



Memorandum

To: Paul Holzen, PE

From: Steve Whiteside, PE
Dave Mason, PE

Date: June 23, 2017

Subject: Preliminary Assessment of Robinson Lake Dam
Franklin, Tennessee

CDM Smith was engaged by the City of Franklin to perform a preliminary assessment of Robinson Lake Dam in Franklin, Tennessee. We understand that the City is considering acquiring the property on which the dam and lake are located. The purpose of the assessment is to identify potential dam safety deficiencies and provide recommendations for future actions.

Background

The existing dam for Robinson Lake is an earth embankment dam with a concrete spillway in the right abutment area discharging to the Harpeth River. The dam has a structural height of 22.5 feet and hydraulic height of 19 feet, with a storage capacity of 91 acre-feet at normal pool and 136 acre-feet at maximum pool. Currently, the dam is privately owned.

Note that the terms “right” and “left” used in this memorandum are the directions as viewed looking downstream from the dam.

Scope of Work

CDM Smith performed the following scope of work for the assessment.

- Contacted the Tennessee Department of Environment and Conservation, Division of Water Resources, Safe Dams Program to obtain information in their files and confirm the current regulatory status of the dam.
- Performed a site visit to observe the current conditions of the dam and appurtenant structures and identified potential dam safety deficiencies. Our scope did not include any geotechnical or structural investigations.
- Prepared this memorandum summarizing the results of the assessment. The memorandum includes a summary of the field observations and representative photos. It includes our opinion concerning potential dam safety deficiencies that may need to be addressed and

planning--level cost estimates investigating and addressing the potential deficiencies. Our scope did not include geotechnical, structural, or hydrologic analyses.

Safe Dams Program Information

CDM Smith contacted Lyle Bentley who is in charge of the Safe Dams Program. Mr. Bentley provided the information included in Appendix A. Mr. Bentley confirmed that the lake is currently classified as a farm pond and is not subject to the dam safety regulations. Per Mr. Bentley, if the City purchases the property and dam, the dam will be subject to the dam safety regulations.

Site Visit Observations

Steve Whiteside and Dave Mason of CDM Smith performed a preliminary visual inspection of Robinson Lake Dam on June 12, 2017. We were accompanied by Doug Noonan of the City and Jason Deal of Barge Waggoner Sumner & Cannon. At the time of the inspection, the reservoir level appeared to be at normal pool. The dam structural height, according to the National Inventory of Dams (NID) database, is 22.5 feet and there was approximately 5.5 feet of freeboard above normal pool.

A dam inspection checklist and representative photographs are included in Appendix B. An overall view of the lake is shown in Photo 1. The following sections summarize the results of the visual inspection.

Crest

The crest is approximately 12 feet wide. The left portion is covered with tall grass and weeds, and the right portion is mostly bare with tall grass and weeds along both sides of the crest (Photos 2 and 3). There is a bare, slightly eroded area on the may be due to a previous overtopping event (Photo 4).

Upstream Slope

The upstream slope is covered with trees, brush, and tall weeds (Photos 5 and 6). The left portion of the slope is partially covered with riprap and concrete fragments (Photo 7). The trees are up to 12 inches in diameter (Photo 8). The slope is very steep, ranging from 1.5 horizontal to 1 vertical (1.5H:1V) to near vertical.

Downstream Slope and Downstream Area

The downstream slope and downstream area are covered with leaves, vines, brush, and trees up to 12 inches in diameter (Photos 9 through 11). The downstream slope is steep, typically about 1.5H:1V. Photo 12 shows the bare, eroded area that may be due to a previous overtopping event.

There is a vertical 36-inch-diameter RCP pipe located downstream of the dam (Photo 13). The pipe is 12 feet long and extends 8 feet below the ground surface. The bottom of the pipe has three feet of muck or sediment. No outlet pipes were observed.

There is significant seepage downstream of the RCP pipe (Photos 14 and 15). The seepage flows downstream and discharges at a drop-off to the Harpeth River. There appeared to be seepage emerging at the base of the drop-off, adjacent to the river.

Outlet Works

No outlet works or low-level outlet for draining the pond was observed.

Spillway

The spillway is located in the right abutment and consists of a trapezoidal concrete weir and discharge channel. The weir is about 46.5 wide with a 25-foot bottom width (Photo16). There is a partially intact fence along the upstream side of the weir that apparently serves as a trash guard (Photo 17). There are small trees and brush in the approach channel upstream of the fence.

The concrete discharge channel is heavily cracked and has brush growing in the channel bottom and sloped walls (Photos 18 and 19). The channel ends at limestone bedrock (Photo 20) where there is a 15-foot-high drop-off down to the river. Seepage was flowing through the limestone face (Photo 21). In addition, seepage was flowing from the river bank to the left of the limestone face (Photos 22 and 23). Total seepage flow was about 100 to 200 gpm. There was erosion in the seepage area, but the seepage flow appeared to be clear.

Summary of Dam Safety Deficiencies

The following are potential dam safety deficiencies CDM Smith identified during the preliminary visual inspection.

1. The slopes and downstream area are covered with large trees and heavy vegetation.
2. The upstream and downstream slopes are very steep.
3. The bare, eroded area on the crest and downstream slope may indicate previous overtopping of the dam during a flood event. If that is the case, the spillway capacity may be inadequate.
4. No outlet works or low-level outlet for draining the pond were observed.
5. Seepage was observed in the area downstream of the RCP riser pipe.
6. Seepage was observed through and adjacent to the limestone at the end of the spillway discharge channel.
7. There are trees and brush in the approach area to the spillway that will reduce spillway capacity. In addition, the fence along the upstream side of the weir can collect debris and reduce spillway capacity.
8. The concrete in the spillway discharge channel is badly cracked and has brush growing in the bottom and sides of the channel.

Recommendations

CDM Smith has the following recommendations to assess and mitigate the identified dam safety deficiencies. The recommended mitigation measures will require a permit from the Safe Dams Program and will need to be designed by a licensed professional engineer experienced in dam safety engineering.

1. Perform hydrologic/hydraulic analyses to evaluate the required spillway capacity for passing the design storm event without overtopping the dam.
2. Perform a geotechnical and geophysical investigation to evaluate the condition of the dam and foundation.
3. Perform geotechnical analyses, including seepage and stability analyses.
4. Based on the results of the analyses and the identified dam safety deficiencies, develop a rehabilitation design. We anticipate that the design may consist of the following:
 - a. Removal of all trees, root balls, and other vegetation.
 - b. Flattening the upstream and downstream slopes to 3H:1V. The downstream slope modification would include the installation of an internal drainage system to control seepage.
 - c. Repairing or replacing the existing spillway. The spillway modification or replacement would include a drainage system to control seepage.
 - d. Grouting bedrock in the spillway area to reduce seepage.
 - e. Constructing a low-level outlet combined with a drop inlet spillway to serve as the principal spillway

Planning-Level Estimate of Rehabilitation Costs

CDM Smith has developed a planning-level cost estimate for rehabilitation measures described above. The planning level construction cost is estimated to be \$1.5-\$2.0 million, which is contingent upon the further exploration and limitations summarized below. On average, the City can also anticipate approximately 25-30% for design and permitting associated with the proposed rehabilitation measures.

Limitations

The conclusions and recommendations provided in this memorandum are based solely on the visual observations of the dam and appurtenant structures by the CDM Smith engineers at the time of the inspection. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of this report.

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 critical to note that the condition of the 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. Only through continued care and inspection can unsafe conditions be detected.

The planning-level cost estimates provided in this memorandum are based on the visual observations, engineering judgment, and similar projects. No warranty, express or implied, is included.

Appendix A

Tennessee Safe Dams Program Information

94-10

TENNESSEE DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES
2611 West End Avenue
Nashville, Tennessee 37203
Telephone (615) 741-2572

2

INVENTORY DATA ON IMPOUNDMENT

Dam # _____

Quad # 63-NE 8

Name of Dam

Robinson Lake
~~Thomas Robinson~~

Name of Owner

Dexter Lockwood
~~William J. Wilson~~

Address

P.O. Box 588
~~Franklin, Tenn. 37064~~Tel. 794-3216 (H)
794-8465 (B)County Williamson

Stream Trib., Harpeth River (9A)

Dam at Stream, Lat. 35° 53' 32", Long. 86° 49' 41"Type of Dam Earth Purposes Recreation

Downstream Hazard Category, (D/S HAZ), _____

Type of Spillway Concrete, Rock

Width _____

Length of Crest 354 Ft., length of Spillway 30 Ft.

Hydraulic Cap. of all Spillways _____ cfs _____ cfs-sm

Spillway Lip Elev. _____ Ft. (MSL), Pool Area 11.5 Ac.Volume in Dam _____ Cu. Yds., Drainage Area 49052 Ac.Max. Vol. Pool 136 50 (1) Ac. Ft., Normal Min. Vol. Pool 91 42 (1) Ac. Ft.Structural Ht. Dam 22.5 Ft. Hydraulic Ht. Dam 19 Ft.Engineered by NoneConstruction by McDowell & CompanyYear Completed 1950 (2), Plans, _____, At _____

Inspection by _____, Date _____

Certificate # _____, Issued on _____, Expires _____

Comments (1) Estimated by 0.4 factor

(2) Estimated

June 21, 1973

Lyle Bentley

From: Lyle Bentley
Sent: Monday, March 23, 2015 8:08 AM
To: 'Clay Wallace'
Cc: Ernest Ekwugha; Erin O'Brien
Subject: RE: Robinson/Lockwood Lake

#94-7010

Mr. Wallace-

We did discuss what you have said below. If the lake is fenced off and not open to the public, then it would still stay unregulated, assuming it is still privately owned. If Franklin owns it, it will be regulated, fenced or not, because it is publicly owned.

Lyle

Lyle Bentley, P. E.
 Natural Resources Unit
 Division of Water Resources
 Office: (615) 532-0154
 Email: Lyle.Bentley@tn.gov



TENNESSEE DEPARTMENT OF
 ENVIRONMENT AND CONSERVATION

Sign-up for the [TDEC E-Newsletter](#).

From: Clay Wallace [<mailto:Clay.Wallace@eli-llc.com>]
Sent: Monday, March 23, 2015 7:38 AM
To: Lyle.Bentley@state.tn.us
Subject: Robinson/Lockwood Lake

*** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email. - OIR-Security***

Mr. Bentley,

We spoke earlier this year about the status of Robinson Lake on the Lockwood property (east of I-65 and south of S Carothers Rd). This is part of the property that Khri Pasarella is purchasing for the Lockwood Glen subdivision. It will be separated from all of the houses by Carothers Parkway which is currently under construction. I just wanted to confirm that we discussed that as long as the lake is not open to public access that it will remain unregulated. Per our discussion, it was my understanding that the lake would only fall under regulation at such a time that it became part of a common open space that was accessible and usable by the subdivision or by the general public. Can you please confirm? I did have one question that I don't remember if we covered. If that area was to be converted to usable open space or a park or some sort, and the lake is fenced off, would it still remain unregulated?

Thank you!

Clay Wallace, PE
Senior Project Engineer
 Energy Land & Infrastructure, LLC (PLLC in NC)

1420 Donelson Pike, Suite A-12

Nashville, TN 37217
(615) 383-6300 Office
(615) 971-5284 Cell
clay.wallace@eli-llc.com
www.eli-llc.com

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Lyle Bentley

From: Lyle Bentley *LB*
Sent: Thursday, December 11, 2014 11:34 AM
To: Ernest Ekwugha
Cc: Erin O'Brien
Subject: Robertson Dam, I. D. No. 94-7010

Ernest-

I contacted Kaye Lockwood, owner of Robertson Dam in Williamson County. The lake is still a farm pond. The construction taking place nearby is due to Franklin extending Carothers Road southward.

Ms. Lockwood is selling the property incrementally to Pearl Street Partners, who will apparently develop it. She thought the lake was eventually going to be given to Franklin to be part of a greenway or something similar. The next property purchase will occur in January, 2015, and the final in January, 2016. She did not know which sale would include the lake. I also talked to Paul Holzen, the Franklin engineering director, and told him that the dam would become regulated once the property started getting developed. He is now aware that the city would have to bring the dam into compliance if it is not in compliance when transferred to the city.

I left several messages for Kris Pascarella of Pearl Street Partners to call me, but he hasn't, yet. In the last one I told him that the dam would be regulated once the property started getting developed and would have to comply with our regulations.

I am going to flag the dam for follow-up in February, 2015, and February, 2016. Please check on it when it shows up to see if it has been sold and what's going to happen with it. Please print this out for your file.

Kaye Lockwood Cell: (615) 948-7386 Bus: (615) 794-8465

Kris Pascarella

Pearl Street Partners, LLC

205 Powell Place

Brentwood, TN 37027-7525

Bus: (615) 312-8242

Cell: (615) 604-3714

Lyle

Lyle Bentley, P. E.
Natural Resources Unit
Division of Water Resources
Office: (615) 532-0154
Email: Lyle.Bentley@tn.gov



Sign-up for the [TDEC E-Newsletter](#).

LB12/11
VCC: NFO 12/11

```
1*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 11DEC14 TIME 11:54:44 *
*****
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```
*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****
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X X XXXXXX XXXXX X
X X X X XX
X X X X X
XXXXXXX XXXX X XXXXX X
X X X X X X
X X X X X
X X XXXXXXX XXXXX XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID ROBERTSON DAM, WILLIAMSON COUNTY, I.D. NO. 94-7010
2 ID DATA FROM GIS AND CURRENT FILE DATA.
3 IT 5 11DEC14 0 109
4 IO 3 0 0
5 JR PREC 0.18 0.33

6 KK INFLOW
7 BA .814 0
8 PB 29.4
9 IN 15 11DEC14 0
10 PC 0.0 0.02 0.04 0.06 0.08 0.11 0.14 0.18 0.23 0.4
11 PC 0.58 0.65 0.7 0.74 0.77 0.8 0.83 0.86 0.88 0.9
12 PC 0.92 0.94 0.96 0.98 1.0
13 LS 0 85 0
14 UD .46

15 KK OUTFLOW
16 RS 1 ELEV 650 0
17 SV 87 133
18 SE 650 653.5
19 SQ 0 90 254 468 589
20 SE 650 651 652 653 653.5
21 ST 653.5 354 2.8 1.5
22 ZZ
```

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1*****
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* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****
```

ROBERTSON DAM, WILLIAMSON COUNTY, I.D. NO. 94-7010
DATA FROM GIS AND CURRENT FILE DATA.

```
4 IO OUTPUT CONTROL VARIABLES
      IPRNT 3 PRINT CONTROL
      IPLOT 0 PLOT CONTROL
      QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
      NMIN 5 MINUTES IN COMPUTATION INTERVAL
      IDATE 11DEC14 STARTING DATE
      ITIME 0000 STARTING TIME
      NQ 109 NUMBER OF HYDROGRAPH ORDINATES
      NDDATE 11DEC14 ENDING DATE
      NDTIME 0900 ENDING TIME
      ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
```

TOTAL TIME BASE 9.00 HOURS

ENGLISH UNITS

DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-Feet
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.18 .33

*** **

* *
* INFLOW *
* *

6 KK

9 IN

TIME DATA FOR INPUT TIME SERIES
JXMIN 15 TIME INTERVAL IN MINUTES
JXDATE 11DEC14 STARTING DATE
JXTIME 0 STARTING TIME

SUBBASIN RUNOFF DATA

7 BA

SUBBASIN CHARACTERISTICS
TAREA .81 SUBBASIN AREA

PRECIPITATION DATA

8 PB

STORM 29.40 BASIN TOTAL PRECIPITATION

10 PI

INCREMENTAL PRECIPITATION PATTERN

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.02	.02	.02	.06	.06	.06	.06	.06	.06
.02	.02	.02	.02	.02	.02	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01

13 LS

SCS LOSS RATE
STRTL .35 INITIAL ABSTRACTION
CRVNR 85.00 CURVE NUMBER
RTIMP .00 PERCENT IMPERVIOUS AREA

14 UD

SCS DIMENSIONLESS UNITGRAPH
TLAG .46 LAG

UNIT HYDROGRAPH
30 END-OF-PERIOD ORDINATES

60.	179.	367.	599.	744.	784.	747.	656.	537.	391.
293.	222.	174.	133.	101.	77.	58.	44.	34.	26.
20.	15.	11.	9.	7.	6.	4.	3.	1.	0.

TOTAL RAINFALL = 29.40, TOTAL LOSS = 2.02, TOTAL EXCESS = 27.38

PEAK FLOW	TIME	6-HR	24-HR	72-HR	9.00-HR
(CFS)	(HR)				
7897.	2.75	2374.	1598.	1598.	1598.
		(INCHES) 27.120	27.383	27.383	27.383
		(AC-FT) 1177.	1189.	1189.	1189.

CUMULATIVE AREA = .81 SQ MI

HYDROGRAPH AT STATION INFLOW
FOR PLAN 1, RATIO = .18

TOTAL RAINFALL = 5.29, TOTAL LOSS = 1.65, TOTAL EXCESS = 3.64

PEAK FLOW	TIME	6-HR	24-HR	72-HR	9.00-HR
(CFS)	(HR)				
1068.	2.83	318.	212.	212.	212.

(INCHES)	3.632	3.639	3.639	3.639
(AC-FT)	158.	158.	158.	158.

CUMULATIVE AREA = .81 SQ MI

*** **

HYDROGRAPH AT STATION INFLOW
FOR PLAN 1, RATIO = .33

TOTAL RAINFALL = 9.70, TOTAL LOSS = 1.84, TOTAL EXCESS = 7.86

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW		
(CFS)	(HR)		6-HR	24-HR	72-HR
+	2322.	2.83	686.	459.	459.
					9.00-HR
		(CFS)			
		(INCHES)	7.832	7.865	7.865
		(AC-FT)	340.	341.	341.

CUMULATIVE AREA = .81 SQ MI

*** **

*
15 KK * OUTFLO * W
*

HYDROGRAPH ROUTING DATA

16 RS	STORAGE ROUTING				
	NSTPS	1	NUMBER OF SUBREACHES		
	ITYP	ELEV	TYPE OF INITIAL CONDITION		
	RSVRIC	650.00	INITIAL CONDITION		
	X	.00	WORKING R AND D COEFFICIENT		
17 SV	STORAGE	87.0	133.0		
18 SE	ELEVATION	650.00	653.50		
19 SQ	DISCHARGE	0.	90.	254.	468.
				589.	
20 SE	ELEVATION	650.00	651.00	652.00	653.00
				653.50	
21 ST	TOP OF DAM				
	TOPEL	653.50	ELEVATION AT TOP OF DAM		
	DAMWID	354.00	DAM WIDTH		
	COQD	2.80	WEIR COEFFICIENT		
	EXPD	1.50	EXPONENT OF HEAD		

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

(INCLUDING FLOW OVER DAM)

STORAGE	87.00	100.14	113.29	126.43	133.00
OUTFLOW	.00	90.00	254.00	468.00	589.00
ELEVATION	650.00	651.00	652.00	653.00	653.50

*** **

HYDROGRAPH AT STATION OUTFLO
FOR PLAN 1, RATIO = .18

PEAK OUTFLOW IS 666. AT TIME 3.33 HOURS

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW		
(CFS)	(HR)		6-HR	24-HR	72-HR
+	666.	3.33	299.	205.	205.
					9.00-HR
		(CFS)			
		(INCHES)	3.413	3.505	3.505
		(AC-FT)	148.	152.	152.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
(AC-FT)	(HR)		6-HR	24-HR	72-HR
+	135.	3.33	115.	106.	106.
					9.00-HR

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
(FEET)	(HR)		6-HR	24-HR	72-HR
+	653.63	3.33	652.10	651.46	651.46
					9.00-HR

CUMULATIVE AREA = .81 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OUTFLO
FOR PLAN 1, RATIO = .33

PEAK OUTFLOW IS 2229. AT TIME 2.92 HOURS

PEAK FLOW	TIME		6-HR	24-HR	72-HR	9.00-HR
+	(CFS)	(HR)				
+	2229.	2.92	(CFS)			
			656.	449.	449.	449.
		(INCHES)	7.492	7.686	7.686	7.686
		(AC-FT)	325.	334.	334.	334.

PEAK STORAGE	TIME		6-HR	24-HR	72-HR	9.00-HR
+	(AC-FT)	(HR)				
+	149.	2.92				
			126.	115.	115.	115.

PEAK STAGE	TIME		6-HR	24-HR	72-HR	9.00-HR
+	(FEET)	(HR)				
+	654.72	2.92				
			652.97	652.11	652.11	652.11

CUMULATIVE AREA = .81 SQ MI

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				.18	.33
HYDROGRAPH AT					
+	INFLOW	.81	1	FLOW	1068.
				TIME	2.83
ROUTED TO					
+	OUTFLO	.81	1	FLOW	666.
				TIME	3.33

** PEAK STAGES IN FEET **
1 STAGE 653.63 654.72
TIME 3.33 2.92

1

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION OUTFLO
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM				
	ELEVATION	650.00	653.50	653.50				
	STORAGE	87.	133.	133.				
	OUTFLOW	0.	589.	589.				
	RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
	.18	653.63	.13	135.	666.	.50	3.33	.00
	.33	654.72	1.22	149.	2229.	2.25	2.92	.00

*** NORMAL END OF HEC-1 ***

$\sim \frac{1}{3}$ C soils

$\sim \frac{2}{3}$ B soils

Assume $\frac{1}{8}$ ac. lots after devel. is thru

$$\frac{2}{3}(85) + \frac{1}{3}(90) = 87 \quad \text{~~87~~}$$

Not all is developed - use 85

Watershed area: 521 ac.

NPA: 11.5 ac.

Ass. TOD area = 14.5 ac.

NP Vol: $19(11.5)(.4) = 87$ ac.

TOD " : $87 + 3.5(13) = 133$ ac.

5.4, 5.5, 4.5, 2.6, 4.8, 7.3, 8.4, 10.9 ave: 6.2

$$L = 6160$$

$$L = \frac{(6160)^{.8} \left(\frac{1000}{85} - 9 \right)^{.7}}{1900 (6.2)^{.5}} = .46 \text{ hr.}$$

Est. ~~NP~~ NP @ 650, PS: BW=30, Z=0

Elev.	H	C	Q
650	0	3	0
651	1	3	90
652	2	3	254
653	3	3	468
653.5	3.5	3	589

Lyle Bentley



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
OFFICE CORRESPONDENCE

LB 7/31
MS 8/01

TRIP REPORT

MEMO TO FILE

DAM NAME: Robinson Lake Dam I.D. No. 94-7010
COUNTY: Williamson INSPECTION DATE: July 13, 2012
PURPOSE OF VISIT: FARM POND REVIEW
INSPECTOR'S NAME: Ernest Ekwugha
OTHERS PRESENT: _____
WEATHER CONDITIONS: Sunny. 90
PHOTOS TAKEN: Yes NO X

CHANGE IN HAZARD CATEGORY: NO _____

FINDINGS: On July 13, 2012, I visited the above referenced dam to determine whether it still qualifies as a farm pond. I noticed that the dam is secured and the public had no access to the lake. There were no changes to the downstream of the dam.

I called Mrs. Dexter Lockwood, the owner of the property to confirm the ownership and usage. A family member answered the phone. She indicated that the farm pond verification will be handled by the owner's daughter.

Based on this trip report, I recommend that the dam remain classified as a significant hazard farm pond. Mrs. Lockwood's address and telephone number had not changed. The next scheduled farm pond review for the above dam will be conducted in July 2017.

Please de-list from upcoming activities report.

Mrs. Dexter Lockwood
4351 South Carothers Road
Franklin, TN 37064

Home Tel. (615) 794-3216

Inspector's signature / Date :

Ernest Ekwugha

July 30, 2012

cc: Central Office

20170715



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

OFFICE CORRESPONDENCE

TN DEPT OF ENVIRONMENT
AND CONSERVATION2007 OCT 12 P 3:46
TRIP REPORTDIVISION
OF WATER SUPPLYS/S 7/26
EJW - 7/27
LB 10/12
MS 10/12

MEMO TO FILE

DAM NAME: Robinson Lake Dam I.D. No. 94 - 7010

COUNTY: Williamson INSPECTION DATE: July 2, 2007

PURPOSE OF VISIT: FARM POND REVIEW

INSPECTOR'S NAME: Ernest Ekwugha

OTHERS PRESENT: _____

WEATHER CONDITIONS: Sunny, 86°

PHOTOS TAKEN: Yes ☐ NO ☒ X

CHANGE IN HAZARD CATEGORY: NO _____

FINDINGS: On July 2, 2007, the above referenced dam was visited to determine whether or not it still qualifies as a farm pond. I observed that the impoundment is on private property and there were no developments downstream.

On July 3, 2007, I called Mrs. Dexter Lockwood, the owner of the property to confirm the ownership and usage. She said the impoundment is located on her property, that it is secured and not open to the general public.

Based on this trip report, I recommend that the dam remain classified as a significant hazard farm pond. Mrs. Lockwood's address and telephone number had not changed. The next scheduled farm pond review for the above dam will be conducted in July 2012.

Please de-list from upcoming activities report.

Mrs. Dexter Lockwood
4351 South Carothers Road
Franklin, TN 37064

Home Tel. (615) 794 - 3216

Inspector's signature / Date :

July 26, 2007

cc: Central Office

20120715

DIVISION OF WATER SUPPLY
SAFE DAMS SECTION

TN DEPT OF ENVIRONMENT
AND CONSERVATION

LB 5/28
MS 5/29
EE 5/30

TRIP REPORT

DAM NAME Robinson Lake Dam I.D. NO. 94-7010
COUNTY Williamson INSPECTION DATE 5/6/02
PURPOSE OF VISIT Farm Pond Review
INSPECTOR'S NAME Ghufran Barzani
OTHERS PRESENT None.
WEATHER CONDITIONS Cloudy, 65°
PHOTOS TAKEN YES NO X
CHANGE IN HAZARD CATEGORY No

FINDINGS: On May 6, 2002, the above referenced dam was visited for the purpose of evaluating its "farm pond" status. I found nothing changed either on the property or in the downstream area. The property was still fenced and posted with "No-Trespassing" and "No-Fishing" signs. The access road was closed off by a gate.

On the same date, I contacted the owner, Ms. Dexter Lockwood. Her secretary told me that she still owns the property that surrounds Robinson Lake and the lake was used only for livestock purpose and that she did not allow anyone to use it otherwise.

The next scheduled "farm pond" review for the above referenced dam will be conducted in July 2007.

I recommend that the lake be classified as a farm pond and the hazard category remain as high. A "farm pond" letter should be sent to this mailing address:

Ms. Dexter Lockwood
P.O. Box 588
Franklin, TN 37064
(615) 794-3216 (home)
(615) 794-8465 (work)

Ghufran Barzani 5/8/2002
INSPECTOR'S SIGNATURE/DATE

DIVISION OF WATER SUPPLY
SAFE DAMS SECTION

TRIP REPORT

DAM NAME Robinson Lake I.D. NO. 94-7010
COUNTY Williamson INSPECTION DATE 9/6/96
PURPOSE OF VISIT Farm Pond Review
INSPECTOR'S NAME Ghufran Barzani
OTHERS PRESENT Gary Horne
WEATHER CONDITIONS Sunny, 71°
PHOTOS TAKEN YES NO X
CHANGE IN HAZARD CATEGORY No

FINDINGS: On September 6, 1996, Gary Horne and I visited the above referenced dam in order to perform a "farm pond" review.

When we arrived at the property, the entrance access road was unlocked. The property was posted with "No Trespassing and Private Property signs.

I spoke with Mr. Dexter Lockwood's daughter, who stated that her father was deceased, but her Mother still owns the property. According to her, the lake is not open to the general public.

Based upon this inspection, the dam should remain classified as a low hazard "farm pond".

I recommend that the dam be flagged again in September, 2001. A "farm pond" letter should be sent to:

Mrs. Dexter Lockwood
P.O. Box 588
Franklin, TN 37064
(615) 794-3216 home
(615) 8465 work

INSPECTOR'S SIGNATURE/DATE

Ghufran Barzani 9/9/96

'KB 9/12

LB 9/13

JSM 9/13

EE 9/17

OFFICE OF THE
DIRECTOR OF
WATER SUPPLY

SEP 13 9 40 AM '96

IN DEPT OF ENVIRONMENT
AND CONSERVATION



LB 9/17
SM 9/20
EE 9/23

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER SUPPLY
6th FLOOR, L & C TOWER
401 CHURCH STREET
NASHVILLE, TN 37243-1549

September 13, 1996

Mrs. Dexter Lockwood
P.O. Box 588
Franklin, TN 37064

RE: Robinson Lake Dam; Williamson County
I.D. No. 94-7010

Dear Mrs. Lockwood:

Your dam has been classified as a "farm pond" as defined in the Rules and Regulations. This office does not intend to regulate your dam based on this definition. A "farm pond" means any impoundment used only for providing water for agricultural and domestic purposes such as livestock and poultry watering, irrigation of crops, recreation, and conservation, for the owner or occupant of the farm, his family, and invited guests, but does not include any impoundment for which the water, or privileges or products of the water, are available to the general public.

General public as used above includes patrons, members, and customers of institutions and/or clubs such as but not limited to summer camps, schools, retirement facilities, churches, private clubs, communes, hunting clubs, and health care facilities. The following are examples of impoundments that are not "farm ponds":

State owned recreational lakes, residential subdivision lakes, industrial waste impoundments, industrial water supply impoundments, hunting clubs, public water supply impoundments, commercial land developments, state owned or operated conservation impoundments, and watershed district impoundments.

Farm as used above means a tract of land that is or may be used for cultivation of crops and or raising livestock. A farm pond is not subject to the requirements of the Safe Dams Act; however, at any time in the future that your

TO	DATE
PLB	9/10
CC: NFO	9/19
FILE	

TELEPHONE/MEETING RECORD

DATE: 9-9-91

TO: FILE

FROM: JOHN MCCLURKAN

SUBJECT: ROBINSON LK Dam 94-7010
Williamson County

On 9-6-91, the above site was visited, and it appeared to still be a farmpond.

On 9-9-91, a call was made to Mr. Dexter Lockwood. His secretary told me that he still owns the property that surrounds Robinson Lake.

I recommend that this dam remain as classified.



TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Environment
T.E.R.R.A. BUILDING
150 NINTH AVENUE NORTH
NASHVILLE, TENNESSEE 37219-5404

September 22, 1986

Dexter Lockwood
P.O. Box 588
Franklin, TN 37064

Re: Robinson Lake, Williamson Co.
I.D. No. 94-7010

Dear Mr. Lockwood:

Your dam has been classified as a "farm pond" as defined in the Proposed Rules and Regulations. Although these Rules and Regulations have not yet been promulgated, this office does not intend to regulate your dam based on this definition. A "farm pond" means any impoundment used only for providing water for agricultural and domestic purposes for the owner or occupant of the farm, his family, and invited guest, such as livestock and poultry watering, irrigation of crops, recreation, and conservation, but does not include any impoundment for which the water, or privileges or products of the water, are available to the general public.

General public as used above includes patrons, members, and customers of institutions and/or clubs such as but not limited to summer camps, schools, retirement facilities, churches, private clubs, communes, hunting clubs, and health care facilities. The following are examples of impoundments which are not "farm ponds".

State owned recreational lakes, residential subdivision lakes, industrial waste impoundments, industrial water supply impoundments, hunting clubs, public water supply impoundments, commercial land developments, state owned or operated conservation impoundments, and watershed district impoundments.

Farm as used above means a tract of land which is or may be used for cultivation of crops and/or raising livestock.

A farm pond is not subject to the requirements of the Safe Dams Act; however, at any time in the future that your facility becomes used by the general public or is developed into one of the other regulated types of impoundments, you must comply with the Act. At this time you are required to notify this office.

As the owner of a dam you are legally liable for any damages resulting from the failure of this dam. Enclosed is a manual you should read that will help you evaluate your dam for any potential problems. We recommend that any problems encountered be investigated by a professional engineer.

I.D. NO. 94-7010

JDR 9-19
JCG 9/19
CC NBO

Date 9/18/86

Basin NBO

INSPECTION REPORT

Name of Dam: Robinson Lake County: Williamson

Owner's Name: ~~William + Tommy Wilson~~ Quad: 63-NE

Type Project: Dexter Lockwood

Existing ☒
New Construction ☐
Repair/Alteration ☐
Removal ☐

Type Inspection: Cursory

Damage Potential Category: One ☐ Two ☒ Three ☐ Undetermined ☐

Inspection by: L. Bentley

Inspection Results:

I went to this lake on 9/17/86.
It was fenced + posted + was ~~used~~
surrounded by pasture. I recommend
that it be classified as a farm
pond.

POOL 1
R153

conc.

9% grade

rock

S P I L L W A Y

ROBINSON'S LAKE, WILLIAMSON CO., TENN.
Aug. 1, 1973 LDS WDT

POOL 2
R153
8.75

POOL 3
R153
9.9
1.9:1

POOL 4
R153
10.75

POOL 5
R153
11.25

END
R200

R153
R153

END
R134
R2185

12" metal pipe w. valve

RIVER

POOL

POOL

SPILL

CREST: LENGTH - 354'

WIDTH - 9'

SPI L LWAY: WIDTH - 31'

CONC., ROCK

HEIGHT: STRUCTURAL - 22.5'

HYDRAULIC - 19'

ROBINSON'S LAKE, WILLIAMSON CO., TENN.
Aug. 1, 1973 LDS, WOT

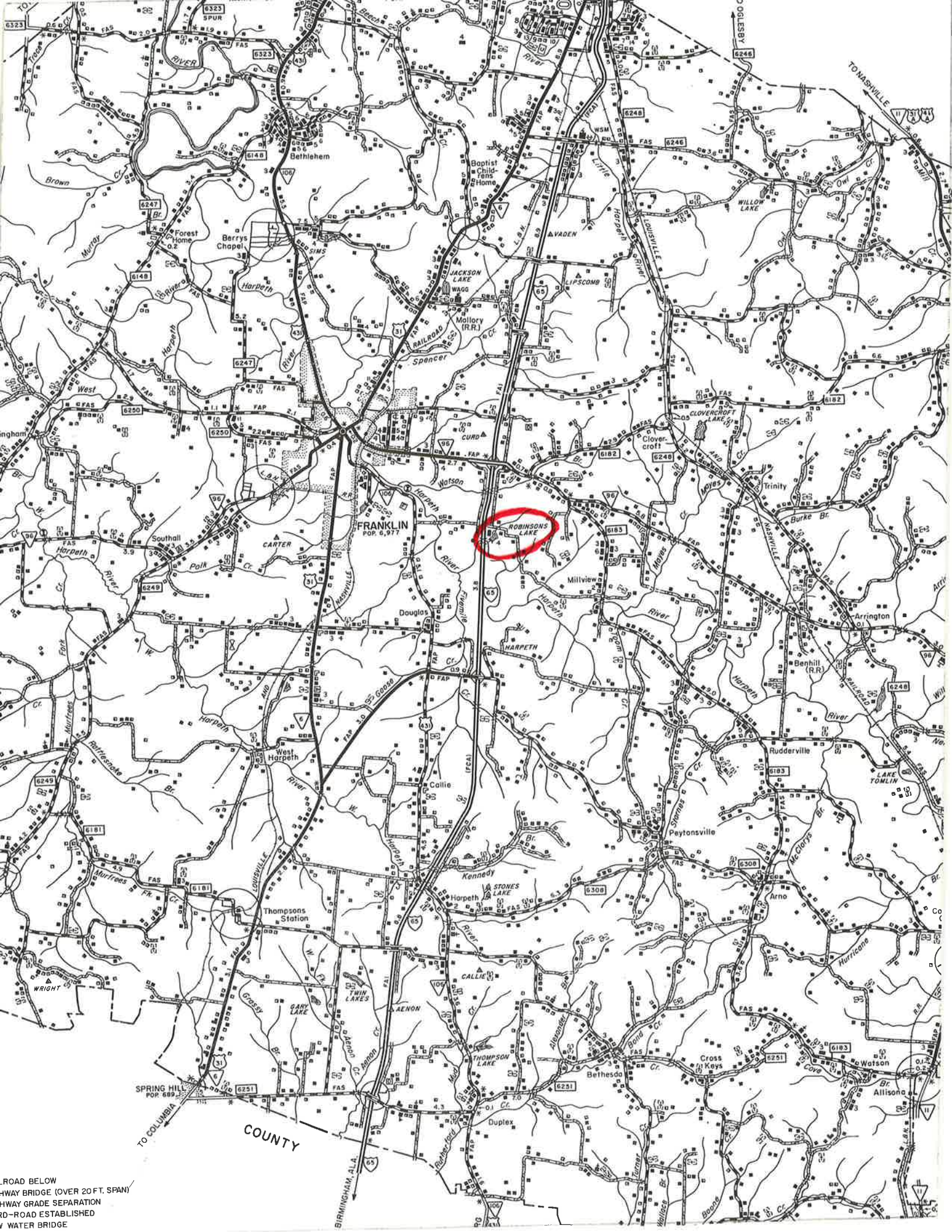
4200

4100

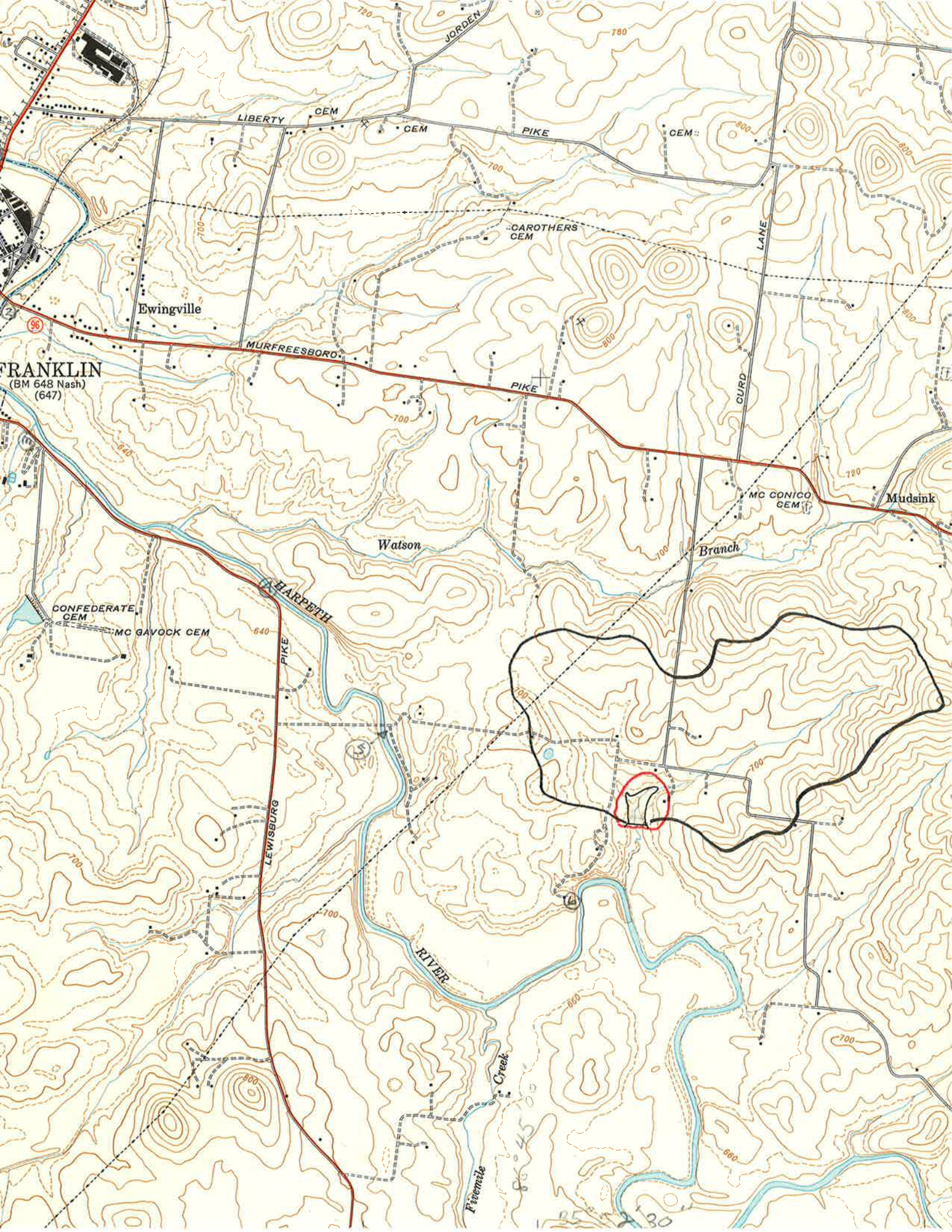
4000

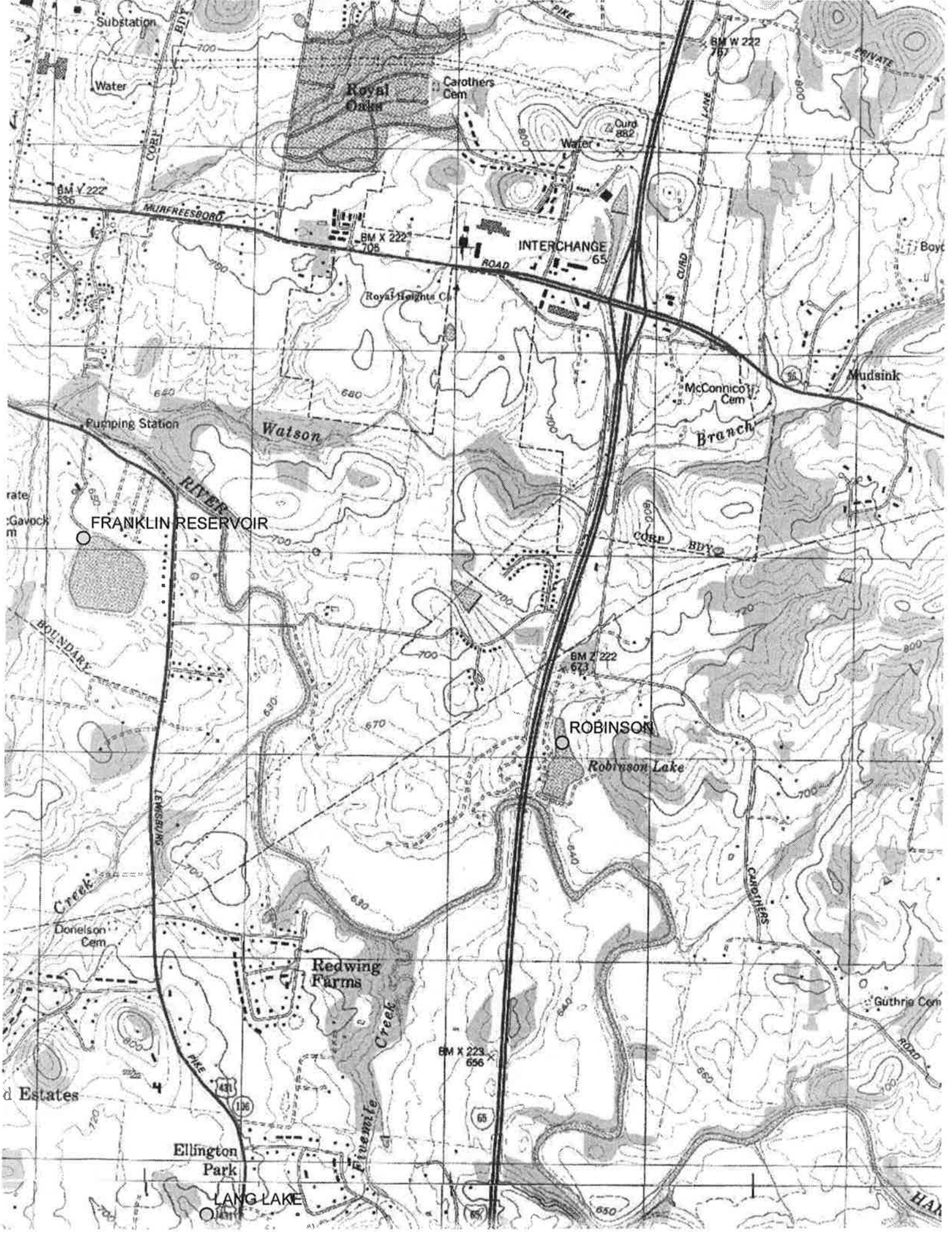
3900

3800



ROAD BELOW
HIGHWAY BRIDGE (OVER 20 FT. SPAN)
HIGHWAY GRADE SEPARATION
ROAD-ROAD ESTABLISHED
WATER BRIDGE





Appendix B

Field Checklist and Photographs

DAM INSPECTION CHECKLIST

NAME OF DAM: Robinson Lake Dam

DAM NO.: 94-7010

LOCATION: Municipality: Franklin, TN

County: Williamson

CLASSIFICATION DATA: Size: Small

Hazard: Significant

PHYSICAL DATA:

Type of Dam: Embankment

Height of Dam: 22.5 ft

Normal Pool Storage Capacity: 91 ac-ft

ELEVATIONS:

Normal Pool:

Pool at Inspection: Normal

Tailwater at Inspection:

DAM OWNER: Kaye Lockwood

OPERATOR: _____

ADDRESS: P. O. Box 588

Franklin, TN 37064

PHONE: (615) 948-7386

FAX NO.: (____)-____-____

E-MAIL ADDRESS: _____

PERSONS PRESENT AT INSPECTION:

Name

Title/Position

Representing

Steve Whiteside

Vice President

CDM Smith

David Mason

Associate

CDM Smith

Doug Noonan

Water Quality Specialist

City of Franklin

Jason Deal

Technical Manager

Barge Waggoner Sumner &
Cannon

DATE OF INSPECTION: 6/12/17

WEATHER: Sunny

TEMPERATURE: 85-90 degrees

NAME OF DAM: Robinson Lake Dam	DAM NO.: 94-7010	DATE: 6/12/17
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ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
EMBANKMENT: CREST					
1	Surface Cracking	None observed.	☐	☐	☐
2	Sinkhole, Animal Burrow	None observed.	☐	☐	☐
3	Low Area(s)	Low area near middle of crest. Possible overtopping location.	☐	☒	☐
4	Horizontal Alignment	Satisfactory.	☐	☐	☐
5	Ruts and/or Puddles	None observed	☐	☐	☐
6	Vegetation Condition	Tall grass and weeds on both sides of crest.	☐	☐	☐
7	Warning Signs	Possible overtopping location observed.	☐	☒	☐
8			☐	☐	☐
9			☐	☐	☐
Additional Comments (Refer to item number if applicable): Crest length = 375 feet Crest width = 12 feet Freeboard = 5.5 feet					
EMBANKMENT: UPSTREAM SLOPE					
10	Slide, Slough, Scarp	View obscured by heavy vegetation.	☐	☐	☐
11	Slope Protection	Riprap on portions of the slope.	☐	☐	☐
12	Sinkhole, Animal Burrow	View obscured by heavy vegetation.	☐	☐	☐
13	Emb.-Abut. Contact	Satisfactory.	☐	☐	☐
14	Erosion	Eroded areas around tree roots.	☐	☐	☒
15	Vegetation Condition	Trees up to 12-inch diameter. Tall weeds, brush, and grass.	☐	☐	☒
16			☐	☐	☐
17			☐	☐	☐
Additional Comments (Refer to item number if applicable): Slope ranges from 1.5H:1V to near vertical.					

NAME OF DAM: Robinson Lake Dam	DAM NO.: 94-7010	DATE: 6/12/17
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ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
EMBANKMENT: DOWNSTREAM SLOPE					
18	Wet Area(s) (No Flow)	None observed.	☐	☐	☐
19	Seepage	None observed.	☐	☐	☐
20	Slide, Slough, Scarp	None observed.	☐	☐	☐
21	Emb. - Abut. Contact	Satisfactory.	☐	☐	☐
22	Sinkhole, Animal Burrow	None observed.	☐	☐	☐
23	Erosion	Some bare areas. Possible overtopping area.	☐	☒	☐
24	Unusual Movement	None observed.	☐	☐	☐
25	Vegetation Control	Trees up to 12-inch diameter, mostly 2-6 inch diameter.	☐	☐	☐
26		Leaves, vines, and brush.	☐	☐	☐
27			☐	☐	☐
Additional Comments (Refer to item number if applicable):					
Slope is typically 1.5H:1V.					
EMBANKMENT: INSTRUMENTATION					
28	Piezometers/Observ. Wells		☐	☐	☐
29	Staff Gauge and Recorder		☐	☐	☐
30	Weirs		☐	☐	☐
31	Survey Monuments		☐	☐	☐
32	Drains		☐	☐	☐
33	Low Flow Release		☐	☐	☐
34	Frequency of Readings		☐	☐	☐
35	Location of Records		☐	☐	☐
36			☐	☐	☐
37			☐	☐	☐
Additional Comments (Refer to item number if applicable):					
No instrumentation observed.					

NAME OF DAM: Robinson Lake Dam	DAM NO.: 94-7010	DATE: 6/12/17
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ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
DOWNSTREAM AREA					
38	Abutment Leakage	Seepage to left of spillway at Harpeth River.	☐	☒	☐
39	Foundation Seepage	Seepage downstream of RCP standpipe.	☐	☒	☐
40	Slide, Slough, Scarp	Erosion at river in seepage areas.	☐	☒	☐
41	Drainage System	None observed.	☐	☐	☐
42	Boils	None observed.	☐	☐	☐
43	Wet Areas	Wet areas adjacent to seepage areas.	☐	☒	☐
44	Reservoir Slopes	Covered with vegetation.	☐	☐	☐
45	Access Roads	Unpaved access road.	☐	☐	☐
46	Security Devices	Locked gate.	☐	☐	☐
47			☐	☐	☐
48			☐	☐	☐
49			☐	☐	☐
Additional Comments (Refer to item number if applicable):					
SPILLWAYS: ERODIBLE CHANNEL					
50	Slide, Slough, Scarp		☐	☐	☐
51	Erosion		☐	☐	☐
52	Vegetation Condition		☐	☐	☐
53	Debris		☐	☐	☐
54			☐	☐	☐
55			☐	☐	☐
Additional Comments (Refer to item number if applicable):					
Not Applicable.					

ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
SPILLWAYS: NON-ERODIBLE CHANNEL					
56	Sidewalls	Sloped concrete side walls are cracked and have brush on them.	☐	☒	☐
57	Channel Floor	Concrete floor is heavily cracked.	☐	☒	☐
58	Unusual Movement	Cracked concrete floor and walls have displaced in some areas.	☐	☒	☐
59	Approach Area	Small trees and heavy brush. 2-foot-high fence at weir.	☐	☐	☒
60	Weir or Control	Trapezoidal concrete weir with 2-foot-high fence trash guard.	☒	☐	☐
61	Discharge Channel	Concrete channel is heavily cracked.	☐	☒	☐
62	Boils	None observed.	☐	☐	☐
63			☐	☐	☐
64			☐	☐	☐
Additional Comments (Refer to item number if applicable): 60. Trapezoidal weir is 46.5 feet wide with 25-foot bottom width. 61. Spillway channel is about 80 feet long. Spillway downstream channel ends at limestone bedrock. There is a 15-foot-high drop-off down to the river. Water was flowing through the limestone face and to the left of it. Portions of the rock have broken off.					
SPILLWAYS: DROP INLET					
65	Intake Structure		☐	☐	☐
66	Trash rack		☐	☐	☐
67	Stilling Basin		☐	☐	☐
68			☐	☐	☐
69			☐	☐	☐
Additional Comments (Refer to item number if applicable): None observed.					

NAME OF DAM: Robinson Lake Dam	DAM NO.: 94-7010	DATE: 6/12/17
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ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
OUTLET WORKS					
70	Intake Structure	None observed.	☐	☒	☐
71	Trash rack	None observed.	☐	☐	☐
72	Stilling Basin	None observed.	☐	☐	☐
73	Primary Closure	None observed.	☐	☐	☐
74	Secondary Closure	None observed.	☐	☐	☐
75	Control Mechanism	None observed.	☐	☐	☐
76	Outlet Pipe	None observed.	☐	☐	☐
77	Outlet Tower	None observed.	☐	☐	☐
78	Outlet Structure	Vertical 36-inch-diameter RCP pipe downstream of dam.	☐	☒	☐
79	Seepage	Seepage flowing downstream of RCP pipe.	☐	☒	☐
80	Unusual Movement	None observed.	☐	☐	☐
81			☐	☐	☐
82			☐	☐	☐
Additional Comments (Refer to item number if applicable): 78. RCP pipe is 12 feet long and extends 8 feet below ground surface. The bottom has about 3 feet of muck. No outlet pipes were observed.					
CONCRETE/MASONRY DAMS: UPSTREAM FACE					
83	Surface Conditions		☐	☐	☐
84	Condition of Joints		☐	☐	☐
85	Unusual Movement		☐	☐	☐
86	Abutment-Dam Contacts		☐	☐	☐
87			☐	☐	☐
88			☐	☐	☐
Additional Comments (Refer to item number if applicable): Not Applicable.					

NAME OF DAM: Robinson Lake Dam	DAM NO.: 94-7010	DATE: 6/12/17
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ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
CONCRETE/MASONRY DAMS: DOWNSTREAM FACE					
89	Surface Conditions		☐	☐	☐
90	Condition of Joints		☐	☐	☐
91	Unusual Movement		☐	☐	☐
92	Abutment-Dam Contacts		☐	☐	☐
93	Drains		☐	☐	☐
94	Leakage		☐	☐	☐
95			☐	☐	☐
96			☐	☐	☐
Additional Comments (Refer to item number if applicable):					
Not Applicable.					
CONCRETE/MASONRY DAMS: CREST					
97	Surface Conditions		☐	☐	☐
98	Horizontal Alignment		☐	☐	☐
99	Vertical Alignment		☐	☐	☐
100	Condition of Joints		☐	☐	☐
101	Unusual Movements		☐	☐	☐
102			☐	☐	☐
103			☐	☐	☐
Additional Comments (Refer to item number if applicable):					
Not Applicable.					

NAME OF DAM: Robinson Lake Dam	DAM NO.: 94-7010	DATE: 6/12/17
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ITEM	CONDITION	COMMENTS	MONITOR	INVESTIGATE	REPAIR
RESERVOIR AREA					
104	Sedimentation		☐	☐	☐
105	Slope Stability		☐	☐	☐
106	Sinkholes		☐	☐	☐
107	Fractures		☐	☐	☐
108	Unwanted Growth		☐	☐	☐
109	Storage Gage		☐	☐	☐
110			☐	☐	☐
111			☐	☐	☐
Additional Comments (Refer to item number if applicable): Did not inspect the reservoir area.					
Final Comments:					

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 1: Robinson Lake viewed from dam crest.



Photo No. 2: Crest viewed from left abutment.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 3: Crest viewed from right abutment.



Photo No. 4: Erosion on crest due to possible overtopping.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 5: Upstream slope viewed from left abutment.



Photo No. 6: Upstream slope viewed from right abutment.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 7: Riprap present on portions of upstream slope.



Photo No. 8: Trees on upstream slope.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 9: Downstream slope viewed from right abutment.



Photo No. 10: Downstream slope and downstream area viewed from left abutment.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 11: Downstream slope and downstream area viewed from right abutment.



Photo No. 12: Erosion on downstream slope due to possible overtopping.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 13: 36-inch-diameter RCP pipe downstream of dam.



Photo No. 14: Seepage downstream of RCP pipe.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 15: Seepage downstream of RCP pipe.



Photo No. 16: Spillway weir viewed from right abutment.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 17: Fence (trash guard) on upstream side of spillway weir.



Photo No. 18: Spillway discharge channel viewed looking downstream.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 19: Spillway discharge channel viewed looking upstream.



Photo No. 20: Bedrock drop-off at downstream end of spillway discharge channel.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 21: Seepage through bedrock at downstream end of spillway discharge channel.



Photo No. 22: Seepage to left of spillway.

Robinson Lake Dam Inspection – June 12, 2017



Photo No. 23: Seepage to left of spillway.