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SUBJECT BANANA RIVER BRIDGE – OPERATING INSTRUCTIONS

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THIS DOCUMENT DOES NOT CONTAIN HAZARDOUS OPERATIONS**PURPOSE**

The purpose of this Instruction is to establish and communicate the instructions for the methods of operating the Banana River Bridge at the Kennedy Space Center. This document also provides guidance for safe bridge operations and to protect employees from various hazards associated with bridge operations under the Base Operations and Spaceport Services (BOSS) Contract.

SCOPE AND APPLICABILITY

This document provides step-by-step instructions to raise and lower the bascule spans of the Banana River Bridge at the Kennedy Space Center - according to established methods and requirements. This Instruction also provides preoperational and communication instructions for the performance of bridge maintenance and repair work. Emergency instructions for several types of events are also included.

PROCESS**1. PERSONAL AND OPERATIONAL HAZARDS****1.1. Personal Hazards**

- 1.1.1. All work shall be performed in accordance with the requirements of KNPR 8715.3, “KSC Safety Procedural Requirements”.
- 1.1.2. Adverse weather conditions (high winds, lightning, heavy rain): all personnel at the bridge shall comply with SMA-EMP, “Emergency Management Plan”.
- 1.1.3. Working over or near water: All work over or near water shall be performed in accordance with SHP-P-0605, “Water Safety” and 29 CFR 1926.106, Code of Federal Regulations, Title 29, Part 1926.106, “Working Over or Near Water”.
- 1.1.4. Hand and portable power tools: All work shall be performed in accordance with SHP-P-0242, “Hand and Portable Power Tools”.
- 1.1.5. Electrical hazards. All electrical work shall be performed in accordance with SHP-P-0303, “Electrical Safety”.
- 1.1.6. Working in dark conditions.
- 1.1.7. The basic types of hazardous mechanical motions. These can include the movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and any parts that impact or shear.

1.2. Operational Hazards

If the specified requirements contained in this document and the reference documents are not followed, relating to the operation of the movable bridge spans, then it is possible that significant damage to major mechanical and/or electrical components could occur. It is required that all defined requirements be precisely followed.

2. SAFETY EQUIPMENT

2.1. Personal Protective Equipment (PPE)

Personnel performing bridge maintenance or inspection operations must wear or utilize the following PPE when required as specified in BOSS Procedure SHP-P-0132, “Personal Protective Equipment”:

- 2.1.1. Personal Flotation Device, U.S. Coast Guard-approved – when working over water or utilizing a boat.
 - a. A minimum of two (2) USCG – approved Type II “classic” Personal Flotation Device (PFD) or Type I PFD is required.
 - b. One (1) USCG Type IV (throwable) Ring Buoy with Reflective Tape attached with 90 feet of nylon rope.
- 2.1.2. Roadway safety vest, ANSI 107-2010 Class 2 compliant- approved.
- 2.1.3. Safety glasses with side shields.
- 2.1.4. Fall protection shall be utilized in accordance with [SHP-P-0500](#), “Fall Protection Program”.
- 2.1.5. Footwear - low-heeled, closed toe, nonporous safety shoes made of leather or equivalent, with soles heavy enough and of appropriate composition to provide adequate foot protection in accordance with all commodity Safety Data Sheets (SDS) and work environment. Safety toe shoes are recommended for all operations and are required for all operations where a hazard may exist to personnel’s feet from falling or dropped heavy objects.
- 2.1.6. Rain Gear.

2.2. Additional Safety Equipment

- 2.2.1. Flashlights.
- 2.2.2. Binoculars.
- 2.2.3. VHF radio.
- 2.2.4. Anemometer (Wind meter).
- 2.2.5. Fire Extinguisher.

3. ESSENTIAL PERSONNEL

Supervision is responsible to verify that personnel are properly trained and qualified and that only properly trained and qualified personnel participate in operating the bridge and other potentially hazardous operations. Supervision is also responsible for the safety of both personnel and equipment and shall ensure operations are performed safely according to approved procedures.

3.1. Operating Personnel Located at the Bridge

- 3.1.1. Bridge Tender or other designated qualified bridge operator – 1 (minimum required).

3.2. Monitoring Personnel Located at the Bridge

- 3.2.1. Supervisor or Lead - 1 (optional).
- 3.2.2. Engineer - 1 (optional)

4. BRIDGE OPERATION RECORDS

The following table contains a listing of records related to the operation of the bridge that must be maintained as described:

BRIDGE OPERATION RECORDS				
Form Number	Title of Bridge Record	Location of Bridge Record	Purpose of Bridge Record	Record Storage
KSC Form 28-1061 NS	"Report of Drawbridge Openings, Kennedy Space Center"	Paper originals of the completed forms shall be maintained at the bridge site in the Control Tower in labeled binders.	The completion of this form for all drawbridge openings is a Contract requirement. The content of this form provides NASA, BOSS and the U.S. Coast Guard information pertaining to the type and identification of vessels that have passed through the bridge opening and provides an understanding of the vessel traffic volumes during the various seasons of the year. Bridge openings during maintenance operations are not to be recorded on this form or in the Log Book.	a. The records shall remain at the bridge Control Tower. Upon request, the Lead Bridge Tender, or designee, shall provide the records to the Bridge Tender Supervisor, who shall coordinate with the appropriate Records Custodian for proper storage, disposal and/or archiving. b. Records shall be made available to NASA or the U.S Coast Guard upon request.
(no form number)	Bridge Log Book for Visitor's and Events.	A bound Bridge Log Book for Visitor's and Events shall be kept in the Control Tower.	The Log Book has the following functions: a) Provides a list of all personnel who have visited the bridge and are currently at the bridge site. The Log Book shall be completed by all visitors' at the bridge. b) Provides a tool that documents events that have occurred at the bridge. The Log is helpful to document anomalies, maintenance or other items that are important to be communicated. The Log shall be maintained by the Bridge Maintenance Crew Supervisor, or designee. The information contained in the Log also serves as a reference tool utilized by the Bridge Maintenance Crew and Bridge System Engineer during troubleshooting operations.	a. The records shall remain at the bridge Control Tower. Upon request, or when the Log Book is full or requires replacement due to wear and tear, the Lead Bridge Tender, or designee, shall provide the records to the Bridge Tender Supervisor, who shall coordinate with the appropriate Records Custodian for proper storage, disposal and/or archiving. b. Records shall be made available to NASA or the U.S Coast Guard upon request.

BRIDGE OPERATION RECORDS				
Form Number	Title of Bridge Record	Location of Bridge Record	Purpose of Bridge Record	Record Storage
(no form number)	Bridge Control Console Data	Printed data shall be kept in the Control Tower in a labeled binder.	Bridge Control Console Data shall be printed whenever deemed necessary due to a problem or concern regarding the operation of the bridge or for testing. The information and data contained on these printouts serve as a troubleshooting aide – to be utilized by the Bridge Tender, the Bridge Maintenance Crew and the Bridge System Engineer.	The records shall remain at the bridge Control Tower. Upon request, the Lead Bridge Tender, or designee, shall provide the records to the Bridge Tender Supervisor, who shall coordinate with the appropriate Records Custodian for proper storage, disposal and/or archiving.

5. GENERAL INSTRUCTIONS FOR BRIDGE OPERATIONS

- 5.1 Personnel performing these instructions shall have a copy of this document in their possession and shall follow the instructions while the procedural activities are being performed.
- 5.2 For access to the Control Tower or the bridge machinery and electrical rooms, contact the Supervisor of the Bridge Maintenance Crew. Keys are required for entry.
- 5.3 Prior to raising or lowering a bridge span(s), it is required that the Bridge Tender, (or other designated qualified bridge operator), know the location of all personnel at the bridge site and must be certain that all personnel and equipment are clear.
- 5.4 Bridge Tenders (or other designated qualified bridge operator), shall only initiate a lower command once all vessels are outside/clear of fender system.
- 5.5 As stated in [33 CFR 117.263 \(b\)](#), “*The draw of the NASA Causeway bridge, mile 27.6 at Cape Canaveral, shall open on signal if at least four hours’ notice is given to the NASA Security Office by telephone or in person*”.
- 5.5.1. All requesting and acknowledgment signals for bridge openings given by the Bridge Tender and the Operator of the vessel shall be in accordance with 33 CFR 117.15, “Signals”, and Appendix “B” of this BOSS Instruction.
- 5.6 Refer to Section 6 of this document for limitations that pertain to the use of the control console bypass switches.
- 5.7 Any deviation from the requirements that are defined in this document which increases the hazard level or alters any safety requirements must be approved by ISC/ Safety & Mission Assurance prior to the start of the hazardous sequence or entry into the elevated hazard steps/sequence.
- 5.8 A BOSS Safety Representative is not required for safety surveillance of normal bridge operations by the Bridge Tender.
- 5.9 Report all equipment/system failures or anomalies to the Supervisor of the Bridge Maintenance Crew.

6. LIMITATIONS ON THE USE OF CONTROL CONSOLE BYPASS SWITCHES

6.1. Limitations on the Use of Control Console Bypass Switches During Bridge Maintenance and Repair Operations

Do not use any by-pass switches located on the control console while bridge maintenance work is being performed, unless directed by the Bridge Maintenance Supervisor or Bridge System Engineer. The by-pass switches are designed for operational functions only and are not intended for maintenance purposes. The use of these by-pass switches during maintenance operations without the appropriate approval and/or oversight may result in unexpected and unsafe bridge movements and could also result in damage to mechanical and/or electrical bridge components.

6.2. Limitations on the Use of Control Console Bypass Switches During Normal Bridge Operations

Do not use any by-pass switches located on the control console during normal operations, unless directed by the Bridge Maintenance Crew Supervisor (or designee) or the Bridge System Engineer.

7. PREOPERATIONAL INSTRUCTIONS FOR BRIDGE MAINTENANCE AND REPAIR WORK

7.1. Notifications

- 7.1.1. For maintenance and repair work that requires the bridge or a roadway lane to be closed to vehicle traffic, email notifications shall be sent per the requirements of [MSI-I-0001](#), “Master Schedule Integration Planning and Scheduling Instruction” and [MSI-REF-0001](#), “Master Integration Planning and Scheduling Appendices”.

7.2. Preparations

- 7.2.1. At the job site, prior to any bridge operations and prior to starting any bridge maintenance or repair work, the Bridge Maintenance Supervisor, or designated person, shall take the lead in performing a Job Hazard Analysis (JHA) in strict conformance with [SHP-P-3100](#).

During the performance of the JHA, the following are some of the items that shall be discussed: planned work activities and objectives of tasks to be performed, identification of hazards and contingency responses for each, hazard control such as lockout/tagout requirements, required PPE, administrative controls, other safety aspects and methods of communication. Additional items shall be discussed per the requirements of the [SHP-P-3100](#).

- 7.2.2. The Supervisor or designated Task Leader shall verify that the required operational personnel are certified, have the required PPE, have received a pretest/pretask briefing and have attended the Job Hazard Analysis and are ready to proceed with the work.
- 7.2.3. Ensure that all personnel are familiar with the work site.

- 7.2.4. Verify specified tools, support equipment, and safety equipment is available and operational by testing each piece.
- 7.2.5. Verify all personnel are thoroughly familiar with the contents of this instruction and equipment involved before starting any task.
- 7.2.6. Measuring and monitoring devices used to demonstrate conformance of products and/or service to specified requirements shall be in current calibration.

7.3. Communications between the Bridge Maintenance Crew and the Bridge Tender

- 7.3.1. Communication between the Bridge Maintenance Crew and the Bridge Tender (or designated qualified bridge operator) shall be as defined in Section 8 of this document.

7.4. Performance of Work

- 7.4.1. Perform bridge Preventive Maintenance work in accordance with the approved Job Plans.
- 7.4.2. Perform repair and replacement of bridge components in accordance with the Work Order task instructions.
- 7.4.3. During bridge maintenance operations, when a bridge span is to be raised or lowered to accommodate work, the standard procedure shall be for the Bridge Tender (or other designated qualified bridge operator) to operate the bridge from the control console in “MANUAL” mode. At the discretion of the Bridge Crew Maintenance Supervisor or designated personnel, a qualified bridge crew member may be designated to operate the bridge from the “pendant”.

8. COMMUNICATION PRIOR TO AND DURING BRIDGE MAINTENANCE AND REPAIR OPERATIONS

- 8.1 Each time the BOSS Bridge Maintenance Crew goes to the bridge to perform work, the Crew Supervisor or designated crew member, shall bring the following to the site:
 - 8.1.1. Two - way radios (2 minimum) – one for the Bridge Tender (or designated qualified bridge operator) and one for the Bridge Crew Supervisor and/or a Crew member designated by the Supervisor. Additional radios shall be brought and utilized as needed – based on the extent and location of maintenance work.
- 8.2 Upon arrival at the bridge site, the Bridge Crew Supervisor or designated Crew member shall, before starting any work, go to the Control Tower and perform the following:
 - 8.2.1. Before starting any work, sign in and record, in the Bridge Log Book, the general scope of the planned maintenance and/or repair work.

- 8.2.2. Verify that the red sign is placed on the control console in direct view of the Bridge Tender (or designated qualified bridge operator) at all times during bridge maintenance operations. The sign must include the following instructions:
- a. STOP. WHAT IS THE BRIDGE CONFIGURATION?
 - b. WHAT IS THE REQUESTED MOVEMENT?
 - c. VERIFY CONSOLE LIGHT INDICATIONS?
 - d. VERIFY SAFE TO OPERATE.
- 8.2.3. Provide a 2-way radio to the Bridge Tender (or designated qualified bridge operator) for the purpose of communicating with the Bridge Crew during maintenance operations. Continuous radio communication shall be maintained between the Bridge Maintenance Crew and the qualified person operating the bridge.
- 8.2.4. Review the following with the Bridge Tender (or designated qualified bridge operator):
- a. The Work Order and a summary of the planned maintenance work.
 - b. The Job Hazard Analysis (JHA) form.
 - c. The content and purpose of the red sign described in Section 8.2.2.
 - d. The required bridge operations, especially procedural restrictions regarding the use of bypass switches defined in Section 6 and other locations in this document.

- 8.3** When maintenance crews are on site, all communication between the Bridge Maintenance Crew and the Bridge Tender (or designated qualified bridge operator) shall be by 2-way radio and shall be by the “**command response**” communication method - for all instructions related to the movement of bridge spans, lock bars, brakes, traffic gates and signals and all other bridge-related components and functions.

In order to verify the receipt, understanding and implementation of the command, each bridge movement command given by the Bridge Maintenance Crew shall be clearly and fully repeated back by the Bridge Tender (or the designated qualified bridge operator). The Bridge Crew member shall acknowledge the response and shall direct the Bridge Tender (or designated qualified bridge operator) to proceed with the bridge movement.

9. QUALITY INSPECTION REQUIREMENTS

Not required.

10. OPERATION RESTRICTIONS

10.1. Normal Restrictions

As stated in 33 CFR 117.263 (b), *“The draw of the NASA Causeway bridge, mile 27.6 at Cape Canaveral, shall open on signal if at least four hours’ notice is given to the NASA Security Office by telephone or in person”.*

10.2. Launch Restrictions

- 10.2.1. Typically, there are no restrictions applied to the operation of the Banana River Bridge when a launch is scheduled from either Kennedy Space Center or Cape Canaveral Air Force Station. If a specific launch requires bridge operation restrictions, the BOSS Mission Support Office will provide the restrictions to ISC/FSEU/Facilities Maintenance.

10.3. Operational Malfunctions

- 10.3.1. Notify Supervision and proceed as directed.
- 10.3.2. If Supervision is unavailable, notify the BOSS Bridge System Engineer.
- 10.3.3. Notify the BOSS JSTC Console at 321-861-5464.
- 10.3.4. Notify the BOSS Duty Office at 321-861-5050.
- 10.3.5. If unable to operate the bridge for maritime vessels, notify the United States Coast Guard at 321-868-4200.
- 10.3.6. Wait for the Bridge Maintenance Team to arrive if malfunction cannot be resolved over the phone.
- 10.3.7. Report equipment/system failures or anomalies, which impact the operation of the bridge, its’ physical condition or vehicular travel over the bridge, in accordance with [SMA-P-0016](#), “Event and Near Miss Reporting and Investigation”.

11. INITIAL PREOPERATIONAL CHECKS TO BE PERFORMED PRIOR TO BRIDGE OPERATIONS OR MAINTENANCE

The following initial preoperational checks are to be performed by the Bridge Tender or other designated qualified bridge operator when first arriving at the bridge in preparation for one or several planned bridge openings that day to accommodate passage of a vessel. These initial preoperational checks also must be performed by the Bridge Tender or other designated qualified bridge operator prior to performing any maintenance on the bridge that requires moving the spans. These initial preoperational checks only need to be performed once per work shift, unless directed otherwise by BOSS Bridge Maintenance Supervision or Management or as deemed necessary by the Bridge Tender or other designated qualified bridge operator. Additional preoperational checks that are required to be performed prior to each bridge opening are defined in Sections 12.1, 13.1, 14.1 and 15.1 of this document.

- 11.1** Check for any damage to the fender system, including walkways that may have recently occurred.
- 11.2** Verify that the disconnect switches for the span motors and brakes (machinery and motor) located in the machinery pits at both near and far sides are on/closed.
- 11.3** Verify that all brakes (machinery and motor) located in the machinery pits on both near and far sides are set and not hand-released.
- 11.4** Verify that all foreign objects are cleared that could become entangled into the gearing of the bascule spans and/or the drive shaft of these spans.
- 11.5** Located in the roadside equipment room, on the Motor Control Center (MCC), verify that all of the “HAND-OFF-AUTO” switches are in the “AUTO” position and that all disconnects are on/closed (the handle is in the up position).
- 11.6** Located in the roadside equipment room, on the Motor Control Center, press the “PUSH-TO-TEST” light on each bucket to verify proper operation of control voltage.
- 11.7** Located in the roadside equipment room, there are two (2) span motor 60 amp circuit breakers. Verify that they are on/closed (the handle is in the up position). These are located next to each variable frequency drive.
- 11.8** Located in the roadside equipment room, verify that the variable frequency drives are powered “ON” and that the serial communication (RIO) network cable is connected to the 20-COMM-R module located in the middle of the drive. Open compartment by lifting the red tab and swinging open the drive upper compartment. The display should be illuminated.
- 11.9** Located in the roadside equipment room, verify that all breakers in panel H, which is located in the Motor Control Center cubical 2FA, are on/closed.
- 11.10** Located in the roadside equipment room, verify that all breakers in panel L, which is located in the Motor Control Center cubical 2FC, are on/closed.
- 11.11** Before opening the bridge for any seagoing vessel, physically inspect all traffic signal lights, gate flasher lights and traffic gongs to verify proper operation by performing the following at the control console:
 - 11.11.1.** Turn the “CONTROL POWER” switch to “MANUAL”.
 - 11.11.2.** Press the “BEGIN RAISE SEQUENCE” button momentarily.
 - 11.11.3.** Verify that the traffic signal lights, gate flasher lights and traffic gongs are functioning properly.
 - 11.11.4.** Press the square “STOP” button momentarily.
 - 11.11.5.** Turn the ‘CONTROL POWER” switch back to the “OFF” position.

11.12 Verify proper operation of the bridge navigational lights by performing the following at the control console:

- 11.12.1. Turn the “CONTROL POWER” switch to “MANUAL”.
- 11.12.2. Turn the “NAVIGATIONAL LIGHT” switch from “AUTO” to “MANUAL” to switch lights from red to green.
- 11.12.3. Verify that the bridge navigational lights are functioning properly.
- 11.12.4. Turn the “CONTROL POWER” switch back to the “OFF” position.
- 11.12.5. Turn the “NAVIGATIONAL LIGHT” switch back to the “AUTO” position to switch lights from green to red.
- 11.12.6. Report discrepancies per SMA-P-0016, “Event and Near Miss Reporting and Investigation”.

11.13 Verify proper operation of the marine radio. Report discrepancies to Supervision.

11.14 Located in the Control Tower, verify that the windows on the north side are completely closed.

12. AUTOMATIC OPERATION FROM THE CONTROL CONSOLE

12.1. Preoperational Checks Prior to Each Bridge Opening

- 12.1.1. Verify that all preoperational checks that are defined in Section 11 and are required to be performed by the Bridge Tender (or other designated qualified bridge operator) at the start of bridge operations or maintenance, have been successfully completed and all systems are set and functioning properly.
- 12.1.2. Verify that all bypass switches on the control console are locked in the off (not activated) position.
 - a. Refer to Section 6 of this document for limitations that pertain to the use of the control console bypass switches.
- 12.1.3. Located in the cabinet space beneath the control console surface and on the left side is a “PLC ON/OFF” switch. Verify that this switch is in the “ON” position.
- 12.1.4. Momentarily press the “LAMP TEST” button located on the control console to verify that the processor is running and to verify that all indicator lights are working properly.
- 12.1.5. Located on the control console, verify that the “CONTROL POWER SWITCH” is in the AUTO” position.
- 12.1.6. Verify that the following indicator lights on the control console are illuminated green. These indicator lights are:
 - a. motor brakes.....“SET”
 - b. machinery brakes“SET”

- c. warning, oncoming and off-going gates “UP”
 - d. span locks “DRIVEN”
 - e. traffic signals lights “SIGNAL GREEN”
 - f. spans fully-seated “FULLY SEATED”
- 12.1.7. Verify the following switch positions located on the control console:
- a. The “EMERGENCY STOP” switch is raised. This is a push/pull type switch.
 - b. The “WIND CONDITION SPEED” switch is in the “NORMAL” position, under normal conditions.
 - c. The “NAVIGATIONAL LIGHTS” switch is in the “AUTO” position.
- 12.1.8. Verify that all personnel at the bridge site are aware that both spans are about to be raised.

12.2. Raising the Bridge

- 12.2.1. The following steps are only to be performed when the preoperational checks that are listed in Sections 11 and 12.1 have been successfully completed.
- 12.2.2. Notify the Duty Office that the spans are going to be raised. Also, notify KSC Security if a Vessel is making passage, as an alarm will trip once the Vessel passes the North side of Bridge.
- 12.2.3. Verify that all bypass switches on the control console are locked in the off (not activated) position.
- 12.2.4. Located on the control console, momentarily press the “BEGIN RAISE SEQUENCE” button. This will cycle/change the traffic lights to red; the gate light flashers will start and the roadway gongs will sound.
- 12.2.5. Before executing the next step, always check for oncoming vehicular traffic.
- 12.2.6. Located on the control console:
- a. Lower the warning gates at the far and near sides by pressing and holding the “DOWN” buttons.
 - b. After the warning gates have been lowered, lower the oncoming gates at the far and near sides by pressing and holding the “DOWN” buttons.
 - c. After the oncoming gates have been lowered, lower the off-going gates on the far and near sides by pressing and releasing the “DOWN” buttons.
- 12.2.7. Located on the control console, momentarily press the “RAISE” button. The lock bars will automatically pull, the horn will sound, and the spans will begin to raise.

12.3. Lowering the Bridge

- 12.3.1. Verify that all personnel in the area are aware that both spans are about to be lowered.
- 12.3.2. Verify that all bypass switches on the control console are locked in the off (not activated) position.
- 12.3.3. Located on the control console, momentarily press the “BEGIN LOWER SEQUENCE” button.
- 12.3.4. After the warning horn has automatically sounded five times, momentarily press the “LOWER” button that is located on the control console.
- 12.3.5. After the spans are fully-seated, locks driven, all gates are up, and the traffic lights have switched to green, verify that the following indicator lights on the console are illuminated green. These indicator lights are:
 - a. motor brakes.....“SET”
 - b. machinery brakes“SET”
 - c. warning, oncoming and off-going gates.....“UP”
 - d. span locks.....“DRIVEN”
 - e. traffic signal lights“SIGNAL GREEN”
 - f. spans fully seated“FULLY SEATED”
- 12.3.6. After the bridge completes the cycle, an alarm will sound to confirm the completion of the operation.
- 12.3.7. Located in the roadside machinery room, ensure that all disconnects that are located on the motor control center in vertical sections 3F, 4F and 5F are placed in the “OFF/OPEN” position (i.e. the handle is down).
- 12.3.8. Located on the control console, place the “CONTROL POWER SWITCH” to the “OFF” position.
- 12.3.9. Notify the Duty Office and KSC Security that the bridge operation is complete and the bridge is in normal operation mode.
- 12.3.10. The Bridge Tender, or the Supervisor (or Lead) of the Bridge Maintenance Crew, shall document the bridge opening and closing, ship identification and other information by completing KSC Form 28-1061 NS.

13. MANUAL OPERATION FROM THE CONTROL CONSOLE**13.1. Preoperational Checks Prior to Each Bridge Opening**

- 13.1.1. Verify that all preoperational checks that are defined in Section 11 and are required to be performed by the Bridge Tender (or other designated qualified bridge operator) at the start of bridge operations or maintenance, have been successfully completed and all systems are set and functioning properly.

- 13.1.2. Verify that all bypass switches on the control console are locked in the off (not activated) position.
 - a. Refer to Section 6 of this document for limitations that pertain to the use of the control console bypass switches.
- 13.1.3. Located in the cabinet space beneath the control console surface and on the left side is a “PLC ON/OFF” switch. Verify that this switch is in the “ON” position.
- 13.1.4. Momentarily press the “LAMP TEST” button located on the control console to verify that the processor is running and to verify that all indicator lights are working properly.
- 13.1.5. Located on the control console, verify that the “CONTROL POWER SWITCH” is in the “MANUAL” position.
- 13.1.6. Verify that the following indicator lights on the control console are green. These indicator lights are:
 - a. motor brakes “SET”
 - b. machinery brakes “SET”
 - c. warning, oncoming and off-going gates..... “UP”
 - d. span locks “DRIVEN”
 - e. traffic signal lights..... “SIGNAL GREEN”
 - f. spans fully seated..... “FULLY SEATED”
- 13.1.7. Verify the following switch positions located on the control console:
 - a. The “EMERGENCY STOP” switch is raised. This is a push/pull type switch.
 - b. The “WIND CONDITION SPEED” switch is in the “NORMAL” position, under normal conditions.
 - c. The “NAVIGATIONAL LIGHTS” switch is in the “AUTO” position.
- 13.1.8. Verify that all personnel in the area are aware that the spans are about to be raised.

13.2. Raising the Bridge:

- 13.2.1. The following steps are only to be utilized when the preoperational checks listed in Sections 11 and 13.1 have been successfully completed.
- 13.2.2. Notify the Duty Office that the bridge is going to be raised. Also, notify KSC Security if a Vessel is making passage, as an alarm will trip once the Vessel passes the North side of Bridge.
- 13.2.3. Located on the control console, press the “BEGIN RAISE SEQUENCE” button. This will cycle/change the traffic lights to red, the gate light flashers will start, and the roadway gongs will sound.

- 13.2.4. Before executing the next step, always check for oncoming vehicular traffic.
- 13.2.5. Located on the control console:
 - a. Lower the warning gates on the far and near sides by pressing and holding the “DOWN” buttons.
 - b. After the warning gates have been lowered, lower the oncoming gates at the far and near sides by pressing and holding the “DOWN” buttons.
 - c. After the oncoming gates have been lowered, lower the off-going gates on the far and near sides by pressing and releasing the “DOWN” buttons.
- 13.2.6. Located on the control console, momentarily press the span locks “PULLED” button. The lock bars will pull.
- 13.2.7. Confirm that the red indicator light for the two span locks “PULLED” buttons are illuminated.
- 13.2.8. Located on the control console, press the “HORN” button one long blast and one short blast.
- 13.2.9. Located on the control console, momentarily press the “RAISE” button. The spans will begin to raise.
- 13.2.10. When the span reaches the fully raised position, it will automatically stop and the span navigational lights will change from red to green.

13.3. Lowering the Bridge:

- 13.3.1. Verify that all personnel in the area are aware that the spans are about to be lowered.
- 13.3.2. Verify that all bypass switches on the control console are locked in the off (not activated) position.
- 13.3.3. Located on the control console, press the “BEGIN LOWER SEQUENCE” button.
- 13.3.4. Located on the control console, press the “HORN” button five short blasts.
- 13.3.5. After the warning horn has sounded, momentarily press the “LOWER” button that is located on the control console.
- 13.3.6. After the spans are fully seated, momentarily press the two span locks “DRIVEN” buttons that are located on the control console.
- 13.3.7. Confirm that the green indicator lights for the two span locks “DRIVEN” buttons are illuminated.
- 13.3.8. After the span locks are driven, located on the control console:
 - a. Raise the off-going gates on the far and near sides by momentarily pressing the two “UP” buttons.
 - b. After the off-going gates have been raised, raise the oncoming gates on the far and near sides by momentarily pressing the two “UP” buttons.

- c. After the oncoming gates have been raised, raise the warning gates on the far and near sides by momentarily pressing the “UP” buttons.
- 13.3.9. The traffic lights will automatically switch from red to green. Verify that the following indicator lights on the console are illuminated green. These indicator lights are:
 - a. motor brakes.....“SET”
 - b. machinery brakes“SET”
 - c. warning, oncoming and off-going gates.....“UP”
 - d. span locks..... “DRIVEN”
 - e. traffic signal lights“SIGNAL GREEN”
 - f. spans fully seated “FULLY SEATED”
- 13.3.10. After the bridge completes the cycle, an alarm will sound to confirm the completion of the operation.
- 13.3.11. Located on the control console, place the “CONTROL POWER” switch to the “OFF” position.
- 13.3.12. Located in the roadside machinery room, verify that all disconnects that are located on the motor control center in vertical sections 3F, 4F and 5F are placed in the “OFF/OPEN” position (i.e. the handle is down).
- 13.3.13. Notify the Duty Office and KSC Security that the bridge operation is complete and that the bridge has been returned to normal configuration.
- 13.3.14. The Bridge Tender, or the Supervisor (or Lead) of the Bridge Maintenance Crew, shall document the bridge opening and closing, vessel identification and other information by completing KSC Form 28-1061 NS.

14. SINGLE SPAN MANUAL OPERATION FROM THE CONTROL CONSOLE

14.1. Preoperational Checks Prior to Each Bridge Opening

- 14.1.1. Verify that all preoperational checks that are defined in Section 11 and are required to be performed by the Bridge Tender (or other designated qualified bridge operator) at the start of bridge operations or maintenance, have been successfully completed and all systems are set and functioning properly.
- 14.1.2. Refer to Section 6 of this document for limitations that pertain to the use of the control console bypass switches.
- 14.1.3. Verify that all bypass switches on the control console are locked in the off (not activated) position.
- 14.1.4. Located in the cabinet space beneath the control console surface and on the left side is a “PLC ON/OFF” switch. Verify that this switch is in the “ON” position.

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- 14.1.5. Momentarily press the “LAMP TEST” button located on the control console to verify that the processor is running and to verify that all indicator lights are working properly.
- 14.1.6. Located on the control console, verify that the “CONTROL POWER” switch is in the “MANUAL” position.
- 14.1.7. Verify that the following indicator lights on the console are green. These indicator lights are:
- a. motor brakes.....“SET”
 - b. machinery brakes“SET”
 - c. warning, oncoming and off-going gates.....“UP”
 - d. span locks.....“DRIVEN”
 - e. traffic signal lights“SIGNAL GREEN”
 - f. spans fully seated.....“FULLY SEATED”
- 14.1.8. Verify the following switch positions located on the control console:
- a. The “EMERGENCY STOP” switch is raised. This is a push/pull type switch.
 - b. The “WIND CONDITION SPEED” switch is in the “NORMAL” position, under normal conditions.
 - c. The “NAVIGATIONAL LIGHTS” switch is in the “AUTO” position.
- 14.1.9. Verify that all personnel in the area are aware that a Bascule span is about to be raised.

14.2. Raising a Single Span

- 14.2.1. The following steps are only to be utilized when the preoperational checks listed in Sections 11 and 14.1 have been successfully completed.
- 14.2.2. Notify the Duty Office that the bridge is going to be raised. Also, notify KSC Security if a Vessel is making passage, as an alarm will trip once the Vessel passes the North side of Bridge.
- 14.2.3. Located on the control console, turn the “SPAN OPERATION” switch to the span you want to move – either the near or far span.
- 14.2.4. Single span operation will only work/transfer successfully if one or both spans are fully seated.
- 14.2.5. Located on the control console, press the “BEGIN RAISE SEQUENCE” button. This will cycle/change the traffic lights from green to red, the gate light flashers will start, and the roadway gongs will sound.
- 14.2.6. Before executing the next step, always check for oncoming vehicular traffic.
- 14.2.7. Located on the control console:

- a. Lower the warning gates on the near and far sides by pressing and holding the “DOWN” buttons.
 - b. After the “WARNING” gates have been lowered, lower the oncoming gates on the far and near sides by pressing and holding the “DOWN” buttons.
 - c. After the oncoming gates have been lowered, lower the off-going gates on the far and near sides by holding the “DOWN” buttons.
- 14.2.8. Located on the control console, momentarily press the span locks “PULLED” button. The lock bars will pull, then stop.
- 14.2.9. Confirm that the red indicator light for the span locks “PULLED” button is illuminated.
- 14.2.10. Located on the control console, press the “HORN” button one long blast and one short blast.
- 14.2.11. Located on the control console, momentarily press the “RAISE” button for the span that is to be raised. The span will begin to move.
- 14.2.12. Located on the control console, momentarily press the red square “STOP” button when the span has reached its desired position.

14.3. Lowering a Single Span:

- 14.3.1. Verify that all personnel in the area are aware that a span is about to be lowered.
- 14.3.2. Verify that all bypass switches on the control console are locked in the off (not activated) position.
- 14.3.3. Located on the control console, press the “BEGIN LOWER SEQUENCE” button.
- 14.3.4. Located on the control console, press the “HORN” button five short blasts.
- 14.3.5. After the warning horn has sounded, momentarily press the “LOWER” button that is located on the control console.
- 14.3.6. After the spans are fully seated, momentarily press the two span locks “DRIVEN” buttons that are located on the control console.
- 14.3.7. Confirm that the green indicator lights for the two span locks “DRIVEN” buttons are illuminated.
- 14.3.8. After the span locks are driven, located on the control console:
- a. Raise the off-going gates on the far and near sides by momentarily pressing the two “UP” buttons.
 - b. After the off-going gates have been raised, raise the oncoming gates on the far and near sides by momentarily pressing the two “UP” buttons.
 - c. After the oncoming gates have been raised, raise the warning gates on the far and near sides by momentarily pressing the “UP” buttons.

- 14.3.9. After all gates are up, the traffic lights will automatically switch from red to green. Verify that the following indicator lights on the console are green. These indicator lights are:
- a. motor brakes.....“SET”
 - b. machinery brakes“SET”
 - c. warning, oncoming and off-going gates.....“UP”
 - d. span locks..... “DRIVEN”
 - e. traffic signal lights..... “SIGNAL GREEN”
 - f. spans fully seated..... “FULLY SEATED”
- 14.3.10. Located on the control console, place the “SPAN OPERATION” switch to the “AUTO” position.
- 14.3.11. Located on the control console, place the “CONTROL POWER SWITCH” to the “OFF” position.
- 14.3.12. Located in the Roadside Machinery Room, verify that all disconnects located on the motor control center in vertical sections 3F, 4F and 5F are placed in the “OFF/OPEN” position (i.e. the handle is down).
- 14.3.13. Notify the Duty Office and KSC Security that the bridge operation is complete and that the bridge has been returned to normal configuration.
- 14.3.14. The Bridge Tender, or the Supervisor (or Lead) of the Bridge Maintenance Crew, shall document the bridge opening and closing, ship identification and other information by completing KSC Form 28-1061 NS.

15. BRIDGE SPAN MANUAL OPERATION FROM THE PENDANT CONTROL

15.1. Preoperational Checks

NOTE:

The following pre-operational steps bypass limit switches and safeties that are utilized to stop the bridge spans from movement. Extreme caution must be used when following this procedure.

15.1.1. Machinery Areas at Near and Far Sides

- a. Verify that all local disconnect switches are on/closed for the near and far side span motors and brakes (machinery and motor).
- b. Verify that all brakes (machinery and motor) are “set” and not hand released.
- c. Remove all foreign objects that could become entangled in gearing and drive shaft of the bascule spans.
- d. Verify that emergency drive system (manual pony operation gears) are not disengaged.

15.1.2. Roadway Equipment/Motor Control Center (MCC)

- a. On the MCC, press the “PUSH-TO-TEST” light on the machinery and motor brakes buckets to verify proper operation of control voltage.
- b. On the MCC, set the “HAND-OFF-AUTO” switches for the machinery and motor brake buckets to the “HAND” position.
- c. On the MCC, verify that the disconnect switch for the variable frequency drive, machine brake, and motor brake buckets are on/closed (the handle is in the up position).
- d. At the sub-roadway level equipment room: verify all breakers are on/closed on all panels, unless otherwise noted.

15.1.3. Roadway Equipment/Drive

- a. Verify that the span motor 60 amp circuit breaker is on/closed (handle in up position), located on the west wall next to each drive.
- b. Verify that the drive unit display is “ON” (power applied), located on the west wall.
- c. Unplug the Remote Input/Output (RIO) serial communication network cable connected to the 20-COMM-R module located in the middle of the drive. Open compartment by lifting the red tab and swinging open the drive upper compartment.
- d. Located on the east wall, MCC cubical labeled 1FB, select the span and drive to be operated.
- e. Remove the pendant from inside the MCC cubical 1FB.

15.1.4. Control Console

- a. Set/Verify that the Master Control Switch is in the “MANUAL” or “OFF” position.
- b. Verify that the “EMERGENCY STOP” switch is raised.
- c. Verify that the waterway/channel is clear for operation.

15.2. Raising a Span

- 15.2.1. Extreme caution must be used when performing this procedure. There are no limit switches or safeties to stop the structure/bridge from movement.
- 15.2.2. Always keep your hand on the “STOP” button of the pendant operator while moving the structure/bridge.
- 15.2.3. Verify that the preoperational checks listed in Sections 11 and 15.1 have been completed.
- 15.2.4. Verify that all gates are “DOWN” and traffic lights are “RED”.
- 15.2.5. Verify that the span locks are “PULLED” by confirming the following:

- a. The red span lock “PULLED” indicator light must be on.
 - b. Walk to mid-span of the bascule leaf and visually confirm that both span locks are PULLED; OR
 - c. Utilizing 2-way radios, obtain confirmation from the Bridge Maintenance Crew Supervisor, or designated person, that there has been visual confirmation that the span locks have completely retracted.
- 15.2.6. Yell “ALL CLEAR”. Verify that all personnel are aware that a span is about to move and are clear of moving machinery.
- 15.2.7. Utilizing 2-way radios, obtain confirmation from the Bridge Maintenance Crew Supervisor, or designated person, that all personnel are clear and it is safe to raise the span.
- 15.2.8. Verify the “RAISE/LOWER” switch on the pendant is in the “RAISE” position.
- 15.2.9. Turn the rheostat to the fully “COUNTERCLOCKWISE/SLOW” position on the pendant.
- 15.2.10. Position yourself so you can see the moving span.
- 15.2.11. Drive unit display will read positive in the raise direction.
- 15.2.12. Press the “START” button. The span will begin to move.
- 15.2.13. Verify that the span is moving in the raise direction. If not, press the “STOP” button.
- 15.2.14. Turn the rheostat clockwise to increase the speed. Full speed is 60 Hz on the drive unit display.
- 15.2.15. Turn the rheostat to the fully “SLOW” position at approximately 30 feet from the fully-raised position. The drive will ramp down to + 5 Hz in 10 seconds.
- 15.2.16. When the span is fully raised, press the “STOP” button on the pendant operator.
- 15.2.17. Repeat the process for the remaining span to be raised.

15.3. Lowering a Span

- 15.3.1. Extreme caution shall be used when performing this procedure. There are no limit switches or safeties to stop the structure/bridge from movement.
- 15.3.2. Always keep your hand on the “STOP” button of the pendant operator while moving the structure/bridge.
- 15.3.3. Verify the preoperational checks in Sections 11 and 15.1 have been completed.
- 15.3.4. Yell “ALL CLEAR”. Verify that all personnel are aware that a span is about to move and are clear of moving machinery.

- 15.3.5. Utilizing 2-way radios, obtain confirmation from the Bridge Maintenance Crew Supervisor, or designated person, that all personnel are clear of moving machinery and it is safe to lower the span.
- 15.3.6. Verify that the “RAISE/LOWER” switch is in the “LOWER” position on the pendant.
- 15.3.7. Turn the rheostat to the fully “COUNTERCLOCKWISE/SLOW” position on the pendant.
- 15.3.8. Position yourself so you can see the moving span.
- 15.3.9. Drive unit display will read negative in the lower direction.
- 15.3.10. Press the “START” button. The span will begin to move.
- 15.3.11. Verify the span is moving in the down direction. If not, press the “STOP” button.
- 15.3.12. Turn the rheostat clockwise to increase the speed. Full speed is 60 Hz on the drive unit display.
- 15.3.13. Turn the rheostat to the fully “SLOW” position at approximately 30 feet from fully seated. The drive will ramp down to – 5 Hz in 10 seconds.
- 15.3.14. When the span is fully seated, press the “STOP” button on the pendant operator.
- 15.3.15. Repeat the process for the remaining span to be lowered.
- 15.3.16. From the MCC, “DRIVE” lockbars and “RAISE” all traffic gates.
- 15.3.17. Verify oncoming traffic lights are “GREEN”.
- 15.3.18. Return all MCC “HANDS-OFF-AUTO” switches to the “AUTO” position.
- 15.3.19. Reconnect the Remote Input/Output (RIO) serial communication network cable to the 20-COMM-R module that is located in the middle of the drive. Open the compartment by lifting the red tab and swinging open the drive upper compartment. Insert the drive communication cable into the 20-COMM-R card.
- 15.3.20. Return the Pendant controller to AUTO position.
- 15.3.21. The Bridge Tender, or the Supervisor (or Lead) of the Bridge Maintenance Crew, shall document the bridge opening and closing, ship identification and other information by completing KSC Form 28-1061 NS.

16. HALF SPEED OPERATION (HIGH WIND SPEED SWITCH)

NOTE:

The “WIND CONDITION SPEED” switch is located near the center of the control console. This switch will function in AUTO or MANUAL to reduce the full operating speed of the span in half (From normal 60 hz to 30 hz). During any point of the actual bridge operation or even

at the beginning of the sequence, the half speed switch can be activated.

NOTE:

The drawbridge shall be operated at half speed during sustained wind conditions of 25 knots or greater as well as when the operator deems necessary.

- 16.1** Place the “CONTROL POWER” switch on the control console to either the “MANUAL” or “AUTO” position.
- 16.2** Verify that all bypass switches on the control console are locked in the off (not activated) position.
- 16.3** Turn the “WIND CONDITION SPEED” switch to the “HALF SPEED” position. The console will sound, warning the operator of the action. Acknowledge the alarm by pressing the black button directly below the blinking red “ALARM ACK” console indicator lamp.
- 16.4** To return to normal operation, turn the “WIND CONDITION SPEED” switch to the “NORMAL” position.

17. OPERATION OF MACHINERY BRAKES FOR MAINTENANCE FROM THE CONTROL CONSOLE

- 17.1** Place the “CONTROL POWER” switch on the control console to the “MANUAL” position.
- 17.2** Verify that all bypass switches on the control console are locked in the off (not activated) position.

NOTE:

Refer to Section 6 of this document for limitations that pertain to the use of the control console bypass switches.

- 17.3** Place the “MAINTENANCE” switch on the control console to the “TEST” position. This switch is located at the upper right of the front vertical panel of the control console, above the “muffin” fan.
- 17.4** Momentarily press the machinery brake “RELEASE” button. The brake will release, as indicated by the illumination of the red indicator light on the control console.
- 17.5** Momentarily press the machinery brake “SET” button. The brake will set, as indicated by the illumination of the green indicator light on the control console.

- 17.6** To return to the original configuration, turn the “MAINTENANCE” and the “CONTROL POWER” switches to the “OFF” position.

18. OPERATION OF MOTOR BRAKES FOR MAINTENANCE FROM THE CONTROL CONSOLE

- 18.1** Place the “CONTROL POWER” switch on the control console to the “MANUAL” position.
- 18.2** Verify that all bypass switches on the control console are locked in the off (not activated) position.

NOTE:

Refer to Section 6 of this document for limitations that pertain to the use of the control console bypass switches.

- 18.3** Place the “MAINTENANCE” switch on the control console to the “TEST” position. This switch is located at the upper right of the front vertical panel of the control console, above the “muffin” fan.
- 18.4** Momentarily press the motor brake “RELEASE” button. The brake will release, as indicated by the illumination of the red indicator light on the control console.
- 18.5** Momentarily press the motor brake “SET” button. The brake will set, as indicated by the illumination of the green indicator light on the control console.
- 18.6** To return to the original reconfiguration, turn the “MAINTENANCE” and the “CONTROL POWER” switches to the “OFF” position.

19. POST OPERATIONS INSTRUCTIONS

19.1. Maintain appropriate records

- 19.1.1.** The Bridge Tender, or the Supervisor (or Lead) of the Bridge Maintenance Crew, shall document the bridge opening and closing, ship identification and other information by completing KSC Form 28-1061 NS.

APPENDIX A: EMERGENCY INSTRUCTIONS**1. Fire**

- a. Evacuate nonessential personnel.
- b. Terminate operations by pushing the “SHUNT TRIP” button. This will cut electrical power to the bridge.

NOTE:

The “SHUNT TRIP” button is located on the control console. It is red and shaped like a mushroom with the words “SHUNT TRIP” engraved on it. This is a push/pull type of switch operation.

- c. Evacuate the area.
- d. Notify the appropriate KSC control center by dialing the following numbers: if using a KSC landline phone, dial 911. If using a cell phone, dial 321-867-7911. Request fire, ambulance, or security support as needed.
- e. Notify Supervision and proceed as directed.
- f. Assist Fire Department personnel, if properly trained, as requested by the Fire Chief.

2. Vehicle Accident

- a. Notify the appropriate KSC control center by dialing the following numbers: if using a KSC landline phone, dial 911. If using a cell phone, dial 321-867-7911. Request fire, ambulance, or security support as needed.
- b. Notify Supervision and proceed as directed.

3. Personnel Injury

- a. Immediately terminate operations, if this can be accomplished safely. Turn off all power and, if necessary and capable, remove victim to administer first aid.
- b. If breathing has stopped, administer CPR (if certified to do so) until voluntary respiration resumes or medical help arrives.
- c. Notify the appropriate KSC control center by dialing the following numbers: if using a KSC landline phone, dial 911. If using a cell phone, dial 321-867-7911. Request fire, ambulance, or security support as needed.
- d. Notify Supervision and proceed as directed.

4. Drawbridge Operations for Emergency Vehicles and Emergency Vessels (33 CFR 117.31)

- a. When a Bridge Tender is informed by a reliable source that an emergency vehicle is due to cross the bridge, the Bridge Tender shall take all reasonable

measures to have the draw bridge closed at the time the emergency vehicle arrives at the bridge.

- b. When the Bridge Tender receives notice, or a proper signal as provided in [33 CFR 117.15](#), the Bridge Tender shall take all reasonable measures to have the draw bridge opened, regardless of the operation schedule of the drawbridge, for passage of the following, provided this opening does not conflict with local emergency management procedures which have been approved by the cognizant U.S. Coast Guard Captain of the Port:
 - i. Federal, state, and local government vessels used for public safety.
 - ii. Vessels in distress where a delay would endanger life or property.
 - iii. Commercial vessels engaged in rescue or emergency salvage operations.
 - iv. Vessels seeking shelter from severe weather.

5. Closure of Drawbridge for Natural Disasters or Civil Disorders (33 CFR 117.33)

- a. Drawbridges need not open for the passage of vessels during periods of natural disasters or civil disorders declared by the appropriate authorities unless otherwise provided for in [33 CFR 117.263](#) or unless directed to do so by the U.S. Coast Guard District Commander.

APPENDIX B: USE OF SIGNALS BY VESSEL OPERATORS & BRIDGE TENDERS

The following are the required signals to be used by marine vessel operators requesting a drawbridge opening and bridge tenders acknowledging requests by vessel operators per [33 CFR 117.15](#) – “Signals”:

1. General:
 - a. The operator of each vessel requesting a drawbridge to open shall signal the bridge tender and the bridge tender shall acknowledge that signal. The signal shall be repeated until acknowledged in some manner by the bridge tender before proceeding.
 - b. The signals used to request the opening of the drawbridge and to acknowledge that request shall be sound signals, visual signals, or radiotelephone communications as described in this Appendix.
 - c. Any of the means of signaling described in this Appendix sufficient to alert the party being signaled may be used.
2. Sound signals:
 - a. Sound signals shall be made by whistle, horn, megaphone, hailer, or other device capable of producing the described signals loud enough to be heard by the bridge tender.
 - b. As used in this Appendix, “prolonged blast” means a blast of four to six seconds duration and “short blast” means a blast of approximately one second duration.
 - c. The sound signal to request the opening of a drawbridge is one prolonged blast followed by one short blast sounded not more than three seconds after the prolonged blast. For vessels required to be passed through a drawbridge opening during a scheduled closure period, the sound signal to request the opening of the drawbridge during that period is five short blasts sounded in rapid succession.
 - d. When the drawbridge can be opened immediately, the sound signal to acknowledge a request to open the draw is one prolonged blast followed by one short blast sounded not more than 30 seconds after the requesting signal.
 - e. When the drawbridge cannot be opened immediately, or is open and shall be closed promptly, the sound signal to acknowledge a request to open the drawbridge is five short blasts sounded in rapid succession not more than 30 seconds after the vessel’s opening signal. The signal shall be repeated until acknowledged in some manner by the requesting vessel.

3. Visual signals:

- a. The visual signal to request the opening of a drawbridge is the following:
 - i. A white flag raised and lowered vertically; or
 - ii. A white, amber, or green light raised and lowered vertically.
- b. When the drawbridge can be opened immediately, the visual signal to acknowledge a request to open the draw, given not more than 30 seconds after the vessel's opening signal, is the following:
 - i. A white flag raised and lowered vertically;
 - ii. A white, amber, or green light raised and lowered vertically; or
 - iii. A fixed or flashing white, amber, or green light or lights.
- c. When the drawbridge cannot be opened immediately, or is open and must be closed promptly, the visual signal to acknowledge a request to open the draw is the following:
 - i. A red flag or red light swung back and forth horizontally in full sight of the vessel given not more than 30 seconds after the vessel's opening signal; or
 - ii. A fixed or flashing red light or lights given not more than 30 seconds after the vessel's opening signal.
- d. The acknowledging signal when the drawbridge cannot open immediately or is open and must be closed promptly shall be repeated until acknowledged in some manner by the requesting vessel.

4. Radio telephone communications:

- a. Radiotelephones may be used to communicate the same information provided by sound and visual signals.
- b. The vessel and the bridge tender shall monitor the frequency used until the vessel has cleared the draw.
- c. When radiotelephone contact cannot be initiated or maintained, sound or visual signals under this section shall be used.

RECORDS

The following records are retained by the organizations listed below:

Record	Responsible Organization
Bridge Control Console Data (no form number)	FSEU/Facilities Maintenance
Bridge Log Book for Visitor's and Events (no form number)	FSEU/Facilities Maintenance
KSC Form 28-1061 NS, "Report of Drawbridge Openings Kennedy Space Center"	FSEU/Facilities Maintenance

AFFECTED DIVISIONS/OFFICES

Engineering Services
FSEU and OM&E
Program Management
Safety & Mission Assurance

MANAGEMENT ROLES AND RESPONSIBILITIES

Program Manager: Ensures Contract compliance to the requirements stated in this Instruction. Reviews and approves or disapproves waiver requests written against this standard.

Division Manager: Ensures compliance within the Division to the requirements stated in this procedure.

Branch Manager: Ensures compliance at the branch level to the requirements stated in this procedure.

FUNCTIONAL ROLES AND RESPONSIBILITIES

Supervisor of Bridge Tenders:

- Ensure that operational instructions and reference documents as described in this document are reviewed, understood and followed by all Bridge Tenders.
- Ensure that only properly trained and qualified personnel participate in operating the bridge and other potentially hazardous operations. Ensure that all required training and certifications are kept current.
- Ensure that all Bridge Records are completed and provided to the BOSS Bridge Records Custodian as defined in Section 4 of this document.

Lead Bridge Tender:

- Ensure that operational instructions and reference documents as described in this document are reviewed, understood and followed by all Bridge Tenders.

- Provide all completed forms and Log Books to the BOSS Bridge Tender Supervisor as described in Section 4 of this document.

Bridge Tenders and Other Qualified Personnel that Will Operate the Bridge:

Follow all operational requirements that are defined in this document. The following list is provided to highlight some of the requirements:

- Review, understand and follow the operational Instructions as described in this document.
- Obtain all required training and certifications prior to performing the work described in this Instruction.
- Use the appropriate PPE as required for the type of work described in this Instruction.
- Complete all forms and Log Books as defined in Section 4 of this document.
- Perform the required preoperational checks at the start of each work shift as described in this Instruction. Perform the checks additional times during each shift, as necessary, or as directed by Supervision.
- Perform the required preoperational checks prior to each bridge opening – as described in this Instruction.
- Prior to raising or lowering a bridge span(s), it is required that the Bridge Tender, or the designated qualified operator, know the location of all personnel at the bridge site and must be certain that all personnel and equipment are clear.
- Understand the limitations that pertain to the use of the control console bypass switches – as described in this procedure.
- Review, understand and follow all of the requirements described in this document pertaining to communication with the Bridge Maintenance Crew when they are on site to perform maintenance work.
- Review, understand and follow all of the Operational Restrictions that are described in this Instruction.
- Review, understand and follow all of the Emergency Instructions that are described in this Instruction.

Supervisor of the Bridge Maintenance Crew:

Follow all operational requirements that are defined in this document. The following list is provided to highlight some of the requirements:

- Ensure that operational instructions and reference documents as described in this document are reviewed, understood and followed by all Bridge Technicians.

- Ensure that all Bridge Technicians obtain all required training and certifications prior to performing the work described in this Instruction. Ensure that all required training and certifications are kept current.
- Ensure that Bridge Technicians use the appropriate PPE as required for the type of work described in this Instruction.
- Understand the limitations that pertain to the use of the control console bypass switches – as described in this procedure.
- For maintenance and repair work that requires the bridge or a roadway lane to be closed to vehicle traffic, the Bridge Maintenance Supervisor must take all of the actions that are defined in this instruction - to inform KSC, CCAFS, Brevard County and the other agencies defined in this Instruction.
- At the job site at the start of each work shift and prior to starting any bridge maintenance or repair work, the Bridge Maintenance Supervisor, or designated person, shall take the lead in performing a Job Hazard Analysis (JHA) in strict conformance with [SHP-P-3100](#) – and as described in this Instruction.
- Ensure that communications between the Bridge Crew and the Bridge Tender are maintained as described in this Instruction.

Bridge Maintenance Crew Technicians:

- Review, understand and follow the operational instructions as described in this document.
- Obtain all required training and certifications prior to performing the work described in this Instruction.
- Use the appropriate PPE as required for the type of work described in this Instruction.

Bridge System Engineer:

- Maintain and update this Instruction to meet the requirements contained in all of the reference documents that are included in this Instruction.
- Provide troubleshooting assistance related to bridge operations - when help is requested by the Bridge Tender or the Supervisor (or Lead) of the Bridge Maintenance Crew.

Bridge Records Custodian:

- Archive all Bridge Records in accordance with current NASA and BOSS requirements.

REFERENCE DOCUMENTS

The following documents are referenced in this procedure:

Document Number	Title
29 CFR 1926.106	Code of Federal Regulations, Title 29, Part 1926.106, “Working Over or Near Water”
33 CFR Part 117	Code of Federal Regulations, Title 33, Part 117, “Drawbridge Operation Regulations”
KNPR 8715.3	KSC Safety Procedural Requirements
KSC Form 28-1061 NS	Report of Drawbridge Openings, Kennedy Space Center
MSI-I-0001	Master Schedule Integration Planning and Scheduling Instruction
MSI-REF-0001	Master Schedule Integration Planning and Scheduling Appendices
SHP-P-0132	Personal Protective Equipment
SHP-P-0242	Hand and Portable Power Tools
SHP-P-0303	Electrical Safety
SHP-P-0500	Fall Protection Program
SHP-P-0605	Water Safety
SHP-P-3100	Job Hazard Analysis (JHA)
SMA-EMP	Emergency Management Plan
SMA-P-0016	Event and Near Miss Reporting and Investigation

ADDITIONAL RESOURCES

The following documents are not referenced in this procedure, but are additional resources:

Document Number	Title
29 CFR 1910.145	Code of Federal Regulations, Title 29, Part 1910.145, “Specifications for Accident Prevention Signs and Tags”
SHP-F-3100	Job Hazard Analysis Form
SMA-SHP	BOSS Safety & Health Plan

ACRONYMS

ANSI	American National Standards Institute
CCAFS	Cape Canaveral Air Force Station
CFR	Code of Federal Regulations
FSEU	Facilities, Systems, Equipment and Utilities
FDOT	Florida Department of Transportation
Hz	Hertz (cycles per second)
BOSS	Base Operations and Spaceport Services
JHA	Job Hazard Analysis
KNPR	Kennedy NASA Procedural Requirements
KSC	Kennedy Space Center
LOTO	Lockout/Tagout
MCC	Motor Control Center
NASA	National Aeronautics and Space Administration
OJT	On-the-Job Training
OM&E	Operations, Maintenance & Engineering
OMI	Operations and Maintenance Instruction
OSHA	Occupational Safety & Health Administration
PPE	Personal Protective Equipment
RIO	Remote Input/Output
SDS	Safety Data Sheet
SHP	Safety & Health Programs
SMA	Safety & Mission Assurance
USGS	United States Coast Guard
VHF	Very High Frequency

DEFINITIONS

Bascule Bridge: A bascule bridge (commonly referred to as a drawbridge) is a moveable bridge with a counterweight that continuously balances a span, or "leaf," throughout its upward swing to provide clearance for boat traffic. It may be single or double leafed. The name comes from the French term for balance scale, which employs the same principle. Bascule bridges are the most common type of movable span because they open quickly and require relatively little energy to operate.

Switch, Bypass: A manually operated device used to provide a means of directly connecting load conductors to a power source and manually bypass an automated function.

Command Response Communication Method: The 2-way radio communication method that is required to be used during bridge maintenance operations. When the Bridge Maintenance Supervisor, or designated person, gives a command to the Bridge Tender, or designated operator, that pertains to a movement of a bridge span or other component, the Bridge Tender, or designated operator, shall confirm receipt and understanding of the command by repeating back the command, prior to initiating the operation.

Disconnecting Means. A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

Duty Office: BOSS scheduling / base support coordination, and operations monitoring function.

Far Side: Bascule bridge components (i.e. span, machinery room, roadside equipment room, traffic gates, abutment, etc.) of a 2-leaf moveable bridge that are located on the side of the bridge opposite from where the Bridge Control Tower is located. For the Banana River Bridge, the far side of the bridge is the east side.

Hertz (Hz): Hertz is a unit of frequency. The number of hertz equals the number of cycles per second. The frequency of any phenomenon with regular periodic variations can be expressed in hertz, but the term is used most frequently in connection with alternating electric currents, electromagnetic waves (light, radar, etc.), and sound. For the application of this Instruction document, hertz pertains to alternating electric current.

Knot: The knot, abbreviated kt or kn, is a unit of speed equal to one nautical mile (1.852 km) per hour or approximately 1.1508 miles per hour. The knot is used in meteorology, maritime and air navigation.

Near Side: Bascule bridge components (i.e. span, machinery room, roadside equipment room, traffic gates, abutment, etc.) of a 2-leaf moveable bridge that are located on the same side of the bridge as where the Bridge Control Tower is located. For the Banana River Bridge, the near side of the bridge is the west side.

Shall or must: Use of the word “shall” or “must” denotes a mandatory requirement.

Shunt Trip: Shunt trip circuit breakers shut off electrical power during emergencies to prevent injury to people and damage to equipment. The shunt trip, a safety feature added to a regular circuit breaker, allows a location or outside of the main breaker to trigger a power shut-off.

REVISION RECORD

The following revisions have been applied to this document:

Revision Number	Change Description	Date
0	Initial Release. (<u>NOTE</u> : OMI Q3906, Revision B, which has been cancelled, was referenced in the development of this ISC Instruction.)	09/2/2016
1	Administrative change only. Document updated to remove branding of previous contract.	04/01/19

DOCUMENT APPROVALS

Manager, FSEU OM&E

Signature on file