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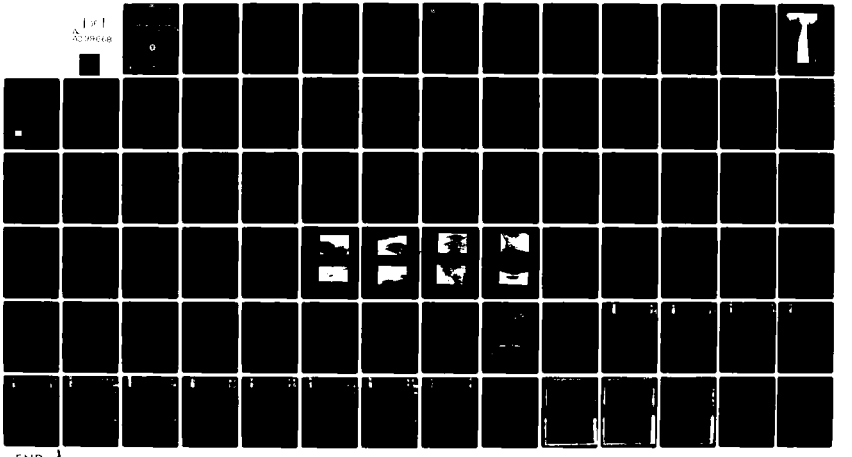

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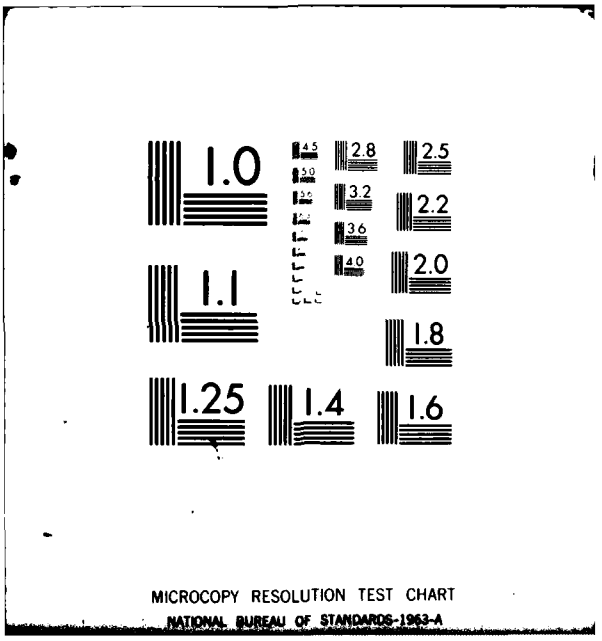
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(6) National Dam Safety Program Lake Windsor Dam (NJ-00034),
HUDSON RIVER BASIN,
TRIBUTARY PAPAKATING CREEK
SUSSEX COUNTY,
NEW JERSEY.
Phase I Inspection Report

LAKE WINDSOR DAM

(9) Final report

NJ 00034

(12) 81 | (10) Peter Yu

DTIC ELECTE JUN 3 1981 S D

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

(1) PAC w61-79-C-0011

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DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

(14) Report No. DAEN(NAP)/53842/NJ00034-81/03 (15)

(11) MAR 1981

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4. TITLE (and Subtitle) Phase I Inspection Report National Dam Safety Program Lake Windsor Dam, NJ00034 Sussex County, New Jersey		5. TYPE OF REPORT & PERIOD COVERED FINAL 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Yu, Peter		8. CONTRACT OR GRANT NUMBER(s) DACW61-79-C-0011
9. PERFORMING ORGANIZATION NAME AND ADDRESS Langan Engineering Assoc. Inc. 990 Clifton Ave. Clifton, N.J. 07013		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS NJ Department of Environmental Protection Division of Water Resources P.O. Box CN029 Trenton, NJ 08625		12. REPORT DATE 3/81 13. NUMBER OF PAGES 50
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16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams	National Dam Safety Program	
Embankments	Outlet works	
Visual Inspection	Spillways	Seepage
Structural Analysis	Riprap	Lake Windsor Dam, NJ

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-N

28 MAY 1981

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Lake Windsor Dam in Sussex County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Lake Windsor Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition and the spillway is considered adequate. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The following actions should be initiated within six months from the date of approval of this report:

(1) Remove debris which has accumulated in the spillway discharge channel.

(2) Investigate the operating condition of the low level outlet and repair if necessary.

(3) Provide safe access to the control for operating the low level outlet.

(4) Repair cracked and spalled concrete in the spillway structure.

(5) Repair deteriorated or dislodged riprap on the upstream face of the embankment and at the downstream toe of the spillway.

(6) Repair eroded areas on the embankment of the dam.

b. The following remedial actions should be initiated within twelve months from the date of approval of this report:

(1) Perform additional investigation to determine seepage conditions through and under the dam, the engineering properties of the dam and foundation, and determine whether or not conventional safety margins exist under more severe stress conditions than those observed during the inspection, and what modifications may be required to achieve such safety margins.

(2) Properly remove all trees and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

d. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

Kenneth R. Moser

KENNETH R. MOSER
Major, Corps of Engineers
Acting District Engineer

1 Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

LAKE WINDSOR DAM (NJ00034)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 26 September 1980 by Langan Engineering Associates, Inc., under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Lake Windsor Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition and the spillway is considered adequate. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The following actions should be initiated within six months from the date of approval of this report:

(1) Remove debris which has accumulated in the spillway discharge channel.

(2) Investigate the operating condition of the low level outlet and repair if necessary.

(3) Provide safe access to the control for operating the low level outlet.

(4) Repair cracked and spalled concrete in the spillway structure.

(5) Repair deteriorated or dislodged riprap on the upstream face of the embankment and at the downstream toe of the spillway.

(6) Repair eroded areas on the embankment of the dam.

b. The following remedial actions should be initiated within twelve months from the date of approval of this report:

(1) Perform additional investigation to determine seepage conditions through and under the dam, the engineering properties of the dam and foundation, and determine whether or not conventional safety margins exist under more severe stress conditions than those observed during the inspection, and what modifications may be required to achieve such safety margins.

(2) Properly remove all trees and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

d. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED: Kenneth R. Moser

KENNETH R. MOSER
Major, Corps of Engineers
Acting District Engineer

DATE: 27 May 1981

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NAME OF DAM:	LAKE WINDSOR DAM
ID NUMBER:	FED ID No NJ 00034
STATE LOCATED:	NEW JERSEY
COUNTY LOCATED:	SUSSEX
STREAM:	TRIBUTARY PAPAKATING CREEK
RIVER BASIN:	UPPER HUDSON
DATE OF INSPECTION:	SEPTEMBER 1980

ASSESSMENT OF GENERAL CONDITIONS

Lake Windsor Dam, classified as having significant hazard potential, is in fair overall condition. There is seepage of water and spongy ground at the downstream toe of the embankment and erosion on the embankments. The embankments are covered with thick brush and trees. The riprap on the upstream face and the toe of the spillway is deteriorating and becoming dislodged in areas. Numerous cracks exist in the concrete of the spillway chute. The control of the low level outlet slide gate is not visible and its operating condition is unknown. There is essentially no available information concerning the design, construction and operation of the dam. Additional investigation is necessary to adequately evaluate the future performance of the dam.

The spillway capacity as determined by the Corps of Engineers Screening criteria is adequate.

The following are recommended to be done soon:

Remove debris which has accumulated in the spillway discharge channel. Investigate the operating condition of the low level outlet and repair if necessary. Provide safe access to the control for operating the low level outlet. Repair cracked and spalled concrete in the spillway structure. Repair deteriorated or dislodged riprap on the upstream embankments and at the downstream toe of the spillway. Repair eroded areas on the embankments of the dam. Develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

The following are recommended to be done in the near future:

Perform additional investigation to determine seepage conditions through and under the dam, the engineering properties of the dam and foundation, and determine whether or not conventional safety margins exist under more severe stress conditons than those observed during our inspection, and what modifications may be required to achieve such safety margins. Properly remove all trees and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay.

K. Peter Yu, P.E.

OVERALL VIEW
LAKE WINDSOR DAM

26 September 1980

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NAME OF DAM:	LAKE WINDSOR DAM
ID NUMBER:	FED ID No NJ 00034
STATE LOCATED:	NEW JERSEY
COUNTY LOCATED:	SUSSEX
STREAM:	TRIBUTARY - PAPAKATING CREEK
RIVER BASIN:	UPPER HUDSON
DATE OF INSPECTION:	SEPTEMBER 1980

LANGAN ENGINEERING ASSOCIATES, INC.

Consulting Civil Engineers
990 CLIFTON AVENUE
CLIFTON, NEW JERSEY
201-472-9366

CONTENTS

NATIONAL DAM SAFETY REPORT

LAKE WINDSOR DAM FED ID NO NJ 00034

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

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. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

SECTION 1 PROJECT INFORMATION

1.1 General

Authority to perform the Phase I Safety Inspection of Lake Windsor Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 12 August 1980. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the US Army Engineers District, Philadelphia.

The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to safety of Lake Windsor Dam and appurtenances based upon available data and visual inspection, and determine any need for emergency measures and conclude if additional studies, investigations and analyses are necessary and warranted. The assessment is made using screening criteria established in Recommended Guidelines for Safety Inspection of Dams prepared by the Department of Army, Office of the Chief of Engineers. It is not the purpose of the inspection report to imply that a dam meeting or failing to meet the screening criteria is, per se, certainly adequate or inadequate.

1.2 Description of Project

a. Description of Dam and Appurtenances

Lake Windsor Dam is a 310 ft long, 32 ft high earthfill dam constructed during 1959 and 1960. The downstream embankment slope varies between 2H:1V to 3H:1V. The upstream slope is 3H:1V. The spillway is a 40 ft wide concrete overfall structure with a 3H:1V downstream slope. There is approximately 25 ft of boulder riprap beyond the toe of the spillway. An 18 inch diameter CMP low level outlet exists under the spillway structure. The outlet is controlled by a slide gate on the upstream end of the pipe. The control for the slide gate is reported to exist below pool elevation approximately 80 ft upstream of the spillway.

b. Location

Lake Windsor Dam is located at the northeastern end of Lake Windsor which is adjacent ot Township Roadway off Route 23 in Wantage Township, Sussex County, New Jersey. It is at north latitude 41°10.1' and west longitude 74°38.4'. A regional vicinity map and map of the area are given in Figures 1 & 2.

c. Size Classification

Lake Windsor Dam is classified as "small" based on its maximum storage capacity of 962 ac ft which is more than 50 ac ft and less than 1000 ac ft. The dam is also classified as "small" based on its maximum height of 32 feet which is less than 40 ft. Accordingly, the dam is classified as "small" in size.

d. Hazard Classification

In the National Inventory of Dams, Lake Windsor Dam has been classified as having "High Hazard Potential." Visual inspection of the downstream area shows that breach of the dam would cause little damage to downstream residences which are located on high ground, however it could be hazardous to people utilizing low lying secondary and dirt roads located approximately 3500 ft downstream of the dam. Accordingly, it is proposed to change the Hazard Potential Classification to "Significant".

e. Ownership

Ownership of Lake Windsor Dam is by Windsor Estates, Inc., care of H. F. Mayer, 267 Forest Street, Fort Lee, New Jersey 07025 as reported by the Wantage Township tax assessor.

f. Purpose of Dam

The purpose of the dam is "residential development" as listed on State of New Jersey, Divison of Water Policy and Supply, Report on Dam Application No. 528, filed 26 February 1959.

g. Design and Construction History

Based on available information, the dam was engineered by Willis, Paul & Proctor, Inc. of Branchville, New Jersey. Permit for construction was issued on 29 June 1959. The dam was completed in mid 1960.

h. Normal Operational Procedures

No information has been found pertaining to operational procedures for the dam.

1.3 Pertinent Data

a. Drainage Areas	1.01 sq. mi.
b. Discharge at Damsite	
Maximum known flood at damsite	unknown
Ungated spillway capacity at max. pool elevation	1911 cfs (Assumes top of dam)
Total spillway capacity at max. pool elevation	1911 cfs (Assumes top of dam)
c. Elevation (Plan elevations, arbitrary datum)	
Top Dam	536
Maximum pool-design surcharge	unknown

	Recreation pool	530 (Design flow line)
	Spillway crest	530
	Maximum tailwater	unknown, dry at time of inspection
d.	Reservoir	
	Length of maximum pool	Approx 6200 ft (Assumes top of dam)
	Length of recreation pool	Approx 3100 ft
e.	Storage (acre-feet)	
	Recreation pool	602
	Top of dam	962
f.	Reservoir Surface (acres)	
	Top dam	92.5 @ el 536
	Maximum pool	92.5 (Assumes top of dam)
	Recreation pool	27.5 (Assumes spillway crest)
	Spillway crest	27.5
g.	Dam	
	Type	Earthfill
	Length	310 ft
	Height	32 ft
	Top Width	Approx 16 ft
	Side Slopes	U/S 3H:1V D/S varies between 3H:1V to 2H:1V
	Zoning	None indicated on plans
	Impervious Core	Reported to be compacted clay

	Cutoff	Compacted Clay fill approx 5 ft below base of dam indicated on plans
	Grout curtain	None indicated on plans
h.	Spillway	
	Type	Concrete overflow chute
	Length of weir	40 ft
	Crest elevation	El 530 (Arbitrary Datum)
	Gates	None
	U/S Channel	Concrete Apron
	D/S Channel	Concrete chute, 3H:1V, boulder riprap at toe of chute
i.	Regulating Outlets	18 in dia CMP low level outlet with slide gate

SECTION 2 ENGINEERING DATA

Essentially no information is available concerning the structural design, construction procedures or operational procedures pertaining to Lake Windsor Dam.

Limited information concerning hydrology and hydraulics, and copies of the construction specifications are in the NJ DEP, Division of Water Resources, Dam Application file No. 528, Lake Windsor.

Reports by James C. Riley, Principal Engineer, Hydraulic, New Jersey Division of Water Policy and Supply indicate that the dam was built in accordance with the approved drawings. The available information is inadequate to evaluate the dam.

SECTION 3 VISUAL INSPECTION

Lake Windsor Dam appears to be in fair overall condition. The low point of the crest of the dam is approximately 1 foot lower than the top of the spillway wing walls.

There is seepage of water and spongy ground at the downstream toe on both sides of the toe of the spillway chute. The embankments are vegetated with thick brush and numerous small diameter trees. A large diameter willow tree is growing on the north downstream embankment. There is erosion of the south upstream embankment adjacent to the spillway wing wall. The embankments have numerous areas of minor erosion due to footpaths on both the upstream and downstream faces. The upstream riprap is deteriorating and has become dislodged in areas.

The concrete forming the spillway wing walls has occasional thin cracks and areas of spalling. Many of these cracks have been filled with an epoxy like material. The concrete forming the bottom of the spillway channel has numerous cracks. The riprap at the toe of the spillway has become dislodged in areas and has accumulated soil sedimentation. Small amounts of debris have accumulated at the toe of the spillway at the time of our inspection.

The control to operate the slide gate on the upstream end of the 18 in CMP low level outlet could not be located during inspection. Plans of the dam show the control to be below pool elevation approximately 80 ft upstream of the dam crest in line with the spillway. The discharge of the low level outlet near the downstream end of the spillway discharge channel appears in satisfactory condition. The downstream channel is densely vegetated with trees and brush.

The shoreline of the reservoir is comprised of private yards on the south shore and forested hills on the north shore.

SECTION 4 OPERATIONAL PROCEDURES

No information concerning operational procedures for the dam have been found. No signs of recent maintenance were observed during our inspection. No warning system appears to be in effect.

SECTION 5 HYDRAULICS/HYDROLOGIC

Available information indicates the dam was designed for a 50-year flood with freeboard of 3.9 ft. The pertinent design data is included in Appendix 4.

Water marks on the spillway retaining walls indicate a past maximum water level of about 6 inches above the spillway crest has occurred.

The hydraulic/hydrologic evaluation is based on a Spillway Design Flood (SDF) equal to one-half of the Probable Maximum Flood chosen in accordance with the evaluation guidelines for dams classified as significant hazard and small in size. The PMF has been determined by developing a synthetic hydrograph based on the probable maximum precipitation of 22.0 inches (200 sq. mi. -24 hour). The Corps of Engineers has recommended the use of the SCS triangular unit hydrograph with the curvilinear transformation. Hydrologic computations are presented in Appendix 3. The 1/2 PMF peak inflow determined for the subject watershed is 2052 cfs.

The capacity of the spillway at maximum pool elevation 536 is 1911 cfs which is less than the SDF discharge. Routing for the 1/2 PMF indicates the dam can adequately pass the flood without overtopping.

The present drawdown facility consists of an 18 inch diameter corrugated metal low level outlet pipe with a slide gate at an invert elevation of approximately 506. Its operating condition is presently unknown. Drawdown of the reservoir has been evaluated assuming that the drawdown structure is operable. Our calculations indicate that the lake level could be lowered 6 ft in about 5 days and 24 ft in about 30 days.

SECTION 6 STRUCTURAL STABILITY

Based on visual observations, no immediate instability appears to exist in Lake Windsor Dam under normal conditions. However, there is seepage of water and spongy ground at the downstream toe of embankment. There is erosion on the embankments. Riprap is deteriorating on the upstream face and at the toe of the spillway discharge.

No information is available concerning the engineering properties of the foundation or dam materials. Consequently, analysis of the degree of stability of the dam cannot be made without gross assumptions concerning the properties of these materials.

No information is available concerning operating records or post construction changes of the dam.

Lake Windsor Dam is located in Seismic Zone 1 of the Seismic Zone Map of Contiguous States. As no information is available concerning the engineering properties of the foundation and dam materials, the degree of stability of the dam and appurtenances under more severe stress conditions than normal and its future performance cannot be evaluated without further investigation.

SECTION 7 ASSESSMENT, RECOMMENDATION/REMEDIAL MEASURES

7.1 Dam Assessment

Lake Windsor Dam is in fair overall condition. There is seepage of water and spongy ground at the downstream toe of the embankment and erosion on the embankments. The embankments are covered with thick brush and trees. The riprap on the upstream face and the toe of the spillway is deteriorating and becoming dislodged in areas. Numerous cracks exist in the concrete of the spillway chute. The control of the low level outlet slide gate is not visible and its operating condition is unknown.

There is essentially no available information concerning the design, construction and operation of the dam. Additional investigation is necessary to adequatley evaluate the future performance of the dam.

The spillway capacity as determined by the Corps of Engineers Screening criteria is adequate.

7.2 Recommendations/Remedial Measures

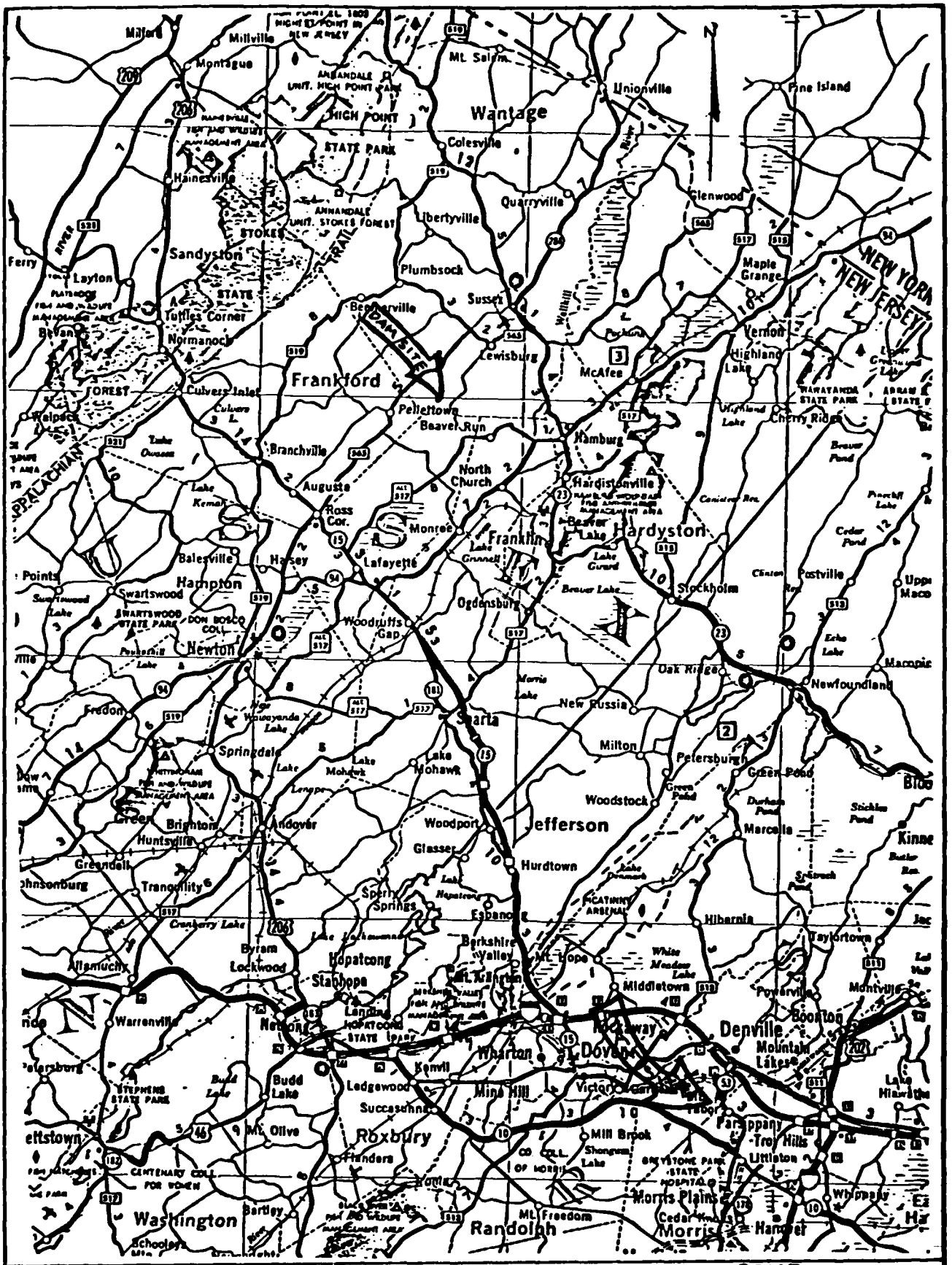
The following are recommended to be done soon:

1. Remove debris which has accumulated in the spillway discharge channel.
2. Investigate the operating condition of the low level outlet and repair if necessary.
3. Provide safe access to the control for operating the low level outlet.
4. Repair cracked and spalled concrete in the spillway structure.
5. Repair deteriorated or dislodged riprap on the upstream embankments and at the downstream toe of the spillway.
6. Repair eroded areas on the embankments of the dam.
7. Develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

The following are recommended to be done in the near future:

1. Perform additional investigation to determine seepage conditions through and under the dam, the engineering properties of the dam and foundation, and determine whether or not conventional safety margins exist under more severe stress conditions than those observed during our inspection, and what modifications may be required to achieve such safety margins.
2. Properly remove all trees and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay.

FIGURES



BY _____ DATE _____ REGIONAL VICINITY MAP JOB NO. 80145

CKD. _____ DATE _____ LAKE WINDSOR FIG. 1

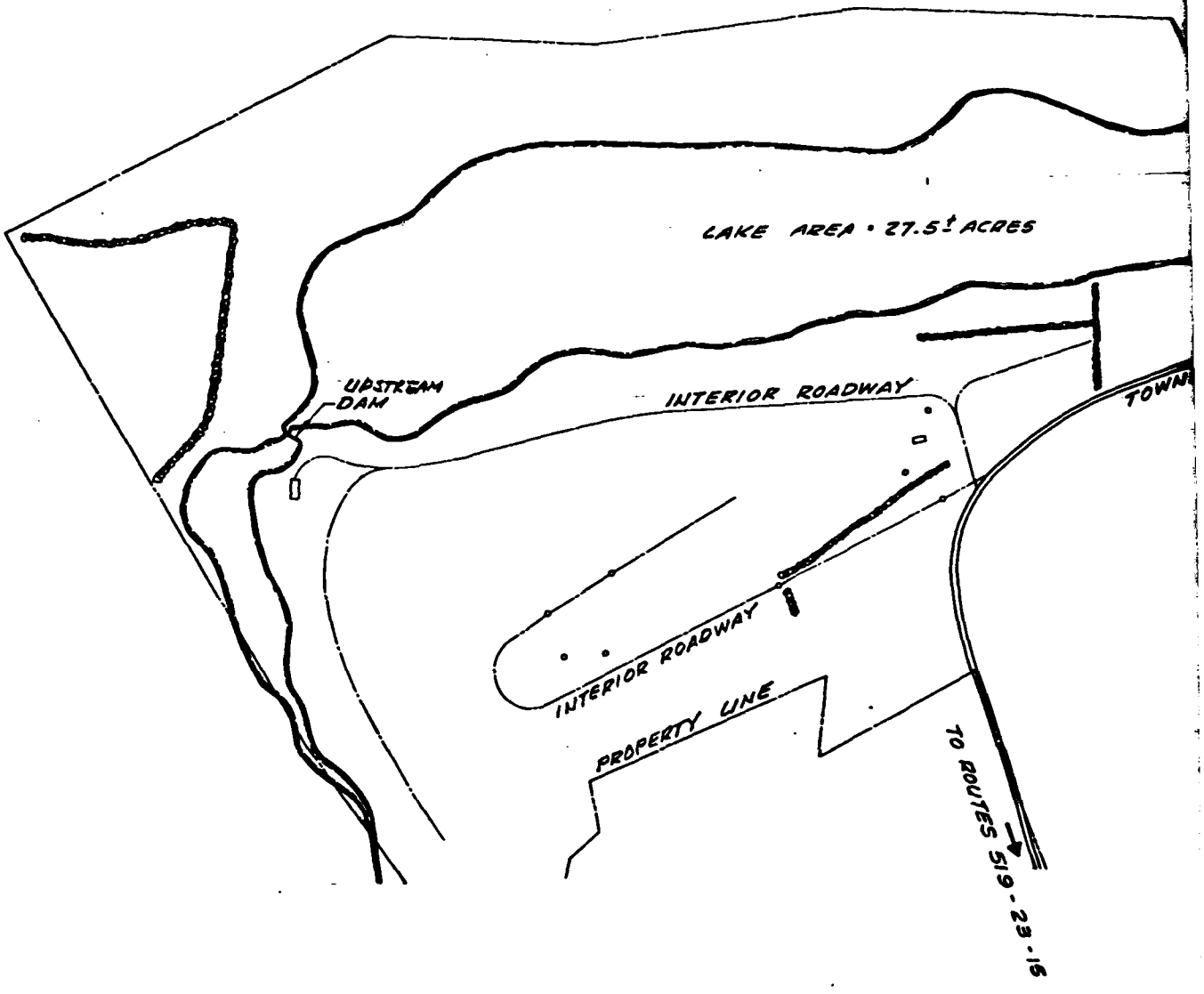
SCALE: 1" = 5 MILES

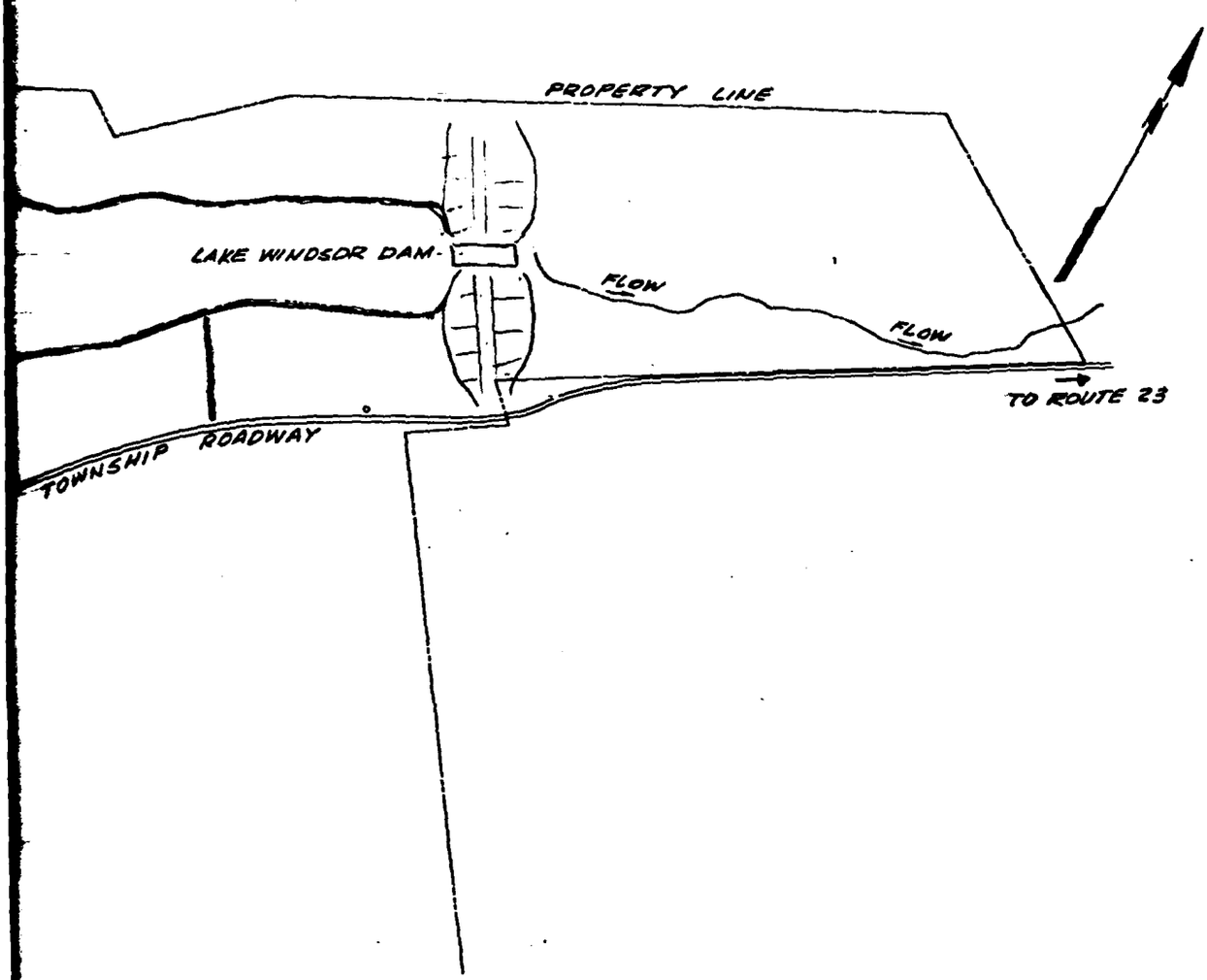
BY RWG DATE _____ MAP of AREA JOB NO. 80145

MAP SOURCE: USGS, BRANCHVILLE, LAKE WINDSOR DAM

FIG. 2

SCALE 1" = 2000 ft.


LAKE AREA • 27.5± ACRES
UPSTREAM DAM
INTERIOR ROADWAY
INTERIOR ROADWAY
PROPERTY LINE
TO ROUTES 519 - 23 - 15



NOTE:
1. SKETCHES AND DATA ADAPTED FROM DRAWING "PROPOSED LAKE SITE" BY WILLIS CONSTRUCTION, BRANCHVILLE, NEW JERSEY, DATED JAN. 20, 1959

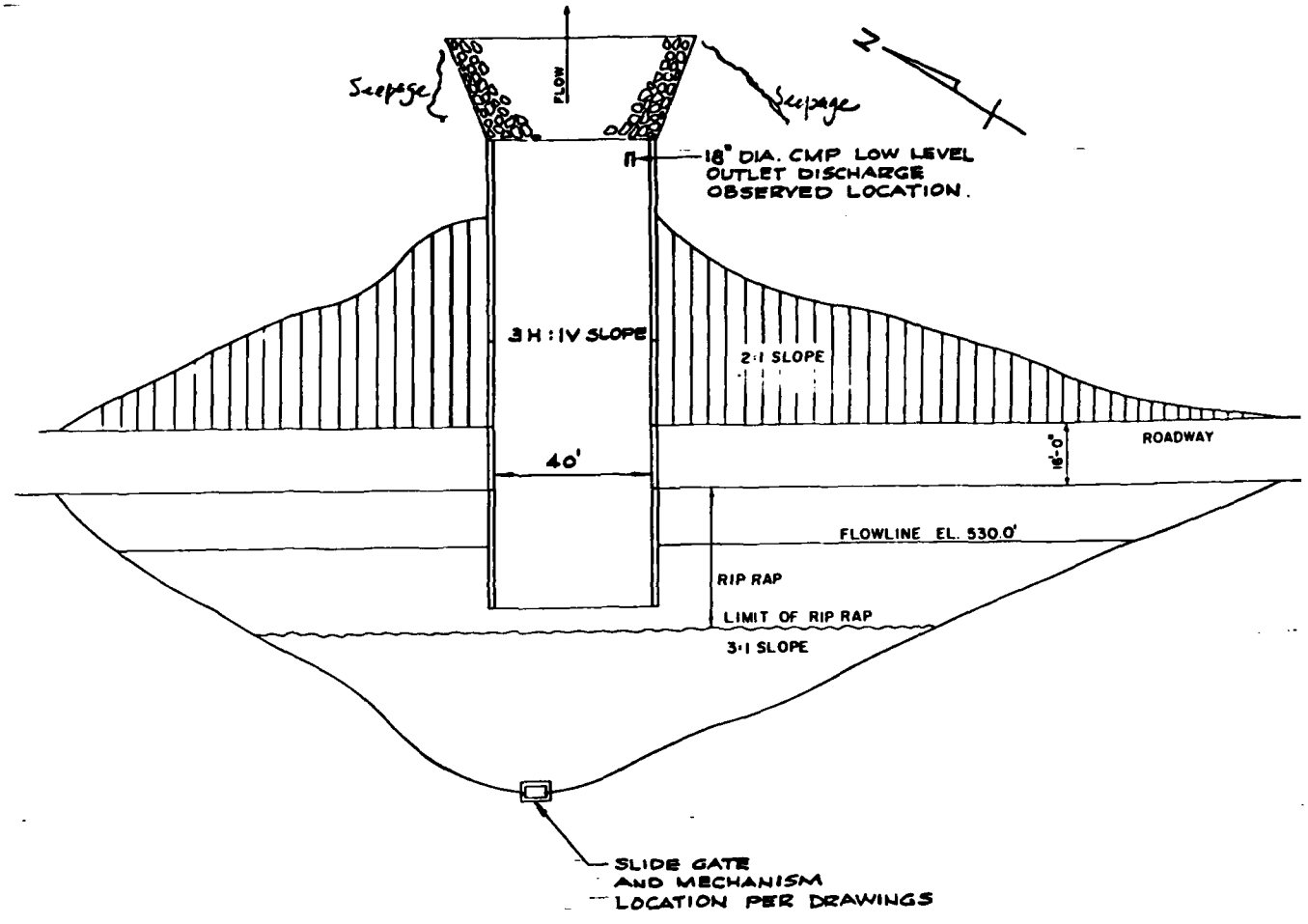
DAM SITE PLAN
LAKE WINDSOR DAM

WANTAGE TOWNSHIP SUSSEX COUNTY, N.J.

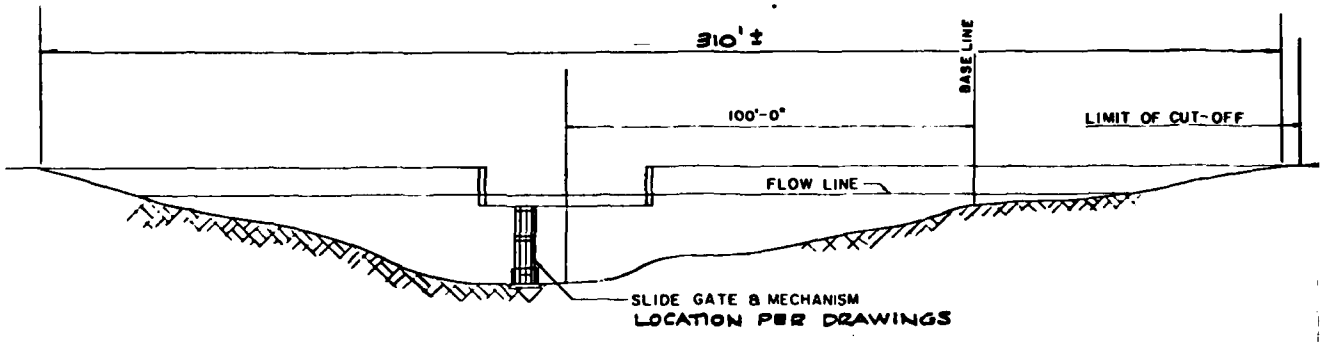
LANGAN ENGINEERING ASSOCIATES, INC.

990 CLIFTON AVENUE CLIFTON, N.J. 07013

DRN. BY: R.D.	SCALE: N.T.S.	JOB No. 80145
CK'D. BY: V.U.	DATE: 9-26-80	FIG. No. 3



PLAN VIEW



UPSTREAM ELEVATION

NOTE:

1. SKETCHES AND DATA ADAPTED FROM DRAWING No. LW-1, REV. 1, "LAKE WINDSOR - PROPOSED DAM", BY WILLIS, PAUL AND DOCTOR, INC., BRANCHVILLE, NEW JERSEY, DATED MAY 28, 1959
2. LOW POINT OF TOP OF DAM IS ABOUT 1 FT LOWER THAN TOP OF SPILLWAY WING WALL FROM INSPECTION.

PLAN AND ELEVATION

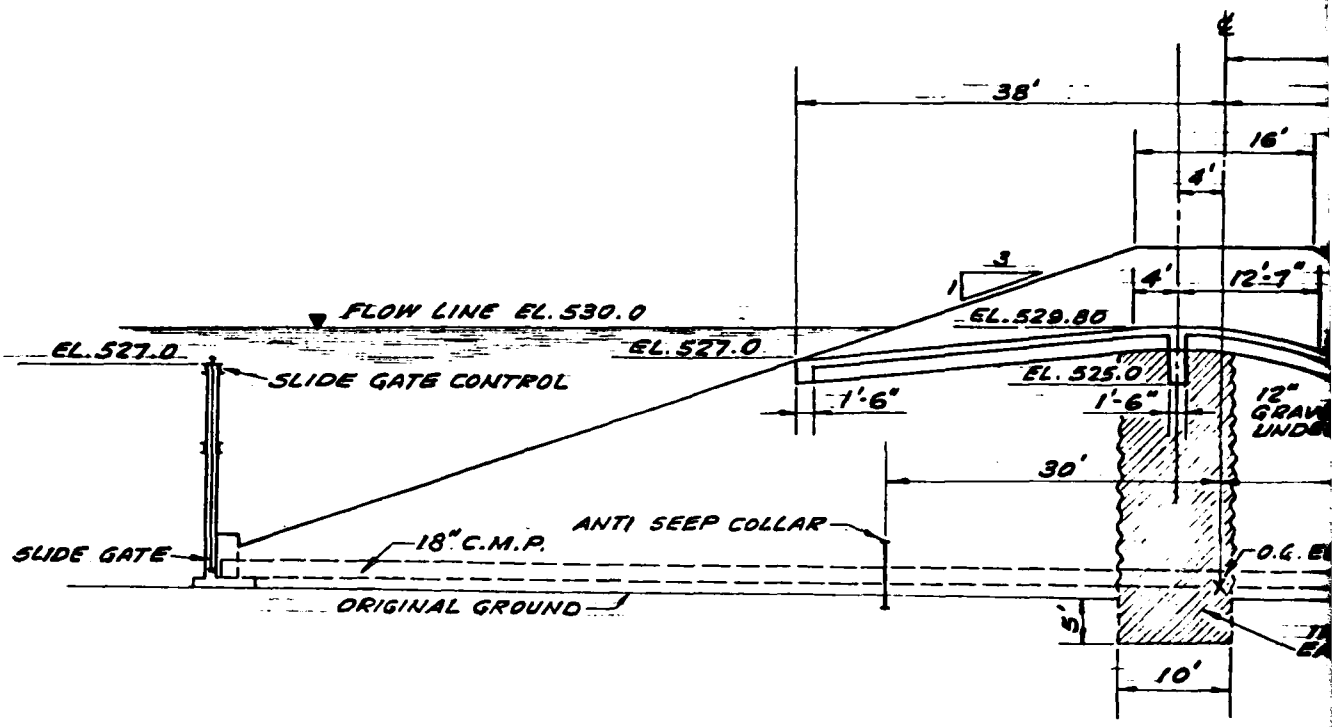
LAKE WINDSOR DAM

WANTAGE TOWNSHIP SUSSEX COUNTY, N.J.

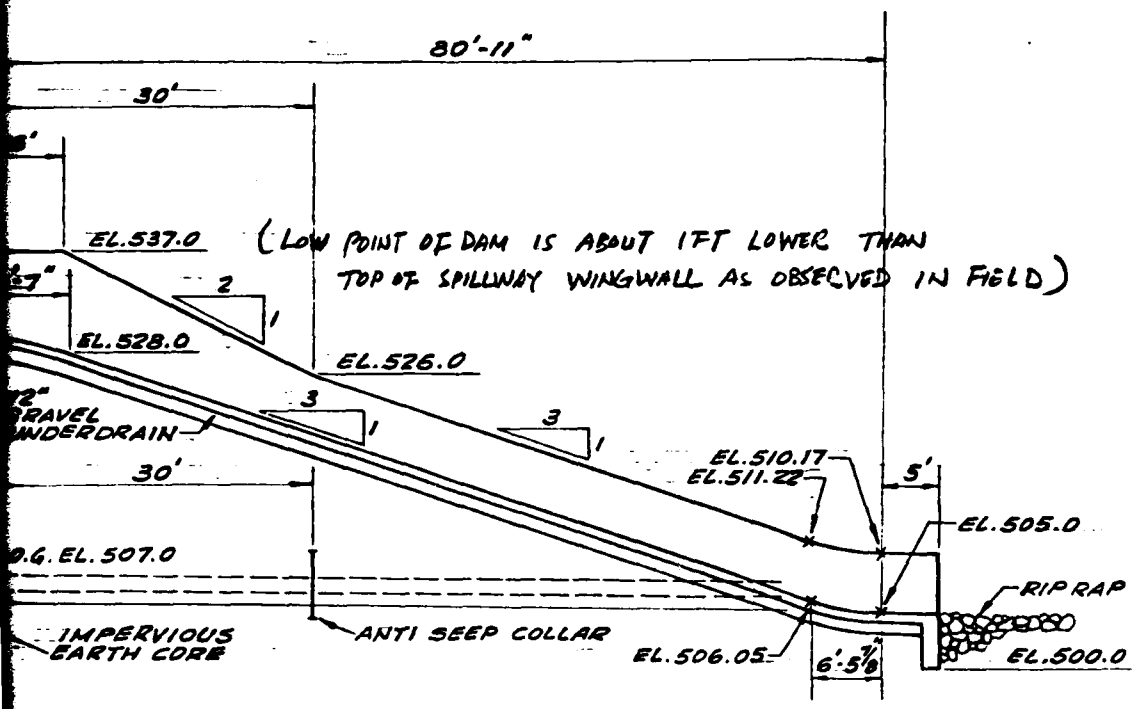
LANGAN ENGINEERING ASSOCIATES, INC.

990 CLIFTON AVENUE CLIFTON, N.J. 07013

DRN. BY: S.S.	SCALE: N.T.S.	JOB No. 80145
CK'D. BY: V.U.	DATE: 9-25-80	FIG. No. 4


38'
16'
4'
3
1
4'
12'-7"
FLOW LINE EL. 530.0
EL. 529.80
EL. 527.0
EL. 527.0
SLIDE GATE CONTROL
EL. 525.0
1'-6"
1'-6"
12" GRAV
UNDO
30'
ANTI SEEP COLLAR
SLIDE GATE
18" C.M.P.
O.G. EL
ORIGINAL GROUND
5'
10'

SECTION



ON

NOTE:
SKETCHES AND DATA ADAPTED FROM DRAWING No. LW-2, REV. 1, "LAYOUT OF DAM AND SPILLWAY" BY WILLIS, PAUL AND PROCTOR, INC., BRANCHVILLE, NEW JERSEY, DATED MAY 26, 1959.

SECTION THRU DAM
LAKE WINDSOR DAM
WANTAGE TOWNSHIP SUSSEX COUNTY, N.J.

LANGAN ENGINEERING ASSOCIATES, INC.
990 CLIFTON AVENUE CLIFTON, N.J. 07013

2

DRN. BY: R.D.	SCALE: N.T.S.	JOB No. 80145
CK'D. BY: V.U.	DATE: 9-26-80	FIG. No. 5

APPENDIX 1

CHECK LIST - HYDROLOGIC AND HYDRAULIC DATA

CHECK LIST - VISUAL INSPECTION

CHECK LIST - ENGINEERING DATA

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.01 sq. mi., avg slope 3.3%, wood or forest land

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 530 (602.4 ac ft)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 536 (962 ac ft) (Assumes top of dam)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: Approx 536 (lowest point on crest of dam)

CREST: Spillway

a. Elevation 530
b. Type Concrete overfall chute
c. Width 16 ft - 7 in (pt to pt)
d. Length 40 ft
e. Location Spillover Approx center of dam
f. Number and Type of Gates None

OUTLET WORKS:

a. Type 18" CMP with slide gate
b. Location Aligned under spillway
c. Entrance inverts Approx 506
d. Exit inverts Same
e. Emergency draindown facilities

HYDROMETEOROLOGICAL GAGES: None known

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 1911 cfs (maximum spillway discharge)

Note: Elevations taken from dam drawings prepared by Willis, Paul & Proctor, Inc.,1959

Check List
Visual Inspection
Phase 1

Name Dam Lake Windsor Dam County Sussex State N. J. Coordinators NJ DEP

Date(s) Inspection 9/26/80 Weather Clear Temperature High 60's F

Pool Elevation at Time of Inspection 529.7 Plan Datum ~~NGVD~~. Tailwater at Time of Inspection Approx 505 Plan Datum ~~NGVD~~

Water not flowing.

Inspection Personnel:

Richard Greene 9/26/80

Val Urban 9/26/80

Peter Yu 9/26/80

Richard Greene Recorder

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	NONE VISIBLE	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	NONE VISIBLE	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	MODERATE EROSION ON UPSTREAM SOUTH EMBANKMENT NEXT TO SPILLWAY RETAINING WALL. MANY FOOT PATHS WITH MINOR EROSION ON BOTH EMBANKMENTS.	REPAIR EROSION.
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	NO MISALINEMENT OBSERVED.	
RIPRAP FAILURES	UPSTREAM - DETERIORATION & MINOR DISLODGEMENT OF RIPRAP. DOWNSTREAM - SPILLWAY RIPRAP HAS ACCUMULATED SEDIMENTATION AND THERE IS SOME DISLODGEMENT OF STONE.	REPAIR DISLODGED RIPRAP.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
	EMBANKMENT BRUSH COVERED WITH NUMEROUS SMALL DIAMETER TREES. LARGE DIAMETER WILLOW TREE ON NORTH EMBANKMENT.	REMOVE BRUSH AND TREES.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	NO APPARENT DEFICIENCY.	
ANY NOTICEABLE SEEPAGE	AT DOWNSTREAM TOE OF EMBANKMENT, APPROX 25 FT NORTH AND SOUTH OF TOE OF SPILLWAY. SEEPAGE OF WATER AND SPONGY GROUND.	INVESTIGATE SOURCE OF SEEPAGE AND PROVIDE REMEDIAL MEASURES IF NECESSARY.
STAFF GAGE AND RECORDER	NONE OBSERVED.	
DRAINS	NONE OBSERVED.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	MINOR SPALLING OF CONCRETE. NUMEROUS CRACKS IN CONCRETE SPILLWAY CHUTE.	REPAIR CRACKS.
APPROACH CHANNEL	PERPENDICULAR TO SPILLWAY. UNOBSTRUCTED.	
DISCHARGE CHANNEL	PERPENDICULAR TO SPILLWAY. CONCRETE LINED. UNOBSTRUCTED EXCEPT FOR MINOR ACCUMULATION OF DEBRIS AT TOE OF SPILLWAY. NUMEROUS CRACKS IN CONCRETE.	REPAIR CRACKS. REMOVE DEBRIS.
BRIDGE AND PIERS	NONE.	NOTCHED WING WALL APPEARS TO BE FOR FUTURE USE AS BRIDGE PIERS.
	CONCRETE WING WALLS HAVE OCCASIONAL CRACKS AND MINOR SPALLING - MANY CRACKS PATCHED WITH EPOXY LIKE MATERIAL.	REPAIR OPEN CRACKS.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	CONDUIT NOT OBSERVED.	CANNOT LOCATE CONTROLS.
INTAKE STRUCTURE	BELOW POOL SURFACE	CONDITION UNKNOWN.
OUTLET STRUCTURE	NO APPARENT DEFICIENCY	APPEARS SATISFACTORY.
OUTLET CHANNEL	SPILLWAY DISCHARGE CHANNEL. MINOR ACCUMULATION OF DEBRIS. SOME DISLODGEMENT OF RIPRAP.	REMOVE DEBRIS. REPAIR RIPRAP.
EMERGENCY GATE	NONE OBSERVED.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	NORTH BANK, APPROX 3 or 4H:1V, DENSE TREES AND BRUSH. SOUTH BANK, APPROX 5 TO 8H:1V, TREES AND LAWNS.	
SEDIMENTATION	WATER CLOUDY- COULD NOT SEE LAKE BOTTOM. THERE APPEARS TO BE SOME SEDIMENTATION BASED ON CLOUDY WATER CONDITIONS FOLLOWING PREVIOUS NIGHT'S RAIN.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	SOFT SWAMPY GROUND. THICKLY VEGETATED STREAM BOTTOM. RIPRAP FOR APPROX 25 FT BEYOND END OF SPILLWAY. NO WATER MOVING. RIPRAP DISLODGED IN AREAS.	REPAIR RIPRAP.
SLOPES	VARIABLE, DENSE TREES AND BRUSH. APPROX 4 TO 8H:1V SIDE SLOPES.	
APPROXIMATE NO. OF HOMES AND POPULATION	NONE VISIBLE IMMEDIATELY DOWNSTREAM.	

CHECK LIST
-ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS	
PLAN OF DAM	LAKE WINDSOR - LAYOUT OF DAM AND SPILLWAY BY WILLIS, PAUL AND PROCTOR, INC. DATED JUNE 17, 1959	Source: NJ DEP Dam Application File No. 528
REGIONAL VICINITY MAP	See Fig. 1 & 2	
CONSTRUCTION HISTORY	INFORMATION NOT AVAILABLE	
TYPICAL SECTIONS OF DAM	LAKE WINDSOR - LAYOUT OF DAM AND SPILLWAY BY WILLIS, PAUL AND PROCTOR, INC. DATED JUNE 17, 1959	SOURCE: NJ DEP DAM APPLICATION FILE NO. 528
HYDROLOGIC/HYDRAULIC DATA	NJ DEP DAM APPLICATION NO. 528	
OUTLETS - PLAN		
- DETAILS **-CONSTRAINTS** **-DISCHARGE RATINGS**	LAKE WINDSOR - LAYOUT OF DAM AND SPILLWAY BY WILLIS, PAUL AND PROCTOR, INC. DATED JUNE 17, 1959	SOURCE: NJ DEP DAM APPLICATION FILE NO. 528
RAINFALL/RESERVOIR RECORDS	INFORMATION NOT AVAILABLE	

ITEM	REMARKS
DESIGN REPORTS	INFORMATION NOT AVAILABLE
GEOLOGY REPORTS	INFORMATION NOT AVAILABLE
DESIGN COMPUTATIONS	
HYDROLOGY & HYDRAULICS	SOURCE: NJ DEP DAM APPLICATION FILE NO. 528
DAM STABILITY	INFORMATION NOT AVAILABLE
SEEPAGE STUDIES	INFORMATION NOT AVAILABLE
MATERIALS INVESTIGATIONS	
BORING RECORDS	
LABORATORY	INFORMATION NOT AVAILABLE
FIELD	
POST-CONSTRUCTION SURVEYS OF DAM	INFORMATION NOT AVAILABLE
BORROW SOURCES.	INFORMATION NOT AVAILABLE

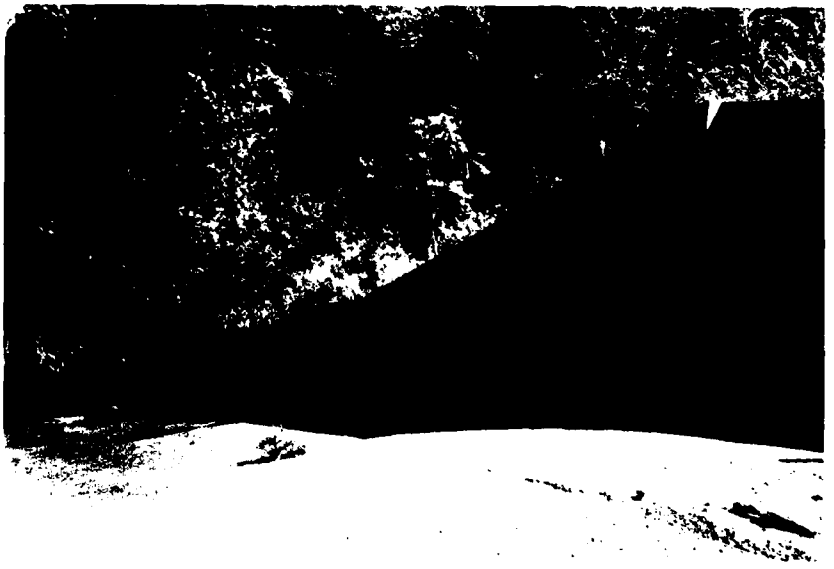
ITEM	REMARKS
MONITORING SYSTEMS	NONE OBSERVED
MODIFICATIONS	NONE OBSERVED
HIGH POOL RECORDS	INFORMATION NOT AVAILABLE
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	INFORMATION NOT AVAILABLE
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	NONE REPORTED
MAINTENANCE OPERATION RECORDS	INFORMATION NOT AVAILABLE

ITEM	REMARKS	
SPILLWAY PLAN SECTIONS DETAILS	LAKE WINDSOR - LAYOUT OF DAM AND SPILLWAY BY WILLIS, PAUL AND PROCTOR, INC. DATED JUNE 17, 1959	SOURCE: NJ DEP DAM APPLICATION FILE NO. 528
OPERATING EQUIPMENT PLANS & DETAILS	LAKE WINDSOR - LAYOUT OF DAM AND SPILLWAY BY WILLIS, PAUL AND PROCTOR, INC. DATED JUNE 17, 1959	SOURCE: NJ DEP DAM APPLICATION FILE NO. 528

APPENDIX 2

PHOTOGRAPHS

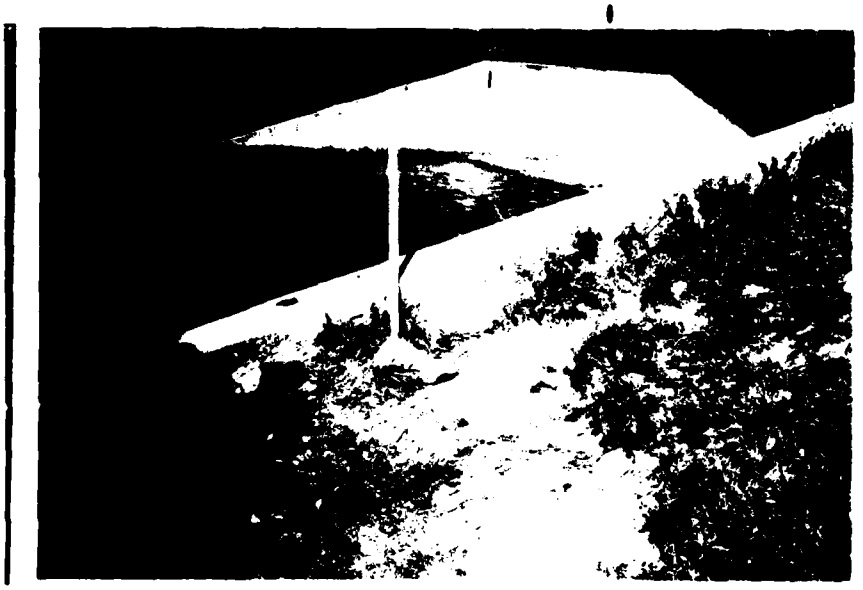
North spillway discharge wing wall. 26 September 1980



South spillway discharge wing wall. 26 September 1980

View of north spillway wing wall and spillway crest. 26 September 1980

View of south spillway wing wall, spillway crest and south embankment. 26 September 1980



Erosion and deterioration of riprap at south upstream embankment and spillway wing wall. 26 September 1980

Erosion and deterioration of riprap at south upstream embankment and spillway wing wall 26 September 1980

Spillway discharge channel and downstream channel viewed from spillway crest.

26 September 198

Reservoir area viewed from spillway crest.

26 September 1980

APPENDIX 3

HYDROLOGICAL COMPUTATIONS

LANGAN ENGINEERING ASSOCIATES, INC.

HYDROLOGICAL COMPUTATIONS
LAKE WINDSOR DAM

A. Location: Sussex County, N.J., Papakating Creek

B. Drainage Area: 1.01 sq.mi (645 acres)

C. Lake Area: 27.5 acres ±

D. Classification: Size - small
Hazard - SIGNIFICANT

E. Spillway Design Flood: 1/2 PMF

F. PMP:

1. Dam located in Zone 1 (Near boundary to Zone 6)
PMP = 22.0 inches (for 200 sq.mi, 24hr, "all season envelope")*

2. PMF must be adjusted by a factor of 0.8** to account for the basin size being < 10 sq. mi

	% Factor (for 10 sq. mi.)		
Duration, hr	Zone 6	Zone 1	Avg
0-6	112	111	112
0-12	123	123	123
0-24	132	133	133
0-48	142	142	142

* HMR #33

** from pg 48 "Design of Small Dams"

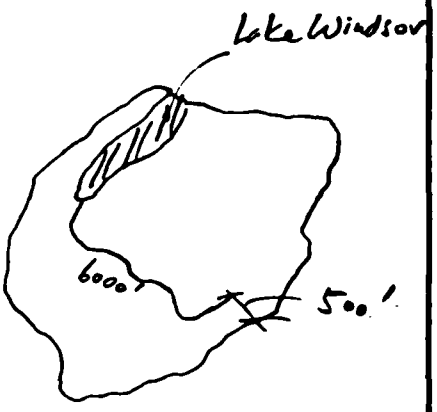
BY VAU DATE ____ Lake Windsor Dam JOB NO. 80145

CKD. DJ DATE 3/23/81 SHEET NO. 1 OF ____

LANGAN ENGINEERING ASSOCIATES, INC.

G. DETERMINE TIME OF CONCENTRATION

Majority area of watershed is wood land.
Longest waterconrse is about 6000 ft stream & 100 ft overland flow



Estimated slope :

Overland : $\frac{16'}{500} = 32\%$

Stream = $\frac{35}{6000} = 0.6\%$

1. Estimate Tc based on average velocity and length

	slope	velocity	remarks
overland flow	32%	1.5 f/s	wooded
Stream	0.6%	1.5 f/s	waterway

$$T_c = \left[\frac{6500}{1.5}\right] \div 3600 = 1.2 \text{ hrs}$$

2. Estimate Tc from curve number method

From Table 2-2. SCS TR-55, Take CN = 74

$$S = \frac{1000}{CN} - 10 = \frac{1000}{74} - 10 = 3.51$$

$$\text{Average slope} = \left(\frac{32 \times 500 + 0.6 \times 6000}{6500}\right)\% = 3\%$$

BY Ty DATE 3/23/81 Lake Windsor Dam JOB NO. 80145
CKD RWO DATE 3/27/81 SHEET NO. 2 OF

LANGAN ENGINEERING ASSOCIATES, INC.

Lag time $L = \frac{\ell^{0.8}(S+1)^{0.7}}{1900(Y)^{0.5}}$ Eq 3-2 TR-55

$= \frac{6500^{0.8}(4.51)^{0.7}}{1900(3)^{0.5}}$

$= 0.98$ hr.

$T_c = \frac{L}{0.6} = \frac{0.98}{0.6} = 1.6$ hrs.

Use Avg. T_c of 1.4 hrs,

$\therefore \boxed{L = 0.84 \text{ hrs}}$

BY Dyp DATE 3/23/81 Lake Windsor Dam JOB NO. 80145

CKD RWG DATE 3/27/81 SHEET NO. 3 OF

LANGAN ENGINEERING ASSOCIATES, INC.

SPILLWAY CAPACITY

The spillway is a weir of trapezoidal cross section with both faces inclined. Its center line is located approximately 180 ft North of the south abutment and is made of reinforced concrete. The weir has an upstream slope of approx 11 horizontal to 1 vertical. The width of the weir (from PT to PT of the curved crest) is 16'-7". The downstream slope is 3 horizontal to 1 vertical. The flow discharges into a riprapped portion of channel approximately 25 ft in length.

The dam is an earth embankment type with upstream slopes 3H:1V and downstream slopes variable between 3H:1V to 2H:1V. It has a 16 ft crest width

BY YAW DATE 9-24-80 Lk. Windsor JOB NO. 80145

CKD PJ DATE 3/23/81 SHEET NO. 4 OF

LANGAN ENGINEERING ASSOCIATES, INC.

All weir calculations will be based on the equation $Q = CLH^{3/2}$ with weir coefficients extracted from original design calculations by S.A. Willis (26 Feb. 1959)

SEE FIGS 4 & 5 FOR DAM PLANS SECTIONS & ELEVATIONS

BY VLL DATE 2-19-80 Lake Windsor JOB NO. 80195

CKD JMJ DATE 3/13/81 SHEET NO. 5 OF

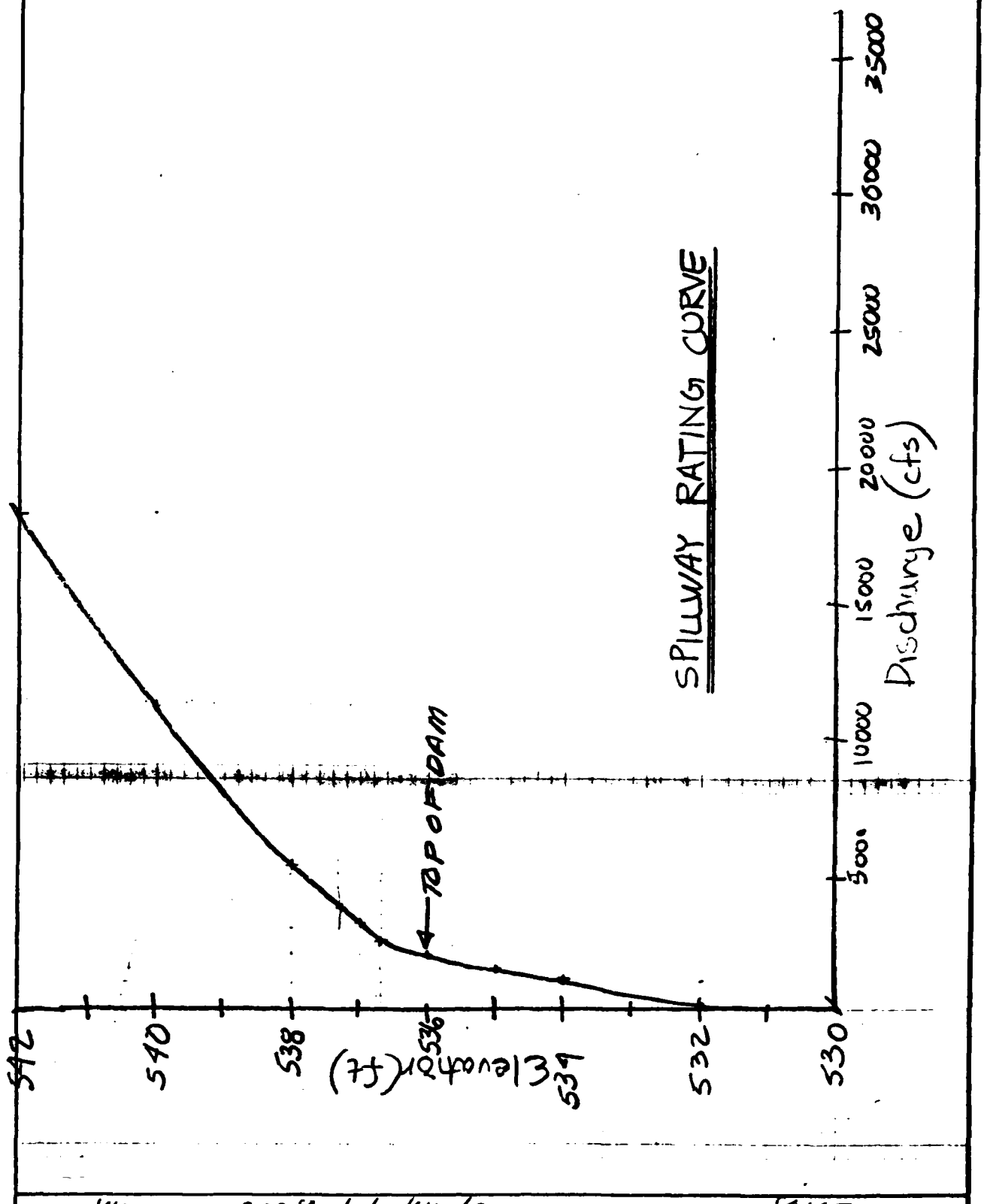
LANGAN ENGINEERING ASSOCIATES, INC.

Elev (ft)	SPILLWAY L=40' w=16'-7" H (ft)	c	Q (cfs)	EMBANKMENT w=16'± H	C	L	Q	ΣQ (cfs)
530	0	3.25	0					0
532	2	↓	368					368
534	4	↓	1040					1040
535	5	↓	1453					1453
536	6	↓	1911	0	3.25	0	1911	1911
536.1	6.1	↓	1959	.1	↓	21	2	1961
536.2	6.2	↓	2007	.2	↓	34	10	2017
536.3	6.3	↓	2056	.3	↓	54	29	2085
536.5	6.5	↓	2154	.5	↓	104	120	2274
536.7	6.7	↓	2255	.7	↓	166	316	2571
537	7	↓	2408	1	↓	210	683	3091
537.3	7.3	3.25	2564	1.3	3.25	270	1301	3865
538	8		2942	2		270	2482	5424
540	10		4111	4		270	7020	11131
542	12		5404	6		270	12897	18301
544	14		6810	8		270	19856	26666
546	16		8320	10		270	27749	36069

BY: M DATE: 9-30-80 Lake Windsor JOB NO. 80145

CKD: PZ DATE: 3/23/81 Spwy Capacity SHEET NO. 6 OF ____

LANGAN ENGINEERING ASSOCIATES, INC.



BY VLL DATE 9-29-80 Lake Windsor JOB NO. 80145

CKD [illegible] DATE 3/23/81 SHEET NO. 7 OF

LANGAN ENGINEERING ASSOCIATES, INC.

RESERVOIR STORAGE CAPACITY

Area of lake at Elev. 530 & Elev 540 were measured planimetrically to areas of 27.5 acres & 135.9 acres respectively.

Assuming a linear distribution of area over 10 ft of vertical elevation we derive an increment area of:

$$\frac{135.9\,ac - 27.5\,ac}{10\,ft} = 10.84\,ac./ft$$

Elev. (ft.)	SURFACE AREA of LAKE (AC.)
530	27.5
531	38.34
532	49.18
533	60.02
534	70.86
535	81.70
536	92.54
537	103.38
538	114.22
539	125.06
540	135.90
542	157.58

Storage capacity vs. elevation will be calculated by HEC-1

BY M DATE 9/24/80 Lake Windsor JOB NO. 80195

CKD. [illegible] DATE 3/23/84 SHEET NO. 8 OF

LANGAN ENGINEERING ASSOCIATES, INC.

SUMMARY OF HYDROGRAPH AND FLOOD ROUTING

1) Hydrograph & routing calculated using HEC-1.

2) PMF for LAKE WINDSOR is 2052 cfs (routed to 1111 cfs).

3) Routing of ½ PMF indicates the dam can adequately pass the flood without overtopping.

BY RM DATE ____ HEC-1 Summary JOB NO. 80145

CKD. [illegible] DATE 3/23/81 SHEET NO. 9 OF ____

LANGAN ENGINEERING ASSOCIATES, INC.

DRAWDOWN ANALYSIS

Structure

There presently exists an 18" Corrugated metal pipe low level outlet structure. The outflow is controlled by a slide gate. The operating condition is unknown.

Capacity

Pipe diam = 18" Invert = 506.05
Length = 164' Area = 1.77 ft²
Flow will be calculated using $Q = C_p H^{1/2}$
where $C_p = A_p \sqrt{\frac{2g}{1+k_m+k_p L}}$

$A_p = 1.77$, $k_m = .90$, k_p (for $n = .025$) $= .0674$

$\therefore C_p = 3.95$

$Q = 3.95 H^{1/2}$

ℓ elev. = 506.8 / 506.8

Elev ft	Head ft	Q cfs	Elev ft	Head ft	Q cfs
530	23.2	19	516	9.2	12
528	21.2	18	514	7.2	10.6
526	19.2	17	512	5.2	9
524	17.2	16	510	3.2	7
522	15.2	15	508	1.2	4
520	13.2	14	506	0	0
518	11.2	13			

BY MW DATE 9-29-80 Lake Windsor JOB NO. 80145
CKD RJ DATE 3/23/81 SHEET NO. 10 OF

LANGAN ENGINEERING ASSOCIATES, INC.

STORAGE

Storage will be calculated using the method of equivalent squares for sideslopes of 2H to 1V. and an area at elevation 530 of 27.5 acres

Elev. (ft)	Equiv square (ft)	Area (ac)	Δh	increment volume ac ft	Volume ac ft
530	1094.48	27.5			
			2	54.6	602.4
528	1086.48	27.1			
			2	53.8	547.8
526	1078.48	26.7			
			2	53.0	494.0
524	1070.48	26.3			
			2	52.2	441.0
522	1062.48	25.9			
			2	51.4	388.8
520	1054.48	25.5			
			2	50.6	337.4
518	1046.48	25.1			
			2	49.8	286.8
516	1038.48	24.7			
			2	49.1	237
514	1030.48	24.4			
			2	48.4	187.9
512	1022.48	24.0			
			2	47.6	139.5
510	1014.48	23.6			
			2	46.9	91.9
508	1006.48	23.3			
			1.95	45.0	45
506.05	998.68	22.9			

BY VK DATE 9-29-81 Lake Windsor JOB NO. 80125

CKD MJ DATE 3/3/81 drawdown SHEET NO. 11 OF

LANGAN ENGINEERING ASSOCIATES, INC.

Elevation (ft)	Qout (cfs)	Qavg (cfs)	Qnet* (cfs)	Volume ac ft	ΔTime (hr)	Σ Time (hr)	Σ Time (days)
530	19						
		18.5	16.5	54.6	40	40	1.7
528	18						
		17.5	15.5	53.8	42	82	3.4
526	17						
		16.5	14.5	53.0	44.2	126.2	5.3
524	16						
		15.5	13.5	52.2	46.8	173.0	7.2
522	15						
		14.5	12.5	51.4	49.7	222.7	9.3
520	14						
		13.5	11.5	50.6	53.2	275.9	11.5
518	13						
		12.5	10.5	49.8	57.4	333.3	13.9
516	12						
		11.3	9.3	49.1	63.9	397.2	16.6
514	10.6						
		9.8	7.8	48.4	75.1	472.3	19.7
512	9						
		8	6	47.6	96	568.3	23.7
510	7						
		5.5	3.5	46.9	162.1	730	30.4
508	4						
		2	0	45.0	— **		
506.05	0						

* $Q_{net} = Q_{avg} - Q_{in}$ where Q_{in} = 2cfs/sqmi × 1.01 sq mi = 2cfs

** where $Q_{in} > Q_{avg}$, not considered

Lake can be lowered 24 feet in 30 days±.

BY: [illegible] DATE: 9-29-80 Lake Windsor JOB NO. 80145

CKD. [illegible] DATE: 3/23/81 drawdown SHEET NO. 12 OF 12

DRAINAGE BASIN LAKE WINDSOR DAM	LIAP SOURCE: USGS BRANCHVILLE, Scale: 1"=2000'	PROJ. NO 8045 SHEET ____ OF ____

LANGAN ENGINEERING ASSOCIATES, INC.

HEC-1 OUTPUTS

WINDSOR LAKE DAM

```
1A1             LAKE WINDSOR DAM (00034)
 A2             INFLOW HYDROGRAPHY AND ROUTING
 A3             N.J. DAM INSPECTION
 B    290       0      10       0       0       0       0       0       0       0
 B1     5
 J      1       1       1
 J1    .5
 K      0       1                                       1
 K1 COMPUTE HYDROGRAPH
 M      1       2    1.01                             .80
 P      0    22.0     112     123     133     142
 T                                                      1     .15
 W2          0.84
 X     -2               1
 K      1       2                                       1
 K1 ROUTING COMPUTATIONS
 Y                              1
 Y1     1                                                      -1
 Y4   530     532     534     535     536   536.1   536.2   536.3   536.5   536.7
 Y4   537   537.3     538     540     542     544     546
 Y5     0     368    1040    1453    1911    1961    2017    2085    2274    2571
 Y5  3091    3865    5424   11131   18301   26666   36069
 $A  27.5   38.34   49.18   60.02   70.86   81.70   92.54  103.38  114.22  125.06
 $A 135.9  157.58
 $E   530     531     532     533     534     535     536     537     538     539
 $E   540     542
 $$   530
 $D   536
 K     99
 A
 A
 A
 A
 A
1         81/04/06. 16.07.03.     NOS 1.3 - L485.        EL4V3KU     STANDARD        MCAUTO - CYBER 175-3 1007.

                                 EEEEEEEEEEEE NN        NN DDDDDDDDDD
                                 EEEEEEEEEEEE NN        NN DDDDDDDDDDD
                                 EE           NNN       NN DD       DDD
                                 EE           NNN       NN DD        DD
                                 EE           NNNN      NN DD        DD
                                 EE           NN NN     NN DD        DD
                                 EE           NN  NN    NN DD        DD
                                 EEEEEEEEEEEE NN   NN   NN DD        DD
                                 EEEEEEEEEEEE NN    NN  NN DD        DD
                                 EE           NN     NN NN DD        DD
                                 EE           NN      NNNN DD        DD
                                 EE           NN       NNN DD        DD
                                 EE           NN       NNN DD        DD
                                 EE           NN        NN DD       DDD
                                 EEEEEEEEEEEE NN        NN DDDDDDDDDDD
                                 EEEEEEEEEEEE NN        NN DDDDDDDDDD

                             EEEEEEEEEEEE   CCCCCCCC   MM        MM   00000000
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EEEEEEEEEEEEE  CCCCCCCCCC  HH          HH  000000000
EE            CCC        CC HH          HH 000      000
EE            CC            HH          HH 00        00
EE            CC            HH          HH 00        00
EE            CC            HH          HH 00        00
EE            CC            HH          HH 00        00
EEEEEEEEEEE   CC            HHHHHHHHHHHH 00        00
EEEEEEEEEEE   CC            HHHHHHHHHHHH 00        00
EE            CC            HH          HH 00        00
EE            CC            HH          HH 00        00
EE            CC            HH          HH 00        00
EE            CC            HH          HH 00        00
EE            CCC        CC HH          HH 000      000
EEEEEEEEEEEEE  CCCCCCCCCC  HH          HH  000000000
EEEEEEEEEEEEE   CCCCCCCC   HH          HH   00000000
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1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 **********************************
     1                A1              LAKE WINDSOR DAM (00034)
     2                A2              INFLOW HYDROGRAPHY AND ROUTING
     3                A3              N.J. DAM INSPECTION
     4                B    290        0      10       0       0       0       0       0       0       0
     5                B1     5
     6                J      1        1       1
     7                J1    .5
     8                K      0        1                                       1
     9                K1 COMPUTE HYDROGRAPH
    10                M      1        2    1.01                       .80
    11                P      0     22.0     112     123     133     142
    12                1                                                1     .15
    13                W2           0.84
    14                X     -2                1
    15                K      1        2                                       1
    16                K1 ROUTING COMPUTATIONS
    17                Y                              1
    18                Y1     1                                                -1
    19                Y4   530      532      534     535     536   536.1   536.2   536.3   536.5   536.7
    20                Y4   537    537.3      538     540     542     544     546
    21                Y5     0      368     1040    1453    1911    1961    2017    2085    2274    2571
    22                Y5  3091     3865     5424   11131   18301   26666   36069
    23                YA  27.5    38.34    49.18   60.02   70.86   81.70   92.54  103.38  114.22  125.06
    24                YA 135.9   157.58
    25                YE   530      531      532     533     534     535     536     537     538     539
    26                YE   540      542
    27                YY   530
    28                YB   536
    29                K    YY
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT 1
ROUTE HYDROGRAPH TO 2
END OF NETWORK

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

RUN DATE= 81/04/06.
TIME= 16.08.09.

LAKE WINDSOR DAM (00034)
INFLOW HYDROGRAPHY AND ROUTING
N.J. DAM INSPECTION

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
290	0	10	0	0	0	0	0	0	0

JOPER	NWT	LKOPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 1 LRTIO= 1

RTIOS= .50

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

SUB-AREA RUNOFF COMPUTATION

COMPUTE HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	1.01	0.00	1.01	.80	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.00	112.00	123.00	133.00	142.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.15	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .84

RECESSION DATA
STRTQ= -2.00 QRCSN= 0.00 RTIOR= 1.00

UNIT HYDROGRAPH 27 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .84 VOL= 1.00

46.	139.	290.	446.	523.	523.	467.	388.	293.	204.
152.	116.	86.	64.	48.	36.	26.	20.	15.	11.
8.	6.	5.	4.	3.	2.	1.			

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.10	1	.00	0.00	.00	2.	1.02	.20	146	.02	0.00	.02	2.
1.01	.20	2	.00	0.00	.00	2.	1.02	.30	147	.02	0.00	.02	2.
1.01	.30	3	.00	0.00	.00	2.	1.02	.40	148	.02	0.00	.02	2.
1.01	.40	4	.00	0.00	.00	2.	1.02	.50	149	.02	0.00	.02	2.
1.01	.50	5	.00	0.00	.00	2.	1.02	1.00	150	.02	0.00	.02	2.
1.01	1.00	6	.00	0.00	.00	2.	1.02	1.10	151	.02	0.00	.02	2.
1.01	1.10	7	.00	0.00	.00	2.	1.02	1.20	152	.02	0.00	.02	2.
1.01	1.20	8	.00	0.00	.00	2.	1.02	1.30	153	.02	0.00	.02	2.
1.01	1.30	9	.00	0.00	.00	2.	1.02	1.40	154	.02	0.00	.02	2.
1.01	1.40	10	.00	0.00	.00	2.	1.02	1.50	155	.02	0.00	.02	2.
1.01	1.50	11	.00	0.00	.00	2.	1.02	2.00	156	.02	0.00	.02	2.
1.01	2.00	12	.00	0.00	.00	2.	1.02	2.10	157	.02	0.00	.02	2.
1.01	2.10	13	.00	0.00	.00	2.	1.02	2.20	158	.02	0.00	.02	2.
1.01	2.20	14	.00	0.00	.00	2.	1.02	2.30	159	.02	0.00	.02	2.
1.01	2.30	15	.00	0.00	.00	2.	1.02	2.40	160	.02	0.00	.02	2.
1.01	2.40	16	.00	0.00	.00	2.	1.02	2.50	161	.02	0.00	.02	2.
1.01	2.50	17	.00	0.00	.00	2.	1.02	3.00	162	.02	0.00	.02	2.
1.01	3.00	18	.00	0.00	.00	2.	1.02	3.10	163	.02	0.00	.02	2.
1.01	3.10	19	.00	0.00	.00	2.	1.02	3.20	164	.02	0.00	.02	2.
1.01	3.20	20	.00	0.00	.00	2.	1.02	3.30	165	.02	0.00	.02	2.
1.01	3.30	21	.00	0.00	.00	2.	1.02	3.40	166	.02	0.00	.02	2.
1.01	3.40	22	.00	0.00	.00	2.	1.02	3.50	167	.02	0.00	.02	2.
1.01	3.50	23	.00	0.00	.00	2.	1.02	4.00	168	.02	0.00	.02	2.
1.01	4.00	24	.00	0.00	.00	2.	1.02	4.10	169	.02	0.00	.02	2.
1.01	4.10	25	.00	0.00	.00	2.	1.02	4.20	170	.02	0.00	.02	2.
1.01	4.20	26	.00	0.00	.00	2.	1.02	4.30	171	.02	0.00	.02	2.
1.01	4.30	27	.00	0.00	.00	2.	1.02	4.40	172	.02	0.00	.02	2.
1.01	4.40	28	.00	0.00	.00	2.	1.02	4.50	173	.02	0.00	.02	2.
1.01	4.50	29	.00	0.00	.00	2.	1.02	5.00	174	.02	0.00	.02	2.
1.01	5.00	30	.00	0.00	.00	2.	1.02	5.10	175	.02	0.00	.02	2.
1.01	5.10	31	.00	0.00	.00	2.	1.02	5.20	176	.02	0.00	.02	2.
1.01	5.20	32	.00	0.00	.00	2.	1.02	5.30	177	.02	0.00	.02	2.
1.01	5.30	33	.00	0.00	.00	2.	1.02	5.40	178	.02	0.00	.02	2.
1.01	5.40	34	.00	0.00	.00	2.	1.02	5.50	179	.02	0.00	.02	2.
1.01	5.50	35	.00	0.00	.00	2.	1.02	6.00	180	.02	0.00	.02	2.
1.01	6.00	36	.00	0.00	.00	2.	1.02	6.10	181	.05	.03	.03	3.
1.01	6.10	37	.00	0.00	.00	2.	1.02	6.20	182	.05	.03	.03	7.
1.01	6.20	38	.00	0.00	.00	2.	1.02	6.30	183	.05	.03	.03	16.
1.01	6.30	39	.00	0.00	.00	2.	1.02	6.40	184	.05	.03	.03	28.
1.01	6.40	40	.00	0.00	.00	2.	1.02	6.50	185	.05	.03	.03	44.
1.01	6.50	41	.00	0.00	.00	2.	1.02	7.00	186	.05	.03	.03	59.
1.01	7.00	42	.00	0.00	.00	2.	1.02	7.10	187	.05	.03	.03	72.
1.01	7.10	43	.00	0.00	.00	2.	1.02	7.20	188	.05	.03	.03	83.
1.01	7.20	44	.00	0.00	.00	2.	1.02	7.30	189	.05	.03	.03	91.
1.01	7.30	45	.00	0.00	.00	2.	1.02	7.40	190	.05	.03	.03	97.
1.01	7.40	46	.00	0.00	.00	2.	1.02	7.50	191	.05	.03	.03	102.
1.01	7.50	47	.00	0.00	.00	2.	1.02	8.00	192	.05	.03	.03	105.
1.01	8.00	48	.00	0.00	.00	2.	1.02	8.10	193	.05	.03	.03	107.
1.01	8.10	49	.00	0.00	.00	2.	1.02	8.20	194	.05	.03	.03	109.
1.01	8.20	50	.00	0.00	.00	2.	1.02	8.30	195	.05	.03	.03	111.
1.01	8.30	51	.00	0.00	.00	2.	1.02	8.40	196	.05	.03	.03	112.
1.01	8.40	52	.00	0.00	.00	2.	1.02	8.50	197	.05	.03	.03	112.
1.01	8.50	53	.00	0.00	.00	2.	1.02	9.00	198	.05	.03	.03	113.
1.01	9.00	54	.00	0.00	.00	2.	1.02	9.10	199	.05	.03	.03	113.
1.01	9.10	55	.00	0.00	.00	2.	1.02	9.20	200	.05	.03	.03	114.
1.01	9.20	56	.00	0.00	.00	2.	1.02	9.30	201	.05	.03	.03	114.
1.01	9.30	57	.00	0.00	.00	2.	1.02	9.40	202	.05	.03	.03	114.
1.01	9.40	58	.00	0.00	.00	2.	1.02	9.50	203	.05	.03	.03	114.
1.01	9.50	59	.00	0.00	.00	2.	1.02	10.00	204	.05	.03	.03	114.
1.01	10.00	60	.00	0.00	.00	2.	1.02	10.10	205	.05	.03	.03	114.
1.01	10.10	61	.00	0.00	.00	2.	1.02	10.20	206	.05	.03	.03	114.
1.01	10.20	62	.00	0.00	.00	2.	1.02	10.30	207	.05	.03	.03	115.

1.01	10.30	43	.00	0.00	.00	2.	1.02	10.40	208	.05	.03	.03	115.
1.01	10.40	44	.00	0.00	.00	2.	1.02	10.50	209	.05	.03	.03	115.
1.01	10.50	45	.00	0.00	.00	2.	1.02	11.00	210	.05	.03	.03	115.
1.01	11.00	46	.00	0.00	.00	2.	1.02	11.10	211	.05	.03	.03	115.
1.01	11.10	47	.00	0.00	.00	2.	1.02	11.20	212	.05	.03	.03	115.
1.01	11.20	48	.00	0.00	.00	2.	1.02	11.30	213	.05	.03	.03	115.
1.01	11.30	49	.00	0.00	.00	2.	1.02	11.40	214	.05	.03	.03	115.
1.01	11.40	70	.00	0.00	.00	2.	1.02	11.50	215	.05	.03	.03	115.
1.01	11.50	71	.00	0.00	.00	2.	1.02	12.00	216	.05	.03	.03	115.
1.01	12.00	72	.00	0.00	.00	2.	1.02	12.10	217	.33	.30	.03	127.
1.01	12.10	73	.02	0.00	.02	2.	1.02	12.20	218	.33	.30	.03	165.
1.01	12.20	74	.02	0.00	.02	2.	1.02	12.30	219	.33	.30	.03	245.
1.01	12.30	75	.02	0.00	.02	2.	1.02	12.40	220	.33	.30	.03	367.
1.01	12.40	76	.02	0.00	.02	2.	1.02	12.50	221	.33	.30	.03	511.
1.01	12.50	77	.02	0.00	.02	2.	1.02	13.00	222	.33	.30	.03	655.
1.01	13.00	78	.02	0.00	.02	2.	1.02	13.10	223	.39	.37	.03	786.
1.01	13.10	79	.03	0.00	.03	2.	1.02	13.20	224	.39	.37	.03	902.
1.01	13.20	80	.03	0.00	.03	2.	1.02	13.30	225	.39	.37	.03	999.
1.01	13.30	81	.03	0.00	.03	2.	1.02	13.40	226	.39	.37	.03	1084.
1.01	13.40	82	.03	0.00	.03	2.	1.02	13.50	227	.39	.37	.03	1160.
1.01	13.50	83	.03	0.00	.03	2.	1.02	14.00	228	.39	.37	.03	1226.
1.01	14.00	84	.03	0.00	.03	2.	1.02	14.10	229	.49	.47	.03	1285.
1.01	14.10	85	.03	0.00	.03	2.	1.02	14.20	230	.49	.47	.03	1342.
1.01	14.20	86	.03	0.00	.03	2.	1.02	14.30	231	.49	.47	.03	1402.
1.01	14.30	87	.03	0.00	.03	2.	1.02	14.40	232	.49	.47	.03	1469.
1.01	14.40	88	.03	0.00	.03	2.	1.02	14.50	233	.49	.47	.03	1538.
1.01	14.50	89	.03	0.00	.03	2.	1.02	15.00	234	.49	.47	.03	1603.
1.01	15.00	90	.03	0.00	.03	2.	1.02	15.10	235	.45	.42	.03	1656.
1.01	15.10	91	.03	0.00	.03	2.	1.02	15.20	236	.75	.72	.03	1709.
1.01	15.20	92	.05	0.00	.05	2.	1.02	15.30	237	1.35	1.32	.03	1799.
1.01	15.30	93	.09	0.00	.09	2.	1.02	15.40	238	3.37	3.35	.03	2066.
1.01	15.40	94	.23	.06	.16	5.	1.02	15.50	239	.97	.95	.03	2540.
1.01	15.50	95	.07	.04	.03	13.	1.02	16.00	240	.60	.57	.03	3191.
1.01	16.00	96	.04	.02	.03	27.	1.02	16.10	241	.46	.43	.03	3799.
1.01	16.10	97	.03	.01	.03	45.	1.02	16.20	242	.46	.43	.03	4104.
1.01	16.20	98	.03	.01	.03	60.	1.02	16.30	243	.46	.43	.03	4093.
1.01	16.30	99	.03	.01	.03	67.	1.02	16.40	244	.46	.43	.03	3838.
1.01	16.40	100	.03	.01	.03	67.	1.02	16.50	245	.46	.43	.03	3461.
1.01	16.50	101	.03	.01	.03	63.	1.02	17.00	246	.46	.43	.03	3019.
1.01	17.00	102	.03	.01	.03	55.	1.02	17.10	247	.36	.34	.03	2663.
1.01	17.10	103	.02	0.00	.02	47.	1.02	17.20	248	.36	.34	.03	2400.
1.01	17.20	104	.02	0.00	.02	41.	1.02	17.30	249	.36	.34	.03	2196.
1.01	17.30	105	.02	0.00	.02	35.	1.02	17.40	250	.36	.34	.03	2015.
1.01	17.40	106	.02	0.00	.02	29.	1.02	17.50	251	.36	.34	.03	1861.
1.01	17.50	107	.02	0.00	.02	24.	1.02	18.00	252	.36	.34	.03	1733.
1.01	18.00	108	.02	0.00	.02	19.	1.02	18.10	253	.03	.00	.03	1614.
1.01	18.10	109	.00	0.00	.00	15.	1.02	18.20	254	.03	.00	.03	1487.
1.01	18.20	110	.00	0.00	.00	11.	1.02	18.30	255	.03	.00	.03	1331.
1.01	18.30	111	.00	0.00	.00	9.	1.02	18.40	256	.03	.00	.03	1140.
1.01	18.40	112	.00	0.00	.00	7.	1.02	18.50	257	.03	.00	.03	933.
1.01	18.50	113	.00	0.00	.00	6.	1.02	19.00	258	.03	.00	.03	735.
1.01	19.00	114	.00	0.00	.00	5.	1.02	19.10	259	.03	.00	.03	562.
1.01	19.10	115	.00	0.00	.00	4.	1.02	19.20	260	.03	.00	.03	420.
1.01	19.20	116	.00	0.00	.00	4.	1.02	19.30	261	.03	.00	.03	316.
1.01	19.30	117	.00	0.00	.00	3.	1.02	19.40	262	.03	.00	.03	240.
1.01	19.40	118	.00	0.00	.00	3.	1.02	19.50	263	.03	.00	.03	182.
1.01	19.50	119	.00	0.00	.00	3.	1.02	20.00	264	.03	.00	.03	138.
1.01	20.00	120	.00	0.00	.00	2.	1.02	20.10	265	.03	.00	.03	105.
1.01	20.10	121	.00	0.00	.00	2.	1.02	20.20	266	.03	.00	.03	82.
1.01	20.20	122	.00	0.00	.00	2.	1.02	20.30	267	.03	.00	.03	66.
1.01	20.30	123	.00	0.00	.00	2.	1.02	20.40	268	.03	.00	.03	53.
1.01	20.40	124	.00	0.00	.00	2.	1.02	20.50	269	.03	.00	.03	44.
1.01	20.50	125	.00	0.00	.00	2.	1.02	21.00	270	.03	.00	.03	37.
1.01	21.00	126	.00	0.00	.00	2.	1.02	21.10	271	.03	.00	.03	32.
1.01	21.10	127	.00	0.00	.00	2.	1.02	21.20	272	.03	.00	.03	28.
1.01	21.20	128	.00	0.00	.00	2.	1.02	21.30	273	.03	.00	.03	25.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.01	.40	130	.00	0.00	.00	2.	1.02	21.50	275	.03	.00	...	
1.01	21.50	131	.00	0.00	.00	2.	1.02	22.00	276	.03	.00	.03	21.
1.01	22.00	132	.00	0.00	.00	2.	1.02	22.10	277	.03	.00	.03	20.
1.01	22.10	133	.00	0.00	.00	2.	1.02	22.20	278	.03	.00	.03	19.
1.01	22.20	134	.00	0.00	.00	2.	1.02	22.30	279	.03	.00	.03	19.
1.01	22.30	135	.00	0.00	.00	2.	1.02	22.40	280	.03	.00	.03	19.
1.01	22.40	136	.00	0.00	.00	2.	1.02	22.50	281	.03	.00	.03	19.
1.01	22.50	137	.00	0.00	.00	2.	1.02	23.00	282	.03	.00	.03	19.
1.01	23.00	138	.00	0.00	.00	2.	1.02	23.10	283	.03	.00	.03	19.
1.01	23.10	139	.00	0.00	.00	2.	1.02	23.20	284	.03	.00	.03	19.
1.01	23.20	140	.00	0.00	.00	2.	1.02	23.30	285	.03	.00	.03	19.
1.01	23.30	141	.00	0.00	.00	2.	1.02	23.40	286	.03	.00	.03	19.
1.01	23.40	142	.00	0.00	.00	2.	1.02	23.50	287	.03	.00	.03	19.
1.01	23.50	143	.00	0.00	.00	2.	1.03	0.00	288	.03	.00	.03	19.
1.02	0.00	144	.00	0.00	.00	2.	1.03	.10	289	0.00	0.00	0.00	19.
1.02	.10	145	.02	0.00	.02	2.	1.03	.20	290	0.00	0.00	0.00	18.
									SUM	24.99	20.16	4.83	79318.
										(635.)	(512.)	(123.)	(2246.04)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4104.	1948.	544.	273.	79311.
CMS	116.	55.	15.	8.	2246.
INCHES		17.94	20.06	20.29	20.29
MM		455.78	509.48	515.39	515.39
AC-FT		966.	1080.	1092.	1092.
THOUS CU M		1192.	1332.	1348.	1348.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	6.	14.	23.	30.	34.	34.
32.	28.	24.	20.	17.	15.	12.	9.	7.	6.
5.	4.	3.	2.	2.	2.	2.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
2.	4.	8.	14.	22.	29.	36.	42.	46.	49.
51.	52.	54.	55.	55.	56.	56.	56.	57.	57.
57.	57.	57.	57.	57.	57.	57.	57.	57.	57.
57.	57.	57.	57.	57.	57.	64.	83.	122.	184.
255.	327.	393.	451.	499.	542.	580.	613.	642.	671.
701.	735.	769.	801.	828.	855.	900.	1033.	1270.	1595.
1899.	2052.	2046.	1919.	1731.	1509.	1331.	1200.	1098.	1007.
931.	867.	807.	743.	666.	570.	467.	367.	281.	210.
158.	120.	91.	69.	53.	41.	33.	27.	22.	19.
16.	14.	13.	12.	11.	10.	10.	10.	9.	9.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2052.	974.	272.	137.	39655.
CMS	58.	28.	8.	4.	1123.
INCHES		8.97	10.03	10.15	10.15

HR	227.67	234.79	237.67	237.67
AC-FT	483.	540.	546.	546.
THOUS CU M	596.	666.	674.	674.

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HYDROGRAPH ROUTING

ROUTING COMPUTATIONS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

DLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	-1

STAGE	530.00	532.00	534.00	535.00	536.00	536.10	536.20	536.30	536.50
	537.00	537.30	538.00	540.00	542.00	544.00	546.00		
FLOW	0.00	368.00	1040.00	1453.00	1911.00	1961.00	2017.00	2085.00	2274.00
	3091.00	3865.00	5424.00	11131.00	18301.00	26666.00	36069.00		
SURFACE AREA=	28.	38.	49.	60.	71.	82.	93.	103.	114.	125.
	136.	156.							
CAPACITY=	0.	33.	76.	131.	196.	273.	360.	457.	566.	686.
	816.	1109.							
ELEVATION=	530.	531.	532.	533.	534.	535.	536.	537.	538.	539.
	540.	542.							

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
530.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
536.0	0.0	0.0	0.

STATION 2, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	.10	1	.17	1.	0.	0.	530.0
1.01	.20	2	.33	1.	0.	0.	530.0
1.01	.30	3	.50	1.	0.	0.	530.0
1.01	.40	4	.67	1.	0.	0.	530.0
1.01	.50	5	.83	1.	0.	0.	530.0
1.01	1.00	6	1.00	1.	0.	0.	530.0
1.01	1.10	7	1.17	1.	0.	0.	530.0
1.01	1.20	8	1.33	1.	1.	0.	530.0
1.01	1.30	9	1.50	1.	1.	0.	530.0
1.01	1.40	10	1.67	1.	1.	0.	530.0
1.01	1.50	11	1.83	1.	1.	0.	530.0
1.01	2.00	12	2.00	1.	1.	0.	530.0
1.01	2.10	13	2.17	1.	1.	0.	530.0
1.01	2.20	14	2.33	1.	1.	0.	530.0
1.01	2.30	15	2.50	1.	1.	0.	530.0
1.01	2.40	16	2.67	1.	1.	0.	530.0

1.01	3.00	18	3.00	1.	1.	0.	530.0
1.01	3.10	19	3.17	1.	1.	0.	530.0
1.01	3.20	20	3.33	1.	1.	0.	530.0
1.01	3.30	21	3.50	1.	1.	0.	530.0
1.01	3.40	22	3.67	1.	1.	0.	530.0
1.01	3.50	23	3.83	1.	1.	0.	530.0
1.01	4.00	24	4.00	1.	1.	0.	530.0
1.01	4.10	25	4.17	1.	1.	0.	530.0
1.01	4.20	26	4.33	1.	1.	0.	530.0
1.01	4.30	27	4.50	1.	1.	0.	530.0
1.01	4.40	28	4.67	1.	1.	0.	530.0
1.01	4.50	29	4.83	1.	1.	0.	530.0
1.01	5.00	30	5.00	1.	1.	0.	530.0
1.01	5.10	31	5.17	1.	1.	0.	530.0
1.01	5.20	32	5.33	1.	1.	0.	530.0
1.01	5.30	33	5.50	1.	1.	0.	530.0
1.01	5.40	34	5.67	1.	1.	0.	530.0
1.01	5.50	35	5.83	1.	1.	0.	530.0
1.01	6.00	36	6.00	1.	1.	0.	530.0
1.01	6.10	37	6.17	1.	1.	0.	530.0
1.01	6.20	38	6.33	1.	1.	0.	530.0
1.01	6.30	39	6.50	1.	1.	0.	530.0
1.01	6.40	40	6.67	1.	1.	0.	530.0
1.01	6.50	41	6.83	1.	1.	0.	530.0
1.01	7.00	42	7.00	1.	1.	0.	530.0
1.01	7.10	43	7.17	1.	1.	0.	530.0
1.01	7.20	44	7.33	1.	1.	0.	530.0
1.01	7.30	45	7.50	1.	1.	0.	530.0
1.01	7.40	46	7.67	1.	1.	0.	530.0
1.01	7.50	47	7.83	1.	1.	0.	530.0
1.01	8.00	48	8.00	1.	1.	0.	530.0
1.01	8.10	49	8.17	1.	1.	0.	530.0
1.01	8.20	50	8.33	1.	1.	0.	530.0
1.01	8.30	51	8.50	1.	1.	0.	530.0
1.01	8.40	52	8.67	1.	1.	0.	530.0
1.01	8.50	53	8.83	1.	1.	0.	530.0
1.01	9.00	54	9.00	1.	1.	0.	530.0
1.01	9.10	55	9.17	1.	1.	0.	530.0
1.01	9.20	56	9.33	1.	1.	0.	530.0
1.01	9.30	57	9.50	1.	1.	0.	530.0
1.01	9.40	58	9.67	1.	1.	0.	530.0
1.01	9.50	59	9.83	1.	1.	0.	530.0
1.01	10.00	60	10.00	1.	1.	0.	530.0
1.01	10.10	61	10.17	1.	1.	0.	530.0
1.01	10.20	62	10.33	1.	1.	0.	530.0
1.01	10.30	63	10.50	1.	1.	0.	530.0
1.01	10.40	64	10.67	1.	1.	0.	530.0
1.01	10.50	65	10.83	1.	1.	0.	530.0
1.01	11.00	66	11.00	1.	1.	0.	530.0
1.01	11.10	67	11.17	1.	1.	0.	530.0
1.01	11.20	68	11.33	1.	1.	0.	530.0
1.01	11.30	69	11.50	1.	1.	0.	530.0
1.01	11.40	70	11.67	1.	1.	0.	530.0
1.01	11.50	71	11.83	1.	1.	0.	530.0
1.01	12.00	72	12.00	1.	1.	0.	530.0
1.01	12.10	73	12.17	1.	1.	0.	530.0
1.01	12.20	74	12.33	1.	1.	0.	530.0
1.01	12.30	75	12.50	1.	1.	0.	530.0
1.01	12.40	76	12.67	1.	1.	0.	530.0
1.01	12.50	77	12.83	1.	1.	0.	530.0
1.01	13.00	78	13.00	1.	1.	0.	530.0
1.01	13.10	79	13.17	1.	1.	0.	530.0
1.01	13.20	80	13.33	1.	1.	0.	530.0
1.01	13.30	81	13.50	1.	1.	0.	530.0
1.01	13.40	82	13.67	1.	1.	0.	530.0

1.01	13.50	83	13.83	1.	1.	0.	530.0
1.01	14.00	84	14.00	1.	1.	0.	530.0
1.01	14.10	85	14.17	1.	1.	0.	530.0
1.01	14.20	86	14.33	1.	1.	0.	530.0
1.01	14.30	87	14.50	1.	1.	0.	530.0
1.01	14.40	88	14.67	1.	1.	0.	530.0
1.01	14.50	89	14.83	1.	1.	0.	530.0
1.01	15.00	90	15.00	1.	1.	0.	530.0
1.01	15.10	91	15.17	1.	1.	0.	530.0
1.01	15.20	92	15.33	1.	1.	0.	530.0
1.01	15.30	93	15.50	1.	1.	0.	530.0
1.01	15.40	94	15.67	2.	1.	0.	530.0
1.01	15.50	95	15.83	6.	1.	0.	530.0
1.01	16.00	96	16.00	14.	2.	0.	530.0
1.01	16.10	97	16.17	23.	3.	1.	530.0
1.01	16.20	98	16.33	30.	5.	1.	530.0
1.01	16.30	99	16.50	34.	8.	1.	530.0
1.01	16.40	100	16.67	34.	10.	1.	530.1
1.01	16.50	101	16.83	32.	12.	2.	530.1
1.01	17.00	102	17.00	28.	13.	2.	530.1
1.01	17.10	103	17.17	24.	14.	2.	530.1
1.01	17.20	104	17.33	20.	15.	2.	530.1
1.01	17.30	105	17.50	17.	15.	2.	530.1
1.01	17.40	106	17.67	15.	15.	2.	530.1
1.01	17.50	107	17.83	12.	15.	2.	530.1
1.01	18.00	108	18.00	9.	15.	2.	530.1
1.01	18.10	109	18.17	7.	14.	2.	530.1
1.01	18.20	110	18.33	6.	14.	2.	530.1
1.01	18.30	111	18.50	5.	13.	2.	530.1
1.01	18.40	112	18.67	4.	12.	2.	530.1
1.01	18.50	113	18.83	3.	11.	2.	530.1
1.01	19.00	114	19.00	2.	11.	2.	530.1
1.01	19.10	115	19.17	2.	10.	2.	530.1
1.01	19.20	116	19.33	2.	9.	1.	530.1
1.01	19.30	117	19.50	2.	9.	1.	530.0
1.01	19.40	118	19.67	1.	8.	1.	530.0
1.01	19.50	119	19.83	1.	7.	1.	530.0
1.01	20.00	120	20.00	1.	7.	1.	530.0
1.01	20.10	121	20.17	1.	6.	1.	530.0
1.01	20.20	122	20.33	1.	6.	1.	530.0
1.01	20.30	123	20.50	1.	6.	1.	530.0
1.01	20.40	124	20.67	1.	5.	1.	530.0
1.01	20.50	125	20.83	1.	5.	1.	530.0
1.01	21.00	126	21.00	1.	5.	1.	530.0
1.01	21.10	127	21.17	1.	4.	1.	530.0
1.01	21.20	128	21.33	1.	4.	1.	530.0
1.01	21.30	129	21.50	1.	4.	1.	530.0
1.01	21.40	130	21.67	1.	3.	1.	530.0
1.01	21.50	131	21.83	1.	3.	0.	530.0
1.01	22.00	132	22.00	1.	3.	0.	530.0
1.01	22.10	133	22.17	1.	3.	0.	530.0
1.01	22.20	134	22.33	1.	3.	0.	530.0
1.01	22.30	135	22.50	1.	3.	0.	530.0
1.01	22.40	136	22.67	1.	2.	0.	530.0
1.01	22.50	137	22.83	1.	2.	0.	530.0
1.01	23.00	138	23.00	1.	2.	0.	530.0
1.01	23.10	139	23.17	1.	2.	0.	530.0
1.01	23.20	140	23.33	1.	2.	0.	530.0
1.01	23.30	141	23.50	1.	2.	0.	530.0
1.01	23.40	142	23.67	1.	2.	0.	530.0
1.01	23.50	143	23.83	1.	2.	0.	530.0
1.02	0.00	144	24.00	1.	2.	0.	530.0
1.02	.10	145	24.17	1.	2.	0.	530.0
1.02	.20	146	24.33	1.	2.	0.	530.0
1.02	.30	147	24.50	1.	2.	0.	530.0
1.02	.40	148	24.67	1.	2.	0.	530.0

1.02	1.00	150	25.00	1.	1.	0.	530.0
1.02	1.10	151	25.17	1.	1.	0.	530.0
1.02	1.20	152	25.33	1.	1.	0.	530.0
1.02	1.30	153	25.50	1.	1.	0.	530.0
1.02	1.40	154	25.67	1.	1.	0.	530.0
1.02	1.50	155	25.83	1.	1.	0.	530.0
1.02	2.00	156	26.00	1.	1.	0.	530.0
1.02	2.10	157	26.17	1.	1.	0.	530.0
1.02	2.20	158	26.33	1.	1.	0.	530.0
1.02	2.30	159	26.50	1.	1.	0.	530.0
1.02	2.40	160	26.67	1.	1.	0.	530.0
1.02	2.50	161	26.83	1.	1.	0.	530.0
1.02	3.00	162	27.00	1.	1.	0.	530.0
1.02	3.10	163	27.17	1.	1.	0.	530.0
1.02	3.20	164	27.33	1.	1.	0.	530.0
1.02	3.30	165	27.50	1.	1.	0.	530.0
1.02	3.40	166	27.67	1.	1.	0.	530.0
1.02	3.50	167	27.83	1.	1.	0.	530.0
1.02	4.00	168	28.00	1.	1.	0.	530.0
1.02	4.10	169	28.17	1.	1.	0.	530.0
1.02	4.20	170	28.33	1.	1.	0.	530.0
1.02	4.30	171	28.50	1.	1.	0.	530.0
1.02	4.40	172	28.67	1.	1.	0.	530.0
1.02	4.50	173	28.83	1.	1.	0.	530.0
1.02	5.00	174	29.00	1.	1.	0.	530.0
1.02	5.10	175	29.17	1.	1.	0.	530.0
1.02	5.20	176	29.33	1.	1.	0.	530.0
1.02	5.30	177	29.50	1.	1.	0.	530.0
1.02	5.40	178	29.67	1.	1.	0.	530.0
1.02	5.50	179	29.83	1.	1.	0.	530.0
1.02	6.00	180	30.00	1.	1.	0.	530.0
1.02	6.10	181	30.17	2.	1.	0.	530.0
1.02	6.20	182	30.33	4.	1.	0.	530.0
1.02	6.30	183	30.50	8.	2.	0.	530.0
1.02	6.40	184	30.67	14.	2.	0.	530.0
1.02	6.50	185	30.83	22.	4.	1.	530.0
1.02	7.00	186	31.00	29.	6.	1.	530.0
1.02	7.10	187	31.17	36.	8.	1.	530.0
1.02	7.20	188	31.33	42.	11.	2.	530.1
1.02	7.30	189	31.50	46.	13.	2.	530.1
1.02	7.40	190	31.67	49.	16.	2.	530.1
1.02	7.50	191	31.83	51.	19.	3.	530.1
1.02	8.00	192	32.00	52.	22.	3.	530.1
1.02	8.10	193	32.17	54.	24.	4.	530.1
1.02	8.20	194	32.33	55.	27.	4.	530.1
1.02	8.30	195	32.50	55.	29.	4.	530.2
1.02	8.40	196	32.67	56.	31.	5.	530.2
1.02	8.50	197	32.83	56.	33.	5.	530.2
1.02	9.00	198	33.00	56.	35.	5.	530.2
1.02	9.10	199	33.17	57.	37.	6.	530.2
1.02	9.20	200	33.33	57.	38.	6.	530.2
1.02	9.30	201	33.50	57.	40.	6.	530.2
1.02	9.40	202	33.67	57.	41.	6.	530.2
1.02	9.50	203	33.83	57.	43.	7.	530.2
1.02	10.00	204	34.00	57.	44.	7.	530.2
1.02	10.10	205	34.17	57.	45.	7.	530.2
1.02	10.20	206	34.33	57.	46.	7.	530.2
1.02	10.30	207	34.50	57.	47.	7.	530.3
1.02	10.40	208	34.67	57.	47.	7.	530.3
1.02	10.50	209	34.83	57.	48.	8.	530.3
1.02	11.00	210	35.00	57.	49.	8.	530.3
1.02	11.10	211	35.17	57.	50.	8.	530.3
1.02	11.20	212	35.33	57.	50.	8.	530.3
1.02	11.30	213	35.50	57.	51.	8.	530.3
1.02	11.40	214	35.67	57.	51.	8.	530.3

1.02	11.50	215	35.83	57.	52.	8.	530.3
1.02	12.00	216	36.00	57.	52.	8.	530.3
1.02	12.10	217	36.17	64.	53.	8.	530.3
1.02	12.20	218	36.33	83.	54.	9.	530.3
1.02	12.30	219	36.50	122.	58.	9.	530.3
1.02	12.40	220	36.67	184.	65.	10.	530.4
1.02	12.50	221	36.83	255.	77.	12.	530.4
1.02	13.00	222	37.00	327.	94.	15.	530.5
1.02	13.10	223	37.17	393.	113.	19.	530.6
1.02	13.20	224	37.33	451.	135.	23.	530.7
1.02	13.30	225	37.50	499.	158.	27.	530.9
1.02	13.40	226	37.67	542.	182.	32.	531.0
1.02	13.50	227	37.83	580.	206.	37.	531.1
1.02	14.00	228	38.00	613.	230.	43.	531.2
1.02	14.10	229	38.17	642.	253.	48.	531.4
1.02	14.20	230	38.33	671.	276.	53.	531.5
1.02	14.30	231	38.50	701.	299.	59.	531.6
1.02	14.40	232	38.67	735.	322.	64.	531.7
1.02	14.50	233	38.83	769.	344.	70.	531.9
1.02	15.00	234	39.00	801.	367.	76.	532.0
1.02	15.10	235	39.17	828.	406.	82.	532.1
1.02	15.20	236	39.33	855.	444.	88.	532.2
1.02	15.30	237	39.50	900.	480.	93.	532.3
1.02	15.40	238	39.67	1033.	521.	100.	532.5
1.02	15.50	239	39.83	1270.	572.	108.	532.6
1.02	16.00	240	40.00	1595.	639.	120.	532.8
1.02	16.10	241	40.17	1899.	723.	134.	533.1
1.02	16.20	242	40.33	2052.	813.	151.	533.3
1.02	16.30	243	40.50	2046.	898.	167.	533.6
1.02	16.40	244	40.67	1919.	970.	182.	533.8
1.02	16.50	245	40.83	1731.	1025.	193.	534.0
1.02	17.00	246	41.00	1509.	1068.	201.	534.1
1.02	17.10	247	41.17	1331.	1095.	206.	534.1
1.02	17.20	248	41.33	1200.	1107.	208.	534.2
1.02	17.30	249	41.50	1098.	1111.	209.	534.2
1.02	17.40	250	41.67	1007.	1106.	208.	534.2
1.02	17.50	251	41.83	931.	1096.	206.	534.1
1.02	18.00	252	42.00	867.	1081.	203.	534.1
1.02	18.10	253	42.17	807.	1062.	200.	534.1
1.02	18.20	254	42.33	743.	1040.	196.	534.0
1.02	18.30	255	42.50	666.	1019.	192.	533.9
1.02	18.40	256	42.67	570.	993.	187.	533.9
1.02	18.50	257	42.83	467.	962.	180.	533.8
1.02	19.00	258	43.00	367.	926.	173.	533.7
1.02	19.10	259	43.17	281.	886.	165.	533.5
1.02	19.20	260	43.33	210.	842.	156.	533.4
1.02	19.30	261	43.50	158.	796.	148.	533.3
1.02	19.40	262	43.67	120.	749.	139.	533.1
1.02	19.50	263	43.83	91.	701.	130.	533.0
1.02	20.00	264	44.00	69.	655.	122.	532.9
1.02	20.10	265	44.17	53.	609.	114.	532.7
1.02	20.20	266	44.33	41.	564.	107.	532.6
1.02	20.30	267	44.50	33.	521.	100.	532.5
1.02	20.40	268	44.67	27.	480.	93.	532.3
1.02	20.50	269	44.83	22.	442.	87.	532.2
1.02	21.00	270	45.00	19.	405.	82.	532.1
1.02	21.10	271	45.17	16.	371.	77.	532.0
1.02	21.20	272	45.33	14.	351.	72.	531.9
1.02	21.30	273	45.50	13.	334.	67.	531.8
1.02	21.40	274	45.67	12.	317.	63.	531.7
1.02	21.50	275	45.83	11.	300.	59.	531.6
1.02	22.00	276	46.00	10.	284.	55.	531.5
1.02	22.10	277	46.17	10.	269.	52.	531.5
1.02	22.20	278	46.33	10.	254.	48.	531.4
1.02	22.30	279	46.50	9.	240.	45.	531.3
1.02	22.40	280	46.67	9.	226.	42.	531.2

1.02	22.50	287	46.83	9.	213.	37.	531.2
1.02	23.00	292	47.00	9.	200.	36.	531.1
1.02	23.10	293	47.17	9.	188.	34.	531.0
1.02	23.20	294	47.33	9.	176.	31.	531.0
1.02	23.30	295	47.50	9.	166.	29.	530.9
1.02	23.40	296	47.67	9.	155.	27.	530.8
1.02	23.50	297	47.83	9.	145.	25.	530.8
1.03	0.00	298	48.00	9.	136.	23.	530.7
1.03	.10	299	48.17	9.	127.	21.	530.7
1.03	.20	300	48.33	9.	119.	20.	530.6

PEAK OUTFLOW IS 1111. AT TIME 41.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1111.	800.	262.	132.	38198.
CMS	31.	23.	7.	4.	1082.
INCHES		7.37	9.66	9.77	9.77
MM		187.09	245.37	248.22	248.22
AC-FT		397.	520.	526.	526.
THOUS CU M		489.	642.	649.	649.

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1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 .50
HYDROGRAPH AT	1	1.01	1	2052.
		(2.62)		(58.11)(
ROUTED TO	2	1.01	1	1111.
		(2.62)		(31.45)(

RATIOS APPLIED TO FLOWS

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	530.00	530.00	536.00
STORAGE	0.	0.	360.
OUTFLOW	0.	0.	1911.

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
.50	534.17	0.00	209.	1111.	0.00	41.50	0.00

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 24 FEB 79
****

APPENDIX 4

HYDROLOGY AND HYDRAULIC DESIGN CALCULATIONS
FROM
STATE OF NEW JERSEY
DIVISION OF WATER POLICY AND SUPPLY

Form 15-SC-3-59

Dam Application No. 528

Map No. 22-169

State of New Jersey
Division of Water Policy and Supply

REPORT ON DAM APPLICATION

Application of Vantage Corporation, Box 196, Branchville, New Jersey

filed February 26, 1959 for approval of plans and for a permit to construct

a dam for the impoundment of Lake Windsor across a tributary of Papakating Creek

tributary to Wallkill River in Vantage Township

Sussex County, New Jersey, has been examined by W. J. Galley, Principal Engineer, Hydraulic

PRINCIPAL FEATURES

Purpose of dam	residential development	Type of dam	earth fill
Site inspected	---	Foundation material	----
Location:	22.22.1.9.f	Maximum height	32 feet
Drainage area	0.90 sq. mi.	Length of dam	310 feet
Elevation of flow line	530.0	Top width of dam	16 feet
Area of lake	30 acres	Downstream slope	2:1 & 3:1
Capacity of lake	9.8 million gallons	Upstream slope	3:1

Type of spillway overflow chute

Length of spillway 40 feet

Design flood flow 693 cubic feet per second = 770 sec. ft. per sq. mi.

Head on spillway for design flood flow 3.1 feet

Freeboard 3.9 feet

Maximum spillway capacity (dam swash) = 2350 cubic feet per second

= 2610 sec. ft. per sq. mi.

Outlet other than spillway 18" diameter C.M.P. drain

Drawings filed by S. A. Willis, License No. 6905

Pertinent Information

The proposed dam embankment section meets all the requirements of the Division as to slope and top width. Rip rap will be placed along the upstream slope from the top of the embankment to approximately 3 feet below normal water level.

A 40-foot bottom width rip rapped trapezoidal channel with 2:1 side slopes will be constructed for a distance of 25 feet downstream from the end of spillway apron.

Hydrology

Encroachment Application No. 3129 located approximately 0.6 miles downstream used 150% Central Jersey Curve as an estimate of a 15-year flood.

by Rational Method ------- 50 year flood

Q = CiA	"C" = 0.40
Q = 0.40 x 576 x 2.60	A = 576 ac
Q = 598 sec. ft.	i = 2.60 "/hr

150% Central Jersey = 567 sec. ft.
North Jersey = 693 sec. ft.

Use North Jersey Curve Run-off as an estimate of a 50-yr flood.

Hydraulics

Determine head on spillway for Q = 693 sec. ft.

$Q = C L H^{3/2}$ L = 39 ft. (effective)
$693 = 3.25 \times 39 \times H^{3/2}$ "C" = 3.25 (Kings)
H = 3.10 ft.

Spillway Crest Elevation	530.00
H	= 3.10 ft.
Water Level Elevation	533.10
Top of Dam Embankment Elevation	537.00
Freeboard	3.90 ft.

It has been found that the site for the dam is suitable and the plans adequate to insure the construction of a structure which will not be a menace to life or property under design flood conditions. It is therefore recommended that the plans be approved and that a permit be issued subject to standard conditions and to the following special conditions:

10. The drawings and specifications hereby approved were prepared by Mills, Paul & Proctor, Inc.,

specifications entitled,

"Lake Windsor Dam
Specifications for Construction of Dam",
dated June 17, 1959.

drawings entitled,

"Lake Windsor Proposed Dam",
dated May 28, 1959;

"Lake Windsor Layout of Dam Spillway",
dated May 26, 1959;

"Lake Windsor Dam Spillway Reinforcing Details",
dated June 16, 1959.

Chief, Bureau of Water Control

Chief Engineer & Acting Director

Trenton, New Jersey

June 22, , 19 59

APPENDIX 5

REFERENCES

APPENDIX 5

REFERENCES

1. Brater, Ernest F. and Kings, Horace W., Handbook of Hydraulics 5th Edition, McGraw-Hill Book Company 1963.

2. United States Department of Agriculture, Soil Conservation Service, Somerset, N. J. Urban Hydrology for Small Watersheds, Technical Release No. 55 January 1975.

3. United States Department of Commerce Weather Bureau, April 1956, Hydrometeorological Report #33, Washington, D.C.

4. United States Department of Interior, Bureau of Reclamation Design of Small Dams, Second Edition 1973, Revised print 1977.

5. United States Department of Agriculture, Soil Conservation Service, Soil Survey of Sussex and Morris County, August 1975.

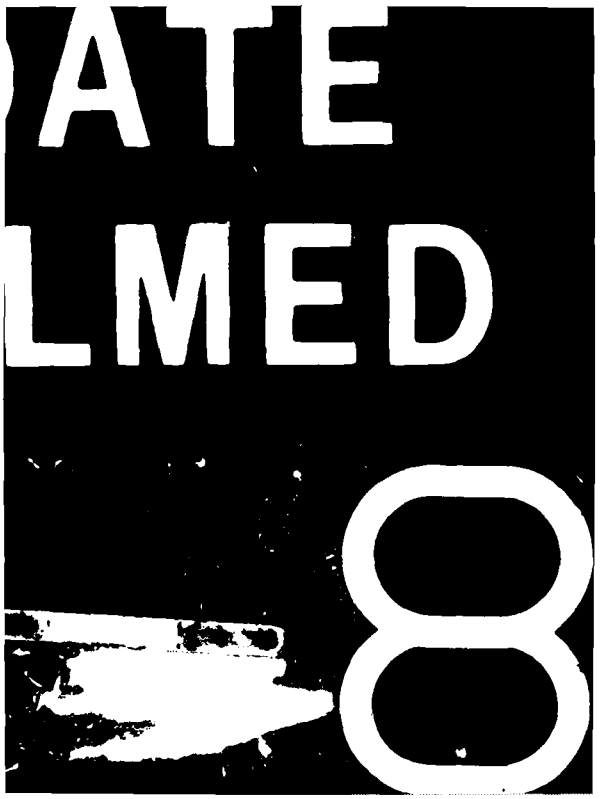
6. United States Army Corps of Engineers, Flood Hydrograph Package (HEC-1), Davis, Calif. September 1978.

7. United States Department of Agriculture, SCS, A Method for Estimating Volume and Rate of Runoff in Small Watersheds, SCS-TP-149, Revised April 1973.

8. United States Army Corps of Engineers, Recommended Guidelines for Safety Inspection, Washington, D.C.

9. Sauls, G. A., Additional Hydrology and Hydraulics Guidance, 12 September 1978.

10. Dam Application File No. 528, Lake Windsor Dam, New Jersey Department of Environmental Protection, Division of Water Resources.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