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FLAHERTY-GIAVARA ASSOCIATES NEW HAVEN CT  
NATIONAL DAM SAFETY PROGRAM. LAKE MUSKODAY DAM (INVENTORY NUMBRE--ETC(U)  
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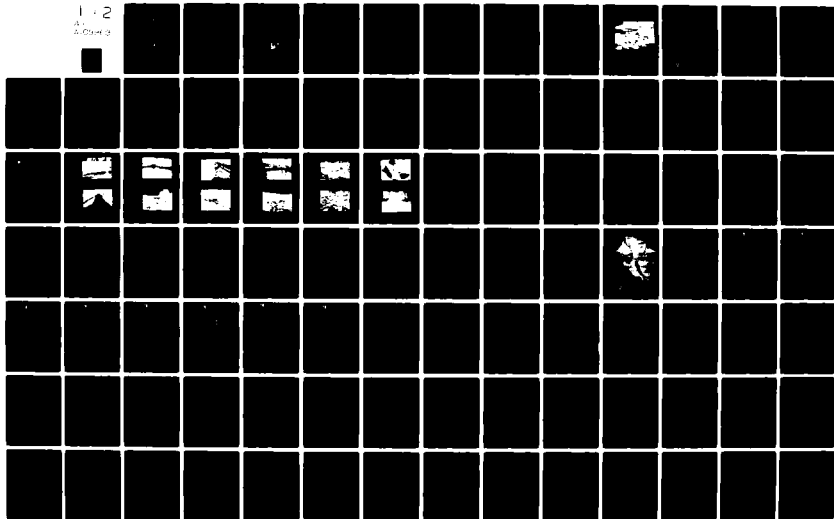
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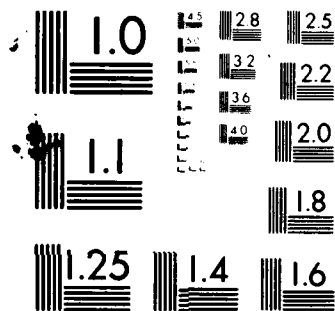
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| Phase I Inspection Report<br>Lake Muskoday Dam<br>Delaware River Basin, Sullivan County, NY<br>Inventory No. NY00341                                                                                                                                    | Phase I Inspection Report<br>National Dam Safety Program                                      |                                             |
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| Dam Safety<br>National Dam Safety Program<br>Visual Inspection<br>Hydrology, Structural Stability                                                                                                                                                       | Lake Muskoday Dam<br>Sullivan County, N.Y.<br>Delaware River Basin                            |                                             |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)                                                                                                                                                                       |                                                                                               |                                             |
| This report provides information and analysis on the physical condition of<br>the dam as of the report date. Information and analysis are based on visual<br>inspection of the dam by the performing organization.                                      |                                                                                               |                                             |
| Examination of available documents and a visual inspection of the<br>dam did not reveal conditions which constitute an immediate hazard<br>to human life or property. However, the dam has some deficiencies<br>that need to be evaluated and remedied. |                                                                                               |                                             |

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Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped by all storms exceeding 11 percent of the Probable Maximum Flood (PMF). Dam overtopping, the resulting erosion of the embankment and hence, dam breaching would cause water surface levels downstream to reach depths which would pose significant danger to residents. Therefore, the spillway is adjudged to be seriously inadequate and the dam is assessed as unsafe, nonemergency.

The classification "unsafe" applied to a dam because of a seriously inadequate spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to life downstream of the dam.

DELAWARE RIVER BASIN

**LAKE MUSKODAY DAM**  
**SULLIVAN COUNTY, NEW YORK**  
**INVENTORY No. NY 341**

**PHASE I INSPECTION REPORT**  
**NATIONAL DAM SAFETY PROGRAM**



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NEW YORK DISTRICT, CORPS OF ENGINEERS  
JULY 1981

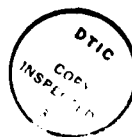
## PREFACE

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. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

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 frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

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. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid 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.



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PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
LAKE MUSKODAY DAM  
INVENTORY NO. NY 341  
DELAWARE RIVER BASIN  
SULLIVAN COUNTY, NEW YORK

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PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Lake Muskoday Dam  
State Located: New York  
County: Sullivan  
Watershed: Delaware River Basin  
Watercourse: Trout Brook  
Date of Inspection: April 8, 1981

ASSESSMENT

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies that need to be evaluated and remedied.

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped by all storms exceeding 11 percent of the Probable Maximum Flood (PMF). Dam overtopping, the resulting erosion of the embankment and hence, dam breaching would cause water surface levels downstream to reach depths which would pose significant danger to residents. Therefore, the spillway is adjudged to be seriously inadequate and the dam is assessed as unsafe, nonemergency.

The classification "unsafe" applied to a dam because of a seriously inadequate spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to life downstream of the dam.

It is recommended that the following additional investigations be performed by a registered professional engineer engaged by the owner:

1. Conduct a detailed hydrologic and hydraulic analysis to more accurately determine the site specific characteristics of the watershed.

2. Investigate the water flow that was evident in the downstream rockfill on either side of the spillway, including observation when lake levels vary, and determine the source of the flow, evaluate the potential for dam instability or failure and recommend remedial measures, if appropriate.

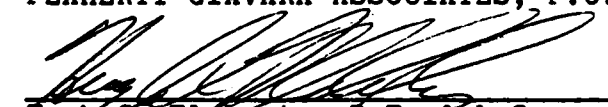
It is recommended that within 3 months of the final approval date of this report, both additional investigations should be initiated and within 18 months, appropriate remedial measures should be completed. In the interim, a plan for providing around-the-clock surveillance of the dam during periods of unusually heavy precipitation should be developed and implemented.

The following remedial measures should be completed within 12 months to correct existing deficiencies:

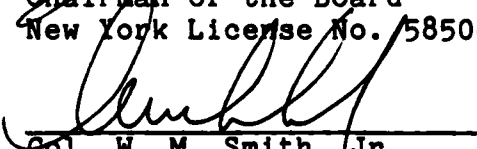
1. Clear brush, trees and debris from the downstream rockfill, and recut at least annually to maintain the cleared condition.
2. Fill and regrade the local potholes on the dam crest, and grade the roadway and its side ditches to avoid detrimental erosion at the dam.
3. Place rockfill or riprap erosion protection where the upstream earthen embankment has been eroded by wave action.
4. Develop and implement a flood warning and emergency evacuation plan to alert downstream residents in the event conditions occur which could result in failure of the dam.
5. A program for regular maintenance should be developed and implemented.

Submitted by:

FLAHERTY GIAVARA ASSOCIATES, P.C.

  
\_\_\_\_\_  
Hugh C. Flaherty, P.E. & L.S.  
Chairman of the Board  
New York License No. 58508

Approved by:

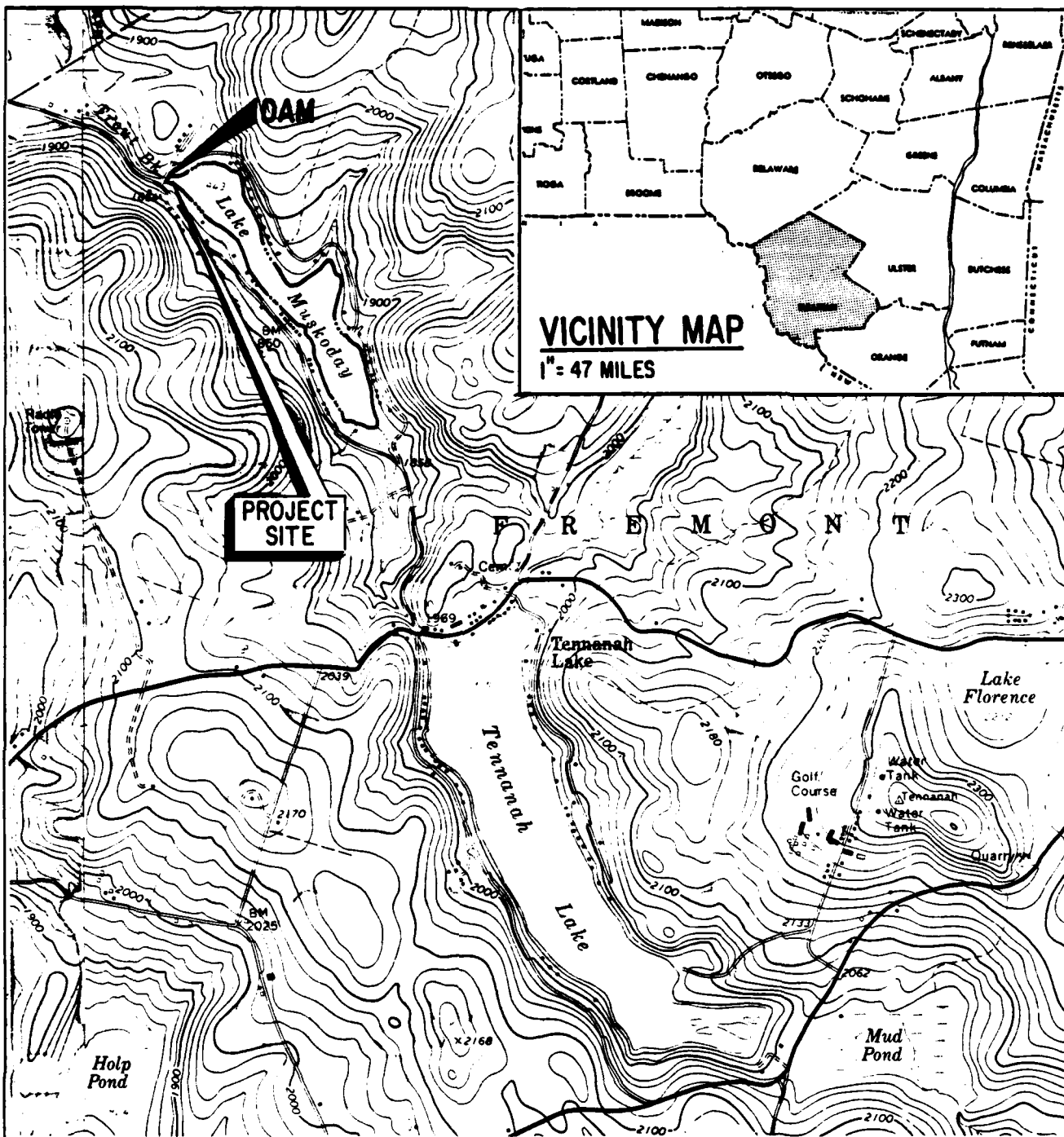
  
\_\_\_\_\_  
Col. W. M. Smith, Jr.  
New York District Engineer

Date:

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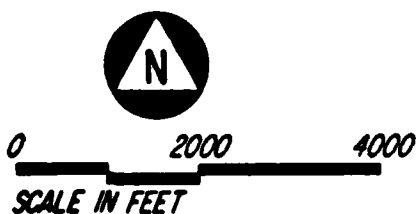


PHOTO #1: Overview of  
Lake Muskoday Dam  
Inventory No. NY 341



## LOCATION MAP

**LAKE MUSKODAY DAM**  
**INVENTORY No. NY 341**  
**DELAWARE RIVER BASIN**  
**SULLIVAN COUNTY**  
**FREMONT, NEW YORK**



FLAHERTY • GIAVARA ASSOCIATES, P.C.

NATIONAL DAM SAFETY PROGRAM  
PHASE I INSPECTION REPORT  
LAKE MUSKODAY DAM  
INVENTORY NO. NY 341  
D.E.C. NO. 147A-413  
DELAWARE RIVER BASIN  
SULLIVAN COUNTY, NEW YORK

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I Inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367. Flaherty Giavara Associates, P.C. has been retained by the New York District to inspect and report on selected dams in the State of New York. Authorization and notice to proceed was issued to Flaherty Giavara Associates, P.C. under a letter of December 24, 1980 from W. M. Smith Jr., Colonel, Corps of Engineers. Contract No. DACW 51-81-C-0006 has been assigned by the Corps of Engineers for this work.

b. Purpose

Evaluation of the existing conditions of the subject dam to identify deficiencies and hazardous conditions, determine if they constitute hazards to life and property and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

Lake Muskoday Dam consists of a stone masonry and stone fill structure with an upstream concrete wall and a concrete overflow spillway in the central portion. The 20 foot wide crest of the dam and a timber deck over the spillway carry a private access road to lakefront property. The total length of the dam is approximately 155 feet, including the 17.4 wide spillway section. A sketch plan and sections prepared by Sheldon Hadden, P.E. are shown on page D-9 in Appendix D.

The dam structure is approximately 17 feet high; it has an irregular upstream earthen slope below the projecting concrete wall and irregular downstream rockfill that has a slope in the range from 2 to 3 horizontal to 1 vertical. An old inspection report indicates that the up-

stream concrete wall extends 3 to 6 feet below the original ground surface to "hard pan" to form a cutoff.

The overflow spillway is 17.4 feet wide and is located in the center of the embankment. It has concrete abutments and wingwalls with a rockfill apron and a timber and steel bridge spans its width.

b. Location

Lake Muskoday Dam is located approximately 4.3 miles southwest of the village of Roscoe in the Town of Fremont, New York. The dam is located at latitude north  $41^{\circ}-54.8'$  and longitude west  $74^{\circ}-59.7'$  on the U.S. Geological Survey 7.5 minute series topographic map "Roscoe, New York". The Location Map on page i indicates where the dam is situated.

c. Size Classification

The maximum height of the dam is 17 feet and the maximum storage capacity is 370 acre-feet at the top of dam. Therefore, Lake Muskoday Dam is classified as a "Small" dam as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

There are three roads and approximately 4 dwellings within the dam failure flood hazard area. Therefore, the dam is in the "High" hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the Lake Muskoday Bungalow Colony, Inc. The address is as follows:

Owner

Contact: Ms. Dorothy B. Graham, Secretary  
Lake Muskoday Bungalow Colony, Inc.  
Lake Muskoday  
Roscoe, New York 12776

f. Purpose

The primary purpose of this dam is to maintain the water level of the lake for recreational use.

g. Design and Construction History

The dam was constructed in 1925. Some design data is documented in the application for the construction of the dam dated January 22, 1924 which is included in Appendix D. No other design or construction history data was obtained.

The only major post construction modification noted was the addition of riprap and stone masonry to the dam in 1975 and 1976.

h. Normal Operating Procedure

There are no regular operating procedures for this dam. The normal water level in the lake is maintained by the crest elevation of the spillway weir at 1843.0 (NGVD).

1.3 PERTINENT DATA

- |                                                                                                                    |           |
|--------------------------------------------------------------------------------------------------------------------|-----------|
| a. <u>Drainage Area (Square Miles)</u>                                                                             | 4.45      |
| b. <u>Discharge at Dam Site (CFS)</u>                                                                              |           |
| - Top of Dam                                                                                                       | 189       |
| - Crest of Overflow Spillway                                                                                       | -         |
| c. <u>Elevations (NGVD - estimated)</u>                                                                            |           |
| - Top of Dam                                                                                                       | 1845.6    |
| - Crest of Overflow Spillway                                                                                       | 1843.0    |
| - Reservoir Drain (outlet invert)                                                                                  | 1839.3±   |
| d. <u>Reservoir Surface Area (Acres)</u>                                                                           |           |
| - Top of Dam                                                                                                       | 57        |
| - Crest of Overflow Spillway                                                                                       | 50        |
| e. <u>Storage (Acre-Feet)</u>                                                                                      |           |
| - Top of Dam                                                                                                       | 370       |
| - Crest of Overflow Spillway                                                                                       | 240       |
| f. <u>Dam</u>                                                                                                      |           |
| - Type: Stone fill between stone masonry and concrete walls and a concrete cutoff with a rockfill downstream slope |           |
| - Length (Feet)                                                                                                    | 155       |
| - Upstream Slope (H:V)                                                                                             | varies    |
| - Downstream Slope (H:V)                                                                                           | 2.0-3.0:1 |
| - Crest Width (Feet)                                                                                               | 20        |

g. Overflow Spillway

- Type: Concrete weir with concrete abutments and a rockfill apron
- Length (Feet) 17.4
- Width (Feet) 20
- Side Slopes (H:V) vertical
- Channel Bottom Slopes (Feet/Foot) -
- Control: None

h. Reservoir Drain

- Type: 24 inch diameter corrugated metal pipe (25 feet long)
- Control: "Stopboards"

## SECTION 2 - ENGINEERING DATA

### 2.1 GEOTECHNICAL DATA

#### a. Geology

The Lake Muskoday Dam is located on Trout Brook, a north-westerly flowing tributary to the Beaver Kill, about 4.3 miles southwest of the village of Roscoe, a short distance south of the Delaware-Sullivan county line, in the Catskill Mountain subprovince of the Appalachian (Allegheny) Plateau physiographic province of New York State.

The topography in the area ranges from elevation 1840 at the downstream toe of the dam to approximately elevation 2200 at the summits of the hills surrounding the dam and lake area.

The underlying bedrock at the site consists of the Slide Mountain Formation belonging to the Upper Devonian West Falls Group. This formation is the terrestrial deposit of the Catskill Delta and consists of a medium to coarse-grained, red, silty sandstone and conglomerate containing minor amounts of red silty shale. It was derived from a combination of distributary channel, floodplain, and beach deposits.

Above the bedrock, the valley bottom and side slopes are mantled by a heterogeneous mixture of clay, silt, sand and rock fragments known as glacial till, deposited at the base of ice sheets which once covered the region.

#### b. Subsurface Conditions

There is no record of subsurface explorations at the site of Lake Muskoday Dam; however, the original application for construction of the dam, dated January 22, 1924 and included in Appendix D, refers to "clay on surface with hard pan about 2 ft." down.

### 2.2 DESIGN RECORDS

Some design information from the original application for the construction of the dam is included in Appendix D. No other design records were obtained.

### 2.3 CONSTRUCTION RECORDS

This dam was constructed in 1925. A plan, and sections of the dam are included on page D-9 in Appendix D. No other construction records were obtained.

2.4 OPERATION RECORDS

No operation records were obtained for this dam.

2.5 EVALUATION OF DATA

The data presented herein was obtained from the files of the New York State Department of Environmental Conservation (DEC). This information appears to be reliable and adequate for the purposes of a Phase I Inspection Report.

## SECTION 3 - VISUAL INSPECTION

### 3.1 FINDINGS

#### a. General

A visual inspection of the Lake Muskoday Dam was conducted on April 8, 1981. The weather was sunny and the temperature was 60+°F. At the time of the inspection, water was flowing in the overflow spillway (See Photos No. 7 and 9).

#### b. Dam

The masonry and stone fill dam structure is generally in fair condition (See Photos No. 4 and 5). There was no visible evidence of significant lateral movement or settlement, or major erosion, but there was moderate water flow from the rockfill on either side of the spillway.

The following specific items were noted:

1. Water flow estimated at a rate greater than 40 gallons per minute (GPM) was exiting from the rockfill on either side of the spillway 2 to 2.5 feet above the downstream water level (See Photo No. 12). Spillway discharge may have dispersed laterally among the rocks to contribute to this flow, but some appeared to come from the dam structure. While sediment was not evident in the flow, there was some medium to fine sand on the channel bottom where the water velocity slowed.
2. There has been local erosion of the upstream earthen embankment at and slightly above the waterline, apparently due to wave action (See Photo No. 6). Occasional exposed rocks may be partial riprap protection.
3. The partially-paved roadway along the dam crest has local shallow potholes, apparently due to traffic under wet conditions (See Photo No. 3).
4. At either end of the dam, the downstream rockfill slope has weeds and brush, some debris and at least one tree among the rock fragments (See Photos No. 10 and 11).
5. The swale between the downstream slope and the right abutment has undergone some erosion where the roadside ditch drains into the stream.

c. Overflow Spillway

The overflow spillway consists of a 17.4 foot wide broad-crested weir and rockfill apron (See Photos No. 8 and 9). A timber plank and steel beam bridge spans the weir, which was free of debris and in good condition at the time of inspection.

d. Downstream Channel

The natural channel downstream from the dam has a width of 25+ feet (See Photo No. 13). The stream contains riffles and pools with bed material ranging in gradation from fine to coarse gravel with some cobbles. Immediately downstream of the dam, the bank stability is good and there are no channel obstructions.

e. Reservoir - Storage Pool Area

The lake shoreline is generally wooded or developed with cabins; it ranges from gently to steep sloping, but the steeper portions are rock-controlled and there is no significant possibility of landslides into the lake affecting the safety of the dam.

3.2 EVALUATION OF OBSERVATIONS

The visual inspection revealed several deficiencies on this structure. The following observations were made:

- a. (1) Water flow estimated at greater than 40 GPM was exiting from the rockfill on either side of the overflow spillway.
- b. (2) At and slightly above the waterline, there was local erosion of the upstream embankment.
- c. (3) The partially-paved roadway along the dam crest has local, shallow potholes.
- d. - At both ends of the dam, the downstream rockfill slope has weeds, brush, some debris and at least one tree among the rock fragments.
- e. 5 The swale between the downstream slope and the right abutment has undergone some erosion.

## SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

### 4.1 PROCEDURES

The normal water surface level is maintained by the crest of the spillway weir at elevation 1843.0 (NGVD). No operational procedures are in effect at this time.

### 4.2 MAINTENANCE OF DAM

There was no evidence of any routine maintenance operations directed toward the Lake Muskoday Dam structure; however, the roadway and the upstream grassed areas do appear to be maintained. In addition, a September, 1975 letter to the State indicates that the downstream rockfill may have been placed in 1975 or 1976 to reinforce the dam.

### 4.3 WARNING SYSTEM

No warning system is presently in effect.

### 4.4 EVALUATION

Presently, no operation or maintenance procedures are in effect for this dam. Therefore, a program of regular operation and maintenance procedures should be implemented.

## SECTION 5 - HYDROLOGIC/HYDRAULIC

### 5.1 DRAINAGE AREA CHARACTERISTICS

The dam is located in the Town of Fremont on Trout Brook, approximately 7.9 miles upstream of the Beaver Kill. The Beaver Kill joins the Delaware River near the village of Hancock, approximately sixty-nine miles upstream of Port Jervis, New York.

The watershed (shown on the Watershed Map on Page C-5 in Appendix C) consists of 2,847 acres (4.45 square miles) of rolling to hilly uplands with typical slopes of 10 percent. Land within the watershed is primarily undeveloped with extensive woodlands. Tennenah Lake, which has a surface area of 166 acres (0.26 square miles), is located within the watershed 1.5+ miles upstream of Lake Muskoday Dam. The only other major upstream storage area is a swamp which has an area of approximately 35 acres and is situated on a tributary to Tennenah Lake.

The watercourse upon which the reservoir is located, is a perennial stream with a typical flow width of 25 feet and a typical flow depth of 8 inches.

### 5.2 ANALYSIS CRITERIA

The purpose of the hydrologic/hydraulic analysis is to evaluate the spillway capacity and the potential for overtopping. The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers' HEC-1 Computer Model - Dam Safety Version. The procedure included determining the Probable Maximum Flood (PMF) runoff from the watershed and routing the inflow hydrograph through the impoundment to determine the outflow hydrograph. The unit hydrograph was defined by the Snyder Synthetic Unit Hydrograph method, and the Modified Puls routing procedure was incorporated.

The initial rainfall loss was assumed to be 1.0 inches, and the uniform rainfall loss was assumed to be 0.1 inches per hour. In accordance with recommended guidelines of the Corps of Engineers, the Probable Maximum Precipitation (PMP) was 20.7 inches (24 hour duration, 200 square mile area).

The analysis was conducted for both the full PMF and for several fractional PMF conditions. The PMF inflow of 5,138 CFS was routed through the reservoir and the peak outflow was determined to be 4,687 CFS.

### 5.3 SPILLWAY CAPACITY

The total outlet capacity is the discharge from the overflow spillway.

The overflow spillway consists of a 17.4 foot wide broad-crested concrete weir and a rockfill apron. The weir is divided into two sections, one 8.5 feet wide and the other 8.9 feet wide, which are separated by a concrete pier for the bridge.

The stage discharge data for the overflow spillway capacity was calculated for the stages tabulated below:

| <u>Stage<br/>(Feet)</u> | <u>Discharge Capacity<br/>(CFS)</u> | <u>Element<br/>of Structure</u> |
|-------------------------|-------------------------------------|---------------------------------|
| 1843.0                  | 0                                   | Overflow Spillway<br>Crest      |
| 1843.5                  | 19                                  | --                              |
| 1844.0                  | 52                                  | --                              |
| 1844.5                  | 96                                  | --                              |
| 1844.7                  | 116                                 | Bottom of Bridge                |
| 1844.8                  | 132                                 | --                              |
| 1845.2                  | 166                                 | --                              |
| 1845.6                  | 189                                 | Top of Dam                      |

The total spillway capacity at the top of dam is 189 CFS.

### 5.4 RESERVOIR CAPACITY

The storage capacity of the lake was obtained from the application for the reconstruction of the dam dated May 21, 1937 for the stages indicated below:

| <u>Stage<br/>(Feet)</u> | <u>Storage<br/>(Acre-Feet)</u> | <u>Storage<br/>(Inches of Runoff)</u> |
|-------------------------|--------------------------------|---------------------------------------|
| 1843.0                  | 240                            | 1.01                                  |
| 1845.6                  | 370                            | 1.56                                  |

### 5.5 FLOODS OF RECORD

No data regarding flood levels was obtained for this dam.

### 5.6 OVERTOPPING POTENTIAL

The results of the HEC-1 DB computer analysis indicate that the crest of the dam is overtopped by all storms exceeding 11 percent of the PMF event. The PMF discharge rate of 4,687 cubic feet per second (CFS) would occur at a peak flood stage of 1850.9 feet, which is 5.3 feet above the crest of the dam.

The results of the analysis are tabulated below:

| <u>Flood<br/>Condition</u> | <u>Peak<br/>Inflow<br/>(CFS)</u> | <u>Peak<br/>Outflow<br/>(CFS)</u> | <u>Maximum<br/>Stage<br/>Elevation<br/>(NGVD)</u> |
|----------------------------|----------------------------------|-----------------------------------|---------------------------------------------------|
| 0.5 PMF                    | 2566                             | 2242                              | 1848.7                                            |
| 1.0 PMF                    | 5138                             | 4687                              | 1850.9                                            |

#### 5.7 EVALUATION

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the capacity of the overflow spillway is not adequate to pass either the full PMF or one half the PMF; only approximately 11 percent of the outflow from the PMF can be safely passed before overtopping will occur. The PMF event would overtop the dam for a duration of 22.5 hours and the maximum depth of flow over the crest would be 5.3 feet. It is estimated that breaching of the dam as a result of overtopping, would cause water surface levels downstream to reach depths which would pose significant danger to residents. Therefore, the spillway is adjudged to be seriously inadequate and the dam is assessed as unsafe, nonemergency.

## SECTION 6 - STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

#### a. Visual Observations

There was no visible evidence of major settlement or lateral movement of the upstream concrete wall, or overall structural instability of the dam during the site examination. The flow from beneath the downstream rockfill on either side of the overflow spillway is not an immediate reason to question the static structural stability of the dam, but it could adversely affect stability if there is active erosion of foundation soil.

#### b. Design and Construction Data

The 1924 and 1975 sketches of Lake Muskoday Dam included in Appendix D, show a configuration for the dam and overflow spillway that generally corresponds to the conditions observed during the visual examination on April 8, 1981.

There is no construction data to confirm the actual physical properties and configuration of the stone fill in the dam structure. However, the dam proportions including the downstream rockfill are considered to be reasonable for the height of the structure and therefore, the dam would be expected to have adequate safety margins with respect to stability under static loading conditions.

#### c. Operating Records

No operating records were obtained for Lake Muskoday Dam.

#### d. Post Construction Changes

The only major post construction modification noted was the addition of riprap and stone masonry to the dam in 1975 and 1976.

#### e. Seismic Stability

The Lake Muskoday Dam is located in Seismic Zone 1 and in accordance with recommended Phase I guidelines does not require seismic analysis.

## SECTION 7 - ASSESSMENT/RECOMMENDATIONS

### 7.1 ASSESSMENT

#### a. Condition

On the basis of the visual examination, there were no signs of impending structural failure or other conditions which would warrant urgent remedial action; however, the apparent seepage flow is a significant deficiency which should have further investigation.

#### b. Adequacy of Information

The evaluation of this dam is based primarily on visual examination, reference to the 1924 and 1975 sketches, approximate hydraulic and hydrologic computations, and application of engineering judgement. The available information that was obtained is adequate for the purposes of a Phase I assessment.

#### c. Need for Additional Investigations

It is recommended that the following additional investigations be performed by a registered professional engineer engaged by the owner:

1. Conduct a detailed hydrologic and hydraulic analysis to more accurately determine the site specific characteristics of the watershed.
2. Investigate the water flow that was evident in the downstream rockfill on either side of the spillway, including observation when lake levels vary, and determine the source of the flow, evaluate the potential for dam instability or failure and recommend remedial measures, if appropriate.

#### d. Urgency

It is recommended that within 3 months of the final approval date of this report, both additional investigations should be initiated and within 18 months, appropriate remedial measures should be completed. In the interim, a plan for providing around-the-clock surveillance of the dam during periods of unusually heavy precipitation should be developed and implemented. The recommended corrective measures presented in Section 7.2 should be completed within 12 months of final approval.

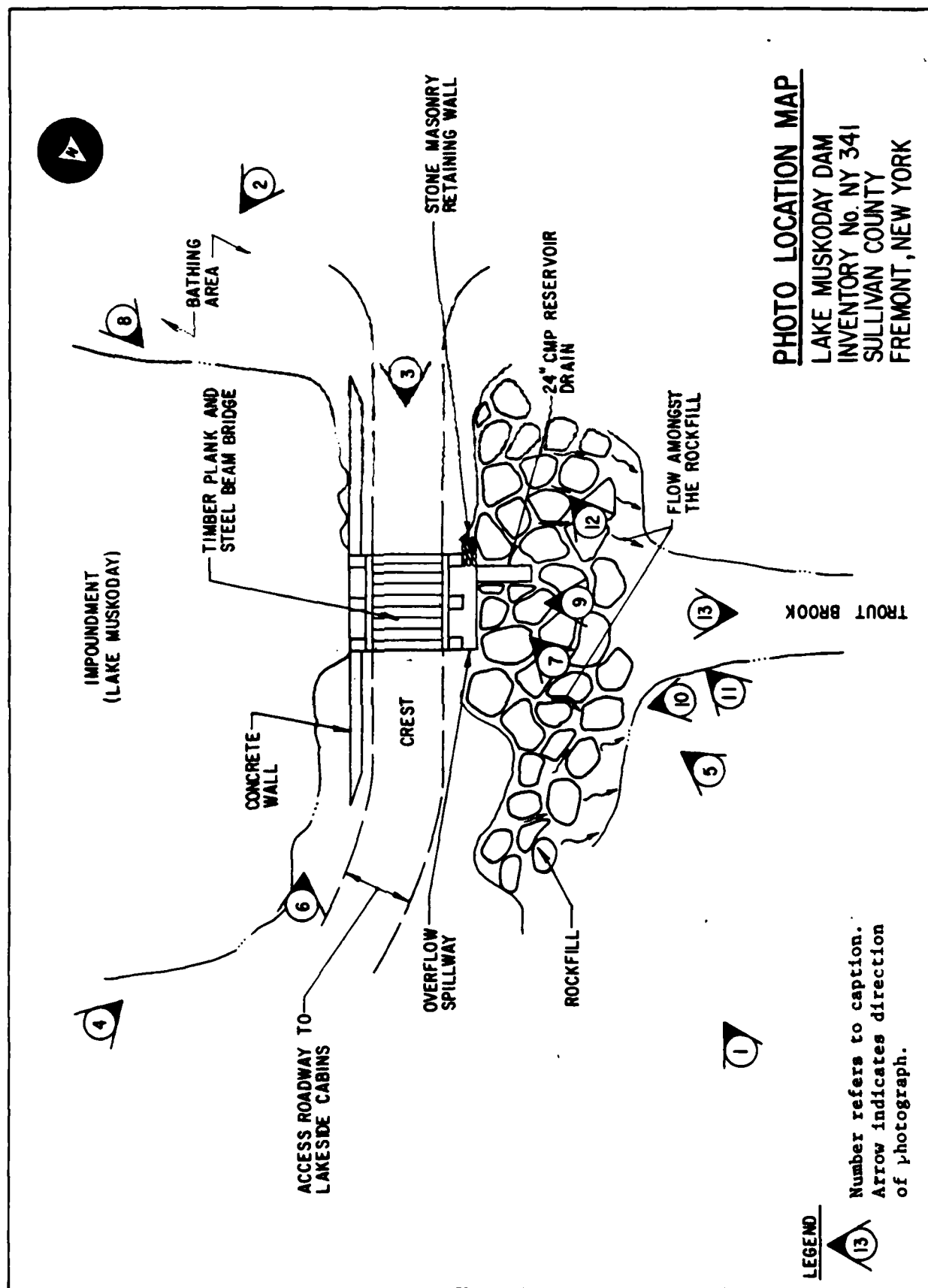
## 7.2 RECOMMENDED MEASURES

It is considered important that the following items be accomplished in addition to any items required as a result of the additional investigations recommended in Section 7.1c:

- a. Clear brush, trees and debris from the downstream rock-fill, and recut at least annually to maintain the cleared condition.
- b. Fill and regrade the local potholes on the dam crest, and grade the roadway and its side ditches to avoid detrimental erosion at the dam.
- c. Place rockfill or riprap erosion protection where the upstream earthen embankment has been eroded by wave action.
- d. Develop and implement a flood warning and emergency evacuation plan to alert downstream residents in the event conditions occur which could result in failure of the dam.
- e. A program for regular maintenance should be developed and implemented.

APPENDIX A

PHOTOGRAPHS



# **PHOTO LOCATION MAP**

LAKE MUSKODAY DAM  
INVENTORY No. NY 341  
SULLIVAN COUNTY  
FREMONT, NEW YORK

## **LEGEND**

Number refers to caption.  
Arrow indicates direction  
of photograph.



PHOTO #2: Overview of beach area and impoundment



PHOTO #3: Crest of dam looking toward right abutment



PHOTO #4: Overview of upstream face of dam



PHOTO #5: Overview of downstream face of dam

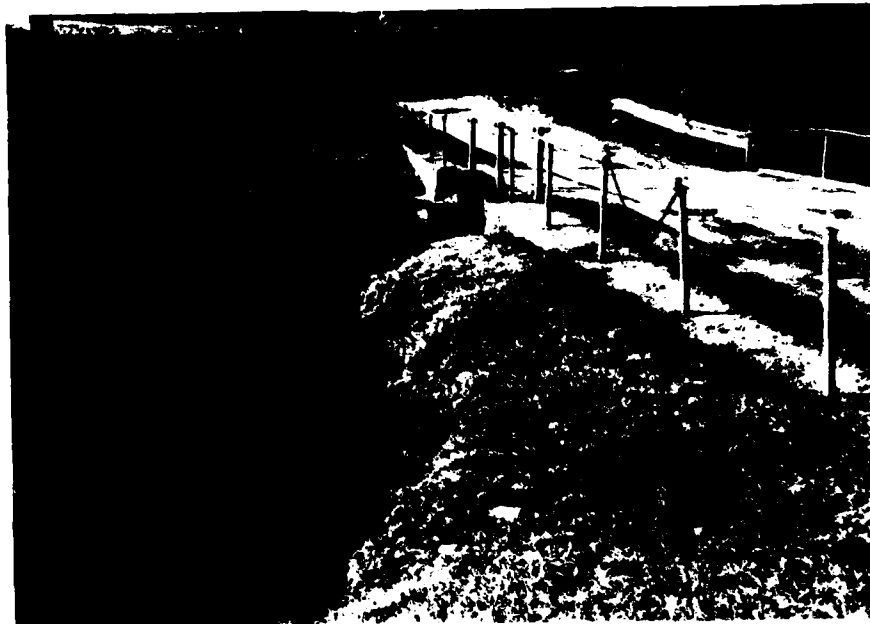


PHOTO #6: Upstream face of dam



PHOTO #7: Downstream face of dam

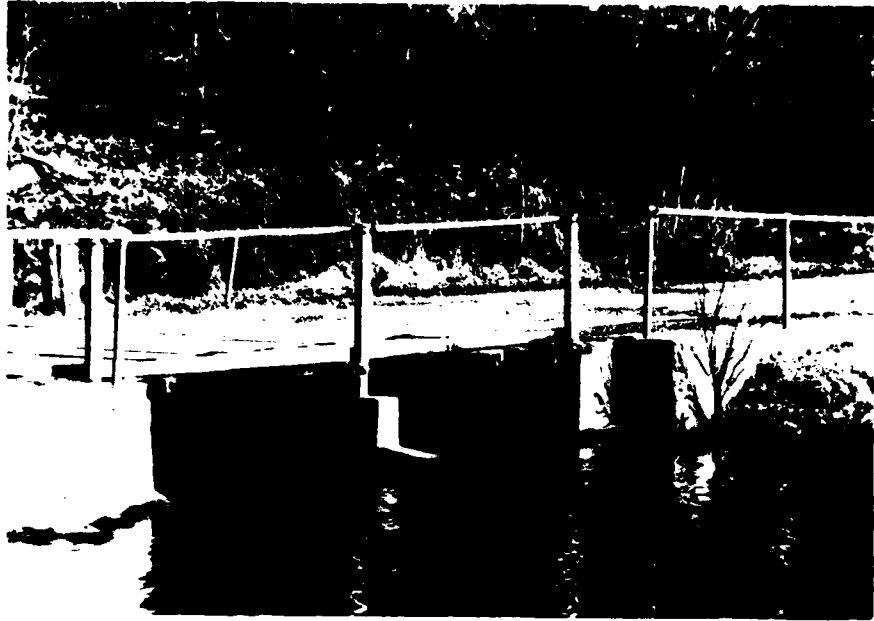


PHOTO #8: Spillway from upstream



PHOTO #9: Spillway from downstream



PHOTO #10: Rockfill on downstream slope at right abutment



PHOTO #11: Rockfill on downstream slope at left abutment

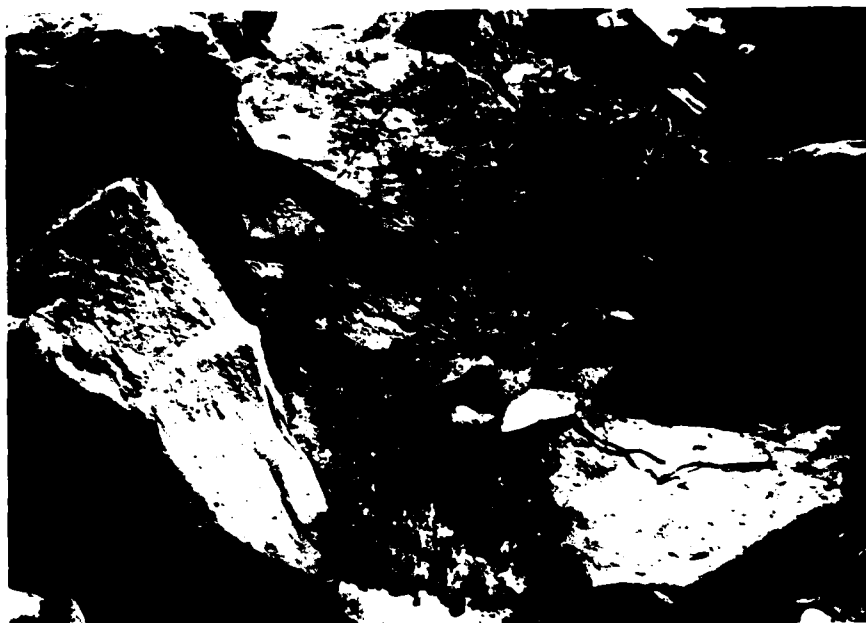


PHOTO #12: Water flowing from under rockfill at  
left abutment



PHOTO #13: Downstream channel conditions

APPENDIX B  
VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Lake Muskoday Dam  
Fed. I.D. # NY 341 DEC Dam No. 147A-413  
River Basin Delaware  
Location: Town Fremont County Sullivan  
Stream Name Trout Brook  
Tributary of Beaver Kill  
Latitude (N) 41° - 54.8' Longitude (W) 74° - 59.7'  
Type of Dam Stone fill between concrete and stone masonry walls with a concrete overflow spillway  
Hazard Category High  
Date(s) of Inspection April 8, 1981  
Weather Conditions Sunny, 60° + F.  
Reservoir Level at Time of Inspection Elevation 1483.1 + (NGVD)

b. Inspection Personnel T.L.Ward & R.A. Criscuolo of Flaherty Giavara Associates, P.C.;  
P. L. LeCount of Haley & Aldrich, Inc.; B. McL. Whittingham of Salmon Associates

c. Persons Contacted (Including Address & Phone No.) \_\_\_\_\_

None

d. History:

Date Constructed 1925 Date(s) Reconstructed Never

Designer Unknown

Constructed By Unknown

Owner Lake Muskoday Bungalow Colony, Inc.

2) Embankment

a. Characteristics

- (1) Embankment Material Stone fill between stone masonry and  
concrete walls
- (2) Cutoff Type Concrete wall extends to "hardpan"
- (3) Impervious Core Upstream concrete wall
- (4) Internal Drainage System None observed
- (5) Miscellaneous No comments

b. Crest

- (1) Vertical Alignment Good; except for local small depressions (potholes)
- (2) Horizontal Alignment Good; substantially straight
- (3) Surface Cracks None observed
- (4) Miscellaneous Small depressions (potholes) apparently from traffic during  
wet conditions; grass at edge of road

c. Upstream Slope

- (1) Slope (Estimate - V:H) Irregular
- (2) Undesirable Growth or Debris, Animal Burrows Grass above and below embedded  
concrete wall; no animal burrows were noted
- (3) Sloughing, Subsidence or Depressions Grass is undercut by wave action at  
edge of water

(4) Slope Protection Occasional rock at water's edge, may be result  
of erosion

(5) Surface Cracks or Movement at Toe None evident

d. Downstream Slope

(1) Slope (Estimate - V:H) 1:2 to 1:3

(2) Undesirable Growth or Debris, Animal Burrows Brush, grass and weeds among  
large rock fragments and some debris

(3) Sloughing, Subsidence or Depressions Erosion below right abutment where  
roadway ditch drains down to stream

(4) Surface Cracks or Movement at Toe None apparent; although rock slabs below  
right abutment may have been displaced

(5) Seepage Moderate flow through rockfill on either side of spillway (estimated  
at 40 GPM for each side); no obvious sediment in flow, but some medium to  
fine sand on bottom where velocity decreases

(6) External Drainage System (Ditches, Trenches, Blanket) None observed

(7) Condition Around Outlet Structure Rockfill slope and apron

(8) Seepage Beyond Toe None evident

e. Abutments - Embankment Contact

Left: good condition

Right: good condition

(1) Erosion at Contact Described in 2)d. (3)

(2) Seepage Along Contact None obvious; however, seepage through rockfill described in 2)d.(5) may also be along abutment contacts

3) Drainage System

a. Description of System Broad-crested concrete weir and rockfill discharge slope and apron leading to the natural streambed

b. Condition of System Good

c. Discharge from Drainage System Rockfill discharge slope dropping approximately 10 feet from weir to streambed

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)

None observed

1

5) Reservoir

- a. Slopes Rock-controlled steep slopes to gentle, wooded slopes and lakeside cabins border the impoundment
- b. Sedimentation Possible accumulation of sediment behind the dam
- c. Unusual Conditions Which Affect Dam None noted

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) Approximately 4 dwellings, and three roads are within the dam failure flood hazard area
- b. Seepage, Unusual Growth None observed
- c. Evidence of Movement Beyond Toe of Dam None evident
- d. Condition of Downstream Channel Good; fine to coarse gravel streambed material with some cobbles; no obstructions

7) Spillway(s) (Including Discharge Conveyance Channel)

Overflow spillway and discharge channel

- a. General Overflow spillway and discharge channel handle all flows
- b. Condition of Overflow Spillway Good; no signs of deterioration

c. Condition of Emergency Spillway Not applicable

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

d. Condition of Discharge Conveyance Channel Good condition, presently stable

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

8) Reservoir Drain/Outlet

Type: Pipe X Conduit \_\_\_\_\_ Other \_\_\_\_\_

Material: Concrete \_\_\_\_\_ Metal Corrugated Metal Other \_\_\_\_\_

Size: 24 inch Length 25 feet

Invert Elevations: Entrance \_\_\_\_\_ Submerged \_\_\_\_\_ Exit 1839.3+ (NGVD)

Physical Condition (Describe): \_\_\_\_\_ Unobservable \_\_\_\_\_

Material: Good

Joints: Unknown Alignment Good, for visible section

Structural Integrity: Appears to be good

\_\_\_\_\_

Hydraulic Capability: Appears to be good

\_\_\_\_\_

Means of Control: Gate "Stop boards" Valve \_\_\_\_\_ Uncontrolled \_\_\_\_\_

Operation: Operable \_\_\_\_\_ Inoperable \_\_\_\_\_ Uncontrolled \_\_\_\_\_

Present Condition (Describe): Good; however, the "stop boards" were not  
removed during the inspection

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

9) Structural

a. Concrete Surfaces Concrete of the overflow spillway is in good condition  
with only very minor spalling

b. Structural Cracking No evidence of any structural cracks

c. Movement - Horizontal & Vertical Alignment (Settlement) None apparent

d. Junctions with Abutments or Embankments Good condition; one-eighth inch  
vertical separation at northeast corner

e. Drains - Foundation, Joint, Face None evident

f. Water Passages, Conduits, Sluices Good condition

g. Seepage or Leakage Described in 2) d. (5)

- h. Joints - Construction, etc. Good condition; but slight mismatch (gap)  
between parapet and left end of spillway deck
- i. Foundation Inaccessible
- j. Abutments See 9) d. above
- k. Control Gates None observed
- l. Approach & Outlet Channels Not applicable
- m. Energy Dissipators (Plunge Pool, etc.) Overflow spillway discharges  
to rockfill slope and apron
- n. Intake Structures Not applicable
- o. Stability Appears to be stable
- p. Miscellaneous No comments

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

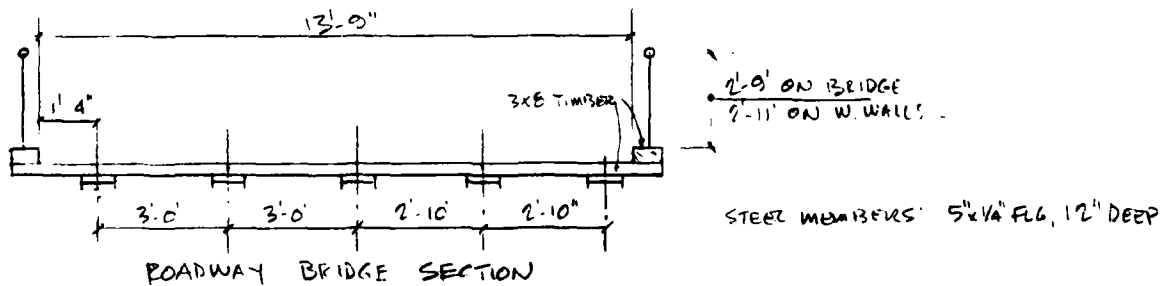
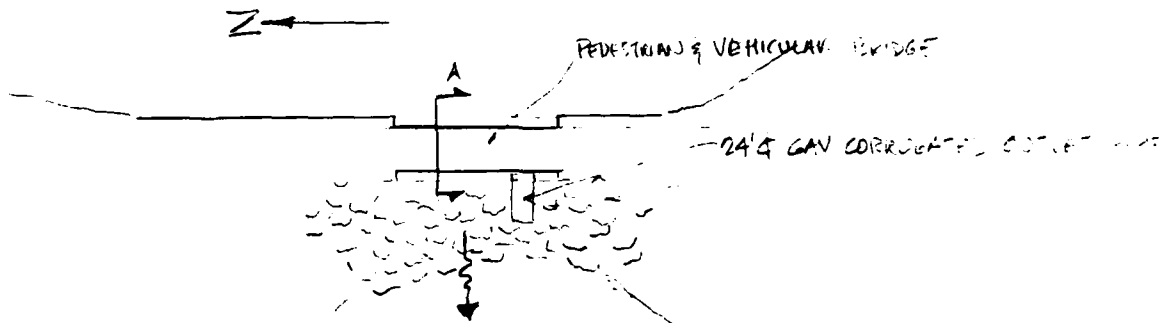
a. Description and Condition None observed

[illegible]

# SALMON ASSOCIATES • Consulting Engineers

BY EW DATE \_\_\_\_\_ SUBJECT LAYE MUSKOGEE A-1 DAM SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_  
 CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_ JOB NO. SCA1

LAYE MUSKOGEE

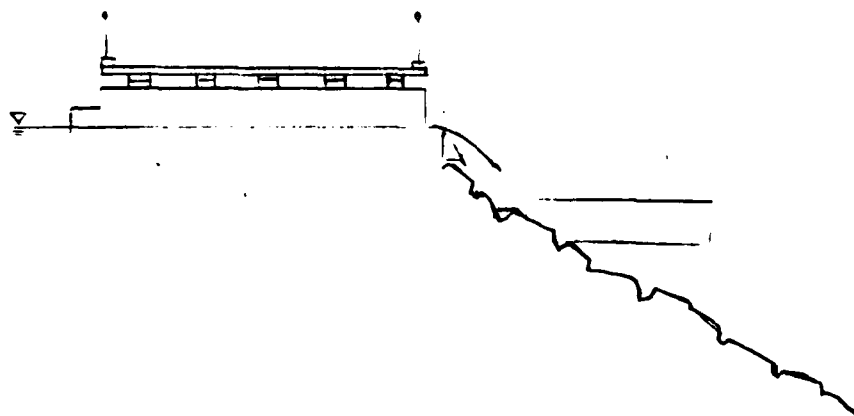
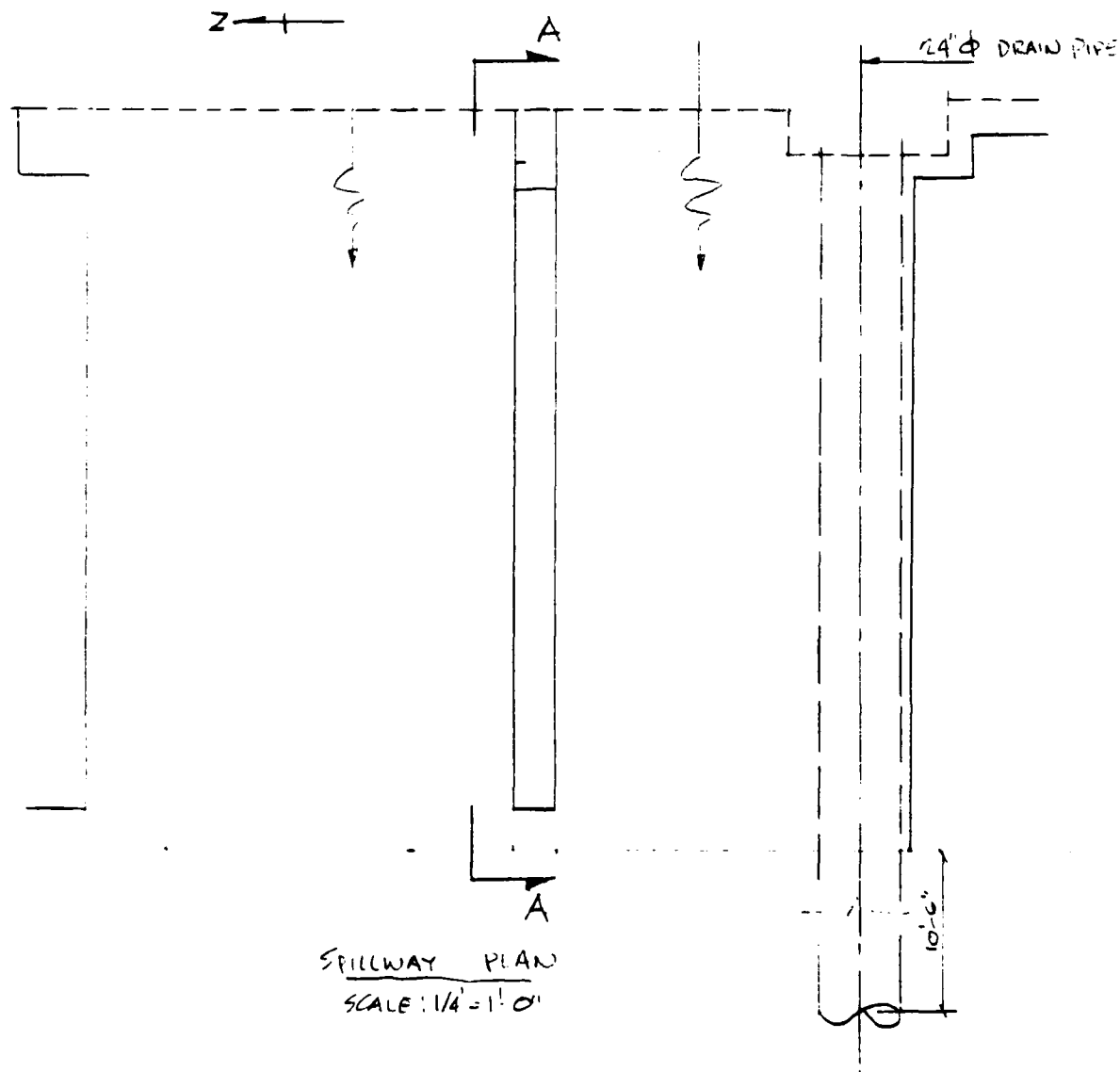


# SALMON ASSOCIATES • Consulting Engineers

BY E. J. J. DATE \_\_\_\_\_  
 CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

SUBJECT LAKE WUSKOLU LAKE

SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_  
 JOB NO. 211



APPENDIX C .

HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

AREA-CAPACITY DATA:

|                                            | <u>Elevation</u><br>(ft.) | <u>Surface Area</u><br>(acres) | <u>Storage Capacity</u><br>(acre-ft.) |
|--------------------------------------------|---------------------------|--------------------------------|---------------------------------------|
| 1) Top of Dam                              | <u>1845.6</u>             | <u>57</u>                      | <u>370</u>                            |
| 2) Design High Water<br>(Max. Design Pool) | <u>--</u>                 | <u>--</u>                      | <u>--</u>                             |
| 3) Emergency Spillway<br>Crest             | <u>--</u>                 | <u>--</u>                      | <u>--</u>                             |
| 4) Pool Level with<br>Flashboards          | <u>--</u>                 | <u>--</u>                      | <u>--</u>                             |
| 5) Overflow Spillway<br>Crest              | <u>1843.0</u>             | <u>50</u>                      | <u>240</u>                            |

DISCHARGES:

|                                                        | <u>Volume</u><br>(cfs) |
|--------------------------------------------------------|------------------------|
| 1) Average Daily                                       | <u>Unknown</u>         |
| 2) Overflow Spillway @ Maximum High Water (Top of Dam) | <u>189</u>             |
| 3) Emergency Spillway @ Design High Water              | <u>--</u>              |
| 4) Principal Spillway @ Emergency Spillway Crest       | <u>--</u>              |
| 5) Low Level Outlet @ Principal Spillway Crest         | <u>25</u>              |
| 6) Total (of all facilities) @ Maximum High Water      | <u>214</u>             |
| 7) Maximum Known Flood                                 | <u>Unknown</u>         |
| 8) At Time of Inspection                               | <u>2+</u>              |

CREST:

ELEVATION: 1845.6 (NGVD)

Type Earthen crest above embankment of stone fill between concrete and stone masonry wall

Width 20 feet Length 155 feet

Spillover Concrete overflow spillway weir

Location Center of embankment

SPILLWAY:

| OVERFLOW           |                                                                              | EMERGENCY |
|--------------------|------------------------------------------------------------------------------|-----------|
| 1843.0 (NGVD)      | Elevation                                                                    |           |
| Broad-crested weir | Type                                                                         |           |
| 20 feet            | Width                                                                        |           |
|                    | Type of Control                                                              |           |
| Weir               | Uncontrolled                                                                 |           |
| --                 | Controlled                                                                   |           |
| None               | Type:                                                                        |           |
|                    | (Flashboards; gate)                                                          |           |
| One                | Number                                                                       |           |
| 17.4 foot weir     | Size/Length                                                                  |           |
| Concrete           | Invert Material                                                              |           |
| Continuously       | Anticipated Length<br>of Operating Service                                   |           |
| Unknown            | Chute Length                                                                 |           |
| Unknown            | Height Between<br>Spillway Crest<br>& Approach Channel<br>Invert (Weir Flow) |           |

Type: \_\_\_\_\_

Location: \_\_\_\_\_

Records:

Date Unknown

Max. Reading Unknown

**FLOOD WATER CONTROL SYSTEM:**

Warning System None in effect

Method of Controlled Releases (mechanisms) "Stop boards" control the reservoir  
drain

DRAINAGE AREA: 2,847 acres = 4.45 square miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type Rural, Woodlands

Terrain - Relief Rolling to hilly uplands

Surface - Soil Glacial till

Runoff Potential (existing or planned extensive alterations to existing surface or subsurface conditions)

Primarily woodlands with scattered open fields; glacial till soils;

average watershed slope is 10  $\pm$  percent, some residential homes and

roadways; some future development around lake possible

Potential Sedimentation problem areas (natural or man-made; present or future)

None

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

Flooding of some lakeside cabins is possible

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the reservoir perimeter:

Location: None

Elevation: \_\_\_\_\_

Reservoir:

Length @ Maximum Pool 4500  $\pm$  feet = 0.9 miles (Miles)

Length of Shoreline (@ Spillway Crest) 10,500  $\pm$  feet=2.0 miles (Miles)



0 2000 4000  
SCALE IN FEET

## **WATERSHED MAP**

**LAKE MUSKODAY DAM**  
**INVENTORY No. NY 341**

**DELAWARE RIVER BASIN**  
**SULLIVAN COUNTY**  
**FREMONT, NEW YORK**

**FLAHERTY - GIAVARA ASSOCIATES, P.C.**

CALCULATIONS



WATERSHED DATA - LAKE MUSKODAY  
 FOR HEC-1 SNYDER HYDROGRAPH

INFLOW TO TENNANAH LAKE

$$L = 6000 \text{ FT} = 1.14 \text{ miles}$$

$$L_c = 2000 \text{ FT} = 0.38 \text{ miles}$$

$$C_p = 2.0 \text{ for average slopes}$$

$$1) T_p = 2.0 (1.14 \times 0.38)^{0.3}$$

$$= 1.56 \text{ HOURS}$$

$$t_r = \frac{t_p}{5.5} = \frac{1.56}{5.5} = 0.28 \quad \text{USE } t_r = 0.5$$

$$t_{pR} = t_p + 0.25(t_r - t_p)$$

$$= 1.56 + 0.25(0.5 - 0.28)$$

$$= 1.62 \text{ HOURS}$$

$$2) C_p = 0.63 \text{ FOR HIGHLAND AREA}$$

$$3) \% \text{ IMPERVIOUS - TENNANAH LAKE}$$

$$\text{ROADS } 36,000 \text{ LF} \times 25' = 900,000 \text{ ft}^2$$

$$\text{HOUSES } \pm 125 @ 1000 \text{ ft}^2 = \frac{125,000 \text{ ft}^2}{1,025,000 \text{ ft}^2}$$

$$1,025,000 \text{ ft}^2 = 23.5 \text{ acres}$$

$$\frac{23.5 \text{ acres}}{1643.7 \text{ acres}} = 1.4\%$$

$$4) \text{ WATERSHED AREA - TENNANAH LAKE}$$

$$1643.7 \text{ acres} / 640 = 2.57 \text{ Square miles}$$

Based on 1" = 2000' USGS MAP



INFLOW TO LAKE MUSKODAY

$$L = 4500 \text{ ft} = 0.85 \text{ miles}$$

$$L_c = 2000 \text{ ft} = 0.38 \text{ miles}$$

$$C_r = 2.0 \text{ for average slopes}$$

$$\begin{aligned} 5) T_p &= C_r (L \times L_c)^{0.3} \\ &= 2.0 (0.85 \times 0.38)^{0.3} = 1.42 \text{ Hours} \end{aligned}$$

$$t_r = \frac{t_p}{5.5} = \frac{1.42}{5.5} = 0.26 \quad \text{USE } t_r = 0.5$$

$$\begin{aligned} t_{pR} &= t_p + 0.25 (t_r - t_r) \\ &= 1.42 + 0.25 (0.5 - 0.26) \\ &= 1.48 \text{ Hours} \end{aligned}$$

$$6) C_p = 0.63 \text{ FOR HIGHLAND AREA}$$

$$7) \% \text{ IMPERVIOUS - LAKE MUSKODAY}$$

$$\begin{aligned} \text{ROADS } 18,000 \text{ LF} \times 25 \text{ LF} &= 450,000 \text{ FT}^2 \\ \text{HOUSES } \pm 70 @ 1000 \text{ FT}^2 &= \frac{70,000 \text{ FT}^2}{520,000 \text{ FT}^2} \end{aligned}$$

$$520,000 \text{ FT}^2 = 11.9 \text{ AC}$$

$$8) \text{ WATERSHED AREA - LAKE MUSKODAY}$$

$$12029 \text{ AC} / 640 = 1.88 \text{ Square Miles}$$

PROJECT CORPS DAMS  
NY 341  
LAKE MUSKOGA



FLAHERTY-GIAVARA ASSOCIATES  
ENVIRONMENTAL DESIGN CONSULTANTS  
ONE COLUMBUS PLAZA, NEW HAVEN, CONN. 06510/203/789-1280

SHEET NO. 3 OF 8  
BY RAC DATE 5-4-81  
CHK'D. BY TLW DATE 5-11-81

9) RAINFALL DATA

(FROM HYDROMETEOROLOGICAL REPORT NO. 33)

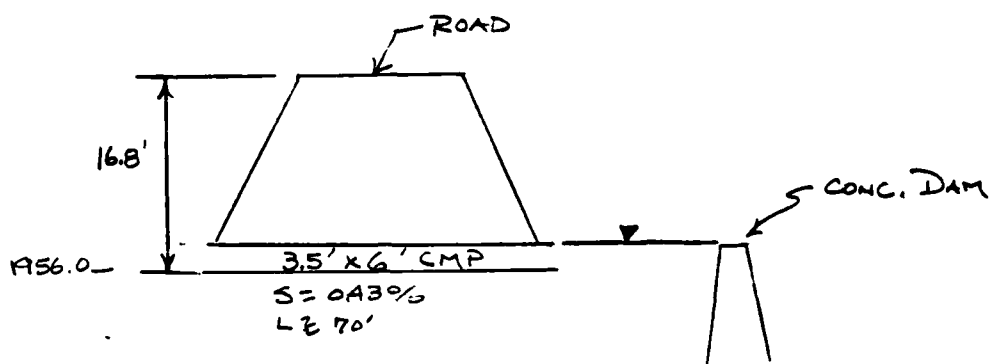
24 HOUR DURATION PMP = 20.7 INCHES  
FOR 200 SQUARE MILES

| <u>DURATION (HOURS)</u> | <u>ADJ FACTOR %</u> |
|-------------------------|---------------------|
| 6                       | 111                 |
| 12                      | 122                 |
| 24                      | 133                 |
| 48                      | 143                 |



## TENNANAH LAKE STAGE-DISCHARGE DATA

FOR NEC-DB, ROUTE THROUGH Tennanah Lake  
 FIRST, THEN ROUTE THROUGH LAKE MUCKODAY



### ① OUTLET CONTROLS

USING NOMOGRAPHS FOUND IN U.S. DEPARTMENT OF  
 TRANSPORTATION 'HYDRAULIC CHARTS FOR THE SELECTION  
 OF HIGHWAY CULVERTS, HYDRAULIC ENGINEERING Circular  
 NO. 5'. The following discharges were read.

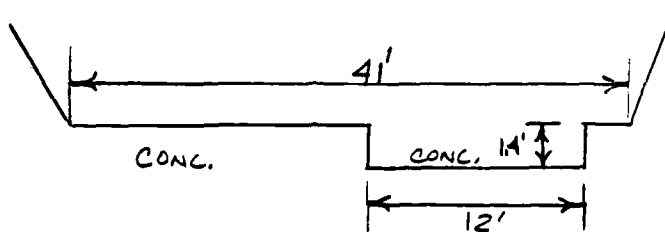
| <u>STAGE</u> | <u>Discharge</u> |
|--------------|------------------|
| 1956.0       | 0                |
| 1959.5       | 35               |
| 1963.2       | 60               |
| 1963.7       | 83               |
| 1964.7       | 115              |
| 1965.7       | 142              |
| 1966.7       | 165              |
| 1967.7       | 185              |
| 1968.7       | 200              |
| 1969.7       | 220              |
| 1970.7       | 240              |
| 1971.7       | 250              |
| 1972.7       | 270              |
| 1973.7       | 280              |
| 1974.7       | 300              |
| 1975.7       | 305              |

C-9



TENNANAH LAKE CONT.

② CHECK OUTFLOW OF CONC DAM



A) IF  $H = 3.0'$   $Q = ?$

$$\begin{aligned} Q_1 &= CL H^{1.5} \\ Q_1 &= (3)(2) H^{1.5} \\ &= 36 H^{1.5} \\ &= 36 (3)^{1.5} \\ &= 187 \end{aligned}$$

$$\begin{aligned} Q_2 &= CL H^{1.5} \\ Q_2 &= (3)(29) H^{1.5} \\ &= 87 H^{1.5} \\ &= 87 (1.6)^{1.5} \\ &= 176 \end{aligned}$$

$$Q_T = 187 + 176 = 363 \text{ CFS}$$

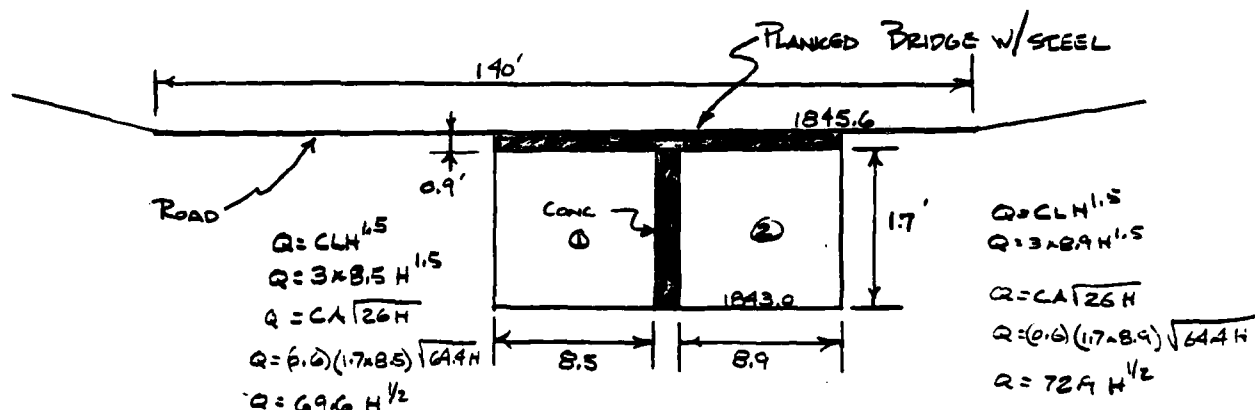
B)  $363 \text{ CFS} > 305 \text{ CFS}$   $\therefore$  Flow Through  
 the CMP Controls.



LAKE MUSKOGEAU

STAGE DISCHARGE DATA

NTS



STAGE DISCHARGE - Spillway Section  
 † Dam OVERTOPING

| STAGE                 | $Q = 3(8.5)H^{1.5}$ | $Q_2 = 3(8.9)H^{1.5}$ | $Q_1 = 69.6H^{1/2}$ | $Q_2 = 72.9H^{1/2}$ | $Q_T = 2.5(140)H^{1.5}$ | DISCHARGE |
|-----------------------|---------------------|-----------------------|---------------------|---------------------|-------------------------|-----------|
| 1843.0                |                     |                       |                     |                     |                         | 0         |
| 1843.5                | $3(8.5)(.5)^{1.5}$  | $3(8.9)(.5)^{1.5}$    |                     |                     |                         | 18.5      |
| 1844.0                | $3(8.5)(1)^{1.5}$   | $3(8.9)(1)^{1.5}$     |                     |                     |                         | 52.2      |
| 1844.5                | $3(8.5)(1.5)^{1.5}$ | $3(8.9)(1.5)^{1.5}$   |                     |                     |                         | 95.9      |
| 1844.7                | $3(8.5)(1.7)^{1.5}$ | $3(8.9)(1.7)^{1.5}$   |                     |                     |                         | 115.7     |
| 1844.75               |                     |                       | $*69.6(0.9)^{1/2}$  | $*72.9(0.9)^{1/2}$  |                         | 135.2     |
| 1845.2                |                     |                       | $69.6(1.35)^{1/2}$  | $72.9(1.35)^{1/2}$  |                         | 165.6     |
| 1845.6 ← (TOP OF DAM) |                     |                       | $69.6(1.75)^{1/2}$  | $72.9(1.75)^{1/2}$  |                         | 188.5     |
| 1846.0                |                     |                       | $69.6(2.15)^{1/2}$  | $72.9(2.15)^{1/2}$  | $2.5(140)(0.9)^{1.5}$   | 297.5     |
| 1847.0                |                     |                       | $69.6(3.15)^{1/2}$  | $72.9(3.15)^{1/2}$  | $2.5(140)(1.9)^{1.5}$   | 832.7     |
| 1848.0                |                     |                       | $69.6(4.15)^{1/2}$  | $72.9(4.15)^{1/2}$  | $2.5(140)(2.9)^{1.5}$   | 1591.6    |
| 1849.0                |                     |                       | $69.6(5.15)^{1/2}$  | $72.9(5.15)^{1/2}$  | $2.5(140)(3.9)^{1.5}$   | 2517.6    |
| 1850.0                |                     |                       | $69.6(6.15)^{1/2}$  | $72.9(6.15)^{1/2}$  | $2.5(140)(4.9)^{1.5}$   | 3583.7    |

\* AN ORFICE FLOW CONDITION WAS ASSUMED TO EXIST FOR STAGES EQUAL TO THE BOTTOM OF THE BRIDGE. BOTH ORFICE AND WEIR FLOW CONDITIONS WERE ASSUMED TO EXIST FOR STAGES GREATER THAN C-11 TOP OF THE BRIDGE.

PROJECT CORPS DAMS  
NY 341  
LAKE MUSKODAY



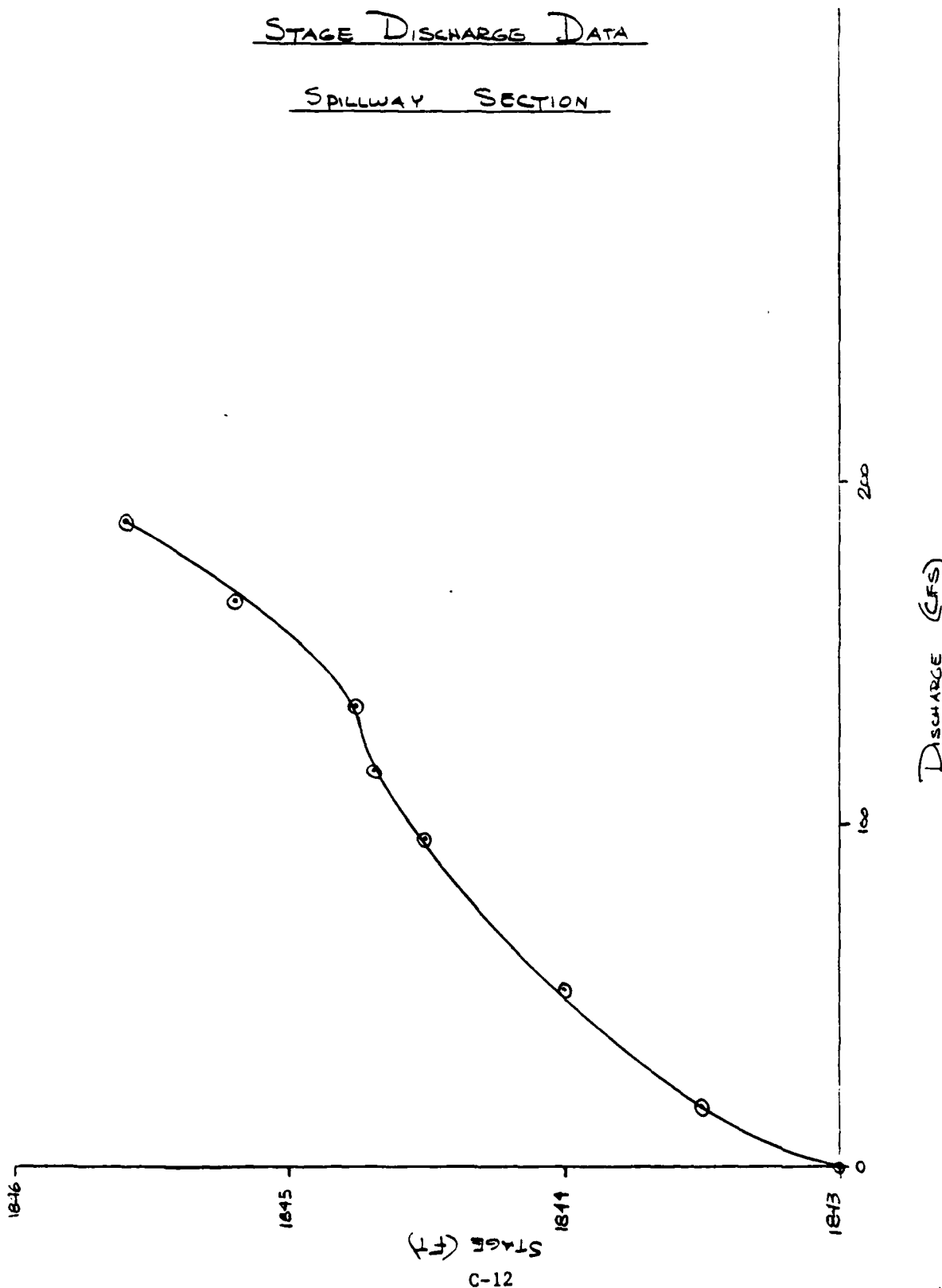
**FLAHERTY-GIAVARA ASSOCIATES**  
ENVIRONMENTAL DESIGN CONSULTANTS  
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1280

SHEET NO. 7 OF 8  
BY RAC DATE 3-4-81  
CHK'D. BY TLW DATE 5-11-81

LAKE MUSKODAY

STAGE DISCHARGE DATA

SPILLWAY SECTION



PROJECT CORPS DAMS  
NY 341  
LAKE MUSKOGEE



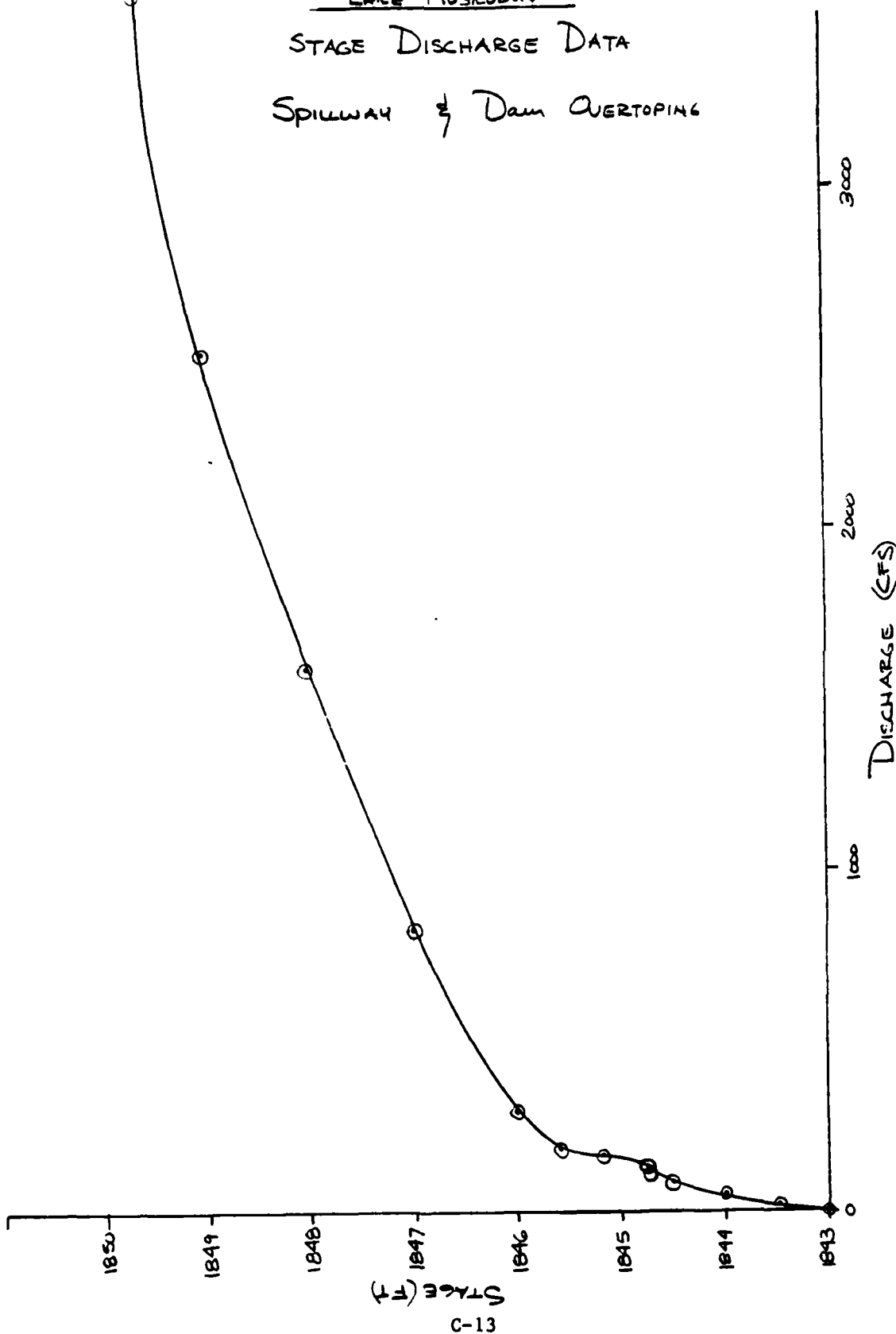
FLAHERTY-GIAVARA ASSOCIATES  
ENVIRONMENTAL DESIGN CONSULTANTS  
ONE COLUMBUS PLAZA, NEW HAVEN, CONN. 06510/203/780-1280

SHEET NO. 8 OF 8  
BY RAC DATE 5-4-81  
CHK'D BY TLW DATE 5-11-81

LAKE MUSKOGEE

STAGE DISCHARGE DATA

SPILLWAY & Dam OVERTOPING



HEC-1 FLOOD HYDROGRAPH COMPUTATIONS

FLAHERTY GIOVARA ASSOCIATES, P.C.

FLAHERTY GIOVARA ASSOCIATES, P.C.  
 \*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 DAM SAFETY VERSION JULY 1978  
 \*\*\*\*\*  
 LAST MODIFICATION 26 FEB 79  
 \*\*\*\*\*

A1 NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT  
 A2 DAM INVENTORY NO. NY 341, LAKE MUSKODAY DAM, SULLIVAN COUNTY, NEW YORK, JULY 23, 1981  
 A3 PREPARED BY FLAHERTY GIOVARA ASSOCIATES, P.C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT 06510  
 B1 120  
 J1 9  
 K1 0.05  
 M1 0.07  
 P1 0.11  
 T1 0.10  
 W1 0.09  
 X1 0.12  
 Y1 0.13  
 Z1 0.20  
 AA1 0.50  
 AB1 1.00  
 AC1 0.01  
 AD1 0.01  
 AE1 0.01  
 AF1 0.01  
 AG1 0.01  
 AH1 0.01  
 AI1 0.01  
 AJ1 0.01  
 AK1 0.01  
 AL1 0.01  
 AM1 0.01  
 AN1 0.01  
 AO1 0.01  
 AP1 0.01  
 AQ1 0.01  
 AR1 0.01  
 AS1 0.01  
 AT1 0.01  
 AU1 0.01  
 AV1 0.01  
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 BG1 0.01  
 BH1 0.01  
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 BR1 0.01  
 BS1 0.01  
 BT1 0.01  
 BU1 0.01  
 BV1 0.01  
 BW1 0.01  
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 ZY1 0.01  
 ZZ1 0.01

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS  
 RUNOFF HYDROGRAPH AT  
 ROUTE HYDROGRAPH TO  
 RUNOFF HYDROGRAPH AT

1  
2

COMBINE 2 HYDROGRAPHS AT 2  
ROUTE HYDROGRAPH TO  
END OF NETWORK

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

RUN DATE: 8/20/  
TIME: 3:52 PM

NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT CORPS OF ENGINEERS  
DAM INVENTORY NO. NY 341, LAKE MUSHKODAY DAM, SULLIVAN COUNTY, NEW YORK  
PREPARED BY FLAHERTY GIAVARA ASSOCIATES, P. C., NEW HAVEN, CONNECTICUT

| NO  | NHR | NMIN | IDAY | IHR | IMIN | METRC | IPLT | IPRT | MBTAN |
|-----|-----|------|------|-----|------|-------|------|------|-------|
| 120 | 0   | 30   | 0    | 0   | 0    | 0     | 2    | 0    | 0     |

MULTI-PLAN ANALYSES TO BE PERFORMED

| RTIOS= | 0.05 | 0.09 | 0.10 | 0.11 | 0.12 | 0.13 | 0.20 | 0.50 | 1.00 |
|--------|------|------|------|------|------|------|------|------|------|
| NPLAN= | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |

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SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH, TENNANAH LAKE - SNYDER METHOD  
ISTAG 1 ICOMP 0 ISECON 0 ITAPE 0 IJPLT 0

JPRT 0 INAME 1 ISTAGE 0 IAUTO 0

| INVDQ       | 1 | IUMQ | 1 | TAREA | 2.57 | SNAP | 0.00 | TRSDA | 2.57 | TRSPC | 0.00 | RATIO | 0.000 | ISNON | 0 | ISAVE | 1 | LOCAL | 0 |
|-------------|---|------|---|-------|------|------|------|-------|------|-------|------|-------|-------|-------|---|-------|---|-------|---|
| PRECIP DATA |   |      |   |       |      |      |      |       |      |       |      |       |       |       |   |       |   |       |   |

| SPFE                                   | 0.00 | PMS | 20.70 | R6 | 111.00 | R12 | 122.00 | R24 | 133.00 | R48 | 143.00 | R72 | 0.00 | R96 | 0.00 |
|----------------------------------------|------|-----|-------|----|--------|-----|--------|-----|--------|-----|--------|-----|------|-----|------|
| TRSPC COMPUTED BY THE PROGRAM IS 0.800 |      |     |       |    |        |     |        |     |        |     |        |     |      |     |      |

| LNDRPT    | 0 | STKR | 0.00 | DLTKR | 0.00 | RTIOL | 1.00 | ERAIN | 0.00 | STRTK | 0.00 | RTIOK | 1.00 | STRTL | 1.00 | CNSTL | 0.10 | ALSHX | 0.00 | RTIMP | 0.01 |
|-----------|---|------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|
| LOSS DATA |   |      |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |

TP= 1.62 UNIT HYDROGRAPH DATA NTA= 0

RECESSION DATA

SIRTS= -2.00 ORCN= -0.10 RTIOR= 1.30  
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 3.90 AND R= 2.87 INTERVALS

**89.**

**COMP 9**

**#QVF#**

|     | INFLW(I) | OUTFLOW(O) | AND OBSERVED FLOW(W) | PRECIP(L) | AND EXCESS(S) |
|-----|----------|------------|----------------------|-----------|---------------|
| 0   | 0        | 0          | 0                    | 0         | 0             |
| 1   | 1        | 1          | 1                    | 1         | 1             |
| 2   | 2        | 2          | 2                    | 2         | 2             |
| 3   | 3        | 3          | 3                    | 3         | 3             |
| 4   | 4        | 4          | 4                    | 4         | 4             |
| 5   | 5        | 5          | 5                    | 5         | 5             |
| 6   | 6        | 6          | 6                    | 6         | 6             |
| 7   | 7        | 7          | 7                    | 7         | 7             |
| 8   | 8        | 8          | 8                    | 8         | 8             |
| 9   | 9        | 9          | 9                    | 9         | 9             |
| 10  | 10       | 10         | 10                   | 10        | 10            |
| 11  | 11       | 11         | 11                   | 11        | 11            |
| 12  | 12       | 12         | 12                   | 12        | 12            |
| 13  | 13       | 13         | 13                   | 13        | 13            |
| 14  | 14       | 14         | 14                   | 14        | 14            |
| 15  | 15       | 15         | 15                   | 15        | 15            |
| 16  | 16       | 16         | 16                   | 16        | 16            |
| 17  | 17       | 17         | 17                   | 17        | 17            |
| 18  | 18       | 18         | 18                   | 18        | 18            |
| 19  | 19       | 19         | 19                   | 19        | 19            |
| 20  | 20       | 20         | 20                   | 20        | 20            |
| 21  | 21       | 21         | 21                   | 21        | 21            |
| 22  | 22       | 22         | 22                   | 22        | 22            |
| 23  | 23       | 23         | 23                   | 23        | 23            |
| 24  | 24       | 24         | 24                   | 24        | 24            |
| 25  | 25       | 25         | 25                   | 25        | 25            |
| 26  | 26       | 26         | 26                   | 26        | 26            |
| 27  | 27       | 27         | 27                   | 27        | 27            |
| 28  | 28       | 28         | 28                   | 28        | 28            |
| 29  | 29       | 29         | 29                   | 29        | 29            |
| 30  | 30       | 30         | 30                   | 30        | 30            |
| 31  | 31       | 31         | 31                   | 31        | 31            |
| 32  | 32       | 32         | 32                   | 32        | 32            |
| 33  | 33       | 33         | 33                   | 33        | 33            |
| 34  | 34       | 34         | 34                   | 34        | 34            |
| 35  | 35       | 35         | 35                   | 35        | 35            |
| 36  | 36       | 36         | 36                   | 36        | 36            |
| 37  | 37       | 37         | 37                   | 37        | 37            |
| 38  | 38       | 38         | 38                   | 38        | 38            |
| 39  | 39       | 39         | 39                   | 39        | 39            |
| 40  | 40       | 40         | 40                   | 40        | 40            |
| 41  | 41       | 41         | 41                   | 41        | 41            |
| 42  | 42       | 42         | 42                   | 42        | 42            |
| 43  | 43       | 43         | 43                   | 43        | 43            |
| 44  | 44       | 44         | 44                   | 44        | 44            |
| 45  | 45       | 45         | 45                   | 45        | 45            |
| 46  | 46       | 46         | 46                   | 46        | 46            |
| 47  | 47       | 47         | 47                   | 47        | 47            |
| 48  | 48       | 48         | 48                   | 48        | 48            |
| 49  | 49       | 49         | 49                   | 49        | 49            |
| 50  | 50       | 50         | 50                   | 50        | 50            |
| 51  | 51       | 51         | 51                   | 51        | 51            |
| 52  | 52       | 52         | 52                   | 52        | 52            |
| 53  | 53       | 53         | 53                   | 53        | 53            |
| 54  | 54       | 54         | 54                   | 54        | 54            |
| 55  | 55       | 55         | 55                   | 55        | 55            |
| 56  | 56       | 56         | 56                   | 56        | 56            |
| 57  | 57       | 57         | 57                   | 57        | 57            |
| 58  | 58       | 58         | 58                   | 58        | 58            |
| 59  | 59       | 59         | 59                   | 59        | 59            |
| 60  | 60       | 60         | 60                   | 60        | 60            |
| 61  | 61       | 61         | 61                   | 61        | 61            |
| 62  | 62       | 62         | 62                   | 62        | 62            |
| 63  | 63       | 63         | 63                   | 63        | 63            |
| 64  | 64       | 64         | 64                   | 64        | 64            |
| 65  | 65       | 65         | 65                   | 65        | 65            |
| 66  | 66       | 66         | 66                   | 66        | 66            |
| 67  | 67       | 67         | 67                   | 67        | 67            |
| 68  | 68       | 68         | 68                   | 68        | 68            |
| 69  | 69       | 69         | 69                   | 69        | 69            |
| 70  | 70       | 70         | 70                   | 70        | 70            |
| 71  | 71       | 71         | 71                   | 71        | 71            |
| 72  | 72       | 72         | 72                   | 72        | 72            |
| 73  | 73       | 73         | 73                   | 73        | 73            |
| 74  | 74       | 74         | 74                   | 74        | 74            |
| 75  | 75       | 75         | 75                   | 75        | 75            |
| 76  | 76       | 76         | 76                   | 76        | 76            |
| 77  | 77       | 77         | 77                   | 77        | 77            |
| 78  | 78       | 78         | 78                   | 78        | 78            |
| 79  | 79       | 79         | 79                   | 79        | 79            |
| 80  | 80       | 80         | 80                   | 80        | 80            |
| 81  | 81       | 81         | 81                   | 81        | 81            |
| 82  | 82       | 82         | 82                   | 82        | 82            |
| 83  | 83       | 83         | 83                   | 83        | 83            |
| 84  | 84       | 84         | 84                   | 84        | 84            |
| 85  | 85       | 85         | 85                   | 85        | 85            |
| 86  | 86       | 86         | 86                   | 86        | 86            |
| 87  | 87       | 87         | 87                   | 87        | 87            |
| 88  | 88       | 88         | 88                   | 88        | 88            |
| 89  | 89       | 89         | 89                   | 89        | 89            |
| 90  | 90       | 90         | 90                   | 90        | 90            |
| 91  | 91       | 91         | 91                   | 91        | 91            |
| 92  | 92       | 92         | 92                   | 92        | 92            |
| 93  | 93       | 93         | 93                   | 93        | 93            |
| 94  | 94       | 94         | 94                   | 94        | 94            |
| 95  | 95       | 95         | 95                   | 95        | 95            |
| 96  | 96       | 96         | 96                   | 96        | 96            |
| 97  | 97       | 97         | 97                   | 97        | 97            |
| 98  | 98       | 98         | 98                   | 98        | 98            |
| 99  | 99       | 99         | 99                   | 99        | 99            |
| 100 | 100      | 100        | 100                  | 100       | 100           |

**PAGE 0005**

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|

[illegible][illegible]

|        | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|--------|------|--------|---------|---------|-------|--------|
| CFS    | 590  | 382    | 133     | 56      | 670   | 191    |
| CMS    | 17   | 11     | 4       | 2       | 34    | 2.03   |
| INCHES |      | 1.38   | 1.92    | 2.03    |       |        |
| MM     |      | 35.08  | 49.88   | 51.56   |       |        |
| CU-FT  |      | 189    | 264     | 278     |       |        |
| CU M   |      | 233    | 325     | 343     |       |        |
| THOUS  |      |        |         |         |       |        |

|        | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|--------|------|--------|---------|---------|-------|--------|
| CFB    | 656. | 424.   | 149.    | 62.     | 7477. | 7477.  |
| CMS    | 19.  | 12.    | 14.     | 2.      | 212.  | 212.   |
| INCHES |      | 1.53   | 2.14    | 2.26    | 2.26  | 2.26   |
| MM     |      | 38.98  | 54.31   | 57.29   | 57.29 | 57.29  |
| CU-FT  |      | 210.   | 293.    | 381.    | 309.  | 309.   |
| ACU M  |      | 259.   | 361.    | 381.    | 381.  | 381.   |

|              |    |    |    |    |    |    |    |
|--------------|----|----|----|----|----|----|----|
| 104          | 78 | 67 | 43 | 82 | 40 | 37 | 33 |
| 51           | 49 | 45 | 29 | 41 | 40 | 38 | 35 |
| 34           | 32 | 30 | 29 | 28 | 26 | 24 | 23 |
| TOTAL VOLUME |    |    |    |    |    |    |    |
| 823          |    |    |    |    |    |    |    |
| 233          |    |    |    |    |    |    |    |
| 2.48         |    |    |    |    |    |    |    |
| 63.02        |    |    |    |    |    |    |    |
| 340          |    |    |    |    |    |    |    |
| 419          |    |    |    |    |    |    |    |

CFS  
CMS  
INCHES  
AC-FT  
THOUS CU M

|              |    |    |    |    |    |    |    |
|--------------|----|----|----|----|----|----|----|
| 104          | 78 | 67 | 43 | 82 | 40 | 37 | 33 |
| 51           | 49 | 45 | 29 | 41 | 40 | 38 | 35 |
| 34           | 32 | 30 | 29 | 28 | 26 | 24 | 23 |
| TOTAL VOLUME |    |    |    |    |    |    |    |
| 823          |    |    |    |    |    |    |    |
| 233          |    |    |    |    |    |    |    |
| 2.48         |    |    |    |    |    |    |    |
| 63.02        |    |    |    |    |    |    |    |
| 340          |    |    |    |    |    |    |    |
| 419          |    |    |    |    |    |    |    |

CFS  
CMS  
INCHES  
AC-FT  
THOUS CU M

|              |    |    |    |    |    |    |    |
|--------------|----|----|----|----|----|----|----|
| 104          | 78 | 67 | 43 | 82 | 40 | 37 | 33 |
| 51           | 49 | 45 | 29 | 41 | 40 | 38 | 35 |
| 34           | 32 | 30 | 29 | 28 | 26 | 24 | 23 |
| TOTAL VOLUME |    |    |    |    |    |    |    |
| 823          |    |    |    |    |    |    |    |
| 233          |    |    |    |    |    |    |    |
| 2.48         |    |    |    |    |    |    |    |
| 63.02        |    |    |    |    |    |    |    |
| 340          |    |    |    |    |    |    |    |
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|              |    |    |    |    |    |    |    |
|--------------|----|----|----|----|----|----|----|
| 104          | 78 | 67 | 43 | 82 | 40 | 37 | 33 |
| 51           | 49 | 45 | 29 | 41 | 40 | 38 | 35 |
| 34           | 32 | 30 | 29 | 28 | 26 | 24 | 23 |
| TOTAL VOLUME |    |    |    |    |    |    |    |
| 823          |    |    |    |    |    |    |    |
| 233          |    |    |    |    |    |    |    |
| 2.48         |    |    |    |    |    |    |    |
| 63.02        |    |    |    |    |    |    |    |
| 340          |    |    |    |    |    |    |    |
| 419          |    |    |    |    |    |    |    |

CFS  
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|              |    |    |    |    |    |    |    |
|--------------|----|----|----|----|----|----|----|
| 104          | 78 | 67 | 43 | 82 | 40 | 37 | 33 |
| 51           | 49 | 45 | 29 | 41 | 40 | 38 | 35 |
| 34           | 32 | 30 | 29 | 28 | 26 | 24 | 23 |
| TOTAL VOLUME |    |    |    |    |    |    |    |
| 823          |    |    |    |    |    |    |    |
| 233          |    |    |    |    |    |    |    |
| 2.48         |    |    |    |    |    |    |    |
| 63.02        |    |    |    |    |    |    |    |
| 340          |    |    |    |    |    |    |    |
| 419          |    |    |    |    |    |    |    |

CFS  
CMS  
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AC-FT  
THOUS CU M

| HYDROGRAPH AT STA | 1 FOR PLAN 1, RTIO 5 | TOTAL VOLUME |
|-------------------|----------------------|--------------|
| 22 1              | 22 1                 | 3738         |
| 22 2              | 22 2                 | 3738         |
| 22 3              | 22 3                 | 3738         |
| 22 4              | 22 4                 | 3738         |
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| 22 9              | 22 9                 | 3738         |
| 22 10             | 22 10                | 3738         |
| 22 11             | 22 11                | 3738         |
| 22 12             | 22 12                | 3738         |
| 22 13             | 22 13                | 3738         |
| 22 14             | 22 14                | 3738         |
| 22 15             | 22 15                | 3738         |
| 22 16             | 22 16                | 3738         |
| 22 17             | 22 17                | 3738         |
| 22 18             | 22 18                | 3738         |
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| 22 20             | 22 20                | 3738         |
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| 22 23             | 22 23                | 3738         |
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## HYDROGRAPH ROUTING

| TENANNAH LAKE ROUTING - MODIFIED PULB METHOD |       |       |       |
|----------------------------------------------|-------|-------|-------|
| ISTA0                                        | ICOMP | IECON | ITAPE |
| 0                                            | 0     | 0     | 0     |
| 1                                            | 1     | 1     | 1     |
| 2                                            | 2     | 2     | 2     |
| 3                                            | 3     | 3     | 3     |
| 4                                            | 4     | 4     | 4     |
| 5                                            | 5     | 5     | 5     |
| 6                                            | 6     | 6     | 6     |
| 7                                            | 7     | 7     | 7     |
| 8                                            | 8     | 8     | 8     |
| 9                                            | 9     | 9     | 9     |
| 10                                           | 10    | 10    | 10    |
| 11                                           | 11    | 11    | 11    |
| 12                                           | 12    | 12    | 12    |
| 13                                           | 13    | 13    | 13    |
| 14                                           | 14    | 14    | 14    |
| 15                                           | 15    | 15    | 15    |
| 16                                           | 16    | 16    | 16    |
| 17                                           | 17    | 17    | 17    |
| 18                                           | 18    | 18    | 18    |
| 19                                           | 19    | 19    | 19    |
| 20                                           | 20    | 20    | 20    |
| 21                                           | 21    | 21    | 21    |
| 22                                           | 22    | 22    | 22    |
| 23                                           | 23    | 23    | 23    |
| 24                                           | 24    | 24    | 24    |
| 25                                           | 25    | 25    | 25    |
| 26                                           | 26    | 26    | 26    |
| 27                                           | 27    | 27    | 27    |
| 28                                           | 28    | 28    | 28    |
| 29                                           | 29    | 29    | 29    |
| 30                                           | 30    | 30    | 30    |
| 31                                           | 31    | 31    | 31    |
| 32                                           | 32    | 32    | 32    |
| 33                                           | 33    | 33    | 33    |
| 34                                           | 34    | 34    | 34    |
| 35                                           | 35    | 35    | 35    |
| 36                                           | 36    | 36    | 36    |
| 37                                           | 37    | 37    | 37    |
| 38                                           | 38    | 38    | 38    |
| 39                                           | 39    | 39    | 39    |
| 40                                           | 40    | 40    | 40    |
| 41                                           | 41    | 41    | 41    |
| 42                                           | 42    | 42    | 42    |
| 43                                           | 43    | 43    | 43    |
| 44                                           | 44    | 44    | 44    |
| 45                                           | 45    | 45    | 45    |
| 46                                           | 46    | 46    | 46    |
| 47                                           | 47    | 47    | 47    |
| 48                                           | 48    | 48    | 48    |
| 49                                           | 49    | 49    | 49    |
| 50                                           | 50    | 50    | 50    |
| 51                                           | 51    | 51    | 51    |
| 52                                           | 52    | 52    | 52    |
| 53                                           | 53    | 53    | 53    |
| 54                                           | 54    | 54    | 54    |
| 55                                           | 55    | 55    | 55    |
| 56                                           | 56    | 56    | 56    |
| 57                                           | 57    | 57    | 57    |
| 58                                           | 58    | 58    | 58    |
| 59                                           | 59    | 59    | 59    |
| 60                                           | 60    | 60    | 60    |
| 61                                           | 61    | 61    | 61    |
| 62                                           | 62    | 62    | 62    |
| 63                                           | 63    | 63    | 63    |
| 64                                           | 64    | 64    | 64    |
| 65                                           | 65    | 65    | 65    |
| 66                                           | 66    | 66    | 66    |
| 67                                           | 67    | 67    | 67    |
| 68                                           | 68    | 68    | 68    |
| 69                                           | 69    | 69    | 69    |
| 70                                           | 70    | 70    | 70    |
| 71                                           | 71    | 71    | 71    |
| 72                                           | 72    | 72    | 72    |
| 73                                           | 73    | 73    | 73    |
| 74                                           | 74    | 74    | 74    |
| 75                                           | 75    | 75    | 75    |
| 76                                           | 76    | 76    | 76    |
| 77                                           | 77    | 77    | 77    |
| 78                                           | 78    | 78    | 78    |
| 79                                           | 79    | 79    | 79    |
| 80                                           | 80    | 80    | 80    |
| 81                                           | 81    | 81    | 81    |
| 82                                           | 82    | 82    | 82    |
| 83                                           | 83    | 83    | 83    |
| 84                                           | 84    | 84    | 84    |
| 85                                           | 85    | 85    | 85    |
| 86                                           | 86    | 86    | 86    |
| 87                                           | 87    | 87    | 87    |
| 88                                           | 88    | 88    | 88    |
| 89                                           | 89    | 89    | 89    |
| 90                                           | 90    | 90    | 90    |
| 91                                           | 91    | 91    | 91    |
| 92                                           | 92    | 92    | 92    |
| 93                                           | 93    | 93    | 93    |
| 94                                           | 94    | 94    | 94    |
| 95                                           | 95    | 95    | 95    |
| 96                                           | 96    | 96    | 96    |
| 97                                           | 97    | 97    | 97    |
| 98                                           | 98    | 98    | 98    |
| 99                                           | 99    | 99    | 99    |
| 100                                          | 100   | 100   | 100   |
| 101                                          | 101   | 101   | 101   |
| 102                                          | 102   | 102   | 102   |
| 103                                          | 103   |       |       |

[illegible]

|               |       |               |              |
|---------------|-------|---------------|--------------|
| SURFACE AREA= | 196.  | 184.          | 293.         |
| CAPACITY=     | 0.    | 679.          | 9406.        |
| ELEVATION=    | 1736. | 1760.         | 1780.        |
|               |       | CREL<br>1054  | SPHID<br>0.0 |
|               |       | CDGW<br>D.0   | EXPW<br>0.0  |
|               |       | ELEVEL<br>0.0 | COOL<br>0.0  |
|               |       | CAREA<br>0.0  | EXPL<br>0.0  |

| TOPEL  | DAM DATA | DAMWID |
|--------|----------|--------|
| 1972 B | COOD     | EXPD   |
|        | 25       | 100    |

STATION 1, PLAN 1, RATIO 1  
END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

C-24

4300 91  
5300 101  
6300 111  
7300 121  
8300 131  
9300 141  
10300 151  
11300 161  
12300 171  
13300 181  
14300 191  
15300 201  
16300 211  
17300 221  
18300 231  
19300 241  
20300 251  
21300 261  
22300 271  
23300 281  
24300 291  
25300 301  
26300 311  
27300 321  
28300 3301  
29300 340  
30300 350  
31300 360  
32300 370  
33300 380  
34300 3901  
35300 400  
36300 410  
37300 421  
38300 431  
39300 441  
40300 451  
41300 461  
42300 471  
43300 481  
44300 491  
45300 501  
46300 511  
47300 521  
48300 531  
49300 541  
50300 551  
51300 561  
52300 571  
53300 581  
54300 591  
55300 601  
56300 6101  
57300 620  
58300 630  
59300 640  
60300 650  
61300 660

**FLAHERTY GIARA ASSOCIATES, P. C.**

[illegible]

**INDEX**

**STATION 1. PLAN 1, RATIO 2**  
**END-OF-PERIOD HYDROGRAPH ORDINATES**

[illegible]

PEAK OUTFLOW IS 16. AT TIME 60.00 HOURS

| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------|--------|---------|---------|--------------|
| 16.  | 16.    | 12      | 5       | 579          |
| 0.   | 0.     |         |         | 16           |
|      | 0.06   | 0.17    | 0.17    | 0.17         |
|      | 1.43   | 4.34    | 4.44    | 4            |
|      | 1.87   | 2.29    | 2.40    | 24           |
|      |        |         | 30      | 30           |

CFS  
CMS  
INCHES  
MM  
AC-FT  
THOUS CU M

#QVF#

| STATION 1 |     | INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(**) |     |     |     |     |     |
|-----------|-----|---------------------------------------------|-----|-----|-----|-----|-----|
|           |     | 100                                         | 200 | 300 | 400 | 500 | 600 |
| 0         | 1   | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 1         | 2   | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 2         | 3   | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 3         | 4   | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 4         | 5   | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 5         | 6   | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 6         | 7   | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 7         | 8   | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 8         | 9   | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 9         | 10  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 10        | 11  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 11        | 12  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 12        | 13  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 13        | 14  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 14        | 15  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 15        | 16  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 16        | 17  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 17        | 18  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 18        | 19  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 19        | 20  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 20        | 21  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 21        | 22  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 22        | 23  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 23        | 24  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 24        | 25  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 25        | 26  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 26        | 27  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 27        | 28  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 28        | 29  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 29        | 30  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 30        | 31  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 31        | 32  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 32        | 33  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 33        | 34  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 34        | 35  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 35        | 36  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 36        | 37  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 37        | 38  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 38        | 39  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 39        | 40  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 40        | 41  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 41        | 42  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 42        | 43  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 43        | 44  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 44        | 45  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 45        | 46  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 46        | 47  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 47        | 48  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 48        | 49  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 49        | 50  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 50        | 51  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 51        | 52  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 52        | 53  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 53        | 54  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 54        | 55  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 55        | 56  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 56        | 57  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 57        | 58  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 58        | 59  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 59        | 60  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 60        | 61  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 61        | 62  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 62        | 63  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 63        | 64  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 64        | 65  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 65        | 66  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 66        | 67  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 67        | 68  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 68        | 69  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 69        | 70  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 70        | 71  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 71        | 72  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 72        | 73  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 73        | 74  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 74        | 75  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 75        | 76  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 76        | 77  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 77        | 78  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 78        | 79  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 79        | 80  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 80        | 81  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 81        | 82  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 82        | 83  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 83        | 84  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 84        | 85  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 85        | 86  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 86        | 87  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 87        | 88  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 88        | 89  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 89        | 90  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 90        | 91  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 91        | 92  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 92        | 93  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 93        | 94  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 94        | 95  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 95        | 96  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 96        | 97  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 97        | 98  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 98        | 99  | 300                                         | 300 | 300 | 300 | 300 | 300 |
| 99        | 100 | 300                                         | 300 | 300 | 300 | 300 | 300 |

**FLAHERTY O'IAVARA ASSOCIATES, P. C.**

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#QV#

STATION 1, PLAN 1, RATIO 3  
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]



**FLAHERTY CIAVARA ASSOCIATES, P.C.**

|         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
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| 2222222 | 0 | 0 | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 7 | 8 | 8 | 9 | 9 | 10 | 11 | 11 | 12 | 12 | 13 | 13 | 14 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 22 | 23 | 23 | 24 | 24 | 25 | 26 | 26 | 27 | 28 | 28 | 29 | 30 | 30 | 31 | 31 | 32 | 32 | 33 | 33 | 34 | 34 | 35 | 36 | 36 | 37 | 37 | 38 | 38 | 39 | 39 | 40 | 40 | 41 | 41 | 42 | 42 | 43 | 43 | 44 | 44 | 45 | 45 | 46 | 46 | 47 | 47 | 48 | 48 | 49 | 49 | 50 | 50 | 51 | 51 | 52 | 52 | 53 | 53 | 54 | 54 | 55 | 55 | 56 | 56 | 57 | 57 | 58 | 58 | 59 | 59 | 60 | 60 | 61 | 61 | 62 | 62 | 63 | 63 | 64 | 64 | 65 | 65 | 66 | 66 | 67 | 67 | 68 | 68 | 69 | 69 | 70 | 70 | 71 | 71 | 72 | 72 | 73 | 73 | 74 | 74 | 75 | 75 | 76 | 76 | 77 | 77 | 78 | 78 | 79 | 79 | 80 | 80 | 81 | 81 | 82 | 82 | 83 | 83 | 84 | 84 | 85 | 85 | 86 | 86 | 87 | 87 | 88 | 88 | 89 | 89 | 90 | 90 | 91 | 91 | 92 | 92 | 93 | 93 | 94 | 94 | 95 | 95 | 96 | 96 | 97 | 97 | 98 | 98 | 99 | 99 | 100 | 100 | 101 | 101 | 102 | 102 | 103 | 103 | 104 | 104 | 105 | 105 | 106 | 106 | 107 | 107 | 108 | 108 | 109 | 109 | 110 | 110 | 111 | 111 | 112 | 112 | 113 | 113 | 114 | 114 | 115 | 115 | 116 | 116 | 117 | 117 | 118 | 118 | 119 | 119 | 120 | 120 | 121 | 121 | 122 | 122 | 123 | 123 | 124 | 124 | 125 | 125 | 126 | 126 | 127 | 127 | 128 | 128 | 129 | 129 | 130 | 130 | 131 | 131 | 132 | 132 | 133 | 133 | 134 | 134 | 135 | 135 | 136 | 136 | 137 | 137 | 138 | 138 | 139 | 139 | 140 | 140 | 141 | 141 | 142 | 142 | 143 | 143 | 144 | 144 | 145 | 145 | 146 | 146 | 147 | 147 | 148 | 148 | 149 | 149 | 150 | 150 | 151 | 151 | 152 | 152 | 153 | 153 | 154 | 154 | 155 | 155 | 156 | 156 | 157 | 157 | 158 | 158 | 159 | 159 | 160 | 160 | 161 | 161 | 162 | 162 | 163 | 163 | 164 | 164 | 165 | 165 | 166 | 166 | 167 | 167 | 168 | 168 | 169 | 169 | 170 | 170 | 171 | 171 | 172 | 172 | 173 | 173 | 174 | 174 | 175 | 175 | 176 | 176 | 177 | 177 | 178 | 178 | 179 | 179 | 180 | 180 | 181 | 181 | 182 | 182 | 183 | 183 | 184 | 184 | 185 | 185 | 186 | 186 | 187 | 187 | 188 | 188 | 189 | 189 | 190 | 190 | 191 | 191 | 192 | 192 | 193 | 193 | 194 | 194 | 195 | 195 | 196 | 196 | 197 | 197 | 198 | 198 | 199 | 199 | 200 | 200 | 201 | 201 | 202 | 202 | 203 | 203 | 204 | 204 | 205 | 205 | 206 | 206 | 207 | 207 | 208 | 208 | 209 | 209 | 210 | 210 | 211 | 211 | 212 | 212 | 213 | 213 | 214 | 214 | 215 | 215 | 216 | 216 | 217 | 217 | 218 | 218 | 219 | 219 | 220 | 220 | 221 | 221 | 222 | 222 | 223 | 223 | 224 | 224 | 225 | 225 | 226 | 226 | 227 | 227 | 228 | 228 | 229 | 229 | 230 | 230 | 231 | 231 | 232 | 232 | 233 | 233 | 234 | 234 | 235 | 235 | 236 | 236 | 237 | 237 | 238 | 238 | 239 | 239 | 240 | 240 | 241 | 241 | 242 | 242 | 243 | 243 | 244 | 244 | 245 | 245 | 246 | 246 | 247 | 247 | 248 | 248 | 249 | 249 | 250 | 250 | 251 | 251 | 252 | 252 | 253 | 253 | 254 | 254 | 255 | 255 | 256 | 256 | 257 | 257 | 258 | 258 | 259 | 259 | 260 | 260 | 261 | 261 | 262 | 262 | 263 | 263 | 264 | 264 | 265 | 265 | 266 | 266 | 267 | 267 | 268 | 268 | 269 | 269 | 270 | 270 | 271 | 271 | 272 | 272 | 273 | 273 | 274 | 274 | 275 |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

**00000000000000000000000000000000**

## STATION 1: PLAN 1: RATIO 4:

**OUTFLOW**

[illegible]

## STORAGE

[illegible]

## STAGE

[illegible]

**#OVF#**

| INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*) | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
|--------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 0                                          | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1    |
| 1                                          | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11   |
| 2                                          | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12   |
| 3                                          | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13   |
| 4                                          | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14   |
| 5                                          | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15   |
| 6                                          | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16   |
| 7                                          | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17   |
| 8                                          | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18   |
| 9                                          | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19   |
| 10                                         | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20   |
| 11                                         | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21   |
| 12                                         | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22   |
| 13                                         | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23   |
| 14                                         | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24   |
| 15                                         | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25   |
| 16                                         | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26   |
| 17                                         | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27   |
| 18                                         | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28   |
| 19                                         | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29   |
| 20                                         | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30   |
| 21                                         | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31   |
| 22                                         | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32   |
| 23                                         | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33   |
| 24                                         | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34   |
| 25                                         | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35   |
| 26                                         | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  | 36   |
| 27                                         | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  | 36  | 37   |
| 28                                         | 29  | 30  | 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38   |
| 29                                         | 30  | 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39   |
| 30                                         | 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40   |
| 31                                         | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41   |
| 32                                         | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42   |
| 33                                         | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43   |
| 34                                         | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44   |
| 35                                         | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45   |
| 36                                         | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  | 46   |
| 37                                         | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  | 46  | 47   |
| 38                                         | 39  | 40  | 41  | 42  | 43  | 44  | 45  | 46  | 47  | 48   |
| 39                                         | 40  | 41  | 42  | 43  | 44  | 45  | 46  | 47  | 48  | 49   |
| 40                                         | 41  | 42  | 43  | 44  | 45  | 46  | 47  | 48  | 49  | 50   |
| 41                                         | 42  | 43  | 44  | 45  | 46  | 47  | 48  | 49  | 50  | 51   |
| 42                                         | 43  | 44  | 45  | 46  | 47  | 48  | 49  | 50  | 51  | 52   |
| 43                                         | 44  | 45  | 46  | 47  | 48  | 49  | 50  | 51  | 52  | 53   |
| 44                                         | 45  | 46  | 47  | 48  | 49  | 50  | 51  | 52  | 53  | 54   |
| 45                                         | 46  | 47  | 48  | 49  | 50  | 51  | 52  | 53  | 54  | 55   |
| 46                                         | 47  | 48  | 49  | 50  | 51  | 52  | 53  | 54  | 55  | 56   |
| 47                                         | 48  | 49  | 50  | 51  | 52  | 53  | 54  | 55  | 56  | 57   |
| 48                                         | 49  | 50  | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58   |
| 49                                         | 50  | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59   |
| 50                                         | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60   |
| 51                                         | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61   |
| 52                                         | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62   |
| 53                                         | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63   |
| 54                                         | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64   |
| 55                                         | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65   |
| 56                                         | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66   |
| 57                                         | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67   |
| 58                                         | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68   |
| 59                                         | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69   |
| 60                                         | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  | 70   |
| 61                                         | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  | 70  | 71   |
| 62                                         | 63  | 64  | 65  | 66  | 67  | 68  | 69  | 70  | 71  | 72   |
| 63                                         | 64  | 65  | 66  | 67  | 68  | 69  | 70  | 71  | 72  | 73   |
| 64                                         | 65  | 66  | 67  | 68  | 69  | 70  | 71  | 72  | 73  | 74   |
| 65                                         | 66  | 67  | 68  | 69  | 70  | 71  | 72  | 73  | 74  | 75   |
| 66                                         | 67  | 68  | 69  | 70  | 71  | 72  | 73  | 74  | 75  | 76   |
| 67                                         | 68  | 69  | 70  | 71  | 72  | 73  | 74  | 75  | 76  | 77   |
| 68                                         | 69  | 70  | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78   |
| 69                                         | 70  | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79   |
| 70                                         | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80   |
| 71                                         | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81   |
| 72                                         | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82   |
| 73                                         | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83   |
| 74                                         | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84   |
| 75                                         | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85   |
| 76                                         | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86   |
| 77                                         | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87   |
| 78                                         | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88   |
| 79                                         | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89   |
| 80                                         | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90   |
| 81                                         | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | 91   |
| 82                                         | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | 91  | 92   |
| 83                                         | 84  | 85  | 86  | 87  | 88  | 89  | 90  | 91  | 92  | 93   |
| 84                                         | 85  | 86  | 87  | 88  | 89  | 90  | 91  | 92  | 93  | 94   |
| 85                                         | 86  | 87  | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95   |
| 86                                         | 87  | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96   |
| 87                                         | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97   |
| 88                                         | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98   |
| 89                                         | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99   |
| 90                                         | 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 100  |
| 91                                         | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 100 | 101  |
| 92                                         | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 100 | 101 | 102  |
| 93                                         | 94  | 95  | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103  |
| 94                                         | 95  | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104  |
| 95                                         | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104 | 105  |
| 96                                         | 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104 | 105 | 106  |
| 97                                         | 98  | 99  | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107  |
| 98                                         | 99  | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108  |
| 99                                         | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109  |
| 100                                        | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110  |
| 101                                        | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111  |
| 102                                        | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112  |
| 103                                        | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113  |
| 104                                        | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114  |
| 105                                        | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115  |
| 106                                        | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116  |
| 107                                        | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117  |
| 108                                        | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118  |
| 109                                        | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119  |
| 110                                        | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120  |
| 111                                        | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121  |
| 112                                        | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122  |
| 113                                        | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123  |
| 114                                        | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124  |
| 115                                        | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125  |
| 116                                        | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126  |
| 117                                        | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127  |
| 118                                        | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128  |
| 119                                        | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129  |
| 120                                        | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130  |
| 121                                        | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131  |
| 122                                        | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132  |
| 123                                        | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133  |
| 124                                        | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134  |
| 125                                        | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135  |
| 126                                        | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136  |
| 127                                        | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137  |
| 128                                        | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138  |
| 129                                        | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139  |
| 130                                        | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140  |
| 131                                        | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141  |
| 132                                        | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142  |
| 133                                        | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143  |
| 134                                        | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144  |
| 135                                        | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145  |
| 136                                        | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146  |
| 137                                        | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147  |
| 138                                        | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148  |
| 139                                        | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149  |
| 140                                        | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150  |
| 141                                        | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151  |
| 142                                        | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152  |
| 143                                        | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153  |
| 144                                        | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154  |
| 145                                        | 146 | 147 | 148 | 14  |     |     |     |     |     |      |

**FLAHERTY O'AVARA ASSOCIATES, P. C.**

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
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| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

-C-35

[illegible]

C-36

#QW#

STATION 1, PLAN 1, RATIO 5  
END-OF-PERIOD HYDROGRAPH ORDINATES

**OUTFLOW**

00000000-NNNN-1800-1  
00000000-NNNN-1800-1  
00000000-NNNN-1001-1  
00000000-NNNN-1790-1  
00000000-NNNN-1046-1  
00000000-NNNN-1920-1  
00000000-NNNN-1041-1  
00000000-NNNN-1041-1  
00000000-NNNN-1041-1

**STORAGE**  
0.0.

PEAK OUTFLOW IS 21. AT TIME 60.00 HOURS

LC-37

#QVF#

| STATION               | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|
| INFLOW(I),            | 0   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   |
| OUTFLOW(O)            | 20  | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 | 110  | 120  | 130  | 140  | 150  | 160  | 170  | 180  | 190  |
| AND OBSERVED FLOW(I*) | 0   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   |
|                       | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 |

FLAHERTY GIAVARA ASSOCIATES, P. C.

191  
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211  
221  
231  
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750  
760

[illegible]

| STATION                            | 1. PLAN 1, RATIO 6 |        |
|------------------------------------|--------------------|--------|
| END-OF-PERIOD HYDROGRAPH ORDINATES |                    |        |
| OUTFLOW                            |                    |        |
| 0.                                 | 0.0000             | 0.0000 |
| 0.                                 | 0.0000             | 0.0000 |
| 0.                                 | 0.0000             | 0.0000 |
| 0.                                 | 0.0000             | 0.0000 |

[illegible]

[illegible]

FLAHERTY GIAVARA ASSOCIATES, P.C.

71  
61  
51  
41  
31  
21  
11  
01  
30  
40  
50  
60  
70  
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970  
980  
990  
1000

**FLANERTY GIAVARA ASSOCIATES, P. C.**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |    |    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |      |      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |       |        |        |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |         |          |          |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |         |
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| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | [ | \ | ] | ^ | _ | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z | { |  | } | ~ | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 0A | 0B | 0C | 0D | 0E | 0F | 0G | 0H | 0I | 0J | 0K | 0L | 0M | 0N | 0O | 0P | 0Q | 0R | 0S | 0T | 0U | 0V | 0W | 0X | 0Y | 0Z | 0[ | 0\ | 0] | 0^ | 0_ | 0` | 0a | 0b | 0c | 0d | 0e | 0f | 0g | 0h | 0i | 0j | 0k | 0l | 0m | 0n | 0o | 0p | 0q | 0r | 0s | 0t | 0u | 0v | 0w | 0x | 0y | 0z | 0{ | 0 | 0} | 0~ | 0000 | 0001 | 0002 | 0003 | 0004 | 0005 | 0006 | 0007 | 0008 | 0009 | 000A | 000B | 000C | 000D | 000E | 000F | 000G | 000H | 000I | 000J | 000K | 000L | 000M | 000N | 000O | 000P | 000Q | 000R | 000S | 000T | 000U | 000V | 000W | 000X | 000Y | 000Z | 000[ | 000\ | 000] | 000^ | 000_ | 000` | 000a | 000b | 000c | 000d | 000e | 000f | 000g | 000h | 000i | 000j | 000k | 000l | 000m | 000n | 000o | 000p | 000q | 000r | 000s | 000t | 000u | 000v | 000w | 000x | 000y | 000z | 000{ | 000 | 000} | 000~ | 000000 | 000001 | 000002 | 000003 | 000004 | 000005 | 000006 | 000007 | 000008 | 000009 | 00000A | 00000B | 00000C | 00000D | 00000E | 00000F | 00000G | 00000H | 00000I | 00000J | 00000K | 00000L | 00000M | 00000N | 00000O | 00000P | 00000Q | 00000R | 00000S | 00000T | 00000U | 00000V | 00000W | 00000X | 00000Y | 00000Z | 00000[ | 00000\ | 00000] | 00000^ | 00000_ | 00000` | 00000a | 00000b | 00000c | 00000d | 00000e | 00000f | 00000g | 00000h | 00000i | 00000j | 00000k | 00000l | 00000m | 00000n | 00000o | 00000p | 00000q | 00000r | 00000s | 00000t | 00000u | 00000v | 00000w | 00000x | 00000y | 00000z | 00000{ | 00000 | 00000} | 00000~ | 00000000 | 00000001 | 00000002 | 00000003 | 00000004 | 00000005 | 00000006 | 00000007 | 00000008 | 00000009 | 0000000A | 0000000B | 0000000C | 0000000D | 0000000E | 0000000F | 0000000G | 0000000H | 0000000I | 0000000J | 0000000K | 0000000L | 0000000M | 0000000N | 0000000O | 0000000P | 0000000Q | 0000000R | 0000000S | 0000000T | 0000000U | 0000000V | 0000000W | 0000000X | 0000000Y | 0000000Z | 0000000[ | 0000000\ | 0000000] | 0000000^ | 0000000_ | 0000000` | 0000000a | 0000000b | 0000000c | 0000000d | 0000000e | 0000000f | 0000000g | 0000000h | 0000000i | 0000000j | 0000000k | 0000000l | 0000000m | 0000000n | 0000000o | 0000000p | 0000000q | 0000000r | 0000000s | 0000000t | 0000000u | 0000000v | 0000000w | 0000000x | 0000000y | 0000000z | 0000000{ | 0000000 | 0000000} | 0000000~ | 0000000000 | 0000000001 | 0000000002 | 0000000003 | 0000000004 | 0000000005 | 0000000006 | 0000000007 | 0000000008 | 0000000009 | 000000000A | 000000000B | 000000000C | 000000000D | 000000000E | 000000000F | 000000000G | 000000000H | 000000000I | 000000000J | 000000000K | 000000000L | 000000000M | 000000000N | 000000000O | 000000000P | 000000000Q | 000000000R | 000000000S | 000000000T | 000000000U | 000000000V | 000000000W | 000000000X | 000000000Y | 000000000Z | 000000000[ | 000000000\ | 000000000] | 000000000^ | 000000000_ | 000000000` | 000000000a | 000000000b | 000000000c | 000000000d | 000000000e | 000000000f | 000000000g | 000000000h | 000000000i | 000000000j | 000000000k | 000000000l | 000000000m | 0000000 |
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**END**

**STATION 1, PLAN 1, RATIO 7  
END-OF-PERIOD HYDROGRAPH ORDINATES**

[illegible]

PEAK OUTFLOW IS 34. AT TIME 60.00 HOURS

PEAK

87

547

INCHES

AC-FT

THOUGH CU M

.....

Abstracts of the 1994 Annual Meeting of the American Society of Human Genetics, 1994, 14-18 October, Denver, Colorado, USA. *Am J Hum Genet* 55: 1-10.

المجلس الأعلى للمعوقين

STATION 1 1

INFLOW(I),   OUTFLOW(O) AND OBSERVED FLOW(\*)

|      |      |      |      |       |       |
|------|------|------|------|-------|-------|
| 200. | 400. | 600. | 800. | 1000. | 1200. |
|------|------|------|------|-------|-------|

[illegible]

**PAGE 0032**

C-45

[illegible]

#N/A#

STATION 1, PLAN 1, RATIO 8  
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]



**FLAHERTY GIAVARA ASSOCIATES, P. C.**

[illegible]

AD-A109 969

FLAHERTY-GIAVARA ASSOCIATES NEW HAVEN CT  
NATIONAL DAM SAFETY PROGRAM. LAKE MUSKODAY DAM (INVENTORY NUMRE--ETC(U)  
SEP 81 H C FLAHERTY DACW51-81-C-0006

F/6 13/13

UNCLASSIFIED

NL

2 - 2

6  
5.000000

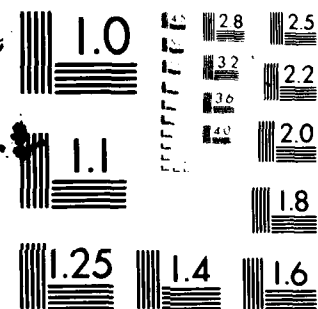
END

DATE

TIME

3 82

DTIC



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

#QV#

STATION 1, PLAN 1, RATIO 9  
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

PEAK OUTFLOW IS 224. AT TIME 59.30 HOURS

**✱ JAO ✱**

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(I+J)[illegible]

14 30 291  
15 00 301  
16 30 311  
17 00 321  
18 30 3301  
19 00 3401  
20 30 350  
21 00 360  
22 30 370  
23 00 3801  
24 30 3901  
25 00 4001  
26 30 4101  
27 00 421  
28 30 431  
29 00 441  
30 30 451  
31 00 461  
32 30 471  
33 00 481  
34 30 491  
35 00 501  
36 30 511  
37 00 521  
38 30 531  
39 00 541  
40 30 551  
41 00 561  
42 30 571  
43 00 581  
44 30 591  
45 00 601  
46 30 611  
47 00 6201  
48 30 6301  
49 00 6401  
50 30 650  
51 00 660  
52 30 670  
53 00 680  
54 30 690  
55 00 700  
56 30 710  
57 00 720  
58 30 730  
59 00 740  
60 30 750  
61 00 760  
62 30 770  
63 00 780  
64 30 790  
65 00 800  
66 30 810  
67 00 820  
68 30 830  
69 00 840  
70 30 850  
71 00 860

19 30 87.  
20 00 88.  
21 00 89.  
22 00 90.  
23 00 91.  
24 00 92.  
25 00 93.  
26 00 94.  
27 00 95.  
28 00 96.  
29 00 97.  
30 00 98.  
31 00 99.  
32 00 100.  
33 00 101.  
34 00 102.  
35 00 103.  
36 00 104.  
37 00 105.  
38 00 106.  
39 00 107.  
40 00 108.  
41 00 109.  
42 00 110.  
43 00 111.  
44 00 112.  
45 00 113.  
46 00 114.  
47 00 115.  
48 00 116.  
49 00 117.  
50 00 118.  
51 00 119.  
52 00 120.

C-52

\*DVN\*

\*\*\*\*\* SUB-AREA RUNOFF COMPUTATION \*\*\*\*\*  
INFLOW HYDROGRAPH, LAKE MUSKODAY - SNYDER METHOD  
ISTAG 2 IECON 0 ITAPE 0 JPLT 0 JPT 0 INAME 1STAGE 1AUTO 0  
IHYDQ 1 IUHQ 1 TAREA 1.88 SNAP 0.00 TRSDA 1.88 TRSFC 0.000 RATIO 0.000 ISNOW 0 ISAVE 1 LOCAL 0  
HYDROGRAPH DATA  
PRECIP DATA  
R12 R24 R48 R72 R96  
0.00 20.70 111.00 122.00 133.00 143.00  
TRSFC COMPUTED BY THE PROGRAM IS 0.800



| 6-HOUR | 24-HOUR | 72-HOUR | TOTAL  | VOLUME |
|--------|---------|---------|--------|--------|
| 3194   | 1073    | 462     | 5593   | 367    |
| 90     | 31      | 13      | 1369   | 367    |
| 19.81  | 21.43   | 22.84   | 280.84 | 367    |
| 401.48 | 349.31  | 380.16  | 2889   | 367    |
| 1984   | 2168    | 2289    | 2889   | 367    |
| 1954   | 2674    | 2823    | 2823   | 367    |

#OVF#

[illegible]

**FLAHERTY OIIVARA ASSOCIATES, P. C.**

[illegible]

14 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 10

[illegible]

**#DND#**

### HYDROGRAPH AT STA

2 FOR PLAN 1. RTIO 1

000-1111111111  
0000-1111111111

00071194641841

PLAN 0007-110B  
146  
120

0004-1264

**SECRET**

00000-12647  
15647  
15711





HYDROGRAPH AT STA 2 FOR PLAN 1, RTIO 9

| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL   | VOLUME |
|------|--------|---------|---------|---------|--------|
| 3053 | 3194   | 1093    | 452     | 5393    | 35393  |
| 143  | 90     | 31      | 13      | 134     | 1569   |
|      | 15.81  | 21.63   | 22.84   | 60.28   | 22.84  |
|      | 401.48 | 349.51  | 380.16  | 1131.15 | 380.16 |
|      | 1584   | 2168    | 2287    | 6039    | 2287   |
|      | 1934   | 2674    | 2823    | 7431    | 2823   |

**C-60**

## COMBINE HYDROGRAPHS

[illegible][illegible]

**#QVF#**

STATION 2

o

[illegible]





**FLAHERTY O'IVARA ASSOCIATES, P. C.**

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 301 | 231 | 251 | 271 | 291 | 311 | 331 | 343 | 353 | 363 | 373 | 383 | 401 | 421 | 441 | 451 | 461 | 471 | 481 | 501 | 521 | 531 | 541 | 551 | 561 | 573 | 583 | 593 | 613 | 623 | 643 | 653 | 663 | 673 | 683 | 701 | 723 | 743 | 753 | 763 | 773 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
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|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
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| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

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C-65







**FLAHERTY GIAVARA ASSOCIATES, P. C.**

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[illegible][illegible]

STATION 2

**#QVF#**

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(\*)

[illegible]

C-74

FLAHERTY GIAVARA ASSOCIATES, P. C.

23 00 461  
23 30 471  
0 30 481  
0 1 00 501  
1 2 30 521  
2 30 531  
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4 30 551  
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2 30 1011  
3 30 1021  
4 30 1031



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FLAHERTY GIAVARA ASSOCIATES, P. C.

9 30 67  
10 00 68  
11 00 69  
12 00 70  
13 00 71  
14 00 72  
15 00 73  
16 00 74  
17 00 75  
18 00 76  
19 00 77  
20 00 78  
21 00 79  
22 00 80  
23 00 81  
24 00 82  
25 00 83  
26 00 84  
27 00 85  
28 00 86  
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30 00 88  
31 00 89  
32 00 90  
33 00 91  
34 00 92  
35 00 93  
36 00 94  
37 00 95  
38 00 96  
39 00 97  
40 00 98  
41 00 99  
42 00 00  
43 00 01  
44 00 02  
45 00 03  
46 00 04  
47 00 05  
48 00 06  
49 00 07  
50 00 08  
51 00 09  
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53 00 11  
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| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
| 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 |
| 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 |
| 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 |
| 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 |
| 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 |

13 00 301  
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69 00 861  
70 00 871



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THOUS CU H

1627.  
2007.

2486.  
3086.

2428.  
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\*OVF\*

STATION 2

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(\*)  
1500. 2000. 2500. 3000.

500. 1000. 1500. 2000. 2500. 3000. 3500. 4000. 4500. 5000. 5500. 6000.

0 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50  
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12325344556677889101112131415161718192021222324252627282930313233343536373839404142434445464748495051525354555657585960616263646566676869707172737475767778798081828384858687888990919293949596979899100101102103104105106107108

6 30109  
7 30110  
8 30111  
9 30112  
10 30113  
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14 30117  
15 30118  
16 30119  
17 30120

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## HYDROGRAPH ROUTING

## LAKE MUSKODAY ROUTING - MODIFIED PULS METHOD

ISTAG 2 ICOMP 1 IRECON 0 IRTAGE 0 JPLT 0 JPR1 0 INAME 1 IRTAGE 0 IAUTO 0

GLOSS 0.0 CLOSS 0.000 AVG 0.00 ROUTING DATA IRTAGE 0 JPLT 0 JPR1 0 INAME 1 IRTAGE 0 IAUTO 0

IRTS 0.000 IRES 1 IRTAGE 0 JPLT 0 JPR1 0 INAME 1 IRTAGE 0 IAUTO 0

IRTS 0.000 IRES 1 IRTAGE 0 JPLT 0 JPR1 0 INAME 1 IRTAGE 0 IAUTO 0

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IRTS 0.000 IRES 1 IRTAGE 0 JPLT 0 JPR1 0 INAME 1 IRTAGE 0 IAUTO 0

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FLAHERTY GIOVARA ASSOCIATES, P.C.

7 00 6201  
8 00 6301  
9 00 6401  
10 00 6501  
11 00 6601  
12 00 6701  
13 00 6801  
14 00 6901  
15 00 7001  
16 00 7101  
17 00 7201  
18 00 7301  
19 00 7401  
20 00 7501  
21 00 7601  
22 00 7701  
23 00 7801  
24 00 7901  
25 00 8001  
26 00 8101  
27 00 8201  
28 00 8301  
29 00 8401  
30 00 8501  
31 00 8601  
32 00 8701  
33 00 8801  
34 00 8901  
35 00 9001  
36 00 9101  
37 00 9201  
38 00 9301  
39 00 9401  
40 00 9501  
41 00 9601  
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43 00 9801  
44 00 9901  
45 00 10001  
46 00 10101  
47 00 10201  
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**#DVD#**

STATION 2, PLAN 1, RATIO 2  
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

PEAK OUTFLOW IS 168. AT TIME 44.00 HOURS

|       | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|-------|------|--------|---------|---------|-------|--------|
| CF8   | 168  | 156    | 88      | 36      |       | 4325   |
| CM8   | 5    | 4      |         | 1       |       | 122    |
| INCUB |      | 0.33   | 0.74    | 0.75    |       | 0.75   |

MM  
AC-FT  
THOUS CU M

19.14  
179  
220

19.14  
179  
220

18.74  
175  
216

8.27  
77  
95

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STATION 2

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(\*)

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1.00 31  
1.50 41  
2.00 51  
2.50 61  
3.00 71  
3.50 81  
4.00 91  
4.50 101  
5.00 111  
5.50 121  
6.00 131  
6.50 141  
7.00 151  
7.50 161  
8.00 171  
8.50 181  
9.00 191  
9.50 201  
10.00 211  
10.50 221  
11.00 231  
11.50 241  
12.00 251  
12.50 261  
13.00 271  
13.50 281  
14.00 291  
14.50 301  
15.00 311  
15.50 321  
16.00 331  
16.50 341  
17.00 351  
17.50 361  
18.00 371  
18.50 381  
19.00 391  
19.50 401  
20.00 411  
20.50 421  
21.00 431  
21.50 441  
22.00 451  
22.50 461  
23.00 471  
23.50 481  
24.00 491

FLAHERTY GIAVARA ASSOCIATES, P. C.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107

| Year | Percentage of Respondents |
|------|---------------------------|
| 1990 | 85%                       |
| 1991 | 80%                       |
| 1992 | 75%                       |
| 1993 | 70%                       |
| 1994 | 65%                       |
| 1995 | 60%                       |
| 1996 | 55%                       |
| 1997 | 50%                       |
| 1998 | 45%                       |
| 1999 | 40%                       |
| 2000 | 35%                       |

STATION 2, PLAN 1, RATIO 3

### END-OF-PERIOD HYDROGRAPH ORDINATES

**OUTFLOW**

0002226  
91  
176  
104  
180  
98

000NNNNN 380 130 60

0002225  
27  
182  
139  
86  
63

0002224 18  
181  
143  
189  
64

000-122414  
177  
148  
92  
66

00001225117013319568

0000NNK7-  
1981  
1981

0000NNND 141 143 99 72

00002227 97 168 100 75

0000222172  
172  
102  
77

## STORAGE

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000000708969

000NNN-023031  
130712

00000006  
230738

0000000000  
101  
121

010  
000  
1334  
119  
104  
77  
60

000-1334129  
108  
108  
179  
61

[illegible]

00007730  
178  
117  
B3  
64

0000KKK9  
62185

## STAGE

000-44-4444  
 5555555555  
 6666666666

000-1-1-1-1  
0000000000

0000-0000  
0000000000  
0000000000

0000-44-44-  
nnnnnnnnnn  
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0000-1-1-1  
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ST 0000111  
434343434343

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PEAK OUTFLOW IS 182. AT TIME 44.00 HOURS

|        | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|--------|------|--------|---------|---------|-------|--------|
| CFS    | 182. | 169.   | 137.    | 40.     | 4853. |        |
| CHB    | 5.   | 5.     | 3.      | 1.      | 137.  | 0.85   |
| INCHES |      | 0.35   | 0.83    | 0.89    | 21.47 | 21.47  |
| MM     |      | 8.99   | 21.04   | 21.47   | 201.  | 201.   |
| CU-FT  |      | 84.    | 196.    | 201.    | 247.  | 247.   |
| THOUS  |      | 104.   | 242.    | 247.    |       |        |

**#JAD#**

## STATION 2

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(\*)

[illegible]

C-92

FLAHERTY GIAVARA ASSOCIATES, P. C.

19 00 3801  
19 30 3901  
20 00 401  
20 30 411  
21 00 421  
21 30 431  
22 00 441  
22 30 451  
23 00 461  
23 30 471  
24 00 481  
24 30 491  
25 00 501  
25 30 511  
26 00 521  
26 30 531  
27 00 541  
27 30 551  
28 00 561  
28 30 571  
29 00 581  
29 30 591  
30 00 601  
30 30 611  
31 00 621  
31 30 631  
32 00 641  
32 30 651  
33 00 661  
33 30 671  
34 00 681  
34 30 691  
35 00 701  
35 30 711  
36 00 721  
36 30 731  
37 00 741  
37 30 751  
38 00 761  
38 30 771  
39 00 781  
39 30 791  
40 00 801  
40 30 811  
41 00 821  
41 30 831  
42 00 841  
42 30 851  
43 00 861  
43 30 871  
44 00 881  
44 30 891  
45 00 901  
45 30 911  
46 00 921  
46 30 931  
47 00 941  
47 30 951



STATION 2, PLAN 1, RATIO 4  
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

PEAK OUTFLOW IS 207. AT TIME 44.00 HOURS

**#QVZ#**

| INFLOW(I), | OUTFLOW(O) | AND OBSERVED FLOW(*) |
|------------|------------|----------------------|
| 300.       | 400.       | 500.                 |
| 400.       | 500.       | 600.                 |

[illegible]

00 261  
 13 30 271  
 14 30 281  
 15 30 291  
 16 30 301  
 17 30 311  
 18 30 321  
 19 30 331  
 20 30 341  
 21 30 351  
 22 30 361  
 23 30 371  
 24 30 381  
 25 30 391  
 26 30 401  
 27 30 411  
 28 30 421  
 29 30 431  
 30 30 441  
 31 30 451  
 32 30 461  
 33 30 471  
 34 30 481  
 35 30 491  
 36 30 501  
 37 30 511  
 38 30 521  
 39 30 531  
 40 30 541  
 41 30 551  
 42 30 561  
 43 30 571  
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 45 30 591  
 46 30 601  
 47 30 611  
 48 30 621  
 49 30 631  
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 51 30 651  
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 55 30 691  
 56 30 701  
 57 30 711  
 58 30 721  
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 62 30 761  
 63 30 771  
 64 30 781  
 65 30 791  
 66 30 801  
 67 30 811  
 68 30 821  
 69 30 831  
 70 30 841  
 71 30 851  
 72 30 861  
 73 30 871  
 74 30 881  
 75 30 891  
 76 30 901  
 77 30 911  
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 79 30 931  
 80 30 941  
 81 30 951  
 82 30 961  
 83 30 971  
 84 30 981  
 85 30 991



STATION 2, PLAN 1, RATIO 5  
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

[illegible]

PEAK OUTFLOW IS 255. AT TIME 43.50 HOURS

|        | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|--------|------|--------|---------|---------|-------|--------|
| CFS    | 255  | 6      | 121     | 47      | 592   | 592    |
| CHS    | 7    | 207    | 3       | 1       | 180   | 180    |
| INCHES |      | 0.43   | 1.01    | 1.03    |       |        |
| MM     |      | 10.98  | 25.68   | 26.20   |       |        |
| CU-FT  |      | 126    | 240     | 35      | 245   | 245    |
| CU M   |      | 126    | 296     | 302     | 302   | 302    |

#OVF#

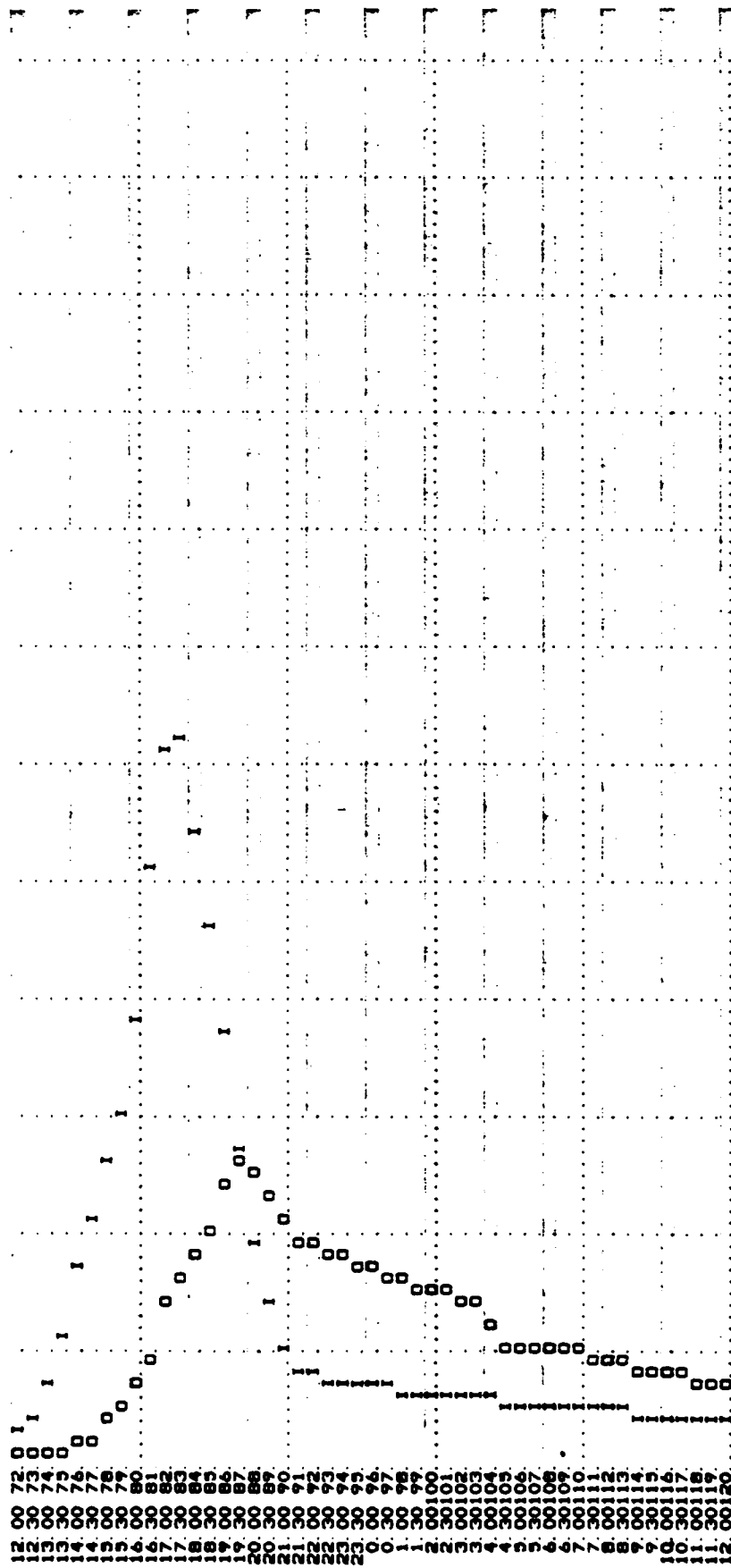
STATION 2

|            |            |                      |
|------------|------------|----------------------|
| INFLOW(I), | OUTFLOW(O) | AND OBSERVED FLOW(*) |
| 300        | 400        | 500                  |
|            |            | 600                  |

0-1234567890123456  
3030303030303030  
0-1234567890123456

7 00 141  
7 30 151  
8 00 161  
8 30 171  
9 00 181  
10 00 201  
10 30 211  
11 00 221  
11 30 231  
12 00 241  
12 30 251  
13 00 261  
13 30 271  
14 00 281  
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17 00 341  
17 30 351  
18 00 361  
18 30 371  
19 00 381  
19 30 391  
20 00 401  
20 30 411  
21 00 421  
21 30 431  
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22 30 451  
23 00 461  
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1 30 521  
2 00 531  
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5 30 601  
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7 30 641  
8 00 651  
8 30 661  
9 00 671  
9 30 681  
10 00 691  
10 30 701  
11 00 711

FLAHERTY GIAVARA ASSOCIATES, P. C.



\*OVN\*

STATION 2, PLAN 1, RATIO 6  
END-OF-PERIOD HYDROGRAPH ORDINATES

| STATION | INFLOW (1),<br>THOUS CU H | OUTFLOW (1),<br>THOUS CU H | OUTFLOW (2),<br>THOUS CU H | OUTFLOW (3),<br>THOUS CU H | OUTFLOW (4),<br>THOUS CU H | OUTFLOW (5),<br>THOUS CU H | OUTFLOW (6),<br>THOUS CU H | OUTFLOW (7),<br>THOUS CU H | OUTFLOW (8),<br>THOUS CU H | OUTFLOW (9),<br>THOUS CU H | OUTFLOW (10),<br>THOUS CU H | OUTFLOW (11),<br>THOUS CU H | OUTFLOW (12),<br>THOUS CU H | OUTFLOW (13),<br>THOUS CU H | OUTFLOW (14),<br>THOUS CU H | OUTFLOW (15),<br>THOUS CU H | OUTFLOW (16),<br>THOUS CU H | OUTFLOW (17),<br>THOUS CU H | OUTFLOW (18),<br>THOUS CU H | OUTFLOW (19),<br>THOUS CU H | OUTFLOW (20),<br>THOUS CU H | OUTFLOW (21),<br>THOUS CU H | OUTFLOW (22),<br>THOUS CU H | OUTFLOW (23),<br>THOUS CU H | OUTFLOW (24),<br>THOUS CU H | OUTFLOW (25),<br>THOUS CU H | OUTFLOW (26),<br>THOUS CU H | OUTFLOW (27),<br>THOUS CU H | OUTFLOW (28),<br>THOUS CU H | OUTFLOW (29),<br>THOUS CU H | OUTFLOW (30),<br>THOUS CU H | OUTFLOW (31),<br>THOUS CU H | OUTFLOW (32),<br>THOUS CU H | OUTFLOW (33),<br>THOUS CU H | OUTFLOW (34),<br>THOUS CU H | OUTFLOW (35),<br>THOUS CU H | OUTFLOW (36),<br>THOUS CU H | OUTFLOW (37),<br>THOUS CU H | OUTFLOW (38),<br>THOUS CU H | OUTFLOW (39),<br>THOUS CU H | OUTFLOW (40),<br>THOUS CU H | OUTFLOW (41),<br>THOUS CU H | OUTFLOW (42),<br>THOUS CU H | OUTFLOW (43),<br>THOUS CU H | OUTFLOW (44),<br>THOUS CU H | OUTFLOW (45),<br>THOUS CU H | OUTFLOW (46),<br>THOUS CU H | OUTFLOW (47),<br>THOUS CU H | OUTFLOW (48),<br>THOUS CU H | OUTFLOW (49),<br>THOUS CU H | OUTFLOW (50),<br>THOUS CU H | OUTFLOW (51),<br>THOUS CU H | OUTFLOW (52),<br>THOUS CU H | OUTFLOW (53),<br>THOUS CU H | OUTFLOW (54),<br>THOUS CU H | OUTFLOW (55),<br>THOUS CU H | OUTFLOW (56),<br>THOUS CU H | OUTFLOW (57),<br>THOUS CU H | OUTFLOW (58),<br>THOUS CU H | OUTFLOW (59),<br>THOUS CU H | OUTFLOW (60),<br>THOUS CU H | OUTFLOW (61),<br>THOUS CU H | OUTFLOW (62),<br>THOUS CU H | OUTFLOW (63),<br>THOUS CU H | OUTFLOW (64),<br>THOUS CU H | OUTFLOW (65),<br>THOUS CU H | OUTFLOW (66),<br>THOUS CU H | OUTFLOW (67),<br>THOUS CU H | OUTFLOW (68),<br>THOUS CU H | OUTFLOW (69),<br>THOUS CU H | OUTFLOW (70),<br>THOUS CU H | OUTFLOW (71),<br>THOUS CU H | OUTFLOW (72),<br>THOUS CU H | OUTFLOW (73),<br>THOUS CU H | OUTFLOW (74),<br>THOUS CU H | OUTFLOW (75),<br>THOUS CU H | OUTFLOW (76),<br>THOUS CU H | OUTFLOW (77),<br>THOUS CU H | OUTFLOW (78),<br>THOUS CU H | OUTFLOW (79),<br>THOUS CU H | OUTFLOW (80),<br>THOUS CU H | OUTFLOW (81),<br>THOUS CU H | OUTFLOW (82),<br>THOUS CU H | OUTFLOW (83),<br>THOUS CU H | OUTFLOW (84),<br>THOUS CU H | OUTFLOW (85),<br>THOUS CU H | OUTFLOW (86),<br>THOUS CU H | OUTFLOW (87),<br>THOUS CU H | OUTFLOW (88),<br>THOUS CU H | OUTFLOW (89),<br>THOUS CU H | OUTFLOW (90),<br>THOUS CU H | OUTFLOW (91),<br>THOUS CU H | OUTFLOW (92),<br>THOUS CU H | OUTFLOW (93),<br>THOUS CU H | OUTFLOW (94),<br>THOUS CU H | OUTFLOW (95),<br>THOUS CU H | OUTFLOW (96),<br>THOUS CU H | OUTFLOW (97),<br>THOUS CU H | OUTFLOW (98),<br>THOUS CU H | OUTFLOW (99),<br>THOUS CU H | OUTFLOW (100),<br>THOUS CU H |
|---------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|
| 0.30    | 100.                      | 200.                       | 300.                       | 400.                       | 500.                       | 600.                       | 700.                       | 800.                       | 900.                       | 1000.                      | 1100.                       | 1200.                       | 1300.                       | 1400.                       | 1500.                       | 1600.                       | 1700.                       | 1800.                       | 1900.                       | 2000.                       | 2100.                       | 2200.                       | 2300.                       | 2400.                       | 2500.                       | 2600.                       | 2700.                       | 2800.                       | 2900.                       | 3000.                       | 3100.                       | 3200.                       | 3300.                       | 3400.                       | 3500.                       | 3600.                       | 3700.                       | 3800.                       | 3900.                       | 4000.                       | 4100.                       | 4200.                       | 4300.                       | 4400.                       | 4500.                       | 4600.                       | 4700.                       | 4800.                       | 4900.                       | 5000.                       | 5100.                       | 5200.                       | 5300.                       | 5400.                       | 5500.                       | 5600.                       | 5700.                       | 5800.                       | 5900.                       | 6000.                       | 6100.                       | 6200.                       | 6300.                       | 6400.                       | 6500.                       | 6600.                       | 6700.                       | 6800.                       | 6900.                       | 7000.                       | 7100.                       | 7200.                       | 7300.                       | 7400.                       | 7500.                       | 7600.                       | 7700.                       | 7800.                       | 7900.                       | 8000.                       | 8100.                       | 8200.                       | 8300.                       | 8400.                       | 8500.                       | 8600.                       | 8700.                       | 8800.                       | 8900.                       | 9000.                       | 9100.                       | 9200.                       | 9300.                       | 9400.                       | 9500.                       | 9600.                       | 9700.                       | 9800.                       | 9900.                       | 10000.                      |                              |

FLAHERTY GIAVARA ASSOCIATES, P.C.

21 00 1 30 2 30 3 30 4 30 5 30 6 30 7 30 8 30 9 30 10 30 11 30 12 30 13 30 14 30 15 30 16 30 17 30 18 30 19 30 20 30 21 30 22 30 23 30 24 30 25 30 26 30 27 30 28 30 29 30 30 30 31 30 32 30 33 30 34 30 35 30 36 30 37 30 38 30 39 30 40 30 41 30 42 30 43 30 44 30 45 30 46 30 47 30 48 30 49 30 50 30 51 30 52 30 53 30 54 30 55 30 56 30 57 30 58 30 59 30

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|    |       |   |   |
|----|-------|---|---|
| 11 | 00118 | 1 | 0 |
| 11 | 30119 | 1 | 0 |
| 11 | 00100 | 1 | 0 |
| 12 | 00120 | 1 | 0 |

**◆◇◆◆◆**

STATION 2, PLAN 1, RATIO 7  
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

PEAK OUTFLOW IS 691. AT TIME 42.50 HOURS

|      |        |         |         |       |        |
|------|--------|---------|---------|-------|--------|
| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
| 691. | 462.   | 212.    | 87.     |       | 10390. |

CFB

CMB  
INCHES  
MM  
AC-FT  
THOUS CU M

STATION 2

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(\*)  
600. 800. 1000. 1200.

C-105

FLAHERTY GIOVANA ASSOCIATES, P. C.

00 481  
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00 501  
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**#QV#**

STATION 2: PLAN 1, RATIO 8  
END-OF-PERIOD HYDROGRAPH ORDINATES

C-107

PEAK OUTFLOW IS 2242. AT TIME 42.00 HOURS

|        | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|--------|------|--------|---------|---------|-------|--------|
| CFS    | 24.2 | 14.1   | 5.7     | 2.27    | 27.99 | 773    |
| CMBS   | 63   | 42     | 16      | 6       | 4     | 76     |
| INCHES |      | 3      | 4       | 4       | 120   | 79     |
| MM     |      | 78     | 119     | 120     | 1128  | 1128   |
| CU-FT  |      |        | 1363    | 1391    | 1391  | 1391   |
| THOUS  |      | 900    |         |         |       |        |

**#AND#**

STATION 2

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(\*)

|   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

iC-108

**FLAHERTY O'IAVARA ASSOCIATES, P. C.**

**PAGE 0096**

[illegible]

C-109

FLAHERTY GIAVARA ASSOCIATES, P. C.

23 00 94.  
23 30 95.  
00 00 96.  
00 00 97.  
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\*OVN\*

C-110

STATION 21 PLAN 1, RATIO 7  
END-OF-PERIOD HYDROGRAPH ORDINATES

| OUTFLOW | STORAGE |
|---------|---------|
| 0       | 0       |
| 1       | 1       |
| 2       | 2       |
| 3       | 3       |
| 4       | 4       |
| 5       | 5       |
| 6       | 6       |
| 7       | 7       |
| 8       | 8       |
| 9       | 9       |
| 10      | 10      |
| 11      | 11      |
| 12      | 12      |
| 13      | 13      |
| 14      | 14      |
| 15      | 15      |
| 16      | 16      |
| 17      | 17      |
| 18      | 18      |
| 19      | 19      |
| 20      | 20      |
| 21      | 21      |
| 22      | 22      |
| 23      | 23      |
| 24      | 24      |
| 25      | 25      |
| 26      | 26      |
| 27      | 27      |
| 28      | 28      |
| 29      | 29      |
| 30      | 30      |
| 31      | 31      |
| 32      | 32      |
| 33      | 33      |
| 34      | 34      |
| 35      | 35      |
| 36      | 36      |
| 37      | 37      |
| 38      | 38      |
| 39      | 39      |
| 40      | 40      |
| 41      | 41      |
| 42      | 42      |
| 43      | 43      |
| 44      | 44      |
| 45      | 45      |
| 46      | 46      |
| 47      | 47      |
| 48      | 48      |
| 49      | 49      |
| 50      | 50      |
| 51      | 51      |
| 52      | 52      |
| 53      | 53      |
| 54      | 54      |
| 55      | 55      |
| 56      | 56      |
| 57      | 57      |
| 58      | 58      |
| 59      | 59      |
| 60      | 60      |
| 61      | 61      |
| 62      | 62      |
| 63      | 63      |
| 64      | 64      |
| 65      | 65      |
| 66      | 66      |
| 67      | 67      |
| 68      | 68      |
| 69      | 69      |
| 70      | 70      |
| 71      | 71      |
| 72      | 72      |
| 73      | 73      |
| 74      | 74      |
| 75      | 75      |
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| 83      | 83      |
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| 87      | 87      |
| 88      | 88      |
| 89      | 89      |
| 90      | 90      |
| 91      | 91      |
| 92      | 92      |
| 93      | 93      |
| 94      | 94      |
| 95      | 95      |
| 96      | 96      |
| 97      | 97      |
| 98      | 98      |
| 99      | 99      |
| 100     | 100     |

PEAK OUTFLOW IS 4687. AT TIME 42.00 HOURS

**#AND#**

| INFLW(I), OUTFLOW(I) AND OBSERVED FLOW(I) | STATION | 2 |
|-------------------------------------------|---------|---|
| 0.                                        | 1000.   |   |
|                                           | 2000.   |   |
|                                           | 3000.   |   |
|                                           | 4000.   |   |
|                                           | 5000.   |   |
|                                           | 6000.   |   |

|   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |

**FLAHERTY OIAVARA ASSOCIATES, P. C.**

[illegible]

[illegible]

**#QW#**

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SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
AREA IN SQUARE MILES (SQUARE KILOMETERS)

\*\*\*\*\*

PEAK FLOW AND STORAGE (END OF PERIOD)

\*\*\*\*\*

| RATIOS APPLIED TO FLOWS |         |
|-------------------------|---------|
| RATIO 3                 | RATIO 4 |
| 0.10                    | 0.11    |

| OPERATION | STATION | AREA | PLAN | RATIO 1 | RATIO 2 | RATIO 3 | RATIO 4 | RATIO 5 | RATIO 6 | RATIO 7 | RATIO 8 | RATIO 9 | RATIO 10 |
|-----------|---------|------|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
|           |         |      |      | 0.09    | 0.09    | 0.10    | 0.11    | 0.12    | 0.13    | 0.20    | 0.50    | 1.00    |          |

|               |   |                |                |                |                |                |                |                |                |                |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                |
|---------------|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--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| HYDROGRAPH AT | 1 | 2.37<br>(6.66) | 328<br>(16.71) | 590<br>(18.56) | 656<br>(20.42) | 721<br>(22.27) | 787<br>(24.13) | 852<br>(25.98) | 917<br>(27.83) | 982<br>(29.68) | 1047<br>(31.53) | 1112<br>(33.38) | 1177<br>(35.23) | 1242<br>(37.08) | 1307<br>(38.93) | 1372<br>(40.78) | 1437<br>(42.63) | 1502<br>(44.48) | 1567<br>(46.33) | 1632<br>(48.18) | 1697<br>(50.03) | 1762<br>(51.88) | 1827<br>(53.73) | 1892<br>(55.58) | 1957<br>(57.43) | 2022<br>(59.28) | 2087<br>(61.13) | 2152<br>(62.98) | 2217<br>(64.83) | 2282<br>(66.68) | 2347<br>(68.53) | 2412<br>(70.38) | 2477<br>(72.23) | 2542<br>(74.08) | 2607<br>(75.93) | 2672<br>(77.78) | 2737<br>(79.63) | 2802<br>(81.48) | 2867<br>(83.33) | 2932<br>(85.18) | 2997<br>(87.03) | 3062<br>(88.88) | 3127<br>(90.73) | 3192<br>(92.58) | 3257<br>(94.43) | 3322<br>(96.28) | 3387<br>(98.13) | 3452<br>(99.98) | 3517<br>(101.83) | 3582<br>(103.68) | 3647<br>(105.53) | 3712<br>(107.38) | 3777<br>(109.23) | 3842<br>(111.08) | 3907<br>(112.93) | 3972<br>(114.78) | 4037<br>(116.63) | 4102<br>(118.48) | 4167<br>(120.33) | 4232<br>(122.18) | 4297<br>(124.03) | 4362<br>(125.88) | 4427<br>(127.73) | 4492<br>(129.58) | 4557<br>(131.43) | 4622<br>(133.28) | 4687<br>(135.13) | 4752<br>(136.98) | 4817<br>(138.83) | 4882<br>(140.68) | 4947<br>(142.53) | 5012<br>(144.38) | 5077<br>(146.23) | 5142<br>(148.08) | 5207<br>(149.93) | 5272<br>(151.78) | 5337<br>(153.63) | 5402<br>(155.48) | 5467<br>(157.33) | 5532<br>(159.18) | 5597<br>(161.03) | 5662<br>(162.88) | 5727<br>(164.73) | 5792<br>(166.58) | 5857<br>(168.43) | 5922<br>(170.28) | 5987<br>(172.13) | 6052<br>(173.98) | 6117<br>(175.83) | 6182<br>(177.68) | 6247<br>(179.53) | 6312<br>(181.38) | 6377<br>(183.23) | 6442<br>(185.08) | 6507<br>(186.93) | 6572<br>(188.78) | 6637<br>(190.63) | 6702<br>(192.48) | 6767<br>(194.33) | 6832<br>(196.18) | 6897<br>(198.03) | 6962<br>(199.88) | 7027<br>(201.73) | 7092<br>(203.58) | 7157<br>(205.43) | 7222<br>(207.28) | 7287<br>(209.13) | 7352<br>(210.98) | 7417<br>(212.83) | 7482<br>(214.68) | 7547<br>(216.53) | 7612<br>(218.38) | 7677<br>(220.23) | 7742<br>(222.08) | 7807<br>(223.93) | 7872<br>(225.78) | 7937<br>(227.63) | 8002<br>(229.48) | 8067<br>(231.33) | 8132<br>(233.18) | 8197<br>(235.03) | 8262<br>(236.88) | 8327<br>(238.73) | 8392<br>(240.58) | 8457<br>(242.43) | 8522<br>(244.28) | 8587<br>(246.13) | 8652<br>(247.98) | 8717<br>(249.83) | 8782<br>(251.68) | 8847<br>(253.53) | 8912<br>(255.38) | 8977<br>(257.23) | 9042<br>(259.08) | 9107<br>(260.93) | 9172<br>(262.78) | 9237<br>(264.63) | 9302<br>(266.48) | 9367<br>(268.33) | 9432<br>(270.18) | 9497<br>(272.03) | 9562<br>(273.88) | 9627<br>(275.73) | 9692<br>(277.58) | 9757<br>(279.43) | 9822<br>(281.28) | 9887<br>(283.13) | 9952<br>(284.98) | 10017<br>(286.83) | 10082<br>(288.68) | 10147<br>(290.53) | 10212<br>(292.38) | 10277<br>(294.23) | 10342<br>(296.08) | 10407<br>(297.93) | 10472<br>(299.78) | 10537<br>(301.63) | 10602<br>(303.48) | 10667<br>(305.33) | 10732<br>(307.18) | 10797<br>(309.03) | 10862<br>(310.88) | 10927<br>(312.73) | 10992<br>(314.58) | 11057<br>(316.43) | 11122<br>(318.28) | 11187<br>(320.13) | 11252<br>(321.98) | 11317<br>(323.83) | 11382<br>(325.68) | 11447<br>(327.53) | 11512<br>(329.38) | 11577<br>(331.23) | 11642<br>(333.08) | 11707<br>(334.93) | 11772<br>(336.78) | 11837<br>(338.63) | 11902<br>(340.48) | 11967<br>(342.33) | 12032<br>(344.18) | 12097<br>(346.03) | 12162<br>(347.88) | 12227<br>(349.73) | 12292<br>(351.58) | 12357<br>(353.43) | 12422<br>(355.28) | 12487<br>(357.13) | 12552<br>(358.98) | 12617<br>(360.83) | 12682<br>(362.68) | 12747<br>(364.53) | 12812<br>(366.38) | 12877<br>(368.23) | 12942<br>(370.08) | 13007<br>(371.93) | 13072<br>(373.78) | 13137<br>(375.63) | 13202<br>(377.48) | 13267<br>(379.33) | 13332<br>(381.18) | 13397<br>(383.03) | 13462<br>(384.88) | 13527<br>(386.73) | 13592<br>(388.58) | 13657<br>(390.43) | 13722<br>(392.28) | 13787<br>(394.13) | 13852<br>(395.98) | 13917<br>(397.83) | 13982<br>(399.68) | 14047<br>(401.53) | 14112<br>(403.38) | 14177<br>(405.23) | 14242<br>(407.08) | 14307<br>(408.93) | 14372<br>(410.78) | 14437<br>(412.63) | 14502<br>(414.48) | 14567<br>(416.33) | 14632<br>(418.18) | 14697<br>(420.03) | 14762<br>(421.88) | 14827<br>(423.73) | 14892<br>(425.58) | 14957<br>(427.43) | 15022<br>(429.28) | 15087<br>(431.13) | 15152<br>(432.98) | 15217<br>(434.83) | 15282<br>(436.68) | 15347<br>(438.53) | 15412<br>(440.38) | 15477<br>(442.23) | 15542<br>(444.08) | 15607<br>(445.93) | 15672<br>(447.78) | 15737<br>(449.63) | 15802<br>(451.48) | 15867<br>(453.33) | 15932<br>(455.18) | 15997<br>(457.03) | 16062<br>(458.88) | 16127<br>(460.73) | 16192<br>(462.58) | 16257<br>(464.43) | 16322<br>(466.28) | 16387<br>(468.13) | 16452<br>(469.98) | 16517<br>(471.83) | 16582<br>(473.68) | 16647<br>(475.53) | 16712<br>(477.38) | 16777<br>(479.23) | 16842<br>(481.08) | 16907<br>(482.93) | 16972<br>(484.78) | 17037<br>(486.63) | 17102<br>(488.48) | 17167<br>(490.33) | 17232<br>(492.18) | 17297<br>(494.03) | 17362<br>(495.88) | 17427<br>(497.73) | 17492<br>(499.58) | 17557<br>(501.43) | 17622<br>(503.28) | 17687<br>(505.13) | 17752<br>(506.98) | 17817<br>(508.83) | 17882<br>(510.68) | 17947<br>(512.53) | 18012<br>(514.38) | 18077<br>(516.23) | 18142<br>(518.08) | 18207<br>(519.93) | 18272<br>(521.78) | 18337<br>(523.63) | 18402<br>(525.48) | 18467<br>(527.33) | 18532<br>(529.18) | 18597<br>(531.03) | 18662<br>(532.88) | 18727<br>(534.73) | 18792<br>(536.58) | 18857<br>(538.43) | 18922<br>(540.28) | 18987<br>(542.13) | 19052<br>(543.98) | 19117<br>(545.83) | 19182<br>(547.68) | 19247<br>(549.53) | 19312<br>(551.38) | 19377<br>(553.23) | 19442<br>(555.08) | 19507<br>(556.93) | 19572<br>(558.78) | 19637<br>(560.63) | 19702<br>(562.48) | 19767<br>(564.33) | 19832<br>(566.18) | 19897<br>(568.03) | 19962<br>(569.88) | 20027<br>(571.73) | 20092<br>(573.58) | 20157<br>(575.43) | 20222<br>(577.28) | 20287<br>(579.13) | 20352<br>(580.98) | 20417<br>(582.83) | 20482<br>(584.68) | 20547<br>(586.53) | 20612<br>(588.38) | 20677<br>(590.23) | 20742<br>(592.08) | 20807<br>(593.93) | 20872<br>(595.78) | 20937<br>(597.63) | 21002<br>(599.48) | 21067<br>(601.33) | 21132<br>(603.18) | 21197<br>(605.03) | 21262<br>(606.88) | 21327<br>(608.73) | 21392<br>(610.58) | 21457<br>(612.43) | 21522<br>(614.28) | 21587<br>(616.13) | 21652<br>(617.98) | 21717<br>(619.83) | 21782<br>(621.68) | 21847<br>(623.53) | 21912<br>(625.38) | 21977<br>(627.23) | 22042<br>(629.08) | 22107<br>(630.93) | 22172<br>(632.78) | 22237<br>(634.63) | 22302<br>(636.48) | 22367<br>(638.33) | 22432<br>(640.18) | 22497<br>(642.03) | 22562<br>(643.88) | 22627<br>(645.73) | 22692<br>(647.58) | 22757<br>(649.43) | 22822<br>(651.28) | 22887<br>(653.13) | 22952<br>(654.98) | 23017<br>(656.83) | 23082<br>(658.68) | 23147<br>(660.53) | 23212<br>(662.38) | 23277<br>(664.23) | 23342<br>(666.08) | 23407<br>(667.93) | 23472<br>(669.78) | 23537<br>(671.63) | 23602<br>(673.48) | 23667<br>(675.33) | 23732<br>(677.18) | 23797<br>(679.03) | 23862<br>(680.88) | 23927<br>(682.73) | 23992<br>(684.58) | 24057<br>(686.43) | 24122<br>(688.28) | 24187<br>(690.13) | 24252<br>(691.98) | 24317<br>(693.83) | 24382<br>(695.68) | 24447<br>(697.53) | 24512<br>(699.38) | 24577<br>(701.23) | 24642<br>(703.08) | 24707<br>(704.93) | 24772<br>(706.78) | 24837<br>(708.63) | 24902<br>(710.48) | 24967<br>(712.33) | 25032<br>(714.18) | 25097<br>(716.03) | 25162<br>(717.88) | 25227<br>(719.73) | 25292<br>(721.58) | 25357<br>(723.43) | 25422<br>(725.28) | 25487<br>(727.13) | 25552<br>(728.98) | 25617<br>(730.83) | 25682<br>(732.68) | 25747<br>(734.53) | 25812<br>(736.38) | 25877<br>(738.23) | 25942<br>(740.08) | 26007<br>(741.93) | 26072<br>(743.78) | 26137<br>(745.63) | 26202<br>(747.48) | 26267<br>(749.33) | 26332<br>(751.18) | 26397<br>(753.03) | 26462<br>(754.88) | 26527<br>(756.73) | 26592<br>(758.58) | 26657<br>(760.43) | 26722<br>(762.28) | 26787<br>(764.13) | 26852<br>(765.98) | 26917<br>(767.83) | 26982<br>(769.68) | 27047<br>(771.53) | 27112<br>(773.38) | 27177<br>(775.23) | 27242<br>(777.08) | 27307<br>(778.93) | 27372<br>(780.78) | 27437<br>(782.63) | 27502<br>(784.48) | 27567<br>(786.33) | 27632<br>(788.18) | 27697<br>(790.03) | 27762<br>(791.88) | 27827<br>(793.73) | 27892<br>(795.58) | 27957<br>(797.43) | 28022<br>(799.28) | 28087<br>(801.13) | 28152<br>(802.98) | 28217<br>(804.83) | 28282<br>(806.68) | 28347<br>(808.53) | 28412<br>(810.38) | 28477<br>(812.23) | 28542<br>(814.08) | 28607<br>(815.93) | 28672<br>(817.78) | 28737<br>(819.63) | 28802<br>(821.48) | 28867<br>(823.33) | 28932<br>(825.18) | 28997<br>(827.03) | 29062<br>(828.88) | 29127<br>(830.73) | 29192<br>(832.58) | 29257<br>(834.43) | 29322<br>(836.28) | 29387<br>(838.13) | 29452<br>(840.08) | 29517<br>(841.93) | 29582<br>(843.78) | 29647<br>(845.63) | 29712<br>(847.48) | 29777<br>(849.33) | 29842<br>(851.18) | 29907<br>(853.03) | 29972<br>(854.88) | 30037<br>(856.73) | 30102<br>(858.58) | 30167<br>(860.43) | 30232<br>(862.28) | 30297<br>(864.13) | 30362<br>(865.98) | 30427<br>(867.83) | 30492<br>(869.68) | 30557<br>(871.53) | 30622<br>(873.38) | 30687<br>(875.23) | 30752<br>(877.08) | 30817<br>(878.93) | 30882<br>(880.78) | 30947<br>(882.63) | 31012<br>(884.48) | 31077<br>(886.33) | 31142<br>(888.18) | 31207<br>(890.03) | 31272<br>(891.88) | 31337<br>(893.73) | 31402<br>(895.58) | 31467<br>(897.43) | 31532<br>(899.28) | 31597<br>(901.13) | 31662<br>(902.98) | 31727<br>(904.83) | 31792<br>(906.68) | 31857<br>(908.53) | 31922<br>(910.38) | 31987<br>(912.23) | 32052<br>(914.08) | 32117<br>(915.93) | 32182<br>(917.78) | 32247<br>(919.63) | 32312<br>(921.48) | 32377<br>(923.33) | 32442<br>(925.18) | 32507<br>(927.03) | 32572<br>(928.88) | 32637<br>(930.73) | 32702<br>(932.58) | 32767<br>(934.43) | 32832<br>(936.28) | 32897<br>(938.13) | 32962<br>(940.08) | 33027<br>(941.93) | 33092<br>(943.78) | 33157<br>(945.63) | 33222<br>(947.48) | 33287<br>(949.33) | 33352<br>(951.18) | 33417<br>(953.03) | 33482<br>(954.88) | 33547<br>(956.73) | 33612<br>(958.58) | 33677<br>(960.43) | 33742<br>(962.28) | 33807<br>(964.13) | 33872<br>(965.98) | 33937<br>(967.83) | 34002<br>(969.68) | 34067<br>(971.53) | 34132<br>(973.38) | 34197<br>(975.23) | 34262<br>(977.08) | 34327<br>(978.93) | 34392<br>(980.78) | 34457<br>(982.63) | 34522<br>(984.48) | 34587<br>(986.33) | 34652<br>(988.18) | 34717<br>(990.03) | 34782<br>(991.88) | 34847<br>(993.73) | 34912<br>(995.58) | 34977<br>(997.43) | 35042<br>(999.28) | 35107<br>(1001.13) | 35172<br>(1002.98) | 35237<br>(1004.83) | 35302<br>(1006.68) | 35367<br>(1008.53) | 35432<br>(1010.38) | 35497<br>(1012.23) | 35562<br>(1014.08) | 35627<br>(1015.93) | 35692<br>(1017.78) | 35757<br>(1019.63) | 35822<br>(1021.48) | 35887<br>(1023.33) | 35952<br>(1025.18) | 36017<br>(1027.03) | 36082<br>(1028.88) | 36147<br>(1030.73) | 36212<br>(1032.58) | 36277<br>(1034.43) | 36342<br>(1036.28) | 36407<br>(1038.13) | 36472<br>(1040.08) | 36537<br>(1041.93) | 36602<br>(1043.78) | 36667<br>(1045.63) | 36732<br>(1047.48) | 36797<br>(1049.33) | 36862<br>(1051.18) | 36927<br>(1053.03) | 36992<br>(1054.88) | 37057<br>(1056.73) | 37122<br>(1058.58) | 37187<br>(1060.43) | 37252<br>(1062.28) | 37317<br>(1064.13) | 37382<br>(1065.98) | 37447<br>(1067.83) | 37512<br>(1069.68) | 37577<br>(1071.53) | 37642<br>(1073.38) | 37707<br>(1075.23) | 37772<br>(1077.08) | 37837<br>(1078.93) | 37902<br>(1080.78) | 37967<br>(1082.63) | 38032<br>(1084.48) | 38097<br>(1086.33) | 38162<br>(1088.18) | 38227<br>(1090.03) | 38292<br>(1091.88) | 38357<br>(1093.73) | 38422<br>(1095.58) | 38487<br>(1097.43) | 38552<br>(1099.28) | 38617<br>(1101.13) | 38682<br>(1102.98) | 38747<br>(1104.83) | 38812<br>(1106.68) | 38877<br>(1108.53) | 38942<br>(1110.38) | 39007<br>(1112.23) | 39072<br>(1114.08) | 39137<br>(1115.93) | 39202<br>(1117.78) | 39267<br>(1119.63) | 39332<br>(1121.48) | 39397<br>(1123.33) | 39462<br>(1125.18) | 39527<br>(1127.03) | 39592<br>(1128.88) | 39657<br>(1130.73) | 39722<br>(1132.58) | 39787<br>(1134.43) | 39852<br>(1136.28) | 39917<br>(1138.13) | 39982<br>(1140.08) | 40047<br>(1141.93) | 40112<br>(1143.78) | 40177<br>(1145.63) | 40242<br>(1147.48) | 40307<br>(1149.33) | 40372<br>(1151.18) | 40437<br>(1153.03) | 40502<br>(1154.88) | 40567<br>(1156.73) | 40632<br>(1158.58) | 40697<br>(1160.43) | 40762<br>(1162.28) | 40827<br>(1164.13) | 40892<br>(1165.98) | 40957<br>(1167.83) | 41022<br>(1169.68) | 41087<br>(1171.53) | 41152<br>(1173.38) | 41217<br>(1175.23) | 41282<br>(1177.08) | 41347<br>(1178.93) | 41412<br>(1180.78) | 41477<br>(1182.63) | 41542<br>(1184.48) | 41607<br>(1186.33) | 41672<br>(1188.18) | 41737<br>(1190.03) | 41802<br>(1191.88) | 41867<br>(1193.73) | 41932<br>(1195.58) | 41997<br>(1197.43) | 42062<br>(1199.28) | 42127<br>(1201.13) | 42192<br>(1202.98) | 42257<br>(1204.83) | 42322<br>(1206.68) | 42387<br>(1208.53) | 42452<br>(1210.38) | 42517<br>(1212.23) | 42582<br>(1214 |
|---------------|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--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FLAHERTY OLIVARA ASSOCIATES, P. C.

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

APPENDIX D

PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS

DAM CONSTRUCTION PERMIT APPLICATION

STATE OF NEW YORK

DEPARTMENT OF

State Engineer and Surveyor

ALBANY

OFFICE FILED  
JAN 23 1924  
RECD TO

Received Jan 22<sup>d</sup> 1924 Dam No. 413 Adirondack Watershed  
Disposition Approved Feb 2<sup>d</sup> 1924 Serial No. 548  
Site inspected \_\_\_\_\_  
Foundation inspected \_\_\_\_\_  
Structure inspected \_\_\_\_\_

### Application for the Construction or Reconstruction of a Dam

Application is hereby made to the State Engineer, Albany, N. Y., in compliance with the provisions of Chapter LXV of the Consolidated Laws and Chapter 647, Laws of 1911, Section 22 as amended, for the approval of specifications and detailed plans, marked \_\_\_\_\_

herewith submitted for the { construction } of a dam located as stated below. All provisions of law will be  
reconstruction  
complied with in the erection of the proposed dam.

1. The dam will be on Front Brook branch of Beaverkill River in the town  
of Freemont County of Sullivan  
and Mouth of stream at Rushville seven miles due north  
(Give exact distance and direction from a well-known bridge, dam, village, main cross-roads or mouth of a stream)

2. The name and address of the owner is A. Holcomb, R. Graham, J. Kutger & C. Mann  
Roscoe

3. The dam will be used for Fishing and recreation

4. Will any part of the dam be built upon or its pond flood any State lands? No

5. The watershed at the proposed dam draining into the pond to be formed thereby is 1/4  
square miles.

6. The proposed dam will have a pond area at the spillcrest elevation of 100+ acres  
and will impound \_\_\_\_\_ cubic feet of water.

7. The lowest part of the natural shore of the pond is \_\_\_\_\_ feet vertically above the spillcrest,  
and everywhere else the shore will be at least 10 feet above the spillcrest.

8. The maximum known flow of the stream at the dam site was \_\_\_\_\_ cubic feet per second on \_\_\_\_\_  
(Date)

9. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam No

10. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) Clay on surface with hard pan about 2 ft

11. The material of the right bank, in the direction with the current, is same; at the spillcrest elevation this material has a top slope of 6 inches vertical to a foot horizontal on the center line of the dam, a vertical thickness at this elevation of 200 feet, and the top surface extends for a vertical height of 6 feet above the spillcrest.

12. The material of the left bank is same; has a top slope of 3 inches to a foot horizontal, a thickness of 300 feet, and a height of 20 feet.

13. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Substance is hard

and practically impervious

14. If the bed is in layers, are the layers horizontal or inclined? If inclined what is the direction of the slope relative to the center line of the dam and the inches vertical to a foot horizontal?

15. What is the thickness of the layers?

16. Are there any porous seams or fissures?

17. WASTES. The spillway of the above proposed dam will be 20 ft feet long in the clear; the waters will be held at the right end by a Concrete Wall the top of which will be 3 feet above the spillcrest, and have a top width of 2 feet; and at the left end by a Concrete wall the top of which will be 3 feet above the spillcrest, and have a top width of 2 feet.

18. There will be also for flood discharge a pipe 24 inches in diameter and the bottom will be 10 feet below the spillcrest, a sluice or gate 20 feet wide in the clear by 5 feet high, and the bottom will be        feet below the spillcrest.

19. APRON. Below the proposed dam there will be an apron built of flat rocks and concrete feet long, 18 feet wide and 3 feet thick. The downstream side of the apron will have a thickness of 3 feet for a width of 15 feet.

20. PLANS. Each application for a permit of a dam over 12 feet in height must be accompanied by a location map and complete working drawings of the proposed structure. Each drawing should have a title giving the parts shown, the name of the town and county in which the dam site is located, and the name of the owner and of the engineer.

The location map (U. S. Geological Quadrangle or other map) should show the exact location of the proposed dam; of buildings below the dam which might be damaged by any failure of the dam; of roads adjacent to or crossing the stream below the dam, giving the lowest elevation of the roadway above the stream bed and giving the shape, the height and the width of stream openings; and of any embankments or steep slopes that any flood could pass over. Also indicate the character and use made of the ground.

The complete working drawings should give all the dimensions necessary for the calculations of the stability of the structure, and all the information asked for below under "Sketches." There may be attached to the plans any written reports, calculations, investigations or opinions that may aid in showing the data and method used by the designer.

21. SKETCHES. For small and unimportant structures, if plans have not been made, on the back sheet of this application make a sketch to scale for each different cross-section at the highest point, showing the height and the depth from the surface of the foundation, the bottom width, the top width (for a concrete or masonry spill at 18 inches below the crest), the elevation of the top in reference to the spillcrest, the length of the section, and the material of which the section is to be constructed. Mark each section with a capital letter. Also sketch a plan; show the above sections by their top lines, giving the mark and the length of each; the openings by their horizontal dimensions; and the abutments by their top width and top lengths from the upstream face of the spillcrest and give the elevation of the top in reference to the spillcrest.

22. ELEVATIONS. Also give the elevations, if possible from the Mean Sea Level, of at least two permanent Bench Marks; of the spillcrest for any existing dam on the proposed dam site, at the middle and at both ends of the spill; and of the spillcrest for the above proposed dam.

23. SAMPLES. When so instructed, send samples of the materials to be used in the construction of the proposed dam, using shipping tags which will be furnished. For sand one-half a cubic foot is desired; for cement, three pints; and for the natural bed, twenty cubic inches.

24. INSPECTION. State how inspection is to be provided for during construction.

*Will consult  
a licensed engineer before construction, when foundation  
is in and at completion.*

PREVIOUS REPORTS



STATE OF NEW YORK  
STATE ENGINEER AND SURVEYOR  
ALBANY

DWIGHT B. LADU  
STATE ENGINEER  
ARNOLD G. CHAPMAN  
DEPUTY

ADDRESS ALL COMMUNICATIONS TO  
DWIGHT B. LADU, STATE ENGINEER

Dam 413, Delaware,  
Roscoe.

August 27, 1924.

Mr. E. D. Hendricks,  
Division Engineer,  
Albany, N. Y.

Dear Sir:

Mr. R. D. Graham is building a dam southwest of Roscoe on the outlet of Tennanah Lake, U. S. G. S. Sheet 147, and more than a mile below the lake.

The dam will be 20' wide and composed of an upstream and a downstream wall and stone filled between. The upstream wall is a 6' stone wall with a concrete wall in front 2' thick on top and 3' thick on the bottom and runs 18" into the bed. The downstream wall is 3' thick. The spillway is 20' long by 3' deep and 10' above the ground.

When in the vicinity of this dam will you please make an inspection of this work? The construction work has just commenced.

Very truly yours,

Dwight B. LaDu,  
State Engineer.

By Arnold G. Chapman  
Deputy State Engineer.

ARMCK/F.

PREVIOUS INSPECTION REPORTS

Report on Dam

August 4, 1944

Mr. Roy C. Finch,  
State Engineer,  
Albany, N. Y.

Dear Sir:

I am enclosing herewith reports on the following dams:

No. 120, Lockport Reservoir, Lower Hudson

No. 121, Delaware

No. 122

No. 123

No. 124, Lower Hudson

No. 125, Lower Hudson

No. 126

No. 127

The examinations and reports on these dams were made  
by Mr. J. J. Talley, Assistant Engineer, in this department.

Very truly yours,

Enclosure

Division Engineer

REPORT ON DAM NO. 413 (Delaware)

Dam No. 413 R.D. Graham  
Town of Freemont, Sullivan County.

New dam. Completed.  
Construction Approved.

Topog. Sheet #147  
Livingston Manor Quad.

July 28, 1925.

I inspected dam #413 on July 9, 1925. Mr. Graham was not at home but I talked with a Young man who was staying at Mr. Graham's during the construction of the dam. The concrete wall on the upstream face has a top width of one foot and the top of the wall was about eleven feet above the bed of the stream. The young man told me that the bottom width was about three feet, that the bottom rested upon hardpan and was from three to six feet below the original <sup>ground</sup> surface. The wall was carried well into the banks to act as cut-offs and was about 150 feet long. The down stream wall was dry masonry and it was stone fill between the walls. The top width of the dam was about seventeen feet.

The spillway section and apron were about as shown by sketches on application. The apron extended for about six feet below the dam. It was rip-rap covered over with cement mortar. Instead of the two foot drain pipe, they placed a hemlock box about 18" square with a plank gate at the upstream end. It would be well to learn if this box is encased in concrete. I could see no seepage whatsoever thru or around the dam. The down stream dry wall looked none too good and may, in time, have to be relayed.

The drainage area is about 4½ sq. mi. and the pond floods about 100 acres. Lake Tennanah on the same stream and about one mile up stream floods over 200 acres.

*George D. Kelley*  
*Asst. Engr.*

PREVIOUS REPORTS

Lake Muskoday  
Roscoe, N. Y. 12776  
Sept. 15, 1975

RECEIVED

SEP 16 1975

REGIONAL UNIT  
New York State Department of  
Environmental Conservation  
REGION #3

Mr. George A. Danskin, Local Permit Agent  
Dept. Environmental Conservation  
21 S. Putt Corners Rd.  
New Paltz, N. Y.

Dear Mr. Danskin:

The Lake Muskoday Bungalow Colony Inc. wants to do some reinforcing work below our dam which is located on the headwaters of Trout Brook, Town of Fremont, Sullivan Co., about 2 miles below Tennannah Lake, and is listed as Dam 413 Delaware Watershed.

I called your office while you were on vacation and spoke to Mr. William E. Stridle explaining that we wanted to bring in rock fill to place below the dam for extra reinforcement and to make a rip-rap and stone masonry extension out from the existing spillway so the overflow will be a gradual flow instead of the existing drop structure.

Mr. Stridle told me there was a possibility that we would not need a permit for doing this type of work and advised me to get in touch with Mr. Douglas Meagley of the Soil Conservation Service.

I called Mr. Meagley, who in turn called Mr. Stridle and the Albany office. His information from Albany was that there are 3 categories to consider where a permit is necessary:

1. Raising the level of the lake
2. Increasing spillway overflow
3. Working on main part of dam

none of which we are planning.

Since he would not be able to inspect and give us advice in time to do any work this fall, he suggested we hire a private engineer to make sketches of the proposed work and mail them to you.

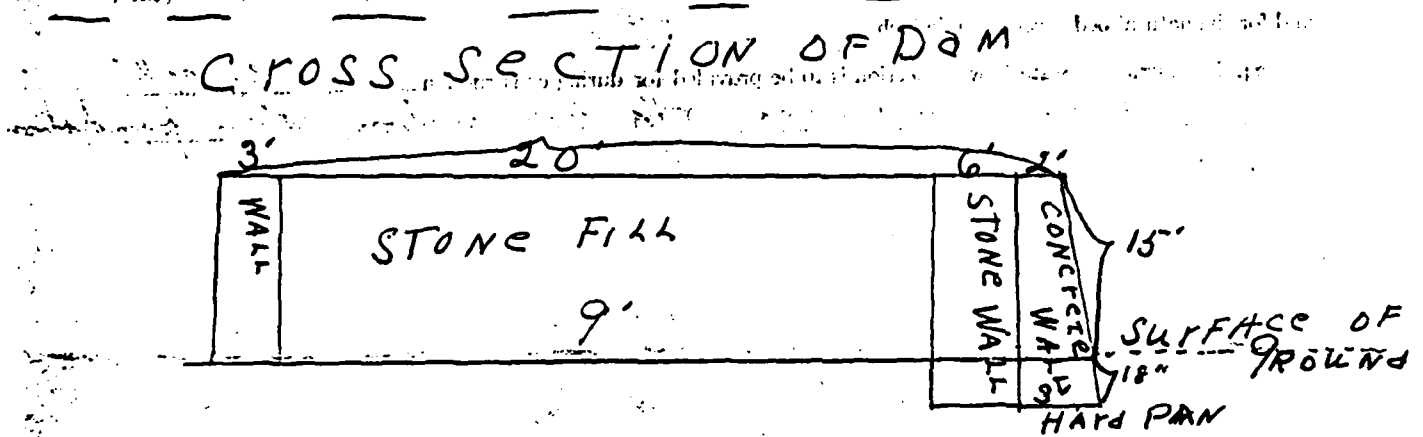
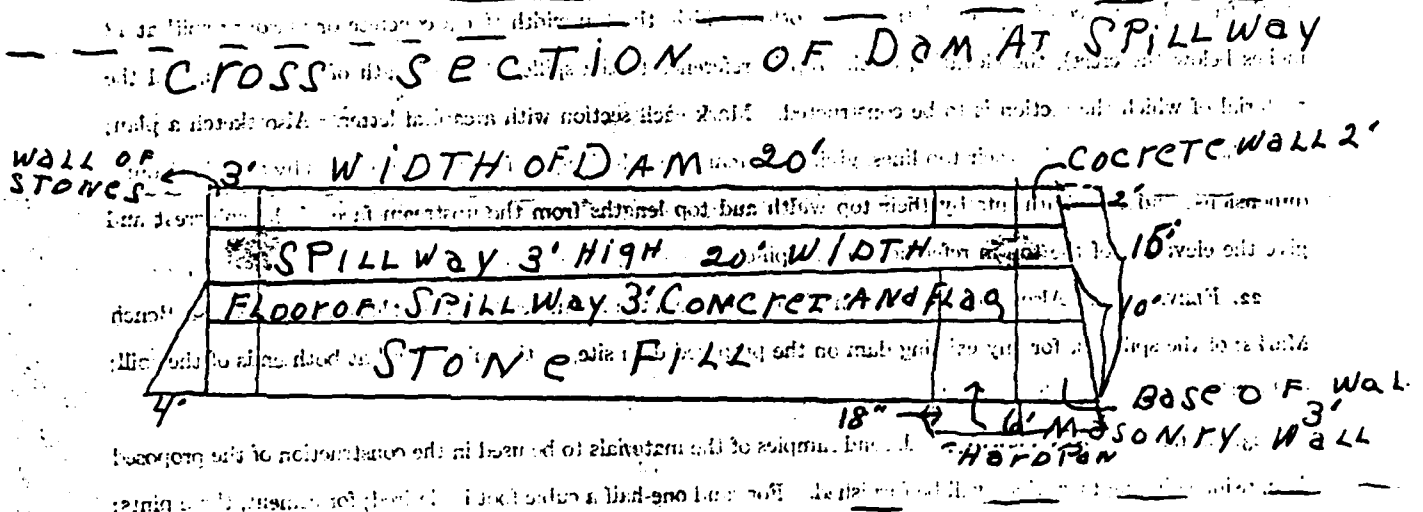
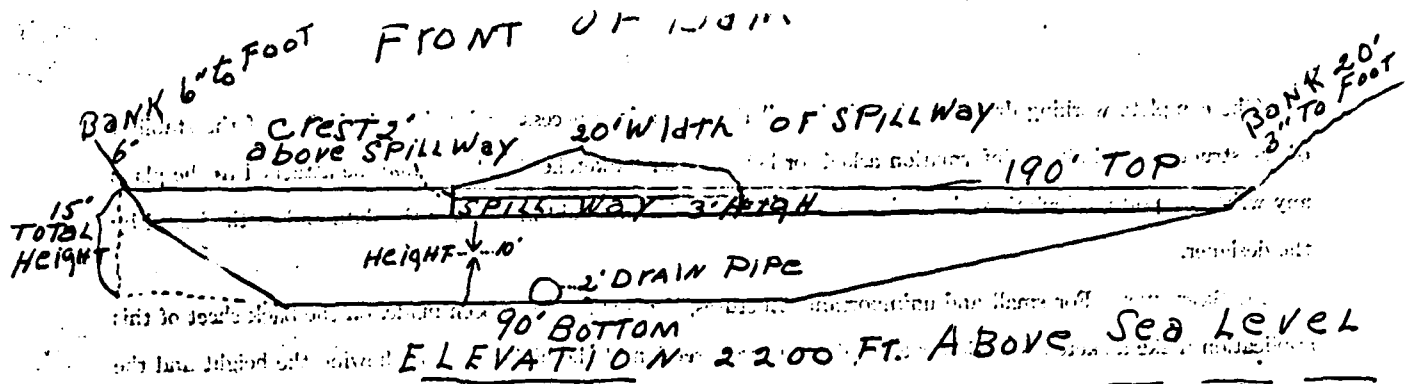
We have started lowering the lake and would like to do some of the rock fill this fall if possible, and then complete the work next fall.

Please advise us if we can do this work or if we need a permit.

Sincerely yours,

Lake Muskoday Bungalow Colony Inc.

Worothy B. Graham, Sec.



The above information is correct to the best of my knowledge and belief.

T. D. Graham  
(Address of signer)

Jan 21 1924  
(Date)

I have been given power to  
sign for other owners.

(A person signing for Applicant should indicate his title or authority).

Lake Muskoday  
ROscoe, N. Y. 12776  
Sept. 15, 1975

RECEIVED

SEP 16 1975

REC'D - REG. UNIT  
New York State Department of  
Environmental Conservation  
REGION #3

Mr. George A. Danskin, Local Permit Agent  
Dept. Environmental Conservation  
21 S. Putt Corners Rd.  
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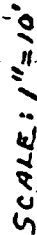
We have started lowering the lake and would like to do some of the rock fill this fall if possible, and then complete the work next fall.

Please advise us if we can do this work or if we need a permit.

Sincerely yours,

Lake Muskoday Bungalow Colony Inc.

*Worothy B. Graham, Sec.*



SCALE: 1"=10'

Sept 6 1961

PREVIOUS INSPECTION REPORTS

## DEC DAM INSPECTION REPORT

Lake Muskoday

|                             |                             |                             |                                                                                |                                 |                              |                            |
|-----------------------------|-----------------------------|-----------------------------|--------------------------------------------------------------------------------|---------------------------------|------------------------------|----------------------------|
| <input type="checkbox"/> 05 | <input type="checkbox"/> 53 | <input type="checkbox"/> 24 | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 413 | <input type="checkbox"/> 062073 | <input type="checkbox"/> 002 | <input type="checkbox"/> 2 |
| RB                          | CTY                         | YR. AP.                     | DAM NO.                                                                        | INS. DATE                       | USE                          | TYPE                       |

AS BUILT INSPECTION

|                                                            |                           |                                                             |
|------------------------------------------------------------|---------------------------|-------------------------------------------------------------|
| <input type="checkbox"/> 3 Location of Spillway and outlet | <i>Reconstructed</i>      | <input type="checkbox"/> 3 Elevations                       |
| <input type="checkbox"/> 3 Size of Spillway and outlet     | <i>Since construction</i> | <input type="checkbox"/> 3 Geometry of Non-overflow section |

GENERAL CONDITION OF NON-OVERFLOW SECTION

|                                             |                                                     |                                         |
|---------------------------------------------|-----------------------------------------------------|-----------------------------------------|
| <input type="checkbox"/> 1 Settlement       | <input type="checkbox"/> 1 Cracks                   | <input type="checkbox"/> 1 Deflections  |
| <input type="checkbox"/> 1 Joints           | <input type="checkbox"/> 2 Surface of Concrete      | <input type="checkbox"/> 1 Leakage      |
| <input type="checkbox"/> 1 Undermining      | <input type="checkbox"/> 1 Settlement of Embankment | <input type="checkbox"/> 1 Crest of Dam |
| <input type="checkbox"/> 1 Downstream Slope | <input type="checkbox"/> 1 Upstream Slope           | <input type="checkbox"/> 1 Toe of Slope |

GENERAL CONDITION OF SPILLWAY AND OUTLET WORKS

|                                                 |                                                         |                                           |
|-------------------------------------------------|---------------------------------------------------------|-------------------------------------------|
| <input type="checkbox"/> C Auxiliary Spillway   | <input type="checkbox"/> 1 Service or Concrete Spillway | <input type="checkbox"/> 1 Stilling Basin |
| <input type="checkbox"/> 1 Joints               | <input type="checkbox"/> 2 Surface of Concrete          | <input type="checkbox"/> 1 Spillway Toe   |
| <input type="checkbox"/> 2 Mechanical Equipment | <input type="checkbox"/> 1 Plunge Pool                  | <input type="checkbox"/> 1 Drain          |

|                                        |                                         |
|----------------------------------------|-----------------------------------------|
| <input type="checkbox"/> 1 Maintenance | <input type="checkbox"/> B Hazard Class |
| <input type="checkbox"/> 3 Evaluation  | <input type="checkbox"/> 3 Inspector    |

COMMENTS:

Concrete spillway with 2' drain pipe cmp.  
Under access road good cond.

APPENDIX E  
STRUCTURAL STABILITY ANALYSIS

(No STRUCTURAL STABILITY ANALYSIS was required for this dam)

APPENDIX F  
REFERENCES

## REFERENCES

1. Chow, Ven Te, Editor - Handbook of Applied Hydrology. McGraw-Hill Book Company, New York, New York, 1964.
2. Hydrologic Engineering Center, U.S. Army Corps of Engineers, HEC-1 Flood Hydrograph Package, Users Manual. Davis, California, January 1973.
3. Hydrologic Engineering Center, U.S. Army Corps of Engineers, Flood Hydrograph Package (HEC-1), Users Manual for Dam Safety Investigations, Davis, California, September 1978.
4. King, Horace and Brater, Ernest. Handbook of Hydraulics, 5th Edition. McGraw-Hill Book Company, New York, New York, 1963.
5. Riedel, J.T., Appleby, J.F. and Schloemer, R.W. Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1000 Square Miles and Durations of 6, 12, 24, and 48 Hours (Hydrometeorological Report No. 33) U.S. Department of Commerce - Weather Bureau and U.S. Department of the Army - Corps of Engineers, Washington, D.C., April 1956
6. U.S. Department of the Interior, Bureau of Reclamation, Design of Small Dams, Second Edition, Washington, D.C., 1973.

APPENDIX G

DRAWINGS

(No DRAWINGS were available for this dam)