - Section 8.8.1 (Cont.)		
Monitor relay and contactor operation during normal operation and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		

Control Console - Section 8.8.2		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.		
Manually operate each relay and contactor with associated circuit breakers off and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a relay or contactor with the associated circuit breaker off, verify that power is off, and with a non-conductive object, press the button on the relay or contactor. The button is usually located on the front or bottom of the housing.		
Monitor relay and contactor operation during normal operation and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		

Limit Switches - Sections 8.8.3 & 11.1 (Component ID # 4, 6, 15, 17,41, 42, 52, 57, 72 & 73)		
All Limit Switches - Inspect all limit switches for wear.		
All Limit Switches - Remove accumulated dust, dirt, and moisture on housing. Use brush, soft cloth, or vacuum cleaner.		
All Limit Switches - Remove accumulated dust, dirt, and moisture from all shafts, keeping it clean and free of galling.		
All Limit Switches - Inspect latches, mounting hardware and seals to ensure proper seal of housing.		
All Limit Switches - Inspect all fasteners and tighten loose connections. Replace corroded hardware.		
All Limit Switches - If accessible, remove the cover and visually inspect condition of all internal parts.		
All Limit Switches - Check for worn or broken mechanical parts.		
Rotary Cam Limit Switch - Inspect the rollers and cams for wear.		
Span Lock and Brake Limit Switches - Inspect snap action contact blocks and all internal component connections. Tighten loose connections.		
Span Lock and Brake Limit Switches - Inspect all wiring from snap action contact blocks for deterioration.		
Span Lock and Brake Limit Switches - Cycle lever arm several times.		
Fully Seated Limit Switch - Inspect all wiring for deterioration.		
Fully Seated Limit Switch - Inspect limit switch body and remove debris.		
Fully Seated Limit Switch - Inspect strike plate and magnet for corrosion and remove debris.		

Speed Switches and Tachometer Assembly - Sections 8.8.4, 11.1 (Component ID # 1, 2 & 55), & 11.9.1		
Remove accumulated dust, dirt, and moisture on housing. Use brush, soft cloth, or vacuum cleaner.		
Remove accumulated dust, dirt, and moisture from shafts, keeping them clean and free of galling where sleeve bearings slide.		
Inspect cover to ensure proper seal of housing.		
Inspect all fasteners and tighten connections if loose. Replace corroded fasteners.		

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615604 – ANNUAL MAINTENANCE CHECKLIST – PAGE 9 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Speed Switches and Tachometer Assembly - Sections 8.8.4, 11.1 (Component ID # 1, 2 & 55), & 11.9.1		
Check components for wear or damage. Replace worn or damaged belts. Consult the manufacturer for the correct belt type and size.		
Check belt tension per manufacturer’s recommendations and adjust tension if belt is excessively loose. Correct tension is obtained when 3.5 ounces of force in the center of the timing belt between the pulleys gives 0.015 inches of belt deflection per inch of distance between pulleys.		
Check condition of gaskets and replace if damaged.		

Siren - Section 8.9.1		
Check electrical connections and tighten loose connections.		
Operate the siren and associated equipment to check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor.		
Check and clean components of collections of dirt or gum, evidence of water dripping, or corrosion.		
Check the siren for debris inside the unit.		
Inspect connections for cracking or leaks.		
Tighten loose hardware.		

Heat Trace - Section 8.9.5		
Visually inspect the pipe, insulation, and connections to the heating cable for physical damage. Check that no moisture is present in junction boxes, electrical connections are tight and grounded, and insulation is dry and sealed. Tighten fasteners if loose.		

Conduit Systems - Section 8.9.7		
Open and clean boxes with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum from conduit.		
Check for corrosion and moisture. Check conduit for cracking or other damage. Replace corroded hardware.		
Tighten loose mounting and connections.		
Check condition of gaskets in boxes and replace gaskets if damaged.		
Lubricate door hinges and latches, where provided, with 3-IN-ONE Multipurpose oil.		
Check and clean all drain holes and fittings.		

Notes:

**BRIDGE 1-687 - WALNUT STREET BRIDGE
ITEM # 615605 – FIVE YEAR MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Couplings - Sections 8.2.2, 11.1 (Component ID # 3, 7, 9, 14, 16 & 29), 11.2, 11.4.3, & 11.7.6		
For brakewheel couplings, purge lubricant and replace with new Falk Long Term Grease (LTG) or equivalent.		
Primary Reducers – Sections 8.2.3, 11.1 (Component ID # 8), 11.2, 11.4.4, & 11.7.1		
Replace oil in the speed reducer housings with Mobil Mobilgear 600 XP 220 or equivalent.		
Span Lock Reducers - Sections 8.3.2, 11.1 (Component ID # 49), 11.2, 11.4.7, & 11.7.2		
Replace oil in the speed reducer housings with Mobil Mobilgear 600 XP 220 or equivalent.		
Span Lock Motor Coupling - Sections 8.3.3, 11.1 (Component ID # 50), 11.2, 11.4.7, & 11.7.5		
Replace coupling lubricant and check for misalignment. Use Falk Long Term Grease or equivalent		
Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.2		
Replace the general purpose plug-in ice cube style relays.		
Lock Motors - Sections 8.7.1, 11.1 (Component ID # 51), 11.2, & 11.4.6		
Clean and paint the motors. Do not paint nameplates.		
Main Leaf (Span) Motor - Sections 8.7.2, 11.1 (Component ID # 5), 11.2, & 11.4.6		
Clean and paint the motors. Do not paint nameplates.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615607 – MONTHLY MAINTENANCE CHECKLIST – PAGE 1 OF 3**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Trunnion Bearings - Sections 8.1.1, 11.1 (Component ID # 18 & 19), 11.2, & 11.4.1		
Purge old grease by pumping new lubricant into the grease fittings. There are four grease fittings per trunnion bearing. Remove excess grease from the inboard and outboard sides of the trunnion bearings after lubricating. The lubricant should be Mobil Mobilux EP-2 grease or equivalent.		
Remove any debris that has accumulated on and around the trunnion assemblies and the portions of the bascule girders near the trunnions.		

Motor and Machinery Brakes - Sections 8.2.1, 11.1 (Component ID # 5 & 11), 11.4.3, & 11.7.8		
Perform brake test. Refer to Section 4.11 for the brake test procedure.		

Couplings - Sections 8.2.2, 11.1 (Component ID # 4, 7, 10, 13, 14, 21, 23, & 25), 11.2, 11.4.4, 11.7.4, 11.7.5, 11.7.6, & 11.7.7		
Inspect key and keyways at all couplings for grease leakage, tightness and cracking. Check coupling flange bolts for corrosion and tightness. Tighten loose fasteners.		
Inspect for leaks at seals and gaskets. If the seal is leaking, inspect for damage. Notify the Engineer if the seal is damaged.		
Inspect helical couplings for damage.		

Speed Reducers - Sections 8.2.3, 11.1 (Component ID # 8, 24, & 27), 11.2, 11.4.5, 11.7.1, & 11.7.2		
Listen for unusual noises during operation of the machinery.		
Before operating the leaf, check the oil level using the dip stick at each speed reducer. Add make up oil if the oil level is below the low level mark on the dip stick.		
Inspect breather for damage. Replace if damaged.		

Bearings - Sections 8.2.4, 11.1 (Component ID # 16, 20, 29, & 30), 11.2, 11.4.1, & 11.4.7		
Sleeve Bearings - Fill with new grease to completely purge the bearing of the existing grease. Remove excess purged grease. Use Mobil Mobilux EP-2 or equivalent		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615607 – MONTHLY MAINTENANCE CHECKLIST – PAGE 2 OF 3**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Open Gearing - Sections 8.2.5, 11.1 (Component ID # 28, 32, 33, & 34), 11.2, & 11.4.6		
Lubricate teeth using Mobil Mobilnac 325 NC or equivalent grease.		
Lock Bar Actuators, Guides and Receivers - Sections 8.3.1, 11.1 (Component ID # 36, 37, 38, & 39), 11.2, 11.4.8, & 11.7.9		
Remove existing lubricant and brush or swab the lock bar sliding surfaces with Mobil Mobilux EP-2 or equivalent.		
Apply grease to the grease fittings for all guides and receiving sockets. There are two fittings, one at the top and one at the bottom, at each guide and receiving socket for a total of eight grease ports. Wipe off excess grease. Use Mobil Mobilux EP-2 grease or equivalent.		
Visually inspect guides and sockets, lock bars, fasteners and shims for damage. With traffic on the span, observe the lock bars, guides, and receiving sockets for relative vertical movement, resulting in the lock bars impacting the top or bottom of the guide or receiving socket sliding surfaces.		
Navigation Lights - Section 8.6.1		
Check navigation lights for proper operation.		
Replace lamps if damaged or nonfunctional.		
Interior/Exterior Lights - Section 8.6.2		
Check for burned-out lamps. Replace burned out bulbs. Verify light switches function properly.		
Traffic Signals - Section 8.6.3		
Check lights for proper illumination and replace burned out bulbs.		
Verify proper operation during marine and maintenance openings.		
Traffic Gate Arm Lights - Section 8.6.4		
Check traffic gate arm lights for proper operation. Replace burned out bulbs.		
Air Horn and Air Compressors - Section 8.9.1		
Perform a general visual inspection of the equipment and check for proper operation of the system.		
Heating and Air Conditioning Systems - Section 8.9.2		
Check all air filters. Replace dirty or damaged filters. Do not use chemicals to clean the unit.		
Check all cooling coils, seals, fittings, ducting connections and pipelines for leaks.		
Check surfaces of casing for signs of corrosion. Retreat or repaint areas of corrosion.		
Inspect the condition of all safety devices for deterioration.		
Check the performance of all equipment related to temperature and humidity control.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615608 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 1 OF 4**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Live Load Bearings - Sections 8.1.2 & 11.1 (Component ID # 41)		
Check that all live load bearings are in contact with their bearing plates when the span is closed and the span locks are driven. There should be no movement of the live load bearing plate when heavy traffic loads cross the span.		
Clean debris from all supporting members and plates.		

Bearings - Sections 8.2.4, 11.1 (Component ID # 16, 20, 29, & 30), 11.2, 11.4.1, & 11.4.7		
For the spherical roller bearings, add replenishment grease. Use Mobil Mobilgrease XHP-462 or equivalent.		

Control Enclosure - Section 8.5.1		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture.		
Examine connections for poor or loose connections and evidence of overheating.		
Lubricate door hinges and latches.		
Check circuit breaker disconnects for proper operation.		
Inspect terminal block screws and hand tighten loose connections.		
Inspect wiring from unit terminal blocks for deterioration of insulation.		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Check all starter contacts. Note when nearly all the silver tip is gone and the contact tip support is exposed. Do not file the contacts. Filing or otherwise dressing the contacts only results in lost tip material and reduces starter life.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615608 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 2 OF 4**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Control Enclosure - Section 8.5.1 (Cont.)		
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the motor control center. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Inspect fuse clips for dirt and verify that the clips provide a tight fit.		
Verify enclosure lights turn on when doors are open. Replace burned out bulbs.		
Verify enclosure heaters are functioning properly.		
Check the condition of gaskets and replace if damaged.		

Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.1		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture.		
Lubricate door hinges and latches.		
Inspect terminal block screws and hand tighten loose connections.		
Inspect wiring from unit terminal blocks for deterioration of insulation.		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the motor control center. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Inspect all relays and tighten loose connections.		
Verify enclosure heaters are functioning.		
Verify enclosure lights turn on when doors are open. Replace burned out bulbs.		

Relay Cabinets - Section 8.8.1		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture.		
Lubricate door hinges and latches.		
Inspect terminal block screws and tighten loose connections.		
Inspect wiring from unit terminal blocks for deterioration of insulation.		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615608 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 3 OF 4**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Relay Cabinets - Section 8.8.1 (Cont.)		
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the relay control cabinet. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Inspect all relays and tighten loose connections.		
During operation, verify each relay lamp turns on. Replace non-operational bulbs.		
Verify enclosure heaters are functioning.		
Verify enclosure lights turn on when doors are open. Replace burned out bulbs.		
Check the condition of gaskets and replace if damaged.		

Control Console - Section 8.8.2		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture. Replace corroded hardware.		
Lubricate door hinges and latches.		
Inspect terminal block screws and tighten all loose connections.		
Inspect wiring from unit terminal blocks for deterioration of insulation		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the control console. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Inspect all relays and tighten loose connections.		
Check all pushbuttons, selector switches, and meters for damage and proper operation.		
Check all indicating lights pushing the "Indicators Check" button located on the left side of the control console and verify each lamp illuminates. Replace burned out bulbs.		
Verify the enclosure lights turn on when doors are open. Replace burned out bulbs.		
Check condition of gaskets and replace if damaged.		
Verify enclosure heaters are functioning properly.		

Sump Pumps - Section 8.9.3		
Control Panel - Open and clean with a vacuum cleaner.		
Control Panel - Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Control Panel - Check for corrosion and moisture.		
Control Panel - Examine connections for poor or loose connections and evidence of overheating.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615609 – SEMI-ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Live Load Bearings - Sections 8.1.2 & 11.1 (Component ID # 41)		
Remove debris from the area surrounding the connection of the live load anchor to concrete foundation.		
Clean and spot paint areas of corrosion to the live load bearing assembly and support beam. The live load bearing components shall be painted using the paint system specified by the DelDOT Standard Specifications for painting existing structural steel.		

Couplings - Sections 8.2.2, 11.1 (Component ID # 4, 7, 10, 13, 14, 21, 23, & 25), 11.2, 11.4.4, 11.7.4, 11.7.5, 11.7.6, & 11.7.7		
For gear couplings, purge lubricant and replace with new Mobil Mobilux EP-0 or equivalent.		
Visually inspect couplings for relative movement between coupling components during operation of the span drive machinery.		

Speed Reducers - Sections 8.2.3, 11.1 (Component ID # 8, 24, & 27), 11.2, 11.4.5, 11.7.1, & 11.7.2		
Lubricate speed reducer bearings with Mobil Mobilux EP-2 or equivalent.		

Lock Bar Actuators, Guides and Receivers - Sections 8.3.1, 11.1 (Component ID # 36, 37, 38, & 39), 11.2, 11.4.8, & 11.7.9		
Remove grease from stem guide pipe and replace with Mobil Beacon 325 grease or equivalent. Refer to Chapter 11 for the lubrication schematics and schedule for details.		
Remove grease in the lock bar operator and replace with Mobil Beacon 325 grease or equivalent. Refer to Chapter 11 for the lubrication schematics and schedule for details.		

Barrier Gates - Sections 8.4.1, 11.1 (Component ID # 45, 46, 47, 49, 52, 56, & 60), 11.2, & 11.8.1		
Check the transmission oil level. If oil is low, check seals for evidence of leaks and refill. If oil is cloudy or dirty, purge from the drain port, flush, and refill. Use Mobil SHC 629.		
Lubricate gate arm pivot shaft bearings, side latch pivot shaft bearings, and all rod ends until clean grease is purged from the bearing or rod end. Use Mobil Mobilux EP-2.		
Lubricate the rotary cam limit switch roller chain with CRC TAC 2 Adhesive Chain Lubricant or equivalent.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615610 – ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 10**

Dates: _____	Maintenance Personnel: _____

Checklist Notes

1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes

1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Trunnion Bearings - Sections 8.1.1, 11.1 (Component ID # 18 & 19), 11.2, & 11.4.1		
Check housing and supporting frame for signs of corrosion. Clean and spot paint areas of corrosion.		
Check housing cap bolts and base bolts for tightness. Tighten loose fasteners.		
Observe the trunnion bearings during opening and closing operations of the leaf. Note any unusual movements, binding, or abnormal sounds.		

Live Load Bearings - Sections 8.1.2 & 11.1 (Component ID # 41)		
Check that all fasteners are tight. Tighten loose fasteners.		
Check the contacting surfaces between the adjusting screw and bearing plate for deformations and wear. There should be no corrosion on the contact areas of the adjusting screw and plate. If corrosion is present, clean the bearing surfaces.		

Counterweight - Section 8.1.3		
Check counterweight balance block locations for proper drainage and clean out debris.		
From the counterweight pit floor and platforms/walkways, visually check the counterweight concrete for spalling, cracks, and signs of structural distress.		
Check for shifting of balance blocks. Neatly restack blocks or plates that have fallen over or shifted out of position.		

Motor and Machinery Brakes - Sections 8.2.1, 11.1 (Component ID # 5 & 11), 11.4.3, & 11.7.8		
Inspect brake shoes and brakewheel for wear, dust, dirt, grease and proper adjustment. Check the brake pad thickness. Notify the Engineer if the remaining thickness is less than 1/16 inch.		
Check clearance between the brake shoes and brakewheel. The measured gap shall have a minimum of 1/64 inch clearance between brake shoe and brakewheel when hand released. If the brake pads remain in contact with the brakewheel when hand released, observe the brake during operation of the span. A brakewheel that is warm or hot on the braking surface after bridge operation may indicate that the pads are not clear of the brakewheel when released. Check and adjust the reserve stroke and brake torque after any linkage adjustment. Refer to Section 11.7.7 for brake adjustment procedures.		
Inspect mechanical linkages for wear, broken parts and tightness of nuts and bolts. Check for freedom of moving parts (no binding or sticking).		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615610 – ANNUAL MAINTENANCE CHECKLIST – PAGE 2 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Motor and Machinery Brakes - Sections 8.2.1, 11.1 (Component ID # 5 & 11), 11.4.3, & 11.7.8 (Cont.)		
Check for excessive heating of parts evident by discoloration of metal parts.		
Check operations of the brake during test operations of the bridge. Check for any unusual odor and excessive vibration.		
Check the brake housing and linkages for evidence of water dripping on brake and corrosion.		
Check adjustment of limit switches and hand release devices and adjust for proper operation.		
Check for possible wear of the automatic adjustment mechanism.		
Check brake actuator reserve stroke is approximately 0.6 inches \pm $\frac{1}{16}$ inch. The automatic adjustment mechanism is designed to maintain the appropriate reserve stroke as the brake pads wear. If the minimum reserve stroke is not maintained, contact the manufacturer.		
Check the brake torque setting. The brake torque is read by matching the top of the spring-block to the corresponding torque value on the scale.		
Check for loose brake terminations. Tighten loose connections.		
During winter months, verify that the brake pads are not frozen to the brakewheel.		
Couplings - Sections 8.2.2, 11.1 (Component ID # 4, 7, 10, 13, 14, 21, 23, & 25), 11.2, 11.4.4, 11.7.4, 11.7.5, 11.7.6, & 11.7.7		
For manual disconnect couplings, lubricate the shifting collar with Dow Corning Molykote BR2-PLUS or equivalent.		
Manually test the clutch to ensure it properly engages and disengages the auxiliary motor disconnect coupling.		
Speed Reducers - Sections 8.2.3, 11.1 (Component ID # 8, 24, & 27), 11.2, 11.4.5, 11.7.1, & 11.7.2		
Check for excessive leakage at the seals.		
Check fasteners for tightness. Tighten loose fasteners.		
Bearings - Sections 8.2.4, 11.1 (Component ID # 16, 20, 29, & 30), 11.2, 11.4.1, & 11.4.7		
Check bearing cap and base fasteners for tightness. Tighten loose fasteners.		
Open Gearing - Sections 8.2.5, 11.1 (Component ID # 28, 32, 33, & 34), 11.2, & 11.4.6		
Replace open gear lubricant using Mobil Mobilnac 325 NC or equivalent.		
Verify that fasteners connecting the rack to the rack support are secure and free of corrosion. Tighten loose fasteners. Clean and spot paint areas of corrosion on the rack support and fasteners.		
Inspect keys and keyways for tightness and cracking.		
Observe the open gearing during raising and lowering operations. Note excessive vibrations, binding, and unusual noises.		
Instrumentation Gear Box - Sections 8.2.6, 11.1 (Component ID # 3), & 11.2		
Flush limit switch gear box oil and replace with Mobil Mobilgear 600 XP 220 or equivalent.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615610 – ANNUAL MAINTENANCE CHECKLIST – PAGE 3 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Lock Bar Actuators, Guides and Receivers - Sections 8.3.1, 11.1 (Component ID # 36, 37, 38, & 39), 11.2, 11.4.8, & 11.7.9		
Check the guide, socket, and actuator fasteners for tightness. Tighten loose fasteners.		
The socket and guide housings shall be checked for cracking (Refer to Photos 9.3C and 9.3D). Inspect the areas where the housing changes shape (flange radii). One way a crack is observed is a thin line of corrosion emanating from the stress concentrations (flange radii).		
Check sockets, guides, and actuator housings for paint failure. Clean flaking paint from components and spot paint areas of corrosion.		

Barrier Gates - Sections 8.4.1, 11.1 (Component ID # 45, 46, 47, 49, 52, 56, & 60), 11.2, & 11.8.1		
Check the clutch for slipping during operation of the barrier gate.		
Check hardware for damage and corrosion. Replace damaged hardware.		
Check electrical connections and tighten loose connections.		
Remove excess grease, oil and debris from equipment.		
Check barrier gate housing for corrosion. Clean and spot paint areas of corrosion on the housing.		
Check condition of gaskets and replace if damaged.		

Warning Gates - Sections 8.4.2, 11.1 (Component ID # 66, 68, 70, 72, & 75), 11.2, & 11.8.2		
Check hardware for damage and corrosion. Replace damaged hardware.		
Check electrical connections and tighten loose connections.		
Remove excess grease, oil and debris from equipment.		
Check gate housing for corrosion. Clean and spot paint areas of corrosion on the housing.		
Check condition of gaskets and replace if damaged.		

Control Enclosure - Section 8.5.1		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.		
Operate the motor controller/contacter without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contacter without load, remove power to the MCC cabinet and with a non-conductive object, press the button the motor controller/contacter. The button is usually located on the front or bottom of the housing.		
Operate the motor controller/contacter under load and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		
Measure and record current draw on load side of contactor. An elevated reading may indicate poor connection. If the recorded current (excluding the current at startup) exceeds the full load current on the motor name plate, notify bridge management.		

Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.1		
Check the condition of filters. Replace dirty or damaged filters.		
Verify enclosure fan is functioning.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615610 – ANNUAL MAINTENANCE CHECKLIST – PAGE 4 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.1 (Cont.)		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware.		
Operate the motor controller/contactor without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contactor without load, remove power to the MCC cabinet and with a non-conductive object, press the button the contact. The button is usually located on the front or bottom of the housing.		
Operate the motor controller/contactor normally (under load) from the control desk during a vessel or maintenance opening and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		
Measure and record current draw on load side of contactor. Elevated reading may indicate poor connection. If the recorded current (excluding the current at startup) exceeds the full load current on the motor name plate, notify bridge management.		
Open and clean resistor enclosure with a vacuum cleaner.		
Check hardware for corrosion.		
Check condition of gaskets and replace if damaged.		

Panelboards - Section 8.5.3		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent		
Check for moisture and corrosion. Replace corroded hardware.		
Examine bus bar connections for poor or loose connections and evidence of overheating. If necessary, pop out, but do no disconnect the circuit breakers.		
Lubricate door hinges and latches.		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Measure resistance to ground at each panelboard using a ground test kit. Verify resistance is 25 ohms or less.		

Transformers - Section 8.5.4		
Open and clean with vacuum cleaner.		
Check for corrosion and moisture. Replace corroded hardware.		
Verify all hardware is secure. Tighten loose fasteners.		
Check transformer components (terminals, insulation, etc.) for evidence of overheating.		

Standby Emergency Generator Receptacle - Section 8.5.5		
Using an off-site portable generator, start and run the bridge for one complete opening using the auxiliary gear motors.		
Visually inspect the generator receptacle and associated equipment for wear or damage.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615610 – ANNUAL MAINTENANCE CHECKLIST – PAGE 5 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Safety (Manual Transfer) and Disconnect Switches - Section 8.5.6		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture. Replace corroded hardware.		
Examine for excessive heating of parts, discoloration of metal parts, charred insulation, odor, or blistering.		
Check for freedom of moving parts.		
Check for worn or broken mechanical parts.		
Tighten loose mountings and connections.		
Check contacts for wear and pitting.		
Check for excessive arcing.		
Check condition of gaskets (for dust-tight or watertight units). Replace damaged gaskets.		
For fused units, inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Test the manual transfer switch with operation of the portable generator.		

Electrical Conductors - Section 8.5.7		
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.		
Check tightness at each conductor termination at each terminal box. Tighten loose connections.		
Check the strain relief fittings for signs of distress.		
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.		

Droop Cables - Section 8.5.8		
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.		
Check tightness of each conductor termination at each terminal box. Tighten loose connections.		
Check the strain relief fittings for signs of distress.		
Check cables for any wear or abrasions on the outer jacket.		
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615610 – ANNUAL MAINTENANCE CHECKLIST – PAGE 6 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Submarine Cables - Section 8.5.9		
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.		
Check tightness of each conductor termination at each terminal box. Tighten loose connections.		
Check the strain relief fittings for signs of distress.		
Visually inspect the submarine cable and watch for signs of cracks, deterioration and discoloration of the cable jacket.		

Navigation Lights - Section 8.6.1		
Check gaskets and replace if damaged.		
Tighten loose connections.		
Check for corrosion of metal parts. Replace corroded hardware.		
Check for worn or broken mechanical parts. Check for cracked lenses.		
Replace lamps		

Interior/Exterior Lights - Section 8.6.2		
Clean luminaire lenses, interior surfaces, and weep holes (where applicable).		
Check gaskets for damage and cracks. Replace damaged gaskets.		
Tighten loose connections.		
Inspect for corrosion of metal parts. Clean and spot paint corroded components.		
Check parts for wear or damage.		

Traffic Signals - Section 8.6.3		
Clean all reflectors, lenses and spot paint heads.		

Lock Motors - Sections 8.7.1, 11.1 (Component ID # 35), 11.2, & 11.4.2		
Motor - Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Motor - Verify that shaft end-play is normal.		
Motor - Inspect and tighten loose electrical connections on the motor.		
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
Motor - During operation, examine motor for smooth running and absence of vibration.		
Motor - During operation, check motor and bearings for overheating.		
Motor - Lubricate span lock motor bearings with Mobil Polyrex EM or equivalent.		
Motor - Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615610 – ANNUAL MAINTENANCE CHECKLIST – PAGE 7 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Lock Motors - Sections 8.7.1, 11.1 (Component ID # 35), 11.2, & 11.4.2 (Cont.)		
Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		
Solenoid Brake - Check electrical connections. Tighten loose connections.		
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).		
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the components of dirt, gum, water, and corrosion.		
Solenoid Brake - Observe the brake during operation of the span locks. Check for excessive vibration or unusual noise during operation.		

Main Leaf (Span) Motors - Sections 8.7.2, 11.1 (Component ID # 6), 11.2, & 11.4.2		
Check for leakage around bearings. Clean of excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Verify that shaft end-play is normal.		
Inspect and tighten loose electrical connections on the motor.		
Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
During operation, examine motor for smooth running and absence of vibration.		
During operation, check motor and bearings for overheating.		
Lubricate main leaf motor bearings with Mobil Unirex N2 or equivalent.		
Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		
Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		

Auxiliary Leaf (Span) Motors - Sections 8.7.3, 11.1 (Component ID # 9), 11.2, & 11.7.3		
Gear Motor - Check for leakage around bearings. Clean of excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Gear Motor - Verify that shaft end-play is normal.		
Gear Motor - Inspect and tighten loose electrical connections on the motor.		
Gear Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
Gear Motor - During operation, examine motor for smooth running and absence of vibration.		
Gear Motor - During operation, check motor and bearings for overheating.		
Gear Motor - Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		
Gear Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		
Solenoid Brake - Check electrical connections. Tighten loose connections.		
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615610 – ANNUAL MAINTENANCE CHECKLIST – PAGE 8 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Auxiliary Leaf (Span) Motors - Sections 8.7.3, 11.1 (Component ID # 9), 11.2, & 11.7.3 (Cont.)		
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the components of dirt, gum, water, and corrosion.		
Solenoid Brake - Observe the brake during operation of the auxiliary gear motor. Check for excessive vibration or unusual noise during operation.		

Traffic Gate Motors - Sections 8.7.4 & 11.1 (Component ID # 44 & 65)		
Motor - Check for leakage around bearings. Clean of excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Motor - Verify that shaft end-play is normal.		
Motor - Inspect and tighten loose electrical connections on the motor.		
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
Motor - During operation, examine motor for smooth running and absence of vibration.		
Motor - During operation, check motor and bearings for overheating.		
Motor - Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		
Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		
Solenoid Brake - Check electrical connections. Tighten loose connections.		
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).		
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the components of dirt, gum, water, and corrosion.		
Solenoid Brake - Observe the brake during operation of the traffic gates. Check for excessive vibration or unusual noise during operation.		

Relay Cabinets - Section 8.8.1		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for heat damage.		
Manually operate each relay and contactor with associated circuit breakers off and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a relay/contacter without load, remove power to the cabinet and with a non-conductive object, press the button the contact. The button is usually located on the front or bottom of the housing.		
Monitor relay and contactor operation during normal operation and check for loud noise and arcing during opening and closing operations. A loud noise and arcing on closing is usually due to contact bounce.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615610 – ANNUAL MAINTENANCE CHECKLIST – PAGE 9 OF 10**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Control Console - Section 8.8.2		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connections points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.		
Manually operate each relay and contactor with associated circuit breakers off and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a relay/contacter without load, remove power to the console and with a non-conductive object, press the button the contact. The button is usually located on the front or bottom of the housing.		
Monitor relay and contactor operation during normal operation and check for loud noise and arcing, during opening and closing operations. A loud noise and arcing on closing is usually due to contact bounce.		
Limit Switches and Resolvers – Sections 8.8.3 & 11.1 (Component ID # 5, 11, 10, 12, 36, 42, 43, 55, 62, 63, 77 & 78)		
All Limit Switches - Inspect all limit switches for wear.		
All Limit Switches - Remove accumulated dust, dirt, and moisture on housing. Use brush, soft cloth, or vacuum cleaner.		
All Limit Switches - Inspect latches, mounting hardware and seals to ensure proper seal of housing.		
All Limit Switches - Inspect all fasteners and tighten loose connections. Replace corroded hardware.		
All Limit Switches - If accessible, remove the cover and visually inspect the condition of all internal parts.		
All Limit Switches - Check for worn or broken mechanical parts.		
Rotary Cam Limit Switch - Inspect the rollers and cams for wear.		
Fully Seated and Brake Limit Switches - Inspect snap action contact blocks and all internal component connections. Tighten loose connections.		
Fully Seated and Brake Limit Switches - Inspect all wiring from snap action contact blocks for deterioration.		
Fully Seated and Brake Limit Switches - Cycle lever arm several times.		
Speed Switches - Sections 8.8.4 & 11.1 (Component ID # 2)		
Remove accumulated dust, dirt, and moisture on housing. Use a brush, soft cloth, or vacuum cleaner.		
Remove accumulated dust, dirt, and moisture from shafts, keeping them clean and free of galling. All bearings are sealed and permanently lubricated.		
Inspect cover to ensure proper seal of housing.		
Inspect all fasteners and tighten connections if loose. Replace corroded fasteners.		
Check for worn or broken mechanical parts.		
Check condition of gaskets and replace if damaged.		
Air Horn and Air Compressors - Section 8.9.1		
Check electrical connections and tighten loose connections.		
Operate the compressor under load and check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor.		
Check and clean components of collections of dirt or gum, evidence of water dripping, or corrosion.		

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615611 – TWO YEAR MAINTENANCE CHECKLIST – PAGE 1 OF 1**

Dates: _____	Maintenance Personnel: _____

Checklist Notes

- The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
- Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes

- All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
- Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Speed Reducers - Sections 8.2.3, 11.1 (Component ID # 8, 24, & 27), 11.2, 11.4.5, 11.7.1, & 11.7.2		
Replace oil in the speed reducer housings with Mobil Mobilgear SHC 150 or equivalent.		
Replace the speed reducer breathers. Write the installation date on the new breathers.		

Bearings - Sections 8.2.4, 11.1 (Component ID # 16, 20, 29, & 30), 11.2, 11.4.1, & 11.4.7		
Replace spherical roller bearings lubricant. Use Mobil Mobilgrease XHP 462 or equivalent		

Auxiliary Leaf (Span) Motors - Sections 8.7.3, 11.1 (Component ID # 9), 11.2, & 11.7.3		
Replace gear motor oil in reducer. Clean around fill hole located on top of the speed reducer portion of the gear motor. Speed reducer section is located at the front of the gear motor. Place basin below drain plug located at the bottom of the speed reducer. Remove drain plug to drain oil from the housing. Flush reducer housing to remove contaminants. Reinstall drain plug. Fill reducer housing with Mobil Mobilgear SHC 150 or equivalent to the proper level indicated on the sight glass. Reinstall fill cap.		

Notes:

Contractor Signature: _____ Date: _____

Inspector Signature: _____ Date: _____
(DelDOT's Representative)

Signing this form certifies that the above work was satisfactorily completed and payment for this item can be made.

**BRIDGE 1-688 – SOUTH MARKET STREET BRIDGE
ITEM # 615612 – FIVE YEAR MAINTENANCE CHECKLIST – PAGE 1 OF 1**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.1		
Replace the general purpose plug-in ice cube style relays.		

Lock Motors - Sections 8.7.1, 11.1 (Component ID # 35), 11.2, & 11.4.2		
Clean and paint the motors. Do not paint nameplates.		

Main Leaf (Span) Motors - Sections 8.7.2, 11.1 (Component ID # 6), 11.2, & 11.4.2		
Clean and paint the motors. Do not paint nameplates.		

Auxiliary Leaf (Span) Motors - Sections 8.7.3, 11.1 (Component ID # 9), 11.2, & 11.7.3		
Clean and paint the motors. Do not paint nameplates.		

Conduit Systems - Section 8.9.5		
Clean and paint all corrosion and oxidation from steel conduit and supports.		
Where PVC coated steel conduit is installed, apply touch up compound to cracks and/or cuts in coating.		

Notes: _____

Contractor Signature: _____ Date: _____

Inspector Signature: _____ Date: _____
 (DelDOT's Representative)

Signing this form certifies that the above work was satisfactorily completed and payment for this item can be made.

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615614 – MONTHLY MAINTENANCE CHECKLIST – PAGE 1 OF 4**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Trunnion Bearings - Sections 8.1.1, 11.1 (Component ID # 11 & 12), 11.2, & 11.4.1		
Purge old grease by pumping new lubricant into the grease fittings. There are four grease fittings per trunnion bearing. Remove excess grease from the inboard and outboard sides of the trunnion bearings after lubricating. The lubricant should be Mobil Mobilux EP-2 grease or equivalent.		
Remove any debris that has accumulated on and around the trunnion assemblies and the portions of the bascule girders near the trunnions.		

Couplings - Sections 8.2.2, 11.1 (Component ID # 3, 6, 9, 14, 16, & 43), 11.2, & 11.4.3		
Inspect keys and keyways at all couplings for grease leakage, tightness and cracking. Check coupling flange bolts for corrosion and tightness. Tighten loose fasteners.		
Inspect for leaks at seals and gaskets. If the seal is leaking, inspect seal for damage. Notify the Engineer if the seal is damaged.		
Inspect jaw couplings for cracking or damage.		

Primary Reducers - Sections 8.2.3, 11.1 (Component ID # 7), 11.2, 11.4.4, & 11.7.1		
Visually inspect the oil level on the dipstick before operating the leaf. Add make up oil if the oil level is below the low level mark on the dipstick.		
Listen for unusual noises during operation of the machinery. Report any unusual noises to bridge management.		
Inspect the breather. Replace the breather if damaged or saturated.		

Bearings - Sections 8.2.4, 11.1 (Component ID # 13, 17, 18, 20, 25, 28, 30, & 37), 11.2, & 11.4.1		
Fill with new grease to completely purge the bearing of the existing grease. Remove excess purged grease. Use Mobil Mobilux EP-2 or equivalent.		

Open Gearing - Sections 8.2.5, 11.1 (Component ID # 19, 22, 26, 27, 29, 21, 32, 39, & 40), 11.2, & 11.4.5		
Lubricate teeth using Mobil Mobiltac 325 NC or equivalent grease.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615614 – MONTHLY MAINTENANCE CHECKLIST – PAGE 2 OF 4**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Lock Bars, Guides, and Receivers - Sections 8.3.1, 11.1 (Component ID # 45, 46, 55, & 56), 11.2, & 11.4.7		
Remove existing lubricant and brush or swab the lock bar and receiving socket sliding surfaces with Mobil Mobilux EP-2 grease or equivalent.		
Visually inspect guides and sockets, lock bars, fasteners and shims for damage. With traffic on the span, observe the lock bars, guides, and receiving sockets for relative vertical movement, resulting in the lock bars impacting the top or bottom of the guide or receiving socket sliding surfaces.		
Span Lock Reducers - Sections 8.3.2, 11.1 (Component ID # 51), 11.2, 11.4.7, & 11.7.4		
Before operating the span lock machinery, temporarily loosen / remove the oil level plug and check the oil level inside the reducer housing. Add oil to the reducer if the oil level is more than ¼" below the oil level plug.		
Listen for unusual noises during operation of the machinery. Report any unusual noises to bridge management.		
Span Lock Motor Couplings - Sections 8.3.3, 11.1 (Component ID # 52), 11.2, 11.7.3, & 11.4.7		
Inspect keys and keyways at all couplings for grease leakage, tightness and cracking. Check coupling flange bolts for corrosion and tightness. Tighten loose fasteners.		
Inspect for leaks at seals and gaskets. If coupling is leaking grease from seals, remove coupling cover to inspect seal. Notify the Engineer if the seal is damaged. If coupling covers are removed, replace lubricant.		
Span Lock Rack and Pinion - Sections 8.3.4, 11.1 (Component ID # 49 & 50), 11.2, & 11.4.7		
Lubricate teeth using Mobil Mobiltac 325 NC or equivalent grease.		
Centering Device and Centering Guide - Sections 8.3.5, 11.1 (Component ID # 57 & 58), 11.2, & 11.4.8		
Apply grease to the sliding surfaces of the centering device and guide. Remove existing lubricant and brush or swab the centering device and centering guide wear plates with Mobil Mobilux EP-2 grease or equivalent.		
Visually inspect centering device, centering guide, wear plates, and fasteners for excessive wear, deformation, fit, or damage.		
Standby Emergency Generator - Section 8.5.5 (Note: Additional generator maintenance shall be performed under a separate Generator Repair and Maintenance Contact)		
Perform visual inspection of the generator components (including belts, hoses, fasteners, etc.) for signs of damage.		
Check for air cleaner restrictions.		
Check coolant level, oil level and fuel level.		
Check for oil, coolant, and fuel leaks.		
Check battery and battery charger for proper operation.		
Check electrical safety controls and alarms.		
Perform all pre-operation inspections.		
Start and run generators for 15 minutes with no load and check for proper alternator voltage.		
Perform all post operation inspections.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615614 – MONTHLY MAINTENANCE CHECKLIST – PAGE 3 OF 4**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Navigation Lights - Section 8.6.1		
Check navigation lights for proper operation.		
Replace lamps if damaged or nonfunctional.		
Interior/Exterior Lights - Section 8.6.2		
Check for burned-out lamps. Replace burned-out lamps. Verify light switches function properly.		
Traffic Signals - Section 8.6.3		
Check lights for proper illumination and replace burned out bulbs.		
Verify proper operation during marine and maintenance openings.		
Traffic Gate Arm Lights - Section 8.6.4		
Check traffic gate arm lights for proper operation. Replace burned out bulbs.		
Electric Horn, Air Horn and Air Compressors - Section 8.9.1		
Perform a general visual inspection of the equipment and check for proper operation of the system.		
Heating and Air Conditioning Systems - Section 8.9.2		
Check all air filters. Replace dirty or damaged filters. Do not use chemicals to clean the unit.		
Check all cooling coils, seals, fittings, ducting connections and pipelines for leaks.		
Check surfaces of casing for signs of corrosion. Retreat or repaint areas of corrosion.		
Inspect the condition of all safety devices for deterioration.		
Check the performance of all equipment related to temperature and humidity control.		
Sump Pump - Section 8.9.3		
Dump buckets of water or run water from a hose into the sump to test the pump's response and look for leaks. Verify that water is pumped out from sump and there is no back-flow. Do not flood the surrounding floor or area.		
Check that the motor is free of all debris		
During operation, examine motor for smooth running and absence of excessive vibration.		
Water Heater - Section 8.9.6		
Check the unit and associate piping for leaks.		
Turn the hot water on at the sink and verify that the water turns hot.		

Notes:

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615615 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 1 OF 3**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
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 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Live Load Bearings - Sections 8.1.2 & 11.1 (Component ID # 59)		
Check that all live load bearings are in contact with their strike plates when the span is closed and the span locks are driven. There should be no movement of the sole plate when heavy traffic loads cross the span.		
Clean debris from all supporting members and plates.		

Span Lock Rack and Pinion - Sections 8.3.4, 11.1 (Component ID # 49 & 50), 11.2, & 11.4.7		
Check rack mounting fasteners for tightness. Tighten loose fasteners.		

Motor Control Cabinets - Section 8.5.1		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture.		
Examine connections for poor or loose connections and evidence of overheating.		
Lubricate door hinges and latches.		
Check circuit breaker disconnects for proper operation.		
Inspect terminal block screws and hand tighten loose connections.		
Inspect wiring from unit terminal blocks for deterioration of insulation.		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Check all starter contacts. Note when nearly all of the silver tip is gone and the contact tip support is exposed. Do not file the contacts. Filing or otherwise dressing the contacts only results in lost tip material and reduces starter life.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615615 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 2 OF 3**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Motor Control Cabinets - Section 8.5.1 (Cont.)		
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the motor control center. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Inspect fuse clips for dirt and verify that the clips provide a tight fit.		
Verify enclosure lights turn on when doors are open. Replace burned out bulbs.		
Verify enclosure heaters and thermostats are functioning properly.		
Check the condition of gaskets and replace if damaged.		
Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.2		
Drive Cabinet - Open and clean with a vacuum cleaner.		
Drive Cabinet - Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Drive Cabinet - Check for corrosion and moisture.		
Drive Cabinet - Lubricate door hinges and latches.		
Drive Cabinet - Inspect terminal block screws and tighten loose connections.		
Drive Cabinet - Inspect wiring from unit terminal blocks for deterioration of insulation.		
Drive Cabinet - Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Drive Cabinet - Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the motor control center. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.		
Drive Cabinet - Inspect all relays and tighten loose connections.		
Drive Cabinet - Verify enclosure heaters are functioning.		
Drive Cabinet - Verify enclosure lights turn on when doors are open. Replace burned out bulbs.		
Drive Cabinet - Change the selected drive for each leaf by turning the appropriate selector switch located in the control cabinet.		
Control Consoles - Section 8.8.1		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture. Replace corroded hardware.		
Lubricate door hinges and latches.		
Inspect terminal block screws and tighten all loose connections.		
Inspect wiring from unit terminal blocks for deterioration of insulation		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current on the load side conductors. The multimeter should read 0 amps and 0 volts.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615616 – SEMI-ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

Checklist Notes

1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes

1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Live Load Bearings - Sections 8.1.2 & 11.1 (Component ID # 59)		
Remove debris from the area surrounding the connection of the live load anchor to concrete foundation.		
Clean and spot paint areas of corrosion to the live load bearing assembly and anchorage. The live load bearing components shall be painted using the paint system specifies by the DelDOT standard Specifications for painting existing structural steel.		

Couplings - Sections 8.2.2, 11.1 (Component ID # 3, 6, 9, 14, 16, & 43), 11.2, & 11.4.3		
For gear couplings, purge lubricant and replace with new Mobil Mobilux EP-0 or equivalent.		
For the machinery brake brakewheel couplings, purge lubricant and replace with new Mobil Mobilux EP-0 or equivalent.		
Visually inspect couplings and brakewheel couplings for relative movement between coupling components during operation of the span drive machinery.		

Warning Gates - Sections 8.4.1, 11.1 (Component ID #64, 65, 67, 71, 74, 75, 76, 77, 86, 90, 93, 98), 11.2, & 11.8.1		
All Gates - Verify bumper rods are properly adjusted and make contact with roadway when lowered.		
All Gates - Verify stay cables are properly adjusted and taught at all times.		
NE & NW Gates - Check the transmission oil level. If oil is low check seals for evidence of leaks and add oil. If oil is cloudy or dirty, drain, flush, and refill the unit with Mobil SHC 634 or equivalent.		
NE & NW Gates - Lubricate shaft bearings and rod ends until clean grease is purged from the bearing or rod end. Use Mobil Mobilux EP-2 or equivalent.		
NE & NW Gates - Lubricate the rotary cam limit switch roller chain with CRC TAC 2 Adhesive Chain Lubricant or equivalent.		
NE & NW Gates - Check the roller chain tension. The chain should not be slack. Tighten chain if it is loose.		
SE & SW Gates - Check the transmission oil level. If oil is low check seals for evidence of leaks and add oil. If oil is cloudy or dirty, drain, flush, and refill the unit with Mobil Mobilgear 600 XP 220 or equivalent.		
SE & SW Gates - Lubricate pivot shaft bearings with Mobil Mobilgear 600 XP 220 or equivalent.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 11**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Trunnion Bearings - Sections 8.1.1, 11.1 (Component ID # 11 & 12), 11.2, & 11.4.1		
Check housing and supporting frame for signs of corrosion. Clean and spot paint areas of corrosion.		
Check housing cap bolts and base bolts. Tighten loose fasteners.		
Observe the trunnion bearings during opening and closing operations of the leaf. Note any unusual movements, binding, or abnormal sounds.		

Live Load Bearings - Sections 8.1.2 & 11.1 (Component ID # 59)		
Check that all fasteners are tight. Tighten loose fasteners.		
Check the contacting surfaces between the sole plate and strike plate for deformations and wear. There should be no corrosion on the contact areas of either plate. If corrosion is present, clean the bearing surfaces.		

Counterweight - Section 8.1.3		
Check counterweight balance block locations for proper drainage and clean out debris.		
From the counterweight pit floor and platforms/walkways, visually check the counterweight concrete for spalling, cracks, and signs of structural distress.		
Check for shifting of balance blocks. Neatly restack blocks or plates that have fallen over or shifted out of position.		

Motor and Machinery Brakes - Sections 8.2.1, 11.1 (Component ID # 5 & 8), 11.2, 11.4.2, & 11.7.2		
Inspect brake shoes and drums for wear, dust, dirt, grease and proper adjustment. Check the brake pad thickness. Notify the Engineer if the remaining thickness is less than 1/16 inch.		
Check clearance between the brake shoe and brakewheel. The measured gap shall have a minimum of 1/64 inch clearance between the brake shoe and brakewheel when hand released. If clearances need to be adjusted, the linkage shall be adjusted in accordance with Section 11.7.2. If adjustments are made to the linkages, the reserve stroke and spring length should be verified and adjusted as well. Adjustment procedures are located within Section 11.7.2.		
Inspect mechanical linkages for wear, broken parts and tightness of nuts and bolts. Check for freedom of moving parts (no binding or sticking).		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 2 OF 11**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Motor and Machinery Brakes - Sections 8.2.1, 11.1 (Component ID # 5 & 8), 11.2, 11.4.2, & 11.7.2 (Cont.)		
Check for excessive heating of parts evident by discoloration of metal parts.		
Check operations of the brake during test operations of the bridge. Check for any unusual odor and excessive vibration.		
Check the brake housing and linkages for evidence of water dripping on the brake and corrosion.		
Check adjustment of limit switches and hand release devices and adjust for proper operation.		
Check brake actuator reserve stroke is 1 ½ inches \pm $\frac{1}{16}$ inch. As the brake pads wear, the reserve stroke becomes shorter. If the reserve stroke requires adjustment, adjust linkages as specified in Section 11.7.2.		
Check the brake spring length. Use a tape measure to measure the length of the spring. Adjustment procedures for adjusting the spring length as well as corresponding brake torque data graphs are located in Section 11.7.2. The spring length shall be adjusted to within $\frac{1}{16}$ inch. At the time this Manual was created, the motor and machinery brake spring lengths were measured to be 6 $\frac{7}{8}$ \pm $\frac{5}{16}$ inch and 6 $\frac{9}{16}$ \pm $\frac{1}{16}$ inch, respectively. Table 3 in Section 11.7.2 shows the existing motor brake torque range is 425 ft-lbs to 725 ft-lbs. Table 3 shows the existing machinery brake torque range is 675 ft-lbs to 750 ft-lbs.		
Lubricate bearing pins using Mobil Mobilgear 600 XP 220 or equivalent lubricant. Lubricate pins using an oil can and applying a couple of drops to each of the brake pins. Cycle brakes manually using the hand release lever while applying the lubricating oil. Do not allow oil to drip onto the brake wheel. Remove any oil residue that drips from the brake pins.		
Check for loose brake terminations. Tighten loose connections.		
During winter months, verify that the brake pads are not frozen to the brakewheel.		
Primary Reducers - Sections 8.2.3, 11.1 (Component ID # 7), 11.2, 11.4.4, & 11.7.1		
Check for excessive leakage at the seals.		
Check fasteners for tightness. Tighten loose fasteners.		
Bearings - Sections 8.2.4, 11.1 (Component ID # 13, 17, 18, 20, 25, 28, 30, & 37), 11.2, & 11.4.1		
Check bearing cap and base fasteners for tightness. Tighten loose fasteners.		
Open Gearing - Sections 8.2.5, 11.1 (Component ID # 19, 22, 26, 27, 29, 21, 32, 39, & 40), 11.2, & 11.4.5		
Replace open gear lubricant using Mobil Mobiltac 325 NC or equivalent.		
Verify that fasteners connecting the rack to the rack support are secure and free of corrosion. Tighten loose fasteners. Clean and spot paint areas of corrosion on the rack support and fasteners.		
Inspect keys and keyways for tightness and cracking.		
Observe the open gearing during raising and lowering operations. Note excessive vibrations, binding, and unusual noises.		
Span Position Instrumentation Drive Equipment - Sections 8.2.6 & 11.1 (Component ID # 34, 35, & 36)		
Check that linkage fasteners are tight. Tighten loose fasteners. Verify linkages and fasteners are free of corrosion. Clean and spot paint areas of corrosion.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 3 OF 11**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Auxiliary Drive System - Sections 8.2.7 & 11.1 (Component ID # 101, 102, & 103)		
Check that sprocket fasteners are tight. Tighten loose fasteners. Verify sprockets and fasteners are free of corrosion. Clean and spot paint areas of corrosion.		
Check that the roller chain is free of corrosion. Check that chain links rotate smoothly.		
Lock Bars, Guides, and Receivers - Sections 8.3.1, 11.1 (Component ID # 45, 46, 55, & 56), 11.2, & 11.4.7		
Check the guide and socket fasteners for tightness. Tighten loose fasteners.		
The socket and guide housings shall be checked for cracking (Refer to Photos 9.3E and 9.3F). Inspect the areas where the housing changes shape (flange radii). One way a crack is observed is a thin line of corrosion emanating from the stress concentrations (flange radii).		
Check sockets and guides for paint failure. Clean flaking paint from components and spot paint areas of corrosion.		
Span Lock Reducers - Sections 8.3.2, 11.1 (Component ID # 51), 11.2, 11.4.7, & 11.7.4		
Check for excessive leakage at the seals.		
Check fasteners for tightness. Tighten loose fasteners.		
Span Lock Rack and Pinion - Sections 8.3.4, 11.1 (Component ID # 49 & 50), 11.2, & 11.4.7		
Replace rack and pinion lubricant with Mobil Mobiltac 325 NC.		
Inspect keys and keyways for tightness and cracking.		
Observe the open gearing during operation of the span lock machinery. Note excessive vibrations, binding, and unusual noises.		
Centering Device and Centering Guide - Sections 8.3.5, 11.1 (Component ID # 57 & 58), 11.2, & 11.4.8		
Visually inspect centering device and centering guide components at flange radii and mounting connections. Components should be checked for cracks, rust and section loss. Mounting connections should be checked for corrosion and tightness. All components should have flaking paint brushed clean and spot painted. Do not paint the wear plate contacting surfaces.		
Warning Gates - Sections 8.4.1, 11.1 (Component ID #64, 65, 67, 71, 74, 75, 76, 77, 86, 90, 93, 98), 11.2, & 11.8.1		
All Gates - Check hardware for damage and corrosion. Replace damaged hardware.		
All Gates - Check electrical connections and tighten loose connections.		
All Gates - Remove excess grease, oil and debris from equipment.		
All Gates - Check gate housing for corrosion. Clean and spot paint areas of corrosion on the housing.		
All Gates - Check condition of gaskets and replace if damaged.		
SE & SW Gates - Replace warning gate instrumentation open gearing with fresh Mobil Mobiltac 325 NC or equivalent.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 4 OF 11**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Motor Control Cabinets - Section 8.5.1		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.		
Operate the motor controller/contacter without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contacter without load, remove power to the MCC cabinet and with a non-conductive object, press the button on the contactor. The button is usually located on the front or bottom of the housing.		
Operate the motor controller/contacter under load and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		
Measure and record current draw on load side of contactor. An elevated reading may indicate a poor connection. If the recorded current (excluding the current at startup) exceeds the full load current on the motor name plate, notify bridge management.		
Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.2		
Check the condition of filters. Replace dirty or damaged filters.		
Verify enclosure fan is functioning.		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware.		
Operate the motor controller/contacter without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contacter without load, remove power to the MCC cabinet and with a non-conductive object, press the button on the contactor. The button is usually located on the front or bottom of the housing.		
Operate the motor controller/contacter normally (under load) from the control desk during a vessel or maintenance opening and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		
Open and clean resistor enclosure with a vacuum cleaner.		
Check hardware for corrosion.		
Check condition of gaskets and replace if damaged.		
Panelboards - Section 8.5.3		
Open and clean with a vacuum cleaner.		
Remove accumulation of dirt, grease, and gum with DexolT D5 contact cleaner or equivalent.		
Check for moisture and corrosion. Replace corroded hardware.		
Examine bus bar connections for poor or loose connections and evidence of overheating. If necessary, pop out, but do not disconnect the circuit breakers.		
Lubricate door hinges and latches.		
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		
Measure resistance to ground at each panelboard using a ground test kit. Verify resistance is 25 ohms or less.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 5 OF 11**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Transformers - Section 8.5.4		
Open and clean with vacuum cleaner.		
Check for corrosion and moisture. Replace corroded hardware.		
Verify all hardware is secure. Tighten loose fasteners.		
Check transformer components (terminals, insulation, etc.) for evidence of overheating.		

Standby Emergency Generator - Section 8.5.5 (Note: Additional generator maintenance shall be performed under a separate Generator Repair and Maintenance Contact)		
Check the condition of all filters and breathers and note if dirty, clogged, or damaged.		
Check the fuel tanks for water and sediment.		
Verify fasteners are secure. Tighten loose fasteners.		
Check operation of automatic transfer switch located in the control house.		
Start and run generator under load for one complete bridge opening.		

Automatic Transfer Switch - Section 8.5.6		
Test with operation of the generator		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture.		
Examine for excessive heating of parts, discoloration of metal parts, charred insulation, odor, or blistering.		
Check for freedom of moving parts.		
Check for worn or broken mechanical parts.		
Tighten loose mountings and connections.		
Check for excessive arcing.		

Safety and Disconnect Switches - Section 8.5.7		
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.		
Check for corrosion and moisture. Replace corroded hardware.		
Examine for excessive heating of parts, discoloration of metal parts, charred insulation, odor, or blistering.		
Check for freedom of moving parts.		
Check for worn or broken mechanical parts.		
Tighten loose mountings and connections.		
Check contacts for wear and pitting.		
Check for excessive arcing.		
Check condition of gaskets (for dust-tight or watertight units). Replace damaged gaskets.		
For fused units, inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 6 OF 11**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Electrical Conductors - Section 8.5.8		
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.		
Check tightness at each conductor termination at each terminal box. Tighten loose connections.		
Check the strain relief fittings for signs of distress.		
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.		
Droop Cables - Section 8.5.9		
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.		
Check tightness of each conductor termination at each terminal box. Tighten loose connections.		
Check the strain relief fittings for signs of distress.		
Check cables for any wear or abrasions on the outer jacket.		
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.		
Submarine Cables - Section 8.5.10		
Submarine Cables - Test each set of submarine cables during normal bridge openings.		
Submarine Cables - Check the strain relief fittings for signs of distress.		
Submarine Cables - Visually inspect the submarine cable and watch for signs of cracks, deterioration and discoloration of the cable jacket.		
Termination Cabinets - Check tightness of each conductor termination at each terminal box. Tighten loose connections.		
Termination Cabinets - Check for discolored connections on terminals, contact supports or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware.		
Termination Cabinets - Operate the remote controlled switches without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position.		
Termination Cabinets - Operate the remote controlled switches under load and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		
Navigation Lights - Section 8.6.1		
Check gaskets and replace if damaged.		
Tighten loose connections.		
Check for corrosion of metal parts. Replace corroded hardware.		
Check for worn or broken mechanical parts. Check for cracked lenses.		
Replace lamps.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 7 OF 11**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Interior/Exterior Lights - Section 8.6.2		
Clean luminaire lenses, interior surfaces, and weep holes (where applicable).		
Check gaskets for damage and cracks. Replace damaged gaskets.		
Tighten loose connections.		
Inspect for corrosion of metal parts. Clean and spot paint corroded components.		
Check parts for wear or damage.		

Traffic Signals - Section 8.6.3		
Clean all reflectors, lenses and spot paint heads.		

Lock Motors - Sections 8.7.1, 11.1 (Component ID # 53), 11.2, & 11.4.6		
Motor - Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Motor - Verify that shaft end-play is normal.		
Motor - Inspect and tighten loose electrical connections on motor.		
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
Motor - During operation, examine motor for smooth running and absence of vibration.		
Motor - During operation, check motor and bearings for overheating.		
Motor - Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		
Motor - Lubricate the motor bearings with Mobil Unirex N2 or equivalent.		
Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		
Solenoid Brake - Check electrical connections. Tighten loose connections.		
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).		
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the components of dirt, gum, water, and corrosion.		
Solenoid Brake - Observe the brake during operation of the span locks. Check for excessive vibration or unusual noise during operation.		

Main Leaf (Span) Motors - Sections 8.7.2, 11.1 (Component ID # 4), 11.2 & 11.4.6		
Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Verify that shaft end-play is normal.		
Inspect and tighten loose electrical connections on motor.		
Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 8 OF 11**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Main Leaf (Span) Motors - Sections 8.7.2, 11.1 (Component ID # 4), 11.2 & 11.4.6 (Cont.)		
During operation, examine motor for smooth running and absence of vibration.		
During operation, check motor and bearings for overheating.		
Lubricate main leaf motor bearings with Mobil Unirex N2 or equivalent.		
Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		
Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		

Traffic Gate Motors - Sections 8.7.3 & 11.1 (Component ID # 62, 63, 82, & 83)		
Motor - Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Motor - Verify that shaft end-play is normal.		
Motor - Inspect and tighten loose electrical connections on motor.		
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
Motor - During operation, examine motor for smooth running and absence of vibration.		
Motor - During operation, check motor and bearings for overheating.		
Motor - Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		
Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		
Solenoid Brake - Check electrical connections. Tighten loose connections.		
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).		
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the components of dirt, gum, water, and corrosion.		
Solenoid Brake - Observe the brake during operation of the gate. Check for excessive vibration or unusual noise during operation.		

Auxiliary Leaf (Span) Gear Motors - Sections 8.7.4, 11.1 (Component ID # 100), 11.2, & 11.7.5		
Gear Motor - Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.		
Gear Motor - Verify that shaft end-play is normal.		
Gear Motor - Inspect and tighten loose electrical connections on motor.		
Gear Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.		
Gear Motor - During operation, examine motor for smooth running and absence of vibration.		
Gear Motor - During operation, check motor and bearings for overheating.		
Gear Motor - Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 9 OF 11**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Auxiliary Leaf (Span) Gear Motors - Sections 8.7.4, 11.1 (Component ID # 100), 11.2, & 11.7.5 (Cont.)		
Gear Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.		
Solenoid Brake - Check electrical connections. Tighten loose connections.		
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).		
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the components of dirt, gum, water, and corrosion.		
Solenoid Brake - Observe the brake during operation of the auxiliary gear motor. Check for excessive vibration or unusual noise during operation.		

Control Consoles - Section 8.8.1		
Replace all indicating light bulbs		
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.		
Manually operate each relay and contactor with associated circuit breakers off and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a relay or contactor with the associated circuit breaker off, verify that power is off, and with a non-conductive object, press the button the relay or contactor. The button is usually located on the front or bottom of the housing.		
Monitor relay and contactor operation during normal operation and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.		

Limit Switches - Sections 8.8.2 & 11.1 (Component ID # 5, 8, 41, 42, 44, 47, 48, 60,78, 79, 94, 95, 99, & 104)		
All Limit Switches - Inspect all limit switches for wear.		
All Limit Switches - Remove accumulated dust, dirt, and moisture on housing. Use brush, soft cloth, or vacuum cleaner.		
All Limit Switches - Remove accumulated dust, dirt, and moisture from all shafts, keeping it clean and free of galling.		
All Limit Switches - Inspect latches, mounting hardware and seals to ensure proper seal of housing.		
All Limit Switches - Inspect all fasteners and tighten loose connections. Replace corroded hardware.		
All Limit Switches - If accessible, remove the cover and visually inspect condition of all internal parts.		
Rotary Cam Limit Switch - Inspect the rollers and cams for wear.		
Span Lock, Brake, and Sprocket Guard Limit Switches - Inspect snap action contact blocks and integral component connections. Tighten loose connections.		
Span Lock, Brake, and Sprocket Guard Limit Switches - Inspect all wiring from snap action contact blocks for deterioration.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615617 – ANNUAL MAINTENANCE CHECKLIST – PAGE 10 OF 11**

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Limit Switches - Sections 8.8.2 & 11.1 (Component ID # 5, 8, 41, 42, 44, 47, 48, 60,78, 79, 94, 95, 99, & 104)		
Span Lock, Brake, and Sprocket Guard Limit Switches - Cycle lever arm several times.		
Fully Seated Limit Switch - Inspect all wiring for deterioration.		
Fully Seated Limit Switch - Inspect limit switch body and remove debris.		
Fully Seated Limit Switch - Inspect strike plate and magnet for corrosion and remove debris.		

Speed Switches and Tachometer Assembly - Sections 8.8.3, 11.1 (Component ID # 1, 2 & 61), & 11.9.1		
Remove accumulated dust, dirt, and moisture on housing. Use brush, soft cloth, or vacuum cleaner.		
Remove accumulated dust, dirt, and moisture from shafts, keeping them clean and free of galling.		
Inspect cover to ensure proper seal of housing.		
Inspect all fasteners and tighten connections if loose. Replace corroded fasteners.		
Check components for wear or damage. Replace worn or damaged belts. Consult the manufacturer for the correct belt type and size.		
Check belt tension per manufacturer's recommendations and adjust tension if belt is excessively loose. Correct tension is obtained when 3.5 ounces of force in the center of the timing belt between the pulleys gives 0.015 inches of belt deflection per inch of distance between pulleys.		
Check condition of gaskets and replace if damaged.		

Electric Horn, Air Horn and Air Compressors - Section 8.9.1		
Check electrical connections and tighten loose connections.		
Operate the compressor under load and check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor.		
Check and clean components of collections of dirt or gum, evidence of water dripping, or corrosion.		
Check the air horn trumpets for debris inside the trumpets.		
Inspect connecting piping, tubing or hoses for cracking or leaks.		
Check the condition of the air filter. Replace filter if dirty or damaged.		
Tighten loose hardware. Check hardware for corrosion.		

Exhaust Fans - Section 8.9.4		
Check any belts for wear, damage and tightness. Tension belts if loose. Replace belts if damaged or worn. When replacing belts, use the same type as supplied with the unit.		
Check all seals, fittings and connections for leaks.		
Check surfaces of casing for signs of corrosion. Clean and spot paint areas of corrosion.		
Inspect the condition of all safety devices for deterioration.		
Observe the exhaust fans for unusual noises or vibrations during operation.		

**BRIDGE 1-693 – THIRD STREET BRIDGE
ITEM # 615618 – FIVE YEAR MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed. Where components are only located on one leaf, mark the box "N/A".
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include "as necessary", "as needed", etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed	
	North Leaf	South Leaf
Couplings - Sections 8.2.2, 11.1 (Component ID # 3, 6, 9, 14, 16, & 43), 11.2, & 11.4.3		
For the motor brakewheel couplings, purge lubricant and replace with new Falk Long Term Grease (LTG) or equivalent.		
Primary Reducers - Sections 8.2.3, 11.1 (Component ID # 7), 11.2, 11.4.4, & 11.7.1		
Replace oil in the speed reducer housings with Mobil Mobilgear 600 XP 220 or equivalent.		
Span Lock Reducers - Sections 8.3.2, 11.1 (Component ID # 51), 11.2, 11.4.7, & 11.7.4		
Replace oil in the speed reducer housings with Mobil Mobilgear 600 XP 220 or equivalent.		
Span Lock Motor Couplings - Sections 8.3.3, 11.1 (Component ID # 52), 11.2, 11.7.3, & 11.4.7		
Replace coupling lubricant and check for misalignment. Use Falk Long Term Grease or equivalent.		
Drive Cabinets and Resistors - Sections 8.5.2 & 11.9.2		
Replace general purpose plug-in style ice cube relays.		
Standby Emergency Generator - Section 8.5.5 (Note: Additional generator maintenance shall be performed under a separate Generator Repair and Maintenance Contact)		
Perform one hour load bank testing and monitor operation.		
Perform two hour test without load and monitor operation.		
Lock Motors - Sections 8.7.1, 11.1 (Component ID # 53), 11.2, & 11.4.6		
Clean and paint the motors. Do not paint nameplates.		

**BRIDGE 2-021A – REHOBOTH BOULEVARD
ITEM # 615620 – MONTHLY MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates:	Maintenance Personnel:
_____	_____
_____	_____
_____	_____
_____	_____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed.
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed
Navigation Lights - Section 8.6.1	
Check navigation lights for proper operation.	
Replace lamps if damaged or nonfunctional.	

Interior/Exterior Lights - Section 8.6.2	
Check for burned-out lamps. Replace burned-out lamps. Verify light switches function properly.	

Traffic Signals - Section 8.6.3	
Check lights for proper illumination and replace burned out bulbs.	
Verify proper operation during marine and maintenance openings.	
Check for proper operation and sound for each warning gong.	

Traffic Gate Arm Lights - Section 8.6.4	
Check traffic gate arm lights for proper operation. Replace burned out bulbs.	

Heating and Air Conditioning Systems - Section 8.9.1	
Visually inspect all air filters. Replace dirty or damaged filters.	
Check all cooling coils, seals, fittings, ducting connections, and pipelines for leaks.	
Inspect the condition of all safety devices where provided, for deterioration including thermostat and thermal limit safety switch.	
Check the performance of all equipment related to temperature and humidity control.	

**BRIDGE 2-021A – REHOBOTH BOULEVARD
ITEM # 615621 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed.
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed
Live Load Bearings - Sections 8.1.2 & 11.1.1 (Component ID #43 & 45)	
Check that all live load bearing sole plates are in contact with their masonry plates when the span is closed. There should be no movement of the sole plate when heavy traffic loads cross the span.	
Clean debris from all supporting members and plates.	

Bearings - Sections 8.2.3, 11.1.1 (Component ID # 6, 10, 12, 15, 17, 18, 21, 22, 25, & 34), 11.2.1, & 11.4.1	
With a grease gun, pump new grease into the bearing to completely purge the bearing of the existing grease. Remove excess purged grease. Use Mobil Mobilux EP-2 or equivalent.	

Open Gearing - Sections 8.2.4, 11.1.1 (Component ID # 3, 4, 11, 13, 16, 20, 24, 26, 27, & 32), 11.2.1, & 11.4.4	
Remove any debris, including leaves, sand, dirt, and bird debris from the gear teeth.	
Remove any lubricant and rags that has been displaced to non-contacting surfaces with scrapers.	
Lubricate teeth using Mobil Mobiltac 325 NC or equivalent grease.	

Air Buffer - Sections 8.2.6, 11.1.1 (Component ID # 36, 37, & 38), 11.2.1, & 11.4.5	
Remove any debris build up from strike plate at pier 1.	
Replace piston rod and strike plate lubricant with Mobil Mobilux EP-2 or equivalent.	

Instrumentation Drive - Sections 8.2.7, 11.1.1 (Component ID # 28, 29, & 30), 11.2.1, & 11.4.6	
Lubricate instrumentation roller chain using CRC TAC 2 Adhesive Chain Lubricant or equivalent.	

Control Enclosure - Section 8.5.1	
Open and clean with a vacuum cleaner.	
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.	
Check for corrosion and moisture.	

**BRIDGE 2-021A – REHOBOTH BOULEVARD
ITEM # 615621 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 2 OF 2**

Maintenance Tasks	Date and Initial When Completed
Control Enclosure - Section 8.5.1 (Cont.)	
Examine connections for poor or loose connections and evidence of overheating.	
Lubricate door hinges and latches with 3-IN-ONE Multi-Purpose Oil.	
Inspect terminal block screws and hand tighten loose connections.	
Inspect wiring from unit terminal blocks for deterioration of insulation.	
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side of the conductors. The multimeter should read 0 amps and 0 volts.	
Check all starter contacts. Note when nearly all of the silver tip is gone and the contact tip support is exposed. Do not file the contacts. Filing or otherwise dressing the contacts only results in lost tip material and reduces starter life.	
Check the condition of gaskets and replace if damaged.	

Control Console - Section 8.8.1	
Open and clean with a vacuum cleaner.	
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.	
Check for corrosion and moisture. Replace corroded hardware.	
Lubricate door hinges and latches with 3-IN-ONE Multi-Purpose Oil.	
Inspect terminal block screws and tighten all loose connections.	
Inspect wiring from unit terminal blocks for deterioration of insulation.	
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current on the load side conductors. The multimeter should read 0 amps and 0 volts.	
Inspect all relays and hand tighten loose connections.	
Check all pushbuttons, selector switches, and meters for damage and proper operation.	
Check all indicating lights and verify that each lamp illuminates. Replace burned out bulbs.	
Check condition of gaskets and replace if damaged.	

Notes:

Contractor Signature: _____ Date: _____

Inspector Signature: _____ Date: _____
(DelDOT's Representative)

Signng this form certifies that the above work was satisfactorily completed and payment for this item can be made.

**BRIDGE 2-021A – REHOBOTH BOULEVARD
ITEM # 615622 – SEMI-ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____
_____	_____
_____	_____
_____	_____

<p>Checklist Notes</p> <p>1. The contractor shall date and initial the tasks below when completed.</p> <p>2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.</p> <p>Payment Notes</p> <p>1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.</p> <p>2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.</p>
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Maintenance Tasks	Date and Initial When Completed
Warning Gates - Sections 8.4.1, 11.1.2 (Component ID #48, 49, 50, 51, 52, 53, 54, 55, 56, 57, & 59), 11.2.2, & 11.8.1	
Check the transmission oil level in both sections of the transmission housing. If oil is low, check seals for evidence of leaks and refill. If oil is cloudy or dirty, purge from the drain port, flush transmission housing and refill with Mobil 600W Cylinder oil or equivalent. Use Mobil 600W Cylinder Oil or equivalent compatible oil for flushing the housing.	
Lubricate shaft bearings and rod ends until clean grease flows from the bearing purge ports. Use Mobil Mobilux EP-2 or equivalent.	
Lubricate the rotary cam limit switch roller chain with CRC TAC 2 Adhesive Chain Lubricant or equivalent.	
Check the roller chain tension and adjust tension if too loose or tight. The roller chain sag should be $\frac{1}{4}$ " \pm $\frac{1}{8}$ ".	

Barrier Gate - Sections 8.4.2, 11.1.2 (Component ID # 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 75, 76, 77, 78, & 80), 11.2.2, & 11.8.2	
Check the transmission oil level in both sections of the transmission housing. If oil is low, check seals for evidence of leaks and refill. If oil is cloudy or dirty, purge from the drain port, flush transmission housing, and refill with Mobil 600W Cylinder oil or equivalent. Use Mobil 600W Cylinder Oil or equivalent compatible oil for flushing the housing.	
Lubricate shaft bearings and rod ends until clean grease flows from the bearing purge ports. Use Mobil Mobilux EP-2 or equivalent.	
Lubricate the rotary cam limit switch roller chain with CRC TAC 2 Adhesive Chain Lubricant or equivalent.	
Check the roller chain tension and adjust the tension if chain is too tight or loose. The roller chain sag should be $\frac{3}{8}$ " \pm $\frac{1}{8}$ ".	
Check the clutch for slipping during operation of the barrier gate.	

Traffic Gate Arm Lights - Section 8.6.4	
Check traffic gate arm lights and wiring for damage.	

Platforms - Section 8.9.4	
Clean and power wash the machinery platform of dirt and debris. Electrical equipment must be protected prior to power washing walkways to prevent water from entering any electrical component. Water intrusion may cause failure to components.	

**BRIDGE 2-021A – REHOBOTH BOULEVARD
ITEM # 615623 – ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 9**

Dates: _____	Maintenance Personnel: _____
_____	_____
_____	_____
_____	_____

<p>Checklist Notes</p> <p>1. The contractor shall date and initial the tasks below when completed.</p> <p>2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.</p> <p>Payment Notes</p> <p>1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.</p> <p>2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.</p>
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Maintenance Tasks	Date and Initial When Completed
Segmental Girders & Track Plates - Section 8.1.1	
Check track plates and segmental girder rivets for signs of corrosion and distress. Clean corrosion and contaminant and spot paint with matching paint. Painting should be done using the paint system specified by the DeIDOT Standard Specifications for painting existing structural steel.	

Live Load Bearings - Sections 8.1.2 & 11.1.1 (Component ID #43 & 45)	
Check that all fasteners are tight. Tighten loose fasteners.	
Inspect masonry plate grout for cracking and evidence of deterioration.	
Check the contacting surfaces between the sole plate and masonry plate for deformations and wear. There should be no corrosion on the contact areas of either plate. Spot paint the live load bearings and fasteners if corroded. The sole plate and masonry plate contacting surfaces shall not be painted.	

Counterweight - Section 8.1.3	
Check counterweight balance block locations for proper drainage and clean out debris.	
From the roadway and machinery platform, visually check the counterweight concrete for spalling, cracks, and signs of structural distress.	
Check for shifting of balance blocks and balance plates. Neatly restack blocks or plates that have fallen over or shifted out of position.	

Motor and Machinery Brakes - Sections 8.2.1, 11.1.1 (Component ID # 1 & 9), 11.4.3, 11.7.1, & 11.7.2	
Motor and Machinery Brakes - Inspect brake shoes and drums for wear, dust, dirt, grease, and proper adjustment. Check the brake pad thickness. Notify the Engineer if the remaining thickness is less than 1/16 inch.	
Motor and Machinery Brakes - Check clearance between the brake shoe and brakewheel. The measured gap shall have a minimum of 1/64" clearance between brake shoe and brakewheel when the brake is hand released. If the motor brake clearances need to be adjusted, the linkages shall be adjusted in accordance with Section 11.7.1. If motor brake linkages are adjusted, verify spring length and adjust if needed. Motor brake adjustment procedures are located within Section 11.7.1. If the machinery brake clearances need to be adjusted, the linkages shall be adjusted in accordance with Section 11.7.2. If adjustments are made to the machinery brake linkages, the reserve stroke and torque setting should be verified and adjusted as well. Machinery brake adjustment procedures are located within Section 11.7.2.	

**BRIDGE 2-021A – REHOBOTH BOULEVARD
ITEM # 615623 – ANNUAL MAINTENANCE CHECKLIST – PAGE 2 OF 9**

Maintenance Tasks	Date and Initial When Completed
Motor and Machinery Brakes - Sections 8.2.1, 11.1.1 (Component ID # 1 & 9), 11.4.3, 11.7.1, & 11.7.2 (Cont.)	
Motor and Machinery Brakes - Inspect the mechanical linkages for wear, broken parts, and tightness of nuts and bolts. Check for freedom of moving parts (no binding or sticking). Check the brake housing and linkages for corrosion and signs of water dripping onto the brake.	
Motor and Machinery Brakes - Check for excessive heating of brake components evident by discoloration of metal parts.	
Motor and Machinery Brakes - Check operations of the brakes during test operations of the bridge. Check for any unusual odor and excessive vibrations.	
Motor and Machinery Brakes - Check adjustment of limit switches and hand release devices and adjust for proper operation. When the machinery brake hand release lever is pulled up or the motor brake hand release lever is pulled back, the brake pads should release from the brakewheel. The motor brake has two limit switches. The machinery brake has three limit switches. Verify brake limit switches provide proper indication at the control desk when the brake is set, released via the control system, and hand released. Adjust limit switch lever arms for proper indication.	
Motor and Machinery Brakes - Check for loose brake terminations. Tighten loose connections.	
Motor and Machinery Brakes - During winter months, verify that the brake pads are not frozen to the brakewheel.	
Machinery Brake - Check brake reserve stroke height with a scale. The reserve stroke height of the machinery brake should be 0.7" +/- .1/16". The reserve stroke refers to the exposed thruster rod length, measured from the top of the thruster cover to the bottom of the circular thruster rod sleeve (refer to Figure 2 of Section 11.7.2). The machinery brake is equipped with an automatic adjustment mechanism designed to adjust the reserve stroke height as needed without operator adjustment. If the automatic adjustment mechanism is not providing the appropriate reserve stroke height, contact the manufacturer.	
Machinery Brake - Check the machinery brake spring tension via the braking torque gage located near the brake thruster. At the time this Manual was created, the machinery brake torque setting was recorded to be 1350 ft-lbs. The torque is read by matching the top of the spring block to the corresponding torque value on the scale. To adjust the braking torque, turn the torque adjustment screw until the top of the spring block is at the appropriate location on the scale. Perform Item 5 in "Motor and Machinery Brakes" to confirm proper operation of the motor brakes after adjustment.	
Motor Brake - Check the motor brake spring length. The motor brake spring length should be 5" +/- .1/16". Adjust the spring length adjustment nuts if needed. Refer to Section 11.7.1 for spring length adjustment procedure.	
Couplings - Sections 8.2.2 & 11.1.1 (Component ID # 7)	
Inspect keys and keyways at the coupling for tightness and cracking.	
Check coupling flange bolts for corrosion and tightness. Tighten loose fasteners.	
Bearings - Sections 8.2.3, 11.1.1 (Component ID # 6, 10, 12, 15, 17, 18, 21, 22, 25, & 34), 11.2.1, & 11.4.1	
Check sleeve bearing cap and base fasteners and collar bearing flange fasteners for tightness. Tighten loose fasteners.	
Open Gearing - Sections 8.2.4, 11.1.1 (Component ID # 3, 4, 11, 13, 16, 20, 24, 26, 27, & 32), 11.2.1, & 11.4.4	
Remove debris and lubricant by hand with scrapers, WD-40 Specialist Machine and Engine Degreaser, and rags. Replace open gear lubricant using Mobil Mobilnac 325 NC or equivalent.	
Verify that fasteners connecting the racks to the rack supports are secure and free of corrosion. Tighten loose fasteners. Spot paint corroded fasteners.	
Visually inspect keys and keyways for cracking. Verify keys are secure within the keyways.	
Observe the open gearing during raising and lowering operations. Note excessive vibrations, binding, and unusual noises.	
Manual Chain Drive Sheaves - Sections 8.2.5 & 11.1.1 (Component ID # 35)	
Verify manual drive sheave locking collars and set screws are secure on the shaft. Tighten set screws if loose.	

**BRIDGE 2-021A – REHOBOTH BOULEVARD
ITEM # 615623 – ANNUAL MAINTENANCE CHECKLIST – PAGE 3 OF 9**

Maintenance Tasks	Date and Initial When Completed
Air Buffer - Sections 8.2.6, 11.1.1 (Component ID # 36, 37, & 38), 11.2.1, & 11.4.5	
Check air buffer housing fasteners for tightness. Tighten loose fasteners.	
Observe the air buffer during operation for unusual movement, binding, or sounds.	
Instrumentation Drive - Sections 8.2.7, 11.1.1 (Component ID # 28, 29, & 30), 11.2.1, & 11.4.6	
Check sprocket fasteners at the span drive machinery shaft location for tightness. Tighten loose fasteners.	
Span Lock Assembly - Sections 8.3.1 & 11.1.1 (Component ID # 39, 40, 41, & 42)	
Verify span lock bar is engaged and sockets are secure and free of galling.	
Inspect pins for damage and wear. Verify cotter pin is secure.	
Check span lock bar socket fasteners for tightness. Tighten loose fasteners.	
Centering Guides - Sections 8.3.2 & 11.1.1 (Component ID # 44)	
Check that the centering guide components do not have pack rust and rivets are intact and do not indicate signs of distress or damage. If rivets are damaged or show signs of distress, notify Bridge Management.	
Check the beveled plate for deformations and signs of damage. Components should have flaking paint brushed clean and spot painted.	
Warning Gates - Sections 8.4.1, 11.1.2 (Component ID #48, 49, 50, 51, 52, 53, 54, 55, 56, 57, & 59), 11.2.2, & 11.8.1	
Check hardware for damage and corrosion. Replace damaged hardware.	
Check electrical connections and tighten loose connections.	
Remove excess grease, oil and debris from equipment.	
Check warning gate housing for corrosion. Clean and spot paint areas of corrosion on the housing.	
Check condition of gaskets and replace if damaged.	
Barrier Gate - Sections 8.4.2, 11.1.2 (Component ID # 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 75, 76, 77, 78, & 80), 11.2.2, & 11.8.2	
Check hardware for damage and corrosion. Replace damaged hardware.	
Check electrical connections and tighten loose connections.	
Remove excess grease, oil and debris from equipment.	
Check barrier gate housing for corrosion. Clean and spot paint areas of corrosion on the housing.	
Check condition of gaskets and replace if damaged.	

**BRIDGE 2-021A – REHOBOTH BOULEVARD
ITEM # 615623 – ANNUAL MAINTENANCE CHECKLIST – PAGE 4 OF 9**

Maintenance Tasks	Date and Initial When Completed
Control Enclosures - Section 8.5.1	
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.	
Operate the motor controller/contacter without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contacter without load, remove power to the MCC cabinet and with a non-conductive screwdriver, press the button on the contactor. The button is usually located on the front or bottom of the housing. Refer to Photo numbered 9.6L.	
Operate the motor controller/contacter under load and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.	
Secondary Resistors - Section 8.5.2	
Clean the resistor enclosure with a vacuum.	
Secure all loose hardware.	
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.	
Panelboards - Section 8.5.3	
Open and clean with a vacuum cleaner.	
Remove accumulation of dirt, grease, and gum with DexolIT D5 contact cleaner or equivalent.	
Check for moisture and corrosion. Replace corroded hardware.	
Examine bus bar connections for poor or loose connections and evidence of overheating. If necessary, pop out, but do not disconnect the circuit breakers.	
Lubricate door hinges and latches with 3-IN-ONE Multi-Purpose Oil.	
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.	
Measure resistance to ground at each panelboard using a clamp on ground resistance tester. Confirm that the main electrical service to the bridge is off before performing any test. Follow the meter manufacturer's recommendations for isolating the grounding electric. With the meter clamped around the grounding electrode, verify resistance is 25 ohms or less.	
Transformers - Section 8.5.4	
Open and clean with vacuum cleaner.	
Check for corrosion and moisture. Replace corroded hardware.	
Verify all hardware is secure. Tighten loose fasteners.	
Check transformer components (terminals, insulation, etc.) for evidence of overheating.	
Portable Generator Receptacle - Section 8.5.5	
Visually inspect the generator receptacle, cables, and associated equipment for wear or damage.	
Using an off-site portable generator, start and run the bridge for one complete opening using the main leaf motor. Refer to Section 4.2 "Portable Generator Operation" for additional information.	

**BRIDGE 2-021A – REHOBOTH BOULEVARD
ITEM # 615623 – ANNUAL MAINTENANCE CHECKLIST – PAGE 5 OF 9**

Maintenance Tasks	Date and Initial When Completed
Manual Transfer Switch - Section 8.5.6	
Test the switch with operation of the portable generator.	
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.	
Check for corrosion and moisture.	
Examine for excessive heating of parts, discoloration of metal parts, charred insulation, odor, or blistering.	
Check for freedom of moving parts.	
Check for worn or broken mechanical parts.	
Tighten loose mountings and connections.	
Check for excessive vibration.	

Safety and Disconnect Switches - Section 8.5.7	
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent.	
Check for corrosion and moisture. Replace corroded hardware.	
Examine for excessive heating of parts, discoloration of metal parts, charred insulation, odor, or blistering.	
Check for freedom of moving parts.	
Check for worn or broken mechanical parts.	
Tighten loose mountings and connections.	
Check contacts for wear and pitting.	
Check for excessive arcing.	
Check condition of gaskets (for dust-tight or watertight units). Replace damaged gaskets.	
For fused units, inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.	

Electrical Conductors - Section 8.5.8	
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.	
Check tightness at each conductor termination at each terminal box. Tighten loose connections.	
Check the strain relief fittings for signs of distress.	
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.	

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Maintenance Tasks	Date and Initial When Completed
Droop Cables - Section 8.5.9	
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.	
Check tightness of each conductor termination at each terminal box. Tighten loose connections.	
Check the strain relief fittings for signs of distress.	
Check cables for any wear or abrasions on the outer jacket.	
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.	
Submarine Cable - Section 8.5.10	
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.	
Check tightness of each conductor termination at each terminal box. Tighten loose connections.	
Check the strain relief fittings for signs of distress.	
Visually inspect the submarine cable and watch for signs of cracks, deterioration, and discoloration of the cable jacket.	
Navigation Lights - Section 8.6.1	
Check gaskets and replace if damaged.	
Tighten loose connections.	
Check for corrosion of metal parts. Replace corroded hardware.	
Check for worn or broken mechanical parts. Check for cracked lenses.	
Replace lamps.	
Interior/Exterior Lights - Section 8.6.2	
Clean luminaire lenses, interior surfaces, and weep holes (where applicable).	
Check gaskets and replace if damaged.	
Tighten loose connections.	
Inspect for corrosion of metal parts. Spot paint corroded components.	
Check parts for wear or damage.	
Traffic Signals - Section 8.6.3	
Clean all reflectors, lenses, gongs, and spot paint heads.	
Check wiring for deterioration.	

**BRIDGE 2-021A – REHOBOTH BOULEVARD
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Main Leaf (Span) Motor - Sections 8.7.1, 11.1.1 (Component ID # 2), 11.1.2, & 11.4.2	
Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.	
Verify that shaft end-play is normal by moving the motor shaft by hand (with power off and motor not in operation) and determining whether movement is excessive (more than 1/16").	
Inspect and tighten loose electrical connections on motor.	
Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.	
During operation, examine motor for smooth running and absence of vibration.	
During operation, measure and record the motor housing and bearing temperatures with an infrared thermometer. Notify bridge management if the measured temperatures are above 100° F.	
Lubricate main leaf motor bearings with Mobil Unirex N2 or equivalent.	
Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.	
Check the phase currents flowing in the motor under loaded conditions with a clamp-on ammeter. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.	

Traffic Gate Motor - Sections 8.7.2 & 11.1.2 (Component ID # 46, 47, 61 & 62)	
Motor - Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.	
Motor - Inspect and tighten loose electrical connections on motor.	
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.	
Motor - During operation, examine motor for smooth running and absence of vibration.	
Motor - During operation, measure and record the motor housing and bearing temperatures with an infrared thermometer. Notify bridge management if the measured temperatures are above 100° F.	
Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.	
Solenoid Brake - Check electrical connections and tighten loose connections.	
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).	
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the solenoid brake components of dirt, gum, water, and corrosion.	
Solenoid Brake - Observe the brake during operation of the gate. Check for excessive vibration or unusual noise during operation.	

Control Console - Section 8.8.1	
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connections points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.	
Manually operate each relay, where possible, with the associated circuit breakers off and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a relay or contactor with the associated circuit breaker off, verify that power is off, and with a non-conductive object, press the button on the relay. The button is usually located on the front or bottom of the housing. Refer to Photo numbered 9.6N.	
Monitor relay and contactor operation during normal operation and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.	

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ITEM # 615623 – ANNUAL MAINTENANCE CHECKLIST – PAGE 8 OF 9**

Maintenance Tasks	Date and Initial When Completed
Limit Switches - Sections 8.8.2, 11.1.1 (Component ID # 1, 9, & 31), 11.1.2 (Component ID # 58, 60, 73, 74, & 79), & 11.9.1	
All Limit Switches - Inspect all limit switches for wear.	
All Limit Switches - Remove accumulated dust, dirt, and moisture on housing. Use a brush, soft cloth, or vacuum cleaner.	
All Limit Switches - Remove accumulated dust, dirt, and moisture from all shafts, keeping it clean and free of galling.	
All Limit Switches - Inspect latches, mounting hardware, and seals to ensure proper seal of housing.	
All Limit Switches - Inspect all fasteners and tighten loose connections. Replace corroded hardware.	
All Limit Switches - If accessible, remove the cover and visually inspect the condition of all internal parts.	
All Limit Switches - Inspect limit switch wiring for deterioration.	
All Limit Switches - Check for worn or broken mechanical parts.	
Rotary Cam Limit Switch - Inspect the rotary cam limit switch cams and rollers for wear, corrosion and good contact between the fixed and movable parts.	
Fully Seated Proximity Switch - Inspect all wiring for deterioration.	
Fully Seated Proximity Switch - Inspect limit switch body and remove debris.	
Fully Seated Proximity Switch - Inspect strike plate and magnet for corrosion and remove debris.	
Brake Limit Switches - Inspect snap action contact blocks and integral component connections. Hand tighten loose connections.	
Brake Limit Switches - Inspect all wiring from snap action contact blocks for deterioration.	
Brake Limit Switches - Cycle lever arm several times.	

Conduit Systems - Section 8.9.5	
Open and clean boxes with a vacuum cleaner.	
Remove accumulation of dirt, grease, and gum from conduit.	
Check for corrosion and moisture. Check conduit for cracking or other damage. Replace corroded hardware.	
Tighten loose mountings and connections.	
Check condition of gaskets in boxes and replace gaskets if damaged.	
Lubricate door hinges and latches, where provided, with 3-IN-ONE Multi-Purpose Oil.	
Check and clean all drain holes and fittings.	

Notes:

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615626 – MONTHLY MAINTENANCE CHECKLIST – PAGE 1 OF 3**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed.
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed
Trunnion Bearing - Sections 8.1.1, 11.1.1 (Component ID # 29, 30, & 31), 11.2.1, & 11.4.1	
Purge old grease by pumping new lubricant into the grease fittings. There are five grease fittings per trunnion bearing. Remove excess grease from the inboard and outboard sides of the trunnion bearings after lubricating. The lubricant should be Mobil Mobilux EP-2 grease or equivalent.	
Remove any roadway debris that has accumulated on and around the trunnion assemblies and the portions of the bascule girders near the trunnions.	

Couplings - Sections 8.2.3, 11.1.1 (Component ID # 6, 34, & 42), 11.2.1, 11.4.4, 11.7.7, & 11.7.8	
Inspect key and keyways at all couplings for grease leakage, tightness, and cracking. Check coupling flange bolts for corrosion and tightness. Per the manufactures installation instructions, the gear coupling fasteners should be torqued to 31 ft-lbs and the disconnect coupling fasteners torqued to 20 ft-lbs.	
Inspect for leaks at seals and gaskets. If the seal is leaking, inspect for damage. Notify the Engineer if the seal is damaged.	
Inspect the jaw coupling for cracking or damage.	

Bearings - Sections 8.2.4, 11.1.1 (Component ID # 5, 7, 9, 11, 13, 17, 19, 21, 24, 27, 33, 43, & 46), 11.2.1, 11.4.1, 11.4.6, 11.7.9, 11.7.10, & 11.7.11	
For sleeve bearings, fill with new grease to completely purge the bearings of the existing grease. Remove excess purged grease. Use Mobil Mobilux EP-2 or equivalent.	

Open Gearing - Sections 8.2.5, 11.1.1 (Component ID # 3, 4, 12, 14, 16, 18, 22, 23, 26, 28, & 44), 11.2.1, & 11.4.5	
Remove any debris, including leaves, sand, dirt, and bird debris, from gear teeth.	
Remove any lubricant that has been displaced to non-contacting surfaces with rags and scrapers.	
Lubricate teeth using Mobil Mobiltac 325 NC or equivalent.	
Clean out rack supports of debris and water.	
Remove any roadway debris that has accumulated on the bascule girder flanges above and around the open gearing and rack support.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615626 – MONTHLY MAINTENANCE CHECKLIST – PAGE 2 OF 3**

Maintenance Tasks	Date and Initial When Completed
Navigation Lights - Section 8.6.1	
Check navigation lights for proper operation.	
Replace lamps if damaged or nonfunctional.	
Interior/Exterior Lights - Section 8.6.2	
Check for burned out lamps. Replace burned out lamps. Verify light switches function properly.	
Traffic and Advanced Warning Signals - Section 8.6.3	
Check lights for proper illumination and replace bulbs when they do not illuminate or are not working.	
Verify proper operation during marine and maintenance openings.	
Traffic Gate Arm Lights - Section 8.6.4	
Check traffic gate arm lights for proper operation. Replace burned out bulbs.	
Electric Horn - Section 8.9.1	
Perform a general visual inspection of the equipment and check for proper operation of the system.	
Heating and Air Conditioning Systems - Sections 8.9.2 & 11.9.3	
Visually inspect all air filters. Replace dirty or damaged filters.	
Check all cooling coils, seals, fittings, ducting connections, and pipelines for leaks.	
Inspect the condition of all safety devices, where provided, for deterioration including thermostat and thermal limit safety switches.	
Check performance of equipment related to temperature and humidity control.	
Sump Pump – Section 8.9.3	
Check that the motor is free of all debris.	
Dump buckets of water or run water from a hose into the sump to test the pump's response and look for leaks. Verify water is pumped out from the sump and there is no back-flow. Do not flood the surrounding floor or area.	
During operation, examine motor for smooth running and absence of excessive vibration. The sump pump should not be operated without water in the sump wet well.	
Check sump pump piping for leaks.	
Check the operation of the sump pump heat lamp. Replace the bulb if it is burned out.	
Hot Water Heater - Section 8.9.4	
Check the unit and associated piping for leaks.	
Turn the hot water on at the bathroom sink and verify that the water turns hot.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615627 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

<p>Checklist Notes</p> <p>1. The contractor shall date and initial the tasks below when completed.</p> <p>2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.</p> <p>Payment Notes</p> <p>1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.</p> <p>2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.</p>
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Maintenance Tasks	Date and Initial When Completed
Live Load Bearings - Sections 8.1.2 & 11.1.1 (Component ID # 47, 48, 49, & 50)	
Check that all live load bearing sole plates are in contact with their masonry plates when the span is closed and the brakes are set. There should be no movement of the live load sole plates when heavy traffic loads cross the span.	
Clean debris from all supporting members and plates.	

Control Enclosure - Section 8.5.1	
Open and clean with a vacuum cleaner.	
Remove accumulation of dirt, grease, and gum with DexoIT D5 contact cleaner or equivalent.	
Check for corrosion and moisture.	
Examine connections for poor or loose connections and evidence of overheating.	
Lubricate door hinges and latches with 3-IN-ONE Multi-Purpose Oil.	
Inspect terminal block screws for tightness. Hand tighten loose connections.	
Inspect wiring from unit terminal blocks for deterioration of insulation.	
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.	
Check all starter contacts. Note when nearly all the silver tip is gone and the contact tip support is exposed. Do not file the contacts. Filing or otherwise dressing the contacts only results in lost tip material and reduces starter life.	
Check the condition of gaskets and replace if damaged.	

Traffic and Advanced Warning Signals - Section 8.6.3	
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the control console. Progression in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. Fuses may not have the same short-circuit withstand ability and current limiting ability.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615628 – SEMI-ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed.
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed
Couplings - Sections 8.2.3, 11.1.1 (Component ID # 6, 34, & 42), 11.2.1, 11.4.4, 11.7.7, & 11.7.8	
For the gear coupling and manual disconnect coupling, purge lubricant and replace with new Mobil Mobilux EP-0 or equivalent.	
Visually inspect couplings for relative movement between coupling components during operation of the span drive machinery.	

Bearings - Sections 8.2.4, 11.1.1 (Component ID # 5, 7, 9, 11, 13, 17, 19, 21, 24, 27, 33, 43, & 46), 11.2.1, 11.4.1, 11.4.6, 11.7.9, 11.7.10, & 11.7.11	
For tapered roller bearings and Sealmaster spherical roller bearings, lubricate bearings with Mobil Mobilgrease XHP 222 or equivalent.	
For Torrington spherical roller bearings, add replenishment grease. Use Mobil Mobilgrease XHP 222 or equivalent.	

Warning Gates - Sections 8.4.1, 11.1.2 (Component ID # 54, 58, 60, 63, 64, 71, 73, 75, 78, & 81), 11.2.2, 11.8.1, & 11.8.2	
Check the oil level in both sections of the transmission. If oil is low, check seals for evidence of leaks and add oil until the oil level is up to the oil level plug or sight gage. For the north warning gate transmission, use Mobil 600W Cylinder Oil or equivalent for the permanent oil and for flushing the housing. For the south warning gate transmission, use Mobil SHC 626 or equivalent for the permanent oil and for flushing the housing.	
Lubricate pivot shaft bearings and rod ends until clean grease flows from the bearing or rod end. Use Mobil Mobilux EP-2 or equivalent.	
Lubricate the rotary cam limit switch roller chain with CRC TAC 2 Adhesive Chain Lubricant or equivalent.	
Check the roller chain tension and adjust tension if needed. The south warning gate roller chain sag should be $\frac{1}{8}'' \pm \frac{1}{8}''$. The north warning gate roller chain sag should be $\frac{1}{4}'' \pm \frac{1}{8}''$. Refer to the manufacturer’s maintenance guidelines in Section 11.8.1 for adjusting the chain tension.	

Traffic Gate Arm Lights - Section 8.6.4	
Check gate arm lights and wiring for damage.	

Pit – Section 8.9.6	
Clean and power wash the counterweight pit of dirt and debris. Electrical equipment must be protected prior to power washing the counterweight pit to prevent water from entering any electrical component. Water intrusion may cause failure to components.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615629 – ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 8**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed.
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed
Trunnion Bearing - Sections 8.1.1, 11.1.1 (Component ID # 29, 30, & 31), 11.2.1, & 11.4.1	
Check housing and supporting frame for signs of corrosion. Clean and spot paint corroded components.	
Check housing cap bolts and base bolts for tightness. Tighten loose fasteners.	
Observe the trunnion bearings during opening and closing operations of the leaf. Note any unusual movements, binding, or abnormal sounds.	

Live Load Bearings - Sections 8.1.2 & 11.1.1 (Component ID # 47, 48, 49, & 50)	
Check that all fasteners are tight and corrosion free. Tighten loose fasteners.	
Inspect masonry plate grout for cracking and evidence of deterioration.	
Check the contacting surfaces between the sole plate and masonry plate for deformations and wear. There should be no corrosion on the contact areas of either plate. If corrosion is present, clean the bearing surfaces. Spot paint the live load bearings and fasteners if corroded. Painting should be done using the paint system specified by the DelDOT Standard Specifications for painting existing structural steel (color typically Forest Green #24172, Federal Standard 595C, and typically alkyd) and be compatible with the existing system. The sole plate and masonry plate contacting surfaces should not be painted.	

Counterweight - Section 8.1.3	
Check counterweight balance pockets for proper drainage and clean out debris.	
From the counterweight pit floor and platforms, visually check the counterweight concrete for spalling, cracks, and signs of structural distress.	
Check for shifting of balance blocks and plates. Neatly restack blocks or plates that have fallen over or shifted out of position.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615629 – ANNUAL MAINTENANCE CHECKLIST – PAGE 2 OF 8**

Maintenance Tasks	Date and Initial When Completed
Auxiliary Drive System - Sections 8.2.1, 11.1.1 (Component ID # 36, 37, 38, 39, 40, & 41), 11.2.1, 11.7.1, 11.7.2, 11.7.3, & 11.7.4	
Remove filter reservoir and clean out any contaminants.	
Inspect lubricator oil level. Remove the fill plug and add Ingersoll Rand No. 50 oil or equivalent until oil level is ¼” from the top of the bowl.	
Verify the auxiliary air motor gear box oil level is up to the oil level plug. If the oil level is low, add oil until the oil level is up to the oil level plug. Use Mobil Mobilgear 600 XP 220 or equivalent oil.	
Perform a test operation of the bridge using the auxiliary drive air motor. Inspect the air lines for leaks during operation of the air motor. Inspect the condition of the air line piping and hoses.	

Motor Brake and Machinery Brake - Sections 8.2.2, 11.1.1 (Component ID # 1 & 10), 11.2.1, 11.4.3, 11.7.5, & 11.7.6	
Inspect brake shoes and drums for wear, dust, dirt, grease, and proper adjustment. Check the brake pad thickness. Notify the Engineer if the remaining thickness is less than 1/16 inch.	
Check clearances between the brake shoes and brakewheel. The measured gap shall have a minimum of 1/64 inch clearance between the brake shoe and brakewheel when hand released. If clearances need to be adjusted, the linkages shall be adjusted in accordance with Sections 11.7.5 and 11.7.6. If adjustments are made to the linkages, the reserve stroke and torque setting should be verified and adjusted as well. Adjustment procedures are located within Sections 11.7.5 and 11.7.6.	
Inspect mechanical linkages for wear, broken parts, and tightness of nuts and bolts. Check for freedom of moving parts (no binding or sticking). Check the brake housing and linkages for evidence of water dripping on the brake and corrosion.	
Check for excessive heating of parts evident by discoloration of metal parts.	
Check operation of the brake during test operations of the bridge. Check for any unusual odor and excessive vibration.	
Check adjustment of limit switches and hand release devices and adjust for proper operation. When the brake hand release lever is pulled up, the brake pads should release from the brakewheel. The motor brake has three limit switches. The machinery brake has three limit switches. Verify brake limit switches provide proper indication at the control desk when the brake is set, released via the control system, and hand released. Adjust limit switch lever arms for proper indication.	
Check the brake reserve stroke height with a scale. The reserve stroke height of the motor brake should be 0.7 inch +/- 1/16 inch. The reserve stroke height for the machinery brake should be 0.8 inch +/- 1/16 in. The reserve stroke refers to the exposed thruster rod length, measured from the top of the thruster cover to the bottom of the lug at the end of the thruster rod (refer to Figure 2 of Sections 11.7.5 and 11.7.6). As the brake pads wear, the reserve stroke becomes shorter. If the reserve stroke requires adjustment, adjust linkages as specified in Sections 11.7.5 and 11.7.6.	
Check the motor brake and machinery brake spring tension via the brake torque gauge located near the thruster. The motor brake should be set to provide a braking torque of 150 ft-lbs. The machinery brake should be set to provide a braking torque of 300 ft-lbs. The torque is read by matching the top of the spring block to the corresponding torque value on the scale. To adjust the brake torque, turn the torque adjustment screw until the top of the spring block is at the appropriate torque setting on the scale. Check operation of the brake (bullet 5 above) to confirm proper operation of the motor brake or machinery brake after adjustment.	
Check for loose brake terminations. Tighten loose connections.	

Couplings - Sections 8.2.3, 11.1.1 (Component ID # 6, 34, & 42), 11.2.1, 11.4.4, 11.7.7, & 11.7.8	
For the manual disconnect coupling shifting collar, purge lubricant and replace with new Mobil Mobilux EP-0 or equivalent.	
Manually test the clutch to ensure it properly engages and disengages the auxiliary air motor disconnect coupling.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615629 – ANNUAL MAINTENANCE CHECKLIST – PAGE 3 OF 8**

Maintenance Tasks	Date and Initial When Completed
Bearings - Sections 8.2.4, 11.1.1 (Component ID # 5, 7, 9, 11, 13, 17, 19, 21, 24, 27, 33, 43, & 46), 11.2.1, 11.4.1, 11.4.6, 11.7.9, 11.7.10, & 11.7.11	
Check bearing cap and base fasteners for tightness. Tighten loose fasteners. The Sealmaster tapered roller bearing cap fasteners should be torqued to 75 ft-lbs and set screws torqued to 33 ft-lbs to 43 ft-lbs. The Sealmaster spherical roller bearing set screws should be torqued to 55 ft-lbs.	
Check that all main pinion bearing set collar set screws are secure. Tighten set screws if loose.	

Open Gearing - Sections 8.2.5, 11.1.1 (Component ID # 3, 4, 12, 14, 16, 18, 22, 23, 26, 28, & 44), 11.2.1, & 11.4.5	
Replace open gear lubricant using Mobil Mobilnac 325 NC or equivalent.	
Verify that fasteners connecting the rack to the rack support are secure and free of corrosion. Tighten loose fasteners. Spot paint corroded fasteners. Painting should be done using the paint system specified by the DeIDOT Standard Specifications for painting existing structural steel (color typically Forest Green #24172, Federal Standard 595C, and typically alkyd) and be compatible with the existing system.	
Visually inspect keys and keyways for cracking. Verify keys are secure within the keyways.	
Observe the open gearing during raising and lowering operations. Note excessive vibrations, binding, and unusual noises.	

Centering Guides - Sections 8.3.1 & 11.1.1 (Component ID # 51)	
Check the centering guide anchor bolts for deterioration or signs of distress.	
Check the beveled plate for deformations and signs of damage. Components should have flaking paint brushed clean and spot painted.	

Warning Gates - Sections 8.4.1, 11.1.2 (Component ID # 54, 58, 60, 63, 64, 71, 73, 75, 78, & 81), 11.2.2, 11.8.1, & 11.8.2	
Check hardware for damage and corrosion. Replace damaged hardware.	
Check electrical connections and tighten loose connections.	
Remove excess grease, oil and debris from equipment.	
Check gate housing for corrosion. Clean and spot paint areas of corrosion on the housing.	
Check condition of gaskets and replace if damaged.	

Control Enclosure - Section 8.5.1	
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.	
Operate the motor controller/contacter without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contacter without load, remove power to the cabinet and with a non-conductive screwdriver, press the button on the contactor. The button is usually located on the front or bottom of the housing.	
Operate the motor controller/contacter under load and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615629 – ANNUAL MAINTENANCE CHECKLIST – PAGE 4 OF 8**

Maintenance Tasks	Date and Initial When Completed
Secondary Resistors - Section 8.5.2	
Open and clean with a vacuum cleaner.	
Remove accumulation of dirt, grease, and gum with DexolT D5 contact cleaner or equivalent.	
Check for corrosion and moisture.	
Inspect and test terminal block screws for tightness. Hand tighten all loose connections.	
Inspect wiring from unit terminal blocks for deterioration of insulation.	

Panelboards – Section 8.5.3	
Open and clean with a vacuum cleaner.	
Remove accumulation of dirt, grease, and gum with DexolT D5 contact cleaner or equivalent.	
Check for moisture and corrosion. Replace corroded hardware.	
Examine bus bar connections for poor or loose connections and evidence of overheating. If necessary, pop out, but do not disconnect the circuit breakers.	
Lubricate door hinges and latches with 3-IN-ONE Multi-Purpose Oil.	
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.	
Measure resistance to ground at each panelboard using a clamp on ground resistance tester. Confirm that the main electrical service to the bridge is off before performing any test. Follow the meter manufacturer’s recommendations for isolating the grounding electric. With the meter clamped around the grounding electrode, verify resistance is 25 ohms or less.	

Portable Generator Cord Set – Section 8.5.4	
Visually inspect the cables and associated equipment for wear or damage.	
Using an off-site portable generator, start and run the bridge for one complete opening using the main leaf motor. Refer to Section 4.2 “Portable Generator Operation” for additional information.	

Safety (Manual Transfer) and Disconnect Switches - Section 8.5.5	
Remove accumulation of dirt, grease, and gum with DexolT D5 contact cleaner or equivalent.	
Check for corrosion and moisture. Replace corroded hardware.	
Examine for excessive heating of parts, discoloration of metal parts, charred insulation, odor, or blistering.	
Check for freedom of moving parts.	
Check for worn or broken mechanical parts.	
Tighten loose mountings and connections.	
Check contacts for wear and pitting.	
Check for excessive arcing.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615629 – ANNUAL MAINTENANCE CHECKLIST – PAGE 5 OF 8**

Maintenance Tasks	Date and Initial When Completed
Safety (Manual Transfer) and Disconnect Switches - Section 8.5.5 (Cont.)	
Check condition of gaskets (for dust-tight or watertight units). Replace damaged gaskets.	
For fused units, inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.	
Test the manual transfer switch with operation of the portable generator.	
Electrical Conductors - Section 8.5.6	
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.	
Check tightness at each conductor termination at each terminal box. Tighten loose connections.	
Check the strain relief fittings for signs of distress.	
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.	
Droop Cables - Section 8.5.7	
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.	
Check tightness of each conductor termination at each terminal box. Tighten loose connections.	
Check the strain relief fittings for signs of distress.	
Check cables for any wear or abrasions on the outer jacket.	
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.	
Submarine Cables - Section 8.5.8	
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.	
Check tightness of each conductor termination at each terminal box. Tighten loose connections.	
Check the strain relief fittings for signs of distress.	
Visually inspect the submarine cable and watch for signs of cracks, deterioration, and discoloration of the cable jacket.	
Navigation Lights - Section 8.6.1	
Check gaskets and replace if damaged.	
Tighten loose connections.	
Check for corrosion of metal parts. Replace corroded hardware.	
Check for worn or broken mechanical parts. Check for cracked lenses.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615629 – ANNUAL MAINTENANCE CHECKLIST – PAGE 6 OF 8**

Maintenance Tasks	Date and Initial When Completed
Interior/Exterior Lights - Section 8.6.2	
Clean luminaire lenses, interior surfaces, and weep holes (where applicable).	
Check gaskets and replace if damaged.	
Tighten loose connections.	
Inspect for corrosion of metal parts. Spot paint corroded components.	
Test emergency light fixtures and batteries. Replace if battery is not operational.	
Check parts for wear or damage.	
Traffic and Advanced Warning Signals - Section 8.6.3	
Clean all reflectors, lenses, and spot paint heads.	
Main Leaf (Span) Motor - Sections 8.7.1, 11.1.1 (Component ID # 2), 11.2.1, 11.4.2 & 11.9.1	
Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.	
Verify that shaft end-play is normal by moving the motor shaft by hand (with power off and motor not in operation) and determining whether movement is excessive (more than 1/16").	
Inspect and tighten loose electrical connections on motor.	
Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.	
During operation, examine motor for smooth running and absence of vibration.	
During operation, measure and record the motor housing and bearing temperatures with an infrared thermometer. Notify bridge management if the measured temperatures are above 100° F.	
Lubricate main leaf motor bearings with Mobil Unirex N2 or equivalent.	
Check painted surface for signs of corrosion. Clean and spot paint areas of corrosion. Do not paint nameplates.	
Check the phase currents flowing in the motor under loaded conditions with a clamp-on ammeter. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.	
Warning Gate Motors - Sections 8.7.2, 11.1.2 (Component ID # 52, 53, 69, & 70), & 11.2.2	
Motor - Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine and Engine Degreaser or equivalent.	
Motor - Inspect and tighten loose electrical connections on motor.	
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.	
Motor - During operation, examine motor for smooth running and absence of vibration.	
Motor - During operation, measure and record the motor housing and bearing temperatures with an infrared thermometer. Notify bridge management if the measured temperatures are above 100° F.	
Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.	
Solenoid Brake - Check electrical connections and tighten loose connections.	
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615629 – ANNUAL MAINTENANCE CHECKLIST – PAGE 7 OF 8**

Maintenance Tasks	Date and Initial When Completed
Warning Gate Motors - Sections 8.7.2, 11.1.2 (Component ID # 52, 53, 69, & 70), & 11.2.2 (Cont.)	
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the solenoid brake components of dirt, gum, water, and corrosion.	
Solenoid Brake - Observe the brake during operation of the gate. Check for excessive vibration or unusual noise during operation.	

Control Console - Section 8.8.1	
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connections points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.	
Manually operate each relay and contactor with associated circuit breakers off and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a relay or contactor with the associated circuit breaker off, verify that power is off, and with a non-conductive screwdriver, press the button on the relay or contactor. The button is usually located on the front or bottom of the housing.	
Monitor relay and contactor operation during normal operation and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.	
Verify the power on indicator on the UPS is steady ON and no audible indication is present. If any other indication is present, consult manufacturer's literature.	

Limit Switches - Sections 8.8.2, 11.1.1 (Component ID # 1, 10, 35), & 11.1.2 (Component ID # 65, 66, 68, 82, & 83)	
All Limit Switches - Inspect all limit switches for wear.	
All Limit Switches - Remove accumulated dust, dirt, and moisture on housing. Use brush, soft cloth, or vacuum cleaner.	
All Limit Switches - Remove accumulated dust, dirt, and moisture from all shafts, keeping it clean and free of galling.	
All Limit Switches - Inspect latches, mounting hardware, and seals to ensure proper seal of housing.	
All Limit Switches - Inspect all fasteners and tighten loose connections. Replace corroded hardware.	
All Limit Switches - If accessible, remove the cover and visually inspect condition of all internal parts.	
All Limit Switches - Inspect limit switch wiring for deterioration.	
All Limit Switches - Check for worn or broken mechanical parts.	
Rotary Cam Limit Switch - Inspect the rotary cam limit switch cams and rollers for wear, corrosion and good contact between the fixed and movable parts.	
Lever Arm Limit Switches - Inspect snap action contact blocks and all internal component connections. Hand tighten loose connections.	
Lever Arm Limit Switches - Inspect all wiring from snap action contact blocks for deterioration.	
Lever Arm Limit Switches - Cycle lever arm several times.	

Electric Horn - Section 8.9.1	
Check electrical connections and tighten loose connections.	
Check the electric horn for debris.	
Tighten loose hardware. Check hardware for corrosion.	

**BRIDGE 3-151 – FRONT STREET BRIDGE
ITEM # 615631 – FIVE YEAR MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

<p>Checklist Notes</p> <p>1. The contractor shall date and initial the tasks below when completed.</p> <p>2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.</p> <p>Payment Notes</p> <p>1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.</p> <p>2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.</p>
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Maintenance Tasks	Date and Initial When Completed
Auxiliary Drive System - Sections 8.2.1, 11.1.1 (Component ID # 36, 37, 38, 39, 40, & 41), 11.2.1, 11.7.1, 11.7.2, 11.7.3, & 11.7.4	
Drain, flush, and refill auxiliary air motor gear box oil. Remove fill plug, vent plug, and drain oil from the auxiliary air motor gearbox. Flush housing with Mobil Mobilgear 600 XP 220 or equivalent oil that is compatible with the oil that is used during operation of the bridge. Reinstall drain plug and fill with Mobil Mobilgear 600 XP 220 or equivalent. The oil level should be up to the oil level plug hole. Reinstall fill plug and vent plug. Clean any spilled oil on the housing or surrounding area.	
Disassemble and service the filter in accordance with Section 11.7.2. Inspect filter components for wear and replace if damaged. Clean and reassemble filter components.	
Disassemble and service the regulator in accordance with Section 11.7.3. Inspect regulator components for wear and replace if damaged. Clean and reassemble regulator components.	
Disassemble, drain, and service the lubricator in accordance with Section 11.7.4. Inspect lubricator components for wear and replace if damaged. Clean and reassemble lubricator components. Remove fill plug and add Ingersoll Rand No. 50 oil or equivalent until oil level is ¼” from the top of the bowl.	
After servicing components, check system for air leaks.	

Navigation Lights - Section 8.6.1	
Replace lamps.	

Main Leaf (Span) Motor - Sections 8.7.1, 11.1.1 (Component ID # 2), 11.2.1, 11.4.2 & 11.9.1	
Clean and paint the motor. Do not paint nameplates	

Conduit Systems – Section 8.9.7	
Clean and paint all corrosion and oxidation from steel conduit and supports.	
Where PVC coated steel conduit is installed, apply touch up compound to cracks and/or cuts in coating.	

Notes:

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615642 – MONTHLY MAINTENANCE CHECKLIST – PAGE 1 OF 4**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed.
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed
Pivot Bearing - Sections 8.1.1, 11.1.2 (Component ID # 28, 29, 30, 31, & 32), 11.2.2, 11.4.7, & 11.7.10	
Lubricate pivot bearing with Mobil Mobilux EP-2 or equivalent using the grease fitting. Notify the supervisor immediately if water is purged from the bearing during lubrication.	

Balance Wheels - Sections 8.1.3, 11.1.1 (Component ID # 21, 22, & 23), 11.2.1, & 11.4.1	
Lubricate balance wheel sleeve bearings with Mobil Mobilux EP-2 or equivalent.	
Clean debris from the balance wheel tracks.	

End Screw Jack Speed Reducer - Sections 8.1.5, 11.1.1 (Component ID # 3), 11.2.1, 11.4.4, & 11.7.1	
Visually inspect the reducer oil level in the sight glass before operating the end screw jacks. Add make up oil (Mobil Mobilgear 600 XP 100) if the oil level is more than ¼” below the oil level line on the lubrication plate.	
Listen for unusual noises during operation of the machinery.	
Inspect breather condition. Replace breather if it is saturated or damaged.	
Inspect the oil pump piping pressure gage. Replace if damaged. Record oil pressure during operation of the end screw jack machinery.	
Inspect oil pump and oil pump piping for leaks.	

End Screw Jack Couplings - Sections 8.1.6, 11.1.1 (Component ID # 2, 4, 6, 13, & 15), 11.2.1, 11.4.3, 11.7.6, & 11.7.7	
Inspect keys and keyways at all couplings for grease leakage, tightness and cracking. Check coupling flange bolts for corrosion and tightness. Per the manufacturer’s installation instructions, the end screw jack motor coupling bolts should be torqued to 100 in-lbs and the end screw jack gear coupling bolts should be torqued to 372 in-lbs.	
Inspect for leaks at seals and gaskets. If the seal is leaking, inspect seal for damage. Notify the Engineer if the seal is damaged. If coupling covers are removed, replace lubricant.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615642 – MONTHLY MAINTENANCE CHECKLIST – PAGE 2 OF 4**

Maintenance Tasks	Date and Initial When Completed
Lubrication Lines - Section 8.1.9	
Check the lubrication lines and fittings for damage prior to use.	
After use of the lubrication lines, check lubrication lines for leaks and verify that components (balance wheel bearings, pivot bearing, and/or bearing wheel bearings) have been adequately lubricated.	
Check the condition of the lubrication line supports. Tighten loose fasteners.	
Verify that lubrication lines are secure and clear of the balance wheels and balance wheel track during operation of the span.	
Couplings - Sections 8.2.2, 11.1.2 (Component ID # 34, 36, 38, 41), 11.2.2, 11.4.3, & 11.7.8	
Inspect keys and keyways at all couplings for grease leakage, tightness and cracking. Check coupling flange bolts for corrosion and tightness. Per the manufacturer's installation instructions, the turning machinery grid coupling bolts should be torqued to 260 in-lbs.	
Inspect for leaks at seals and gaskets. If the seal is leaking, inspect seal for damage. Notify the Engineer if the seal is damaged. If coupling covers are removed, replace lubricant.	
Inspect instrumentation couplings for cracking or damage.	
Turning Machinery Speed Reducer - Sections 8.2.3, 11.1.2 (Component ID # 40), 11.2.2, 11.4.4, & 11.7.2	
Visually inspect the oil level by temporarily loosening / removing the oil level plug and check the oil level inside the reducer housing. Add oil to the reducer if the oil level is more than ¼" below the oil level plug.	
Listen for unusual noises during operation of the machinery. Report any unusual noises to bridge management.	
Inspect the condition of the breather. Replace the breather if it is damaged or saturated.	
Bearings - Sections 8.2.4, 11.1.2 (Component ID # 42 & 43), & 11.2.2	
Lubricate the sleeve bearings with Mobil Mobilux EP-2 or equivalent.	
Open Gearing - Sections 8.2.5, 11.1.2 (Component ID # 44 & 45), 11.2.2, & 11.4.5	
For all gears, remove any debris, including leaves, sand, dirt, and bird debris from the gear teeth and surrounding area.	
Remove any lubricant that has been displaced to non-contacting surfaces with scrapers and rags.	
For all gears, lubricate teeth using Mobil Mobiltac 325 NC or equivalent grease.	
Lock Bar, Guides, and Receiver - Sections 8.3.1, 11.1.2 (Component ID # 48, 49, 50, & 51), 11.2.2, & 11.4.9.2	
Remove existing lubricant and brush or swab the lock bar sliding surfaces with Mobil Mobilux EP-2 or equivalent.	
Visually inspect receiver, guides, lock bar, and fasteners for excessive wear, fit or damage.	
Span Lock Open Gearing - Sections 8.3.2, 11.1.2 (Component ID # 47 & 48A), 11.2.2, & 11.4.9.1	
Remove any debris, including leaves, sand, dirt, and bird debris, from the gear teeth and surrounding area.	
Remove any lubricant that has been displaced to non-contacting surfaces with scrapers and rags.	
Lubricate teeth using Mobil Mobiltac 325 NC or equivalent grease.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615642 – MONTHLY MAINTENANCE CHECKLIST – PAGE 3 OF 4**

Maintenance Tasks	Date and Initial When Completed
Stand-by Generator - Section 8.5.4 (Note: Additional generator maintenance shall be performed under a separate Generator Repair and Maintenance Contact)	
Perform visual inspection of the generator components (including belts, hoses, fasteners, etc.) for signs of damage.	
Check for air cleaner restrictions.	
Check coolant level, oil level and fuel level.	
Check for oil, coolant, and fuel leaks.	
Check battery and battery charger for proper operation.	
Check electrical safety controls and alarms.	
Perform all pre-operation inspections.	
Start and run generators for 15 minutes with no load and check for proper alternator voltage.	
Perform all post operation inspections as specified in Section 4.2.2.1 Testing under No Load.	
Navigation Lights - Section 8.6.1	
Check navigation lights for proper operation.	
Replace lamps if damaged or nonfunctional.	
Interior/Exterior Lights - Section 8.6.2	
Check for burned out lamps. Replace burned out lamps. Verify light switches function properly.	
Traffic Signals - Section 8.6.3	
Check lights for proper illumination and replace burned out bulbs.	
Verify proper operation during marine and maintenance openings.	
Check traffic signal pole hardware connections. Tighten loose connections.	
Traffic Gate Arm Lights - Section 8.6.4	
Check traffic gate arm lights for proper operation. Replace burned out bulbs.	
Span Lock Gear Motor -Sections 8.7.1, 11.1.2 (Component ID # 46), 11.2.2, 11.4.9.3, & 11.7.3	
Speed Reducer - Visually inspect the oil level is up to the oil level plug for before operating the span lock. Add make up oil (Mobil Mobilgear 600 XP 100) if the oil level is low.	
Speed Reducer - Listen for unusual noises during operation of the machinery. Report any unusual noises to bridge management.	
Heating and Air Conditioning Systems - Section 8.9.1	
Visually inspect all air filters. Replace dirty or damaged filters.	
Check all cooling coils, seals, fittings, ducting connections and pipelines for leaks.	
Inspect the condition of the contactor inside the HVAC unit for signs of overheating.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615643 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 1 OF 3**

Dates: _____	Maintenance Personnel: _____

<p>Checklist Notes</p> <p>1. The contractor shall date and initial the tasks below when completed.</p> <p>2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.</p> <p>Payment Notes</p> <p>1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.</p> <p>2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.</p>
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Maintenance Tasks	Date and Initial When Completed
Bearing Wheels - Sections 8.1.2, 11.1.1 (Component ID # 16, 17, 18, 19, & 20), 11.2.1, & 11.4.7	
Lubricate bearing wheel bearings with Mobil Mobilux EP-2 or equivalent.	
Clean debris from track.	

End Screw Jacks - Sections 8.1.7, 11.1.1 (Component ID # 7, 8, & 9), 11.2.1, 11.4.8, & 11.7.5	
Check end screw jack protective boot for rips or leaks.	
Clean debris from end screw jack masonry plates.	
Observe end screw jacks during operation for any unusual noises or observations.	

Motor Control Enclosures - Section 8.5.1	
Open and clean with a vacuum cleaner in the interior of each enclosure.	
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent from relays, terminals, surfaces, wiring, contacts, etc.	
Check for corrosion and moisture. Replace corroded hardware.	
Examine connections for poor or loose connections and evidence of overheating.	
Lubricate door hinges and latches with 3-IN-ONE Multipurpose Oil.	
Inspect terminal block screws and hand tighten all connections.	
Inspect wiring from unit terminal blocks for deterioration of insulation.	
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.	
Check all starter contacts in each enclosure. Note when nearly all the silver tip is gone and the contact tip support is exposed. Do not file the contacts. Filing or otherwise dressing the contacts only results in lost tip material and reduces starter life.	
Check the condition of gaskets and replace if damaged.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615643 – QUARTERLY MAINTENANCE CHECKLIST – PAGE 2 OF 3**

Maintenance Tasks	Date and Initial When Completed
Span Control Cabinet and Resistor Enclosure - Section 8.5.2	
Open and clean enclosure resistor and span drive enclosure with a vacuum cleaner. Clean resistors, contactors, relays, wiring, terminal, lugs, etc. of dirt, dust, grease of unwanted debris.	
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent from relays, terminals, surfaces, wiring, contacts, etc.	
Check for corrosion and moisture.	
Lubricate door hinges and latches with 3-IN-ONE Multipurpose Oil.	
Inspect terminal block screws for tightness. Hand tighten all loose connections.	
Inspect wiring from unit terminal blocks for deterioration of insulation.	
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.	
Inspect all fuses with a meter and verify continuity. For fuse replacement, always install the same type and rating fuses furnished with the motor control center. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.	
Inspect all relays and tighten loose connections.	
Check all starter contacts. Note when nearly all of the silver tip is gone and the contact tip support is exposed. Do not file the contacts. Filing or otherwise dressing the contacts only results in lost tip material and reduces starter life.	

Traffic Gate Arm Lights - Section 8.6.4	
Replace blown or damaged fuses. For fuse replacement, always install the same type and rating fuses furnished with the motor control center. Evolution in fuse design has produced fuses that are mechanically equivalent but not electrically equivalent. They may not have the same short-circuit withstand ability and current limiting ability.	

Control Console - Section 8.8.1	
Open and clean the control console interior with a vacuum cleaner including relays, terminal blocks, wiring, etc.	
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent from surfaces, relays, terminals, surfaces, wiring, contacts, etc.	
Check for corrosion and moisture. Replace corroded hardware.	
Lubricate door hinges and latches with 3-IN-ONE Multipurpose Oil.	
Inspect terminal block screws and tighten all loose connections.	
Inspect wiring from unit terminal blocks for deterioration of insulation.	
Check all pushbuttons, selector switches, and meters for damage and proper operation.	
Check all indicating lights by pressing on the head of each pilot light to verify each lamp illuminates. Replace bulbs if damaged or nonfunctional.	
Check condition of gaskets and replace if damaged.	

Notes:

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615644 – SEMI-ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____
_____	_____
_____	_____
_____	_____

<p>Checklist Notes</p> <p>1. The contractor shall date and initial the tasks below when completed.</p> <p>2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.</p> <p>Payment Notes</p> <p>1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.</p> <p>2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.</p>
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Maintenance Tasks	Date and Initial When Completed
End Screw Jack Couplings - Sections 8.1.6, 11.1.1 (Component ID # 2, 4, 6, 13, & 15), 11.2.1, 11.4.3, 11.7.6, & 11.7.7	
For gear couplings, replace lubricant with Mobil Mobilux EP-0 or equivalent.	

Couplings - Sections 8.2.2, 11.1.2 (Component ID # 34, 36, 38, 41), 11.2.2, 11.4.3, & 11.7.8	
Replace lubricant within the brakewheel coupling with Mobil Mobilux EP-0 or equivalent.	
Replace lubricant within the turning machinery grid coupling with Falk Long Term Grease or equivalent.	

Turning Machinery Speed Reducer - Sections 8.2.3, 11.1.2 (Component ID # 40), 11.2.2, 11.4.4, & 11.7.2	
For the upper and lower output shaft bearings, lubricate bearings with Mobil Mobilux EP-2 or equivalent.	

Traffic Gates - Sections 8.4.1, 11.1.3 (Component ID # 56, 58, 60, 63, & 65), 11.2.3, & 11.8.1	
Verify bumper rods are properly adjusted and make contact with roadway when lowered.	
Verify stay cables are properly adjusted and taut at all times.	
Check the transmission oil level in both sections of the transmission housing. If oil is low, check seals for evidence of leaks and add oil until the oil level is up to the oil level plug or sight gage. If oil is cloudy or dirty, drain, flush, and refill the unit with Mobil SHC 629 or equivalent. Use Mobil Mobilgear SHC 629 or equivalent compatible oil for flushing the housing.	
Lubricate pivot shaft bearings and rod ends until clean grease is purged from the bearing or rod end. Use Mobil Mobilux EP-2 or equivalent.	
Lubricate the rotary cam limit switch roller chain with CRC TAC 2 Adhesive Chain Lubricant or equivalent.	
Check the roller chain tension and adjust tension if needed. The roller chain sag should be $\frac{1}{4}'' \pm \frac{1}{8}''$	

Traffic Gate Arm Lights - Section 8.6.4	
Check gate arm lights and wiring for damage.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615645 – ANNUAL MAINTENANCE CHECKLIST – PAGE 1 OF 10**

Dates: _____	Maintenance Personnel: _____

Checklist Notes
 1. The contractor shall date and initial the tasks below when completed.
 2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.

Payment Notes
 1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.
 2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.

Maintenance Tasks	Date and Initial When Completed
Pivot Bearing - Sections 8.1.1, 11.1.2 (Component ID # 28, 29, 30, 31, & 32), 11.2.2, 11.4.7, & 11.7.10	
Check upper and lower housing and supporting frame for signs of corrosion. Clean and spot paint the housing, support frame, and fasteners if corroded.	
Check upper and lower housing fasteners for tightness. Tighten loose fasteners.	
Observe the pivot bearing during opening and closing operations of the span. Note any abnormal sounds.	
Inspect the pivot bearing pedestal for cracking and evidence of deterioration.	

Bearing Wheels - Sections 8.1.2, 11.1.1 (Component ID # 16, 17, 18, 19, & 20), 11.2.1, & 11.4.7	
Check the bearing wheel base fasteners and end cap fasteners are secure. Tighten loose fasteners.	
Check the bearing wheels and track for any signs of distress.	
Inspect bearing wheel track grout for cracking and evidence of deterioration.	

Balance Wheels - Sections 8.1.3, 11.1.1 (Component ID # 21, 22, & 23), 11.2.1, & 11.4.1	
Check the balance wheel base, balance wheel cap, and balance wheel track fasteners are secure. Tighten loose fasteners.	
Check the balance wheels and tracks for any signs of distress.	
Inspect balance wheel track grout for cracking and evidence of deterioration.	

Passive Live Load Bearings – Sections 8.1.4 & 11.1.1 (Component ID # 24, 25, 26, & 27)	
Check that the upper and lower weldment fasteners and the live load shoe fasteners are secure. Tighten loose fasteners.	
With the span closed and the end jacks driven, check the clearance at both passive live load bearing locations to ensure the clearances are 0.003”.	
Inspect lower support weldment grout for cracking and evidence of deterioration.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615645 – ANNUAL MAINTENANCE CHECKLIST – PAGE 2 OF 10**

Maintenance Tasks	Date and Initial When Completed
End Screw Jack Speed Reducer - Sections 8.1.5, 11.1.1 (Component ID # 3), 11.2.1, 11.4.4, & 11.7.1	
Check for oil leakage at the seals.	
Check fasteners for tightness. Tighten loose fasteners.	
End Screw Jack Couplings - Sections 8.1.6, 11.1.1 (Component ID # 2, 4, 6, 13, & 15), 11.2.1, 11.4.3, 11.7.6, & 11.7.7	
For the end screw jack motor coupling, replace lubricant with Falk Long Term Grease (LTG) or equivalent.	
End Screw Jacks - Sections 8.1.7, 11.1.1 (Component ID # 7, 8, & 9), 11.2.1, 11.4.8, & 11.7.5	
Replace the end screw jacks lubricant with Mobil Mobilux EP-2 or equivalent.	
Check that all fasteners are tight and end screw jack components are corrosion free. Tighten loose fasteners. Clean and spot paint areas of corrosion on the end screw jacks. Do not paint the bearing plate contacting surfaces.	
Check the contacting surfaces between the end screw jack bearing plates and masonry plates for deformations and wear. There should be no corrosion on the contact areas of either plate. If corrosion is present, clean the plate surfaces.	
Inspect masonry plate grout for cracking and evidence of deterioration.	
Counterweight and Balance Plates - Section 8.1.8	
Check counterweight balance plate locations for proper drainage and clean out debris.	
Check for concrete spalling, cracks, and signs of structural distress. Check adjacent structural supports for signs of distress.	
Check for shifting of balance plates. Neatly restack plates that have fallen over or shifted out of position.	
Motor Brake - Sections 8.2.1, 11.1.2 (Component ID # 39), 11.2.2, 11.4.2, & 11.7.9	
Inspect the brake shoes and brakewheel for wear, dust, dirt, grease, and proper adjustment. Check the brake pad thickness. Notify the Engineer if the remaining thickness is less than 1/16 inch.	
Check clearance between the brake shoe and brakewheel. The measured gap shall have a minimum of 1/64" clearance between brake shoe and brakewheel when hand released. If clearances need to be adjusted, the linkages shall be adjusted in accordance with Section 11.7.9. If adjustments are made to the linkages, the reserve stroke and torque setting should be verified and adjusted as well. Adjustment procedures are located within Section 11.7.9.	
Inspect the mechanical linkages for wear, broken parts, and tightness of nuts and bolts. Check for freedom of moving parts (no binding or sticking). Check the brake housing and linkages for corrosion and signs of water dripping onto the brake. Seal or repair overhead components or hatches if water is found dripping on the brake.	
Check for excessive heating of parts evident by discoloration of metal parts.	
Check operation of the brake during test operations of the bridge. Check for any unusual odor and excessive vibration.	
Check adjustment of limit switches and hand release device and adjust for proper operation. When the motor brake hand release lever is pulled up, the brake pads should release from the brakewheel. The motor brake has two limit switches. Verify brake limit switches provide proper indication at the control desk when the brake is set, released via the control system, and hand released. Adjust limit switch lever arms if proper indication is not observed at the control desk.	
Check brake reserve stroke height with a scale. The reserve stroke height of the motor brake should be 0.7" +/- 1/16". The reserve stroke refers to the exposed thruster rod length, measured from the top of the thruster cover to the bottom of the lug at the end of the thruster rod (refer to Figure 2 of Section 11.7.9). As the brake pads wear, the reserve stroke becomes shorter. If the reserve stroke requires adjustment, adjust linkages as specified in Section 11.7.9.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615645 – ANNUAL MAINTENANCE CHECKLIST – PAGE 3 OF 10**

Maintenance Tasks	Date and Initial When Completed
Motor Brake - Sections 8.2.1, 11.1.2 (Component ID # 39), 11.2.2, 11.4.2, & 11.7.9 (Cont.)	
Check the motor brake spring tension via the brake torque gauge located near the thruster of the brake. The motor brake should be set to provide a braking torque of 25 ft-lbs. The torque is read by matching the top of the spring block to the corresponding torque value on the scale. To adjust the brake torque, turn the torque adjustment screw until the top of the spring block is at the appropriate torque setting on the scale. Perform Item 5 above (observing brake operation during test operations of the bridge) to confirm proper operation of the motor brake after adjustment.	
Check for loose brake terminations. Tighten loose connections.	
During winter months, verify that the brake pads are not frozen to the brakewheel.	
Turning Machinery Speed Reducer - Sections 8.2.3, 11.1.2 (Component ID # 40), 11.2.2, 11.4.4, & 11.7.2	
Check for oil leakage at the seals.	
Check fasteners for tightness. Tighten loose fasteners.	
Bearings - Sections 8.2.4, 11.1.2 (Component ID # 42 & 43), & 11.2.2	
Check bearing cap and base fasteners for tightness. Tighten loose fasteners.	
Open Gearing - Sections 8.2.5, 11.1.2 (Component ID # 44 & 45), 11.2.2, & 11.4.5	
Remove, clean, and replace open gear lubricant using Mobil Mobilnac 325 NC or equivalent.	
Observe the open gearing during opening and closing operations. Note excessive vibrations, binding, and unusual noises.	
Inspect rack grout for cracking and evidence of deterioration.	
Instrumentation Gear Box - Sections 8.2.6, 11.1.2 (Component ID # 35), 11.2.2, & 11.7.4	
Check instrumentation gear box oil level. If the oil level is low, fill the gear box with Mobil 600 W Super Cylinder Oil or equivalent up to the proper level.	
Clean the grease fittings and pump fresh grease into the bearings with grease fittings slowly with a hand grease gun. Use Mobil Mobilux EP-2 or equivalent.	
Check gear box fasteners for tightness. Tighten loose fasteners.	
Lock Bar, Guides, and Receiver - Sections 8.3.1, 11.1.2 (Component ID # 48, 49, 50, & 51), 11.2.2, & 11.4.9.2	
Visually inspect all lock bar guides and receiver weldments for cracks, corrosion and section loss. Mounting connections should be checked for corrosion and tightness. Tighten loose fasteners. All components should have flaking paint and corrosion brushed clean and spot painted with matching paint. Do not paint contacting surfaces.	
Span Lock Open Gearing - Sections 8.3.2, 11.1.2 (Component ID # 47 & 48A), 11.2.2, & 11.4.9.1	
Remove, clean, and replace open gear lubricant using Mobil Mobilnac 325 NC or equivalent.	
Visually inspect the key and keyway for cracking. Verify the key is secure within the keyways.	
Observe the open gearing during operations of the span lock machinery. Note excessive vibrations, binding, and unusual noises.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615645 – ANNUAL MAINTENANCE CHECKLIST – PAGE 4 OF 10**

Maintenance Tasks	Date and Initial When Completed
Rigid Stops - Section 8.3.3	
Inspect the condition of the fully closed rigid stop and overtravel bumper block components.	
Inspect rigid stop components for corrosion and fasteners for tightness. Clean and spot paint areas of corrosion. Tighten loose fasteners.	
Inspect fully closed rigid stop grout for cracking and evidence of deterioration.	
Traffic Gates - Sections 8.4.1, 11.1.3 (Component ID # 56, 58, 60, 63, & 65), 11.2.3, & 11.8.1	
Check hardware for damage and corrosion. Replace damaged hardware.	
Check electrical connections and tighten loose connections.	
Remove excess grease, oil and debris from equipment.	
Check gate housing for corrosion. Clean and spot paint areas of corrosion on the housing.	
Check condition of gaskets and replace if damaged.	
Motor Control Enclosures - Section 8.5.1	
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.	
Operate the motor controller/contacter without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contacter without load, remove power to the MCC cabinet and with a non-conductive screwdriver, press the button on the contactor. The button is usually located on the front or bottom of the housing (see Photo 9.6B and 9.6B1).	
Operate the motor controller/contacter under load and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.	
Span Control Cabinet and Resistor Enclosure - Section 8.5.2	
Clean out filters with vacuum. Replace filters if damaged or dirty.	
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connection points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.	
Operate the motor controller/contacter without load (turn circuit breakers off) and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a motor controller/contacter without load, remove power to the MCC cabinet and with a non-conductive screwdriver, press the button on the contactor. The button is usually located on the front or bottom of the housing (see Photo 9.6C and 9.6L).	
Operate the motor controller/contacter under load and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.	
Panelboards - Section 8.5.3	
Open panel board cover and clean interior with a vacuum cleaner.	
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent from, terminals, surfaces, wiring, circuit breakers, etc.	
Check for moisture and corrosion. Replace corroded hardware.	
Examine bus bar connections for poor or loose connections and evidence of overheating. If necessary, pop out, but do not disconnect the circuit breakers.	
Lubricate door hinges and latches with 3-IN-ONE Multipurpose Oil.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615645 – ANNUAL MAINTENANCE CHECKLIST – PAGE 5 OF 10**

Maintenance Tasks	Date and Initial When Completed
Panelboards - Section 8.5.3 (Cont.)	
Inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.	
Measure resistance to ground at each panelboard using a clamp on ground resistance tester. Confirm that the main electrical service to the bridge is off before performing any test. Follow the meter manufacturer's recommendations for isolating the grounding electric. With the meter clamped around the grounding electrode, verify resistance is 25 ohms or less.	
Stand-by Generator - Section 8.5.4 (Note: Additional generator maintenance shall be performed under a separate Generator Repair and Maintenance Contact)	
Check the condition of all filters and breathers and note if dirty, clogged, or damaged.	
Check the fuel tanks for water and sediment.	
Verify fasteners are secure. Tighten loose fasteners.	
Check operation of manual transfer switch located in the control house.	
Start and run generator under load for one complete bridge opening.	
Safety (Manual Transfer) and Disconnect Switches - Section 8.5.5	
Open and clean enclosure with a vacuum cleaner. Clean wiring, terminal, lugs, etc. of dirt, dust, grease of unwanted debris.	
Remove accumulation of dirt, grease, and gum with DeoxIT D5 contact cleaner or equivalent from wiring, terminals, surfaces, contacts, etc.	
Check for corrosion and moisture. Replace corroded hardware.	
Lubricate door hinges and latches with 3-IN-ONE Multipurpose Oil.	
Examine for excessive heating of parts, discoloration of metal parts, charred insulation, odor, or blistering.	
Check for freedom of moving parts.	
Check for worn or broken mechanical parts.	
Tighten loose mountings and connections.	
Check contacts for wear and pitting. Clean bolted connections where possible with contact cleaner.	
Check for excessive arcing.	
Check condition of gaskets (for dust-tight or watertight units). Replace damaged gaskets.	
For fused units, inspect all circuit breakers. Verify with a meter that continuity is broken on trip or switch off conditions. With the circuit breaker in the OFF position, use a multimeter to measure the current and voltage on the load side conductors. The multimeter should read 0 amps and 0 volts.	
Test the manual transfer switch with operation of the generator.	
Electrical Conductors - Section 8.5.6	
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.	
Check tightness at each conductor termination at each terminal box. Tighten loose connections.	
Check the strain relief fittings for signs of distress.	
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615645 – ANNUAL MAINTENANCE CHECKLIST – PAGE 6 OF 10**

Maintenance Tasks	Date and Initial When Completed
Drag Cables - Section 8.5.7	
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.	
Check tightness of each conductor termination at each terminal box. Hand tighten loose connections.	
Check the strain relief fittings for signs of distress.	
Check cables for any wear or abrasions on the outer jacket.	
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.	
Aerial Cables - Section 8.5.8	
Visually inspect terminations and splices for cracks, deterioration, corrosion, discoloring, or any other abnormalities.	
Check tightness of each conductor termination at each terminal box. Hand tighten loose connections.	
Check the strain relief fittings for signs of distress.	
Check cables for any wear or abrasions on the outer jacket.	
Inspect wires and electrical cables for grease and oil contamination, fraying, abrasions, sweating, cracked, melted or overheated blue tinted insulation. Clean the insulation of moisture, grease and oil after removing power sources if present.	
Navigation Lights - Section 8.6.1	
Check gaskets. Replace damaged gaskets.	
Tighten loose connections.	
Check for corrosion of metal parts. Replace corroded hardware.	
Check for worn or broken mechanical parts. Check for cracked lenses.	
Replace lamps.	
Interior/Exterior Lights - Section 8.6.2	
Clean luminaire lenses, interior surfaces, and weep holes (where applicable).	
Check gaskets. Replace damaged gaskets.	
Tighten loose connections.	
Inspect for corrosion of metal parts. Spot paint corroded components.	
Check parts for wear or damage.	
Test emergency light fixtures and batteries, replace batteries if not operational.	
Traffic Signals - Section 8.6.3	
Clean all reflectors, lenses and spot paint heads.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615645 – ANNUAL MAINTENANCE CHECKLIST – PAGE 7 OF 10**

Maintenance Tasks	Date and Initial When Completed
Span Lock Gear Motor -Sections 8.7.1, 11.1.2 (Component ID # 46), 11.2.2, 11.4.9.3, & 11.7.3	
Motor - Verify that shaft end-play is normal by moving the motor shaft by hand (with power off) and determining whether movement is excessive (more than 1/16 inch).	
Motor - Inspect and tighten loose electrical connections on the motor.	
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.	
Motor - During operation, examine motor for smooth running and absence of vibration.	
Motor - During operation, measure and record the motor housing and bearing temperatures with an infrared thermometer. Notify bridge management if the measured temperatures are above 100° F.	
Motor - Check painted surfaces for signs of corrosion. Clean surfaces of corrosion and spot paint with matching paint. Do not paint nameplates.	
Motor - Check the phase currents flowing in the motor under loaded conditions with a clamp-on ammeter. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.	
Solenoid Brake - Check electrical connections and tighten loose connections.	
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).	
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the solenoid brake components of dirt, gum, water, and corrosion.	
Solenoid Brake - Observe the brake during operation of the span lock. Check for excessive vibration or unusual noise during operation.	
Speed Reducer - Check for excessive leakage at the seals.	
Speed Reducer - Check fastener tightness and tighten loose fasteners.	
Turning Machinery (Span) Motor - Section 8.7.2, 11.1.2 (Component ID # 37), 11.2.2, & 11.4.6	
Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine & Engine Degreaser or equivalent.	
Verify that shaft end-play is normal by moving the motor shaft by hand (with power off) and determining whether movement is excessive (more than 1/16 inch).	
Inspect and tighten loose electrical connections on motor.	
Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.	
During operation, examine motor for smooth running and absence of vibration.	
During operation, measure and record the motor housing and bearing temperatures with an infrared thermometer. Notify bridge management if the measured temperatures are above 100° F.	
Lubricate turning machinery motor bearings. Use Mobil Unirex N2 or equivalent.	
Check painted surfaces for signs of corrosion. Clean surfaces of corrosion and spot paint with matching paint. Do not paint nameplates.	
Check the phase currents flowing in the motor under loaded conditions with a clamp-on ammeter. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615645 – ANNUAL MAINTENANCE CHECKLIST – PAGE 8 OF 10**

Maintenance Tasks	Date and Initial When Completed
End Screw Jack Motor - Section 8.7.3, 11.1.1 (Component ID # 1), 11.2.1, & 11.4.6	
Motor - Check for leakage around bearings. Clean off excess grease and dirt.	
Motor - Verify that shaft end-play is normal by moving the motor shaft by hand (with power off) and determining whether movement is excessive (more than 1/16 inch).	
Motor - Inspect and tighten loose electrical connections on the motor.	
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.	
Motor - During operation, examine motor for smooth running and absence of vibration.	
Motor - During operation, measure and record the motor housing and bearing temperatures with an infrared thermometer. Notify bridge management if the measured temperatures are above 100° F.	
Motor - Check painted surfaces for signs of corrosion. Clean surfaces of corrosion and spot paint with matching paint. Do not paint nameplates.	
Motor - Lubricate end screw jack motor bearings. Use Mobil Unirex N2 or equivalent.	
Motor - Check the phase currents flowing in the motor under loaded conditions with a clamp-on ammeter. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.	
Solenoid Brake - Check electrical connections and tighten loose connections.	
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).	
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the solenoid brake components of dirt, gum, water, and corrosion.	
Solenoid Brake - Observe the brake during operation of the end screw jack. Check for excessive vibration or unusual noise during operation.	

Traffic Gate Motors - Section 8.7.4 & 11.1.3 (Component ID # 54 & 55)	
Motor - Check for leakage around bearings. Clean off excess grease and dirt using a rag and WD-40 Specialist Machine & Engine Degreaser or equivalent.	
Motor - Inspect and tighten loose electrical connections on motor.	
Motor - Verify that all keys, bolts, and pins are in their proper position. Check all bolts for tightness. If loose, tighten.	
Motor - During operation, examine motor for smooth running and absence of vibration.	
Motor - During operation, measure and record the motor housing and bearing temperatures with an infrared thermometer. Notify bridge management if the measured temperatures are above 100° F.	
Motor - Check the phase currents flowing in motors under loaded conditions with a clamp-on ammeter for all motors. Utilize a true RMS ammeter. Compare the measured current with the nameplate data. Record values in the "Notes" sections of the maintenance checklist.	
Solenoid Brake - Check electrical connections and tighten loose connections.	
Solenoid Brake - Check components for wear or damage. Check for loose fasteners. Tighten loose fasteners. Check for freedom of moving parts (parts are free of binding and sticking).	
Solenoid Brake - Check for excessive heating of parts evidenced by discoloration of metal parts, charred insulation, or odor. Check for collections of dirt or gum, evidence of water dripping, or corrosion. Clean the solenoid brake components of dirt, gum, water, and corrosion.	
Solenoid Brake - Observe the brake during operation of the gate. Check for excessive vibration or unusual noise during operation.	

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615645 – ANNUAL MAINTENANCE CHECKLIST – PAGE 9 OF 10**

Maintenance Tasks	Date and Initial When Completed
Control Console - Section 8.8.1	
Check for discolored connections on terminals, contact supports, bus bars, or connectors. Discoloration usually indicates that overheating has occurred, probably because of loose connections. Clean connections points that are discolored. Tighten all loose hardware. Check wires and connectors for damage.	
Manually operate each relay and contactor with associated circuit breakers off and observe contact operation to be sure it opens and closes cleanly and that the contacts are fully sealed in the closed position. In order to manually operate a relay or contactor with the associated circuit breaker off, verify that power is off, and with a non-conductive screwdriver, press the button on the relay or contactor. The button is located as shown in Photo 9.6H.	
Monitor relay and contactor operation during normal operation and check for loud noise and arcing, both on opening and on closing. A loud noise and arcing on closing is usually due to contact bounce.	
Limit Switches - Sections 8.8.2, 11.1.1 (Component ID # 3, 11, &12), 11.1.2 (Component ID # 33, 39, 40 ,46, 52, & 53), & 11.1.3 (Component ID # 66, 68, & 69)	
All Limit Switches - Inspect all limit switches for wear.	
All Limit Switches - Remove accumulated dust, dirt, and moisture on housing. Use a brush, soft cloth, or vacuum cleaner.	
All Limit Switches - Remove accumulated dust, dirt, and moisture from all shafts, keeping it clean and free of galling.	
All Limit Switches - Inspect latches, mounting hardware and seals to ensure proper seal of housing.	
All Limit Switches - Inspect all fasteners and tighten loose connections. Replace corroded hardware.	
All Limit Switches - If accessible, remove the cover and visually inspect condition of all internal parts.	
All Limit Switches - Inspect limit switch wiring for deterioration.	
All Limit Switches - Check for worn or broken mechanical parts.	
Rotary Cam Limit Switch - Inspect the rotary cam limit switch cams and rollers for wear, corrosion and good contact between the fixed and movable parts.	
Lever Arm Limit Switches - Inspect snap action contact blocks and all internal component connections. Hand tighten loose connections.	
Lever Arm Limit Switches - Inspect all wiring from snap action contact blocks for deterioration.	
Lever Arm Limit Switches - Cycle lever arm several times.	
Conduit / Wireway - Section 8.9.5	
Open and clean boxes with a vacuum cleaner.	
Remove accumulation of dirt, grease, and gum from conduit.	
Check for corrosion and moisture. Check conduit for cracking or other damage. Replace corroded hardware.	
Tighten loose mountings and connections.	
Check condition of gaskets in boxes and replace gaskets if damaged.	
Lubricate door hinges and latches, where provided, with 3-IN-ONE Multi-Purpose Oil.	
Check and clean all drain holes and fittings.	

Notes:

**BRIDGE 3-164 – CEDAR CREEK BRIDGE
ITEM # 615646 – FIVE-YEAR MAINTENANCE CHECKLIST – PAGE 1 OF 2**

Dates: _____	Maintenance Personnel: _____

<p>Checklist Notes</p> <p>1. The contractor shall date and initial the tasks below when completed.</p> <p>2. Submitted checklists with maintenance items with check marks and no supporting notes indicate that the work was performed on the pertinent component and the component was found and left in good working order and repair. Add supporting notes for any observed component deficiencies, corrections performed, and/or needed repairs.</p> <p>Payment Notes</p> <p>1. All work within this checklist will be incidental to the pertinent monthly, quarterly, or annual maintenance item.</p> <p>2. Maintenance items with items that include “as necessary”, “as needed”, etc. will not be measured and paid, but will be incidental to the pertinent maintenance items.</p>
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Maintenance Tasks	Date and Initial When Completed
End Screw Jack Speed Reducer - Sections 8.1.5, 11.1.1 (Component ID # 3), 11.2.1, 11.4.4, & 11.7.1	
Flush and replace oil in the speed reducer housing with Mobil Mobilgear 600 XP 100 or equivalent.	

Turning Machinery Speed Reducer - Sections 8.2.3, 11.1.2 (Component ID # 40), 11.2.2, 11.4.4, & 11.7.2	
Flush and replace oil in the speed reducer with Mobil Mobilgear 600 XP 150.	

Instrumentation Gear Box - Sections 8.2.6, 11.1.2 (Component ID # 35), 11.2.2, & 11.7.4	
Drain, flush, and refill the instrumentation gear box up to the appropriate level with Mobil 600 W Super Cylinder Oil or equivalent.	

Stand-by Generator - Section 8.5.4	
Perform one hour load bank testing and monitor operation.	
Perform two hour test without load and monitor operation.	

Span Lock Gear Motor -Sections 8.7.1, 11.1.2 (Component ID # 46), 11.2.2, 11.4.9.3, & 11.7.3	
Motor - Clean and paint the motor. Do not paint the nameplate.	
Speed Reducer - Drain, flush and replace oil in the speed reducer housing with Mobil Mobilgear 600 XP 100 or equivalent.	

Turning Machinery (Span) Motor - Section 8.7.2, 11.1.2 (Component ID # 37), 11.2.2, & 11.4.6	
Clean and paint the motor. Do not paint nameplates.	

End Screw Jack Motor - Section 8.7.3, 11.1.1 (Component ID # 1), 11.2.1, & 11.4.6	
Clean and paint the motor. Do not paint nameplates.	

