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 II (Current Date)

(State or County) Bridges Group XXXX State Job No. XXXXXXX

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. 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.

The mechanical equipment inspection will include, but not necessarily be limited to, a cursory examination for smooth operation, uniform and 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 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) 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.4) Prepare and submit a concise report of the mechanical inspection specified herein. The report shall include:

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

ROUTE: BRIDGE:	_ STRUCTURE NO.:
DATE:/ WEATHER:	TYPE INSPECTION
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

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 II MECHANICAL INSPECTION

TASK ID	TASK DESCRIPTION	CONSUL. ESTIMATED HOURS
3.a.1	Mobilization - Review previous data, prepare forms, travel to & from site	
3.a.2	Perform Visual Inspection - Complete Form EL-45 Mc	
3.a.2a	Visual Inspection Supplement for Bascule Bridges	
3.a.2b	Visual Inspection Supplement for Vertical Lift Bridges	
3.a.2c	Visual Inspection Supplement for Swing Bridges	
3.a.3	Span Balance - Verify balance by observing operation and/or drift test	
3.a.4	Prepare Report - Include brief description of structure and mechanical system	

TOTAL MECHANICAL HOURS

Estimated by _____ Date _____

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 and 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 Ev	aluation	609-530-3572
Movable Brid	ge Engineering	609-530-2163
Drawbridge (Operations	732-528-9494
Traffic Opera	tions North	201-797-3676
or - Traffic Opera	ations 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 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, Department 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.

The electrical equipment inspection will include, but not necessarily be limited to, a cursory examination for smooth operation, uniform and regular movement, proper 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 condition, system grounding, enclosure grounding, equipment grounding, bonding, current/voltage/kilowatt readings, safety interlocks, weather tightness, safety and signs of distress or pending distress with regards to the following components:

advance warning signs traffic signals and 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 radio transmitter and receiver fire/smoke detection system emergency lighting units electric heating system 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) tachometer(s) over speed/under speed switch(es) A/B transfer switch(es) sound powered telephones elevators interlocks/bypass switches

(3.b.3) Observe the bridge console's voltmeter(s), ammeter(s) and tachometer(s) during span operation. Record meter readings for the lift and lower cycles in field notes.

Traffic Safety Inspection

(3.b.4) 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 Lights Barrier Gate Lights Barrier Gate Lights Barrier Gate Loperation Barrier Gate Loperation

(3.b.5) 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.6) 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.7) 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.8) 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.9) 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.10) 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.11) 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.12) 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
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

TRAFFIC SIGNALS/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
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)
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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 <u>II</u> ELECTRICAL INSPECTION

TASK ID	TASK DESCRIPTION	CONSUL. ESTIMATED HOURS
3.b.1	Mobilization - Review previous data, prepare forms, travel to & from site	
3.b.2	Perform Visual Inspection - Complete Form EL-45 Ec	
3.b.3	Record Console Meter Readings - During complete bridge operation	
3.b.4	Perform Visual Safety Inspection - Complete Form EL-45S.	
3.b.5	Marine Navigation Lighting – Inspect physical condition, mounting, and operation.	
3.b.6	Aerial Navigation Lighting – Inspect physical condition, mounting, and operation	
3.b.7	Warning Gongs – Inspect physical condition, mounting, and operation.	
3.b.8	Traffic Signals – Inspect physical condition, mounting, and operation. Provide measurements as described above.	
3.b.9	Traffic Warning Gates – Inspect physical condition, mounting, and operation. Provide measurements as described above.	
3.b.10	Barrier Gates - Inspect physical condition, mounting, and operation. Provide measurements as described above.	
3.b.11	Safety Interlock System – Inspect and document circuits and their operation.	
3.b.12	Prepare Report – Include all information as described above.	

TOTAL ELECTRICAL HOURS

Estimated by _____ Date _____