

THIS SCOPE IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED TO DEVELOP COST PROPOSALS OR TO BE INCLUDED IN REPORTS. THE ACTUAL, BRIDGE SPECIFIC, MECHANICAL AND ELECTRICAL INSPECTION SCOPE-OF-WORK WILL BE PROVIDED THROUGH THE NJDOT PROJECT MANAGER.

SCOPE OF WORK FOR CONSULTANT INSPECTIONS

Type I (Current Date)

(State or County) Bridges

Group XXXX

State Job No. XXXXXXXX

3. For Movable Bridges

a) Mechanical Inspection

Structure XXXX-XXX

(3.a.1) Review previous inspection reports. Obtain and/or prepare the necessary drawings and other related data and services required in the mobilization for the inspection specified herein. Include the coordination of the inspection specified herein with the U.S. Coast Guard, Department forces, and County agencies. Include the notification of local police prior to performing any inspection/testing activity that may disturb vehicular traffic on the bridge. Inspection/testing activities that disturb vehicular traffic shall only be performed during off peak hours.

FOR SECURITY REASONS, A 72-HOUR NOTIFICATION MUST BE GIVEN PRIOR TO THE START OF THE ON-SITE INSPECTION. ACCESS TO THE BRIDGE WILL NOT BE ALLOWED WITHOUT THIS ADVANCE NOTIFICATION. THE FOLLOWING AGENCIES MUST BE NOTIFIED:

Structural Evaluation	609-530-3572
Movable Bridge Engineering	609-530-2163
Drawbridge Operations	732-528-9494
Traffic Operations North	201-797-3676
- or - Traffic Operations South	856-486-6650

(3.a.2) Perform a visual inspection* of the operating machinery and associated components. Utilizing the checklist, EL-45Mc, identify and record any and all deficiencies, particularly those areas needing immediate corrective action in order to keep the bridge safely in service. Clean, remove and replace equipment inspection covers or enclosure panels, as required, to perform the inspections specified herein. Unless stated elsewhere herein, the Department's personnel will not be utilized for this purpose. Record date, time and any condition that may affect inspection results at the time of testing. Reference any applicable codes that may be affected by the condition, access, or layout of the equipment. Record all nameplate information for all mechanical equipment in the field notes. Detail the procedures and equipment used for each task in the field notes.

The mechanical equipment inspection will include, but not necessarily be limited to, a detailed examination for smooth operation, uniform and regular movement, synchronization, interlock, mounting, overheating, vibration, wear, rust, corrosion, noise, slippage, engagement, applied tension, lubrication,

oil levels, oil contamination, dirt accumulation, fluid pressure, leakage, alignment, clearances, chordal thickness, backlash, air pressure, weather tightness, safety and signs of distress or pending distress with regards to the following components:

- open gearing
- enclosed gearing
- machinery supports and frames
- bearings
- shafts
- keys, key ways, splines, and mechanical shrink-fit assemblies
- couplings
- fasteners
- auxiliary drive system(s)
- buffers
- strike plates
- brakes
- engine-generator

(3.a.2a) For bascule spans, the inspection will also include the following additional components:

- live-load shoes
- span locks
- curved racks
- trunnion assemblies
- bumper blocks

(3.a.2b) For vertical lift spans, the inspection will also include the following additional component:

- live-load shoes
- span locks
- span guides
- sheave wheel assemblies
- wire ropes and sockets
- tension adjusting devices
- counterweight (balance) chains
- span leveling devices
- centering devices

(3.a.2c) For swing spans, the inspection will also include the following additional components:

- wedge or screw-jack machinery
- latch bar machinery
- ring gear
- center bearing
- balance wheels and track

(3.a.3) Perform a visual inspection of the counterweight wire ropes, related operating machinery, and associated components. Utilizing the checklist, EL-45R, identify and record any and all deficiencies, particularly those areas needing immediate corrective action in order to keep the bridge safely in service.

Clean, remove and replace equipment inspection covers or enclosure panels, as required, to perform the inspections specified herein. Unless stated elsewhere herein, the Department's personnel will not be utilized for this purpose. Record date, time and any condition that may affect inspection results at the time of testing. Record all nameplate information for all mechanical equipment in the field notes. Detail the procedures and equipment used for each task in the field notes.

The counterweight wire rope inspection will include, but not necessarily be limited to, a detailed examination for smooth operation, uniform and regular movement, synchronization, mounting and installation pattern, vibration, wear, rust, corrosion, noise, slippage, engagement, applied tension, lubrication, lubrication contamination, dirt accumulation, twisting, alignment, clearances, thickness, diameter, safety and signs of distress or pending distress with regards to the following components:

- rope operation
- rope strands
- rope diameters
- rope lay configuration
- rope tension loading
- block sockets
- socket pins and caps
- cotter pins
- keeper plates
- separator / spreader plates
- rope deflectors
- rope clamps
- shims
- counterweight-rope connections
- span-rope connections
- connection castings
- connection rod assemblies
- take-up assemblies
- sheave wheel grooves
- auxiliary sheave wheel grooves
- lubrication assemblies
- all other associated components

(3.a.3a) Measure and record the tension in all counterweight wire ropes. The tension measurements must be done using the vibration method for a minimum of 3 times by use of an accelerometer. Compare to original values and the values stated in previous reports and report any changes. Compare tension with wire rope ultimate tensile strength and confirm whether or not Ultimate Tensile Strength (UTS)/Loading Ratio meets AASHTO 8:1 safety factor. Provide copies of measurements in the inspection reports.

(3.a.3b) Measure and record the diameter of all counterweight wire ropes. Compare to the nominal diameters of the ropes. Compare to original values and the values stated in previous reports and report any changes. Provide copies of measurements in the inspection reports.

(3.a.3c) Verify counterweight wire rope operation by observing span operation. Record date, time, weather, wind velocity and direction at the time of observation. Detail observations in field notes.

(3.a.4) Measure and record chordal thickness and backlash of gears where feasible. Compare to original values and the values stated in previous reports and report any changes. Provide copies of measurements in the inspection reports.

(3.a.5) Measure and record clearance of bearings. Compare to original values and the values stated in previous reports and report any changes. Provide copies of measurements in the inspection reports.

(3.a.6) Perform in-depth brake inspection. Measure and record the torque settings of all motor and machinery brakes. Measure and record thickness of all brake pads and drum clearances. Check brake engagement timing and synchronization during a test operation. Compare all measurements with previous data and report any changes. Provide copies of measurements in the inspection reports.

(3.a.7) Remove all trunnion-bearing caps. Inspect all trunnion bearings for scoring and other signs of severe wear. Compare to conditions stated in previous reports and report any changes.

(3.a.8) Remove counterweight pocket caps. Inspect all counterweight pockets and caps for damage, rusting, or water intrusion. Inspect all counterweight ballast material for rusting, corrosion, or wear. Compare to conditions stated in previous reports and report any changes.

(3.a.9) Measure and record the socket liner clearance and lock bar dimensions of the span locks. Compare to original values and values stated in previous reports and report any changes. Provide copies of measurements in the inspection reports.

(3.a.9a) For swing spans, inspect span wedge and/or screw-jack linkage shafts, couplings, and hangars for smooth and efficient operation. Check wedges and wedge blocks for proper lubrication and surface scoring. Detail observations in the field notes.

(3.a.10) Measure and record air pressure and bushing clearance of air buffers. Compare to original values and values stated in previous reports and report any changes. Provide copies of measurements in the inspection reports.

(3.a.11) Measure and record clearance at expansion joints between movable span(s) and fixed spans. Compare to original construction values and report any changes. Provide a record of measurements and temperature.

(3.a.12) Verify span/counterweight balance by observing span operation. Record date, time, weather, wind velocity and direction at the time of observation. Detail observations in field notes.

(3.a.13) Prepare and submit a concise report of the inspection specified herein. The report shall include:

1. A description of the structure, its mechanical operating system, and all major equipment
2. A description of the structure, its rope operating system, and all major equipment
3. A copy of this scope of work
4. Completed inspection form EL-45Mc
5. Completed inspection form EL-45R
6. Span drive machinery layout
7. Span lock machinery layout
8. A typed copy of all field notes
9. A summary of conclusions and recommendations
10. Cost estimates for recommended repairs
11. Final Mechanical Inspection Report in electronic form

*The dismantling of equipment, except as specifically stated elsewhere in this text, is not intended as part of this scope of work. However, if during the course of this inspection the consultant believes that dismantling of equipment is warranted, the consultant shall advise the Department of this fact. No payment for the dismantling of equipment will be made without prior approval.

Note: Any condition requiring immediate corrective action or priority repair shall be promptly reported, in writing, to the Department.

New Jersey Department of Transportation
DRAWBRIDGE MECHANICAL INSPECTION REPORT

ROUTE: _____	BRIDGE: _____	STRUCTURE NO.: _____
DATE: ____/____/____	WEATHER: _____	TYPE _____ INSPECTION <small>(I or II)</small>
INSPECTOR: _____		TEMPERATURE: _____ ° F

MECHANICAL

The following were evaluated for smooth operation, uniform & regular movement, synchronization, interlock, mounting, overheating, vibration, wear, rust, noise, slippage, engagement, applied tension, lubrication, oil levels, oil contamination, dirt accumulation, fluid pressure, leakage, alignment, clearances, chordal thickness, backlash, air pressure, weather tightness, safety, and signs of distress:

3=Operational/Needs Minor Work 2=Operational/Needs Major Work
1=Non Operational S=Satisfactory N=Not Applicable

OPEN GEARING	ENCLOSED GEARING
MACHINERY SUPPORTS & FRAME	BEARINGS
SHAFTS	KEYS, KEY WAYS, SPLINES, SHRINK FITS
COUPLINGS	FASTENERS/MOUNTINGS
AUXILIARY DRIVE	BRAKES
TRUNNION ASSEMBLIES	SPAN LOCKS
SHEAVE WHEEL ASSEMBLIES	CURVED RACKS
SPAN GUIDES	BUMPER BLOCKS
LIVE LOAD SHOES/STRIKE PLATES	BUFFERS
WIRE ROPES AND SOCKETS	TENSION ADJUSTING DEVICES
COUNTERWEIGHT / BALANCE CHAINS	SPAN LEVELING DEVICES
CENTERING DEVICES	WEDGE OR SCREW-JACK MACHINERY
LATCH BAR MACHINERY	RING GEAR
CENTER BEARING	BALANCE WHEELS AND TRACK
SPAN BALANCE	ENGINE/GENERATOR
COUNTERWEIGHT POCKETS AND CAPS	COUNTERWEIGHT BALLAST MATERIAL

ATTACH EXPLANATION OF WORK NEEDED

New Jersey Department of Transportation
DRAWBRIDGE WIRE ROPE INSPECTION REPORT

ROUTE: _____	BRIDGE: _____	STRUCTURE NO.: _____
DATE: ___/___/___	WEATHER: _____	TYPE _____ INSPECTION <small>(I or II)</small>
INSPECTOR: _____		TEMPERATURE: _____ ° F

WIRE ROPES

The following were evaluated for smooth operation, uniform and regular movement, synchronization, mounting and installation pattern, vibration, wear, rust, corrosion, noise, slippage, engagement, applied tension, lubrication, lubrication contamination, dirt accumulation, twisting, alignment, clearances, thickness, diameter, safety and signs of distress or pending distress:

U=Unsatisfactory S=Satisfactory N=Not Applicable

ROPE OPERATION		SHIMS	
ROPE STRANDS		COUNTERWEIGHT ROPE CONNECTIONS	
ROPE LAY		SPAN ROPE CONNECTIONS	
ROPE TENSION		CONNECTION CASTINGS	
BLOCK SOCKETS		CONNECTION ROD ASSEMBLIES	
SOCKET PINS AND CAPS		TAKE-UP ASSEMBLIES	
COTTER PINS		SHEAVE WHEEL GROOVES	
KEEPER PLATES		AUXILIARY SHEAVE WHEEL GROOVES	
SEPARATOR / SPREADER PLATES		AUXILIARY ROPE CONNECTIONS	
ROPE DEFLECTORS		LUBRICATION ASSEMBLIES	
ROPE CLAMPS		OTHER ASSOCIATED COMPONENTS	

ATTACH EXPLANATION OF WORK NEEDED

CONSULTANT'S MAN-HOUR PROPOSAL PER-TASK WORKSHEET

Fill in estimated time per task, and provide for review to the
 Movable Bridge Engineering Group
 Phone 609-530-2163 – Fax 609-530-4444

BRIDGE _____ GROUP _____ JOB # _____

TYPE I MECHANICAL INSPECTION

TASK ID	TASK DESCRIPTION	ESTIMATED HOURS
3.a.1	Mobilization - Review previous data, prepare forms, and travel to & from site.	
3.a.2	Perform Visual Mechanical Inspection - Complete Form EL-45 Mc.	
3.a.2a	Visual Mechanical Inspection Supplement for Bascule Lift Bridges	
3.a.2b	Visual Mechanical Inspection Supplement for Vertical Lift Bridges	
3.a.2c	Visual Mechanical Inspection Supplement for Swing Lift Bridges	
3.a.3	Perform Visual Rope Inspection - Complete Form EL-45R.	
3.a.3a	Measure Rope Tension – Use Vibration Method for 3 cycles with accelerometer. Compare to previous reports.	
3.a.3b	Measure Rope Diameters – Compare to nominal diameters, original diameters, and values in previous inspection reports.	
3.a.3c	Rope Operation – Verify proper rope operation by observing span operation.	
3.a.4	Measure Gears - Chordal thickness and backlash, compare to previous reports.	
3.a.5	Measure Bearing Clearances - Compare to previous reports.	
3.a.6	Perform In-depth Brake Inspection – Measure torque, pad thickness, drum clearances and check timing and synchronization. Compare to previous reports.	
3.a.7	Trunnion Bearing Inspection - Remove bearing caps, inspect and compare to previous reports.	
	Estimated Cost of Trunnion Bearing Cap Removal by Others	
3.a.8	Counterweight Pockets – Visual inspection of counterweight pockets, caps, and ballast material.	
3.a.9	Span Locks - Measure clearances and compare to original measurements and previous reports.	
3.a.9a	Span Wedges or Screw-Jacks – Inspect shafts, couplings, hangars, wedges, and blocks.	
3.a.10	Air Buffers - Measure pressure and clearances and compare to previous reports.	
3.a.11	Expansion Joints - Measure clearances between fixed and movable spans.	
3.a.12	Span Balance - Verify balance by observing operation and/or drift test.	
3.a.13	Prepare Report - Include brief description of structure and mechanical system.	

TOTAL MECHANICAL HOURS

Estimated by _____ Date _____

b) Electrical Inspection

Structure XXXX-XXX

(3.b.1) Review previous inspection reports. Obtain and/or prepare the necessary drawings and other related data and services required in the mobilization for the inspection specified herein. Include the coordination of the inspection specified herein with the U.S. Coast Guard, Department forces, and County agencies. Include the notification of local police prior to performing any inspection/testing activity that may disturb vehicular traffic on the bridge. Inspection/testing activities that disturb vehicular traffic shall only be performed during off peak hours.

FOR SECURITY REASONS, A 72-HOUR NOTIFICATION MUST BE GIVEN PRIOR TO THE START OF THE ON-SITE INSPECTION. ACCESS TO THE BRIDGE WILL NOT BE ALLOWED WITHOUT THIS ADVANCE NOTIFICATION. THE FOLLOWING AGENCIES MUST BE NOTIFIED:

Structural Evaluation	609-530-3572
Movable Bridge Engineering	609-530-2163
Drawbridge Operations	732-528-9494
Traffic Operations North	201-797-3676
- or - Traffic Operations South	856-486-6650

(3.b.2) Perform a visual inspection* of the electrical equipment and associated components. Utilizing the checklist, EL-45Ec, Identify and record any and all deficiencies, particularly those areas needing immediate corrective action in order to keep the bridge safely in service. Clean, remove and replace equipment inspection covers or enclosure panels, as required, to perform the inspections specified herein. Unless stated elsewhere herein, the Department's personnel will not be utilized for this purpose. Record date, time and any condition that may affect inspection results at the time of testing. Reference any applicable codes that may be affected by the condition, access, or layout of the equipment. Record all nameplate information for all electrical equipment in the field notes. Detail the procedures and equipment used in the field notes.

The electrical equipment inspection will include, but not necessarily be limited to, a detailed examination for smooth operation, uniform and regular movement, mounting, applied tension, vibration, overheating, wear, rust, carbon deposits, loose terminations, noise, lubrication, alignment, clearances, spring tension, arcing, insulating fluid levels, insulating fluid contamination, dirt accumulation, insulation values, system grounding, enclosure grounding, equipment grounding, bonding, current/voltage/kilowatt readings, interlock, weather tightness, safety and signs of distress or pending distress with regards to the following components:

- advance warning signs
- traffic signals and warning gongs
- warning and/or barrier gates
- horn and navigation lighting
- drive motor(s)
- brake motor(s)
- Circuit breakers/fuses
- relays/timers
- contactors/starters
- overloads

switches/pushbuttons
indicating lights
resistors/reactors
instruments (gauges, meters, dials, selsyns)
control consoles
panel boards
limit switches
transformers
safety switches
raceways, conduits, fittings, boxes
enclosures
insulators
wiring
lightning protection
service lighting
Emergency lighting units
electric heating system
span lock motor(s)
transfer switch(es)
generator(s)
battery charger(s)
louver motor(s)
block heater(s)
programmable controller(s)
thyristor motor control system(s)
tachometers(s)
over speed/under speed switch(es)
A/B transfer switch(es)
sound powered telephones/intercom system
elevators
interlocks/bypass switches

(3.b.3) Perform the following for a minimum of two complete cycles (raising and lowering):

- (1) Measure and record drive motor amperes per terminal simultaneously for each motor.
- (2) Measure and record drive motor voltage between terminals simultaneously for each motor.

Note: Voltage readings shall be taken from the load side of the motor's disconnect switch.

- (3) Measure and record utilities' incoming voltages, per phase simultaneously.
- (4) Measure and record generator output voltages, per phase simultaneously.

Present, in table form, the above measurements for every five degrees of span movement. Record date, time, weather, wind velocity and direction at the time of testing. Detail the procedures and equipment used in field notes.

(3.b.3a) Review the above measurements and compare to previous inspection results. Discuss changes and identify any possible defects or inconsistencies in the operation of the drive motor and/or span. Record the power factor of each drive motor. Compare power requirements of the span motor during raising and lowering. Identify any abnormal condition in the balance of the span and counterweight.

(3.b.4) Perform overload current, and ground fault current tests as recommended by the manufacturer, in order to verify the calibration of all three phase circuit breakers. Test motor overload units. Compare overload heater rating with motor full load current rating to verify proper sizing.

(3.b.5) Perform insulation resistance testing (megger) of all power circuit wiring from the main disconnect to and including each motor device. Perform surge comparison tests on all induction-type drive motors. Review the data obtained and identify any defects or inconsistencies. Compare to original values and values stated in previous reports. Provide a record of the readings in the inspection report.

Traffic Safety Inspection

(3.b.6) Perform a visual inspection* of the traffic safety equipment and associated components. Utilizing the checklist, EL-45S, identify and record any and all deficiencies, particularly those areas needing immediate corrective action in order to keep the bridge safely in service. Clean, remove and replace equipment inspection covers or enclosure panels, as required, to perform the inspections specified herein. Unless stated elsewhere herein, the Department's personnel will not be utilized for this purpose. Compare observations with Manual of Uniform Traffic Control Devices (MUTCD) guidelines to determine if any deficiencies exist. Record date, time and any condition that may affect inspection results at the time of testing. Record all nameplate information for all electrical equipment in the field notes. Detail the procedures and equipment used in field notes.

The traffic safety equipment inspection will include, but not necessarily be limited to, a detailed examination for smooth operation, uniform and regular movement, synchronization, interlock, mounting, slippage, engagement, applied tension, alignment, clearances, backlash, weather tightness, safety and signs of distress or pending distress with regards to the following components:

- Marine Navigation Lighting
- Aerial Navigation Lighting
- Warning Gongs
- Traffic Signal Fixtures
- Traffic Signal Pole
- Traffic Signal Operation
- Warning Gate Cabinets & Machinery
- Warning Gate Arms
- Warning Gate Lights
- Warning Gate Operation
- Barrier Gate Cabinets & Machinery
- Barrier Gate Arms
- Barrier Gate Lights
- Barrier Gate Operation
- Barrier Gate Locking Mechanisms

(3.b.7) Inspect the condition and operation of marine navigation lighting. Observe and check the physical condition of the navigation lighting, security of mountings, wiring to navigation lighting and aids, and internal wiring. Verify that upon operator's initialization, bascule, swing or lift bridge span navigation lighting turn green at bridge fully open position. Inspect the navigation lighting for proper luminance, lens condition, focus, clarity, and insect intrusion. Confirm proper visibility in accordance with United States Coast Guard (USCG) Standards stated in CFR title 33 section 118.65. Include conduit and wiring, light lens diameters, visibility to marine traffic, and number of fixtures. Provide a record of details and measurements. Any navigation lighting deficiency is to be considered a condition that requires immediate repair.

(3.b.8) Inspect the condition and operation of aerial navigation lighting. Observe and check: physical condition of the aerial navigation lighting, security of mountings, wiring to aviation lighting and aids, and internal wiring. Verify that the aviation lighting is proper color (Red) and flashing as required at the top of the bridge structure. Inspect the aviation lighting for proper luminance, lens condition, focus, clarity, and insect intrusion. Confirm proper visibility in accordance with United States Federal Aviation Administration (FAA) Standards stated in CFR title 33 section 118. Include conduit and wiring, light lens diameters, visibility to marine traffic, and number of fixtures. Provide a record of details and measurements. Any aviation lighting deficiency is to be considered a condition that requires immediate repair.

(3.b.9) Inspect for proper operation and proper physical condition of all warning gongs, poles, mountings, fixtures, and operation. Verify that upon operator's initialization, warning gongs repetitively sound at red traffic signal until the raising of the span or span lock release.

(3.b.10) Inspect condition and operation of the traffic signals. Observe and check the physical condition of the traffic signals, security of fixture mountings, wiring to traffic signal lights, and internal wiring. Verify that upon operator's initialization, the traffic signals switch from green to yellow to red. Record the time delay from yellow to red signal. Record the time delay from red signal to traffic gate permissive. Inspect the traffic signals for proper luminance, lens condition, focus, clarity, and insect intrusion. Include conduit and wiring, light lens diameters, visibility to traffic, and number of fixtures per approach. Provide a record of details and measurements.

(3.b.11) Inspect condition and operation of the traffic warning gates. Include mounting base condition, storage position, deployed position, gate arm length, motor condition and specifications, machinery, wiring, flashing light operation, operation timing (for lowering and raising), hand crank operation. Compare to previous data and report any changes. Provide a record of all details and measurements. Verify that upon operator's initialization, the traffic gates completely lower to stop traffic and raise to allow traffic to proceed.

(3.b.12) Inspect condition and operation of the barrier gates. Include mounting base condition, storage position, deployed position, gate arm length, motor condition and specifications, machinery conditions, wiring condition, flashing light operation, operation timing (for lowering and raising), hand crank operation, locking operation, and distance to traffic warning gates and movable span. Compare to previous data and report any changes. Provide a record of all details and measurements. Verify that upon operator's initialization, the barrier gates completely lower/close and lock across the whole roadway to block traffic and raise/open to allow traffic to proceed.

(3.b.13) Inspect safety interlocking circuits forward / upstream and reverse / downstream. Prepare and submit a concise interlock testing plan for approval before proceeding with this testing. Include observations of operation with scenarios listed below. Verify for all possible combinations that:

INTERLOCK TESTS ARE NOT TO BE ATTEMPTED WITHOUT MOVABLE SPAN AND GATES BEING COMPLETELY CLEAR OF ROADWAY TRAFFIC AND PEDESTRIANS.

Warning gates do not lower during a green signal

Barrier gates do not lower (or close) during a green signal or with any warning gate up

Barrier gates do not lower (or close) during a red signal with any warning gate up

Span locks do not pull during a green signal.

Span locks do not pull during a red signal, with any warning gate and/or barrier gate up/open

Span locks do not pull during a red signal, with warning gate down and any barrier gate up/open

Span does not lift with any gate up or traffic signal green.

All gates do not raise or open and/or traffic signal cannot turn green with span raised.

Span locks do not drive with span raised

Barrier gates do not raise (or open) with span locks pulled

Warning gates do not raise with any barrier gate down/closed and/or span locks pulled

Traffic signals cannot turn green with any gate down/closed and/or span locks pulled

Provide recommendations (if any) to improve the safety of the system. Identify and record any and all deficiencies that do not comply with the NJDOT Movable Bridge Engineering Group – Bypass and Interlocking Standards, particularly those areas needing immediate corrective action, in order to keep the bridge safely in service. Any deficiencies related to the safety of the traffic system must be immediately reported to the Department and a priority repair letter must be generated to correct the deficiency. Information necessary to supplement the priority repair letter must be provided. Information may include providing electrical schematics, hand marked sketches, limit switch settings verification and adjustment procedures, field wiring changes and bridge operational program logic change.

(3.b.14) Prepare and submit a concise report of the inspection specified herein. The report shall include:

1. A description of the structure, its electrical system, and all major equipment
2. A description of the traffic safety system, and all related equipment
3. A copy of this scope of work
4. Completed inspection form EL45Ec
5. Completed inspection form EL45S
6. Electrical equipment layout
7. A typed copy of all field notes
8. A summary of conclusions and recommendations
9. Cost estimates for recommended repairs
10. Final report in electronic form

Note: Any condition requiring immediate corrective action or priority repair shall be promptly reported, in writing, to the Department.

New Jersey Department of Transportation
DRAWBRIDGE ELECTRICAL INSPECTION REPORT

ROUTE: _____	BRIDGE: _____	STRUCTURE NO.: _____
DATE: ____/____/____	WEATHER: _____	TYPE _____ INSPECTION <small>(I or II)</small>
INSPECTOR: _____	TEMPERATURE: _____ ° F	

ELECTRICAL

The following were evaluated for smooth operation, uniform & regular movement, mounting, applied tension, vibration, overheating, wear, rust, noise, carbon deposits, loose terminations, dirt accumulation, insulation, grounding, bonding, current/voltage/kilowatt readings, interlocks, weather tightness, safety, and signs of distress:

3=Operational/Needs Minor Work 2=Operational/Needs Major Work
1=Non Operational S=Satisfactory N=Not Applicable

TRAFFIC SIGNALS/WARNING GONGS		HORN	
WARNING/BARRIER GATES		SERVICE/EMERGENCY LIGHTING	
SMOKE DETECTION/ROOM HEATING		SOUND POWERED PHONES	
CONTROL CONSOLE / INDICATOR LIGHTS		INSTRUMENTS (GAUGES/METERS/SELSYN)	
PROGRAMMABLE CONTROLLERS		SWITCHES/PUSHBUTTONS	
DRIVE AMPERAGE/VOLTAGE READINGS		RADIO TRANSMITTERS/RECEIVERS	
NAVIGATION LIGHTING		CIRCUIT BREAKERS/FUSES	
PANEL BOARDS/SAFETY SWITCHES		RELAYS/TIMERS	
RACEWAYS/CONDUIT/FITTINGS/BOXES		INSULATORS	
ENCLOSURES		TRANSFER SWITCHES	
CONTACTORS/STARTERS/OVERLOADS		LIGHTNING PROTECTION	
RESISTORS		ELEVATORS	
TRANSFORMERS		BRAKE MOTOR(S)	
LIMIT SWITCHES		GENERATOR	
DRIVE MOTORS		FREQUENCY OF GENERATOR	
SPAN LOCK MOTOR(S)		TACHOMETER	
BATTERIES/BATTERY CHARGER(S)		WIRING	
OVER SPEED/UNDER SPEED SWITCH		BLOCK HEATERS	
PRIMARY DRIVE SYSTEM		LOUVER MOTOR(S)	
SECONDARY DRIVE SYSTEM		BYPASSES/INTERLOCKS	

ATTACH DETAILED EXPLANATION OF WORK NEEDED

New Jersey Department of Transportation
DRAWBRIDGE TRAFFIC SAFETY INSPECTION REPORT

ROUTE: _____	BRIDGE: _____	STRUCTURE NO.: _____
DATE: ____/____/____	WEATHER: _____	TYPE _____ INSPECTION _____
INSPECTOR: _____		TEMPERATURE: _____ ° F

TRAFFIC SAFETY INSPECTION

The following were evaluated for smooth operation, uniform & regular movement, synchronization, interlock, mounting, overheating, vibration, wear, rust, noise, slippage, engagement, applied tension, lubrication, oil levels, oil contamination, dirt accumulation, fluid pressure, leakage, alignment, clearances, chordal thickness, backlash, air pressure, weather tightness, safety, and signs of distress:

S=Operational / Good Condition 2=Operational / Needs Repair 1=Non Operational N=Not Applicable

TRAFFIC SIGNAL MOUNTING		WARNING GONGS	
TRAFFIC SIGNAL POLE & ARM		BARRIER GATE MOUNTINGS	
TRAFFIC SIGNAL OPERATION		BARRIER GATE CABINETS	
WARNING GATE MOUNTINGS		BARRIER GATE MACHINERY	
WARNING GATE CABINETS		BARRIER GATE HAND CRANK OPERATION	
WARNING GATE MACHINERY		BARRIER GATE ARMS	
WARNING GATE HAND CRANK OPERATION		BARRIER GATE LIGHTS	
WARNING GATE ARMS		BARRIER GATE LOCKING MECHANISMS	
WARNING GATE LIGHTS		SAFETY INTERLOCKS	
MARINE NAVIGATION LIGHTING		AERIAL NAVIGATION LIGHTING	

SAFETY INTERLOCK VERIFICATION

(Check box if interlocks are operating correctly. The following operations should be prohibited)

WARNING GATE LOWER WITH GREEN SIGNAL	
BARRIER GATE LOWER/CLOSE WITH GREEN SIGNAL & WARNING GATES UP	
BARRIER GATE LOWER/CLOSE WITH RED SIGNAL & WARNING GATES UP	
SPAN LOCK PULL WITH GREEN SIGNAL, WARNING & BARRIER GATES UP/OPEN	
SPAN LOCK PULL WITH RED SIGNAL, WARNING & BARRIER GATES UP/OPEN	
SPAN LOCK PULL WITH RED SIGNAL, WARNING GATES DOWN, & BARRIER GATE(S) UP/OPEN	
SPAN LIFT WITH ANY GATE(S) UP OR TRAFFIC SIGNAL GREEN	
GATE(S) UP OR OPEN AND/OR TRAFFIC SIGNAL GREEN WITH SPAN RAISED	
SPAN LOCKS CANNOT BE DRIVEN WITH SPAN RAISED	
BARRIER GATE RAISE/OPEN WITH SPAN LOCKS PULLED	
WARNING GATE RAISE WITH ANY BARRIER GATES DOWN/CLOSED AND/OR SPAN LOCKS PULLED	
GREEN SIGNAL WITH ANY GATE(S) DOWN/CLOSED AND/OR SPAN LOCKS PULLED	

TIMING (In Seconds)

FROM GREEN TO YELLOW SIGNAL	
FROM YELLOW TO RED SIGNAL	
FROM RED SIGNAL TO WARNING GATE PERMISSIVE	

ATTACH EXPLANATION OF WORK NEEDED

CONSULTANT'S MAN-HOUR PROPOSAL PER-TASK WORKSHEET

Fill in estimated time per task, and provide for review to the
 Movable Bridge Engineering Group
 Phone 609-530-2163 – Fax 609-530-4444

BRIDGE _____ GROUP _____ JOB # _____

TYPE I ELECTRICAL INSPECTION

TASK ID	TASK DESCRIPTION	CONSUL. ESTIMATED HOURS
3.b.1	Mobilization - Review previous data, prepare forms, and travel to & from site.	
3.b.2	Perform Visual Electrical Inspection - Complete Form EL-45 Ec.	
3.b.3	* Volt/Amp Measurements - Two complete cycles (raise & lower) of incoming feed, motor and generator operation	
3.b.3a	Review recordings and identify possible problems.	
3.b.4	* Test Circuit Breakers - Overload and ground fault	
3.b.5	* Test Insulation Resistance - Megger all power circuit wiring.	
3.b.6	Perform Visual Safety Inspection - Complete Form EL-45S.	
3.b.7	Marine Navigation Lighting – Inspect physical condition, mounting, and operation.	
3.b.8	Aerial Navigation Lighting – Inspect physical condition, mounting, and operation	
3.b.9	Warning Gongs – Inspect physical condition, mounting, and operation.	
3.b.10	Traffic Signals – Inspect physical condition, mounting, and operation. Provide measurements as described above.	
3.b.11	Traffic Warning Gates – Inspect physical condition, mounting, and operation. Provide measurements as described above.	
3.b.12	Barrier Gates - Inspect physical condition, mounting, and operation. Provide measurements as described above.	
3.b.13	Safety Interlock System – Inspect and document circuits and their operation.	
3.b.14	Prepare Report - Include brief description of structure and electrical system.	

TOTAL ELECTRICAL HOURS

Estimated by _____ Date _____

* **No hours if tasks are sub-contracted.**