Glass Club Dam (TX04004)

Operations and Maintenance Guidelines

June 2013

Prepared by:

Board of Directors
Glass Club Lake, Inc.

Operation and Maintenance Guide
Glass Club Dam, TX04004
Glass Club Lake, Inc.

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OPERATION

Operation of a dam may involve adjusting the reservoir level, controlling debris and blockage of spillway, keeping records and, in general, ensuring public safety. Proper operation procedures are extremely important for maintaining a safe structure. Many small dams do not need a full-time operator, but should be checked regularly. Special operational procedures to be followed during an emergency should be posted.

Establishing an operation plan calls for detailed documentation of the following:

- Data on the physical characteristics of dam and reservoir
- Descriptions of dam components
- Instructions for inspections
- Guidelines for maintenance
- Guidelines for emergency operations

BACKGROUND

Glass Club Lake – Texas ID TX04004

Glass Club Dam is located approximately one mile northeast of Omaha in Morris County, Texas. The coordinates of the dam are Longitude -94.719554 and Latitude 33.189955. The structure was constructed in approximately 1922. Adjudicated Water Rights Permit number 04828 authorizes Glass Club Lake, Inc. to use the water impounded by the dam for recreation purposes without right of diversion. Currently the dam consists of an approximately 600 foot-long, east/west orientated earthen embankment, a siphon, and a combined service/emergency spillway. The siphon, located approximately 200 feet east of the left end of the dam, consists of a 16 inch diameter steel pipe, a priming valve and a control valve. The dam's combined service/emergency spillway is located at the right end of the dam and consists of an approximately 15 foot wide concrete flat bottom channel with 3:1 concrete side slopes. At the bottom of the spillway channel is a 20 foot x 20 foot stilling basin section lined with rock riprap. When engaged, flows from the spillway discharge directly into Village Creek. TCEQ records indicate the dam has an estimated normal storage capacity of 500 acre-feet and a maximum storage capacity of 750 acre-feet.

Dam Description

Official Dam Name: **GLASS CLUB DAM**

Stream: **VILLAGE CREEK**

Dam Location: **1 Mile North of Omaha, TX**

Latitude/Longitude: **Latitude 33.189955 Longitude -94.719554**

Dam Owner: **Glass Club Lake, Inc.**

Dam Owner's Address: **P.O. Box 927, Omaha, TX 75571**

Embankment

Type	Earthen Embankment
Year Constructed	1922
Length	600 feet
Maximum Height	33 feet
Top Width	10 feet
Top of Embankment Elevation	351.38 feet-msl
Drainage Area	_____ square miles

Principal Spillway

Type	_____
Location	_____
Crest Length	_____ feet
Crest Elevation	_____ feet-msl

Service/Emergency Spillway

Type	Concrete lined control section
Location	Right (East) end of Dam
Crest Length	15' flat bottom w/ 3:1 side slopes
Crest Elevation	346.44 feet-msl

Inlet-Outlet Works

Type	_____
Location	_____ (ex.–Right end of the dam)
Invert Elevation (Inlet)	_____ feet-msl (bottom of pipe)
Invert Elevation (Outlet)	_____ feet-msl (bottom of pipe)

Reservoir

Elev. Top of Conservation Pool	346.44 feet-msl
Capacity Conservation Pool (Normal Pool)	500 acre-feet
Capacity at Top of Dam (Maximum)	750 acre-feet
Surface Area	35 acres

OPERATING INSTRUCTIONS AND RECORDS

Currently, Releases from Glass Club Lake reservoir are uncontrolled. Glass Club Lake is a self-operating reservoir.

SCHEDULE OF ROUTINE TASKS

Schedule of routine tasks as tabulated below is subject to the hazard classification of the dam. Because Glass Club Lake is considered a significant hazard, the following tasks are required.

Operation Plan – Schedule of Routine Tasks

FREQUENCY	SIGNIFICANT HAZARD
Daily	-
Weekly	-
Monthly	Surveillance, Monitor seepage, *See below
Quarterly	-
Bi-Annually	-
Annually	Visual Inspection. Test outlet.
As Required	Routine Maintenance & Additional Inspections
Immediately After Floods	Additional Inspections
Immediately After Earthquakes	Additional Inspections

Record all observations. Periodic observations of seepage is particularly important. Photographs are valuable for documenting changes.

There are a few specific items that should be routinely checked for this dam, which are listed below:

- The area immediately downstream of the spillway should be checked to ensure additional erosion does not occur at the end of the spillway. If major erosion has occurred, an engineer should be contacted immediately. In addition, the channel downstream of the spillway should be checked to ensure debris will not restrict the flow from the spillway during a storm event.
- The siphon pipe shall be inspected to ensure that there is not a major leak. If a major leak is detected, an engineer should be contacted immediately. The area around the siphon pipe shall also be inspected to ensure “piping” is not occurring.
- The downstream embankment slope shall be inspected and or monitored for seepage occurring at the toe of the slope. If seepage is detected or increases, and contains flowing sediment, an engineer shall be contacted immediately.

INSPECTION GUIDELINES

An effective inspection program is essential for identifying problems and providing safe maintenance of the dam. An inspection program should involve three types of inspections: (1) periodic technical inspections; (2) periodic maintenance inspections; (3) informal observations by project personnel as they operate the dam (if applicable).Technical inspections must be performed by specialists familiar with the design and construction of dams and should include assessments of structure safety. Maintenance inspections are performed more frequently than technical inspections in order to detect, at an early stage, any developments that may be detrimental to the dam. They involve assessing operational capability as well as structural stability. The third type of inspection is actually a continuing effort by the dam's owner on-site project personnel (data tenders, powerhouse operators, maintenance workers) performed in the course of their normal duties (if applicable). The continued effectiveness of these inspections requires education on new personnel. Regular visual inspections are among the most economical means the owner can use to ensure the safety and long life of a dam and its immediate environment. Visual inspection is a straightforward procedure that can be used by any properly trained person to make a reasonably accurate assessment of a dam's condition. The inspection involves careful examination of the surface and all parts of the structure, including its adjacent environment. The equipment required is not expensive, and the inspection usually can be completed in less than one day. A dam owner, by applying the maximum prudent effort, can identify any changes in previously noted conditions that may indicate a safety problem. Quick corrective action to conditions requiring attention will promote the safety and extend the useful life of the dam while possibly preventing costly future repairs.

ORGANIZING FOR INSPECTIONS

All inspections should be organized and systematic, and inspectors should use equipment appropriate for the task, record observations accurately, and survey the structure and site comprehensively. It is essential that documentation be developed and maintained in order to ensure adequate follow-up and repair.

Recording inspection observations:
An accurate and detailed description of conditions during each inspection will enable meaningful comparisons of conditions observed at different times. The inspector should record all measurements and observed details required for an accurate picture of a dam's current condition and possible problems. Using the forms given in Appendix "A" & "B" will help record the details.

This information has three elements:

a. *Location* – Accurately describe the location of any questionable are or condition so that it can be evaluated for changes over time or re-examined by experts. Photographs can help. Record the location along the dam, as well as above the tow or below the crest. Similarly, document the location of problems in the outlet or spillway.

b. *Extent or Area* – The length, width, and depth or height of any suspected problem area should be determined.
c. *Descriptive detail* – Give a brief yet detailed description of any anomalous condition. Some items to include:
    - Quantity of drain outflows
    - Quantity of seepage from point and area sources
    - Color or quantity of sediment in water
    - Depth of deterioration in concrete
    - Length, displacement, and depth of cracks
    - Extent of moist, wet, or saturated areas
    - Adequacy of protective cover
    - Adequacy of surface drainage
    - Steepness or configuration of slopes
    - Apparent deterioration rate
    - Changes in conditions

Coverage:
An inspection is conducted by walking along and over a dam as many times as is required to observe the entire structure. From any given location, a person can usually gain a detailed view for 10 to 30 feet in each direction, depending upon the smoothness of the surface or type of material (grass, concrete, riprap, brush) on the surface. On the downstream slope, a zigzag inspection path will ensure that any cracking is detected.

Sequence:
Here is a sequence of inspection that ensures systematic coverage of an entire site:

- Upstream slope
- Crest
- Downstream slope
- Seepage occurring at the siphon pipe, toe of the slope along the downstream embankment and the outlet channel, stilling basin of the spillway
- Spillway

Following a consistent sequence lessens the chance of an important condition being overlooked. Reporting inspection results in the same sequence is recommended to ensure consistent records. Inspection forms are included in Appendix A. The forms should be supplemented with additional details specific to a given dam.

Record Keeping:
The inspector should fill out a dated report for each inspection, which should be filed along with any photographs taken (which should also be dated). In addition to inspection observations, monitoring measurements and weather conditions (especially recent rains, extended dry spells and snow cover) should also be systematically included in the inspection report. A sketch of the dam with problem areas noted is helpful. Immediately following an inspection, observations should be compared with previous records to see if there are any trends that may indicate developing problems. If questionable change or trend is noted, and failure is not imminent, the owner should consult a professional engineer experienced in dam safety. Reacting quickly to

questionable conditions will ensure the safety and long life of a dam and possibly prevent costly repairs or expensive litigations.

Crucial Inspection Times:
There are at least five special times when an inspection is recommended regardless of the regular schedule:

1. Prior to a predicted major rainstorm or heavy snow melt: check spillway, outlet channel, and riprap.
2. During or after a severe rainstorm: check primary spillway and outlet channel.
3. During or after a severe windstorm: check riprap performance during the storm (if possible) and again after the storm has subsided.
4. Following an earthquake in the area: make a complete inspection immediately after the event and weekly inspections for the next several months to detect any delayed effects.
5. During and immediately after a reservoir filling (if ever drained): schedule a regular program of frequent complete inspections during the period a reservoir is first being filled to ensure that design and site conditions are as predicted. In most states, including Texas, an inspection are filling schedule are prescribed by the design engineer and approved by the state engineer.

MAINTENANCE GUIDELINES

A good maintenance program will protect a dam against deterioration and prolong its life. A poorly maintained dam will deteriorate, and may fail. Nearly all the components of a dam and the materials used for its construction are susceptible to damaging deterioration if not properly maintained. A good maintenance program protects not only the owner, but the general public as well. Moreover, the cost of a proper maintenance program is small compared to the costs of major repairs, loss of life and property, and litigation.

Develop a basic maintenance program based primarily on systematic and frequent inspections. Inspections, as noted above, should be performed at least monthly and after major floods or earthquakes. During each inspection, refer to a checklist of items that call for maintenance.

The following outline lists, by relative priority, the various problems or conditions that might be encountered in a dam that has deteriorated from lack of maintenance.

Immediate Maintenance:
The following conditions are critical and call for immediate attention:

- A dam about to be overtopped or being overtopped.
- A dam about to be breached (by progressive erosion, slope failure, or other circumstances).

- A dam showing signs of piping or internal erosion indicated by increasingly cloudy seepage or other symptoms.
- A spillway being blocked or otherwise rendered inoperable, or having normal discharge restricted.
- Evidence of excessive seepage appearing anywhere at the dam site (an embankment becoming saturated, seepage exiting on the downstream face of a dam) increasing in volume.

Although the remedy for some critical problems may be obvious 9such as clearing a blocked spillway), the problems listed above generally require the services of a professional engineer familiar with the construction and maintenance of dams. The Emergency Action Plan should be activated when any of the above conditions are noted.

Required Maintenance at earliest possible date:
The following maintenance should be completed as soon as possible after the defective condition is noted:

- Remove all underbrush and trees from the dam, and establish a good grass cover.
- Fill animal burrows.
- Restore and re-seed eroded area and gullies on embankment dams.
- Repair defective spillways, gates, valves and other appurtenant features.
- Repair any concrete or metal components that have deteriorated, as soon as weather permits.

Continuing Maintenance:
Several tasks should be performed continually:

- Routine mowing and general maintenance.
- Maintenance and filling of any cracks and joints on concrete dams and in concrete spillways.
- Observation of any springs or areas of seepage, comparing quantity and quality (clarity) with prior observations.
- Inspection of the dam (as discussed previously).
- Monitoring of development in the watershed which would materially increase runoff from storms.
- Monitoring of development downstream and updating the Emergency Action Plan to include new houses or other occupied structures within the area.

Appendix A: Inspection Report

Inspection Results—Dam Conditions

Dam Name:_____ Inventory No:_____
Name of Inspector/s: _____
Name of Contact/s: _____
Date of Inspection: _____ Start Time: _____ End Time: _____ Weather: _____

Crest level (at center) above water: _____
Service spillway level ❑ Above or ❑ Below water: _____
Emergency spillway level above water: _____
Ground Moisture Condition: ❑ Dry ❑ Damp ❑ Wet ❑ Snow ____ ❑ Other: _____

Crest of Embankment General Condition: ❑ Good ❑ Fair ❑ Poor Width: _____
Problems Noted: ❑ None ❑ Rutting ❑ Erosion ❑ Poor Drainage Height: _____
❑ Trees ❑ Depressions ❑ Bulges ❑ Livestock Damage ❑ Cracks Length: _____
❑ Misalignment of Crest ❑ Misalignment of Utility Poles ❑ Misalignment of Fences or Rails ❑ Sinkhole ❑ Burrows
❑ Breached ❑ Other: _____
Comments: _____

Upstream Embankment General Condition: ❑ Good ❑ Fair ❑ Poor Slope: _____
Problems Noted: ❑ None ❑ Rip-Rap ❑ Erosion ❑ Too Steep ❑ Burrows ❑ Trees ❑ Cattails ❑ Depressions
❑ Bulges ❑ Livestock Damage ❑ Slides ❑ Concrete Decay ❑ Cracks ❑ Sinkhole ❑ Benching
❑ Misalignment of Rip-rap ❑ Open Joints in Concrete
Comments: _____

Downstream Embankment General Condition: ❑ Good ❑ Fair ❑ Poor Slope: _____
Problems Noted: ❑ None ❑ Sloughing ❑ Erosion ❑ Too Steep ❑ Burrows ❑ Trees ❑ Cattails ❑ Depressions
❑ Bulges ❑ Livestock Damage ❑ Slides ❑ Concrete Decay ❑ Cracks ❑ Sinkhole ❑ Other:_____
Comments: _____

Seepage on Downstream Slope Amount: ❑ Major ❑ Moderate ❑ Minor ❑ None Found
Problems Noted: ❑ None ❑ Saturation Starts at _____ % up Embankment ❑ Presence of Sediment in Flow
❑ Cattails at Toe of Dam ❑ Surface Water at Toe of Dam ❑ Seepage Associated with Sloughing ❑ Continuous Flow
❑ Sporadic Flow
Comments: _____

Downstream Hazard Conditions ❑ Narrow Canyon ❑ Wide Canyon ❑ Lightly Sloping Prairie ❑ Pastureland
❑ Large Trees and Forest ❑ Brushy and Scrubby Forest ❑ No Homes ❑ Lightly Populated ❑ Moderately Populated
❑ Densely Populated ❑ Industrial ❑ Businesses Estimated number of homes: _____
Comments: _____

Service Inlet Structure General Condition: ❑ Good ❑ Fair ❑ Poor
Problems Noted: ❑ None ❑ Blockage ❑ Not Located ❑ Steel Corrosion ❑ Concrete Spalling ❑ Concrete Cracking
❑ Reinforcement Corrosion ❑ Missing Parts ❑ Timber Decay ❑ Leakage Below Water Level ❑ Inoperable Valve
❑ Other: _____
Comments: _____

Service Outlet Structure General Condition: ❑ Good ❑ Fair ❑ Poor
Problems Noted: ❑ None ❑ Blockage ❑ Not Located ❑ Corrosion of Conduit ❑ Presence of Sediment in Flow
❑ Inaccessible ❑ Concrete Cracking ❑ Concrete Spalling ❑ Reinforcement Corrosion ❑ Misalignment of Walls/Slabs
❑ Open Joints
Comments: _____

Service Spillway Condition: ❑ Good ❑ Fair ❑ Poor Depth: _____ Width: _____
Problems Noted: ❑ None ❑ Blockage ❑ Not Located ❑ Trees ❑ Burrows ❑ Back-Cutting Erosion ❑ Inaccessible
❑ Livestock Damage ❑ Concrete Cracking ❑ Concrete Spalling ❑ Reinforcement Corrosion ❑ Damaged Water-stops
❑ Open Joints ❑ Sinkholes ❑ Holes in Spillway Chute ❑ Seepage ❑ Misalignment of Walls/Slabs ❑ Damaged Gates
❑ Nonfunctional Gates ❑ Lubrication of Gates ❑ Testing of Gates
Comments: _____

Emergency Spillway Condition: ❑ Good ❑ Fair ❑ Poor Depth: _____ Width: _____
Problems Noted: ❑ None ❑ Blockage ❑ Not Located ❑ Trees ❑ Burrows ❑ Back-Cutting Erosion ❑ Inaccessible
❑ Livestock Damage ❑ Concrete Cracking ❑ Concrete Spalling ❑ Reinforcement Corrosion ❑ Damaged Water-stops
❑ Open Joints ❑ Sinkholes ❑ Holes in Spillway Chute ❑ Seepage ❑ Misalignment of Walls/Slabs ❑ Damaged Gates
❑ Nonfunctional Gates ❑ Lubrication of Gates ❑ Testing of Gates
Comments: _____

Other Items ❑ Major road along crest of dam ❑ Private road or driveway along crest of dam
❑ Vehicle bridge along crest of dam ❑ Culverts built into crest of dam
❑ Pipeline immediately downstream from dam - Type of pipeline: _____
❑ Water supply line in crest of dam ❑ Other: _____
Comments: _____

Repair Items Ranked by Priority
Item 1: _____
Item 2: _____
Item 3: _____
Item 4: _____

Security Issues ❑ Vehicle Accessible ❑ Vehicle Gates ❑ Vehicle Fences and Railing ❑ Pedestrian Accessible
❑ Pedestrian Gates and Fences ❑ Obscured from Surveillance ❑ Locks ❑ Breaches in Fence ❑ Evidence of Parties
❑ Graffiti ❑ Security System
Comments: _____

Operational Procedures ❑ SOP Available Location Kept: _____
❑ Logbook Location of Logbook: _____
❑ Major Events Noted ❑ Staff Training Topics of Training: _____
❑ Manual Gate Operations ❑ Powered Gate Operations ❑ Automated Gate Operations
Comments: _____

Communications ❑ Directory Available ❑ 24-Hour Coverage ❑ Telephone Available at Dam
❑ Cell Phone Coverage—Provider: _____
Comments: _____

Emergency Action Plan ❑ Available ❑ Filed with TCEQ ❑ Change in Downstream Hazard
Frequency of Update: _____ Date of Last Revision: _____
Date of Last Exercise: _____
Comments: _____

Instrumentation ❑ Present ❑ Adequately Maintained ❑ Inadequately Maintained ❑ Operational ❑ Data Collected
❑ Data Analyzed ❑ Adequately Protected
Comments: _____

Early Warning System ❑ Present ❑ Adequately Maintained ❑ Inadequately Maintained ❑ Operational

Frequency of Maintenance: _____ Date of Last Exercise: _____

Comments: _____

_____

_____

Reservoir Drawdown Capability Method of Drawdown: _____

Maximum Drawdown: _____ c.f.s. Frequency of Testing: _____

Comments: _____

_____

_____

Backup Power ❑ Present ❑ Adequately Maintained ❑ Inadequately Maintained ❑ Operational

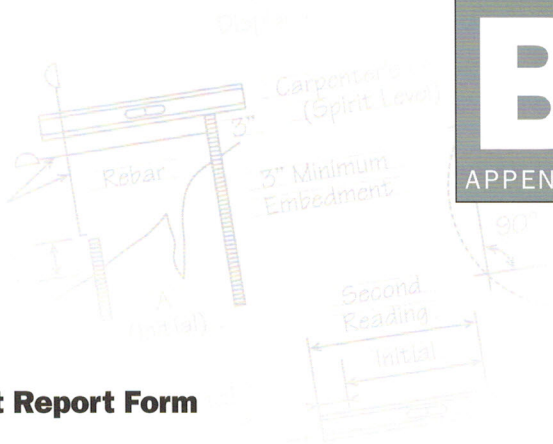
Frequency of Maintenance: _____ Date of Last Exercise: _____

Comments: _____

_____

_____

Appendix B: Report Forms



Dam Incident Report Form

Date _____ Time _____

Name of Dam _____

Stream Name _____

Location _____

County _____

Observer _____

Observer Telephone No. _____

Nature of Problem _____

_____

Location of Problem Area *(looking downstream)* _____

_____

Extent of Problem Area _____

_____

Flow Quantity and Color _____

_____

Water Level in Reservoir _____

Was Situation Worsening? _____

Emergency Status _____

Current Weather Conditions _____

_____

Additional Comments _____

_____

_____

_____

_____

_____

Inspection Monitoring Form

Date _____ Time _____

Name of Dam _____

Inspector _____

Item Being Monitored _____

Extent of Area _____

Current Description _____

Change From Previous Inspections _____