



Department of the Army
U.S. Army Corps of Engineers
Washington, DC

Engineer Circular 1130-2-553

18 March 2025

CECW-CO

EXPIRES 18 March 2027
Project Operations
Flood Risk Management Maintenance Standards

FOR THE COMMANDER:

DAMON A. DELAROSA
COL, EN
Chief of Staff

Purpose. This engineer circular establishes policy for maintenance practices for flood risk management dams. It defines the project maintenance plans, maintenance standards, standard maintenance categorization, and maintenance management control that will be included in a future maintenance regulation.

Applicability. This circular applies to all United States Army Corps of Engineers Civil Works elements and all United States Army Corps of Engineers commands having flood risk management dams.

Distribution Statement. Approved for public release; distribution is unlimited.

Proponent and Exception Authority. The proponent of this circular is the Directorate of Civil Works, Operations and Regulatory Division. The proponent has the authority to approve exceptions or waivers to this circular that are consistent with controlling law and regulations. Only the proponent of a publication or form may modify it by officially revising or rescinding it.

Contents

1. Purpose	1
2. Distribution statement	1
3. References	1
4. Records management (recordkeeping) requirements	1
5. Associated publications	1
6. Project-Maintenance Management Plans	1
7. Standard maintenance categorization	1
8. Responsibilities	3
9. Maintenance standards	3

Appendixes

Appendix A References	5
Appendix B Bridges Maintenance Tasks	9
Appendix C Dam Sections Maintenance Tasks	14
Appendix D Outlet Works Maintenance Tasks	21
Appendix E Spillways Maintenance Tasks	59
Appendix F Instrumentation Maintenance Tasks	76

Table List

Table 1 Maintenance frequency matrix	3
Table B–1. Bridges maintenance task list	9
Table C–1. Dam sections maintenance task list.....	14
Table D–1. Outlet works maintenance task list	21
Table E–1. Spillways maintenance task list.....	59
Table F–1. Instrumentation maintenance task list	76

1. Purpose

This engineer circular establishes policy for maintenance practices for flood risk management dams. It defines the project maintenance plans, maintenance standards, standard maintenance categorization, and maintenance management control that will be included in a future maintenance regulation.

2. Distribution statement

Approved for public release; distribution is unlimited.

3. References

See Appendix A.

4. Records management (recordkeeping) requirements

The records management requirement for all record numbers, associated forms, and reports required by this publication are addressed in the Army Records Retention Schedule. Detailed information for all related record numbers is located on the U.S. Army Corps of Engineers (USACE) Records Management Site <https://usace.dps.mil/sites/INTRA-CIOG6/SitePages/Records-Management.aspx>. If any record numbers, forms, and reports are not current, addressed, and/or published correctly, see DA Pam 25-403 for guidance.

5. Associated publications

This section contains no entries.

6. Project-Maintenance Management Plans

a. Project-Maintenance Management Plans (PMMPs) will be developed to plan and adapt tasks necessary to maintain flood risk management dam facilities. PMMPs will be based on the maintenance standards defined herein. PMMPs will identify roles and requirements of those responsible for ensuring maintenance is performed according to the specific maintenance plans.

b. The PMMPs must be reviewed and approved at the Operations Project Manager (OPM) level and above. OPMs will review PMMPs at least every 5 years and update as needed. Updates will also be made within 1 year of change in equipment or other events that affect details in the plan.

7. Standard maintenance categorization

a. According to the guidance provided by the major subordinate command (MSC), all flood risk management maintenance and inspection activities will be prioritized by the OPM for the affected facility. The OPM will ensure that identified, priority maintenance

and inspection activities are scheduled, maintenance history captured, and accountability for performance documented in the Facilities and Equipment Maintenance System (FEM). The work order priority application will be used to manage maintenance activities and defer work according to MSC guidance.

b. The four categories of flood risk management maintenance are defined as:

(1) Preventive Maintenance – the systematic care, servicing, and inspection of assets, facilities, equipment, and components for the purpose of detecting and correcting incipient failures and accomplishing minor maintenance. The frequency of preventive maintenance is generally less than one year.

(2) Corrective Maintenance – the repair or renewal of an item that has failed or is about to fail. In a mature maintenance organization, this corrective maintenance work is frequently identified during the performance of inspections or preventive maintenance work and corrected before an unplanned failure occurs.

(3) Recurring Maintenance – the replacement or renewal of items that are required on a recurring basis, with a frequency of greater than 1 year and less than 7 to 10 years. Examples are painting, floor coverings, engine overhauls, etc. These generally fall below the capital thresholds. These are also the items that are frequently deferred. Recurring maintenance is sometimes referred to as cyclic maintenance.

(4) Component Renewal – the renewal or replacement of major asset components (roofs, large heating, ventilation, and air conditioning system; lock and dam gates and mechanisms; etc.) The work almost always exceeds the capital threshold and generally has a frequency of greater than 7 to 10 years but is not a capital improvement.

c. Common maintenance strategies employ the above maintenance categories in a deliberate approach as follows:

(1) Predictive Maintenance – the practice of choosing maintenance actions based on a well-developed program that includes equipment history, monitoring, analysis, scheduling, documentation, and benchmark testing to determine imminent equipment operational degradation. Predictive maintenance is a technique used extensively in a reliability-centered maintenance program that uses a condition-based approach where the equipment is monitored and measured to determine when maintenance is needed. It includes evaluation of equipment history, monitoring, analysis, documentation, and benchmark testing to determine imminent equipment operational degradation and the implementation of appropriate repair or replace evaluation. The goal of predictive maintenance is to avoid excessive maintenance while detecting impending failures and repairing or replacing components or equipment before it fails in service.

(2) Reactive Maintenance – the practice of structuring maintenance and operation activities around performing repairs when equipment has already functionally failed, in order to restore the equipment to its normal operating condition.

8. Responsibilities

a. The Chief of Operations at the MSC is responsible for oversight and coordination within the region to ensure maintenance standards are applied at each lock and dam facility. They, or their designee at the regional level, are also responsible for approval of variances requested to the maintenance standards. Approval for variances to the maintenance standards may be delegated to the District Chief of Operations but not lower.

b. The Chief of Operations at the District is responsible for the implementation of the maintenance standards at the locks and dams. They are also responsible for reviewing the request for a variance to the maintenance standards. When authority is delegated, they are responsible to approve deviations from the maintenance standards.

c. Operations Managers (OMs) and OPMs are responsible for documenting performance of the maintenance standards in FEM. They are responsible for submitting any requests for variance to the MSC Chief of Operations for approval. OMs/OPMs are responsible for incorporating the maintenance standards into preventive maintenance program at their facilities. The OPM is responsible to maintain a record of approval by the MSC Chief of Operations or designee for any deviation from the maintenance standards provided in this policy.

d. The maintenance manager at each lock and dam is responsible to assure maintenance actions are completed and the work was performed according to the standards.

9. Maintenance standards

a. A maintenance standard is defined by the task and the task frequency taken together. Appendixes B through F list required maintenance tasks and frequencies for essential operating systems and subsystems common across the Enterprise. This set of standards are used to establish an initial maintenance plan.

b. Because a maintenance standard is defined by the task and frequency of performance, maintenance task frequencies may be adjusted based on recommendations provided in Table 1 and only when an approved variance is granted.

Table 1
Maintenance frequency matrix

Reliability Requirements	Asset Condition		
	Poor	Fair	Good
Low	Standard	Less Frequent	Least Frequent
Medium	More Frequent	Standard	Less Frequent
High	Most Frequent	More Frequent	Standard

c. Appendixes B through F do not specify “how” to perform maintenance tasks. The standard of quality for maintenance work associated with a task is based on the professional standards of the craft trade performing the work and are influenced by applicable equipment standards, specific manufacturer’s maintenance manuals and recommendations, equipment condition and history, criticality, environment, severity of use, and other pertinent parameters.

d. The InterNational Electrical Testing Association (NETA) Standard for Maintenance Testing Specifications for Electrical Power Equipment and Systems (ANSI/NETA MTS) is a document that is used worldwide by individuals seeking to assure that the electrical power equipment and systems in their care operate reliably and safely in conformance with industry and manufacturer standards and tolerances. NETA-referenced tasks must incorporate ANSI/NETA MTS Section 3 (Qualifications), Section 4 (Division of Responsibility), and Section 5 (General) by reference as a part of any subsection. The use of NETA-certified contractor support is encouraged.

e. MSC subject matter experts will provide guidance on how to address equipment and variations not identified within appendixes B through F.

f. If the appendixes show tasks that do not apply to any equipment at a facility, this will be reflected in the PMMPs and approved by the MSC Chief of Operations.

Appendix A References

Section I

Required Publications

Unless otherwise indicated, all U.S. Army Corps of Engineers publications are available on the USACE website at <https://publications.usace.army.mil>. Army publications are available on the Army Publishing Directorate website at <https://armypubs.army.mil>. DoD Publications are available on the Executive Services Directorate (ESD) website at <https://www.esd.whs.mil>. American Society of Mechanical Engineers (ASME) publications are available at <https://www.asme.org>. National Fire Protection Association (NFPA) publications are available at <https://www.nfpa.org>. Occupational Safety and Health Administration (OSHA) publications are available at <https://www.osha.gov/>. Unified Facilities Criteria (UFC) publications are available at <https://www.wbdg.org>.

ANSI/ASSP Z359.2, 2017

Minimum Requirements for a Comprehensive Managed Fall Protection Program
(Available at <https://blog.ansi.org/2017/04/ansi-asse-z3592-2017-fall-protection/>.)

ANSI/NETA MTS-2023

American National Standards Institute/InterNational Electrical Testing Association
Standard for Maintenance Testing Specifications for Electrical Power Equipment and
Systems (Available at <https://www.netaworld.org>)

AR 190-13

The Army Physical Security Program

AR 190-51

Security of Unclassified Army Resource

ASME A17.1, 2019

Safety Code for Elevators and Escalators

ASME A17.1, 2021

Safety Code for Elevators and Escalators

ASME A17.2, 2020

Guide for Inspection of Elevators, Escalators, and Moving Walks

ASME B30.2, 2022

Overhead and Gantry Cranes

ASME B30.10, 2014

Hooks

ASTM D6224, 2022

Standard Practice for In-Service Monitoring of Lubricating Oil for Auxiliary Power Plant Equipment (Available at <https://www.astm.org/d6224-23.html>.)

California Code of Regulations, CCR title 8 subsection 3001c

(Available at <https://www.dir.ca.gov/title8/3001.html>.)

DA Pam 25-403

Guide to Recordkeeping in the Army

EM 1110-2-1102

Inspection and Evaluation of USACE Bridges

EM 1110-2-1424

Lubricants and Hydraulic Fluids

EM 1110-2-1908

Instrumentation of Embankment Dams and Levees

EM 1110-2-1914

Design, Construction, and Maintenance of Relief Wells

EM 1110-2-2610

Lock and Dam Operating Equipment

EM 1110-2-3105

Mechanical and Electrical Design of Pumping Stations

EM 1110-2-3200

Wire Rope for Civil Works Structure

EM 1110-2-3400

Painting – New Construction and Maintenance

EM 1110-2-6054

Inspection, Evaluation, and repair of Hydraulic Steel Structures

ER 1110-2-101

Reporting of Evidence of Distress of Civil Works Projects

ER 1110-2-111

USACE Bridge Safety Program

ER 1110-2-1156

Safety of Dams – Policy and Procedures

ER 1110-2-8157

Responsibility for Hydraulic Steel Structures

IEEE 43, 2013

Recommended Practice For Testing Insulation Resistance of Electrical Machinery
(Available at [https://standards.ieee.org/ieee/43/4791/.](https://standards.ieee.org/ieee/43/4791/))

ISO 4406, 2021

Hydraulic fluid power—Fluids—Method for coding the level of contamination by solid particles (Available at [https://www.iso.org/standard/79716.html.](https://www.iso.org/standard/79716.html))

NFPA 1, 2020

Fire Code

NFPA 70B – 2016 70B

Recommended Practice for Electrical Equipment Maintenance

NFPA 110, 2019

Emergency and Standby Power Systems

OSHA 1910.22

General Requirements

OSHA 1910.28

Duty to have fall protection and falling object protection.

OSHA 1910.29

Fall protection systems and falling object protection – criteria and practices.

OSHA 1910.30

Training requirements.

Title 23 Code of Federal Regulations, Part 650, Subpart C

National Bridge Inspection Standards, the American Association of State Highway and Transportation Officials (AASHTO) Manual for Maintenance Inspection of Bridges, 2nd edition, 2002. (Available at

[https://www.federalregister.gov/documents/2022/05/06/2022-09512/national-bridge-inspection-standards.](https://www.federalregister.gov/documents/2022/05/06/2022-09512/national-bridge-inspection-standards))

TM 5-601, 2006

Supervisory Control and Data Acquisition (SCADA) Systems for Command, Control, Communications, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR) Facilities (Available at [https://www.wbdg.org/ffc/army-coe/technical-manuals-tm/tm-5-601.](https://www.wbdg.org/ffc/army-coe/technical-manuals-tm/tm-5-601))

UFC 3-530-01, 2015

Interior and Exterior Lighting Systems and Controls

UFC 3-540-07, 2019

Operation and maintenance – Generator

UFC 4-022-02, 2010
Selection and Application of Vehicle Barriers

Section II

Prescribed Forms

This section contains no entries.

Appendix B Bridges Maintenance Tasks

O=Operational, W=Weekly, M=Monthly, Q=Quarterly, S=Semi-Annual, A=Annual, and P=Periodic.

Table B-1. Bridges maintenance task list

Maintenance Tasks	O	W	M	Q	S	A	P	References
Substructure								
Railing Post Anchors								
Visually inspect for loose or missing anchor bolts and nuts and record on the work order.							2 yrs	Project O&M Manual
Visually inspect for broken or missing welds and record on the work order.							2 yrs	Project O&M Manual
Visually inspect metal work for corrosion and record on the work order.							2 yrs	Project O&M Manual
Visually inspect for broken anchor bolt split washers at the bearings and record on the work order.							2 yrs	Project O&M Manual
Piers								
Visually inspect for damage, settlement, cracking, or misalignment and record on the work order.							2 yrs	Project O&M Manual
Visually inspect grout pads for delamination at seismic restraints and record on the work order.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of grout pads at bridge bearing plates.							2 yrs	Project O&M Manual
Visually inspect gabions for deterioration and record on the work order.							2 yrs	Project O&M Manual
Abutments								
Visually inspect and record on the work order the condition of settlement or loss of material.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of vegetation.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of concrete cracks, deterioration, rust stains, or differential settlements.							2 yrs	Project O&M Manual
Superstructure								
Girders, Stringers, Diaphragms								
Visually inspect for corrosion or damage and record on the work order.							2 yrs	Project O&M Manual
Visually inspect for offset openings at the piers and record on the work order.							2 yrs	Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for bird droppings and other foreign debris from bottom flange and record on the work order.							2 yrs	Project O&M Manual
Visually inspect for loose bolts, tighten, and record on the work order.							2 yrs	Project O&M Manual
Hand Railing								
Verify and record on the work order that the top rail (installed on or after Jan. 17, 2017) has at least 42 inches in height and handrail must be between 30 and 38 inches height.							5 yrs	OHSA 1910.29
Verify and record on the work order that the top rail (installed before Jan. 17, 2017) is between 36 and 38 inches height. Top rail may serve as a handrail.							5 yrs	OHSA 1910.30
Visually inspect for corrosion or damage; record on the work order.							2 yrs	Project O&M Manual
Visually inspect for misalignments; record movement on the work order.							2 yrs	Project O&M Manual
Visually inspect for missing hardware components; tighten hardware as needed and record condition on the work order.							2 yrs	Project O&M Manual
Visually inspect for handrail continuity and record on work order.							2 yrs	ER 1110-2-111
Steel Grating								
Elevated platforms: Verify and record on the work order that 42 inch high guardrail or barrier are provided along open sides.						x		OSHA 1910.28
Visually inspect for missing grating and record on the work order.						x		OSHA 1910.22
Visually inspect for bending, unlevel, flexing, etc. of grating when walked on and record on the work order.						x		OSHA 1910.22
Visually inspect and record on the work order the condition of corrosion.						x		OSHA 1910.22
Verify and record on the work order that grating has at least tie down clips installed on each support (e.g. 6-8 clips per grating section).						x		OSHA 1910.22
Verify and record on the work order that the grating panels overlap the support beam by at least one inch.						x		OSHA 1910.22
Visually inspect for corrosion or damage and record on the work order.							2 yrs	Project O&M Manual
Visually inspect for excessive strain or deflection in joints or members and record on the work order.							2 yrs	Project O&M Manual
Decking								
Survey Monuments								
Visually inspect for settlement or misalignment and record on the work order.							2 yrs	Project O&M Manual
Visually inspect for missing caps or if monument is damaged and record on the work order.							2 yrs	Project O&M Manual
Drains								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Verify and record on the work order the drainage system is free of debris and obstructions.						x		Project O&M Manual
Visually inspect for proper slope of the drainage system and record on the work order.						x		Project O&M Manual
Visually inspect for loose, damaged, or missing drains and record on the work order.						x		Project O&M Manual
Concrete								
Visually inspect and record on the work order the condition of concrete cracks.						x		Project O&M Manual
Visually inspect and record on the work order the condition of scaling, spalls or popouts of concrete.						x		Project O&M Manual
Visually inspect and record on the work order the condition of overall apparent alignment of structure (settlement, deflection, expansion, and contraction).						x		Project O&M Manual
Visually inspect and record on the work order the condition of flashing joints, sealants, weep holes, etc. for drainage issues.						x		Project O&M Manual
Visually inspect for large cracks, spalls, delamination, rust stains, or exposed rebar and record on the work order.							2 yrs	Project O&M Manual
Visually inspect for excessive weed growth. Recommend removal at specific locations as needed for mission. Record condition on the work order.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of holes in curbing joint sealant.							2 yrs	Project O&M Manual
Steel Grating								
Elevated platforms: Verify and record on work order that 42 inch high guardrail or barrier are provided along open sides.						x		OSHA 1910.28
Visually inspect for missing grating and record on the work order.						x		OSHA 1910.22
Visually inspect for bending, unlevel, flexing, etc. of grating when walked on and record on the work order.						x		OSHA 1910.22
Visually inspect and record on the work order the condition of corrosion.						x		OSHA 1910.22
Verify and record on the work order that grating has clips installed as recommended by grating manufacturer.						x		OSHA 1910.22
Verify and record on the work order that the grating panels overlap the support beam by at least one inch.						x		OSHA 1910.22
Visually inspect for corrosion or damage and record on the work order.							2 yrs	Project O&M Manual
Visually inspect for excessive strain or deflection in joints or members and record on the work order.							2 yrs	Project O&M Manual
Joints								
Expansion Bearings								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for binding and corrosion; record on the work order.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of misalignments; record movement.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of joint sealant.							2 yrs	Project O&M Manual
Remove debris and record on the work order.						x		Project O&M Manual
Plates								
Visually inspect for corrosion and debris and record on the work order.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of misalignments; record movement.							2 yrs	Project O&M Manual
Approach Roadway								
Visually inspect and record on the work order the condition of the vertical offset between the approach roadway and bridge deck.							2 yrs	Project O&M Manual
Other								
Visually inspect and record on the work order the condition of utility lines and brackets; Record corrosion, flaking paint, bird droppings and other foreign debris.							2 yrs	EM 1110-2-1102
Visually inspect and record on the work order the condition of protective coatings.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of gap between chain-linked fence and bridge deck. Recommend monitoring if appropriate.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of fences and gates.							2 yrs	Project O&M Manual
Traffic Safety Features								
Visually inspect bridge railing system for corrosion and tighten bolts; record on the work order.							2 yrs	EM 1110-2-1102
Verify and record on the work order that the paddle markers adjacent of the bridge approaches are painted with reflective paint.							2 yrs	Project O&M Manual
Verify and record on the work order that the load posting signs are in place, legible, and match requirements.							2 yrs	Project O&M Manual
Verify and record on the work order that the bridge markers and delineators are properly located and meet standards.							2 yrs	Project O&M Manual
Visually inspect and record on the work order the condition of reflective tape on the guardrail ends; replace as needed.							2 yrs	ER 1110-2-111
Visually inspect and record on the work order the condition of vehicle barrier system.							2 yrs	EM 1110-2-1102
Visually inspect and record on the work order the condition of electrical conduit/expansion joints under the service bridge.							2 yrs	NFPA 70B
Electrical Conduit								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect cable and raceways for proper bonding to fittings (plugs, tap, boxes) and record on the work order.							2 yrs	NFPA 70B
Visually inspect for conduit which has been bent, dented, crimped, cut, or broken and record on the work order.							2 yrs	NFPA 70B
Visually inspect for leaks into electrical conduit where improper fittings are used or where the conduit is damaged and record on the work order.							2 yrs	NFPA 70B
Verify and record on the work order that the conduit is properly supported.							2 yrs	NFPA 70B
Verify and record on the work order the installation of weatherproof hubs on outside installations.							2 yrs	NFPA 70B
Verify and record on the work order that bushings are installed at boxes.							2 yrs	NFPA 70B

Appendix C Dam Sections Maintenance Tasks

O=Operational, W=Weekly, M=Monthly, Q=Quarterly, S=Semi-Annual, A=Annual, and P=Periodic

Table C–1. Dam sections maintenance task list

Maintenance Tasks	O	W	M	Q	S	A	P	References
Embankment Sections								
Visually inspect and record on the work order the condition of settlement on the upstream and downstream slopes, caused by slides or sloughs, slumps, sink holes or collapses.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of large cracks and cracks due to desecration (drought conditions) on the upstream and downstream embankments and abutments to include length, width, depth, and vertical offsets.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of downstream slope seepage. Record on the work order the condition of seepage through the foundation, downstream from the embankment.						x		ER 1110-2-1156
Record on the work order the condition of benching on the upstream slope, include approximate stationing and bench height.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of woody debris on upstream slope. Include stations and elevation of findings.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of vegetation growth on the upstream and downstream slopes. Record on the work order the change in vegetation that may indicate seepage.				x				ER 1110-2-1156
Visually inspect and record on the work order the condition of surface runoff collector system for sinkholes in vicinity of system, standing water, joint separations, obstructions, sealant.				x				ER 1110-2-1156
Visually inspect seepage blanket areas for woody vegetation and erosion and record on the work order.				x				ER 1110-2-1156
Survey Monuments								
Visually inspect and record on the work order the condition of settlement caused by slides or sloughs, slumps, sink holes or collapses.						x		Project O&M Manual
Visually inspect for missing caps and monument damage and record on the work order.						x		Project O&M Manual
Stone Protection								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for broken down or missing riprap on the downstream and upstream slopes. Record erosion behind riprap.						x		Project O&M Manual
Concrete Sections, Mass Concrete								
Non-Overflow Sections								
Remove excessive joint vegetation and record on the work order.				x				Project O&M Manual
Visually inspect and record on the work order the condition of joints and joint material and record signs of movement.						x		Project O&M Manual
Visually inspect wall drains for loss of backfill material and or grates for damage and record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of monolith numbers along joints. Repair if needed.						x		Project O&M Manual
Visually inspect and record on work order the condition of cracks in concrete, spalls, offsets, pitting, holes and if rebar is exposed.						x		Project O&M Manual
Visually inspect and record on work order the condition of discoloration from joints or cracks.						x		Project O&M Manual
Retaining Wall								
Visually inspect and record on the work order the condition of cracks, spalls, offsets, and settlement.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of unusual seepage, include locations and elevation.						x		ER 1110-2-1156
Visually inspect for loss of backfill material in wall drains or damage to grates and record on the work order.						x		ER 1110-2-1156
Faces								
Visually inspect and record on the work order the condition of cracks, spalls, settlement and/or if rebar is exposed. Check for rust colored staining from cracks.						x		ER 1110-2-1156
Visually inspect for unusual seepage and record on the work order.						x		ER 1110-2-1156
Metal								
Visually inspect and record on the work order the condition of fatigue or failure of items embedded in concrete.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of loose connections and anchor bolts, and tighten as needed.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of fastening mechanisms, chains, and locks for bent, broken, or missing parts.						x		ER 1110-2-1156

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for corrosion on hinges, doors, ladders, steps, and handrails; reapply protective coating and record on the work order.						x		ER 1110-2-1156
Visually inspect for excessive strain or deflection in joints or members and record condition the work order.						x		ER 1110-2-1156
Overflow Sections								
Aeration Piers								
Visually inspect and record on the work order the condition of cracks, spalls, abrasive wear, and exposed reinforcement.						x		ER 1110-2-1156
Visually inspect for damage caused by flow debris and record on the work.						x		ER 1110-2-1156
Faces								
Visually inspect and record on the work order the condition of cracks, spalls, and settlement.						x		Project O&M Manual
Visually inspect for unusual seepage and record on the work order.						x		Project O&M Manual
Fall Protection System (to be performed by Fall Protection Competent Person or Qualified Person)								
Visually inspect for spalling and delamination on anchorage surface near the connectors and record on the work order.						x		ANSI/ASSP Z359.2
Visually inspect anchorage connectors for corrosion, dents, cracks, and deformities and record on the work order.						x		ANSI/ASSP Z359.2
Verify and record on the work order that connectors are securely attached to the surface.						x		ANSI/ASSP Z359.2
Visually inspect steel cable for corrosion, fraying, and deformities and record on the work order.						x		ANSI/ASSP Z359.2
Remove debris from cable and connectors; record on the work order.						x		ANSI/ASSP Z359.2
Visually inspect for corrosion and damage to additional positioning points and record on the work order.						x		ANSI/ASSP Z359.2
Verify and record on the work order that the positioning points are securely attached to anchorage surface.						x		ANSI/ASSP Z359.2
Abutments								
Remove woody vegetation within 15' of groin and record on the work order.				x				Project O&M Manual
Visually inspect for seepage along abutment. If seepage found, record on the work order and include elevation, current pool elevation, clear or cloudy water, and flow rate.				x				Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
If abutment has grouted riprap, visually inspect for breakdown of the grout, riprap popouts, and voids under grouted riprap by sounding or noting holes. Repair deficiencies and record on the work order.				x				Project O&M Manual
Survey Monuments								
Visually inspect and record on the work order the condition of settlement caused by slides or sloughs, slumps, sink holes or collapses.					x			Project O&M Manual
Visually inspect and record on the work order the condition of missing caps/plates and monument damage.					x			Project O&M Manual
Drains								
Visually inspect and record on the work order the condition of clogs of the drainage system.				x				Project O&M Manual
Visually inspect and record on the work order the condition of drainage system and verify proper slope.				x				Project O&M Manual
Verify and record on the work order that the drainage system free of debris and obstructions.				x				Project O&M Manual
Visually inspect for flowrate that is outside normal range and record on the work order.				x				Project O&M Manual
Visually inspect and record on the work order the functionality of French drains.				x				Project O&M Manual
Backfill								
Visually inspect for seepage through the downstream abutments or contacts. Record on the work order the number of seepage points, approximate elevation on embankment, approximate flow rate, and color of seeping water.				x				Project O&M Manual
Visually inspect and record on the work order the condition of gully development in the contacts. Record if gully has been filled with rock material. Recommend monitoring or repair as appropriate.				x				Project O&M Manual
Visually inspect and record on the work order the condition of vegetation growth on the abutments of contacts of the dam. Record any marked change in vegetation that may indicate seepage.				x				Project O&M Manual
Visually inspect for burrowing rodent activity and record on the work order.				x				Project O&M Manual
Groins								
Remove woody vegetation within 15' of groin and record on the work order.				x				Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for seepage along groin. If seepage found, record on the work order and include elevation, current pool elevation, clear or cloudy water, and flow rate.				x				Project O&M Manual
If abutment has grouted riprap, visually inspect for breakdown of the grout, riprap popouts, and voids under grouted riprap by sounding or noting holes. Repair deficiencies and record on the work order.				x				Project O&M Manual
Visually inspect and record on the work order the condition of settlement caused by slides or sloughs, slumps, sink holes or collapses.				x				Project O&M Manual
Visually inspect for vegetation growth changes that may indicate seepage and record on the work order.				x				Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.				x				Project O&M Manual
Crest								
Dam Crest Alignment Indicators								
Visually inspect for misalignment and record on the work order.						x		ER 1110-2-1156
Visually inspect for missing or damaged crest alignment markers and reflectors; record on the work order.						x		ER 1110-2-1156
Station Marker Numbers								
Visually inspect for missing or damaged markers; record on the work order.						x		Project O&M Manual
Guard Rails								
Visually inspect for misalignment or damage. Recommend monitoring if appropriate and record on the work order.						x		Project O&M Manual
Guideposts Alignment								
Visually inspect for misalignment. Recommend monitoring if appropriate and record on the work order.						x		Project O&M Manual
Dam Paved Access Road								
Visually inspect for cracking patterns, spacing of cracks, and material change in pavement. Record on work order new cracks or changes in existing cracks to include direction (longitudinal or transverse), depth (full pavement depth and if into embankment) or partial pavement depth, width, appearance of new crack or changes in existing, differently settlement between sides of crack. Not depressions or upheavals and locations.						x		Project O&M Manual
Verify and record on the work order the condition of surface drainage system.						x		Project O&M Manual
Dam Crest Longitudinal Surface								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of settlement and survey monuments and readings. Record width, depth, and pattern of cracking.						x		ER 1110-2-1156
Visually inspect for longitudinal or transverse cracking and record on the work order.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of gullies. Record the length, width, and depth of gully. Recommend monitoring if appropriate.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of burrowing rodent activity.				x				ER 1110-2-1156
Visually inspect and record on the work order the condition of vegetation.				x				ER 1110-2-1156
Dike Sections								
Visually inspect for evidence of settlement on the upstream and downstream slopes, caused by slides or sloughs, slumps, sink holes or collapses, and record on the work order.						x		ER 1110-2-1156
Visually inspect for large cracks and cracks due to drying on the upstream and downstream slopes and record on the work order.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of downstream slope seepage. Record evidence of seepage through the foundation, downstream form of the embankment.						x		ER 1110-2-1156
Visually inspect and record on the work order evidence of benching on the upstream slope.						x		ER 1110-2-1156
Visually inspect for woody debris on upstream slope and record on the work order.						x		ER 1110-2-1156
Visually inspect and record on the work order vegetation growth on the upstream and downstream slopes. Record change in vegetation that may indicate seepage.				x				ER 1110-2-1156
Remove unwanted pests and repair damage; record on the work order.				x				ER 1110-2-1156
Embankment Sections								
Visually inspect slopes, including the junction with the foundation and abutment drains, for settlement, cracking, sloughing, gullying, dislocation of rocks, or loss of grade and record on the work order.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of seepage. Record wet areas on downstream slopes.						x		ER 1110-2-1156
Visually inspect for unusual movement or cracking at or beyond toe and record on the work order.						x		ER 1110-2-1156

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of erosion at downstream toe. Monitor as appropriate.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of weed and brush growth. Record any burning and evidence of unauthorized grazing.				x				ER 1110-2-1156
Visually inspect and record on the work order the condition of burrowing rodent activity.				x				ER 1110-2-1156
Roadway								
Visually inspect for material change in grade and section of roadways, including ramps and crown of embankment and record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of surface drainage systems; remove debris.						x		Project O&M Manual
Visually inspect for longitudinal and transverse cracks and differential settlement; record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of roadway surface; Record spots requiring resurfacing or regrading.						x		Project O&M Manual
Visually inspect and record on the work order the condition of survey monuments imbedded in roadway.						x		Project O&M Manual
Guideposts Alignment								
Visually inspect for misalignment or slumping and record on the work order.						x		Project O&M Manual
Station Marker Numbers								
Visually inspect for missing or damaged markers and record on the work order.						x		Project O&M Manual
Survey Monuments								
Visually inspect for settlement caused by slides or sloughs, slumps, depression sink holes or collapses and record on the work order.						x		Project O&M Manual
Visually inspect for missing caps and monument damage; record on the work order.						x		Project O&M Manual

Appendix D Outlet Works Maintenance Tasks

O=Operational, W=Weekly, M=Monthly, Q=Quarterly, S=Semi-Annual, A=Annual, and P=Periodic

Table D-1. Outlet works maintenance task list

Maintenance Tasks	O	W	M	Q	S	A	P	References
Approach								
Visually inspect the approach walls, floor slabs and joints for movement, displacement, or damage. Record conditions on the work order.						x		ER 1110-2-1156
Flip Bucket								
Concrete								
Visually inspect and record on the work order the condition of concrete cracks.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of scaling, delamination, spalls or popouts of concrete or exposed rebar.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of overall apparent alignment of structure (settlement, deflection, expansion, and contraction).						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of flashing joints, sealants, weep holes, etc. for drainage issues.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of cracks, spalls, abrasive wear, and exposed reinforcement.						x		ER 1110-2-1156
Visually inspect for drain obstructions; remove as needed and record on the work order.						x		ER 1110-2-1156
Visually inspect for changes in grade/alignment and record condition on the work order.						x		ER 1110-2-1156
Visually inspect for unusual flow patterns during discharge periods and record condition on the work order.						x		ER 1110-2-1156
Visually inspect for undercutting/voids under concrete at downstream edge and record findings on the work order.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of cracks, spalls, abrasive wear, and exposed reinforcement.						x		ER 1110-2-1156
Visually inspect for changes in grade/alignment and record condition on the work order.						x		ER 1110-2-1156
Stilling Basin (chute blocks, baffle piers, end sill, walls & apron)								
Concrete Walls & Apron								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of cracks, delamination, spalls, abrasive wear, and exposed reinforcement. Inspect for rust colored staining from cracks.						x		ER 1110-2-1156
Visually inspect for panel displacement and offset joints and record condition on the work order.						x		ER 1110-2-1156
Visually inspect for leaks and/or seepage and record on the work order.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of expansion joints.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of drains. Clear debris.						x		ER 1110-2-1156
Chute Blocks, Baffle Piers & End Sill								
Visually inspect and record on the work order the condition of cracks, delamination, spalls, abrasive wear, and exposed reinforcement.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of settlement and erosion.						x		ER 1110-2-1156
Visually inspect for debris accumulation that may obstruct flow. Record on the work order.						x		ER 1110-2-1156
Visually inspect for loss of gate hardware, indications of debris being trapped in the stilling basin for an extended time tumbling and rounding the debris potentially indicating a hydraulics issue. Record findings on the work order.						x		ER 1110-2-1156
Fencing								
Visually inspect for loose connections and anchor bolts; tighten as needed. Record findings on the work order.						x		ER 1110-2-1156
Visually inspect for damage to fencing, repair as needed and record condition on the work order.						x		ER 1110-2-1156
Conduit								
Gate Well Covers								
Verify that the covers are in place except during servicing operations and record on the work order.							5 yrs	Project O&M Manual
Visually inspect the metal for corrosion and repair/replace as needed. Record findings on the work order.						x		Project O&M Manual
Manhole Covers								
Verify and record on the work order that the hold down bolts are tight and gasket is not leaking.						x		Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of access ladder; tighten loose connections and anchor bolts.						x		Project O&M Manual
Visually inspect the metal for corrosion and repair/replace as needed. Record findings on the work order.						x		Project O&M Manual
Air Intake Pipe								Also in Service Gate
Verify and record on the work order that the inlet grilles and supply pipes are securely anchored in place.					x			Project O&M Manual
Visually inspect for pipeline obstructions; clear as needed and record condition on the work order.					x			Project O&M Manual
Visually inspect for leakage when gates are in open position and record on the work order.					x			Project O&M Manual
Verify and record on the work order that adequate provisions are maintained to keep personnel and debris away from the inlet opening grillage at the top of the tower.					x			Project O&M Manual
Visually inspect and record on the work order the condition of pipe hangers, supports; tighten fasteners.					x			Project O&M Manual
Visually inspect for corrosion in metal; Reapply protective coating as needed. Record condition on the work order.					x			Project O&M Manual
Ladders								
Visually inspect for corrosion in metal; Reapply protective coating as needed. Record condition on the work order.						x		Project O&M Manual
Visually inspect for loose connections and anchor bolts. Tighten and record on the work order.						x		Project O&M Manual
Visually inspect for excessive strain or deflection in joints or members and record on the work order.						x		Project O&M Manual
Concrete								
Visually inspect and record on the work order the condition of cracks, "pop-outs", spalls, and abrasive wear. Record evidence on the crack diagram. Note holes and leakage into the conduit.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of expansion joints.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of settlement, survey monuments and readings.						x		ER 1110-2-1156

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of debris accumulation such as sediment, rubbish, and vegetal matter that may obstruct flow.						x		ER 1110-2-1156
Verify and record on the work order that weep holes are free of debris and drain freely.						x		ER 1110-2-1156
Exit Structure								
Concrete								
Visually inspect and record on the work order the condition of cracks, "pop-outs", spalls, and abrasive wear. Record evidence on the crack diagram.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of expansion joints.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of settlement, survey monuments and readings.						x		ER 1110-2-1156
Visually inspect for debris accumulation such as sediment, rubbish, and vegetal matter that may obstruct flow and record on the work order.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of wall deflections (horizontal movement at the wall joints. Report changes greater the 1/4 inch immediately.						x		ER 1110-2-101
Visually inspect and record on the work order the condition of erosion, sinkholes, and depression behind the walls.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of burrowing rodent activity at edges of concrete.						x		ER 1110-2-1156
Natural Outlet Channel								
Exit Channel Training Levee								
Visually inspect and record on the work order the condition of cracks, "pop-outs", spalls, and abrasive wear. Record evidence on the crack diagram.						x		Project O&M Manual
Visually inspect and record on the work order the condition of expansion joints.						x		Project O&M Manual
Visually inspect for debris accumulation such as sediment, rubbish, and vegetal matter that may obstruct flow and record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of settlement, survey monuments and readings.						x		Project O&M Manual
Visually inspect and record on the work order the condition of erosion.						x		Project O&M Manual
Seepage Blanket								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of excessive vegetative growth. Remove vegetative growth and recommend specific location removal, if appropriate.						x		Project O&M Manual
Visually inspect and record on the work order the condition of erosion or changes in grade.						x		Project O&M Manual
Visually inspect and record on the work order the condition of deteriorated rock or grouted portions.						x		Project O&M Manual
Visually inspect for unwanted pests and repair damage and record on the work order.						x		Project O&M Manual
Intake Structure								
Concrete								
Visually inspect and record on the work order the condition of concrete cracks, scaling, spalls or popouts of concrete and abrasive wear.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of overall apparent alignment of structure (settlement, deflection, expansion, and contraction).						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of flashing joints, sealants, weep holes, etc. for drainage issues.						x		ER 1110-2-1156
Visually inspect for debris accumulation such as sediment, rubbish, and vegetal matter that may obstruct flow and record on the work order.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of survey monuments and readings.						x		ER 1110-2-1156
Visually inspect for excessive leaking, including any location in the tunnel and record the condition on the work order.						x		ER 1110-2-1156
Buoy Line								
Visually inspect and record on the work order the condition of log booms; record damage and missing components. Repair as needed.					x			Project O&M Manual
Visually inspect for corrosion and fraying in cable and record condition on the work order.					x			Project O&M Manual
Visually inspect for damage, cracks, or signs of fatigue to buoys. Repair or replace as needed and record condition on the work order.					x			Project O&M Manual
Signage								
Visually inspect and record on the work order the condition and stability of sign mounts, tighten loose hardware.				x				Project O&M Manual
Visually inspect and record on the work order obstructions to line-of-sight.				x				Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Verify and record on the work order the legibility and cleanliness of signs.				x				Project O&M Manual
Hydraulic System								
Oil Reservoir								
Visually inspect and record on the work order the condition of fluid level in sight glass.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the thermostat setting (70F – Typical).				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of oil color and particles through level indicator.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of oil filter. Filter oil with external system as needed for system target ISO Code.						x		ISO 4406
Take oil test sample for laboratory analysis and record on the work order.						x		ISO 4406
Drain reservoir and clean sludge buildup. Record on the work order.							10 yrs	EM 1110-2-1424
Visually inspect and record on the work order the condition of air tightness of reservoir connections.				x				EM 1110-2-1424
Visually inspect for leaks in reservoir connections and record condition on the work order.				x				EM 1110-2-1424
Visually inspect and record on the work order the condition of reserve oil quantity.						x		EM 1110-2-1424
Change breather (desiccant filter) when color changes to pink and record on the work order.				x				EM 1110-2-1424
Visually inspect and record on the work order the condition of the particle filter as recommended by MFR. Change when recommended or when differential pressure indicator trips.						x		EM 1110-2-1424
Visually inspect and record on the work order the condition of loose fittings and hardware.				x				Manufacturer's O&M Manual
4-Way Directional Control Valve								
Operate through positions, check for proper engagement and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of detent engagement.				x				Manufacturer's O&M Manual
Visually inspect for spool leaks and record condition on the work order.				x				Manufacturer's O&M Manual
Visually inspect for corrosion and record condition on the work order.				x				Manufacturer's O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and listen for cavitation within the spool and record condition on the work order.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of loose fittings and hardware.				x				Manufacturer's O&M Manual
Visually inspect for surface damage to the valve (e.g. galvanic corrosion and cavitation damage) and record condition on the work order.						x		Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of deterioration or cavitation in seals and seats.			x					Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of damaged structural members caused by vibration.						x		Manufacturer's O&M Manual
Pressure Gauges								
Visually inspect for consistent readings across gauges and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for return to zero when depressurized and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for leaks and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for erratic readings and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for damage (cracked glass, bent needle, zero peg) and record condition on the work order.				x				Manufacturer's O&M Manual
Visually inspect vacuum gauge reading in the pump suction line for high pressure or excessive pump noise; change or clean the oil filter. Record findings on the work order.						x		Manufacturer's O&M Manual
Motor								
Visually inspect for excessive heat, noise or vibration during operation and record on the work order.				x				Manufacturer's O&M Manual
Clean motor, blowing out dirt from windings, and wipe commutator and brushes. Record on the work order.					x			Manufacturer's O&M Manual
Visually inspect motor and remove, clean out, and replace oil in sleeve bearings. Record on the work order.					x			Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the motor. Examine, and tighten loose connections.					x			Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the grease of ball or roller bearing.					x			Manufacturer's O&M Manual
Test current input and compare it with normal. Record on the work order.						x		Manufacturer's O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect operating speed and record on the work order.						x		Manufacturer's O&M Manual
Test insulation/Megger the motor and record findings on the work order.						x		IEEE 43
Remove and renew grease of ball or roller bearing per MFR run hours. Record on the work order.						x		Manufacturer's O&M Manual
Visually inspect pump grease. Apply grease after every three months or per manufacturer's run hours. Record on the work order.				x				Manufacturer's O&M Manual
Pumps								
Visually inspect for excessive heat, noise or vibration during operation and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the pump. Examine and tighten loose connections.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the bearing and lubricant, bearing temperature and lubricant level. Lubricant should be clear with no signs of bubbling. Add lubricant if bubbling occurs to decrease temperature of bearing.					x			Manufacturer's O&M Manual
Visually inspect mechanical seals for signs of visible leakage. Make sure that pump's packing has adequate lubrication. Replace the packing and add lubricant per operation manual if packing looks compressed and dry. Record on the work order.					x			Manufacturer's O&M Manual
Change oil after every three months or per manufacturer's run hours and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect pump grease. Apply grease after every three months or per manufacturer's run hours. Record on the work order.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the shaft alignment.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the coupling alignment with the equipment coupled.						x		Manufacturer's O&M Manual
Replace/clean suction strainer/filter as applicable and record on the work order.						x		Manufacturer's O&M Manual
Service & Emergency Gates								
Operate gates full travel. Each gate needs to have a full travel once every 3 years. Recommend running half the gates full travel on commercial power and the other half on emergency power. Record findings on the work order.							3 yrs	EM 1110-2-2610
Hydraulic Hoist Cylinder								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect filter. Change or filter hydraulic oil per manufacturer's recommendation or when analysis results exceed established thresholds. Use appropriate micron filter for desired particle removal. Record condition on the work order.						x		EM 1110-2-1424
Visually inspect oil reserve. Sample reservoir oil annually (Min.), or as needed based on operating conditions, in accordance with ASTM D6224; ISO Max. 20/18/15 (<2000 psi), 19/17/14 (<3000 psi), 18/16/13 (>3000 psi). Record condition on the work order.						x		EM 1110-2-1424
Visually inspect and record on the work order the operating pressures at midstroke raising and lowering. Compare recorded operating pressures with previously recorded operating pressures.				x				Manufacturer's O&M Manual
Ensure counterbalance valves are holding the load during operation and pressure gauges are maintaining positive pressure while lowering. Record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for excessive leaks around the cylinder and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for drift from last position; reset gate if necessary and record findings on the work order.				x				Manufacturer's O&M Manual
Visually inspect for worn or cracked hoses and record on the work order.				x				Manufacturer's O&M Manual
Wipe down cylinder and bonnet with cloth to remove oil and dirt and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for loose fittings and hardware and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect rod for scoring/pitting and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect rod for organic buildup; Clean rod with Aluminum Oxide 320 grit abrasive pad saturated with hydraulic fluid to remove organic buildup; Use 600 grit light duty pad for maintenance on clean stems. Record findings on the work order.				x				Manufacturer's O&M Manual
Inspect operation of mechanical controls and record on the work order.			x					Project O&M Manual
Lubricate accessible surfaces of the gate leaf stem and record on the work order.						x		Project O&M Manual
Inspect and verify the operation of the grease system (Farval or other...). Record findings on the work order.						x		Manufacturer's O&M Manual
Overhead Mounted Semi-Automatic Gate Stem Hanger								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect shear pin for lock engagement and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for drift over time and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for loose fittings and hardware. Record on the work order.				x				Manufacturer's O&M Manual
Visually inspect operation and free movement. Record on the work order.			x					EM 1110-2-2610
Visually inspect and record on the work order the condition of the manual control including tension opening.			x					Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the operating counter-balance adjustment.			x					Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of operation of moving parts; keep free of debris.			x					Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the safety cap spring open at catch.			x					Manufacturer's O&M Manual
Visually inspect metal for corrosion and record condition on the work order.			x					Manufacturer's O&M Manual
Visually inspect the hanger jaws for wear and record condition on the work order.						x		Manufacturer's O&M Manual
Lubricate and record on the work order.			x					Manufacturer's O&M Manual
Bonnet Mounted Semi-Automatic Dogging Device								
Visually inspect shear pin for lock engagement and record finding on the work order.				x				Manufacturer's O&M Manual
Visually inspect for drift over time and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for dogging hydraulic cylinder engagement and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for excessive oil leaks and record on the work order.		x						Manufacturer's O&M Manual
Visually inspect for loose fittings and hardware and record on the work order.				x				Manufacturer's O&M Manual
Automatic Hydraulic Gate Hanger								
Visually inspect for brake engagement and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for drift over time and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect lifting bar position while in neutral and record on the work order.				x				Manufacturer's O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for excessive oil leaks and record on the work order.		x						Manufacturer's O&M Manual
Visually inspect for loose fittings and hardware and record on the work order.				x				Manufacturer's O&M Manual
Gate Position Indicators								
Visually inspect rod packings for leakage and record on the work order.		x						Manufacturer's O&M Manual
Visually inspect rod for scoring/pitting and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect rod for organic buildup; Clean rod with Aluminum Oxide 320 grit abrasive pad saturated with hydraulic fluid to remove organic buildup; Use 600 grit light duty pad for maintenance on clean stems. Record on the work order.				x				Manufacturer's O&M Manual
Visually inspect flexible grease, air, and/or oil lines for damage or deterioration and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the position indicator tape.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the position indicator encoder.				x				Manufacturer's O&M Manual
Visually inspect for loose fittings and hardware and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect alignment of the indicator stem and condition of the guide. Record condition on the work order.			x					Manufacturer's O&M Manual
Visually inspect indicator for accuracy and record on the work order.			x					Manufacturer's O&M Manual
Visually inspect condition of indicator scale and stem cross-arm attachment and record on the work order.			x					Manufacturer's O&M Manual
Visually inspect readability of indicator targets and gauges from the chamber door and record on the work order.			x					Manufacturer's O&M Manual
Frame Seals								
Visually inspect for leakage past the seals and record on the work order.						x		Project O&M Manual
Visually inspect for corrosion and record condition on the work order.						x		Project O&M Manual
Visually inspect for loose fittings and hardware and record on the work order.						x		Project O&M Manual
Visually inspect for tearing, damage, cracks caused by fatigue, unusual wear, or indentations and record on the work order.						x		Project O&M Manual
Remove grit and debris from bronze sealing strips and record on the work order.						x		Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Remove obstructions from the gate bottom bearing surfaces and record on the work order.						x		Project O&M Manual
Lubricate seal bearings and record on the work order.						x		Manufacturer's O&M Manual
Gate Slots and Embeds								
Visually inspect gate slots and embeds for spalls, offsets, corrosion (in metal embeds) and debris and record on the work order.						x		Project O&M Manual
Frame								
Visually inspect for damage, warping, or misalignment and record on the work order.						x		ER 1110-2-1156
Visually inspect for bent gate guides and seat and record on the work order.						x		ER 1110-2-1156
Structural Components								
Visually inspect for damaged structural member caused by overloading and record on the work order.						x		ER 1110-2-1156
Visually inspect for corrosion or cavitation damage along leaf bottom and record on the work order.						x		ER 1110-2-1156
Visually inspect metal for corrosion and record on the work order.			x					ER 1110-2-1156
Visually inspect for cracked or broken ribs and record on the work order.						x		ER 1110-2-1156
Visually inspect for loose stem connections and record on the work order.						x		ER 1110-2-1156
Visually inspect for damaged or badly worn seating surfaces and record on the work order.						x		ER 1110-2-1156
Visually inspect for scoring along the gate leaf stem and record on the work order.			x					ER 1110-2-1156
Visually inspect drainage holes on downstream webs for obstructions and clean if needed. Record on the work order.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of the anodes and replace as needed.						x		ER 1110-2-1156
Visually inspect and replace missing bolts, nuts, and washers. Record on the work order.						x		ER 1110-2-1156
Lifting Assembly								
Operate full travel monthly and record on the work order.			x					Project O&M Manual
Visually inspect for corrosion damage at the hoisting connection, stem, and stem guides; record on the work order.						x		Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Lubricate when gate is both closed and open. Record on the work order.			x					Project O&M Manual
Verify that the gate hanger lug is firmly secured to the top of the gate leaf stem extension and record on the work order.			x					Project O&M Manual
Air Vent								
Visually inspect and remove obstructions. Record condition on the work order.						x		Project O&M Manual
Gate Body and Bonnet								
Visually inspect for corrosion or cavitation damage on the sidewalls just downstream from the guide slots and on the floor just downstream from the sill. Record on the work order.			x					Project O&M Manual
Visually inspect for damaged seats and loose or missing hardware and record on the work order.			x					Project O&M Manual
Bonnet Cover								
Visually inspect for cracks in the cover or leaky gaskets at the flange where it joins the bonnet. Tighten hold down bolts. Record on the work order.			x					Project O&M Manual
Visually inspect for leakage at the piston stem packings (oil leaking from the upper packings and water from the lower packings and record on the work order.			x					Project O&M Manual
Visually inspect stem for excessive pitting or binding and record on the work order.						x		Project O&M Manual
Electrical Control System								
Visually inspect for improper functioning and record on the work order.			x					Project O&M Manual
Embedded steel liner downstream of gates								
Visually inspect for delamination, corrosion, pitting of embedded steel liner and leakage into conduit at edges of liner and record on the work order.						x		Project O&M Manual
Bulkhead Gate								
Visually inspect and remove debris accumulation. Record on the work order.						x		ER 1110-2-8157
Visually inspect for metal corrosion; reapply protective coatings and record on the work order.							5 yrs	EM 1110-2-6054
Visually inspect the wheels, rollers, magnesium anodes (if applicable), grease fittings, etc. for cracks, corrosion, etc. as a part of regular Hydraulic Steel Structures (HSS) inspection. Record on the work order.							5 yrs	EM 1110-2-6054

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect gate slots and embeds for spalls, offsets, corrosion (in metal embeds) and debris. Divers and/or Remote Operating Vehicle (ROV)can be utilized as needed for inspection of the slots under water. Record on the work order.							5 yrs	EM 1110-2-6054
Seals								
Visually inspect the condition of all rubber seals; inspect for abnormal leaks and record on the work order.						x		Project O&M Manual
Verify that the gate frame and the seal bearing strips around the conduit opening are maintained in serviceable condition and record on the work order.						x		Project O&M Manual
Visually inspect the condition of gate handling riggings, anchorage, and appurtenances and record on the work order.						x		Project O&M Manual
Lubricate before using the dogging assembly and service anchorage with waterproof grease. Record on the work order.						x		Project O&M Manual
Main Hoist Crane								
Perform yearly inspection by a third party. Record on the work order.						x		ASME B30.2
Visually inspect lifting beam and rigging before each use and annually for corrosion, wear, damage, and general serviceability by a Qualified Person. Record on the work order.						x		ASME B30.2
Grease the fittings and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect limit switches for malfunction and record on the work order.				x				ASME B30.2
Visually inspect load carrying ropes for excessive wear, kinking, broken strands or stretching and record on the work order.						x		ASME B30.2
Visually inspect control mechanisms for malfunction and record on the work order.				x				ASME B30.2
Visually inspect electrical apparatus for malfunction and deterioration and record on the work order.						x		ASME B30.2
Visually inspect brake, clutch system parts and linings, pawls, and ratchets for excessive wear or damage and record on the work order.					x			ASME B30.2
Visually inspect for worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers, and locking and clamping devices and record on the work order.						x		ASME B30.2
Visually inspect for cracked or worn drums and sheaves and record on the work order.						x		ASME B30.2

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for loose bolts and rivets and record on the work order.						x		ASME B30.2
Visually inspect surface and coatings for cracks, corrosion, or other damage and record on the work order.						x		ASME B30.2
Visually inspect structural members for corrosion, misalignment, loose, or damaged and record on the work order.						x		ASME B30.2
Ensure base plate mounting nuts and bolts are tight and record on the work order.						x		ASME B30.2
Visually inspect coupling nuts and bolts for tightness and properly lubricated moving parts and record on the work order.						x		ASME B30.2
Visually inspect to see if there is a metal enclosure surrounding the reducing gears and that the gears are lubricated and record on the work order.						x		ASME B30.2
Visually inspect hoist rope for proper lubrication and record on the work order.						x		ASME B30.2
Verify the rope is lying properly on the drum and that there are at least two full wraps on the drum when the gate is in the lowered position and record on the work order.						x		ASME B30.2
Spot check the hoist chain for cracks, if it has deformed, or severely corroded links; inspect for lubrication. Record on the work order.						x		ASME B30.2
Visually inspect gear reducer enclosure for accumulated condensation; drain. Record on the work order.						x		ASME B30.2
Visually inspect oil sump for condensation and drain any water that is found. This must be done before the hoist is operated or the water will be mixed with the oil. Record on the work order the amount of water and determine whether it is significant or merely reflects normal. condensation.						x		ASME B30.2
Visually inspect for metal corrosion; reapply protective and record on the work order.						x		ASME B30.2
Visually inspect gear boxes for moisture; drain and refill. Record on the work order.						x		ASME B30.2
Jib-Boom Crane								
Inspect annually by 3rd party. Record on the work order.						x		ASME B30.2
Visually inspect lifting beam and rigging before each use and annually for corrosion, wear, damage, and general serviceability by a Qualified Person. Record condition on the work order.						x		ASME B30.2
Grease the fittings and record on the work order.							x	Manufacturer's O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for deteriorated electrical components, such as pushbuttons, limit switches or contactors and record on the work order.				x				ASME B30.2
Visually inspect condition and operation of the boom swing hoist, including braking system, and record on the work order.					x			ASME B30.2
Visually inspect condition and operation of the monorail hoist and trolley, and record on the work order.					x			ASME B30.2
Visually inspect for metal corrosion; reapply protective coatings and record on the work order.					x			ASME B30.2
Lubricate boom swing hoist, appurtenances, bearings, monorail hoist and trolley and record on the work order.					x			ASME B30.2
Low Flow Gate (hydraulic window and hand valve)								
Operate gates full travel and record on the work order.				x				Project O&M Manual
Position Indicator								
Visually inspect for out of sync; apply resynchronization procedure as needed during operation and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for scoring/pitting on rod and record on the work order.				x				Manufacturer's O&M Manual
Exercise synchronization valves and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect for leaks in 4-way spool and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the pressure indicator.				x				Manufacturer's O&M Manual
Visually inspect for loose fittings and hardware, and record on the work order.				x				Manufacturer's O&M Manual
Emergency Generator								Manufacturer's O&M Manual
Visually inspect metal for corrosion; reapply protective coatings and record on the work order.					x			UFC 3-540-07
Fuel System								
Visually inspect main supply tank level and record on the work order.			x					NFPA 110
Visually inspect day tank level and record on the work order.						x		NFPA 110
Test day tank float switch and record findings on the work order.				x				NFPA 110

Maintenance Tasks	O	W	M	Q	S	A	P	References
Test supply or transfer pump operation and record findings on the work order.				x				NFPA 110
Test solenoid valve operation and record findings on the work order.				x				NFPA 110
Clean strainer, filter, dirt leg, or combination and record on the work order.				x				NFPA 110
Visually inspect and clean water in system. Record on the work order.				x				NFPA 110
Visually inspect and replace (if needed) flexible hose and connectors. Record on the work order.			x					NFPA 110
Visually inspect tank vents and overflow piping for obstructions and record on the work order.						x		NFPA 110
Visually inspect and record on the work order the condition of piping.						x		NFPA 110
Replace gasoline in main tank (when used) and record on the work order.						x		NFPA 110
Change fuel filters and record on the work order.						x		Manufacturer's O&M Manual
Verify that fuel tank full-line cap is secured and locked, and record on the work order.		x						NFPA 110
Verify accuracy of sight gauge and record findings on the work order.					x			NFPA 110
Visually inspect and clean the sediment chamber and the gauze strainer of the fuel pump, and record on the work order.						x		NFPA 110
Lubrication System								
Check oil level and record on the work order.			x					Manufacturer's O&M Manual
Change oil per MFR's running hours or annually and record on the work order.						x		Manufacturer's O&M Manual
Change oil filter per MFR's running hours or annually and record on the work order.						x		Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the oil heater.			x					Manufacturer's O&M Manual
Visually inspect, clean, and replace crankcase breather. Record on the work order.					x			
Visually inspect for leaks and inspect hoses and connectors. Record on the work order.					x			Manufacturer's O&M Manual
Visually inspect for dirty or contaminated oil and record on the work order.						x		Manufacturer's O&M Manual
Visually inspect pump for damaged, broken, or missing parts and record on the work order.		x						Manufacturer's O&M Manual
While running: Record oil pressure on the work order.		x						Manufacturer's O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Cooling System								
Check engine coolant level and record on the work order.			x					UFC 3-540-07
Replace antifreeze and record on the work order.						x		UFC 3-540-07
Visually inspect to make sure that adequate cooling water is provided for heat exchanger and record on the work order.			x					UFC 3-540-07
Clean rod in heat exchanger and record on the work order.						x		UFC 3-540-07
Visually inspect to make sure that adequate fresh air is provided for radiator and record on the work order.			x					UFC 3-540-07
Clean exterior of radiator and record on the work order.						x		UFC 3-540-07
Visually inspect the condition of fan and alternator belt and record on the work order.				x				UFC 3-540-07
Visually inspect and record on the work order the condition of water pump.				x				UFC 3-540-07
Visually inspect and record on the work order the condition of flexible hoses and connections.				x				UFC 3-540-07
Visually inspect and record on the work order the condition of jacket water heater.			x					UFC 3-540-07
Visually inspect duct work, clean louvers, and record on the work order.						x		UFC 3-540-07
Visually inspect, clean, and test louver motors and controls, and record on the work order.						x		UFC 3-540-07
While running: Record temperature on the work order.			x					Manufacturer's O&M Manual
Exhaust Line System								
Visually inspect for leakage of the exhaust system and record on the work order.			x					UFC 3-540-07
Drain condensate trap and record on the work order.			x					UFC 3-540-07
Visually inspect insulation and fire hazards and record on the work order.				x				NFPA 1
Visually inspect for excessive backpressure and record on the work order.						x		UFC 3-540-07
Visually inspect and record on the work order the condition of exhaust system hangers and supports.						x		UFC 3-540-07
Visually inspect and record on the work order the condition of the flexible exhaust section.					x			UFC 3-540-07
Battery System								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect the battery electrolyte level and specific gravity/state of charge, and record on the work order.			x					UFC 3-540-07
Visually inspect and clean terminals and case exterior. Record on the work order.				x				UFC 3-540-07
Visually inspect charge and charge rate. Record on the work order.			x					UFC 3-540-07
Visually inspect equalize charge and record on the work order.			x					UFC 3-540-07
Visually inspect and test all backup power systems. Record on the work order.			x					Project O&M Manual
AC/DC Electrical System and Controls								
Perform general inspection of systems and record on the work order.		x						UFC 3-540-07
Tighten control and power wiring connection and record on the work order.						x		UFC 3-540-07
Visually inspect wire chafing where subject to movement and record on the work order.					x			UFC 3-540-07
Visually inspect operation of safeties and alarms and record on the work order.					x			UFC 3-540-07
Clean boxes, panels, and cabinets and record on the work order.					x			UFC 3-540-07
Visually inspect, clean, and/or replace circuit breakers and/or fuses as applicable (Note: Do not break manufacturer's seals or perform internal inspection on these devices) and record on the work order.						x		UFC 3-540-07
Clean transfer switch main contacts and record on the work order.						x		UFC 3-540-07
Visually inspect calibration of voltage-sensing relays/devices and record on the work order.						x		UFC 3-540-07
Visually inspect wire insulation for breakdown and record on the work order.						x		UFC 3-540-07
Third party: Visually inspect and tighten control and power wiring connections. Record on the work order.						x		Manufacturer's O&M Manual
Third party: Visually inspect and clean the automatic transfer switch main contacts. Record on the work order.						x		Manufacturer's O&M Manual
Third party: Inspect and clean exciter. Record on the work order.						x		Manufacturer's O&M Manual
Third party: Inspect and clean voltage regulator. Record on the work order.						x		Manufacturer's O&M Manual
Third party: Inspect electrical wires for abrasions where subject to motion and record on the work order.						x		Manufacturer's O&M Manual
Engine								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Perform load bank testing and record on the work order.						x		UFC 3-540-07
Run the generator and remedy any alerts and record on the work order.			x					UFC 3-540-07
Change spark plugs and record on the work order.						x		UFC 3-540-07
Visually inspect drive belts for wear and proper adjustment, and record on the work order.					x			UFC 3-540-07
Visually inspect for broken, damaged, or missing parts and record on the work order.						x		Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the governor operation and lubrication.			x					Manufacturer's O&M Manual
Visually inspect for water in the pre-filter; drain as necessary and record on the work order.							250 hrs	Manufacturer's O&M Manual
Third party: Inspect injector pump and record on the work order.						x		Manufacturer's O&M Manual
Third party: Inspect valves and bolt torque and record on the work order.							500 hrs	Manufacturer's O&M Manual
Third party: Renew the plastic gauze element of the engine breather system and record on the work order.							500 hrs	Manufacturer's O&M Manual
Third party: Clean the body of the breather and record on the work order.						x		Manufacturer's O&M Manual
Third party: Inspect and clean the inside of the breather pipe. Record on the work order.						x		Manufacturer's O&M Manual
Third party: Clean turbocharger impeller and compressor casing. Record on the work order.						x		Manufacturer's O&M Manual
Third party: Inspect and record on the work order the condition of the exhauster or compressor.							2000 hrs	Manufacturer's O&M Manual
Third party: Inspect and record on the work order the valve tip clearances of the engine.						x		Manufacturer's O&M Manual
Third party: Inspect and record on the work order the condition of the alternator and the starter motor.							2000 hrs	Manufacturer's O&M Manual
Motor Starter								
Visually inspect and clean the contactors in the starter panel (The panel should be cleaned by a smooth cloth or a very fine emery paper.) and record on the work order.						x		Manufacturer's O&M Manual
Clean the entire panel with a wet cloth, use a brush when hand cannot reach. (Use vacuum to remove dust.) Record on the work order.						x		Manufacturer's O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect the connections and tighten loose connections with a screwdriver, reconnect any loose wires. Record on the work order.						x		Manufacturer's O&M Manual
Visually inspect the terminal box on the motor for loose connections and record on the work order. a. If there are loose connections use the correct size spanner to tighten the connections.						x		Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the starter panel.						x		Manufacturer's O&M Manual
Filters								
Change filters (oil, air, and fuel) as recommended by the manufacturer and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect quarterly and change breather (desiccant filter) when color changes to pink. Record on the work order.				x				Manufacturer's O&M Manual
Piping								
Visually inspect for corrosion/leakage and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of pipe supports					x			Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of pipe couplings.					x			Manufacturer's O&M Manual
Drainage System								
High Water Alarm								
Verify high water alarm by raising the float switches and record on the work order.				x				Project O&M Manual
Verify high water alarm by manually triggering the transducers and record on the work order.				x				Project O&M Manual
Visually inspect and record on the work order the condition of mounting brackets, supports, etc.						x		Project O&M Manual
Strainers and Lines								
Clean strainers to prevent blockage and record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of valves and shut-off valves.						x		Project O&M Manual
Remove debris from floor drain trenches and record on the work order. Note if zebra mussels or other invasive species are present.			x					Project O&M Manual
Vertical and Foundation Drains								
Visually inspect for obstructions; remove mineral deposits and record on the work order.						x		Project O&M Manual
Measure flow and record on the work order.						x		Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Seepage Drains								
Measure flow and record on the work order.						x		Project O&M Manual
Pumps and Motors								
Megger motor at least once per year and record on the work order.						x		Project O&M Manual
Visually inspect to ensure the pumps start automatically and record on the work order.			x					Project O&M Manual
Ventilation System								
Fan Motor				x				Project O&M Manual
Visually inspect for excessive noise/vibration during operation and record on the work order.						x		Project O&M Manual
Megger test motor and record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition and adjustment of fan belt.			x					Project O&M Manual
Visually inspect fan speed controls and record on the work order.			x					Project O&M Manual
Lubricate fan assembly and motor anti-friction bearings, and record on the work order.					x			Project O&M Manual
Duct System								
Visually inspect ductworks for holes, rips, tears, loose duct tape, etc. and record on the work order.				x				Project O&M Manual
Visually inspect for condensation and record on the work order.				x				Manufacturer's O&M Manual
Clean air returns and registers. Record on the work order.				x				
Visually inspect metal for corrosion; reapply protective coating and record on the work order.					x			Project O&M Manual
Air Filters								
Change (disposable) air filters as recommended by the manufacturer and record on the work order.				x				Manufacturer's O&M Manual
Clean washable filter as recommended by the manufacturer and record on the work order.				x				Manufacturer's O&M Manual
Emergency Lighting System								
Conduct a thorough examination of the unit and record on the work order.						x		UFC 3-530-01
Test the battery and lighting system and record on the work order.						x		UFC 3-530-01
Visually inspect and record on the work order the condition and voltage of the battery and verify manufacturer date.						x		UFC 3-530-01

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect AC/DC lamps or bulbs for damage and proper operation, and record on the work order.						x		UFC 3-530-01
Verify charging circuit is operational and working properly and record on the work order.						x		UFC 3-530-01
Service Cranes & Hoists								
Bridge Crane						x		ASME B30.2
Perform yearly inspection by a third party and record on the work order.						x		ASME B30.2
Verify proper brake operation; visually inspect for wear and record on the work order.						x		ASME B30.2
Visually inspect hook for signs for deformation, wear, and safety latch operation of hooks and latches. Record on the work order.				x				ASME B30.10
Visually inspect upper travel limits and record on the work order.				x				ASME B30.2
Visually inspect end of travel limits and record on the work order.				x				ASME B30.2
Visually inspect wire rope for proper spooling onto the drum(s) and sheave(s) and record on the work order.				x				
Remove debris and dirt and record on the work order.					x			Project O&M Manual
Lubricate and record on the work order.					x			Project O&M Manual
Visually inspect to ensure that load capacity is marked on crane. Record on the work order.					x			
Sheave(s)								
Visually inspect for cracks and record on the work order.						x		ASME B30.2
Hoisting Hatch								
Verify that hatch cover is in place and flush with the floor when hoistway is not in use, Record on the work order.					x			Project O&M Manual
Remove debris from guard post sockets and record on the work order.					x			Project O&M Manual
Visually inspect and record on the work order the condition of hatch cover lifting handles, guard chain assembly, and lifting equipment.					x			Project O&M Manual
Lubricate chain guard snaps and adjusting screws. Record on the work order.					x			Project O&M Manual
Visually inspect metal for corrosion; reapply protective coating and record on the work order.					x			Project O&M Manual
Chain Hoists								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect capacity, warning, and other safety labels. Record findings on the work order.						x		ASME B30.2
Visually inspect for unusual sounds and record on the work order.						x		ASME B30.2
Visually inspect brakes to ensure they're holding the load and record on the work order.						x		ASME B30.2
Visually inspect chains for open links, open connecting links, deformation, and record on the work order.						x		ASME B30.2
Visually inspect and record on the work order the condition of the hook latch.						x		ASME B30.10
Visually inspect the hook for cracks, deformation of throat opening and record on the work order.						x		ASME B30.10
Perform Non-destructive Test (NDT) of the hook and record findings on the work order.						x		ASME B30.10
Verify hoist assemblies are stored in a dry, clean space, and hung in a normal vertical (operating) position and record on the work order.						x		Project O&M Manual
Visually inspect metal for corrosion; reapply protective coating and record on the work order.					x			Project O&M Manual
Lubricate gears and bearings; check for wear and record on the work order.					x			Project O&M Manual
Visually inspect rope for binding , wear corrosion, flat sections, kinking, and condition of sections previously repaired and record on the work order.					x			Project O&M Manual
Visually inspect for proper hoist operation and record on the work order.					x			Project O&M Manual
Motors								
Visually inspect for excessive heat, noise or vibration during operation and record on the work order.				x				Manufacturer's O&M Manual
Examine and tighten loose connections. Record on the work order.				x				Manufacturer's O&M Manual
Clean motor, blowing out dirt from windings, and wipe commutator and brushes. Record on the work order.					x			Manufacturer's O&M Manual
Remove, clean out, and replace oil in sleeve bearings. Record on the work order.					x			Manufacturer's O&M Manual
Visually inspect grease of ball or roller bearing and record on the work order.					x			Manufacturer's O&M Manual
Test current input and compare it with normal. Record on the work order.						x		Manufacturer's O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Verify operating speed and record on the work order.						x		Manufacturer's O&M Manual
Test insulation/Megger the motor and record on the work order.						x		IEEE 43
Remove and renew grease of ball or roller bearing per MFR run hours and record on the work order.							x	Manufacturer's O&M Manual
Metal Work								
Visually inspect for corrosion; reapply protective coating; remove debris; record on the work order.					x			Project O&M Manual
Hoistway Structure								
Visually inspect for corrosion; reapply protective coating; remove debris; record on the work order.					x			Project O&M Manual
Visually inspect and tighten loose connections and anchor bolts; record on the work order.					x			Project O&M Manual
Visually for excessive strain or deflection in joints or members and record on the work order.					x			Project O&M Manual
Water Supply & Sanitary Sewer								
Piping								
Visually inspect pipe for leakage and record on the work order.						x		Project O&M Manual
Visually inspect pipe for corrosion and record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of pipe support.						x		Project O&M Manual
Visually inspect metal for corrosion; reapply protective coatings and record on the work order.						x		Project O&M Manual
Valves								
Visually inspect for valve leakage and record on the work order.						x		Manufacturer's O&M Manual
Verify valve position (open/close). Verify that check valve work properly to prevent wastewater flowing back into the basin. Record on the work order.						x		Manufacturer's O&M Manual
Pressure Regulators								
Verify pressure setting. Install pressure gauge on the upstream and downstream of pressure regulators to verify the proper setting pressure regulators. Record on the work order.						x		Manufacturer's O&M Manual
Pumps and Motors								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect pump and motor for excessive heat, noise or vibration during operation and record on the work order.				x				EM 1110-2-3105
Visually inspect and tighten loose connections, pump and motor and record on the work order.				x				EM 1110-2-3105
Visually inspect and record on the work order the condition of the pump bearing and lubricant. Visually inspect bearing temperature and lubricant level. Lubricant should be clear with no signs of bubbling. Add lubricant if bubbling occurs to decrease temperature of bearing.					x			EM 1110-2-3105
Visually inspect mechanical seals in pump for signs of visible leakage. Make sure that pump's packing has adequate lubrication. Replace the packing and add lubricant per operation manual if packing looks compressed and dry. Record on the work order.					x			EM 1110-2-3105
For oil-lubricated pumps: Change oil after every three months or per manufacturer's run hours and record on the work order.				x				EM 1110-2-3105
For grease-lubricated pumps: apply grease after every three months or per manufacturer's run hours and record on the work order.				x				EM 1110-2-3105
Grease the motor bearings in accordance with manufacturer's instructions and record on the work order.				x				EM 1110-2-3105
Visually inspect and record on the work order the condition of the pump shaft alignment.				x				EM 1110-2-3105
Visually inspect and record on the work order the condition of the pump coupling alignment with the equipment coupled.						x		EM 1110-2-3105
Replace/clean pump suction strainer/filter as needed and record on the work order.								EM 1110-2-3105
Clean motor, blowing out dirt from windings, and wipe commutator and brushes; record on the work order.					x			EM 1110-2-3105
Remove, clean out, and replace oil in sleeve bearings; record on the work order.					x			EM 1110-2-3105
Visually inspect grease of ball or roller bearing and record on the work order.					x			EM 1110-2-3105
Test current input and compare it with normal; record on the work order..						x		EM 1110-2-3105
Visually inspect operating speed and record on the work order.						x		EM 1110-2-3105
Test insulation/Megger the motor and record on the work order.						x		IEEE 43
Remove and renew grease of ball or roller bearing per MFR run hours and record on the work order.						x		EM 1110-2-3105

Maintenance Tasks	O	W	M	Q	S	A	P	References
Storage and Pressure Tanks								
Visually inspect for leaks, deterioration, or damage and record on the work order.					x			Project O&M Manual
Floatwell								
Visually inspect metal for corrosion; reapply protective coatings and record on the work order.						x		Project O&M Manual
Inlet Pipes								
Visually inspect for leaks or deterioration and record on the work order.				x				Project O&M Manual
Control Valves								
Visually inspect for leaks at valve hand, valve body, flanges , and valve seat; record on the work order.				x				Manufacturer's O&M Manual
Verify that the yoke clamp bolt is not loose and record on the work order.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of valve stem and stem nut connector.				x				Manufacturer's O&M Manual
Monitor corrosion; replace with stainless steel parts and record on the work order.						x		Project O&M Manual
Manhole								
Visually inspect for leaks or deterioration and record on the work order.				x				Project O&M Manual
Visually inspect and record on the work order the condition of the access ladder; tighten loose connections and anchor bolts if necessary.				x				Project O&M Manual
Visually inspect for adequate confined space signage and record on the work order.						x		Project O&M Manual
Drain Lines								
Visually inspect valves and fittings for leaks or deterioration and record on the work order.				x				Project O&M Manual
Visually inspect for obstructions and remove debris; record on the work order.				x				Project O&M Manual
Instrument and Staff Gauges								
Visually inspect and record on the work order the condition of the instrument cabinet.				x				Project O&M Manual
Visually inspect and record on the work order the condition of the instruments and appurtenances.				x				Project O&M Manual
Lubricate instrumentation and record on the work order.				x				Project O&M Manual
Clean outside pool elevation staff gauge and record on the work order.				x				Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Remove vegetation around staff gauge and record on the work order.				x				Project O&M Manual
Flushing System								
Visually inspect and record on the work order the condition of the flushing system, including tank and pump.			x					Project O&M Manual
Flush inlets when submerged; record on the work order readings for staff gauge, inside electric tape, and punch tape.			x					Project O&M Manual
Sediment Chamber								
Visually inspect and clean the bottom sediment chamber; record on the work order.							3 yrs	Project O&M Manual
Compressed Air System								
Change oil filter and record on the work order.				x				Project O&M Manual
Change air filter and record on the work order.				x				Project O&M Manual
Change oil/water separator and record on the work order.						x		Project O&M Manual
Change oil and record on the work order.						x		
Visually inspect and record on the work order the condition of all the fans, belts (if applicable), air paths, motors, and drive gears.			x					Project O&M Manual
Visually inspect and record on the work order the condition of moisture trap and auto drain.			x					Project O&M Manual
Visually inspect and record on the work order the load and unload pressure settings; adjust valves.			x					Project O&M Manual
Visually inspect and record on the work order the condition of the air intake chamber.			x					Project O&M Manual
Visually inspect for excessive vibration and record on the work order.			x					Project O&M Manual
Lubricate motor bearing per MVR and record on the work order.			x					Project O&M Manual
Visually inspect readings; verify gauges function properly and record on the work order.			x					Project O&M Manual
Visually inspect for leaks in piping and control valves and record on the work order.			x					Project O&M Manual
Visually inspect for metal corrosion; reapply protective coating and record on the work order.					x			Project O&M Manual
Check oil level and record on the work order.			x					Project O&M Manual
Visually inspect flexible connection assemblies for damage or deterioration and record on the work order.			x					Project O&M Manual
Sump Pumps								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Verify pumps on/off levels by raising or lowering the floats or engage the transducers as applicable and record on the work order.						x		Project O&M Manual
Verify high water alarm and record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of the check valves.						x		Project O&M Manual
Visually inspect pumps for unusual noise, vibration, or high temperature and record on the work order.						x		Project O&M Manual
Monitor sediment buildup in pit; remove if adversely affecting pump performance and record on the work order.						x		Project O&M Manual
Visually inspect pump column and anchorage for corrosion and record on the work order.						x		Project O&M Manual
Visually inspect ladder and anchorage into sump pump pit for corrosion and record on the work order.						x		Project O&M Manual
Facility Power (includes all electrical subcomponents)								
Manual Transfer Switches								
Examine the switch for dust, dirt, soot, or moisture. Clean by using a lint free dry cloth, brush, or vacuum cleaner. Do not blow into the switch. Record findings on the work order.			x					Manufacturer's O&M Manual
Visually inspect the switch and terminators for signs of overheating. Clean terminal and connecting straps if applicable and record on the work order.			x					Manufacturer's O&M Manual
Perform mechanical operating test to ensure the switch mechanism is operating freely, operating ON or OFF 2-3 times. The handle should operate smoothly without binding. If there is a mechanical trip provision, operate the trip provision within manufactures instructions. Record findings on the work order.			x					Manufacturer's O&M Manual
Automatic Transfer Switch								
Examine the switch for dust, dirt, soot, or moisture. Clean by using a lint free dry cloth, brush, or vacuum cleaner. Do not blow into the switch. Record findings on the work order.					x			Manufacturer's O&M Manual
Verify lubrication on moving current carrying parts and sliding surfaces and apply the appropriate lubrication if needed. Record on the work order.						x		Manufacturer's O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Perform mechanical operating test to ensure the switch mechanism is operating freely, operating ON or OFF 2-3 times. The handle should operate smoothly without binding. If there is a mechanical trip provision, operate the trip provision within manufactures instructions. Record findings on the work order.			x					NFPA 110
Visually inspect the control devices for correct settings and operation and record on the work order.						x		Manufacturer's O&M Manual
For automatic transfer tests, simulate loss of power, then return the switch to normal power. Next, simulate loss of emergency power. Verify the engine start sequence, timing delay, normal source voltage sensing and frequency sensing relays, automatic transfer operation, interlocks and limit switch, engine cool down, and alternate source voltage sensing and frequency sensing relays for the correct operation. Record findings on the work order.			x					NFPA 110
Cables								
Megger critical cables and compare to the year before insulation test to verify if the readings are trending downwards. Record findings on the work order.						x		IEEE 43
Visually inspect and record on the work order the condition of the anchor bolts that secure wall brackets.						x		Project O&M Manual
Electrical Panels								
Visually inspect enclosures located in a poor environment for dust, dirt, and corrosive conditions. If there is dust and dirt, remove with a vacuum cleaner. Refurbish or replace enclosures that are badly corroded. Record findings on the work order.						x		NFPA 70B
Remove foreign material such as dirt, debris, or hardware from the outside top surfaces, so it doesn't fall into the enclosure and record on the work order.						x		NFPA 70B
Visually inspect the equipment inside the enclosure for dust, dirt, moisture, or other contaminants, eliminate cause if found. Record on the work order.						x		NFPA 70B
Ensure panels are locked as designated and record on the work order.						x		NFPA 70B
Visually inspect electrical panels for missing or unreadable labels and record on the work order.						x		NFPA 70B
Circuit Breakers								
Visually inspect the molded case circuit breaker for damage and record condition on the work order.						x		NFPA 70B

Maintenance Tasks	O	W	M	Q	S	A	P	References
Verify the Mounded Case Circuit Breaker (MCCB) is kept clean of external contamination and record on the work order.						x		NFPA 70B
Visually inspect the case of the breaker for cracks and record on the work order.						x		NFPA 70B
Visually inspect the connections for tightness and signs of overheating. Record findings on the work order.						x		NFPA 70B
Operate the circuit breaker manually to keep the contacts clean and lubrication performing properly. If there is a trip to test button, manually operate as well. Record findings on the work order.						x		NFPA 70B
Bulkhead Bypass (water up) Piping System								
Valves								
Perform visual inspection for leakage, loose fasteners, corrosions, etc. and record on the work order.						x		Project O&M Manual
Verify operation and lubricate. Record on the work order.					x			Project O&M Manual
Piping								
Visually inspect for corrosion and leakage and record on the work order.					x			Project O&M Manual
Flush out intake piping system using air pressure and record on the work order.					x			Project O&M Manual
Visually inspect inlets and outlets for debris or obstructions and record on the work order.					x			Project O&M Manual
Visually inspect for cavitation around outlets and record on the work order.					x			Project O&M Manual
Pump and Motor								
Verify operation and lubricate. Record on the work order.					x			Project O&M Manual
Gate Wells								
Visually inspect for debris; keep clear by regular operation of the air jets. Record on the work order.			x					Project O&M Manual
Visually inspect for damage or deterioration and record on the work order.			x					Project O&M Manual
Metal Work								
Visually inspect metal for corrosion; reapply protective coating; record on the work order.					x			Project O&M Manual
Lubricate and clean operating screws; record on the work order.					x			Project O&M Manual
Communication System								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for damage or malfunction and record on the work order.						x		Project O&M Manual
Verify that guy wires are securely fastened, ground straps secure, and hardware tight and record on the work order.						x		Project O&M Manual
Visually inspect mounting base for settlement and record on the work order.						x		Project O&M Manual
Verify that lines are securely attached to poles and record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of pole misalignment or settlement.						x		Project O&M Manual
Control Tower								
Roof Slab								
Visually inspect roof slab and covering for leaking, blistering, displaced gravel, and damaged flashing; record on the work order.						x		Project O&M Manual
Visually inspect and clear drains; record on the work order.						x		Project O&M Manual
Visually inspect lightning protection system anchorage, wires, connections for damage or loss and repair as needed. Record on the work order.						x		Project O&M Manual
Metal access ladders, stairways, and catwalks (exterior and interior)								
Visually inspect for metal corrosion; reapply protective coatings and record on the work order.						x		Project O&M Manual
Remove debris and record on the work order.						x		Project O&M Manual
Visually inspect and tighten loose connections and anchor bolts; record on the work order.						x		Project O&M Manual
Visually inspect for excessive strain or deflection in joints or members and record on the work order.						x		Project O&M Manual
Visually inspect sacrificial anodes and replace as necessary; record on the work order.						x		Project O&M Manual
Locking System								
Visually inspect for signs of intrusion and record on the work order.					x			Manufacturer's O&M Manual
Visually inspect condition and functioning of doors and locking mechanisms; record on the work order.						x		AR 190-51, Appendix D
Test alarm systems and record on the work order.			x					AR 190-13, 9-2b (1)
Visually inspect, adjust, and lubricate instrumentation padlocks and locking mechanisms; record on the work order.						x		AR 190-51, Appendix D

Maintenance Tasks	O	W	M	Q	S	A	P	References
Survey Monuments								
Visually inspect for settlement or misalignment and record on the work order.						x		Project O&M Manual
Visually inspect if caps are missing or if monument is damaged and record on the work order.						x		Project O&M Manual
Service Door								
Visually inspect condition; adjust door and controls for best operation and record on the work order.					x			Project O&M Manual
Visually inspect and maintain door locks; record on the work order.					x			Project O&M Manual
Lubricate all points of lubrication and record on the work order.					x			Project O&M Manual
Visually inspect sill slot and drains; remove obstructions and debris and record on the work order.					x			Project O&M Manual
Visually inspect metal for corrosion; reapply protective coating and record on the work order.					x			Project O&M Manual
Visually inspect and record on the work order the condition of weather stripping; replace if worn or deteriorated.					x			Project O&M Manual
Record on the work order the presence of unusual water and wind leakage into the control house during periods of wind and rain.					x			Project O&M Manual
Access gallery								
Visually inspect floors, stairs, and walkways and verify they are clean and clear of debris; record on the work order.		x						Project O&M Manual
Visually inspect and remove unwanted pests; record on the work order.					x			Project O&M Manual
Perform general cleanup of interior and record on the work order.		x						Project O&M Manual
Visually inspect for seepage, cracks, and record on the work order.					x			Project O&M Manual
Visually inspect for movement of 3-D joint meters and record on the work order.					x			Project O&M Manual
Visually inspect for settlement or damage to walls or floor and record on the work order.					x			Project O&M Manual
Utility House								
Visually inspect floors, stairs, and walkways and verify they are clean and clear of debris; record on the work order.					x			Project O&M Manual
Visually inspect and remove unwanted pests; record on the work order.					x			Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Perform general cleanup of interior and record on the work order.					x			Project O&M Manual
Control Chamber								
Visually inspect floors, stairs, and walkways and verify they are clean and clear of debris; record on the work order.		x						Manufacturer's O&M Manual
Visually inspect and remove unwanted pests; record on the work order.					x			Manufacturer's O&M Manual
Perform general cleanup of interior and record on the work order.		x						Manufacturer's O&M Manual
Visually inspect for seepage, cracks, and record on the work order.					x			Project O&M Manual
Visually inspect for seepage, cracks, and record on the work order.					x			Project O&M Manual
Visually inspect for movement of 3-D joint meters and record on the work order.					x			Project O&M Manual
Visually inspect for settlement or damage to walls or floor and record on the work order.								
General								
Visually inspect and lubricate (as required) machinery, sheaves, worm, gear, motor, brake, selector, and controller; record on the work order.			x					ASME A17.2
Visually inspect and record on the work order the condition of governor operation and working parts. Clean and lubricate.			x					ASME A17.2
Visually inspect and adjust car door operation. Lubricate hangers, rollers, gibs, linkages, and pivot points. Record on the work order.			x					ASME A17.2
Visually inspect and adjust door clearances, eccentrics, arm bearings, speed control switches, cables, clutches, chains, and belts. Tighten door drive system points. Record on the work order.			x					ASME A17.2
Visually inspect the operation of the limit and safety switches in hoistway and car; record on the work order.			x					ASME A17.2
Check the oil level in the car and in the counterweight oil buffers. Add oil as required. Record on the work order.			x					ASME A17.2
Visually inspect and record on the work order the condition of the car ventilation system and heater.			x					ASME A17.2
Visually inspect for proper car leveling operation. Adjust if required. Record on the work order.				x				ASME A17.2

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of the door speed control switches.				x				ASME A17.2
Visually inspect and record on the work order the condition of resistors and mounting assemblies.				x				ASME A17.2
Visually inspect the car top and hoistway for loose covers, vanes, or components and record on the work order.				x				ASME A17.2
Visually inspect all parts of the safeties and adjust clearance between the safety jaws and guide rails. Clean all parts and lubricate the pivot points. Record on the work order.				x				ASME A17.2
Lubricate the guide shoe stems and record on the work order.					x			ASME A17.2
Clean the guide rails with solvent to remove dirt, debris, or excess lubricant and record on the work order.						x		ASME A17.2
Drain, flush, and refill the gearing lubricant. Record on the work order.								ASME A17.2
Visually inspect and record on the work order the condition of guide rails, cams, fastenings, and counterweights in hoistways.						x		ASME A17.2
Visually inspect and record on the work order the condition of guide shoes, pivots, stems, counter weights, and fastenings.				x				ASME A17.2
Third party: Inspect governors for free tripping and record on the work order.						x		ASME A17.2
Third party: Perform Category 5 Testing every 5 years and record on the work order.							5 yrs	ASME A17.2
Verify that each landing door chain is present and working properly; record on the work order.				x				Manufacturer's O&M Manual
Verify that paint on walls, ceiling, and doors is clean and in good condition; record on the work order.				x				Manufacturer's O&M Manual
Verify that top of elevator shaft is clean of obstructions and record on the work order.				x				Manufacturer's O&M Manual
Verify the date of the posted Certificate of Inspection is current and record on the work order.				x				California Code of Regulations, CCR title 8 subsection 3001c
Verify that there are no unusual noises detected and record on the work order.				x				Manufacturer's O&M Manual
Braking System								
Visually inspect operation of the brake and adjust or repair if necessary. Lubricate pivot points. Record on the work order.			x					ASME A17.2

Maintenance Tasks	O	W	M	Q	S	A	P	References
Remove, clean, and lubricate the brake cores. Inspect the brake linings for wear; clean or replace if necessary. Adjust the brakes to wear evenly if necessary. Record on the work order.						x		ASME A17.2
Visually inspect and record on the work order the condition of the electrical connections.						x		ASME A17.2
Third party: Inspect brakes for wear on linings and sheave grooves. Record on the work order.						x		ASME A17.2
Electrical System								
Visually inspect and record on the work order the condition of all car operating controls, lamps, and gongs. Replace burned-out lamps.			x					ASME A17.1
Visually inspect and record on the work order the condition of the car emergency light.			x					ASME A17.1
Verify the door edge safety switch is present and working properly. Record on the work order.				x				ASME A17.1
Test to verify the power outlet inside car works and safety cover is in place and record on the work order.				x				ASME A17.1
With both the elevator and each landing floor door open, attempt to operate the elevator at each level to test that the sensor is working properly and record findings on the work order.				x				ASME A17.1
During normal operation, verify that the sensor allows the elevator to operate properly and record on the work order.				x				ASME A17.1
Third party: Inspect operation of controller, starter, relay, and selector panels for burning, loose connections, discoloration, and access moisture. Record on the work order.						x		ANSI A17.2
Third party: Inspect operation and settings of operating and safety switches. Record on the work order.						x		ANSI A17.2
Communication System								
Visually inspect and record on the work order the condition of the car telephone and alarm operations. Repair the alarm system if required.			x					ASME A17.2
Verify that adequate instructions for occupants is prominently posted within the car near the controls and record on the work order.				x				ASME A17.2
Test operation of the phone(s) located at designated levels and record on the work order.			x					ASME A17.2
Verify a current employee emergency call out list is present and record on the work order.				x				Project O&M Manual
Motors								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Perform megger-testing of motor and record findings on the work order.						x		ASME A17.2
Drain, flush, and refill the oil reservoirs. Record on the work order.						x		ASME A17.2
Lubricate the bearings and record on the work order.						x		ASME A17.2
Third party: Inspect motors for lubrication, wear, and noise. Record on the work order.						x		ASME A17.2
Ropes and Appurtenances								
Visually inspect all ropes for wear and lubrication (do not lubricate the governor rope); replace or lubricate the ropes if required. Clean the governor and hoist ropes. Inspect the rope hitches, fastenings, and shackles; equalize ropes if warranted. Record on the work order.				x				ASME A17.2
Visually inspect and record on the work order the condition of the clearances for governor tension sheave, counterweight-to-buffer (with car at top landing), and compensation sheave to pit. Visually inspect the governor sheave fastenings.					x			ASME A17.2
Hydraulic Power Unit and Appurtenances								
Test a sample of the hydraulic fluid for viscosity, color, contamination, foaming, and other pertinent properties specified by the equipment manufacturer. Drain and replace the fluid if the tests show it does not meet the requirements of the equipment manufacturer. Record on the work order.						x		ASME A17.2
Visually inspect and record on the work order the condition of the flexible hoses and replace as needed. Pressure hoses are required to be tested, inspected, and replaced according to the Code.						x		ASME A17.2
Test the mechanism and observe for proper operation of motor and pump, oil lines, tank, controls, plunger, packing, etc. Check the oil tank level. Visually inspect the packing of valves and cylinder for leakage and tighten if necessary. Record on the work order.			x					ASME A17.2
Stop Logs								
Visually inspect j-bulb or other seals for position, cracking, hardening. Seal should protrude beyond the metal. Record on the work order.						x		EM 1110-2-6054
Ensure fracture critical analysis has been performed that allows personnel to work behind stoplogs or know restrictions before getting behind stoplogs. Record on the work order.							5 yrs	EM 1110-2-6054

Maintenance Tasks	O	W	M	Q	S	A	P	References
Clean stoplogs after pulled and visually inspect for corrosion and weld defects. Verify leaf springs are still in place and functional. Record conditions on the work order.							5 yrs	EM 1110-2-6054
Bypass (water up) System								
Visually inspect and record on the work order the condition of wheels in gate storage pit.						x		Project O&M Manual
Metal Work								
Visually inspect for metal corrosion, delamination, or weld defects. Reapply protective coating and record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of cracks, undercutting and size.						x		Project O&M Manual
Visually inspect and record on the work order the condition of damaged seals. Replace as needed.						x		Project O&M Manual
Trash Rack								
Metal Work								
Visually inspect for corrosion, missing steel bars or obstructions and record on the work order.						x		Project O&M Manual
Concrete								
Visually inspect and record on the work order the condition of settlement, spalls, or other damage.						x		Project O&M Manual
Trash rack Slots								
Visually inspect trash rack slot metal embeds for corrosion, spalls, pitting, debris, and record on the work order.						x		Project O&M Manual

Appendix E Spillways Maintenance Tasks

O=Operational, W=Weekly, M=Monthly, Q=Quarterly, S=Semi-Annual, A=Annual, and P=Periodic

Table E-1. Spillways maintenance task list

Maintenance Tasks	O	W	M	Q	S	A	P	References
Spillway Section								
Quadrant Walls								
Visually inspect and record on the work order the condition of cracks, spalls, abrasive wear, and exposed reinforcement in concrete.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of panel displacement and offset joints.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of leaks.						x		ER 1110-2-1156
Wing Walls								
Visually inspect and record on the work order the condition of cracks, spalls, abrasive wear, and exposed reinforcement in concrete.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of panel displacement and offset joints.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of leaks.						x		ER 1110-2-1156
Signage								
Visually inspect and record on the work order the condition and stability of sign mounts, tighten loose hardware.				x				
Visually inspect and record on the work order obstructions to line-of-sight.				x				
Verify and record on the work order the legibility and cleanliness of signs.				x				
Visually inspect and record on the work order the condition of proper operation; test light functioning, as applicable.						x		Project O&M Manual
Downstream Warning Siren								
Visually inspect and record on the work order the condition of operation.						x		Project O&M Manual
Visually inspect and record on the work order the condition of vehicle barrier system.						x		UFC 4-022-02
Visually inspect and record on the work order the condition of barrier system condition and function.						x		UFC 4-022-02
Fencing								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order damage to gates and locks. Record functionality.				x				Project O&M Manual
Visually inspect and record on the work order the condition of connection and anchor bolts. Tighten loose connections and anchor bolts as needed.						x		Project O&M Manual
Remove debris and record on the work order.						x		Project O&M Manual
Approach Channel								
Blanket								
Visually inspect and record on the work order the condition of debris accumulation such as sediment, rubbish, and vegetal matter that may obstruct flow.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of settlement, survey monuments and readings.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of changes in grade/alignment of approach channel.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of the rock protection.						x		ER 1110-2-1156
Apron								
Visually inspect and record on the work order the condition of debris accumulation such as sediment, rubbish, and vegetal matter that may obstruct flow.						x		Project O&M Manual
Concrete								
Visually inspect and record on the work order the condition of changes in grade/alignment of approach channel.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of cracks, delamination, "pop-outs", spalls, and abrasive wear. Record evidence on the crack diagram.						x		Project O&M Manual
Visually inspect and record on the work order the staining that could indicate corroding rebar.						x		Project O&M Manual
Visually inspect and record on the work order the condition of expansion joints.						x		Project O&M Manual
Exit Channel								
Chute								
Visually inspect and record on the work order the condition of debris accumulation such as sediment, rubbish, and vegetal matter that may obstruct flow.						x		Project O&M Manual
Visually inspect and record on the work order the condition of erosion.						x		Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of settlement, uplift, survey monuments and readings.						x		Project O&M Manual
Visually inspect and record on the work order the condition of deterioration or erosion of bedded material of grouted portions.						x		Project O&M Manual
Visually inspect and record on the work order the condition of unusual flow patterns during discharge periods.				x				Project O&M Manual
Visually inspect, remove, and record on the work order the condition of unwanted pests and repair damage.						x		Project O&M Manual
Drainage System								
Visually inspect and record on the work order the condition of foundation drainage hole; report unusual seepage.						x		Project O&M Manual
Visually inspect, remove, and record on the work order the condition of debris, drift, and obstructions from floor drainage outlets.						x		Project O&M Manual
Visually inspect, clean, and record on the work order the condition of weep holes.						x		Project O&M Manual
Visually inspect and record on the work order the condition of normal water flow from uplift drains.						x		Project O&M Manual
Visually inspect, remove, and record on the work order the condition of efflorescence deposits/obstructions in drain cross-over lines.						x		Project O&M Manual
Verify and record on the work order that drain cover plates are securely attached.						x		
Visually inspect and record on the work order the condition of pools of stagnant water.						x		Project O&M Manual
Visually inspect and record on the work order the condition of overflow manhole covers and remove obstructions.						x		Project O&M Manual
Visually inspect and record on the work order the condition of drainage ditches. Clean silt as needed.						x		Project O&M Manual
Visually inspect drain exits for obstructions such as vegetation, rock or other debris and remove as needed. Ensure flap gates are operational.						x		Project O&M Manual
Stoplogs								
Visually inspect and record on the work order the condition of corrosion in metal work.						x		EM 1110-2-6054
Visually inspect and record on the work order the condition of welds, record cracks, undercutting and size.							5 yrs	EM 1110-2-6054
Visually inspect and record on the work order the condition of seals; replace damaged seals.						x		EM 1110-2-6054

Maintenance Tasks	O	W	M	Q	S	A	P	References
Verify and record on the work order that the wheels turn in gate storage pit.						x		EM 1110-2-6054
Visually inspect stoplogs for proper storage to include being off the ground, separated from each other to prevent damage to the seals, and protected from sunlight to prevent ultra violet (UV) damage to rubber seals.						x		EM 1110-2-6054
Flip Bucket								
Visually inspect, remove, and record on the work order the condition of debris, sediment, and abrasive materials.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of pools of stagnant water.						x		ER 1110-2-1156
Visually inspect, remove, and record on the work order the condition of concrete for cracks, delamination, spalls, movement.						x		ER 1110-2-1156
Impingement Area								
Visually inspect and record on the work order the condition of degradation of downstream channel.						x		ER 1110-2-1156
Fencing								
Verify and record on the work order the condition of damage; verify gates and locks functional.						x		Project O&M Manual
Visually inspect and record on the work order the condition of connections and anchor bolts; tighten as needed.						x		Project O&M Manual
Remove debris and record on the work order.						x		Project O&M Manual
Stone Protection								
Visually inspect, remove, and record on the work order the condition of vegetative growth.						x		Project O&M Manual
Visually inspect and record on the work order the condition of erosion or changes in grade.						x		Project O&M Manual
Visually inspect and record on the work order the condition of deteriorated rock or grouted portions.						x		Project O&M Manual
Visually inspect, remove, and record on the work order the condition of unwanted pests and repair damage.						x		Project O&M Manual
Concrete Control Structure								
Staff Gauges								
Visually inspect and record on the work order the condition of gauges for cleanliness and legibility.				x				Project O&M Manual
Repair staff gauges if broken or damaged and record on the work order.				x				Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of slippage or settlement or concrete footing.				x				Project O&M Manual
Visually inspect and record on the work order the condition of settlement, survey monuments and readings.				x				Project O&M Manual
Expansion Joints								
Visually inspect and record on the work order the condition of condition of expansion joints.						x		Project O&M Manual
Cut-off Wall								
Visually inspect and record on the work order the condition of settlement, survey monuments and readings.						x		Project O&M Manual
Visually inspect and record on the work order the condition of cracks, "pop-outs", spalls, and abrasive wear.						x		Project O&M Manual
Control or End Sill								
Visually inspect and record on the work order the condition of settlement, or upheaval, survey monuments and readings.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of cracks, delamination, efflorescence, "pop-outs", spalls, and abrasive wear.						x		ER 1110-2-1156
Ogee Spillway								
Visually inspect and record on the work order the condition of any settlements and/or misalignment issues of the concrete spillway.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of concrete cracks.						x		ER 1110-2-1156
Visually inspect and record on the work order the condition of scaling, delamination, spalls or popouts of concrete or exposed rebar.						x		ER 1110-2-1156
Tainter Gates and Tainter Gate Machinery								
General								
Perform Hydraulic Steel Structures Inspection and record findings on the work order.							5 yrs	ER 1110-2-8157
Visually inspect and record on the work order the condition of gate painting.						x		EM 1110-2-3400
Visually inspect and record on the work order the condition of welds above water level.						x		EM 1110-2-6054
Operate gates with full travel for throughout inspection and lubricate the whole lifting chains or wire ropes. Record on the work order.							3 yrs	EM 1110-2-6054
Operate gates with full travel to check upper limit switch if water is not on gates. Record on the work order.						x		EM 1110-2-6054

Maintenance Tasks	O	W	M	Q	S	A	P	References
Operate gates with full travel to check upper limit switch if water is on gates and bulkheads are required for full travel of gates.							3 yrs	EM 1110-2-6054
Operate gate to check lower limit switch and record on the work order.				x				EM 1110-2-6054
Lubricate open gears/bull gears and record on the work order.				x				EM 1110-2-6054
Use backup power (such as diesel generator) to operate the tainter gates and record on the work order.						x		EM 1110-2-6054
Visually inspect and record on the work order the condition of chain links or wire ropes.				x				EM 1110-2-6054
Lubricate chain links or wire ropes above water level. Portion of chains and wire ropes under water should be lubricated at the minimum of once every 3 years. Record on the work order.							3 yrs	EM 1110-2-6054
Visually inspect and record on the work order the condition of brake mechanisms and brake pads.				x				EM 1110-2-6054
Record on the work order unusual noise during operation.				x				EM 1110-2-6054
Record on the work order vibration during operation.				x				EM 1110-2-6054
Perform patch cord method using adjacent motor to operate tainter gate as applicable. record on the work order any issues with direction of gate travel.							3 yrs	
Seals								
Visually inspect and record on the work order condition of seals. Record cracks.						x		EM 1110-2-6054
Visually inspect and record on the work order the condition of mechanical fasteners.						x		EM 1110-2-6054
Visually inspect and record on the work order the condition of seals during operation. Record if binding is observed.						x		EM 1110-2-6054
Gate Trunnion Arms, Bearings, and Anchorages								
Visually inspect and record on the work order the condition of trunnion pin/bushing during operation. Record observed binding.				x				EM 1110-2-6054
Grease trunnion pins while gate in operation for a few feet (between 1 and 10 ft) and record on the work order.				x				EM 1110-2-6054
Visually inspect and record on the work order the condition of trunnion pin/bushing/yoke rings. Record misalignment or abnormal wear.						x		

Maintenance Tasks	O	W	M	Q	S	A	P	References
Ensure cap screws on the end plats, and nuts and bolts connecting the struts to the trunnion are tight. Record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of trunnion yoke on the thrust girder. Record observed shifting.						x		Project O&M Manual
Visually inspect and record on the work order the condition of corrosion on metal work.						x		Project O&M Manual
Visually inspect and record on the work order the condition of sealant. Record observed loss of sealant.						x		Project O&M Manual
Visually inspect and record on the work order the condition of the anchor member. Record observed trunnion interference.				x				Project O&M Manual
Visually inspect and record on the work order the condition of concrete. Record large cracks or spalling.						x		Project O&M Manual
Visually inspect and record indication that thrust girder is shifting when gate is under maximum head pressure.						x		Project O&M Manual
Traveling Nut Limit Switch								EM 1110-2-6054
Visually inspect for loose lever mounting screws, improper roller rotation, other problems, or damage. Visually inspect the head to make sure the head mounting screws are tightly fastened and the exterior of the head is not damaged. Record results on the work order.						x		Project O&M Manual
Visually inspect the cover and housing to make sure the head mounting screws are tightly fastened and the exterior of the head and housing are not damaged. Replace the limit switch if needed.						x		Project O&M Manual
Verify terminal box has electrical continuity, proper insulation, loose terminal screws, cracking, and any corrosion. Replace the limit switch if needed. Verify the limit switch operation and over-travel. Manually operate the roller lever to ensure it operates smoothly. Readjust the over-travel and replace the limit switch if the roller lever does not operate smoothly.						x		Project O&M Manual
Electric Controller								
Verify the electrical grounding. Record results on the work order.						x		NFPA 70B
Visually inspect and record the condition on the work order of enclosures in a poor environment for dust, dirt, and corrosive conditions. Remove dust and dirt with vacuum cleaner.						x		NFPA 70B

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of desiccant packs in electrical controllers and replace them as recommended by the manufacturer.						x		
Braking System								
Lubricate braking system per manufacturer's recommendation and record on the work order.						x		Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the brake shoe thickness and brake ring.						x		Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of the brake airline filters and lubricators.			x					Manufacturer's O&M Manual
Worm Gear								
Lubricate gear teeth per manufacturer's recommendation and record on the work order.						x		Manufacturer's O&M Manual
Visually inspect and record on the work order unusual vibration, noise, and temperature during operation.				x				Manufacturer's O&M Manual
Bull Gear								
Lubricate gear teeth per manufacturer's recommendation and record on the work order.				x				Manufacturer's O&M Manual
Verify contact pattern percentage. Ensure it's at minimum of 70%. Record condition on work order.				x				Manufacturer's O&M Manual
Visually inspect and record on the work order the condition of gear teeth for the following issues: excessive wear, fatigue, pitting, and cracking of gear teeth.					x			Manufacturer's O&M Manual
Access Covers								
Visually inspect and record on the work order the condition of latching mechanism or mechanical fasteners.						x		Project O&M Manual
Power Supply System								
Conduct megger testing of electrical cables and record on the work order.						x		Project O&M Manual
Lubricating System								
Visually inspect oil level and record on the work order.						x		Project O&M Manual
Test oil quality and replace oil as recommended by the manufacturer; record on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of grease lines/fittings.						x		Project O&M Manual
Hoisting Equipment								
Hoist Rope Cable and Drums								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of hoist rope and drums. Record kinks, crushing, dogleg, bird caging, corrosion.						x		EM 1110-2-3200
Visually inspect for broken wires, stands and record on the work order.						x		EM 1110-2-3200
Visually inspect for reduction in size of wire rope (10% or less) and record on the work order.						x		EM 1110-2-3200
Visually inspect for proper reeve. Record on the work order issues as appropriate.						x		EM 1110-2-3200
Visually inspect for cracked or worn drums and record on the work order.						x		EM 1110-2-3200
Verify rated load capacity is visible and readable; record findings on the work order.						x		EM 1110-2-2610
Visually inspect and record on the work order the condition of electrical components and wiring.						x		EM 1110-2-2610
Visually inspect and record on the work order the condition of fastening devices/anchor bolts.						x		EM 1110-2-2610
Apply lubrication and record on the work order.						x		EM 1110-2-2610
Visually inspect for indication that load is not being equally distributed between the ropes provided for each drum. Record results on work order.				x				EM 1110-2-3200
Visually inspect and record on the work order the condition of rope anchorage assembly at the gate.						x		EM 1110-2-2610
Visually inspect metal work for corrosion and record results on work order.						x		EM 1110-2-2610
Hoist Guard								
Visually inspect guard fasteners, check for missing bolts, nuts, etc. Record results on work order.				x				EM 1110-2-2610
Drive Shaft Coupling								
Verify proper torque on the set screws. Record results on work order.						x		EM 1110-2-2610
Visually inspect and record on the work order any looseness or wear on keys.						x		EM 1110-2-2610
Visually inspect and record on the work order any sign of cracks and shaft wear.						x		EM 1110-2-2610
Apply lubrication and record on the work order.						x		EM 1110-2-2610
Reducers								
Visually inspect the oil level and record on the work order.						x		EM 1110-2-2610

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order unusual noise, vibration, and temperature during operation.						x		EM 1110-2-2610
Visually inspect and record on the work order any oil leaks on the seals.						x		EM 1110-2-2610
Test oil quality and replace oil as recommended by the manufacturer; record on the work order.						x		EM 1110-2-2610
Visually inspect and record on the work order the condition of seals, drain plugs and shaft caps. Record any oil leakage; drain water in bottom of each gear case.						x		EM 1110-2-2610
Tighten all nuts and bolts and record on the work order.						x		EM 1110-2-2610
Visually inspect and record on the work order the condition of the metal work and sign of corrosion.						x		EM 1110-2-2610
Brakes								
Visually inspect and record on the work order the stopping distance; note excessive wear.				x				EM 1110-2-2610
Visually inspect for excessive drift and record on the work order.				x				EM 1110-2-2610
Tighten all nuts and bolts and record on the work order.				x				EM 1110-2-2610
Apply lubrication and record on the work order.				x				EM 1110-2-2610
Motor								
Visually inspect and record on the work order excessive heat, noise, or vibration during operation.				x				EM 1110-2-2610
Clean motor, blowing out dirt from windings, and wipe commutator and brushes; record on the work order.						x		EM 1110-2-2610
Remove, clean out, and replace oil in sleeve bearings and record on the work order.						x		EM 1110-2-2610
Examine and tighten loose connections. Record on the work order.						x		EM 1110-2-2610
Visually inspect and record on the work order the condition of the grease of ball or roller bearing.						x		EM 1110-2-2610
Test current input and compare it with normal. Record findings on work order.						x		EM 1110-2-2610
Verify operating speed and record on the work order.						x		EM 1110-2-2610
Test insulation/megger the motor and record on the work order.						x		EM 1110-2-2610
Remove and renew grease of ball or roller bearing per MFR run hours and record on the work order.							3 yrs	Manufacturer's O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect metal work for corrosion; keep clean and dry. Record on the work order.						x		EM 1110-2-2610
Apply lubrication and record on the work order.						x		EM 1110-2-2610
Visually inspect for unusual sound or improper functioning during operation and record on the work order.				x				EM 1110-2-2610
Visually inspect slack rope limit switch control for proper adjustment and record on the work order.						x		EM 1110-2-2610
Visually inspect and adjust travel limiting controls during operation. Record on the work order.						x		EM 1110-2-2610
Lubricating System								
Inspect for proper oil level and record on the work order.						x		Manufacturer's O&M Manual
Replace oil/fluid as recommended by the manufacturer. At the minimum, oil/fluid needs to be replaced once per year. Record on the work order.						x		Manufacturer's O&M Manual
Visually inspect water lubrication piping and valves for leaks; monitor corrosion and record condition on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the adjustment of spray jets that lubricate fixed seal bearing plates.						x		Project O&M Manual
Drive Shaft Assembly						x		
Visually inspect for misalignment and record on the work order.						x		EM 1110-2-2610
Visually inspect and record on the work order the condition of the bearing brackets.						x		EM 1110-2-2610
Visually inspect and record on the work order the condition of the mounting hardware.						x		EM 1110-2-2610
Lubricate bearings; record abnormal wear on the work order.						x		EM 1110-2-2610
Gate Leaf								
Tighten all nuts and bolts and record on the work order.						x		EM 1110-2-2610
Visually inspect metal work for corrosion and record results on work order.						x		EM 1110-2-2610
Monitor excessive wear where hoisting ropes are attached and their bearing on the upstream face of the leaf. Record changes on the work order.						x		EM 1110-2-2610
Visually inspect for misalignment between piers or distortion of the structure and record on the work order.						x		EM 1110-2-2610

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of the gate slot.						x		EM 1110-2-2610
Indicator								
Verify accuracy and readability of gauge and record on the work order.						x		Project O&M Manual
Apply lubrication and record on the work order.						x		Project O&M Manual
Visually inspect metal work for corrosion and record results on work order.						x		Project O&M Manual
Inspection Gallery								
Handrails, Toe Boards and Stairs								
Visually inspect for loose mounting brackets, missing welds, corrosion, missing nuts, etc. and record findings on the work order.						x		Project O&M Manual
Visually inspect for metal corrosion; reapply protective coating and record on the work order.						x		Project O&M Manual
Fencing								
Visually inspect for damage to fencing, gates and locks functionality and record on the work order.			x					Project O&M Manual
Visually inspect and tighten loose connections and anchor bolts, and record on the work order.						x		Project O&M Manual
Remove debris and record on the work order.						x		Project O&M Manual
Concrete								
Visually inspect for cracks, spalls, abrasive wear, and record on the work order.						x		ER 1110-2-1156
Visually inspect for water intrusion or penetration and record on the work order.						x		ER 1110-2-1156
Visually inspect for rust stains as the possible result of internal corrosion and deterioration of reinforcement steel and record on the work order.						x		ER 1110-2-1156
Visually inspect for exposure of reinforcing bars and record on the work order.						x		ER 1110-2-1156
Visually inspect for settlement and misalignment at joints and record on the work order.						x		ER 1110-2-1156
Metal								
Visually inspect for metal corrosion and repair/replace and needed and record on the work order.						x		Project O&M Manual
Visually inspect doors, hatches, and covers for proper operation and record on the work order.						x		Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for missing, broken, or corroded anchor bolts or other mechanical fasteners. Tighten and record on the work order.						x		Project O&M Manual
Drains								
Verify that drain cover plates are securely attached and record on the work order.				x				Project O&M Manual
Remove debris, drift, and obstructions from floor drainage outlets and record on the work order.				x				Project O&M Manual
Clean drainage gutters of debris or biological buildup and note if invasive species are present and record on the work order.						x		Project O&M Manual
Clean out weep holes and record on the work order.						x		Project O&M Manual
Air and Water Piping								
Visually inspect and record on the work order the condition of pipe hangers, supports, and all fasteners.						x		Project O&M Manual
Tighten loose fasteners and record on the work order.						x		Project O&M Manual
Visually inspect valves for leaks and record condition on the work order.						x		Project O&M Manual
Clean strainers and condensate traps and record on the work order.						x		Project O&M Manual
Visually inspect ventilation system for proper operation and record on the work order.						x		Project O&M Manual
Elevators								
General								
Visually inspect and lubricate (as required) machinery, sheaves, worm, gear, motor, brake, selector, and controller and record on the work order.			x					ASME A17.2
Visually inspect and record on the work order the condition of governor operation and working parts. Clean and lubricate.			x					ASME A17.2
Visually inspect and adjust car door operation. Lubricate hangers, rollers, gibs, linkages, and pivot points. Record on the work order.			x					ASME A17.2
Visually inspect and adjust door clearances, eccentrics, arm bearings, speed control switches, cables, clutches, chains, and belts. Tighten door drive system points. Record findings on the work order.			x					ASME A17.2
Visually inspect and record on the work order the condition of the operation of the limit and safety switches in hoistway and car.			x					ASME A17.2

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect the oil level in the car and in the counterweight oil buffers. Add oil as required. Record on the work order.			x					ASME A17.2
Visually inspect and record on the work order the condition of the car ventilation system and heater.			x					ASME A17.2
Visually inspect for proper car leveling operation. Adjust if required and record on the work order.				x				ASME A17.2
Visually inspect and record on the work order the condition of the door speed control switches.				x				ASME A17.2
Visually inspect and record on the work order the condition of resistors and mounting assemblies.				x				ASME A17.2
Visually inspect car top and hoistway for loose covers, vanes, or components and record condition on the work order.				x				ASME A17.2
Visually inspect all parts of the safeties and adjust clearance between the safety jaws and guide rails. Clean all parts and lubricate the pivot points. Record condition on the work order.				x				ASME A17.2
Lubricate the guide shoe stems and record on the work order.					x			ASME A17.2
Clean the guide rails with solvent to remove dirt, debris, or excess lubricant and record on the work order.						x		ASME A17.2
Drain, flush, and refill the gearing lubricant and record on the work order.						x		ASME A17.2
Visually inspect and record on the work order the condition of guide rails, cams, fastenings, and counterweights in hoistways.						x		ASME A17.2
Visually inspect and record on the work order the condition of guide shoes, pivots, stems, counter weights, and fastenings.				x				ASME A17.2
Third party: Inspect governors for free tripping and record on the work order.						x		ASME A17.2
Third party: Perform Category 5 Testing every 5 years and record on the work order.							5 yrs	ASME A17.2
Verify that each landing door chain is present and working properly and record on the work order.				x				ASME A17.2
Verify that paint on walls, ceiling, and doors is clean and in good condition and record on the work order.				x				ASME A17.2
Verify that top of elevator shaft is clean of obstructions and record on the work order.				x				ASME A17.2

Maintenance Tasks	O	W	M	Q	S	A	P	References
Verify that the date of the posted Certificate of Inspection is current and record on the work order.				x				California Code of Regulations, CCR title 8 subsection 3001c, ASME A17.1
Verify that there are no unusual noises detected and record on the work order.				x				ASME A17.2
Braking System								
Visually inspect operation of the brake and adjust or repair if necessary. Lubricate pivot points. Record on the work order.				x				ASME A17.2
Remove, clean, and lubricate the brake cores. Inspect the brake linings for wear; clean or replace if necessary. Adjust the brakes to wear evenly if necessary. Record findings on the work order.						x		ASME A17.2
Visually inspect and record on the work order the condition of the electrical connections.						x		ASME A17.2
Third party: Inspect brakes for wear on linings and sheave grooves. Record on the work order.						x		ASME A17.2
Electrical System								
Visually inspect and record on the work order the condition of all car operating controls, lamps, and gongs. Replace burned-out lamps.			x					ASME A17.2
Visually inspect and record on the work order the condition of the car emergency light.			x					ASME A17.2
Verify the door edge safety switch is present and working properly and record on the work order.				x				ASME A17.2
Test to verify the power outlet inside car works and safety cover is in place and record on the work order.				x				ASME A17.2
With both the elevator and each landing floor door open, attempt to operate the elevator at each level to test that the sensor is working properly and record on the work order.				x				ASME A17.2
During normal operation, verify that the sensor allows the elevator to operate properly and record on the work order.				x				ASME A17.2
Third party: Verify operation of controller, starter, relay, and selector panels for burning, loose connections, discoloration, and access moisture. Record on the work order.						x		ASME A17.2
Third party: Verify operation and settings of operating and safety switches. Record on the work order.						x		ASME A17.2
Communication System								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of the car telephone and alarm operations. Repair the alarm system if required.			x					ASME A17.2
Verify that adequate instructions for occupants is prominently posted within the car near the controls and record on the work order.				x				ASME A17.2
Test operation of the phone(s) located at designated levels and record on the work order.				x				ASME A17.2
Verify a current employee emergency call out list is present and record on the work order.				x				ASME A17.2
Motors								
Perform megger-testing of motor and record findings on the work order.						x		ASME A17.2
Drain, flush, and refill the oil reservoirs and record on the work order.						x		ASME A17.2
Lubricate the bearings and record on the work order.						x		ASME A17.2
Third party: Check motors for lubrication, wear, and noise. Record on the work order.						x		ASME A17.2
Ropes and Appurtenances								
Visually inspect and record on the work order the condition of all ropes for wear and lubrication (do not lubricate the governor rope); replace or lubricate the ropes if required. Clean the governor and hoist ropes. Inspect the rope hitches, fastenings, and shackles; equalize ropes if warranted.				x				ASME A17.2
Verify the clearances for governor tension sheave, counterweight-to-buffer (with car at top landing), and compensation sheave to pit. Visually inspect the governor sheave fastenings. Record conditions and findings on the work order.				x				ASME A17.2
Hydraulic Power Unit and Appurtenances								
Test a sample of the hydraulic fluid for viscosity, color, contamination, foaming, and other pertinent properties specified by the equipment manufacturer. Drain and replace the fluid if the tests show it does not meet the requirements of the equipment manufacturer. Record findings on the work order.						x		ASME A17.2
Visually inspect and record on the work order the condition of the flexible hoses and replace as needed. Pressure hoses are required to be tested, inspected, and replaced according to the Code.						x		ASME A17.2

Maintenance Tasks	O	W	M	Q	S	A	P	References
Test mechanism – Observe for proper operation of motor and pump, oil lines, tank, controls, plunger, packing, etc. Check the oil tank level. Visually inspect the packing of valves and cylinder for leakage and tighten if necessary. Record findings and conditions on the work order.			x					ASME A17.2

Appendix F Instrumentation Maintenance Tasks

O=Operational, W=Weekly, M=Monthly, Q=Quarterly, S=Semi-Annual, A=Annual, and P=Periodic

Table F–1. Instrumentation maintenance task list

Maintenance Tasks	O	W	M	Q	S	A	P	References
Accelerographs								EM 1110-2-1908
Visually inspect and record on the work order the condition of event counter and indicator.		x						Project O&M Manual
Protective Housing								
Visually inspect and record on the work order the condition of housing function and damage.			x					Project O&M Manual
Visually inspect and record on the work order the condition of hardware and fasteners. Tighten as needed.				x				Project O&M Manual
Verify and record on the work order that ID numbers are present and legible.			x					Project O&M Manual
Visually inspect and record on the work order the condition of settlement and erosion.			x					Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.			x					Project O&M Manual
Visually inspect and record on the work order the condition of vegetation; remove excessive vegetation and debris.			x					Project O&M Manual
Power Supply System								
Visually inspect and record on the work order the condition of battery charging system; replace if needed.		x						Project O&M Manual
Locks								
Verify and record on the work order that locks are present and in good working condition; lubricate as needed.			x					Project O&M Manual
Seismic Alarm Devices								
AC/DC Power Supply System								
Visually inspect and record on the work order the condition of battery charging system (trickle charger and/or solar charge controller); replace if needed.			x					Project O&M Manual
Visually inspect and record on the work order the condition of fuses; replace fuses as applicable.						x		Project O&M Manual
Solar Panel								
Visually inspect, clean and record on the work order the condition of the solar panel; replace if needed.			x					Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Battery								
Visually inspect, clean and record on the work order the condition of the battery terminals; tighten as needed.				x				Project O&M Manual
Visually inspect and record on the work order the condition of charge and charge rate; replace if needed.			x					
Protective Housing								
Visually inspect and record on the work order the condition of housing function and damage.			x					Project O&M Manual
Visually inspect and record on the work order the condition of hardware and fasteners. Tighten as needed.				x				Project O&M Manual
Verify that ID numbers are present and legible and record on the work order.			x					Project O&M Manual
Visually inspect and record on the work order the condition of settlement and erosion.			x					Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.			x					Project O&M Manual
Visually inspect and record on the work order the condition of vegetation; remove excessive vegetation and debris.			x					Project O&M Manual
Locks								
Verify that locks are present and in good working condition; lubricate as needed and record on the work order.			x					Project O&M Manual
Piezometers								
Visually inspect access stairs and retaining walls for damage or deterioration and record condition on the work order.			x					Project O&M Manual
Metal Structures								
Visually inspect the tubing ends for damage and record the condition on the work order.			x					Project O&M Manual
Covers								
Visually inspect and record on the work order the condition of housing function and damage.			x					Project O&M Manual
Visually inspect and record on the work order the condition of hardware and fasteners. Tighten as needed.				x				Project O&M Manual
Verify that ID numbers are present and legible; record on the work order.			x					Project O&M Manual
Visually inspect and record on the work order the condition of settlement and erosion.			x					Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.			x					Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of vegetation; remove excessive vegetation and debris.			x					Project O&M Manual
Locks								
Verify that locks are present and in good working condition; lubricate as needed and record on the work order.			x					Project O&M Manual
Observation Wells								
Covers								
Visually inspect and record on the work order the condition of housing function and damage.			x					Project O&M Manual
Visually inspect and record on the work order the condition of hardware and fasteners. Tighten as needed.				x				Project O&M Manual
Verify that ID numbers are present and legible; record on the work order.			x					Project O&M Manual
Visually inspect and record on the work order the condition of animals guards; replace if needed.			x					Project O&M Manual
Visually inspect and record on the work order the condition of vegetation; remove excessive vegetation and debris.			x					Project O&M Manual
Visually inspect and record on the work order the condition of inlets and clear out eroded material.			x					Project O&M Manual
Risers								
Visually inspect for damage and record condition the work order.			x					Project O&M Manual
Visually inspect and record on the work order the condition of inlets and clear out eroded material.			x					Project O&M Manual
Visually inspect and record on the work order the condition of sediment at bottom of risers: flush if applicable.							5 yr.	EM 1110-2-1908
Concrete Base								
Visually inspect and record on the work order the condition of settlement and erosion.			x					Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.			x					Project O&M Manual
Locks								
Verify that locks are present and in good working condition; lubricate as needed and record on the work order.			x					Project O&M Manual
Weirs								
Structural Components								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of weir function and damage.			x					Project O&M Manual
Visually inspect and record on the work order the condition of all hardware and fasteners; tighten as needed.				x				Project O&M Manual
Visually inspect, remove, and record on the work order the condition of obstructions from drainage lines and intake ports.			x					Project O&M Manual
Stilling Well								
Visually inspect and record on the condition of sediment; flush if needed.						x		Project O&M Manual
Inlet Pipes								
Visually inspect connections and fittings for leaks or deterioration and record condition on the work order.			x					Project O&M Manual
Visually inspect, remove, and record on the work order the condition of obstructions from drainage lines and intake ports.			x					Project O&M Manual
Embankment								
Visually inspect and record on the work order the condition of settlement and erosion.			x					Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.			x					Project O&M Manual
Channels								
Visually inspect, remove, and record on the work order the condition of excessive vegetation, sediment, and debris.			x					Project O&M Manual
Visually inspect for unusual movement or flow changes and record on the work order.			x					Project O&M Manual
Staff Gauges								
Concrete Base								
Visually inspect and record on the work order the condition of settlement and erosion, survey monuments and readings.			x					Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.			x					Project O&M Manual
Visually inspect, remove, and record on the work order the condition of excessive vegetation and debris.			x					Project O&M Manual
Structural Components								
Visually inspect and record on the work order the condition of staff gauge function and damage.			x					Project O&M Manual
Visually inspect and record on the work order the condition of all hardware and fasteners; tighten as needed.				x				Project O&M Manual

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect, remove, and record on the work order the condition of cleanliness and legibility.			x					Project O&M Manual
Repair components if broken or damaged and record on the work order.			x					Project O&M Manual
Relief Wells								
Outflow Pipes and Screens								
Visually inspect for damage and record condition on the work order.			x					Project O&M Manual
Visually inspect and record on the work order the condition of inlet areas of the outfall drain pipes and remove debris.			x					Project O&M Manual
Visually inspect and record on the work order the condition of animals guards; replace if needed.			x					Project O&M Manual
Remove sediment and pump test after cleaning. Record on the work order.							5 yrs	EM 1110-2-1914
Manhole Covers								
Verify that the ID numbers are present and legible and record on the work order.			x					Project O&M Manual
Visually inspect for soil accumulation onto the covers due to sloughing and record on the work order.			x					Project O&M Manual
Risers								
Visually inspect for damage and record condition on the work order.			x					Project O&M Manual
Visually inspect and record on the work order the condition of inlets; keep clear of eroded material.			x					Project O&M Manual
Concrete Base								
Visually inspect for damage to concrete collars and record condition on the work order.			x					Project O&M Manual
Visually inspect and record on the work order the condition of settlement and erosion.			x					Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.			x					Project O&M Manual
Visually inspect for excessive vegetation and debris, remove and record on the work order.			x					Project O&M Manual
Locks								
Verify that locks are present and in good working condition; lubricate as needed and record on the work order.			x					Project O&M Manual
Inclinometers								
Cable								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for breaks, twists, gouges, and worn markings; record condition on the work order.							5 yr.	EM 1110-2-1908
Visually inspect the connector and its O-rings for wear and corrosion and record condition on the work order.							5 yrs	EM 1110-2-1908
Probe/Sensor								
Visually inspect and record on the work order the condition of probe; clean and dry as needed.							5 yrs	EM 1110-2-1908
Visually inspect for wear to O-rings and electrical connectors and record condition on the work order.						x		EM 1110-2-1908
Recalibrate the probe per manufacturer recommendation and record on the work order.							5 yrs	EM 1110-2-1908
Casing								
Flush casing to remove debris or sediment and record on the work order.							5 yrs	EM 1110-2-1908
Remove incrustation or residue from casing grooves and record on the work order.							5 yrs	EM 1110-2-1908
Wheels								
Lubricate wheels after each use and record on the work order.							5 yrs	EM 1110-2-1908
Verify that wheel yoke is laterally stable and free to return to extended position and record on the work order.							5 yrs	EM 1110-2-1908
Enclosure								
Visually inspect and record on the work order the condition of inclinometer function and damage.							5 yrs	EM 1110-2-1908
Tighten all hardware and fasteners and record on the work order.							5 yrs	EM 1110-2-1908
SCADA System								
Pneumatic Systems/Components								
Visually inspect and record on the work order the condition of regulators and filters.			x					TM 5-601
Visually inspect and record on the work order the condition of tubing and piping.			x					TM 5-601
Actuate pressure switches and record on the work order.					x			TM 5-601
Calibrate switches and sensors and record on the work order.						x		TM 5-601
Calibrate pressure gauges and record on the work order.						x		TM 5-601
Calibrate thermometers and record on the work order.						x		TM 5-601

Maintenance Tasks	O	W	M	Q	S	A	P	References
Automated Data Acquisition (ADAS) System								
Structural Components								
Verify proper operation and visually inspect for damage. Record condition on the work order.			x					Project O&M Manual
Tighten all hardware and fasteners and record on the work order.			x					Project O&M Manual
Visually inspect and record on the work order the condition of settlement and erosion.			x					Project O&M Manual
Visually inspect and record on the work order the condition of vegetation and debris: remove excessive vegetation and debris.			x					Project O&M Manual
Electrical/Electronic Systems								
Perform lamp Test/Verify Indicators and record results on the work order.			x					TM 5-601
Visually inspect and record on the work order the existence of dirt, water, and heat in enclosures.			x					TM 5-601
Visually inspect and record on the work order the condition of actuate (stroke) valves and actuators.					x			TM 5-601
Visually inspect and record on the work order the condition of actuate switches.					x			TM 5-601
Run Position Locator Control (PLC) diagnostics and record results on work order.					x			TM 5-601
Calibrate sensors and transmitters; record on the work order.						x		TM 5-601
Calibrate meters and record on the work order.						x		TM 5-601
Calibrate actuators and record on the work order.						x		TM 5-601
Test batteries and record on the work order.					x			TM 5-601
Test automatic control sequences and record on the work order.						x		TM 5-601
Verify alarms and record on the work order.						x		TM 5-601
Update software and patching; record on the work order.				x				TM 5-601
Update anti-virus definition and record on the work order.			x					TM 5-601
Visually inspect and record on the work order the condition of wire, cable, and connections.			x					TM 5-601
Visually inspect and record on the work order the condition of surge protectors: replace if damaged.			x					EM 1110-2-1908
Data Communication System								
Verify proper operation and record on the work order.			x					EM 1110-2-1908

Maintenance Tasks	O	W	M	Q	S	A	P	References
Power Supply System								
Visually inspect and record on the work order the condition of the battery charging system; replace if needed.			x					EM 1110-2-1908
Toe Drains								
Visually inspect for obstructions and confirm free-flowing. If toe drain is daylighting the internal horizontal blanket drain, check for contamination of rock by soil particles or decomposing vegetation. Record condition on the work order.				x				Project O&M Manual
Visually inspect the toe drain for vegetation, overspray of herbicide by noting dead vegetation around rocks; remove any found vegetation by spraying or manually. Embankment grass/vegetation, should grow up to but not into the drain rock. If overspray is observed, visually inspect and record on the work order the condition of erosion of soil into rock. Record condition on the work order.				x				Project O&M Manual
Perform drain cleaning (rodding, mechanical abraders, water pressure blasting) and record on the work order.							5 yrs	Project O&M Manual
Weather Stations/Rain Gauges								
Structural Components								
Visually inspect and record on the work order the condition of operation and damage.			x					Project O&M Manual
Tighten all hardware and fasteners and record on the work order.				x				Project O&M Manual
Visually inspect and record on the work order the condition of settlement and erosion.			x					Project O&M Manual
Visually inspect, remove, and record on the work order the condition of excessive vegetation and debris.			x					Project O&M Manual
Data Communication System								
Visually inspect and record on the work order the condition of operation and damage.						x		Project O&M Manual
Power Supply System								
Visually inspect and record on the work order the condition of battery charging system; replace if needed.			x					Project O&M Manual
Locks								
Verify that locks are present and in good working condition; lubricate as needed and record on the work order.			x					Project O&M Manual
Calibrated Crack Monitors								
Structural Components								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect for monitor damage and record condition on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the readings on devices.						x		Project O&M Manual
Ball and Box Devices								
Visually inspect ball and box devices for corrosion, position, attachment, etc. and record condition on the work order.				x				
Visually inspect and record on the work order the readings on the devices.				x				
Flumes								
Parshall Flume								
Visually inspect for spalls, cracks, undercutting in concrete and record condition on the work order.						x		
Remove biofouling, vegetation and/or other obstructions within 3-5 feet upstream and downstream of the flume at least 30 minutes before reading. Record on the work order.						x		
Visually inspect and record on the work order the condition of gauge; clean prior to reading measurements. Replace gauge if damaged or missing and note in recording document.						x		
Visually inspect embankment on either side of flume and record on the work order any washout or water getting around or under the flume.						x		
Record measurements on the work order and compare with previous readings. Submit findings to District representatives.						x		
Stilling Well								
Clean sediment as needed and record on the work order.						x		Project O&M Manual
Inlet Pipes								
Visually inspect for leaks or deterioration on the connections and fittings and record on the work order.			x					Project O&M Manual
Visually inspect, remove, and record on the work order the condition of obstructions from drainage lines and intake ports.			x					Project O&M Manual
Survey Measurement/Control Points								
Visually inspect and record on the work order the condition of settlement or misalignment.						x		Project O&M Manual
Visually inspect and record on the work order the condition of monument and caps; record damage or missing components.						x		Project O&M Manual
Protective Housing								

Maintenance Tasks	O	W	M	Q	S	A	P	References
Visually inspect and record on the work order the condition of housing function.						x		Project O&M Manual
Visually inspect and record on the work order the condition of hardware and fasteners. Tighten as needed.						x		Project O&M Manual
Verify and record on the work order that ID numbers are present and legible.						x		Project O&M Manual
Visually inspect and record on the work order the condition of settlement and erosion.						x		Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.						x		Project O&M Manual
Visually inspect and record on the work order the condition of vegetation; remove excessive vegetation and debris						x		Project O&M Manual
Concrete Base								
Visually inspect for damage to concrete collars and record condition on the work order.						x		Project O&M Manual
Visually inspect and record on the work order the condition of settlement and erosion.						x		Project O&M Manual
Visually inspect and record on the work order the condition of burrowing rodent activity.						x		Project O&M Manual
Visually inspect, remove, and record on the work order the condition of excessive vegetation and debris.						x		Project O&M Manual

Glossary of Terms

<u>Term</u>	<u>Definition</u>
AC	Alternating Current
ADA	Automated Data Acquisition
AHA	Activity Hazard Analysis
ALS	Automated Lubrication System
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
DC	Direct Current
EC	Engineering Circular
EM	Engineering Manual
FEM	Facilities and Equipment Maintenance
HSS	Hydraulic Steel Structures
ID	Identification
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
MCCB	Mounded Case Circuit Breaker
MFR	Manufacturer Recommendation
MSC	Major Subordinate Command
MTS	Maintenance Testing Specifications
NDT	Non-Destructive Testing
NEC	National Electric Code
NETA	InterNational Electrical Testing Association
NFPA	National Fire Protection Association
O&M	Operations and Maintenance
OM	Operations Manager
OPM	Operations Project Manager
OSHA	Occupational Safety and Health Administration
PLC	Programmatic Logic Control
PMMP	Project Maintenance Management Plan
ROV	Remote Operating Vehicle
SCADA	Supervisory Control and Data Acquisition
UFC	Unified Federal Code
USACE	U.S. Army Corps of Engineers
UV	Ultra Violet