Publication copy

2002 Regular Biennial Inspection Report, Centerton Lake Dam (All Systems Engineering, December 4, 2002), as produced by NJDEP Bureau of Dam Safety on August 25, 2026

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Published by Ronald W. Yarbrough, plaintiff, as part of the public record of Yarbrough v. Lake Centerton Park Homeowners Association, Inc., et al., Superior Court of New Jersey, Chancery Division, Salem County, Docket No. SLM-C-000017-26.

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RICK
INSP
ASSIGN

ALL SYSTEMS ENGINEERING L.L.C.

BRIDGES ■ DAMS ■ MARINE STRUCTURES ■ RETAINING WALLS

LETTER OF TRANSMITTAL

TO:
NJDEP/Dam Safety
501 East State Street
1st Floor
Trenton, New Jersey 08625-0419

DATE: FEB. 20, 2003 JOB#
ATTN: MR. RICK G. TAMAGNO
RE: REGULAR BIENNIAL INSPECTION REPORT
CENTERTON LAKE DAM

WE ARE SENDING YOU: ■ ATTACHED ☐ UNDER SEPARATE COVER VIA FED EX THE FOLLOWING ITEMS:
☐ SHOP DRAWINGS ☐ PLANS ☐ SPECIFICATIONS ☐ CALCULATIONS ■ REPORT DOCUMENTS
☐ COPY OF LETTER ☐ SAMPLES ☐ OTHER

COPIES	DATE	NO.	REV.	DESCRIPTION
1 Copy	12/4/02			Regular Biennial Inspection Centerton Lake Dam
				Maurice river Basin, township of Pittsgrove, Salem County
				Federal ID# NJ

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REMARKS:

Copy To: _____

Signed: Russell D Cipolla, P.E. (CAS)
Russell D. Cipolla, P.E.
President

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ALL SYSTEMS ENGINEERING L.L.C.

BRIDGES ■ DAMS ■ MARINE STRUCTURES ■ RETAINING WALLS

REGULAR BIENNIAL INSPECTION
CENTERTON LAKE DAM

NJ ATLAS #35-03
FEDERAL ID # NJ 00439

IN THE

MAURICE RIVER BASIN OVER MUDDY RUN
TOWNSHIP OF PITTSGROVE, SALEM COUNTY

PREPARED FOR

LAKE CENTERTON PARK HOMEOWNER'S ASSOCIATION, INC.
23 LAKE CENTERTON DRIVE
PTTSGROVE, NJ 08318

DECEMBER 4, 2002

Prepared by:



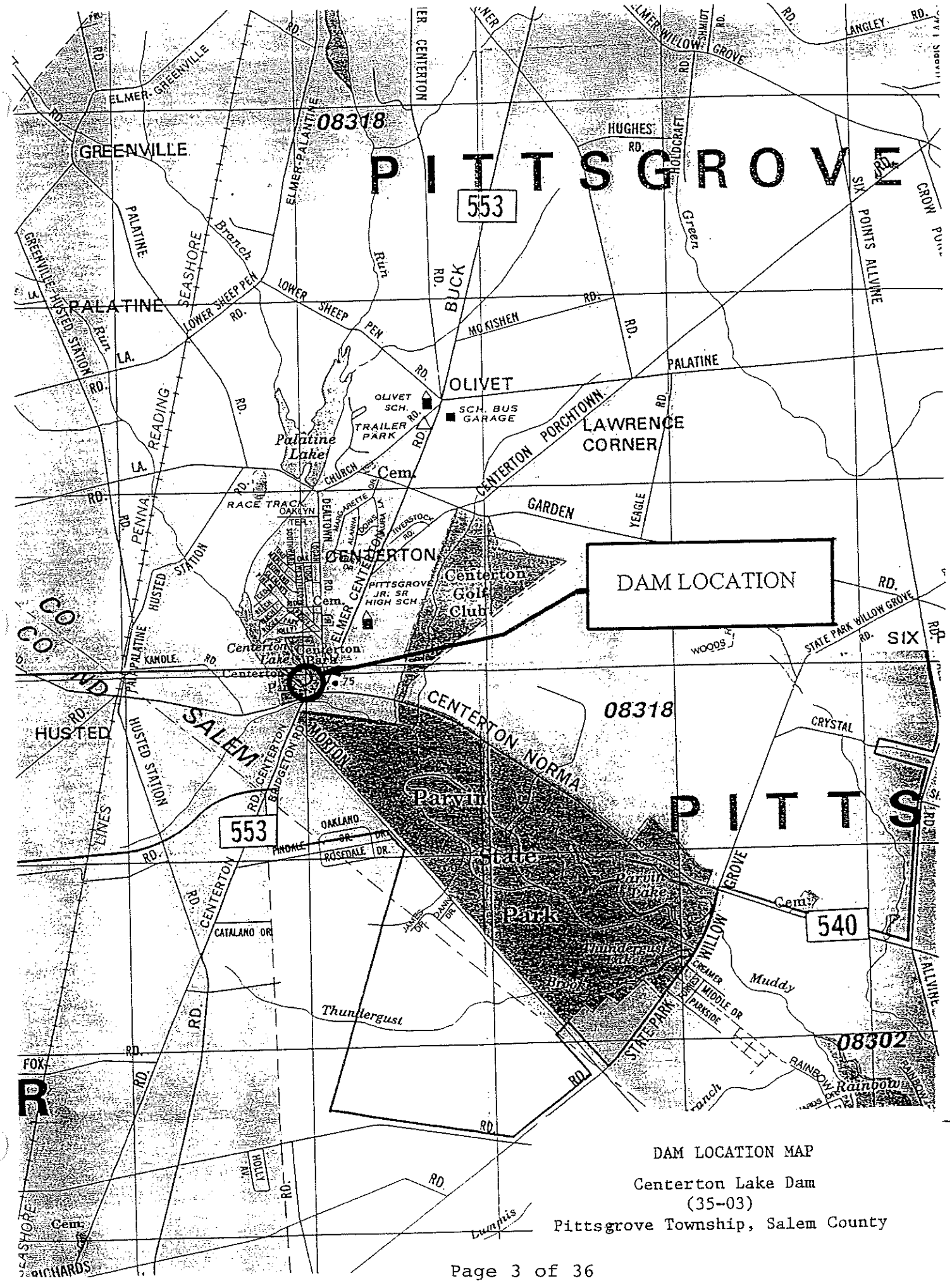
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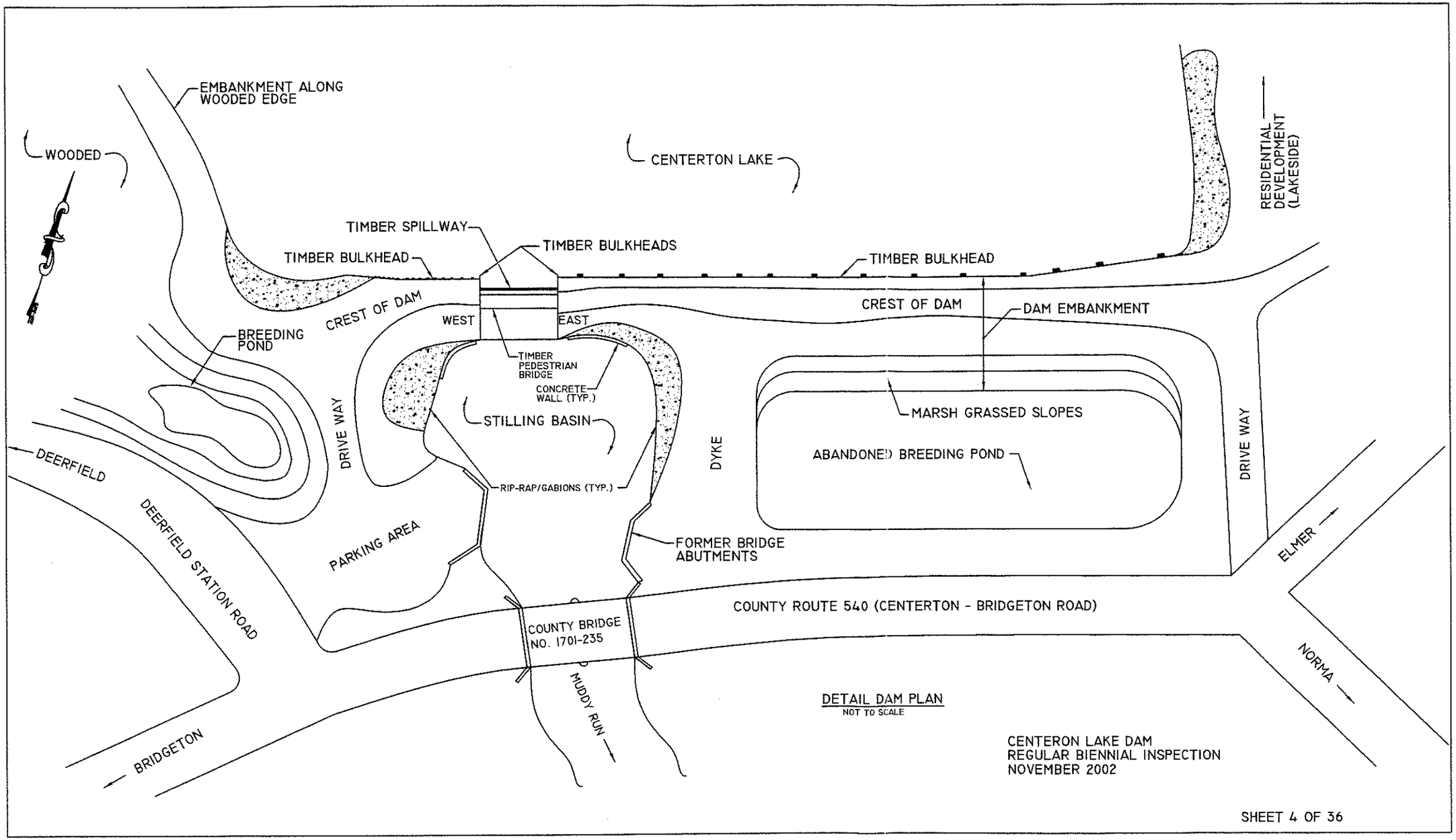
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DAM LOCATION MAP

Centerton Lake Dam
(35-03)
Pittsgrove Township, Salem County



DETAIL DAM PLAN
NOT TO SCALE

CENTERON LAKE DAM
REGULAR BIENNIAL INSPECTION
NOVEMBER 2002

INTRODUCTION

Description:

The Centerton Lake Dam is located at the south end of Centerton Lake, in Pittsgrove Township, Salem County, New Jersey. The dam itself is located just north of the intersection of County Routes 553 and 540 (see attached Dam Location Map and Detailed Dam Plan). The dam is located in the Maurice River Basin downstream along the Muddy Run from two other lakes, Parvin Lake and Rainbow Lake, respectively. All three lakes located on the Muddy Run are man-made lakes impounded by dams.

The Centerton Dam consists of a long earth embankment with a timber spillway structure. The dam's embankment ranges from a maximum height of 12 feet above the lake bottom to less than 2 feet on the eastern side of the main embankment. The total length of the embankment is approximately 650 feet. The dam crest ranges in width from 12 to 14 feet along it's length. A timber bulkhead extends approximately 500 feet along the upstream face. The timber spillway also consists of timber bulkhead/sidewalls, 12 timber gates each 3'-8" wide, and a 24' long downstream timber apron supported by piles. The timber apron contains several vertical PVC pipe drains projecting out of the timber floor just downstream of the gate structure. The entire spillway structure is protected both upstream and downstream by wood sheathing cut off walls extending into the ground to prevent seepage. The existing spillway was constructed in 1953. (Refer to Appendix B for plans of spillway and dam-1953).

The New Jersey Department of Environmental Protection Dam Safety Section (NJDEP DSS) has given this dam a hazard classification of II (Significant Hazard Potential). The lake is currently used for recreational purposes and is owned by the Lake Centerton Park Homeowner's Association, Inc. The first recorded inspection of Centerton Lake Dam was performed in 1942. The latest regular biennial inspection was performed in November 2002.

General Inspection Criteria:
The purpose of this study (per N.J.A.C. 7:20 – 1.11) is as follows:

1) To visually verify the safety of the Centerton Lake Dam and its appurtenant works.

2) To disclose visually apparent conditions which might disrupt operation or cause failure.

3) To determine, within the limits of a visual inspection, if the Dam and appurtenant works are Adequate to serve the purpose for which they were designed and are being used.

4) To note the extent of visually apparent deterioration as a basis for long term planning, periodic maintenance or immediate repair or rehabilitation.

5) Review Emergency Action Plan and Operation and Maintenance to determine if these are accurate and reliable.

An inspection of the Centerton Lake Dam was performed on November 26, 2002 by Russell D. Cipolla, P.E. and Peter Vanderhelm of All Systems Engineering, LLC.

The following procedures were performed for the inspection:

1) A visual inspection of the upstream and downstream embankments of the dam, of the exposed portions of the timber spillway structure and upstream/downstream timber bulkhead.

2) Soundings were performed adjacent to the upstream spillway channel and adjacent to the downstream timber floor and cutoff wall.

3) The downstream discharge channel, stilling basin and beyond the county bridge, was inspected for obstructions.

This study meets or exceeds the requirements of a regular dam inspection as defined by the NJDEP Dam Safety Standards (N.J.A.C. 7:20-1.1). The findings have been reported on the basis of a detailed and thorough visual inspection. In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future.

This report is also limited by the lack of available as built plans concerning the original construction and of the 1953 reconstruction and the repairs made in 1984.

Documentation Sources:

Information for this report was obtained from the following sources:

1) Detailed and thorough visual inspection of the dam and the timber spillway structure conducted on November 26, 2002.

2) Regular biennial inspection reports dated October 1990 and October 1992 by R.M. Bolgowan Engineering Associates, Inc. and November 2000 by Taylor, Wiseman & Taylor.

3) Dam Break Analysis and Final Hydrologic & Hydraulic Study dated February 28, 1995 by Hopewell Valley Engineering, PC.

4) Operation and Maintenance Manual dated February 28, 1995 and Emergency Action Plan dated August 1995 by Hopewell Valley Engineering, PC.

5) The Centerton Lake Dam safety file located at the offices of the NJDEP in Trenton, New Jersey.

FINDINGS

Changes from Previous Inspection:

1) Additional repairs were made to the timber spillway and support structure and the timber bulkheads. The cross brace at the east pile bent has been repaired. The vertical members required to lift the gate have been replaced. (See Photos #10, 11 &12).

2) Additional deterioration, decay and rotting of various timber spillway, bulkhead and structural members. (See Photos 16 & 17).

3) Additional sinkholes were observed along the upstream timber bulkhead and behind both the east and west bulkheads adjacent to the spillway. (See Photo #5).

4) A small opening with seepage in the downstream embankment against the east spillway bulkhead was observed at an inspection performed on November 19, 2002. This inspection was not part of this regular biennial inspection, but the findings are included herein. The opening allowed water flowing out but did not contain any embankment particles causing piping at the time of inspection. (See Photo #18).

Dam Embankment:

Overall, the embankment of the dam is in good condition.

The upstream embankment east of the spillway is protected by a treated timber bulkhead. The physical condition of the bulkhead is fair and a section of bulkhead approximately 300 feet long has rotated outward (See Photo #2). In some areas the top of the bulkhead is leaning outward by as much as 10 to 12 inches from vertical. Several areas of soil subsidence (sink holes) were observed behind the timber bulkhead. Several two feet deep sinkholes were observed adjacent to the timber sheeting along the east side of the spillway. Soil loss appears to be through sections of deteriorated sheeting in the east bulkhead.

The upstream embankment west of the spillway varies from 1 ½ to 2 horizontal to 1 vertical and is protected with relatively small stone rip rap. The embankment in this area appears stable and is in good condition.

The downstream embankment slopes east of the spillway are approximately 1 ½ to 2 horizontal to 1 vertical in the eastern most portion of the dam. Where the embankment parallels the abandoned fish breeding pond, the embankment slopes are as steep as 1 horizontal to 1 vertical. Inspection of this portion of the dam was difficult and limited due to the heavy growth of cattails growing on the downstream embankment and beyond (See Photo #4). Where physical inspection was possible the dam was firm with no signs of movement or seepage. Inspection for animal burrows was not possible due to amount of growth.

The downstream slopes of the stilling basin appeared stable and well protected (See Photos #9 & 14). The gabion baskets adjacent to the timber spillway are filled with concrete to form a wall. The shape of the wall was well defined and is in good condition. The areas beyond the concrete filled gabions were graded to approximately 2 horizontal to 1 vertical and protected with stone rip rap. The slopes of the stilling basin are generally well protected and in good condition except for a small unprotected area at the downstream ends (See Photo #6).

The majority of the embankment west of the spillway structure, and along the low-lying sides of the lake, consist of irregularly sloped perimeter dikes. Below the downstream west embankment lies another breeding pond which is approximately 85 feet long by 25 feet wide.

The crest of the earth dam is primarily of uniform elevation is approximately 12 to 14 feet wide and consists of unprotected gravelly embankment. The crest slopes gently downward in both directions away from the timber spillway (See Photos #2 & 5). The crest is narrow at the west bulkhead (See Photo #8).

Timber Spillway:

The timber spillway is in fair condition with some maintenance work required to maintain the structural integrity and operation of the spillway (See Photo #7). Results of our inspection are listed below.

1) Some timber sheeting along the eastern bulkhead was deteriorated to a point that a probing rod extended through it and into the embankment. Also, soil loss and a void space has been observed behind the bulkhead. This is probably the cause of the sinkhole adjacent to the eastern bulkhead. Many of the walers also have advanced decay and are in various stages of deterioration (See Photos #16, 17 & 18).

2) The six original knee braces that support the vertical posts of the spillway gates shows signs of decay and deterioration (See Photos #11, 12 & 13).

3) All vertical 12" x 12" pilings that support the spillway gates show signs of deterioration (See Photo #17). Especially, the western most corner post which when probed showed 4" deep Decay, and the second from the east corner piling exhibited 3" deep decay.

4) The boards of the timber floor immediately adjacent to the timber gates have separated and erosion is evident beneath the floor (15" to 18" deep). The area of erosion is located beneath the center six timber gates.

5) Soundings along the upstream spillway channel indicates a scour hole immediately adjacent to the cutoff wall along the eastern bulkhead. The depth of scour was measured at 3 to 8 feet below the level of the timber floor.

6) Soundings along in the stilling basin just beyond the timber floor and cutoff wall of the spillway structure has revealed a scour hole approximately 7 to 8 feet deep below the level of the timber floor. The scour hole is concentrated within the middle 25 feet of the spillway (See Photo #19).

Dam Break Analysis:

A Dam Break Analysis was completed by Hopewell Valley Engineering, PC and submitted on February 28, 1995. Three failure conditions were analyzed which included the Sunny Day (normal pool) failure, 100-year storm failure and the 0.5 PMF (Probable Maximum Flood) failure. Results of their analysis conclude that the sunny day failure condition did not overtop the downstream roadway, however, the 100-year storm and 0.5 PMF storm conditions do overtop the downstream roadway. In all design storms, the mapped dwellings immediately downstream of the dam were not inundated. The report recommended reducing the spillway design storm to the 100-year storm from the 0.5 PMF storm.

Hydrology/Hydraulic Analysis:

A Hydrology/Hydraulic study was completed by Hopewell Valley Engineering, PC dated February 28, 1995. The report was prepared to analyze the existing spillway based on the Spillway Design Storm as the 100-year storm. Results of the analysis concluded that the 100-year design storm would overtop the existing embankment. To correct this problem, Hopewell Engineering recommended that the existing earth embankment be modified to provide a 250 foot long earth spillway to pass the 100 year Spillway Design Flood safely over the dam with the required freeboard of 1.0 foot.

Operations and Maintenance Manual:

An Operations and Maintenance Manual was prepared by Hopewell Valley Engineering, PC and submitted on February 28, 1995 to NJDEP Dam Safety Section. The plan appears reliable with minor updates required for contact notification.

Emergency Action Plan (EAP):

An Emergency Action Plan was prepared by Hopewell Valley Engineering, PC and submitted August of 1995 to NJDEP Dam Safety Section. The plan appears reliable with minor updates required for contact notification.

CONCLUSION AND RECOMMENDATIONS

Dam Embankment:

The dam embankment of the Centerton Lake Dam is assessed at being in **good** overall condition.

The following maintenance tasks should be performed within the next 6 months to assure the integrity of the dam and to prolong its useful life.

*1) Based on the Hydrologic and hydraulic Study for the Centerton Lake Dam (by Hopewell Valley Engineering, PC dated February 28, 1995) results indicate that the dam embankment is overtopped by the 100 year design storm. The above report recommends that the earth embankment be modified to provide a 250 feet long earth spillway to safely pass the 100 year design storm over the dam. The spillway should be properly stabilized to prevent any erosion during high flow conditions.

*2) Regrade the downstream slope of the earth dam to 2 horizontal to 1 vertical. Clear the cattails from the side slope and 5 feet beyond the toe of slope. Stabilize the slopes with erosion protection treatment. Removal of the cattail growth and thick brush will allow for the proper inspection of the downstream slopes for animal burrows, water seepage and allow for the general detection of deficiencies.

3) Monitor the rotation of the upstream bulkheads along the east and west portion of the earth embankment. Fill in all areas where soil subsidence and sinkholes has occurred. Seal off areas of timber bulkhead which may be allowing seepage to occur. Failure of the wall may present an immediate danger of dam failure. Some type of embankment stabilization will be required adjacent to the bulkheads.

Timber Spillway:

The Centerton Lake Dam timber spillway is assessed as being in **fair** overall condition.

The following preventative maintenance tasks should be performed within the next 6 months to assure the integrity of the dam spillway and to prolong its useful life.

*1) Repair the deteriorated eastern and western timber bulkhead that forms the approach channel with pressure treated lumber. The deteriorated timber is allowing soil seepage and has created a void space behind the bulkhead. Replace and compact soil in the sinkhole that has formed behind the bulkhead.

2) Replace all deteriorated vertical bulkhead timbers and walers in the east and west bulkheads with pressure treated lumber.

*3) Fill in the scour holes that have formed in front of the timber gates and cutoff wall along the east bulkhead and just beyond the timber floor of the spillway adjacent to the stilling basin. Fill with coarse sand and gravel then protect with 18 inches of stone rip rap.

4) Block out between the western most 12" x 12" support pilings and the first round pile along the west bulkhead to prevent future lateral movement due to decay. Do the same for the second 12" x 12" support pile in from the east corner. Use pressure treated lumber.

5) Replace six of the eight deteriorated 8" x 8" knee braces that provides lateral support to vertical post which supports the timber gates. Two appear to have been recently replaced. Use pressure treated lumber.

*6) The timber floor immediately downstream of the timber gates has separated (approximately 1" – 2") allowing scour to occur beneath the floor (measured 15 – 18" deep). The separated floor is primarily between the center two pile bents and extends approximately 3 – 4 feet behind the timber gates. The void space should be filled with a coarse sand and new pressure treated boards attached to the existing floor to prevent future scour.

7) The timber gate posts should be thoroughly saturated with a timber preservative and the post tops coated with a tar to help protect and reduce the rate of decay.

8) Clean and paint the 12" steel channel on top of the spillway with an exterior resistance paint.

* Denotes recommendations included in the November 2000 Regular Biennial Inspection Report.

ATTACHMENT A

VISUAL INSPECTION LIST

VISUAL INSPECTION CHECKLIST

This general checklist should be used as an aid when examining all dams. This checklist may not, however, include all features or conditions found at a specific dam that are relevant to the safety of that dam. All features integral to the safety of the dam being examined should be inspected and their condition reported.

NJ INSPECTION YEAR: 2002

TYPE OF INSPECTION: (formal, regular, informal): **Regular**

DAM NAME: **Centerton Lake Dam**

DAM FILE NO.: **#35 - 03**

LOCATION: **Centerton Lake, Centerton NJ**

OWNER: **Lake Centerton Park Homeowner's Association, Inc.**

OPERATOR: **Same**

DATE OF INSPECTION: **November 26, 2002**

RESERVOIR INFORMATION

Normal Reservoir Elevation (ft): **78.60**

Reservoir Elevation at time of inspection (ft): **78.33**

WEATHER CONDITIONS (including recent rainfall): **Sunny – 50 degrees no rain for about one week**

INSPECTION PERSONNEL

New Jersey Licensed Professional Engineer(s):

Name	Affiliation	Area of Expertise
Russell D. Cipolla	**All Systems Engineering, LLC**	**Bridge, Dam & Spillway Construction, Design & Inspection**

Non-Licensed technical expert(s) and advisor(s):

Name	Affiliation	Area of Expertise

State Representative(s): **None Present**

Name	Affiliation	Area of Expertise

Dam Owner Representative(s): **Ronald Yarbrough, L.C.P.H.A.I.**

Name	Affiliation	Area of Expertise
Walter Muessing	**Muessing Const. Co., Inc.**	**General Contractor**

Others:

Name
Peter Vanherhelm

Affiliation
All Systems Engineering, LLC

GENERAL INFORMATION

Name of Dam: **Centerton Lake Dam**

Fed. I.D. No. **#00439**

N.J. Dam No.: **#35 - 03**

River Basin: **Maurice River Basin**

Town: **Centerton**

County: **Salem**

Block: **1503**

Lot: **73**

Nearest Downstream City-Town: **Centerton**

Stream Name: **Muddy Run**

Tributary of: **Maurice River**

Latitude (N): **39 degrees 31.5"**

Longitude (W): **75 degrees 10.2"**

Type of Dam: **Earth fill**

Purpose of Dam: **Recreation**

Hazard Category: **Class II***

Drainage Area (sqr mls): **39.4***

Height (ft): **2 – 12 ft.***

Length (ft): **660 – main section**

Normal Surface (ac): **37 ac***

Normal Capacity (af): **132 af***

Maximum Capacity (af): **576 af (top of dam)***

Spillway Capacity (cfs): **1170 cfs***

HISTORY*

Date Constructed: **1942**

Dates(s) Reconstructed: **Spillway & Dam 1953**
Bulkhead & Dam 1980

Designer: **James S. Parks, P.E. (1953)**

Constructed By: **Federic Ianusse (1953)**

Owner & Address: **Federic Ianusse (current owner at time of construction)**

Owner/Operator present during inspection (yes or no): **No**

PREVIOUS INSPECTIONS DATES

Last Inspection: **2000**

Last Regular Inspection: **2000**

Phase I Inspection: **1979**

Last Formal Inspection: **Unknown**

***Information obtained from 2000 Regular Biennial Inspection Report**

EMERGENCY ACTION PLAN (Required for all Class I and Class II dams)

Submitted: **August 1995**

Date of Approved Plan:

Date of Plan Revision: **Unknown**

Is the notification flowchart complete and current? **No**

Is inundation mapping or a description included? **Yes**

Are emergency materials and equipment identified? **Yes**

When was the plan last tested? **Unknown**

DOWNSTREAM HAZARD CLASSIFICATIONS

Present Hazard Classification: **Class II – Significant Hazard**

Changes in Downstream Land Use and Habitation: **No**

Is present classification appropriate? **Yes**

OPERATION AND MAINTENANCE

Date of Operation and Maintenance Plan: **Submitted February 1995**

Are instructions adequate? **Yes**

Do operating personnel follow instructions? **Yes**

What are operating personnel capabilities? **Current members of the Lake Centerton Park Homeowner's Association, Inc.**

EXAMINATION OF EMBANKMENT DAMS AND DIKES

DESCRIPTION OF STRUCTURE

Embankment Material: **Sand, gravel & clay**

Cutoff Type: **Timber (19ft. west and entire length of dam 490 ft. ± to the east)**

Impervious Core: **Unknown**

Internal Drainage System: **None**

Movement (Horizontal and Vertical Alignment): **None observed**

Junctions with Abutments or Embankments: **Good/Fair-sinkholes and water seepage at east & west bulkheads (see sinkholes)**

Miscellaneous: **None**

CREST

Vertical Alignment: **Level , good**

Horizontal Alignment: **Straight along east, slight curve along west, good**

Surface Cracks: **None observed**

Settlement: **Minor sinkholes along upstream timber bulkhead**

Unusual Conditions: **Narrow width adjacent to spillway. Soft ground near top of embankment just behind bulkheads.**

UPSTREAM SLOPE

Slope (Estimate) (H:V): **Vertical timber bulkhead (19ft. west and entire length of dam 490 ft. ± to the east) (0.25h:IV)**

Trees, Undesirable Growth or Debris, Animal Burrows: **None**

Sloughing, Subsidence or Depressions: **Minor sinkholes along upstream bulkhead due to leaning out-ward of timber bulkhead**

Slope Protection: **Timber bulkhead along lake front 6" x6" posts w/2" x 8" horizontal planks in fair to poor condition.**

Surface Cracks or Movement at Toe: **None apparent, but could have minor seepage along bulkhead bottom due to sinkholes.**

Unusual Conditions: **180' – 200' section of east bulkhead 10" – 12" out of vertical with subsidence behind wall. Soft ground along top of lake bulkhead most areas.**

DOWNSTREAM SLOPE

Slope (Estimate) (H:V): **Varies 1:1 to 2:1**

Trees, Undesirable Growth or Debris, Animal Burrows: **None, cattails need to be removed from downstream slope and 5' beyond for proper inspection**

Sloughing, Subsidence or Depressions: **Minor erosion along toe due to steep slopes, sinkhole observed just west of the west bulkhead, 2 ft. deep.**

Surface Cracks or Movement at Toe: **None observed**

Seepage : **None observed**

External Drainage System (Ditches, Trenches, Blanket): **None**

Condition Around Outlet Structure: **N/A**

Unusual Conditions: **None**

ABUTMENTS AND TOE AREA

Erosion at Contract: **Scour at east abutment in spillway channel. Erosion along downstream embankment adjacent to east bulkhead.**

Seepage or Wet Area Along Contract: **Previously observed seepage (water flow) on November 19, 2002, but now dry.**

Signs of Movement: **None observed**

Depressions, Sinkholes: **Sinkhole behind the east and west timber bulkhead of the spillway channel with 5 ft. deep sinkhole at west corner and 2 ft. deep sinkhole at east corner of lakeside bulkhead.**

Unusual Conditions: **Scour at downstream wing walls just beyond cutoff wall, 2-3ft. deep along east wing-wall & bulkhead at gabions.**

SEEPAGE AND TOE DRAIN / RELIEF WELL FLOW SUMMATION N/A

EXAMINATION OF CONCRETE AND MASONRY DAMS

DESCRIPTION OF STRUCTURE: N/A

EXAMINATION OF SPILLWAYS AND OUTLET WORKS

TYPE(S) AND DESCRIPTION OF SPILLWAY(S)

Primary: **Timber spillway with 12 moveable timber gates. Spillway channel confined with timber bulkheads. on each side. Beyond gates there is a 24 ft. long timber apron. All gates are fully operational on each side by the use of a 4 ton hydraulic jack (on-site during inspection).**

Secondary (auxiliary): **None observed**

Emergency: **None-only the removal of timber gates on main spillway.**

Other: **Timber bulkheads on each side in fair condition. No rotation of piles observed. Vertical planks in poor condition-some repairs done previously. Walers in fair condition.**

FOR EACH SPILLWAY THE FOLLOWING ASPECTS MUST BE EXAMINED WHERE APPROPRIATE

ENTRANCE CHANNEL

Description: **Channel parallel with timber bulkheads about 15 ft. long**

Vegetation (Trees, Bushes): **None**

Debris: **None**

Channel Side-Slope Stability: **Timber bulkheads, showing signs of deterioration. See "other"above.**

Slope Protection/Erosion: **Timber bulkheads**

Unusual Conditions: **Scour adjacent to the upstream spillway gates (east bulkhead 6 ft. to 8 ft. deep)**

SPILLWAY CREST

Description: **12 moveable timber lift gates w/(4) 6" boards in each gate.**

Condition of Material: **Good**

Signs of Movement: **None observed**

Joints: **A few leaking gates**

Unusual Conditions: **Decay in most gate posts. Fair condition.**

DROP BOX N/A

SPILLWAY WINGWALLS

Description: **Timber bulkheads in addition to above description, although intact, east side has a hollow sound when tapped with probing rod. Also, severly deteriorated vertical planks-some 100% through on west bulkhead. Deteriorated diagonal cross-bracing at west pile bent with cross-section loss.**

Condition of Material: **Fair-see above**

Signs of Movement: **None observed**

Joints: **Deteriorated joints have been repaired. East and west bulkhead shows signs of leakage**

Drains: **None**

Unusual Conditions: **Upstream wing-walls have been repaired**

DOWNSTREAM APRON

Description: **Timber floor-full length and width**

Condition of Material: **Fair**

Signs of Movement: **Gaps in timber floor boards of 1 ½ " – causing scour beneath timber floor adjacent to timber gates**

Unusual Conditions: **Scour beyond end of apron**

CULVERTS N/A

TRASH RACKS N/A

CHUTES N/A

STILLING BASIN

Description: **Downstream slopes and toe protected with poured concrete wall, gabion baskets and large stone rip-rap on east-smaller rip-rap on west. (Appears inadequate for proper erosion protection).**

Condition of Material: **Good**

Signs of Movement: **None observed**

Erosion: **None observed, except at bottom of west downstream embankment 2'-6" deep.**

Unusual Conditions: **None**

EXIT CHANNEL

Vegetation (Trees, Bushes): **Clear**

Debris: **Clear**

Channel Side-Slope Stability: **Fair/Good-Steep along west embankment (1H:1V)**

Erosion: **At ends of rip-rapped channel slopes of west side 15-20ft., also 3'-6" to 6'-6" deep scour below end**

of sliceway floor.

Unusual Conditions: **None**

LOW LEVEL OUTLET: N/A

STILLING BASIN FOR LOW LEVEL OUTLET: N/A

EXIT CHANNEL FOR LOW LEVEL OUTLET: N/A

EXAMINATION OF OTHER FEATURES

INSTRUMENTATION: (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.) location, condition: N/A

RESERVOIR

Slopes: **Gentle natural, wooded and well vegetated**

Sedimentation: **None**

Unusual Conditions Which Affect Dam: **None**

Unusual Conditions: **None**

APPURTENANT STRUCTURES (Power House, Gatehouse, Penstocks, Water Supply, Other)

Pedestrain bridge-timber in fair condition-no rotted main support members. Some railing post are decayed & have loose members. 12" steel channel across top of main vertical posts in fair condition-needs painting.

CONCLUSION

1) I certify that the above dam was personally inspected by me and was found to be in (safe, unsafe) condition.
Circle One

2) I recommend the following repairs be made immediately:
   - Repair erosion along crest near bulkheads & widen crest.
   - Fill in sinkholes adjacent to the east and west spillway timber bulkheads and on west downstream embankment.
   - Fill in sinkholes along the main timber bulkhead at lake.
   - Block out between the western most 12" x 12" spillway pile with pressure treated timber to adjacent round piling to prevent movement. Do similar to second from east corner piling.
   - Replace six of eight deteriorated diagonal 8" x 8" timber braces at the spillway.
   - Replace all deteriorated vertical timber sheeting and walers in the east and west spillway bulkheads.
   - Tighten all loose bridge timber and paint steel channel along top of spillway.
   - Refer to "Conclusions and Recommendations" on page 10 for additional repairs.
   - Replace deteriorated diagonal cross-bracing at west pile bent.

3) The following long term improvements should also be undertaken:

   Due to the condition of the spillway and appurtenances, the condition need for repairs and monitoring and improvements to the embankments for overtopping requirements, the owner should undertake a 5 year plan to replace the entire dam and spillway structures.

4) The following monitoring studies should also be undertaken:
   - Monitor the appearance of any sinkholes in the east & west bulkhead/embankment interfaces and along the main timber bulkhead at lake.
   - Monitor during periods of heavy rainfall the downstream east & west embankments near the bulkheads for leaks and piping of soils.

5) Have the recommendations above include those from Phase I Inspection Report or previous Regular or Formal inspection Report? Yes

6) Does the Emergency Action Plan or the Operation and Maintenance Procedures require revisions?

   Yes. Updating of contact personnel, addresses and telephone numbers. Also lists of available equipment, contractors, etc. The E.A.P. does not require updated dam break/innundation analysis.

7) Name of Professional Engineering company/Consultant Representing the Owner:

   All Systems Engineering, LLC
   Washington Professional Campus II, Suite 504 B
   901 State Route 168
   Turnersville, NJ 08012-3204

   Phone: [redacted]
   Fax: [redacted]

New Jersey Licensed Professional Engineer representing the dam owner in responsible charge of the inspection:

Sign _____ Date 12/4/02

Russell D. Cipolla, P.E., President

New Jersey Professional Engineer License Number : **36129**

(Department use only)

Dam Name_____

N.J. Reference No._____ **Hazard Classification**_____

Engineer_____ **Date of Inspection**_____

APPENDIX A

PHOTOGRAPHS



Photo #1
Overall View of Lake



Photo #2
Embankment Looking East
Note: Leaning timber bulkhead



Photo #3
View of Eastern Shore Residences



Photo #4
Downstream Embankment at Breeding Pond
Note: Marsh grass & steep slopes



Photo #5
Embankment Looking West
Note: Leaning timber bulkhead



Photo #6
Downstream Stilling Basin & County Bridge



Photo #7
Overall View of Spillway



Photo #8
Pedestrian Bridge and Spillway
Note: Narrow width of embankment crest & erosion & rusting horizontal channel beam at left



Photo #9
East Embankment Protection at Stilling Pond
(Similar West Side)



Photo #10
View of spillway at entrance Channel



Photo #11
Western Portion of spillway
Note: New spillway boards, vertical posts & diagonal bracing

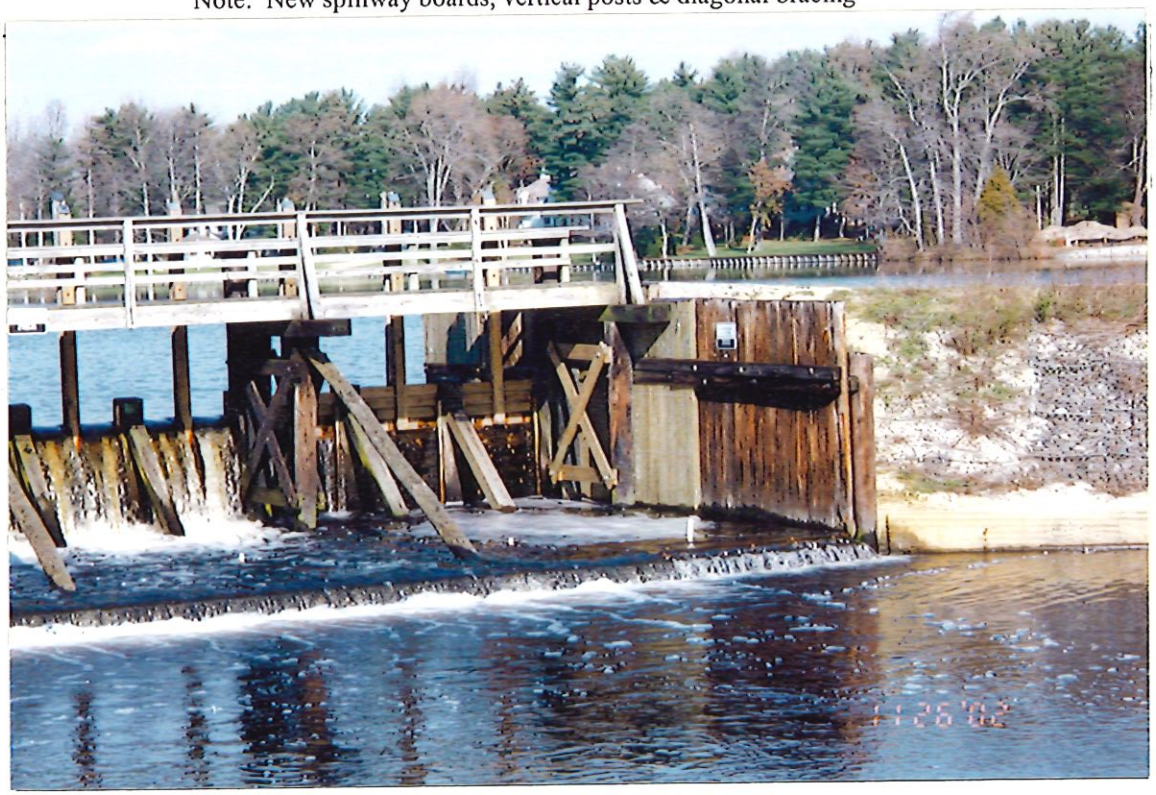


Photo #12
Eastern Portion of Spillway
Note: New spillway boards, vertical posts, diagonal bracing & bulkhead repairs



Photo #13
Eastern Spillway Section
Note: Deteriorated left diagonal support



Photo #14
West Downstream Embankment Slope
Note: sinkholes at bottom end of measuring rod

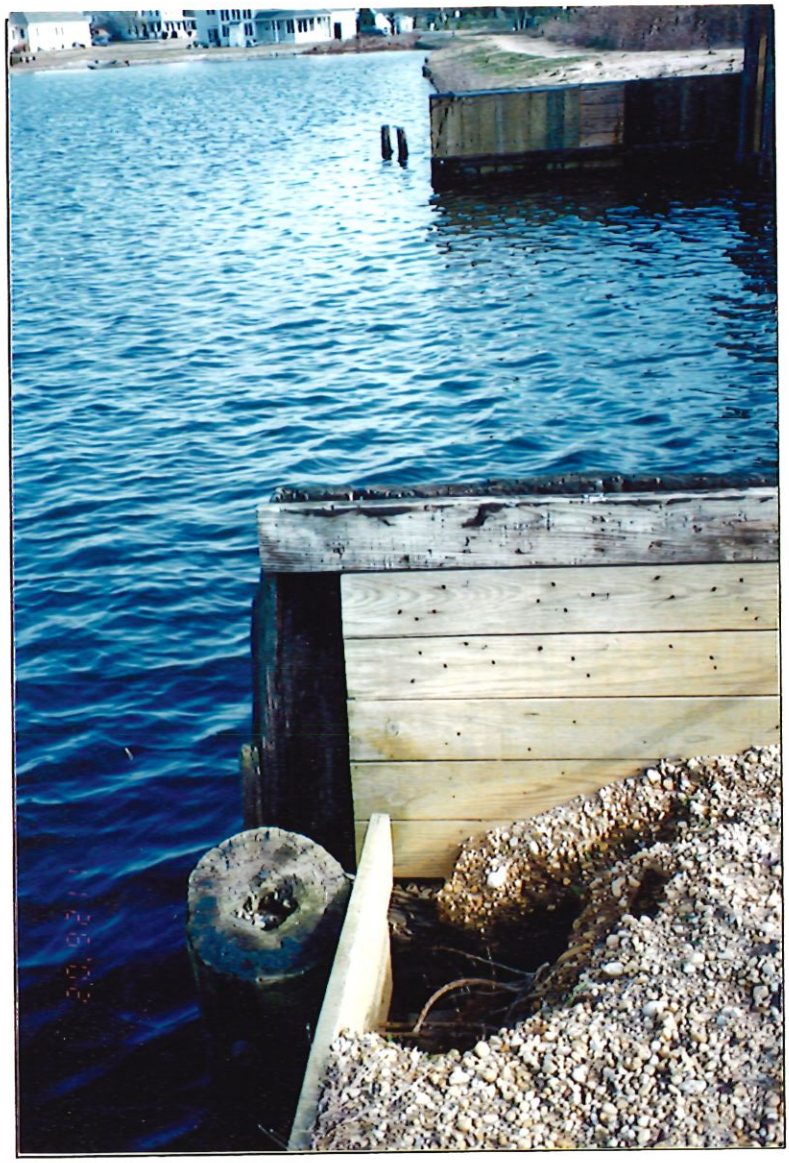


Photo #15
Sinkhole at West Bulkhead Upstream
Typical also at east bulkhead

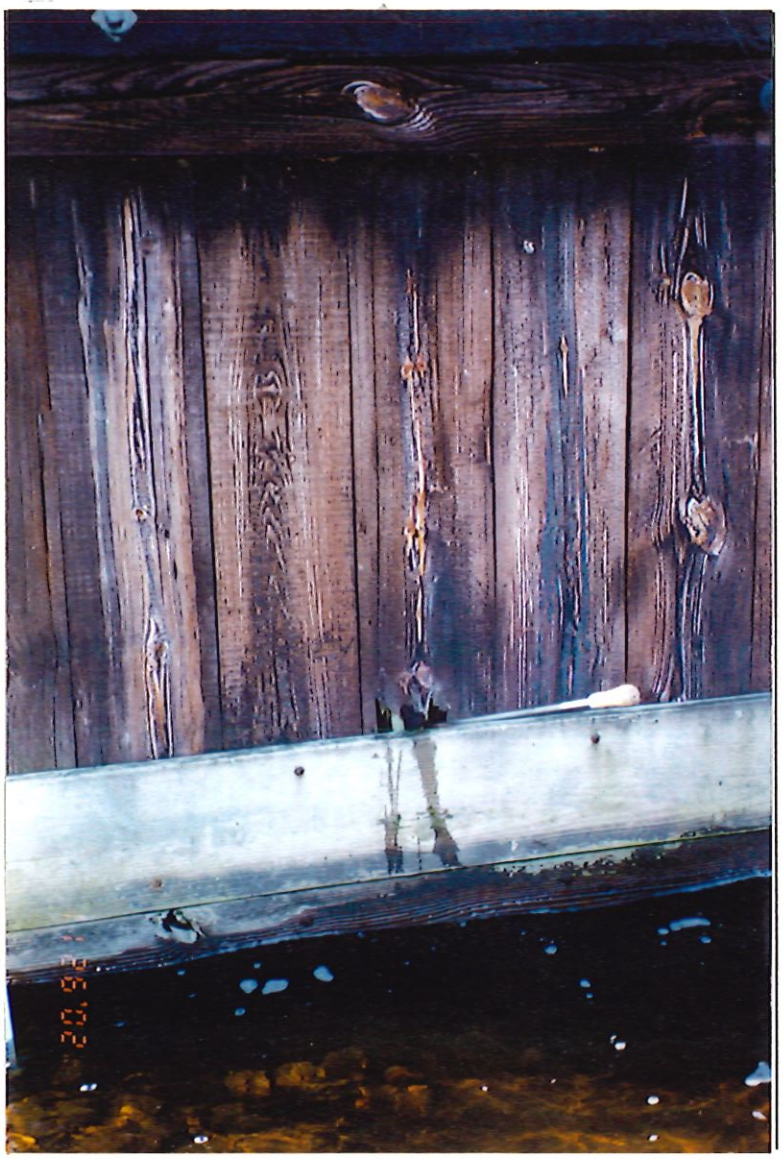


Photo #16
Western Downstream Spillway Bulkhead
Note: Probing rod extends through vertical timber sheet into soil



Photo #17
Western Bulkhead 12" x 12" Vertical Support Pile
Note: Probing rod extends 4" into decayed member

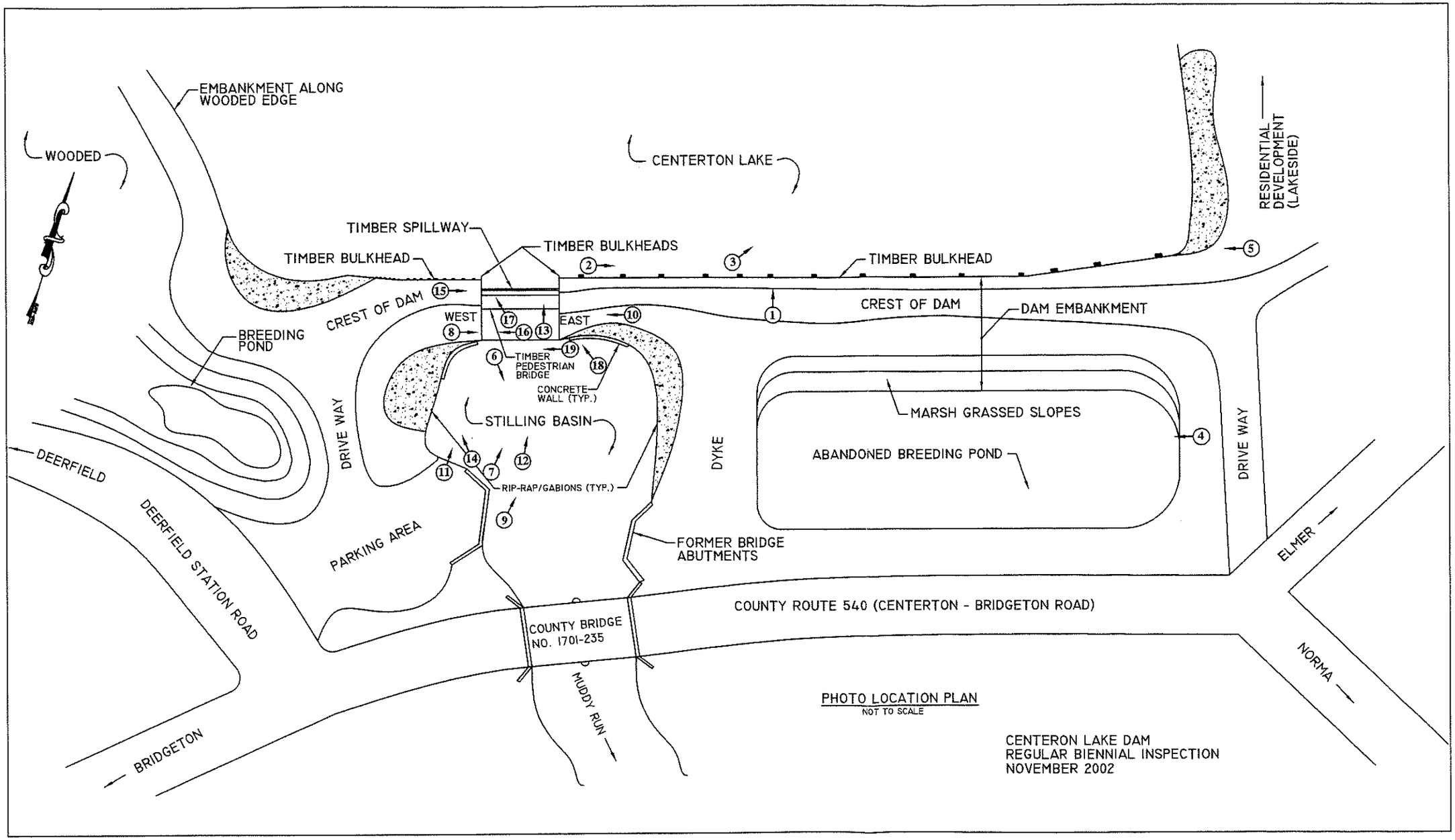


Photo #18
East Bulkhead Embankment
Note: Water penetration through embankment about 12" below waler, under bolt on 11/19/02.
This condition was not present during 11/26/02 inspection



Photo #19
Downstream Spillway Floor
Note: Scoured areas beyond dropoff at cutoff wall

PHOTO LOCATION PLAN


EMBANKMENT ALONG WOODED EDGE
WOODED
CENTERTON LAKE
RESIDENTIAL DEVELOPMENT (LAKESIDE)
TIMBER SPILLWAY
TIMBER BULKHEADS
TIMBER BULKHEAD
TIMBER BULKHEAD
CREST OF DAM
WEST
EAST
CREST OF DAM
DAM EMBANKMENT
BREEDING POND
TIMBER PEDESTRIAN BRIDGE
CONCRETE WALL (TYP.)
STILLING BASIN
DRIVE WAY
DYKE
MARSH GRASSED SLOPES
ABANDONED BREEDING POND
DRIVE WAY
DEERFIELD
DEERFIELD STATION ROAD
RIP-RAP/GABIONS (TYP.)
PARKING AREA
FORMER BRIDGE ABUTMENTS
ELMER
COUNTY ROUTE 540 (CENTERTON - BRIDGETON ROAD)
COUNTY BRIDGE NO. 1701-235
NORMA
MUDDY RUN
BRIDGETON
PHOTO LOCATION PLAN
NOT TO SCALE
CENTERON LAKE DAM
REGULAR BIENNIAL INSPECTION
NOVEMBER 2002

APPENDIX B

PLANS OF SPILLWAY AND DAM (1953)