Lynn Torgerson - SED

WISCONSIN
DEPT. OF NATURAL RESOURCES

George E. Meyer
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Street
P.O. Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2621
TELEFAX 608-264-9200
TDD 608-267-6897

January 23, 1995

IN REPLY REFER TO: 40.08

Susan L. Baldwin, Director
Department of Parks, Recreation & Culture
Milwaukee County
9480 Watertown Plank Road
Wauwatosa, WI 53226

SUBJECT: Estabrook Dam, Field File # 40.08, Dam Safety Inspection Report, Milwaukee County.

Dear Ms. Baldwin:

This is the Department of Natural Resources' Dam Safety Report based on our inspection of the Estabrook Dam on the Milwaukee River. The inspection took place as you requested in your letter to me dated July 13, 1994. This report identifies work that needs to done on the dam and a schedule for when that work is to be completed. Please contact me if you have questions about the needed repairs or are uncertain how to proceed.

ESTIMATE OF THE DAM HAZARD RATING AND SPILLWAY CAPACITY & FLOOD FLOWS

Wisconsin Administrative Code NR 333.04 requires all dams in the state to be assigned a Hazard Rating. Our **estimate** of the Hazard Rating for the Estabrook Dam is Class 1 or Low Hazard. This is only an estimate of the hazard rating based on approximations of flood flows, map surveillance and site visits.

Hazard ratings are based on:

1) existing land use downstream of the dam, and
2) existing land use control (zoning) downstream of the dam

Existing land use is divided into land use classifications low, significant and high. These are based on whether or not there is **existing development** downstream of the dam that could be affected should the dam fail.

In this case, the dam appears to be submerged during the 100-year flood. Our records indicate a scale model of the proposed dam was constructed and tested at the University of Wisconsin in 1933 to test submergence criteria. We concur with the findings of the 1933 studies.

The land use control can be established by a floodplain **zoning ordinance** that prohibits future development in the area downstream of the dam affected by the dam. A floodplain zoning ordinance was adopted by the communities downstream for establishing land use control downstream of the dam within the 100-year floodplain. Because the dam is submerged, this zoning does reflect the area that could be inundated in case of a dam failure.

Wisconsin Administrative Code NR 333.07(2) establishes design hydraulic capacity requirements for all dams in the state. The idea is to reduce the probability of a dam failure by making it pass larger flows without overtopping. This dam is submerged during the 100-year flood. Under the provision in NR 333.07(3)(a) the dam qualifies under "REDUCED REQUIREMENTS". ***Therefore, additional spillway capacity will not be required.***

Note: Right and left are referenced while standing on the dam looking downstream.

ITEM	WORK TO BE COMPLETED BY
1) SIGNING	June 1, 1995

Signing is required around dams in the State in accordance with Wisconsin Administrative Code NR 330. A copy of the code will be included with the guidebook, being mailed at a later date.

Signs warning of the presence of the dam and providing a suitable portage route around the dam are required. Provide the signs by the date indicated.

2) TREE REMOVAL AT CONCRETE DAM ABUTMENTS — June 1, 1995

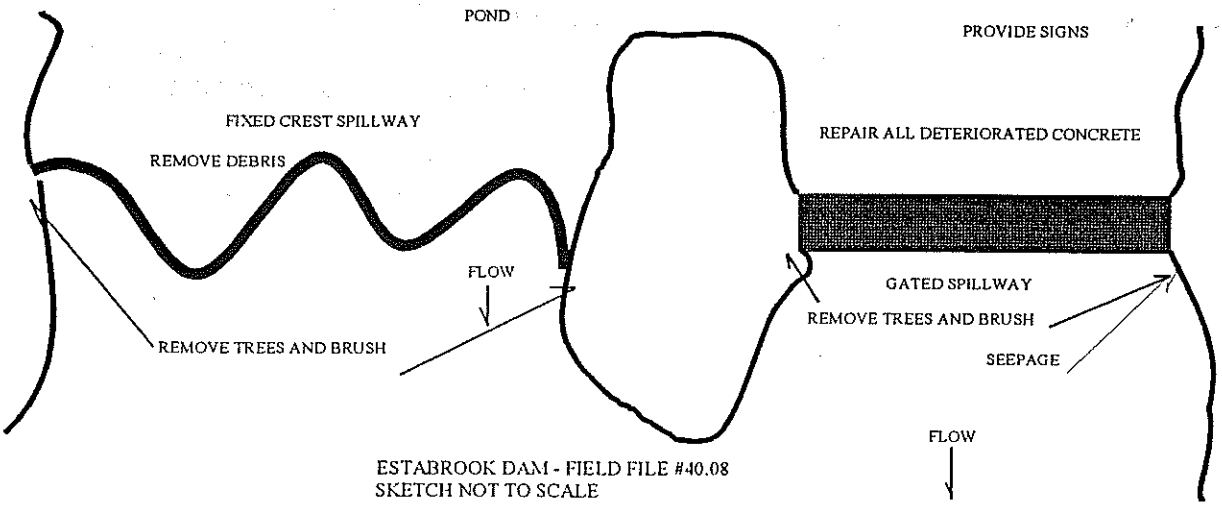
Remove all tress and brush at the right and left abutments of both the spillway sections of the dam. This includes both the gated and the fixed crest spillway sections.

Tree removal is important for a number of reasons. Trees can topple over in a severe storm taking with them a portion of the earthen embankment. The root systems provide a path for seepage waters to follow through the embankment. Trees grow old, die and topple over and/or leave their root system in the embankment to rot and provide a path for seepage. Trees also shade the embankment and make it difficult for grass to become established. Grass has proven to be the best method for controlling erosion on earthen embankments. Tree roots have also proven to be attractive to burrowing animals for use as homes. Root systems have been known to penetrate concrete and masonry structures causing damage. All of these things lead to the same end, a risk of failure. By eliminating the trees from the embankment you reduce the risk of failure caused by tree growth.

Tree removal is to include the complete removal of the stumps and the roots, filling of the holes created with firmly compacted tight soils, adding topsoil and grass seed to establish grass growth. The embankment should then be mowed on a regular basis so that the growth does not exceed 6 inches at any time.

3) CONCRETE DAM REPAIRS — October 1, 1997

All the piers on the dam are in need of repair. The sprayed on concrete applied in the past has served its purpose and now needs to be removed. New sound concrete must replace the old.



Due to the extent of the needed repairs, Milwaukee County will have to hire an engineer, registered in the State of Wisconsin, to design the repair of the dam. Plans must be submitted to this office prior to their implementation.

4) DEBRIS REMOVAL FROM FIXED CREST SPILLWAY — MAY 1, 1995

We noted a large amount of debris (mostly logs) deposited along the crest of the fixed spillway. Remove all debris by the date shown.

5) SEEPAGE MONITORING — MONITOR

Seepage was noted exiting through the concrete dam at the left abutment. Monitor the seepage for an increase in the amount of water flowing. If the amount of water increases or the concrete in the area deteriorates further, repairs will be necessary.

Contact this office if the amount of seepage increases.

6) ESTABLISHING BENCHMARKS — June 1, 1996

For the purpose of future surveys, we would like you to establish two benchmarks at a location off the spillways, yet easily accessible. I am sending to you a copy of Instructions for Benchmark and Field Book Procedures and two copies of form 3500-48. After completing the work please return one filled-in form back to the Department. ***The benchmarks must be tied to Mean Sea Level datum.***

7) OPERATION, INSPECTION AND MAINTENANCE PLAN — OCTOBER 1, 1996

The Estabrook Dam should have a written plan for regular operation, inspection and maintenance. Maintenance of the dam should include all of those areas identified on the "Dam Inspection Checklists" which are included as part of this report.

Because our inspection program only allows for an inspection of your dam every ten years, I recommend that a registered professional engineer visually inspect the dam at least every 3 years and after every major flood. Inspection should include soundings of the streambed upstream and downstream of the dam. Copies of the reports should be sent to this office.

SUMMARY OF REQUIRED WORK AND SCHEDULE

ITEM		REQUIRED COMPLETION DATE
1.	SIGNING	June 1, 1995
2.	TREE REMOVAL AT CONCRETE DAM ABUTMENTS	June 1, 1995
3.	CONCRETE DAM REPAIRS	October 1, 1997
4.	DEBRIS REMOVAL FROM FIXED CREST SPILLWAY	MAY 1, 1995
5.	SEEPAGE MONITORING	MONITOR
6.	ESTABLISHING BENCHMARKS	June 1, 1996
7.	OPERATION, INSPECTION AND MAINTENANCE PLAN	

If the schedule above is not acceptable to you, submit your own schedule, in writing, for completing the above modifications and repairs. In order for us to consider a schedule other than this, you must submit your alternative schedule by March 1, 1995. If we do not hear from you by then, the schedule we have determined will be in affect.

We are mailing separately a copy of the Dam Safety Guidebook prepared for dam owners. A copy of the Department's field file for your dam has been included as an appendix.

If you have any questions concerning this report, the guidebook or the operation and maintenance of your dam, please call me at 608/266-8033. As a final note, if Milwaukee County intends to participate in the State Dam Repair/Removal Grant Program, Wisconsin Administrative Code NR 335 requires that you request, in writing, financial assistance within six months of the date of this report. The deadline for applying for this grant cycle is April 1, 1995.

Sincerely,

William D. Sturtevant

William D. Sturtevant, P.E.
Assistant State Dam Safety Engineer
Bureau of Water Regulation & Zoning

cc: Mary Ellen Vollbrecht - SED
Lynn Torgerson - SED

DAM INSPECTION CHECKLIST

Date 08.03.94

NAME OF DAM Estabrook Park FILE 40.08
OWNER'S NAME Milwaukee County TELEPHONE NO. 414 257-4505
STREET OR ROUTE 9480 Watertown Plank Road
CITY, STATE, ZIP CODE Wauwatosa WI 53226
COUNTY Milwaukee DISTRICT SED WATERWAY Milwaukee River
WEATHER & SITE CONDITIONS
INSPECTORS WDS, KEM
OTHERS
CONTACT PERSON Mr. Paul Hathaway, Parks Facilities Planning Manager (Bill Waldron took message) - 08.01.94 @ 10:45 AM

MISCELLANEOUS AREAS

CHECK AREA AS INSPECTED	CHECK/CIRCLE CONDITIONS NOTED		OBSERVATIONS
MONITORING		piezometers	
		weirs	
	✓	monuments/benchmarks	
GAGES	✓	rainfall	
	✓	pool level (op. range)	[illegible] SEE - [illegible] DRAWDOWN WELL
	✓	stream	N/A
WATERSHED	✓	slopes	MODERATE - STEEP - GENTLE
	✓	land use	VARIES EVERYWHERE - AG TO HEAVY DEVELOP.
	✓	other impoundments	D/S NORTH AVE - U/S - NONE OF CONSEQUENCE
D/S AREA		stream channel	
	✓	channel crossings	"HIGH & DRY"
	✓	flood plain zoning	RIVERWAY ZONED
	✓	development	HEAVY
EMERG. PLAN	✓	notification list	OPERATOR NOTIFIED PER SUN, PHONE SERVICE
	✓	evacuation plan	YES - CHECK D/S AREA
	✓	materials/equipment	COUNTY OWNS EQUIPMENT - ALTERNATE GATE OPER.
	✓	access road to dam	OK FROM LT - NONE FROM RT.
HYDRO POWER		last date used	
		current cap.	
		condition of powerhouse	
BOATING SAFETY	✓	upstream signs	NOT LOCATED
	✓	portage signs	NOT LOCATED

General Comments, Sketches, & Field Measurements

Department of Natural Resources | Form 3500-74A | Rev. 3-89

DAM INSPECTION CHECKLIST

Date 08.03.94

NAME OF DAM Estabrook Park FILE 40.08

INSPECTORS WPS, KEM

EMBANKMENT - DIKE - LEVEE

CHECK AREA AS INSPECTED		CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS ISLAND AND ABUTMENT CONT.	ACTION: REPAIR	MONITOR	INVESTIGATE
✓	U/S SLOPE	✓ vegetation/riprap				
		✓ beaching/slide/cracks				
		✓ undermining/erosion				
		✓ rodent burrows	NONE APPARENT			
		*	NOT AN EMBANKMENT			
✓	CREST	✓ ruts/erosion				
		✓ cracks/settlement				
		✓ poor alignment				
✓	D/S SLOPE	vegetation/erosion				
		rodent burrows				
		sloughs/slides/cracks				
		seepage/wetness				
✓	GROINS	vegetation/riprap				
		erosion				
		seepage/wetness				
✓	ABUTMENTS	✓ vegetation/erosion	VEG. & ABUT'S HEAVY - REMOVES ALL VEG. ADJ. TO DAM	✓		
		✓ sloughs/slides/cracks	NONE APPARENT			
		✓ seepage/wetness				
	TOE	cracks/slumps				
		embankment drains				
		seepage/wetness				
	MILL RACE DIKE	vegetation/erosion				
		sloughs/slides/cracks				
		seepage/wetness				
		rodent burrows				

General Comments:

DAM INSPECTION CHECKLIST Date 08.03.94

NAME OF DAM Estabrook Park FILE 40.08

INSPECTORS WDS, KEay

CONCRETE DAM TYPE GRAVITY - TIED TO ROCK FOUNDATION

CHECK AREA AS INSPECTED	CHECK/CIRCLE CONDITION NOTED		FULL POOL OBSERVATIONS	ACTION: REPAIR	MONITOR	INVESTIGATE
U/S FACE	✓	deteriorated joints	NONE APPARENT			
	✓	cracking/spalling	SPALLING - ALL DIERS - GUNITE NEEDS TO BE REPLACED (3-5)	✓		
CREST	✓	deteriorated joints	NOT VISIBLE			✓ FALL
	✓	cracking/spalling				
	✓	poor alignment	ALIGNMENT OK			
D/S FACE	✓	deteriorated joints	NONE APPARENT			
	✓	cracking/spalling	SPALLING DIS PIERS - GUNITE	✓		
	✓	seepage	@ LT ABUTMENT			
ABUTMENTS	✓	vegetation/erosion	CLEAR VEG - MINM	✓		
	✓	sloughs/slides/cracks	NONE APARENT.			
	✓	seepage/wetness	@ LT - SMALL LEAK 5' FT LT OF ABUT TO SPILLWAY		✓	
TOE	✓	erosion/undermining	WILL CHECK IN FALL			✓
	✓	seepage/wetness				
	✓	foundation drains	NONE APPARENT			✓
GALLERY		deteriorated joints				
		cracking/spalling				
		seepage				

General Comments:

DRAWDOWN PLANNED FOR OCT

VERIFY STABILITY of MASONRY DAM - REPAIR - REMOVE DEBRIS

Department of Natural Resources — Form 3500-74C — Rev. 3-89

DAM INSPECTION CHECKLIST

Date 08.03.94

NAME OF DAM Estabrook — FILE No. 08

INSPECTORS WDS, KEA

SPILLWAYS - DRAINS - OUTLETS

CHECK AREA AS INSPECTED		CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	ACTION: REPAIR	MONITOR	INVESTIGATE	
		PRINCIPAL SPILLWAY	TYPE: GATED LT & OPEN/BOARDS RT				
✓	✓	trashrack/debris	DEBRIS BOTH SECTIONS	✓			
	✓	gates/flashboards	GATES OK -			✓	FALL
INLET-RISER	✓	cracks/deterioration					
✓	✓	improper alignment	APPEARED OK			✓	
FLOW-WAY	✓	cracks/deterioration				✓	FALL
	✓	joint deterioration				✓	
	✓	gates/operability	GATES & FLASHBOARDS OPERATED ANNUALLY		✓		
✓		type	None				
		cracks/deterioration					
		seepage/piping					
STILLING BASIN/OUTLET		undercutting					
		erosion					
		debris					
		EMERGENCY SPILLWAY	TYPE: None				
		vegetation/cover					
ALL AREAS		erosion					
		obstructions					
		LAKE DRAINS/OTHER OUTLETS	TYPE: None				
		gates/valves					
		joints/flow surface					
		inlet tower					
		outlet area					
DRAINS, OUTLETS		operability					
		flow amounts					
		flow clear/muddy					
TOE DRAIN							

General Comments:

DAM INSPECTION CHECKLIST

Date 08.03.94

NAME OF DAM Etafrook FILE 40.08

INSPECTORS WDS, KEM

ELEVATIONS

CHECK AREA AS INSPECTED	CHECK/CIRCLE CONDITION NOTED		OBSERVATIONS
WATER-LEVELS		headwater	36.14
		operating range	
		gage reading	
		tailwater	
		highwater mark	29.11
		downstream bed	
		structural height	17
GATES		number & type	10
		width	11.6' x 7.5'
		top elevation	36.32
		sill elevation	28.75
SPILLWAYS		number & type	2 stop log bays & FIXED CREST
		width	STL = 10' FCR1 221 FCR2 = 540'
		crest elevation	STL = 36.00 FCR1 = 35.86 FCR2 = 36.00
		apron	

EMBANK-MENTS		length	Left	Right	length (top)	Emergency Spillway
		@dam abutment			length (crest)	
		mid-point			top left elevation	
		@ groin			left crest elevation	N/A
		low-point	40.72	40.45	top right elevation	
					right crest elevation	

Benchmark Information:

all elevations given reffenenced to BM 904-A

BM 904-A found, was not checked seems to be OK

General Comments: