

^{A10} **SECTION 34 01 43.71 – MIRAFLORES SWING BRIDGE AND ACCESS**

1.01 SUMMARY:

- A. The purpose of this Section is to provide the requirements for the rehabilitation, testing, operation and maintenance of the Miraflores Swing Bridge and its east viaduct to ensure safe and reliable operation of the bridge at any time. The work will permit the use of the bridge for moving material and equipment between the Pacific project site and areas located to the east of the existing locks. This Section is only **applicable** if the Contractor decides that the use of the Miraflores Swing Bridge is necessary to facilitate the execution of the Works as established in **the Contractor's Technical Proposal**. See Section 01 50 00 (*Temporary Facilities, Accesses and Controls*).
- B. **Scope of Work:** The Contractor shall furnish and be responsible for the cost of all management, labor, tools, and any other equipment, transportation, materials, and parts necessary to inspect, repair, maintain, test, and operate the Miraflores Swing Bridge and the approaches as specified. All work shall be performed in accordance with these specifications. The work shall include but shall not be limited to the following elements:
1. **Swing Bridge Structure:** The rehabilitation of the portion of the bridge structure that opens and closes.
 2. **East Viaduct:** The rehabilitation of the fixed portion of the structure that connects the movable section of the bridge to the road on land.
 3. **Mechanical Components:** The rehabilitation of all mechanical components necessary for the testing, operation, and maintenance of the bridge.
 4. **Electrical:** The rehabilitation of all elements necessary for supplying electric power, light and control to the bridge and all electrical components required for the testing, operation and maintenance of the bridge.
 5. **Controls:** The rehabilitation of all elements necessary for controlling the safe testing and operation of the bridge.
 6. **Railway Tracks and Supports:** Design and construction of the railway tracks and supports on the Miraflores Swing Bridge and bridge accesses within the areas under the responsibility of the Employer.
- C. **Related Sections:** The following is a list of related Sections. See them for more details.
1. 01 35 29 (*Health and Safety Management/Emergency Response Procedures*).
 2. 01 42 13 (*Acronyms and Units*)
 3. 01 42 16 (*Definitions*).
 4. 01 42 19 (*Reference Standards*).
 5. 01 50 00 (*Temporary Facilities, Accesses and Controls*)
 6. Volume VI, Part 17 (*Miraflores Swing Bridge Reference Documents*).

1.02 REFERENCES:

A. **Reference Standards:**

1. **American Association of State Highway and Transportation Officials (AASHTO) Standards:**

LRFD Bridge Design Specifications, 4th Edition

Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, 4th Edition

Manual for Condition Evaluation of Bridges
2. **American Bearing Manufacturers Association (ABMA).**
3. **American Gear Manufacturers Association (AGMA).**
4. **American Institute of Steel Construction (AISC).**
5. **American National Standard Institute (ANSI).**
6. **American Society of Mechanical Engineers (ASME) International.**
7. **American Society for Testing and Materials (ASTM) International**
8. **American Welding Society (AWS).**
9. **Code of Federal Regulations (CFR)**

29 CFR 1910 Occupational Safety and Health Administration (OSHA), Department of Labor - Occupational Safety and Health Standards

29 CFR 1926 Occupational Safety and Health Administration (OSHA), Department of Labor - Safety and Health Regulations for Construction

29 CFR 1926.62 Lead Exposures in Construction
10. **Institute of Electrical and Electronics Engineers (IEEE).**
12. **International Organization for Standardization (ISO).**
13. **National Association of Corrosion Engineers (NACE).**
14. **National Electrical Manufacturers Association (NEMA).**
15. **National Fire Protection Association (NFPA).**
16. **Occupational Safety and Health Administration (OSHA).**
17. **Society for Protective Coatings (SSPC).**
18. **Manual for Railway Engineering by American Railway Engineering and**

Maintenance of Way Association (AREMA) Standards.

19. **Panama Canal Authority Regulations**

2600SEG-230

Norma para la Exposición al plomo

B. **Employer Provided Data:** See Volume VI, Part 17 (*Miraflores Swing Bridge Documents*) for the following documents. Refer to Sub-Clause 5.1 (*General Design Obligations*) of the Conditions of Contract.

1. Miraflores Swing Bridge Inspection Report
2. Miraflores Swing Bridge, Structural Analysis and Conceptual Cost Estimate
3. Miraflores Swing Bridge Reference Drawings:

1.03 REQUIREMENTS:

A. **Security Requirements:** The Contractor shall comply with the security requirements indicated in Section 01 50 00 (*Temporary Facilities, Accesses and Controls*) when performing work at the Employer's facility.

B. **Initial Inspection Work:** If the Contractor chooses to use the Miraflores Swing Bridge, within 35 days after the Commencement Date, the Contractor shall make a complete and systematic inspection of the Swing Bridge and East Viaduct. Prior notification by the Contractor of his intentions to use the Miraflores Swing Bridge is required. See Section 01 50 00 (*Temporary Facilities Accesses and Controls*).

C. **Inspection Requirements:**

1. **Swing Bridge Structure:**

- a. Perform a complete structural inspection to determine the condition of all structural members, connections and supports.
- b. Determine which structural members, connections and supports require repair or replacement.
- c. Perform a structural analysis to validate the load-carrying capacity of the swing bridge after repairs are done.

2. **East Viaduct:**

- a. Perform a complete structural inspection to determine the condition of all members, connections, and supports.
- b. Determine which members, connections, and supports require repair or replacement.
- c. Perform a structural analysis to validate the load-carrying capacity of the east viaduct after repairs are done.

3. **Mechanical:**

- a. Perform a complete inspection of all mechanical components to determine their condition.
- b. Determine which components require repair or replacement in order to provide a system that will provide the required level of operation and reliability.

4. **Electrical and Control:**

- a. The Contractor shall perform a complete inspection of all electrical and control systems and components to determine their condition.
- b. Determine which components require repair or replacement in order to provide the required level of operation and safety.

5. **Corrosion Protection:** Perform a complete inspection of the various components mentioned above to determine the condition of corrosion protection.

D. **General Maintenance Requirements:**

1. The swing bridge shall be maintained in a satisfactory, reliable and safe operating condition, in accordance with the requirements of these specifications, and shall be capable of providing at all times the maximum rated capacity, speed and performance indicated on the drawings, component identification plates and the manufacturer's data for the swing bridge. This compliance shall include the acceleration and retardation as designed by the manufacturer and as required for safe and reliable operation of the system. The Employer reserves the right to make such tests as necessary and when deemed advisable to ascertain compliance with these requirements.
2. The Contractor shall maintain all equipment appurtenances and accessories to comply with the requirements of all applicable regulations, rules, and codes.
3. The Contractor shall lubricate at regular scheduled intervals all parts of the machinery as recommended by the manufacturer.
4. **Clean-Up:** The Contractor shall be responsible for the general cleaning of spaces that house the equipment. General cleaning shall include removal of debris, dust and other matter from spaces utilized or maintained by the Contractor.
5. The Contractor shall ensure that the required personnel for maintenance or emergencies are available when the bridge is being operated.
6. The Contractor shall ensure the availability of parts required for the proper operation and maintenance of the bridge.
7. **Conditions Requiring Repairs and/or Replacements:** The Contractor's work shall include but shall not be limited to the following repairs and replacements:

- a. **Viaduct Shoes:** Replace all the expansion shoes and the two fixed shoes at east abutment.
- b. **Viaduct Foundation Anchor Bolts:** Replace all the anchor bolts at the pedestals.
- c. Bridge grounding system.
- d. Electrical distribution equipments such as cables, wire ways, junction boxes, terminal boxes, switches and circuit breakers that are damaged, deficient and may cause an electrical fault.
- e. Bridge, East Viaduct and West Approach lighting systems.

E. Corrosion Protection:

1. Provide the level of corrosion protection for each of the components to ensure that no deterioration of the components occur during the use of the swing bridge.
2. All replacement parts and equipment or any other part or equipment that is subject to rust shall be painted to match the existing paint scheme. Replacement parts and components shall be coated in accordance with Section 09 96 00 (*Corrosion Control Coatings*).
3. Lead Abatement shall conform to 29 CFR 1926.62 and any other applicable regulations; waste shall be chemically treated to stabilize the lead prior to disposal. Also, lead abatement shall include but shall not be limited to compliance with air, soil and water regulations.

- F. Reporting Hazardous Conditions:** Should the inspection, maintenance, repair or operation disclose any deficiencies that present a hazard, either to the equipment or users, the Contractor shall immediately report the hazard directly to the Employer.

1.04 DESIGN CRITERIA/SYSTEM DESCRIPTION:

A. Performance:

1. The structural components shall be able to carry the required loading, as indicated on the [Miraflores Swing Bridge reference](#) drawings, without causing any damage, loss of life, injury to the Contractor's or Employer personnel, or interruption in Canal Operations. Design loads shall not be exceeded. [See Volume VI, Part 17 \(Miraflores Swing Bridge Documents\) for the Miraflores Swing Bridge reference drawings.](#)
2. The mechanical, electrical, and control systems shall provide reliable service that will not cause disruption to the operation of the Canal.

3. The entire system (structural, mechanical, electrical, and controls) shall permit the reliable operation (opening and closing) of the bridge within the times designated by Employer.
 4. The Contractor shall develop Contingency plans for electrical, control, and mechanical failures to be able to open the swing bridge when required. Structural failure is not acceptable to the Employer. The execution of the Contingency plans shall permit the Contractor to open the bridge within 2 hours should the operating mechanism fail. If the Contractor fails within the 2-hour period to reopen the swing bridge or fails to diligently prosecute the work of reopening the bridge, the Employer may reopen the bridge by any means deemed necessary and the Contractor shall be liable to the Employer for all resulting costs.
 5. The Contractor shall coordinate the opening and closing of the swing bridge with the Employer.
- B. **Swing Bridge Hours of Operation:** The swing bridge will be permitted by the Employer to be operated in the closed position for rail or road traffic for no more than 1.5 hours daily for the Contractor. As such it contemplates only one swing per day at a time most convenient to vessel Transit operations as directed by the Employer's Representative. The Contractor shall operate the bridge under the supervision of the Employer. The Employer may operate the swing bridge for its own use whenever the need arises without notifying the Contractor.
- C. **Safety and Health Protection:** The Contractor shall comply with all applicable Employer's safety, fire prevention, and sanitary regulations. Whenever required, barricades and warning signs shall be provided to areas where work is being performed. Such barricades and warning signs shall be placed prior to commencement of any maintenance work. See Section 01 35 29 (*Health and Safety Management/Emergency Response Procedures*) and Section 01 50 00 (*Temporary Facilities, Accesses and Controls*). The existing paint on some components such as the swing spans of the bridge and the viaduct contains lead. The Contractor shall implement lead abatement where required. The cost for any lead abatement shall be the responsibility of the Contractor.
- 1.05 SUBMITTALS:** All drawings and other submittals shall be submitted in accordance with the requirements of Section 01 33 00 (*Submittal Procedures*) and the requirements of this Section for the following phases:
- A. **Initial Inspection Report:** The Contractor shall perform a complete and systematic inspection of the swing bridge and east viaduct in accordance with Paragraph 1.03 of this section. The Contractor shall submit an initial inspection report to the Employer's Representative for review, within 42 days after the Commencement Date, indicating the existing deficiencies that would require correction to bring all equipment up to a reliable and safe operating condition.
 - B. Ninety one (91) calendar days before beginning repairs on the Miraflores Swing Bridge the Contractor shall submit to the Employer for approval the following:

1. Drawings showing the layout plans, the types and locations of the repairs or replacements required for the structural, mechanical, electrical, controls, and corrosion systems.
 2. **Documentation:**
 - a. Analysis that substantiate the capacity of the structures for the intended loadings. Design assumptions and calculations (including but not limited to, design codes, load combinations, and allowed stress.)
 - b. **Purchased Equipment Data:** The Contractor shall submit, for the review of the Employer's Representative, a list of equipment for intended purchase with technical documentation attached, including the catalog items.
 - c. **Electrical and Electronic Data:** The electrical and electronic data shall include drawings and information on electrical power and control circuits and information on standard components to be used.
 - C. **Testing and Inspection Reports:** The Contractor shall furnish to the Employer for his review a report on all tests and inspections, showing in detail each test procedure and inspection results. Certified test reports shall be submitted to the Employer's Representative in booklet form. Refer to Section 01 31 00 (*Project Management and Coordination*).
 - D. **Monthly Reports:** The Contractor shall furnish to the Employer [for his review](#) monthly reports in accordance with Section 01 31 00 (*Project Management and Coordination*). The reports shall be furnished within 7 calendar days after the last day of each month. The reports shall include but shall not be limited to progress of work, tests performed, tests witnessed, inspections performed, correspondence received, observations, comments, meetings, and recommendations.
- 1.06 QUALITY ASSURANCE:** The Contractor shall provide quality control adequate to ensure that inspections are thorough and that all required repairs and maintenance tasks are performed. All work shall comply with the requirements of Section 01 40 00 (*Quality Requirements*).
- A. **Workmanship:** Structural fabrication shall conform to the applicable requirements of AISC, AWS, or other recognized agencies. Unless otherwise specified, all welding shall be in accordance with the applicable AWS code or other equivalent recognized regulation. All welding procedures and welding performance qualifications to be used shall be in accordance with AWS requirements.
 - B. **Tests, Inspections, and Verifications:** Tests, inspections, and verifications for materials and fabricated items shall be specified by the Contractor to conform to applicable requirements. The Contractor shall confirm compliance of all project requirements and shall carry out the tests, inspections, and verifications of the bridge. These inspections shall be undertaken after the Employer's Representative has reviewed the quality-control and test plans submitted by the Contractor. The Employer's Representative reserves the right to inspect independently all phases of the work, by using Employer's Personnel or third-party inspection services.

- C. **Operational Tests:** After the Swing Bridge, east viaduct and operating machinery, rehabilitation has been completed; the Contractor shall operate the bridge throughout its full operating range for at least 5 complete cycles to demonstrate proper operation. Adjustments shall be made to the operation and control system until all components function as required. The bridge structure shall be operated through its entire travel a sufficient number of times to indicate that all parts and equipment are in good operating condition and to ensure that the bridge is in true alignment and that necessary clearances have been provided. Compliance with bridge closing and opening time shall be verified during these operations. Required repairs or replacements to correct defects, as determined by the Employer's Representative, shall be made at no additional cost to the Employer. The trial operation and testing shall be successfully repeated after defects are corrected. Tests shall also be performed on all redundant systems, equipment, and components. The primary systems, equipment, and components shall be temporarily taken out of service, as required, to perform these tests. The operational tests shall be performed on a remote automatic as well as local manual basis.

1.07 QUALIFICATION OF THE CONTRACTOR'S TECHNICAL PERSONNEL: The Contractor shall provide personnel who shall be responsible for daily swing bridge operations, maintenance and all work performed under this Section.

- A. **Management Personnel:** The names of the any management personnel, as well as alternate(s) who will assume management duties and have the authority to act for the Contractor when the managers are absent, shall be designated in writing to the Employer prior to the Commencement Date. Management personnel shall be available for calls on a 24-hour-day 7-day-week schedule, and phone number(s) shall be provided to enable contact with them at any time.
- B. **Technicians:** All maintenance personnel directly engaged in the work to be accomplished under this Section shall possess, prior to their employment in a craftsman's position on this Contract, at least 4 years of recent (within the last 6 years) work-related experience in a trade of similar complexity: Such experience shall include the operation, maintenance, and repair of equipment of similar complexity.
- C. **Inspection Team Leaders:** The inspection team leaders shall be qualified engineers or have a related technical degree, and have a minimum of five (5) years of work-related experience (within the last 7 years) in the inspection of structures and equipment of similar type and complexity.

END OF SECTION^{A10}