WHITE TANKS FRS #3

# DESIGN REPORT VOLUME 2

## WHITE TANKS FRS NO. 3 REMEDIATION PROJECT - PHASE 1

Prepared by:

URS

In cooperation with:

GEOLOGICAL CONSULTANTS INC.

EH Engineering Hydrosystems Inc

Flood Control District of Maricopa County

NRCS Natural Resources Conservation Service

Submitted March 2005

Contract No. FCD 2003C055 PCN 470.04.30

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WHITE TANKS FRS #3

# DESIGN REPORT VOLUME 2

## WHITE TANKS FRS NO. 3 REMEDIATION PROJECT - PHASE 1

Registered Professional Engineer (Civil)
CERTIFICATE NO.
32847
TODD E.
RINGSMUTH
Date Signed 3-23-05
ARIZONA, U.S.A.

Prepared by:

URS

In cooperation with:

GEOLOGICAL CONSULTANTS INC.

EH Engineering Hydrosystems Inc

"To the best of my professional knowledge, judgement, and belief, this document meets applicable NRCS standards."

NRCS Natural Resources Conservation Service

Flood Control District of Maricopa County

Submitted March 2005

Contract No. FCD 2003C055 PCN 470.04.30

# ARIZONA DEPARTMENT OF WATER RESOURCES
# OFFICE OF WATER ENGINEERING

JANET NAPOLITANO
Governor

HERB GUENTHER
Director

## CHECKLIST OF ITEMS REQUIRED FOR A COMPLETE APPLICATION

Name of Dam: White Tank Flood Retarding Structure No. 3

Owner of Dam: Flood Control District of Maricopa County

Application No._____ Date Filed: _____

[Application No. and Date Filed to be filled in by Arizona Department of Water Resources]

### Instructions

This checklist is primarily applicable to significant and high hazard potential dams in accordance with Arizona Administrative Code (A.A.C.) R12-15-1208(A)(2), 1215 and 1216. All items and/or the designated level of design detail may not be required for all applications, including those for low and very low hazard potential dams in accordance with A.A.C. R12-15-1207(D), 1209, 1210, 1211, 1215 and 1216.

This guide, which identifies items required for a complete application, has been prepared to facilitate the applicant's understanding of the process. Any omissions or errors do not relieve the applicant from complying with applicable sections of Arizona Revised Statutes (A.R.S.) Title 45-Waters, Chapter 6 and A.A.C. Title 12–Natural Resources, Chapter 15–Department of Water Resources. The Director may require additional information, beyond the items delineated in this checklist, in accordance with A.R.S. §§ 45-1203(E) and 1206(A).

Complete the following checklist by indicating to the left that the item has been included and to the right its location(s) within the application documents. If a checklist item does not apply, indicate **N/A** and provide a supporting discussion. The checklist will be provided electronically via e-mail upon the applicant's request.

Example

| | | |
|---|---|---|
| Y | Surface Water Diversion Plan - Details of the plan for control or diversion of surface water during construction, if required. | See Section 16.1 of the Design Report & Section 107 of the Supplementary General Conditions |

## I. GENERAL ITEMS

| | | |
|---|---|---|
| Y | Application Form – Complete and submitted in duplicate. [Ref. A.R.S. §§ 45-1203(B), 1206(A); A.A.C. R12-15-1208(A)(1), 1209(E), 1210(A)(1), 1210(B)(1), 1211(A)(1)] | The Application Form is provided with this submittal. |
| Y | Fee –The fee must be based upon the total estimated project cost associated with construction of the dam and appurtenant works. Preliminary investigations and surveys, engineering design, supervision of construction and any other engineering costs shall be included in the project construction costs (refer to "Instructions for Filing an Application"). [Ref. A.R.S. § 45-1204; A.A.C. R12-15-151(B)(11), 1208(A)(3), 1210(A)(2), 1210(B)(2), 1211(A)(4)] | The fee has been calculated and is provided with the Application Form. |

**ADWR, Office of Water Engineering, Dam Safety**
**Checklist for Application No. _____**

| | | |
|---|---|---|
| Y | Two Sets (minimum) of Construction Drawings<br>[Ref. A.R.S. §§ 45-1203(A), 1206(A); A.A.C. R12-15-1208(A)(5), 1209(E)(1), 1210(A)(6), 1211(A)(6), 1215(1)] | Two full-size sets of the Construction Drawings are provided with the Application. |
| Y | Two Sets (minimum) of Construction Specifications<br>[Ref. A.R.S. §§ 45-1203(A), 1206(A); A.A.C. R12-15-1208(A)(6), 1210(A)(7), 1215(2)] | Two sets of the Construction Specifications are provided with the Application. |
| Y | Two Design Reports (minimum)<br>[Ref. A.A.C. R12-15-1208(A)(7), 1210(A)(8), 1215(3)] | Two copies of the Design Report (Volumes 1 through 4) and the Supplemental Design and Geotechnical/Geophysical Investigation Report – Phase 1 are provided with the Application. |
| Y | Two Sets (minimum) of Construction Quality Assurance (CQA) Plan<br>[Ref. A.A.C. R12-15-1208(A)(8), 1210(A)(9), 1212(C), 1215(2)(e)] | Two sets of the Construction Quality Assurance (CQA) Plan are provided with the Application. The CQA Plan is located in Appendix A of the Construction Specifications. |
| Y | Two Sets (minimum) of Evidence of Financial Capability – Consists of a long-term budget plan and evidence of financing, prepared using customary accounting principles, that demonstrate that the applicant has the financial capability to construct, operate and maintain the dam in a safe manner. [Ref. A.A.C. R12-15-1208(A)(10)] | The FCDMC is authorized under Arizona Revised Statute 48-3620 and is mandated to operate and maintain flood control structures for the benefit of Maricopa County residents and is funded through secondary taxes as established by the Board of Supervisors. |
| Y | Two Sets (minimum) of the Construction Schedule<br>[Ref. A.R.S. §§ 45-1203(E), 1206(A)] | Two copies of the preliminary Construction Schedule has been provided with the application. A more detailed Construction Schedule will be submitted by FCDMC to ADWR within a reasonable time after contract award. |
| Y | Two Sets (minimum) of the Emergency Action Plan, Operation and Maintenance Plan, and Instrumentation Plan – These documents, if not ready for submittal with the application filling, may be submitted during construction. [Ref. A.R.S. § 45-1203(E); A.A.C. R12-15-1208(B), 1217, 1221] | The Operation and Maintenance Agreement and Emergency Action Plan are provided with the Application. The Instrumentation Plan is provided in Sections 12.8 and 12.9 of the Design Report. |
| Y | Drawings, Specifications, CQA Plan and Design Report Sealed by P.E.<br>The drawings, specifications, CQA Plan and design reports (each of which are described in detail below) must be prepared by a professional engineer registered in Arizona to a level of detail appropriate for construction. The design engineer must be experienced in the design and construction of dams. The engineer's seal and signature must appear on all drawings, specifications and engineering reports, and conform to the requirements of the Arizona State Board of Technical Registration. A preliminary review set of drawings submitted with the application may also be stamped "preliminary" and/or "not for construction" in accordance with the rules of the Arizona State Board of Technical Registration. [Ref. R4-304; A.A.C. R12-15-1215(1)(a), 1215(2)(a), 1215(3)(a)] | The Construction Drawings, Construction Specifications, CQA Plan, and design reports provided with the Application are sealed by a registered Professional Engineer licensed by the State of Arizona. |

## II. CONSTRUCTION DRAWINGS

Drawings should be prepared on conventional drafting material such that clear, legible prints can be obtained. Drawings must clearly present all details and dimensions required to construct the dam in accordance with the engineers design. Submittal of blue line prints, black line prints or mylar for final approval will be satisfactory. The following drawings should be included. List additional drawings in this section if applicable to the design. [Ref. A.A.C. R12-15-1208(A)(5), 1209(E)(1), 1209(F)(1), 1210(A)(6), 1211(A)(4), 1215(1)]

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| Y | Dam Safety Section Approval Block – In preparing the drawings, each sheet should contain the normal title block in the lower right hand corner as well as a space 1" high x 4" wide in proximity to the lower right hand corner for the Department's approval stamp. | All Construction Drawings contained in the drawing set have the appropriate ADWR Dam Safety Section Approval Block. |
| Y | Topographic Map - A topographic map(s) of the dam, spillway, outlet works and reservoir on a scale large enough to accurately locate the dam and appurtenances, indicate cut and fill lines, and show property lines and ownership status of the land. Elevations must be to a national datum base, such as mean sea level, rather than an assumed elevation. Contour intervals must be compatible with the height and size of the dam and its appurtenances as required to provide adequate design and construction details. Horizontal control must be in accordance with the State coordinate system and/or per latitude and longitude. [Ref. A.A.C. R12-15-1215(1)(b)] | A topographic map of the dam configuration, existing emergency spillway, proposed outlet works, and property line with ownership is included as Drawing No. C1. A topographical map showing the PMF maximum flood pool is shown on Drawing C1. Topographic maps showing cut and fill lines are included on Drawing Nos. C4 through C7. |
| Y | Reservoir Area and Capacity Curves – The area-capacity curves shall reflect area in acres and capacity in acre-feet in relation to depth of water and elevation in the reservoir. The spillway invert and top of dam elevations must be shown. The reservoir volume/space functional allocations must also be shown. Alternate scales may be included as required for the owner's use. [(Ref. A.A.C. R12-15-1215(1)(c)] | The reservoir elevation–area-capacity curve is shown on Drawing No. C1. |
| Y | Spillway and Outlet Works Rating Curves and Tables - The spillway rating curve must be at a scale or scales which allow determination of discharge rate (cfs) at both low and high flows as measured by depth of water passing over the control section. [Ref. A.A.C. R12-15-1215(1)(d)] | The Outlet Works rating curve is shown on Drawing No. C7.<br><br>The emergency spillway will not be modified during Phase 1 construction activities. The rating curve for the existing emergency spillway was provided with the drawings for the Interim Dam Safety Improvements. A preliminary emergency spillway rating curve is provided on Figure 9-1 of the Design Report. The final emergency spillway rating will be provided on the construction drawings for the Phase 2 modifications design. |
| Y | Location Map - A location map showing the dam footprint and all exploration drill holes, test pits, trenches, adits, borrow areas and bench marks with elevations, reference points and permanent ties. This map shall use the same vertical and horizontal control as the "topographic map." [Ref. A.A.C. R12-15-1215(1)(e)] | A Location Map showing the dam footprint and all exploration drill holes, test pits and trenches is included in the Geotechnical Data Report and shown on Figure 7-1 of the Design Report. The Geotechnical Data Report is provided with the Application. A Location Map showing the construction benchmarks is included as Drawing No. G1. A location Map showing the borrow area is included as Drawing No. C1. |

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| Y | Geologic Information – Geologic information including geologic map(s), profile along the centerline and other pertinent cross sections of the dam site, spillway(s) and appurtenant structures, aggregate and material sources, and reservoir area at scale(s) compatible with the site and geologic complexity, showing logs of exploration drill holes, test pits, trenches and adits. [Ref. A.A.C. R12-15-1215(1)(f)]. | Geological Information has been included in the Geotechnical Data Report. |
| Y | Dam Plan – Plan(s) of the dam to adequately delineate design and construction details. [Ref. A.A.C. R12-15-1215(1)(g)] | Plans of the dam are shown on Drawing Nos. C4 through C7, C9, C11, and C12. |
| Y | Foundation Profile - A foundation profile along the dam centerline at a true scale (vertical=horizontal) showing the existing ground and proposed finished grade (cut and fill) elevations, including anticipated geologic formations. Include any proposed grout and drain holes. [Ref. A.A.C. R12-15-1215(1)(h)] | A Foundation Profile is provided on Drawing No. C2. |
| Y | Dam Profiles and Sections - A profile and a sufficient number of cross-sections of the dam to delineate design and construction details. Camber, crest details, interior filters and drains, and other zone details must be shown and dimensioned. The profile of the dam may be drawn to different horizontal and vertical scales if required for detail. A maximum section of the dam shall be included; it must be drawn to a true scale (vertical = horizontal). The outlet conduit may be shown on the maximum section if this is typical of the proposed construction. [Ref. A.A.C. R12-15-1215(1)(i)] | A profile of the dam is provided on Drawing No. C2. Sections of the dam are shown on Drawing Nos. XS2 through XS6 and XS12. |
| Y | Foundation Plan – Foundation plan(s) showing excavation grades and cut slopes with any proposed foundation preparation, grout and drain holes, and foundation dewatering requirements. [Ref. A.A.C. R12-15-1215(1)(j)] | Excavation grades and cut slopes are provided on Drawing Nos. XS2 through XS4 and XS7. |
| Y | Outlet Works – A plan, profile and details of the outlet works, including the intake structure, the gate system, conduit, trashrack, filter diaphragm, concrete encasement and the downstream outlet structure. Include all connection and structural design details. [Ref. A.A.C. R12-15-1215(1)(k)] | A plan and profile of the Outlet Works are shown on Drawing No. C7. Details of the Outlet Works are included on Drawing Nos. ST1 through ST17 and on Drawing No. XS7 through XS11. |
| Y | Spillway - A plan, profile, control section and cross sections of the spillway. Include details of any foundation preparation, grouting or concrete work that is planned. A complex control structure, a concrete chute or an energy-dissipating device for a terminal structure will require both hydraulic and structural design details. [Ref. A.A.C. R12-15-1215(1)(l)] | The Spillway Plan, Profile and Sections are not included as part of the Phase 1 remediation construction activities. However, preliminary drawings including a Spillway Plan, Profile and Sections have been included in Appendix K of the Design Report. |
| Y | Drainage Area – Hydrologic data, drainage area and flood routing criteria. [Ref. A.A.C. R12-15-1215(1)(m)] | See Sections 8.0 and 10.0 of the Design Report. See Figures 8-1 and 8-3, and Tables 8-4 and 10-1 for the hydrologic data, drainage areas delineation, and reservoir routing criteria. |

## III. CONSTRUCTION SPECIFICATIONS

The specifications must include a detailed description of the work to be performed and a statement of the requirements for the various types of material and installation techniques that will enter into the permanent construction. Of particular importance are those sections describing foundation preparation, placement of materials and material testing. Specifications must be complete and not cross-referenced to specifications in other documents. As a minimum, the following specifications should be included, when applicable, to the design. List additional specifications applicable to the design in this checklist. [Ref. A.A.C. R12-15-1208(A)(6), 1210(A)(7), 1211(A)(3), 1215(2)]

| | | |
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| Y | Earthwork Specification – Include all earth and rock material descriptions, placement criteria and construction requirements for all elements of the dam and related structures. [Ref. A.A.C. R12-15-1215(2)(f)(i)] | See Special Provisions sections 206, 210, 215, 220, 221, 225, 310, 604, 606, 701, 702, 703, and 728. |
| Y | Concrete, Grout and Shotcrete Specifications – Include all concrete, grout and shotcrete material descriptions, placement and consolidation criteria, temperature controls and construction requirements for all elements of the dam and related structures. [Ref. A.A.C. R12-15-1215(2)(f)(ii)] | See Special Provisions sections 505, 725, 726, 727 and 776. |
| Y | Foundation Specification – Include acceptable material criteria and testing, cleaning and treatment. If foundation or curtain grouting is required, include the type of grout, grouting method, special equipment, recording during grouting and foundation monitoring to avoid disturbance from grouting. [Ref. A.A.C. R12-15-1215(2)(f)(iii)] | See Special Provisions sections 201, 206, and 606. |
| Y | Materials Testing – Include in each specification all materials testing to be performed by the contractor for pre-qualification of materials for use and acceptance of materials as constructed in place in accordance with specifications. Include all required special performance testing such as water pressure tests in conduits. [Ref. A.A.C. R12-15-1215(2)(f)(iv)] | Within each section of the Special Provisions where applicable. |
| N | Control of Stream During Construction - A plan for control or diversion of surface water during construction. The frequency of storm runoff to be controlled during construction may be determined by the design engineer commensurate with the risk of economic loss during construction. [Ref. A.A.C. R12-15-1215(2)(f)(v)] | The Construction Stormwater Control Plan will be submitted by FCDMC to ADWR within a reasonable time after contract award. |
| N/A | Blasting – Criteria for blast monitoring and acceptable blast vibration levels (particle velocities), monitoring equipment and monitoring locations must be included for the dam and other vibration sensitive structures and equipment. [Ref. A.A.C. R12-15-1215(2)(f)(vi)] | Not Required For This Project. |
| Y | Instrumentation – Include material descriptions, placement criteria and construction requirements. Instrumentation should be required to be installed by experienced specialty subcontractors. [Ref. A.A.C. R12-15-1215(2)(f)(vii)] | In accordance with R12-15-1208.B.3, a detailed instrumentation and monitoring plan will be submitted during construction of the Phase 1 embankment. See Special Provision section 796 for construction requirements for the TDR instrumentation cable. |
| Y | Additional Specifications: | Refer to the Construction Specifications for a complete list of specifications for the project. |

## IV. DESIGN REPORT

A design report is required for all dams and appurtenant structures. The report should include a discussion and definition of the engineering consideration and conclusions incorporated in the design. The report must also include copies of pertinent calculations as appendices. As a minimum, the following sections should be included in the design report when applicable to the design. List additional sections applicable to the design report in this checklist. [Ref. A.A.C. R12-15-1208(A)(7), 1210(A)(8), 1215(3)]

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| Y | Classification – The classification under AAC R12-15-1206 of the proposed dam, or for the proposed enlargement of an existing dam and reservoir. [Ref. A.A.C. R12-15-1215(3)(b)] | Refer to Section 1.2 of the Design Report. |
| Y | Hydrology – Hydrologic considerations, including calculations and a summary table of data used in determining the required emergency spillway capacity and freeboard, and design of any diversion or detention structures. Input and output listings (both hard copy and on diskette) of any computer programs used must be included. Include calculations for wave runup and wave setup in the reservoir as well as estimated sedimentation rates. [Ref. A.A.C. R12-15-1215(3)(c)] | Refer to Sections 8.0 and Appendices C, D and E of the Design Report. |
| Y | Hydraulics - Hydraulic characteristics, engineering data and calculations used in determining the capacities of the outlet works and emergency spillway. Input and output listings (both hard copy and on diskette) of any computer programs used must be included. Technical references must support any complex hydraulic designs. [Ref. A.A.C. R12-15-1215(3)(d)] | Refer to Sections 9.0 and 10.0 and Appendices C, D, E, and I of the Design Report. |
| | Geotechnical Investigation – Geotechnical investigation and testing of the dam site and reservoir basin. Results and analysis of subsurface investigations including logs of test borings and geologic cross sections. [Ref. A.A.C. R12-15-1215(3)(e)] | Refer to Section 7.0 and Appendix G of the Design Report. Also refer to the Geotechnical Data Report and the Supplemental Design and Geotechnical/Geophysical Investigation Report. |
| N/A | Blasting Plan – Guidelines and criteria for blasting to be used by the contractor in preparing the blasting plan. [Ref. A.A.C. R12-15-1215(3)(f)] | Not required for this project. |
| N | Surface Water Diversion Plan - Details of the plan for control or diversion of surface water during construction. Include a discussion for the basis for selection of the frequency of storm runoff to be controlled during construction. [Ref. A.A.C. R12-15-1215(3)(g)] | The Construction Stormwater Control Plan will be submitted by FCDMC to ADWR within a reasonable time after contract award. |
| N | Dewatering Plan – Details of the dewatering plan for subsurface water during construction. [Ref. A.A.C. R12-15-1215(3)(h)] | The Construction Dewatering Plan will be submitted by FCDMC to ADWR within a reasonable time after contract award. |
| Y | Materials Information – Testing results of earth and rock materials, including the location of test pits and the logs of these pits. Strength test results must be plotted and the strengths selected for use in stability analyses shown. [Ref. A.A.C. R12-15-1215(3)(i)] | Refer to Section 7.0 and Appendix G of the Design Report. Also refer to the Geotechnical Data Report. |
| N/A | Grout Design – Discussion and design of the foundation grouting, grout curtain and grout cap based on foundation stability and seepage considerations. [Ref. A.A.C. R12-15-1215(3)(j)] | No foundation grouting, grout curtains or cap grouting used for this design. |
| | Reinforced Concrete Design – Calculations and basic assumptions on loads and limiting stresses for reinforced concrete design. Input and output listings (both hard copy and on diskette) of any computer programs used should be included. [Ref. A.A.C. R12-15-1215(3)(k)] | Refer to Section 14.0 and Appendix H of the Design Report. |

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| Y | Stability Analysis – A discussion and stability analysis of the dam including appropriate seismic loading, safety factors and embankment zone strength characteristics. Analyses must include both short-term and long-term loading on upstream and downstream slopes. Input and output listings (both hard copy and on diskette) of any computer programs used should be included. Plots of critical failure surfaces as well as the zones and phreatic surface used in the analyses must be shown on the critical cross section of the embankment. [Ref. A.A.C. R12-15-1215(3)(l)] | Refer to Section 12.6 and Appendix G of the Design Report. |
| Y | Seismicity – The seismicity of the project area and activity of faults in the vicinity must be discussed. Both deterministic and statistical methods must be utilized and the appropriate seismic coefficient identified for use in analyses. [Ref. A.A.C. R12-15-1215(3)(m)] | Refer to Section 12.6 and Appendix G of the Design Report. |
| Y | Cutoff Trench Design - Discussion and design of the cutoff trench based on seepage and/or other considerations. [Ref. A.A.C. R12-15-1215(3)(n)] | Refer to Sections 7.0, 11.0, and 12.4 of the Design Report. |
| Y | Seepage – Permeability characteristics of foundation and dam embankment materials, including calculations for seepage quantities through the dam, the foundation and anticipated in the internal drain system. Input and output listings (both hard copy and on diskette) of any computer programs used should be included. Copies of flow nets, if utilized, must be included. [Ref. A.A.C. R12-15-1215(3)(o)] | Refer to Section 12.6 and Appendix G of the Design Report. |
| Y | Internal Drainage – Discussion and design of internal drainage based on seepage quantity calculations. Include instrumentation necessary to monitor the drainage system and filter design calculations for protection against piping of foundation and embankment materials. [Ref. A.A.C. R12-15-1215(3)(p)] | Refer to Section 12.6 and Appendix G of the Design Report. |
| Y | Erosion Protection – Erosion protection against waves and rainfall runoff must be provided for both the upstream and downstream slopes, as appropriate. [Ref. A.A.C. R12-15-1215(3)(q)] | Refer to Section 12.4 of the Design Report. |
| Y | Dam Foundation Treatment and Abutment Contact Design, and Spillway Foundation Design - Discussion and design of foundation treatment to adequately compensate for geological weakness in the dam foundation and abutment areas, and in the spillway foundation area.<br>[Ref. A.A.C. R12-15-1215(3)(r)] | Refer to Section 12.4 of the Design Report. |
| Y | Post-construction Vertical and Horizontal Movement Systems<br>[Ref. A.A.C. R12-15-1215(3)(s)] | Refer to Section 12.8 and 12.9 of the Design Report. |
| Y | Foundation Conditions – Discussion of foundation conditions including the potential for subsidence, fissures, dispersive soils, collapsible soils and sinkholes. [Ref. A.A.C. R12-15-1215(3)(t)] | Refer to Sections 6.0, 7.0, and 11.0 and Appendices B and F of the Design Report. |
| N | Additional Report Section: | |
| N | Additional Report Section: | |

## V. CONSTRUCTION QUALITY ASSURANCE PLAN

A Construction Quality Assurance (CQA) Plan is required for all dams and appurtenant structures. A statement of the designer's requirement with regard to construction testing frequencies, foundation preparation guidelines, etc., must be included in the CQA Plan to facilitate the construction in conformance with the plans and specifications. As a minimum, the CQA Plan should include the following sections: [Ref. A.A.C. R12-15-1208(A)(8), 1209(E)(3), 1210(A)(9), 1212, 1213]

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| Y | Delineation of Responsibilities and Authority – The responsibilities and lines of authority of the organizations involved in the construction of the dam must be described. The role of pre-construction, progress and problem or work deficiency meetings should be discussed. [Ref. A.A.C. R12-15-1212(A)] | The Delineation of Responsibilities and Authority is included in Section 2.0 the Construction Quality Assurance Quality Control (CQAQC) plan, provided as Appendix A of the Construction Specifications. |
| Y | Third Party Testing – The CQA Plan should detail the responsibilities of third party (independent of the contractor) field and laboratory testing by a registered engineer for all elements of the dam and related structures. [Ref. A.A.C. R12-15-1212(B)] | The Third Party Testing is included in Sections 6.0 through 12.0 of the Construction Quality Assurance Quality Control (CQAQC) plan, provided as Appendix A of the Construction Specifications. |
| Y | Statement of Qualifications – The CQA Plan should identify the training and experience of the CQA personnel, field supervisors and engineer of record. This information should document their ability to fulfill their assigned roles. [Ref. A.A.C. R12-15-1212(C)] | The Statement of Qualifications is included in Section 2.0 of Construction Quality Assurance Quality Control (CQAQC) plan, provided as Appendix A of the Construction Specifications. |
| Y | Inspection and Testing Activities - The CQA Plan should specify the inspection, testing and sampling activities to be implemented for all elements of dam construction. The CQA Plan should identify key inspection items that require the Department's approval. [Ref. A.A.C. R12-15-1212(A), 1212(D), 1212(G)] | The Inspection and Testing Activities are included in Sections 6.0 through 12.0 and in Tables 1 and 2 of the Construction Quality Assurance Quality Control (CQAQC) plan, provided as Appendix A of the Construction Specifications. |
| Y | Acceptance and Rejection Criteria - The acceptance or rejection criteria for inspection and testing activities should be clearly stated. The CQA Plan should describe procedures for documenting corrective measures and design changes that require prior approval by the Department. [Ref. A.A.C. R12-15-1212(E), 1212(F)] | The Acceptance and Rejection Criteria is included in Sections 6.0 through 12.0 and Tables 1 and 2 of the Construction Quality Assurance Quality Control (CQAQC) plan, provided as Appendix A of the Construction Specifications. |
| Y | Documentation Requirements - The CQA Plan should include requirements for the submittals of as-built drawings and a completion report, which are required prior to the issuance of a license. [Ref. A.A.C. R12-15-1213] | The Document Requirements are included in Sections 13.0 and 14.0 of the Construction Quality Assurance Quality Control (CQAQC) plan, provided as Appendix A of the Construction Specifications. |

## VI. CONSTRUCTION SCHEDULE

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|---|---|---|
| Y | Construction Schedule - A statement of the anticipated sequence and duration of construction operations must be filed in duplicate with the application. [Ref. A.R.S. § 45-1203(E)] | A preliminary Construction Schedule has been provided with the application. A more detailed Construction Schedule will be submitted by FCDMC to ADWR within a reasonable time after contract award. |

## VII. OPERATION AND MAINTENANCE PLAN

An Operation and Maintenance (O&M) Plan must be prepared for all dams and their appurtenant structures. The O&M Plan must specify the frequency of inspections and maintenance of the dam and appurtenant structures. The frequency for exercising any mechanical or electrical equipment or systems must also be specified. Equipment must be exercised and inspected at least once each year. The frequency of inspections for submerged facilities such as intake structures or outlet pipes must also be specified. More frequent inspections and operation may be required depending on the size of the dam or reservoir, hazard classification or condition of the dam. The O&M Plan must specifically address the following: [Ref. A.R.S. § 45-1212; A.A.C. R12-15-1205(D), 1208(B)]

___Y___ Dam Structure (Earth & Rockfill) – Settlement, slides, depressions, misalignment, cracking (transverse and longitudinal), burrowing animals, erosion, seepage and adequacy of slope protection.

___Y___ Dam Structure (Concrete & Masonry) – Cracking, spalling, scaling, joint displacement or offsets, foundation and abutment contacts displacement or offset, seepage and adverse vegetation.

___Y___ Metal Surfaces – Corrosion, deficient protective coatings, misaligned or split seams. Includes gates, stairs and ladders, handrails, pipe, drainage culverts, instrumentation pipes or hardware, drainage culverts, bridges, etc.

___Y___ Spillways – Spillway control structures (gates, concrete sills, flash boards, etc.), approach channels, main channels, stilling basins and energy dissipaters.

___Y___ Outlet Works – Includes buildings or structures that enclose the outlet works and submerged facilities such as intake structures.

___Y___ Downstream Channel Areas – Sloughing, eroding or backcutting, obstructions, adequacy of erosion protection and tailwater, and flow conditions.

___Y___ Reservoir Rim Area – Areas susceptible to slides or major rock falls that could result in overtopping of the dam or significant releases.

___Y___ Site Security – Fencing, surveillance cameras, security patrols, etc.

___Y___ Instrumentation – Description of the instrumentation system(s) that is part of the performance monitoring system for the dam and all appurtenant structures. The O&M Plan must clearly separate instruments and reading frequencies for the following conditions: (a) during construction, (b) immediately following completion of construction, (c) until initial reservoir fill is completed, and (d) long term monitoring. Vertical and horizontal movement monitoring of the dam must be performed, as a minimum. The design, construction and geological conditions of the dam may require other instrumentation, such as monitoring wells, piezometers, inclinometers, pressure cells, extensometers, crack monitors, seepage or drainage monitors, and strong motion (seismograph).

___Y___ Log Book - A logbook must be maintained for the life of the dam. The logbook must be part of the dam's permanent records and must be used to document each inspection, maintenance work performed and record of equipment operation (exercising). Each entry in the logbook must include the date, a description of the inspection and operation or maintenance work done, and shall be signed by the responsible person. Dates when instrumentation readings are taken and person taking readings must be recorded in the logbook.

The Operation and Maintenance Agreement is provided with the Application.

__ Y Annual Report – The owner or operator providing an annual report to ADWR, Office of Water Engineering, must list all inspections made, maintenance work performed, instrumentation data collected and dates of same. The report must include an interpretation of the instrumentation data by a person qualified to evaluate the data of the dam's performance. The report must include the significance of the instrumentation data and a discussion of planned maintenance or repairs at the dam.

___Y Photographic Record - The owner or operator maintaining complete photographic record of sufficient detail that would typically show the extent of cracks in concrete, erosion of embankments or condition of metal parts. Photos must be taken on a five-year interval (minimum) and must be maintained for the life of the dam. A complete set of the photos (minimum 3 1/2 x 5 inches in size) must be provided to ADWR when taken and included as part of the annual report for that year.

## VIII. EMERGENCY ACTION PLAN

Dams classified as having high or significant downstream hazard potential must file an Emergency Action Plan (EAP) including a dam breach inundation map. The EAP must be filed in duplicate and, at a minimum, include the following elements: [Ref. A.A.C. R12-15-1221]

___Y Notification Flow Chart – The EAP should include a chart showing the hierarchy for notification in an emergency situation, including priority of notifications. Notifications should include local emergency response agencies, affected downstream populations, county emergency management agencies and affected flood control districts. [(Ref. A.A.C. R12-15-1221(A)(1)]

The Emergency Action Plan is provided with the Application.

___Y Statement of Purpose – The EAP must describe the project and scope of the EAP. [Ref. A.A.C. R12-15-1221(A)(2)]

___Y Emergency Detection, Evaluation and Action - The EAP must delineate the type of potential unsafe conditions, evaluation procedures and triggering events that require the initiation of partial or full emergency notification procedures based on the urgency of the situation. [Ref. A.A.C. R12-15-1221(A)(3)]

___Y Responsibilities – The EAP should delineate areas of responsibility, particularly the owners, to ensure effective and timely action. The individuals responsible for notifications and declaring an emergency must be clearly identified. [Ref. A.A.C. R12-15-1221(A)(4)]

___Y Notification Procedures – The EAP should be specific for each emergency situation that is anticipated. [Ref. A.A.C. R12-15-1221(A)(5)]

___Y Preparedness - The EAP should identify emergency supplies and resources, equipment access to the site and alternative means of communication. The EAP should also identify specific preparedness activities required such as annual full or partial mock exercises and updates of the EAP. [Ref. A.A.C. R12-15-1221(A)(6)]

Emergency Preparedness is covered under the District's Flood Emergency Response Manual. The District conducts annual desk top emergency mock exercises and an annual field exercise for all District operated FRS's and Dams.

___Y Inundation Map – An inundation map should show the area that would be subject to flooding due to spillway flows and dam failure. [Ref. A.A.C. R12-15-1221(A)(7)]

## IX. OTHER PERMITS

It is not unusual that additional permits from this and/or other government agencies may also be required before construction may commence. Several other permits are described below. It is the responsibility of the owner to obtain all permits required for construction.

| | | |
|---|---|---|
| N/A | State Trust Land - If the dam is to be constructed on, any materials for the dam to be borrowed from or the reservoir will inundate State Trust Land; contact the State Land Department at (602) 542-4621 for details of their requirements. | The dam structure and all construction activities will occur on FCDMC property. |
| N/A | Federal Land - If the dam is to be constructed on, any materials for the dam are to be borrowed from or the reservoir will inundate federal land, contact the appropriate federal agency for details of their requirements. | The dam structure and all construction activities will occur on FCDMC property. |
| N | Water Rights - If surface waters are to be impounded, contact the Arizona Department of Water Resources, Office of Water Engineering, at (602) 417-2445 for details. | The proposed modifications will not impact existing water rights. |
| Y | Corps 404 Permit – Any significant work in or affecting a stream may require a A404 Permit. Contact the U.S. Army Corps of Engineers for details. | An Individual 404 Permit has been obtained from the Army Corp of Engineers for the project. A copy of the Permit has been included as Appendix B of the Construction Specifications. A full copy of the application and permit is available from FCDMC. |
| Y | Corps 401 Certification - A 401 Certification from the Arizona Department of Environmental Quality is required before a 404 Permit can be obtained to ensure that federal activities do not violate state water quality standards. | The 401 Certification is addressed in the Individual 404 Permit, which is provided in Appendix B of the Construction Specifications. |
| N/A | Geotechnical Exploration Holes, Monitoring and Piezometers Wells - Certain types of drilled holes require permits and/or must be abandoned in accordance with prescribed procedures. For details, contact the Arizona Department of Water Resources, Groundwater Management Support Section, (602) 417-2470. | It is anticipated the Dam construction activities will not require further Geotechnical Exploration Holes or any Monitor and Piezometer Wells. |
| N | Dewatering Wells – If dewatering of the dam foundation is required, contact the Arizona Department of Water Resources, Groundwater Management Support Section, (602) 417-2470. | If required, any Dewatering Wells will be outlined in the Construction Stormwater Control Plan that will be submitted by FCDMC to ADWR within a reasonable time after contract award. |
| N | Floodplain Management - Any activity in a floodplain requires a floodplain use permit from the local flood control district. Any structure, which will divert, retard or obstruct the flow of water, will require an in-depth review by a flood control district before issuance of the permit. Removal of a dam will also require an in-depth review. Contact the local flood control district. | The construction activities do not occur within a floodplain. |
| Y | Archaeological Clearance - Any activity, which involves ground disturbance, requires prior clearance regarding cultural resources sensitivity and treatment from the State Historic Preservation Officer. Contact the Arizona State Parks, (602) 542-4174. | Archaeological Clearance has been performed for the site and included within the Individual 404 Permit application which is available from FCDMC. |

GEOLOGICAL CONSULTANTS INC

KENNETH M. EUGE, R.G.
JASON C. WILLIAMS, R.G.

**Memorandum**

May 17, 2004

To: Todd Ringsmuth, P.E.
URS Corporation

From: Ken Euge, R.G.
Principal Geologist

Subject: Subsidence at White Tanks FRS No. 3
Historical and Predictive Subsidence Assessment
Contract No. FCD 2003055
Geological Consultants Project No. 2003-162

According to the scope of work for Work Assignment No. 1 for the White Tanks FRS No. 3, Design for Dam Modification, Geological Consultants Inc. is submitting herewith this technical memorandum to satisfy the Item 7.0 of the project Scope of Work.

## 1.0 Introduction

The assessment of land subsidence at White Tanks FRS No. 3 identified in the project slope of work included the following tasks:

- Review various historical reports that document the evaluation of land subsidence in the project area including but not limited to the Draft Design Issues Report dated November 20, 1998 prepared by Dames & Moore and the Preliminary Geotechnical Investigation Report dated March 16, 2004 prepared by AMEC Earth & Environmental Inc. (AMEC).
- Obtain historic water level data for wells located within two miles of White Tanks FRS No. 3 and review and graphically summarize the historic water level data.
- Obtain historic survey level data for National Geodetic Survey (NGS) benchmarks within a two and one-half mile radius of White Tanks FRS No. 3 and evaluate the NGS data relative to historic land subsidence trends in the dam vicinity.
- Consult with the Arizona Department of Water Resources (ADWR) and the Maricopa Association of Governments (MAG) regarding future potential water demands related to projected population increases in the West Salt River Valley that may induce future potential land subsidence in the project area.
- Prepare this technical memorandum to document the data findings, define historic land subsidence trends and deduce from the data future potential land subsidence that may impact the White Tanks FRS No. 3 structure.



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## 2.0 Previous Land Subsidence Evaluations

According to the scope of work for the subject activity, we have completed our review of pertinent reports directed at the White Tanks FRS No. 3 including the Dames and Moore Draft Design Issues Report (1998), the AMEC Preliminary Geotechnical Investigation Report (2004), and other relevant documents.

### 2.1. Dames & Moore Draft Design Issues Report:

Background information is provided in the Dames & Moore report relative to the subsurface geology in the project vicinity and historic groundwater level trends. The described geology is typical for a fault block bounded basin with the Basin and Range Physiographic Province of south central Arizona. Basin stratigraphy consists several thousands of feet of unconsolidated and semi-consolidated alluvial sediments derived from the erosion of the basin-bounding mountains. The sedimentary sequence overlies crystalline basement rock. The basin sediment makes up the groundwater aquifer.

The Western Salt River Valley stratigraphy is divided into three sedimentary units: upper alluvial unit (UAU), middle alluvial unit (MAU), and lower alluvial unit (LAU). The UAU includes unconsolidated and poorly consolidated Quaternary age sand and gravel with some silt and clay. The MAU, also referred to as the "middle fine-grained unit" by the US Bureau of Reclamation (1976), consists of semi-consolidated to over-consolidated silts and clays with minor layers of sand and gravel. Near the margins of the basin the MAU is coarser-grained and poorly consolidated. The LAU, also referred to as the "lower coarse-grained unit" by the US Bureau of Reclamation (1976), is well-consolidated sand and gravel units that grade to finer-grained silt and clay near the center of the basin. A large evaporite deposit, referred to as the Luke Salt Body, occupies the central part of the basin and is included in both the MAR and the LAU.

Groundwater conditions described in the Dames & Moore Report indicate water levels in the vicinity of White Tanks No. 3 have generally declined since the 1940s with the greatest declines occurring between 1940 and 1970. Rates of decline have diminished since the 1970s and 1980s with some local well experiencing stabilized water levels or rebounding water levels

An evaluation of the NGS benchmark (H265) level data reported by Dames & Moore, suggest the similar trends of lowering ground surface elevations with comparable lower of the groundwater table in the basin. Benchmark H265 is located on the Beardsley Canal access road on the east side of the Beardsley Canal at the northwest corner of the northeast ¼ of Section 9, Township 2 North, Range 2 West. To extend the record period through 1991, elevation data use by Schuman and O'Day (1995), were incorporated into the Dames & Moore subsidence analysis. However, subsequent discussions with H.H. Schuman (personal communication, 2004) revealed that the 1988 and 1991 elevation data

used in Schuman and o'Day (1995) was not obtained from NGS leveling data but from a 1988 "conventional survey" from an unknown source and a 1991 survey reportedly conducted by the District. To deduce estimated subsidence from these surveys and extend the historical record, Schuman compared his 1988 survey data with the 1957 USGS Waddell Topographic Quadrangle spot elevations. Similar comparisons were made with the District's 1991 survey data. Although Schuman and O'Day (1995) indicated 17 to 18 feet of subsidence had occurred in the Luke Air Force Base area, the elevation data used estimate the subsidence could be inaccurate by as much as a foot or more.

The greatest water level declines, reported by Schuman and O'Day (1995) are associated with about 18 feet of land subsidence near the center of the basin in the Luke Air Force Base area. However, at White Tanks which is located near the margin of the subsiding basin almost four feet of subsidence is documented. The reported estimated subsidence rate is 0.0357 feet per year for the period 1991 to 2046 according to a study done by the NRCS. Figure 2-2 of the Dames & Moore report describes the historic land subsidence and depth to groundwater for a benchmark (H265) and a well (B(2-2)4 DCB). Benchmark H265 is located on the east side of the Beardsley Canal and its intersection with the Glendale Boulevard alignment at the northwest corner of the northeast ¼ of Section 9, Township 2 North, Range 2 West approximated 400 feet east of the White Tanks FRS No. 3 embankment centerline. Well b(202)4DCB is located approximately 150 feet east of the north end of White Tanks No. 3 FRS and about 1,400 feet north-northwest from benchmark H265. These data are used to define the historic rate of subsidence compared to changes in water level and to estimate future potential subsidence for the site

## 2.2. AMEC Preliminary Geotechnical Investigation Report

This report was prepared to help identify a new dam location downstream, and to assess the fissure risk White Tanks FRS No. 3. The land subsidence assessment presented in Preliminary Geotechnical Investigation Report was taken from a supplemental report of ground subsidence and earth fissures for White Tanks FRS No. 3 dated February 7, 2003.

Generally, the basin stratigraphy described in the AMEC (2004) report is similar to that described in the Dames and Moore (1998) report. However, the AMEC descriptions were expanded to include estimated depth and thickness of the various basin fill units. From the results of a gravity survey, the estimated depth to bedrock at White Tanks No. 3 is about 1,000 to over 1,600 feet below ground surface. The Upper Alluvial Unit (UAU) is estimated to be about 400 feet to 700 feet thick; the Middle Fine-Grained Unit (MFGU) about 400 feet to 500 feet thick; and the Lower Alluvial Unit (LAU) about 400 feet to 500 feet thick.

The description of groundwater conditions in the AMEC report is similar to the conditions described in the Dames & Moore report.

Discussion of historic land subsidence in the AMEC report relied on the same NGS data prior to 1984 showing similar rates of subsidence between 1948 and

1982. A comparison of the 1990 level survey of the dam crest to the design elevation of the crest suggests the south end of the structure has subsided about one foot while the north end has subsided about 4.5 feet. Level survey data along the crest of the dam were used to estimate settlement for the period 1990 through 2001. The estimated settlement for the south end of the dam is about 0.2 feet and for the north end 0.4 feet. AMEC also evaluated InSAR interferograms for the same period which documented similar relative elevation changes within the study area.

### 2.3. Other Data

Other relevant documents have also been acquired pertaining to historic groundwater levels (ADWR) and level survey benchmark records (NGS), projected population growth through year 2030 (Maricopa Association of Governments), projected water use through year 2030, and surface geology subsurface stratigraphy of the site vicinity (AzGS, USGS, USBOR).

## 3.0 Groundwater

The major human-induced factor contributing to subsidence is the large scale pumping and removal of groundwater. Nearly all of the populated southern Arizona basins from Phoenix to Tucson have experienced at least a 100+ foot drop in groundwater level, and an area surrounding the town of Stanfield, Arizona has dropped more than 500 feet (Schumann, 1986).

### 3.1. Groundwater Conditions in the West Salt River Valley Sub-Basin

White Tank #3 FRS is within the West Salt River Valley Sub-Basin, one of the seven groundwater sub-basins within the Phoenix Active Management Area (AMA) as defined by the Arizona Department of Water Resources (ADWR, 1994). Prior to 1923, the groundwater system in the West Salt River Valley was in equilibrium, recharge and outflow were balanced. Groundwater underflow was to the south toward the Gila and Salt Rivers. Agricultural activity increased dramatically in the 1930's by utilizing the large-scale pumping of groundwater. By 1923, 2.3 million acre-feet per year were needed to meet agricultural demands. As a result, groundwater flow directions were impacted due to the lowering of the water table. The water table decline appeared to reach its maximum in the mid 1980's. A significant groundwater sink, or lowering of the water table occurred northeast of the Luke AFB area causing groundwater flow direction to concentrate in that area (Schumann, 1995).

For approximately the last 20 years (since the mid 1980's) the rate of groundwater level decline has decreased in the project vicinity. However, the overall trend is of ongoing water level decline.

Analysis of water level data (ADWR, 2002) from selected wells in the area indicates water levels have indeed dropped from 200 to 250 feet from the early 1940's through 2002.

### 3.2. Groundwater Conditions in the White Tanks FRS No. 3 Area

To complete the groundwater analysis, all wells within 2-miles of the center of the dam were identified using ADWR's GWSI database (ADWR, 2003). A total of nineteen wells were identified within the 2-mile radius zone (Figure 1). Several of the wells within this zone have only one or two water level reading. Because of the limited or very sporadic readings, those wells were not used in this analysis. Thirteen wells within the 2-mile radius zone that appeared to have sufficient water level history records to permit a reasonable assessment of historic groundwater trends. No historical information was available from ADWR on the pumping rates of these wells.

Water level hydrographs for 9 wells south and southeast of White Tanks FRS #3 (Appendix A) depict water level increases over the past 20- to 25-years. A well record approximately 1-mile east of WT#3 (B-02-02 10BAA) depicts relatively static water levels from 1972 to 1998. Two wells located northeast (B-02-02 03BAA) and northwest (B-02-02 05AAB) of WT#3 depicted water level readings too erratic to discern any reliable trend over the past 30 years. Hydrographs were obtained from the ADWR technical database. When reviewing the hydrographs (Appendix A) be aware that the plot may be either exaggerated or muted because the Depth to Water and Date Measured ordinate and abscissa are not to the same scale.

In the White Tanks FRS No. 3 area, the groundwater levels at a well located 600 feet east of the north end of the dam (Well B-02-02 04DCB) showed a groundwater decline of about 150-feet between 1946 and 1976. From 1976 to 2002, the groundwater decline at the well is about 25-feet.

Water level records we have observed in wells throughout southern and central Arizona Basin and Range have generally shown a similar record. Dramatic water level declines from the time the well was installed to about the mid 1970's to mid 1980's. Within this period, water levels have generally either leveled off, or reversed trend and started to increase. We believe the dramatic water level decline was interrupted by a few conditions:

1. Above average rainfall in the late 1970's and early 1980's.
2. Additional water provided by the CAP canal.
3. In localized areas, retirement of farmland, or a switch to crops that required less water to sustain.

Arizona is currently in a drought. While water levels in the vicinity of the dam have either stopped declining, or are showing an overall increase in groundwater

levels, it remains to be seen what effect less rainfall in the area will have on aquifer recharge and water level conditions.

In summary, the results of this assessment indicate groundwater level trends are generally static throughout the area with some individual wells that show increasing water levels and some wells that show falling water levels, albeit at relatively low rates. One well (B-02-02 04DCB), located just east of the north end of White Tanks No. 3, has been regularly monitored since the late 1940s. The water level history of this well depicted in its hydrograph documents a decline of almost 150 feet through 1970 and an additional 25 feet through 2000 (Appendix A). This well in conjunction with the historic NGS level line data is used to assist with the definition of historical land subsidence and subsidence rates.

## 4.0 Subsidence

### 4.1. Historical Land Subsidence

Land subsidence is known to occur in alluvium filled valleys of Arizona where agricultural activities and urban development have caused substantial over-drafting or removal of groundwater from thick basin aquifers. The magnitude of subsidence is directly related to the subsurface geology, the thickness, and compressibility of the alluvial sediments deposited in the valleys, and the net groundwater decline. According to Bouwer (1977), land subsidence rate range from about one- hundredth to one-half feet per 10-foot drop in groundwater level, depending on the thickness and compressibility of the basin fill sediments.

There are three categories of land subsidence: (1) active subsidence; (2) residual subsidence; and (3) total subsidence. Land subsidence induced by groundwater over-drafting (or over pumping) is referred to as "active subsidence" and it does not immediately stop once pumping is stopped. As groundwater levels stabilize, or begin to rise, the subsidence continues for some time before it gradually diminishes and stops. The land subsidence that continues after groundwater levels stabilize or rise is referred to as "residual subsidence" and generally continues for several years (EPA, 2001). The entire land subsidence process cannot be considered complete until residual subsidence approach zero, whereas the cumulative drop in the land surface, know as "total subsidence" can be determined. Because of the near-static to rising water levels in the site vicinity, the land around White Tank FRS No. 3 is an area of residual subsidence.

### 4.2. Regional Subsidence

Prior to the utilization of groundwater resources within the Phoenix area, the water table was higher and hydrogeologic conditions were in equilibrium. Water levels within the aquifer were lowered when pumping was initiated and the basin fill sediments were dewatered. In the arid southwest, the water in the aquifer may be removed by pumping faster than it can be naturally replenished causing a net

water table decline. As a result, the weight of the soil column is gradually increased as the buoyant effects and aquifer pressures induced by the water acting on the soil column are decreased. This condition causes increased loading stresses to consolidate portions of the thick compressible sediments that result in the lowering (subsidence) of the land surface over a large area.

Land subsidence was first documented in Arizona in 1934 following the releveling of first-order survey lines by the Coast and Geodetic Survey (now the National Geodetic Survey (NGS)). Subsequent leveling by the NGS, the U.S. Geological Survey, the Bureau of Reclamation, and the ADOT has documented substantial land surface subsidence in south central Arizona including the Salt River Valley, the Queen Creek Apache Junction area, and the Eloy Casa Grande Stanfield area as overdrafting of the aquifer continues.

## 4.3 Subsidence in the White Tanks FRS No. 3 Area

Land subsidence is well documented within the project area. Data from the National Geodetic Survey (NGS) (Figure 2) (Table 1a), the District survey of NGS benchmarks in 2004 (Table 2a), District releveling data at the crest of White Tank #3 (Figure 4), and DifSAR data provided by ADWR are used to complete the assessment of historic land subsidence.

Level line elevation data obtained from NGS are unadjusted. Where the leveling network is not complex and demonstrably stable local benchmarks are nearby, unadjusted leveling data are commonly used for land subsidence evaluations. In the White Tanks FRS No. 3 area, unadjusted NGS level line elevation measured at benchmarks along the Beardsley Canal (Figure 3) were used to initially calculate land subsidence over the period 1948 to 1981 (Table 1a). Calculated land subsidence using unadjusted NGS leveling survey data are summarized in Table 1b and depicted in Figure 3.

Table 1a
Level Survey Benchmark Elevations (unadjusted)
Along Beardsley Canal

| Benchmark Designation | 1948 Elevation (ft) | 1967 Elevation (ft) | 1981 Elevation (ft) |
|---|---|---|---|
| F265 | 1149.1029 | 1147.2787 | 1146.5712 |
| G265 | 1168.3720 | 1167.2662 | 1166.7200 |
| H265 | 1199.3116 | 1197.5740 | 1196.3050 |
| J265 | 1231.4593 | 1230.4145 | 1229.1619 |
| K265 | 1277.6508 | 1276.7714 | 1275.6065 |
| 3541 | 1306.6060 | 1305.1050 | 1302.7554 |

Table 1b
Subsidence Along Beardsley Canal Benchmarks

| Benchmark Designation | Total Subsidence (ft) 1948-1967 | Subsidence Rate (ft/yr) 1948-1967 | Total Subsidence (ft) 1967 – 1981 | Subsidence Rate (ft/yr) 1967 – 1981 | Total Subsidence (ft) 1948-1991 | Subsidence Rate (ft/yr) 1948-1981 |
|---|---|---|---|---|---|---|
| F265 | 1.824 | 0.096 | 0.707 | 0.050 | 2.531 | 0.077 |
| G265 | 1.106 | 0.058 | 0.546 | 0.039 | 1.652 | 0.050 |
| H265 | 1.738 | 0.091 | 1.269 | 0.091 | 3.007 | 0.091 |
| J265 | 1.045 | 0.055 | 1.253 | 0.089 | 2.298 | 0.070 |
| K265 | 0.879 | 0.046 | 1.165 | 0.083 | 2.044 | 0.062 |
| L265 | 1.252 | 0.523 | 2.599 | 0.186 | 3.851 | 0.117 |

In 2004, the District acquired adjusted NGS level line elevation data for the north-south NGS level line parallel to the Beardsley canal for the period 1948 to 2004. Table 3a shows historical elevation data and Table 3b shows the total amount and rate of subsidence for the data intervals. Table 4 summarizes the historical subsidence measured at NGS benchmark H265 which is closest to the White Tanks FRS No. 3 structure (Figure 2).

Table 3a
NGS Benchmark Elevations Along Beardsley Canal

| Benchmark Designation | 1948* Elevation (ft) | 1967* Elevation (ft) | 1981* Elevation (ft) | 2004** Elevation (ft) |
|---|---|---|---|---|
| F265 | 1149.186 | 1147.034 | 1146.565 | No Data |
| G265 | 1168.455 | 1167.021 | 1166.716 | No Data |
| H265 | 1199.393 | 1197.326 | 1196.300 | 1195.694 |
| J265 | 1231.542 | 1230.167 | 1229.157 | 1228.731 |
| K265 | 1277.730 | 1276.522 | 1275.604 | 1275.257 |
| L265 | 1306.683 | 1305.105 | 1302.753 | No Data |

* NGS Adjusted Elevations ** Adjusted elevations obtained by FCDMC (FCDMC, 2004)

Table 3b
Subsidence Along Beardsley Canal; NGS Benchmarks

| Benchmark Designation | Total Subsidence (ft) 1948-1967 | Subsidence Rate (ft/yr) 1948-1967 | Total Subsidence (ft) 1967 – 1981 | Subsidence Rate (ft/yr) 1967 – 1981 | Total Subsidence (ft) 1981-2004 | Subsidence Rate (ft/yr) 1981-2004 |
|---|---|---|---|---|---|---|
| F265 | 2.152 | 0.1133 | 0.469 | 0.0335 | No Data | - |
| G265 | 1.434 | 0.0755 | 0.305 | 0.0218 | No Data | - |
| H265 | 2.067 | 0.1088 | 1.026 | 0.0733 | 0.606 | 0.0263 |
| J265 | 1.375 | 0.0724 | 1.010 | 0.0721 | 0.426 | 0.0185 |
| K265 | 1.208 | 0.0636 | 0.918 | 0.0656 | 0.347 | 0.0151 |
| L265 | 1.578 | 0.0831 | 2.352 | 0.1680 | No Data | - |

Table 4
Historical Subsidence Benchmark H265

| Time Period | Subsidence (feet) | Subsidence Rate (feet/year) |
|---|---|---|
| 1948 to 1967 | 2.07 | 0.11 |
| 1967 to 1981 | 1.03 | 0.07 |
| 1981 to 2004 | 0.61 | 0.03 |

For the purpose of this subsidence evaluation the adjusted elevation data obtained by the District will be used to define historical land subsidence trends in the White Tanks FRS No. 3 area.

Releveling of the White Tanks FRS No. 3 crest monuments by the District (2004) shows ongoing subsidence/settlement along the crest of the dam (Figure 4). Between 1990 and 2003 the elevation at the crest of the dam is lowering at a rate of 0.011 ft at station 70+07 to 0.030 ft/yr at station 10+00, which means that the northern crest of the dam is subsiding at a rate greater than the southern end.

Difsar data for an 8-year period (Figure 5) (ADWR, 2004) shows a similar trend. According to this data the southern end of the dam has undergone approximately 0.2 ft of subsidence between July 1992 and October 2000 and the north end of the dam has subsided almost 0.26 feet of the same period (Figure 6). The comparison with interferometry records, particularly DifSAR records, for the 8-year period ending October 2000 indicates an average subsidence rate of 0.019 feet per year. Both the District releveling data and the DifSAR data show the north end of the dam subsiding at a higher rate than the southern end of the dam.

Due to the large gaps in time between the data, 1981 to 1992 and 2000 to 2004, the DifSAR information was not integrated into any of the graphs using adjusted NGS benchmark elevations. However, Figure 7 is provided to illustrate a reasonable comparison between the DifSAR data and the benchmark data. The DifSAR point was calculated by taking the maximum 8-year deformation value from the DifSAR information (0.276) and adding it to the 2004 elevation (assuming no subsidence over period 2000 to 2004), to give a hypothetical 1992 elevation. This point falls within the range of the benchmark subsidence data.

An assessment of incremental land subsidence verses groundwater drawdown was performed using historical land subsidence calculated using the adjusted NGS leveling data from benchmark H265 and water level decline data from well B-02-02 04DCB. Table 5 provides a summary of this assessment.

Table 5
Incremental Land Subsidence vs. Drawdown

| Time Period | Δ Subsidence (feet) | Δ Water Level Decline (feet) | Subsidence/Drawdown Ratio (feet/foot) |
|---|---|---|---|
| 1948 to 1967 | 2.07 | 111 | 0.019 |
| 1967 to 1981 | 1.03 | 15 | 0.069 |
| 1981 to 2004 | 0.61 | 20 | 0.031 |

The comparison of the groundwater level decline to the subsidence records suggests that active subsidence is continuing in the White Tanks FRS No 3 area through the period of record. The results of our assessment of historical groundwater and land subsidence records are consistent with the results described in the Dames and Moore and the AMEC studies. In our opinion, based on the assessment of the differential InSAR (DifSAR) data when compared to the grade of the north end of the FRS is about 4 feet below design grade due primarily to land subsidence in the area. Residual subsidence in the area will continue to cause a lowering of the crest elevation.

## 5.0 Future Potential Land Subsidence

### 5.1 General

Attempting to quantify future potential land subsidence is a difficult task. Several factors come into play that can affect future subsidence. These factors include, but may not be limited to, the following:

- On-going residual subsidence.
- Continuing groundwater use at present rates.
- Reduction in groundwater use.
- Future increases in groundwater use.
- Location of pumping centers.
- Water use practices.
- Increase or decrease in available surface water.
- Increase or decrease in groundwater level.
- Aquifer compressibility.
- Saturated thickness of aquifer
- Depth to bedrock or subsurface structural feature.

Because of the wide variety of complex and interrelated factors that can affect subsidence predictions, the selection of appropriate prediction methods must consider simplifying assumptions to reduce complexities. For the analysis of future potential land subsidence at White Tanks FRS No. 3, we have examined two cases:

1) Predicted subsidence with present-day groundwater conditions and
2) Predicted subsidence with additional groundwater withdrawal.

## 5.2 Predicted Subsidence with Present-Day Groundwater Conditions

Predictive assessments of future potential land subsidence were conducted using conventional empirical methods with available subsidence data to estimate future trends. In this method, the amount of land subsidence is considered a function of time, ignoring the causality of land subsidence. We used the historical records to determine the rate of subsidence and projected the values to year 2100 using and linear approximations and linear extrapolation of the historical data to year 2100.

### 5.2.1 Predicted Subsidence at Benchmark H265

Historical data used for the extrapolations included the adjusted elevation data provided by the District for NGS benchmark H265 for the period 1947 through 2004. A visual extrapolation curve was constructed for the period 1947 through 2100 (Figure 8). Based on the visual extrapolation, the estimated subsidence expected by year 2100 is about 1.67 feet with a rate of subsidence of about 0.02 feet per year. Assuming groundwater levels are static or rising during this period, the subsidence would be classified as is residual subsidence. A plot of the linear trend analysis curve for the period 1981 through 2004 is presented in Figure 8. In this scenario, using the difference in subsidence between 1981 and 2004, the subsidence rate is about 0.026 feet per year. Assuming this rate continue through year 2100 the total subsidence that could be experience at White Tanks No. 3 could be about 2.53 feet.

### 5.2.2 Predicted Subsidence Using DifSAR Interferometry

Future potential land subsidence was also calculated using differential interferometry (DifSAR) of land surface deformation for the period 1992 through 2000. However, because the DifSAR point is about 14 feet from the benchmark H265, it was examined independently from the benchmark data. It must be pointed out that the DifSAR point deformation represents an average deformation within a 50 meter pixel and therefore must only be used to evaluate a general subsidence trend for the 1992 through 2000 time period. Land subsidence and subsidence rates calculated from the DifSAR data point (closest to benchmark H265) is about 0.25 feet with a subsidence rate of about 0.03 feet per year. The average subsidence rate along the DifSAR profile line from Bethany Home Road to Northern Avenue is about 0.028 feet per year. A plot of the DifSAR deformation along a north-south profile parallel to the Beardsley Canal is depicted in Figure 5. Assuming the average DifSAR deformation rate is projected to 2100, the predicted subsidence through year 2100 could be about 2.688 feet.

### 5.2.2 Predicted Subsidence Using Differential Subsidence/Groundwater Level Ratio

For the determination of the rate of subsidence per foot of water level drawdown, the analysis assumed an approximation of water level decline that would occur through year 2100. The assumed groundwater level decline could be about 73 feet over the next 100 years based on a visual linear extrapolation of the historical rate of water level decline in well B-02-02 04BCD over the period from 1975 through 2002. According to the ADWR well location database, this well is located about 200 feet east of the north end of White Tanks FRS No. 3. This scenario was evaluated to assess the future potential subsidence using the ratio of subsidence to water level decline. The predictive results for this scenario suggest that for the period of record between 1981 and 2004 the differential subsidence and water level change is 0.606 feet and 19.75 feet, respectively, resulting in a subsidence/drawdown ratio of 0.03 feet/foot (Figure 10). Using this subsidence/drawdown ratio projected to year 2100, the resultant subsidence is about 2.98 feet.

## 5.3 Predicted Subsidence with Additional Groundwater Withdrawal

The most significant factor affecting the actual rates of land subsidence, and ultimately total subsidence over the next 100 years, is the response to the groundwater aquifer to pumping and recharge. Changes of land use from agricultural to urban uses and the resulting population growth and water demand are expected to negatively impact land subsidence. Predicting land subsidence using population growth and estimated water demand only provides a rough indicator of potential impact to the aquifer on a basin-wide or sub-basin level. This information cannot be used to predict land subsidence unless a groundwater drawdown model is applied to the growth and demand factors.

### 5.3.1 Population Growth Projections

Maricopa Association of Governments (MAG) has prepared population growth projections for the County that only go through year 2030. To estimate the future potential water demands that might be expected over the next 30 year, we have examined the local areas surrounding the White Tank No. 3 to determine the potential impact of population growth on water use requirements for the area. Four Residential Area Zones (RAZ) surround White Tanks No. 3 (Figure 11). The total population growth for these areas through 2030 is 143,817 (Figure 12) which equates to about 54,280 housing units.

### 5.3.2 Water Demand Projections

Using the ADWR formula for calculating water use (ADWR, 1999), the residential water demand ranges from 1.206 AF per year for 2000 to 12,238 AF per year through 2030. Non-residential water demand ranges from 1,450 AF per year for year 2000 to 10,772 AF per year through 2030. The combined values

equate to a total estimated water demand of about 23,010 acre-feet per year. The sources expected to meet this demand will come from surface water sources (Central Arizona Project, Salt River Project, and local irrigation districts), reclamation/recharge sources, and groundwater. Percentage distributions from each of these sources are expected to vary from year to year as has in the past (ADWR, 1999). If it were possible to accurately define the numerous input parameters, it might be possible to distribute this water demand equally to each of the wells within each RAZ area and calculate rough approximations of groundwater level drawdown a resultant land subsidence impact estimated. However, changes in the assumption made regarding groundwater demand, such as allocations during wet and dry cycles, well sites where groundwater is pumped, and changes in land use will significantly affect drawdown calculations thereby making the resulting projections of future potential land subsidence subject to question. Likewise, making minor changes in the assumptions made could radically affect projected subsidence estimate. Therefore we have not attempted to develop subsidence predictions using projected water demands.

### 5.3.3 Projected Groundwater Conditions

Groundwater modeling and analysis are commonly required to assess potential impacts to the aquifer system that may be caused by new, large master planned community development. Likewise, studies encompassing larger basin-wide area are conducted by regulatory agencies. When the results of these types of studies are available they may be used to predict groundwater drawdown into the future. In the case of land development, the analysis attempt to predict drawdown of a 100-year period as part of the 100-year assured water supplies that are required for permitting and to demonstrate that the water table will not be drawn down more than 1,000 feet below ground surface. The predictive time period for other water use planning studies may vary from 5 years to 25 years or more.

**5.3.2.1 ADWR Water Planning Study:** URS obtained and reviewed published data on future groundwater usage and levels as modeled by ADWR (1996). According to this report, the decline in groundwater levels between 1983 and 2025 is predicted to range from 50 to 100 feet. The rate of decline for this time period ranges from approximately 1.2 feet per year to 2.4 feet per year. ADWR (1996) assumes that the three Water Planning Areas in the immediate vicinity of White Tanks FRS No. 3 rely fully on groundwater for current and future water supplies. The ADWR model does not predict groundwater level declines past 2025. Assuming that the rates of decline remain unchanged, it is estimated that over the 100-year design life of the dam, groundwater levels at the dam could decline by 120 to 240 feet.

**5.3.2.2 Maricopa Water District Water Study:** Groundwater drawdown projections associated with a major land planning study for the development of approximately 2,000 acres parallel to the Beardsley Canal was recently conducted by Fluid Solutions of Phoenix, Arizona. The study, which was conducted for the

Maricopa Water District, included an area adjacent to the east side of the Beardsley Canal from McMicken Dam south of Trilby Wash to one-mile south of White Tanks FRS No. 3. The results of the Fluid Solution's drawdown study suggests the water demand for developments in the vicinity of White Tanks FRS No. 3 could cause a lowering of the water table of about 375 feet over the next 100 years. Figure 13 depicts the future potential water level decline hydrograph.

We have assumed the water table will decline at the present rate until the development begins to draw groundwater from the aquifer by the year 2010. At that time increased water use could cause an increase in the drawdown rate. To predict the future potential land subsidence, we have assumed the incremental subsidence/drawdown ratio will be similar to the initial incremental ratio of the 1948 to 1967 period, about 0.019 feet of subsidence per foot of drawdown. We believe this ratio is reasonably conservative considering the renewed drawdown is starting essentially from a "static" level similar to the initial rapid drawdown period for this well. Therefore, assuming the 0.019 feet per foot ratio, the estimated future potential land subsidence that could be induced with this water level change is about 7.17 feet or about 0.07 feet per year. Groundwater demand from adjacent parcel for urban development or agricultural purposes could cause an additional drop in the water table and a proportional increase in the rate of land subsidence.

### 5.3.4 Subsidence Prediction Summary

The results of the predictive subsidence evaluation are summarized in the following table.

Table 6
Summary of Predictive Subsidence Evaluation (at or near Benchmark H265)

| Predictive Method | 2100 Predicted Subsidence (feet) |
|---|---|
| Visual Extrapolation | 1.67 |
| Linear Extrapolation | 2.53 |
| DifSAR Interpolation | 2.69 |
| Subsidence/Water Level Decline Ratio | 2.98 |
| Drawdown Analysis (ADWR) | 2.28-4.56[1] |
| Drawdown Analysis (MWD) | 7.17 |

1 URS (2004) Predicted subsidence estimated by extrapolation of ADWR groundwater projections through 2100.

- If groundwater levels in the vicinity of the White Tanks FRS No. 3 continue to decline at a nominal rate similar to the rate during the period between 1981 and 2004, the predicted design subsidence of 1.67 feet of additional subsidence by year 2100 is not unreasonable. A reasonable conservative upper bound subsidence limit assuming the same water level

decline is 2.98 feet. In our opinion, considering the predicted water demand estimates by ADWR and MWD, there is a moderate to high probability that the lower bound value of predicted land subsidence could be exceeded over the life of the structure.

- Based on our interpretation of the data used and the uncertainties associated with calculating estimates of future potential land subsidence, it is possible that approximately 1-foot to 4 feet of subsidence could be experienced at the structure (Table 7). The maximum subsidence would occur at the north end of the structure. In our opinion, there is a moderate to low probability of exceeding the upper bound limit of the predicted land subsidence in this area over the life of the structure through 2100.

- Predicted land subsidence base on water use studies conducted by ADWR (through year 2025) and MWD (through year 2100) are estimated to range from 2.28 feet to 7.17 feet, respectively. In our opinion, there is a low probability of exceeding the upper bound limit of the predicted land subsidence

**5.3.4.1 Subsidence at White Tanks No. 3 FRS:** Subsidence monitoring conducted at White Tanks No. 3 FRS demonstrates that the measured land subsidence is not constant and varies throughout the length of the structure. Documented subsidence at the north end of the structure is greater than the subsidence at the south end. However, the subsidence trends during the period of record from 1990 to 2004 are reasonably consistent (Figure 4). We would expect that these observed subsidence trends to continue for several years unless there is a change in the groundwater patterns, such as water level decline, in the vicinity of the structure. Predicted subsidence for the White Tanks No. 3 FRS were approximated using level survey data from NGS benchmark H265. To determine the reasonableness of using this benchmark, a comparison was made of the subsidence measure at the structure to that measured at the benchmark. The comparison considered the ratio of the subsidence rates relative the maximum subsidence measured at station 10+00 at the north end of the structure for the period 1990 through 2003. The ratio of the subsidence rates at the structure relative to the subsidence rate at benchmark H265 was also determined. As can be seen in Table 7 the differential ratios range from approximately 1 percent to 4 percent.

Table 7
Comparison of Subsidence Rate Ratios
White Tanks No. 3 FRS & Benchmark H265

| Station | Subsidence 1990-2003 (feet) | Rate of Change (feet/year)[1] | Subsidence Rate Ratio Relative to Station 10+00 | Subsidence Rate Ratio Relative to BM H265[2] | Predicted Subsidence @ WT No. 3 (feet)[3] |
|---|---|---|---|---|---|
| 10+00 | 0.325 | 0.025 | 1.00 | 0.96 | 4.00 |
| 19+95 | 0.325 | 0.025 | 1.00 | 0.96 | 4.00 |
| 30+00 | 0.273 | 0.021 | 0.84 | 0.81 | 3.24 |
| 40+00 | 0.234 | 0.018 | 0.72 | 0.69 | 2.76 |
| 49+88 | 0.156 | 0.012 | 0.48 | 0.46 | 1.84 |
| 60+08 | 0.091 | 0.007 | 0.28 | 0.27 | 1.08 |
| 70+07 | 0.091 | 0.007 | 0.28 | 0.27 | 1.08 |

1 Assumes groundwater level decline at current rate.
2 Subsidence rate at BM H265 calculated from 0.606 feet of subsidence over a 23-year period 1981 to 2004.
3 Predicted land subsidence White Tanks No. 3 FRS through year 2100 assuming groundwater level decline.

## 6.0 General Conditions

The geologic and hydrogeological observations, findings, and conclusions presented in this memorandum report for the subsidence evaluation conducted for the White Tanks No. 3 FRS and the interpretations made relied on information gathered from a variety of sources including FCDMC, ADWR, USGS, NGS, MAG, MWD, URS, and published documents in Geological Consultants Inc. library. These sources are believed to be reliable and appropriate for the evaluation of historic land subsidence and for making rough approximations of estimated future potential land subsidence.

It must be recognized that subsurface geologic, soils, and hydrogeological conditions may vary from place to place, over time, and from those found at locations where measurements or surveys were made by others to provide data used the investigator. No warranty or representation, either expressed or implied, is or should be construed regarding geological, soil, or hydrogeological conditions at locations other than those described in this report. Verification of the subsurface conditions, survey data, and other data provided by the various sources was beyond the scope of this investigation. The land subsidence predictions presented in this report used the best information and data available at the time of this evaluation. Although there may be uncertainties in the predicted subsidence estimates, the interpretations made and the assumptions used to render opinion regarding predicted land subsidence are believed to be reasonable.

The services provided by Geological Consultants Inc. were performed in accordance with generally accepted geological principles and standard practices used by members of the geological profession in this locale at the time of this study.

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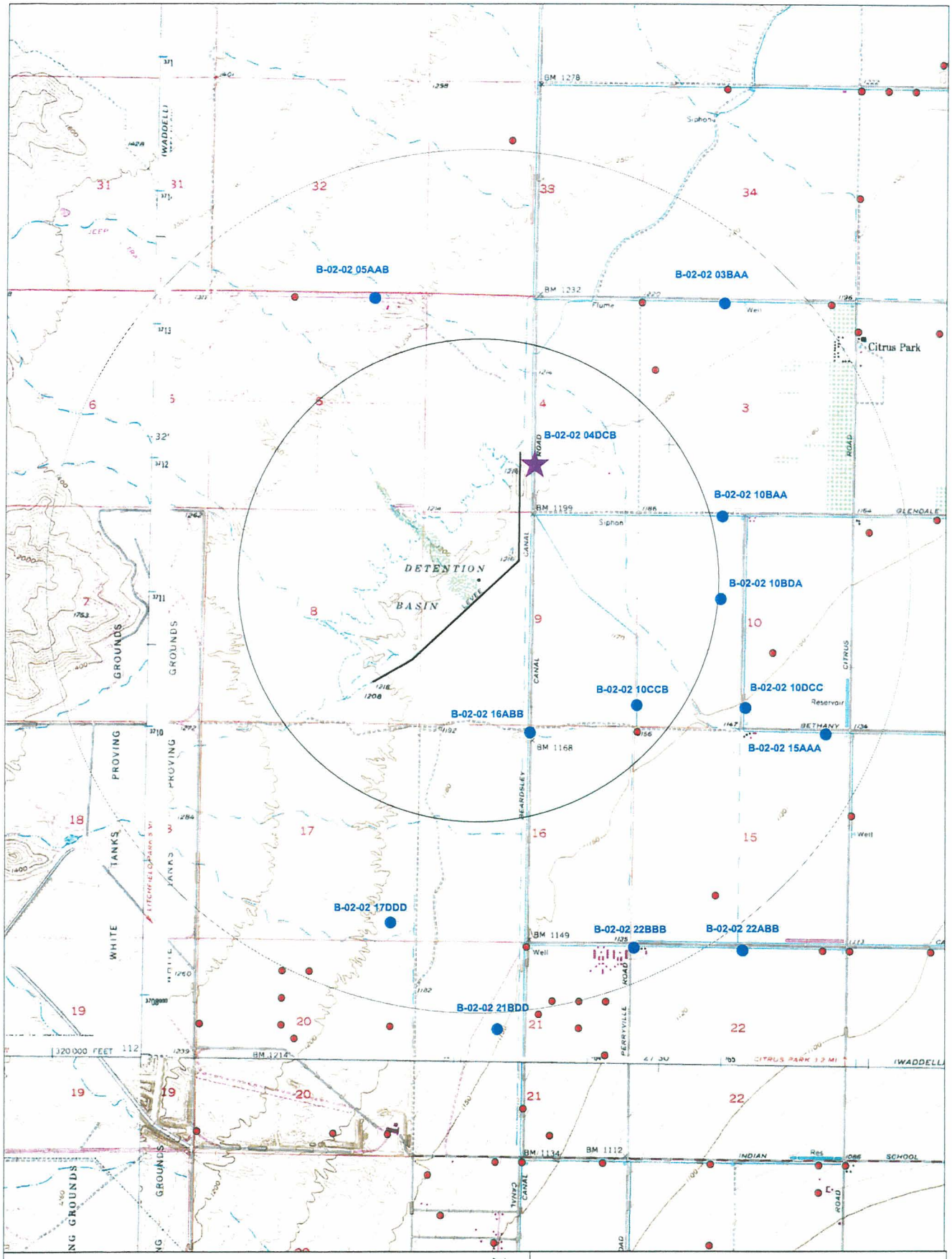
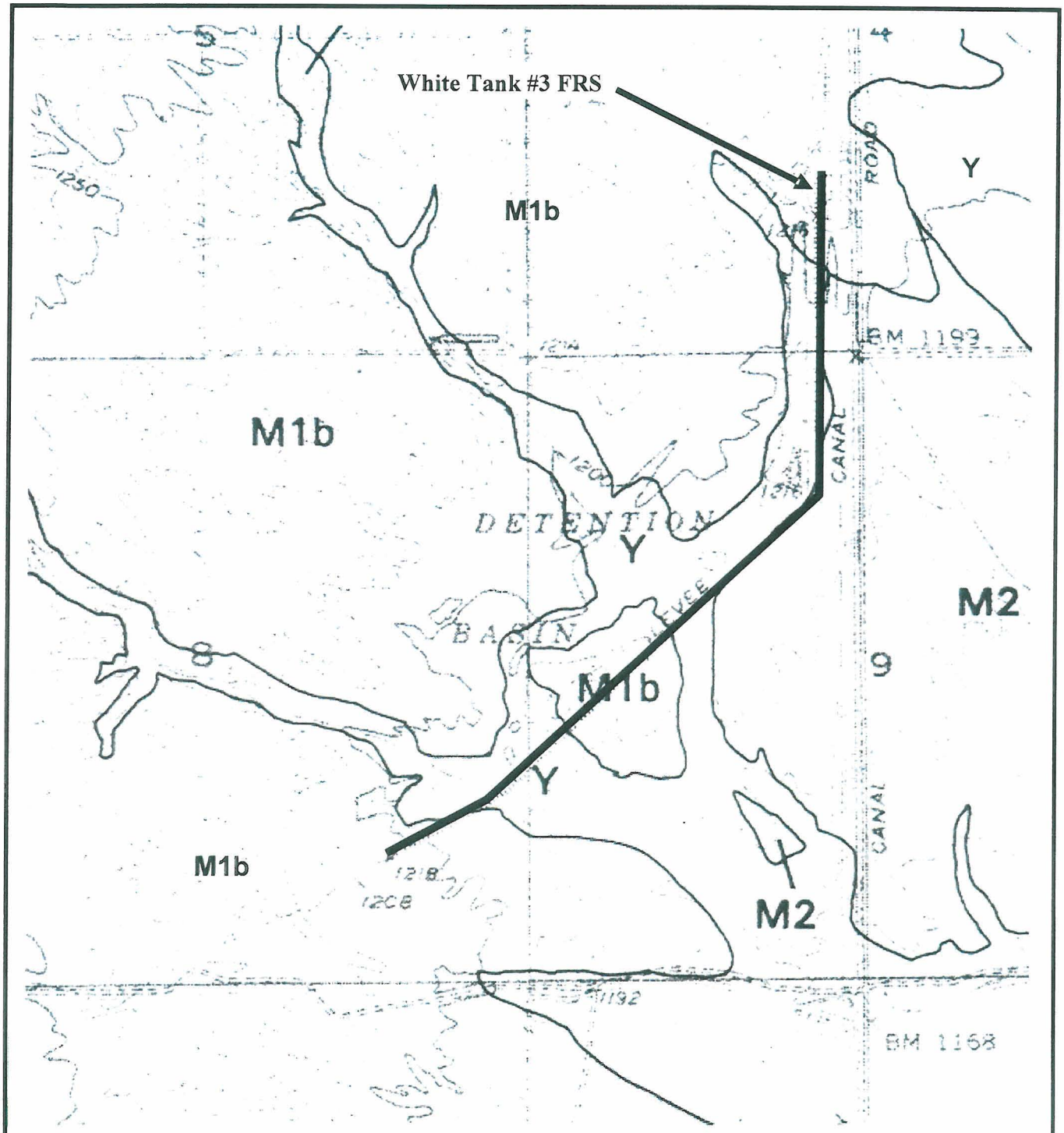



White Tank #3 Remediation Project
Land Subsidence & Earth Fissure Investigation
Well Hydrograph Location Map
Figure 1

GEOLOGICAL CONSULTANTS INC.
2333 West Northern Ave, Suite 1A
Phoenix, AZ 85021
phone 602-864-1888
fax 602-864-1899




**EXPLANATION:**

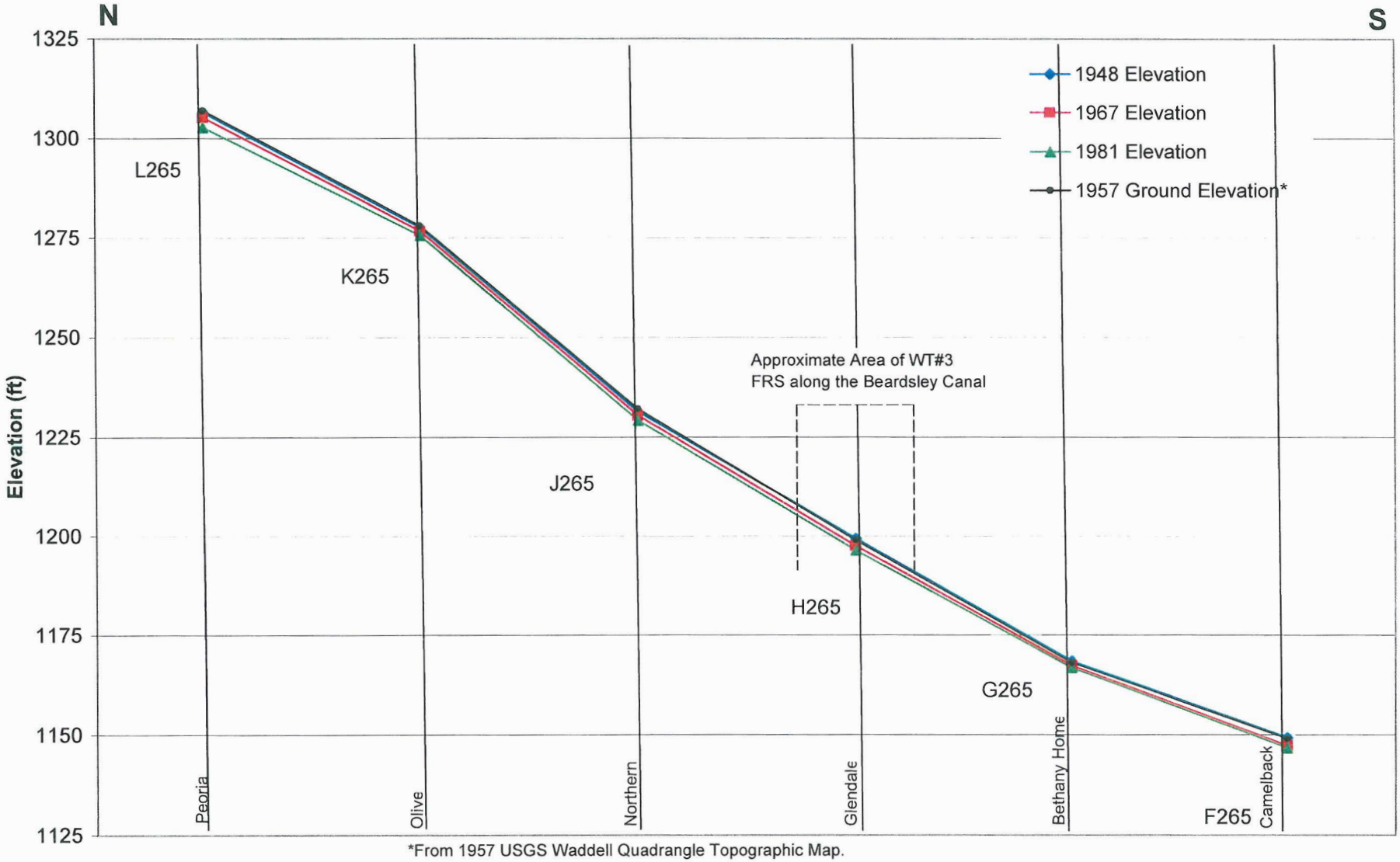
Y - Holocene Alluvial Surfaces
M2 - Pleistocene Alluvial Fans, 10 to 150 ka
M1b- Pleistocene Alluvial Fans, 150 to 300 ka
— Geologic Contact

Note: Refer to Section 3.0 for Geologic Description
Geology from Field and Pearthree, 1991

Seismic Refraction Survey
White Tank #3
Geologic Map
Figure 2

GEOLOGICAL CONSULTANTS INC.
2333 West Northern Ave. Ste 1A
Phoenix, Arizona 85021
Phone 602-864-1888
Fax 602-864-1899

## NGS Level Survey Data (Unadjusted) along the Beardsley Canal




*From 1957 USGS Waddell Quadrangle Topographic Map.

FCD Contract No. 2003C014
GCI Project No. 2003-162

42377845-13FC-10045E.xls

**Figure 3**

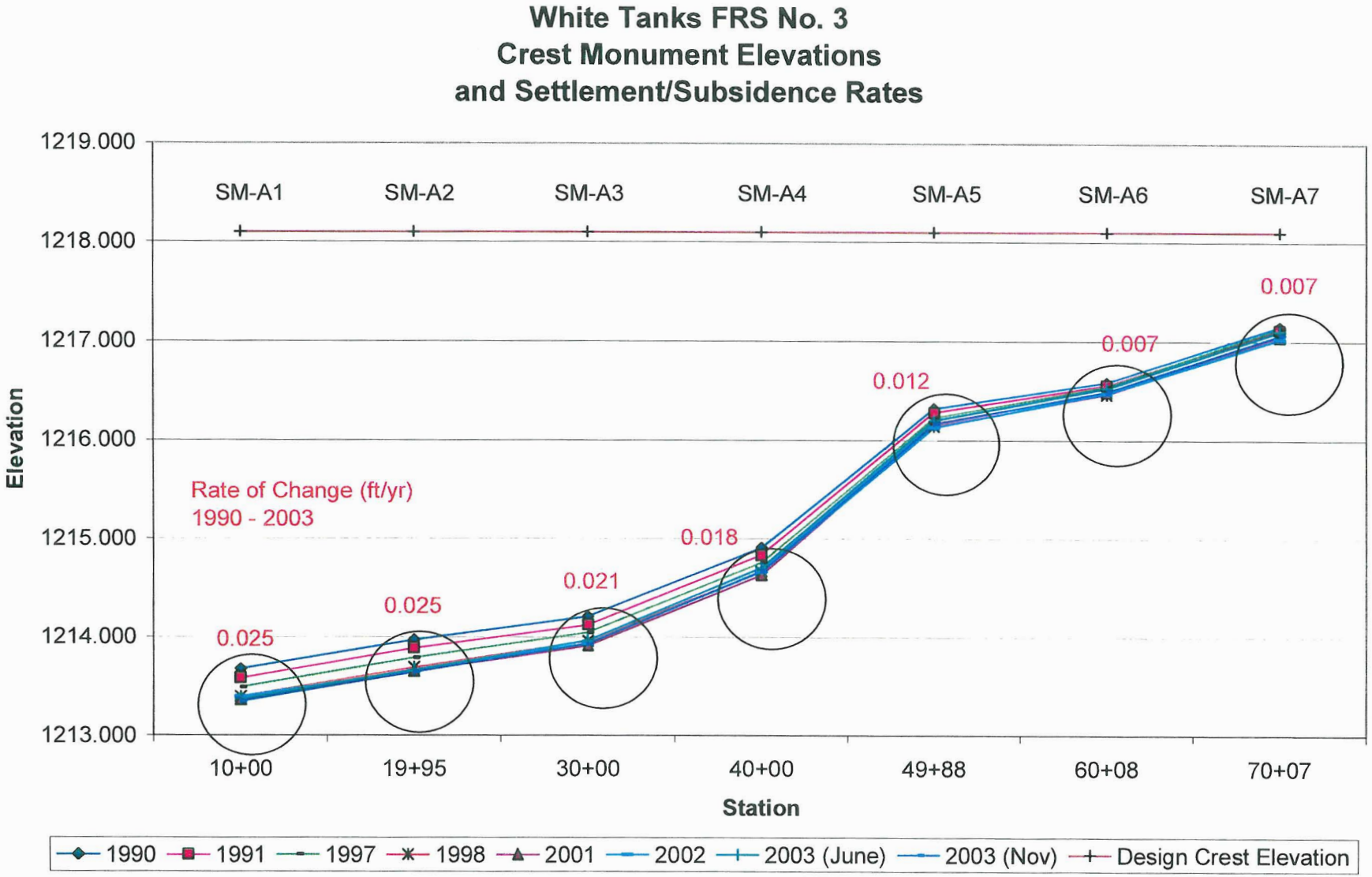

White Tanks FRS No. 3
Crest Monument Elevations
and Settlement/Subsidence Rates
1219.000
1218.000
1217.000
1216.000
1215.000
1214.000
1213.000
Elevation
SM-A1
SM-A2
SM-A3
SM-A4
SM-A5
SM-A6
SM-A7
Rate of Change (ft/yr)
1990 - 2003
0.025
0.025
0.021
0.018
0.012
0.007
0.007
10+00
19+95
30+00
40+00
49+88
60+08
70+07
Station
1990
1991
1997
1998
2001
2002
2003 (June)
2003 (Nov)
Design Crest Elevation

**Figure 4**

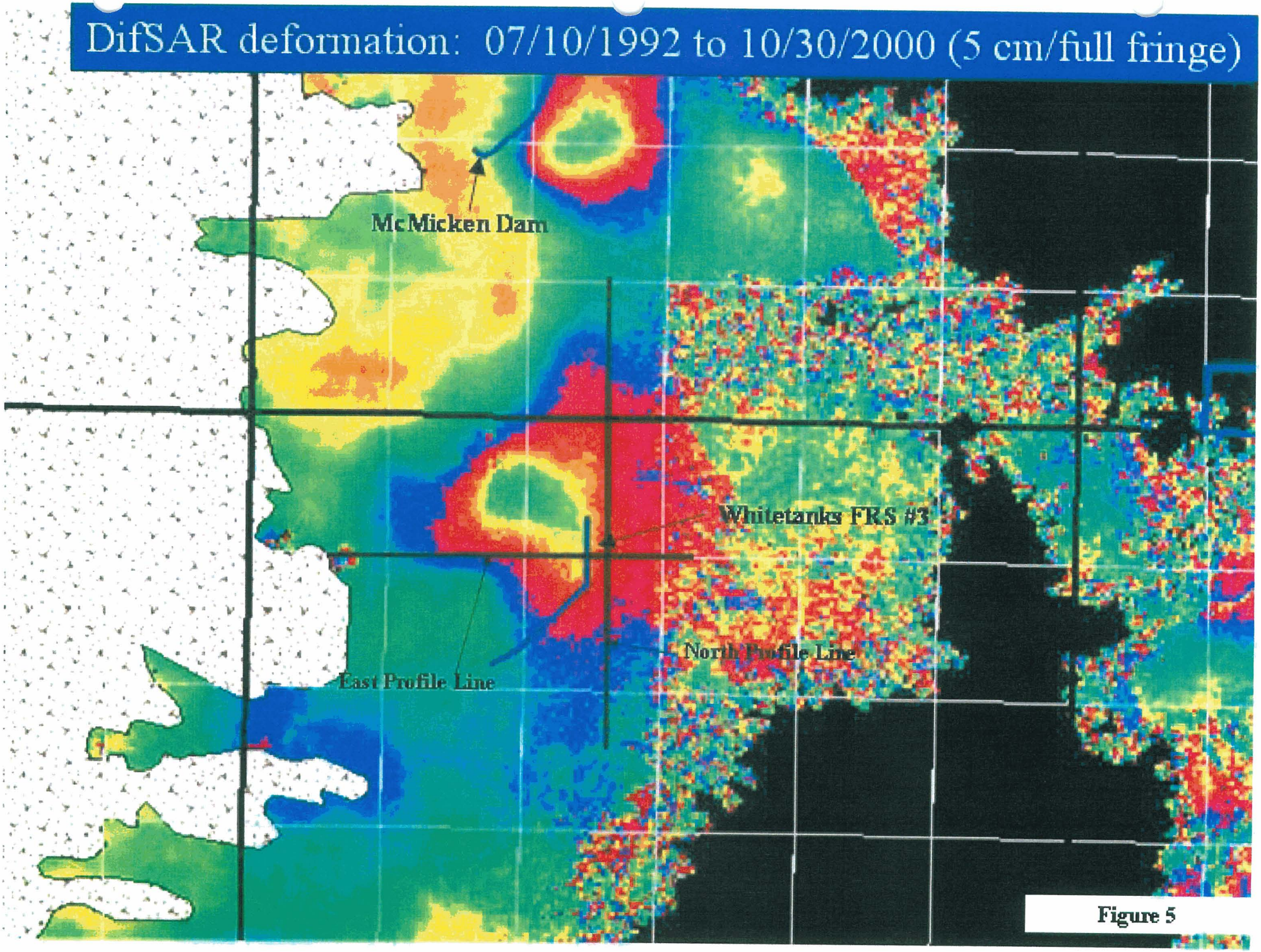
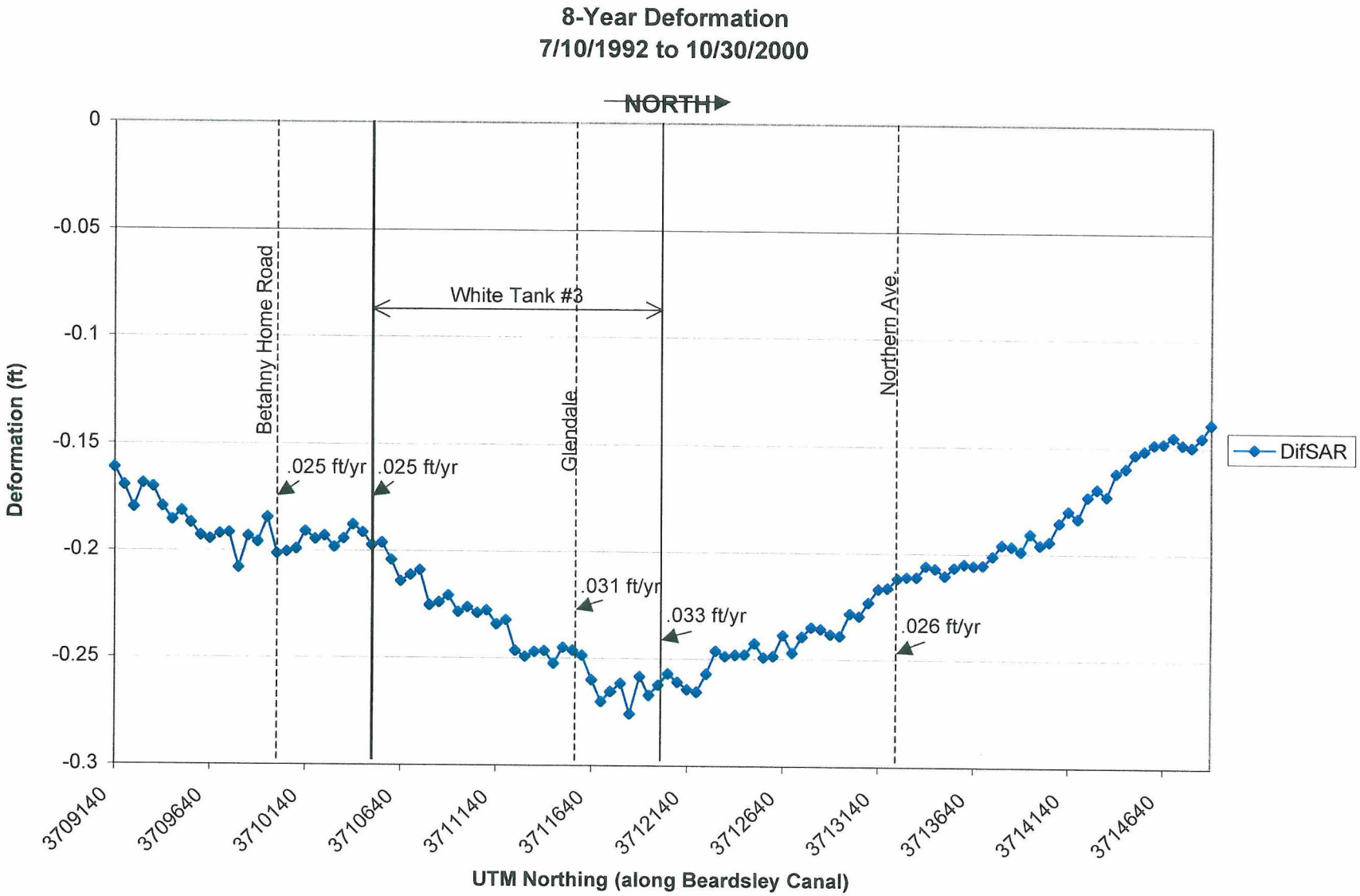

DifSAR deformation: 07/10/1992 to 10/30/2000 (5 cm/full fringe)
McMicken Dam
Whitetanks FRS #3
North Profile Line
East Profile Line

Figure 5

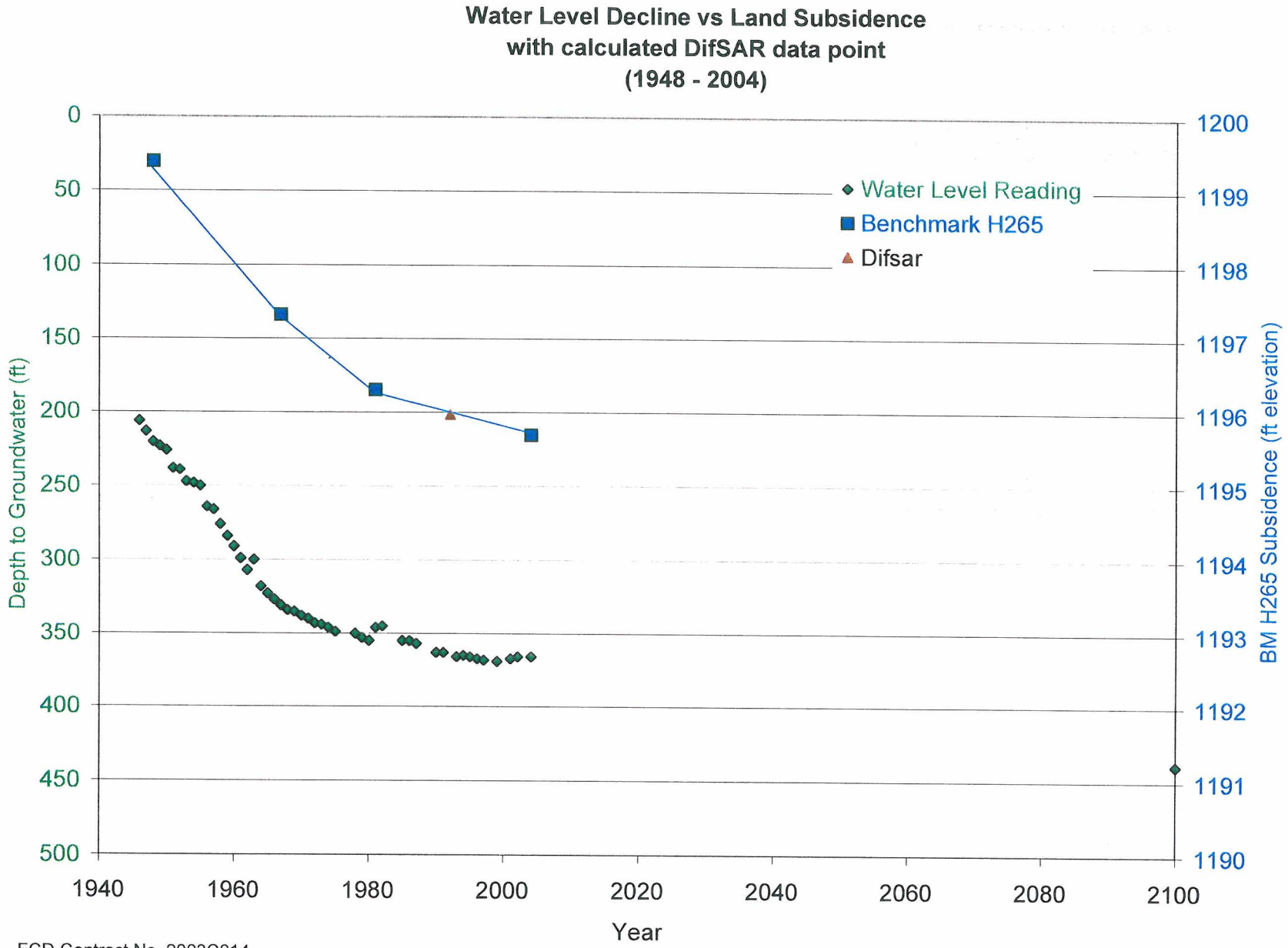



FCD Contract No. 2003C014
GCI Project No. 2003-162

42377D68-5A78-009C1A.xls

Data from ADWR, 2004.

**Figure 6**




FCD Contract No. 2003C014
GCI Project No. 2003-162

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**Figure 7**

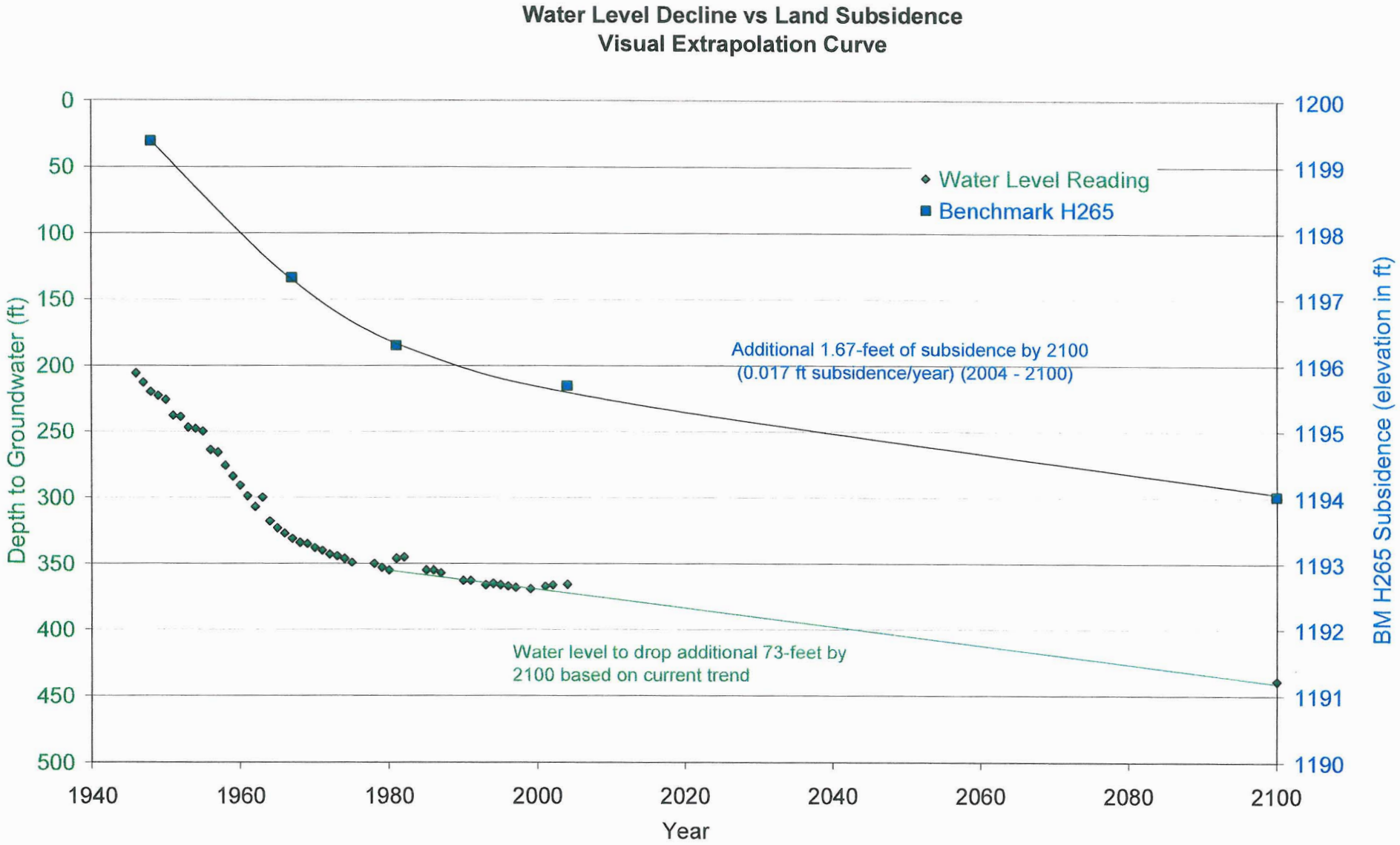
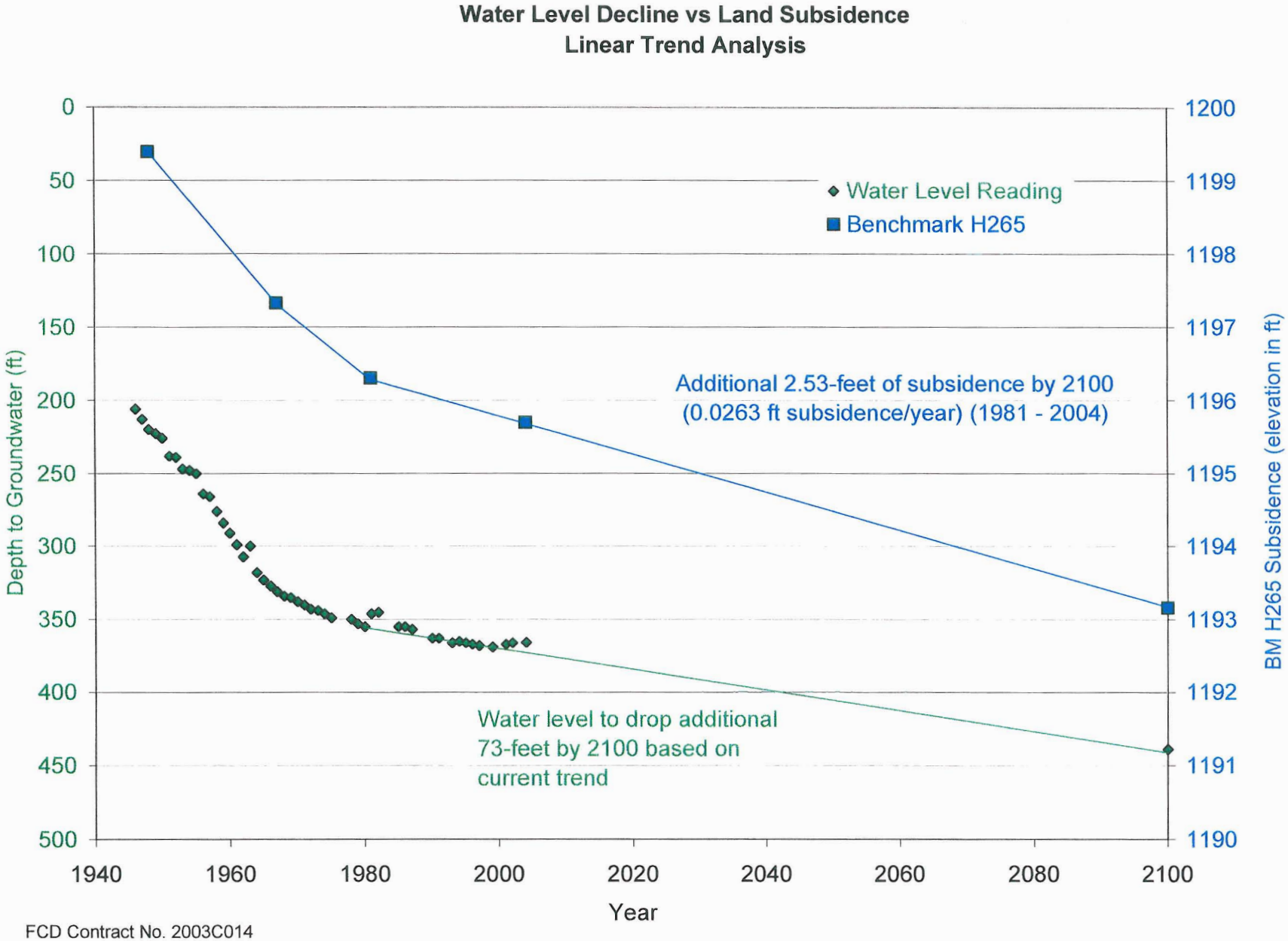

Water Level Decline vs Land Subsidence
Visual Extrapolation Curve
Depth to Groundwater (ft)
0
50
100
150
200
250
300
350
400
450
500
BM H265 Subsidence (elevation in ft)
1200
1199
1198
1197
1196
1195
1194
1193
1192
1191
1190
1940
1960
1980
2000
2020
2040
2060
2080
2100
Year
Water Level Reading
Benchmark H265
Additional 1.67-feet of subsidence by 2100
(0.017 ft subsidence/year) (2004 - 2100)
Water level to drop additional 73-feet by
2100 based on current trend

**Figure 8**




FCD Contract No. 2003C014
GCI Project No. 2003-162

42377B10-72CB-18C609.xls

**Figure 9**

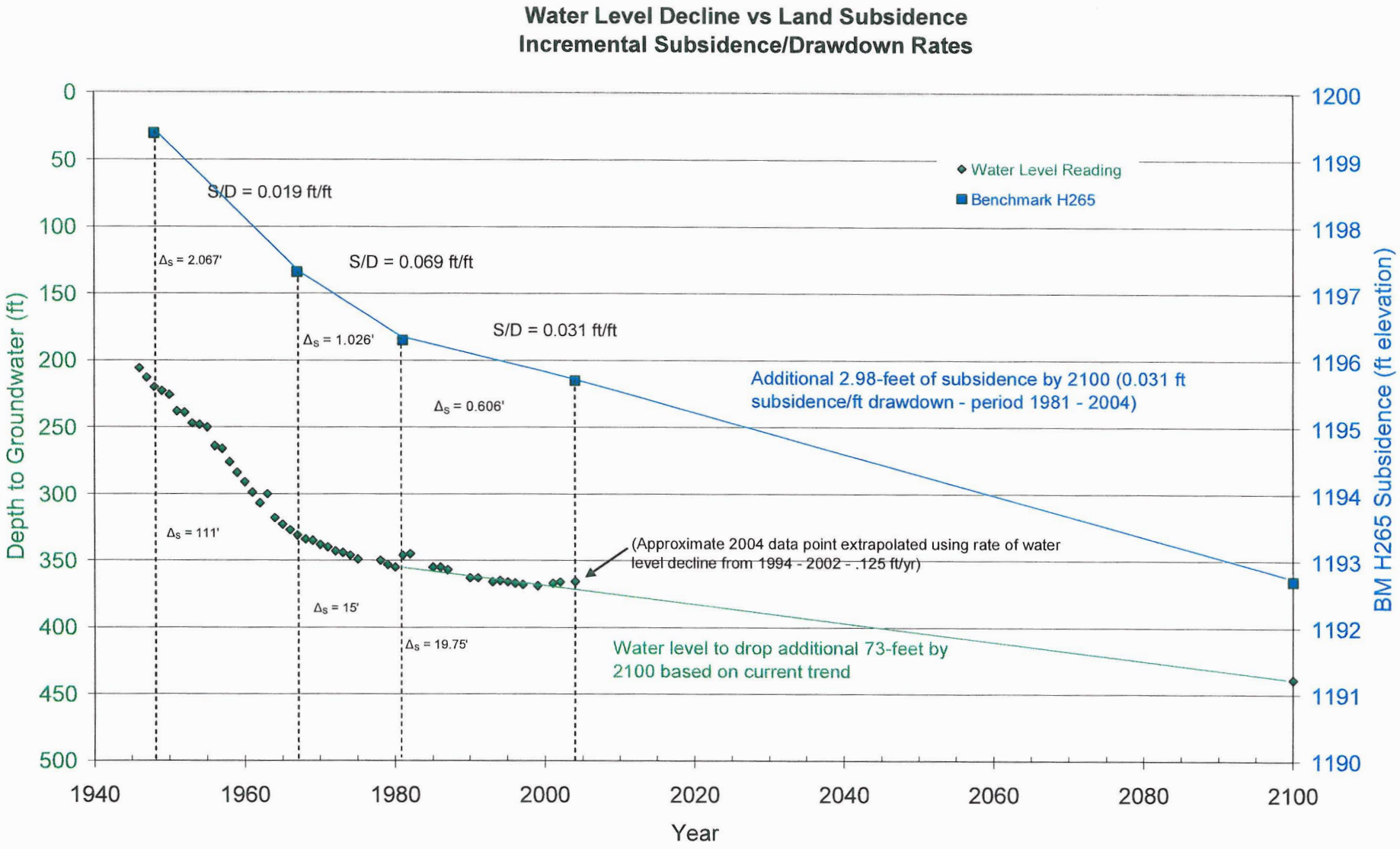
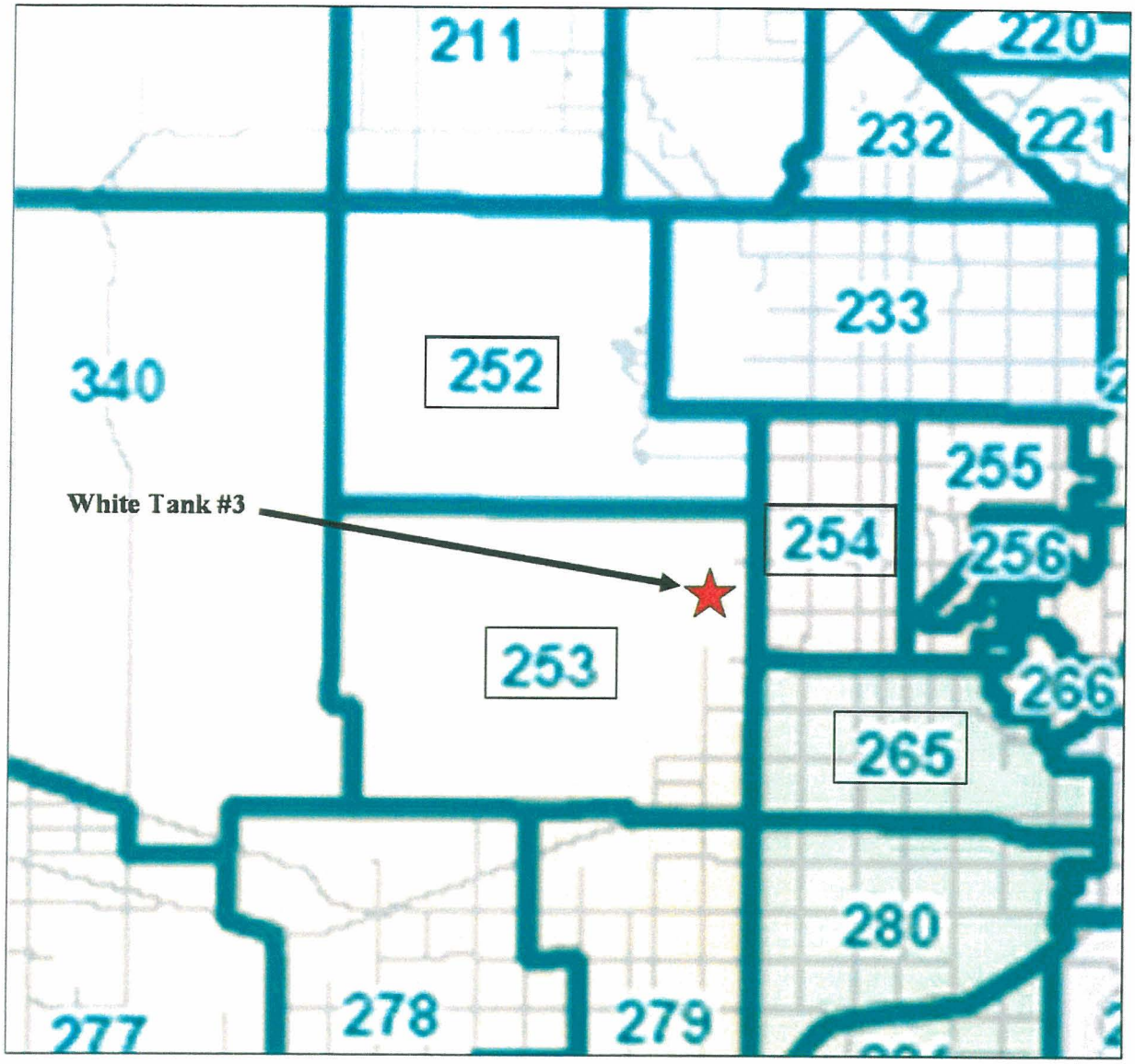

Water Level Decline vs Land Subsidence
Incremental Subsidence/Drawdown Rates
Depth to Groundwater (ft)
BM H265 Subsidence (ft elevation)
Year
Water Level Reading
Benchmark H265
S/D = 0.019 ft/ft
S/D = 0.069 ft/ft
S/D = 0.031 ft/ft
Δs = 2.067'
Δs = 1.026'
Δs = 0.606'
Δs = 111'
Δs = 15'
Δs = 19.75'
Additional 2.98-feet of subsidence by 2100 (0.031 ft subsidence/ft drawdown - period 1981 - 2004)
(Approximate 2004 data point extrapolated using rate of water level decline from 1994 - 2002 - .125 ft/yr)
Water level to drop additional 73-feet by 2100 based on current trend
0
50
100
150
200
250
300
350
400
450
500
1200
1199
1198
1197
1196
1195
1194
1193
1192
1191
1190
1940
1960
1980
2000
2020
2040
2060
2080
2100

**Figure 10**

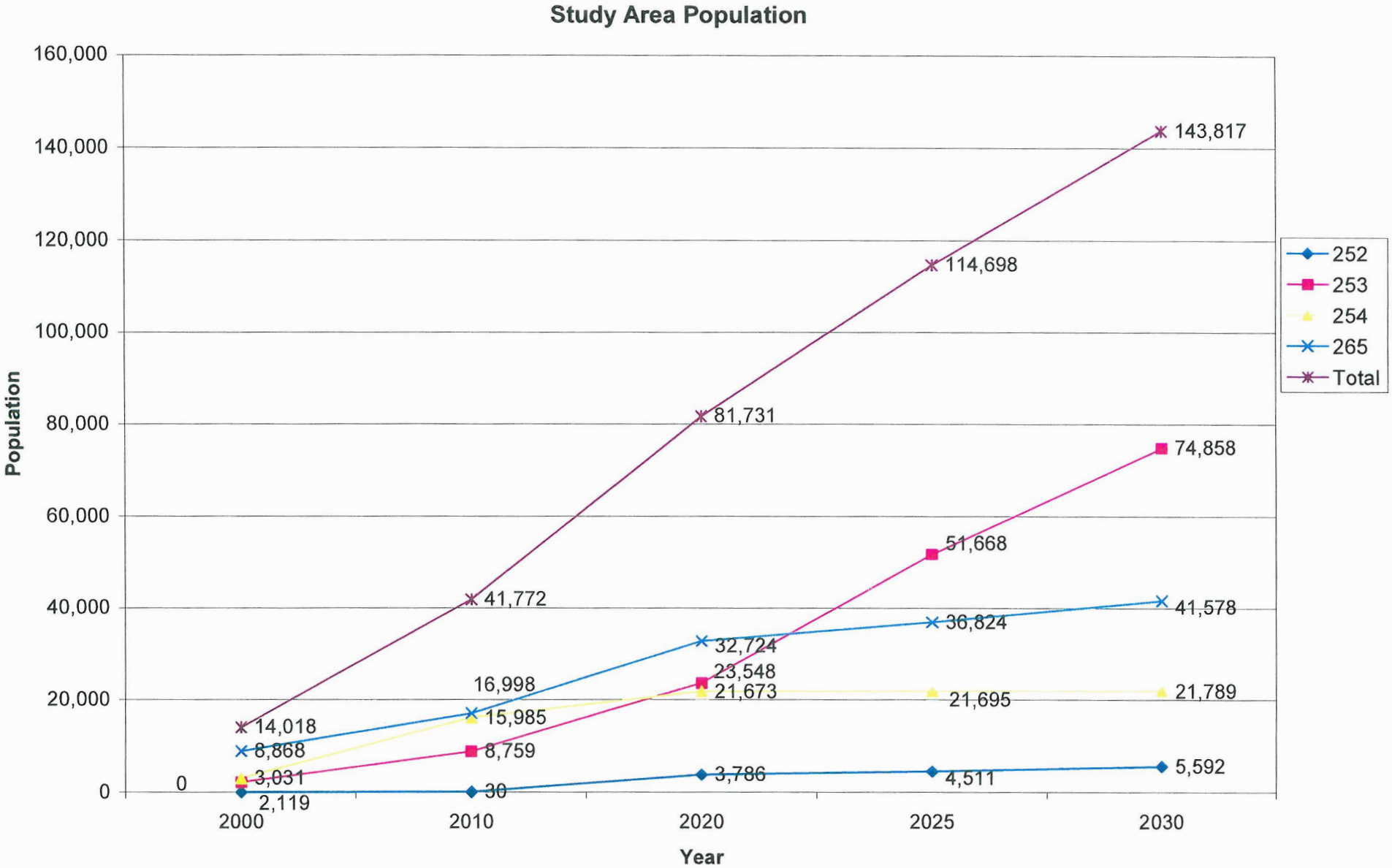



**2003 Regional Analysis Zone (RAZ) Boundaries (Maricopa County only)**

280 RAZ Boundaries
Maricopa County
Major Roads

County Areas are shown in white

**Figure 11**




Data Source: Maricopa Association of Governmants Resident Population and Housing by Regional Analysis Zone (RAZ)

**Figure 12**

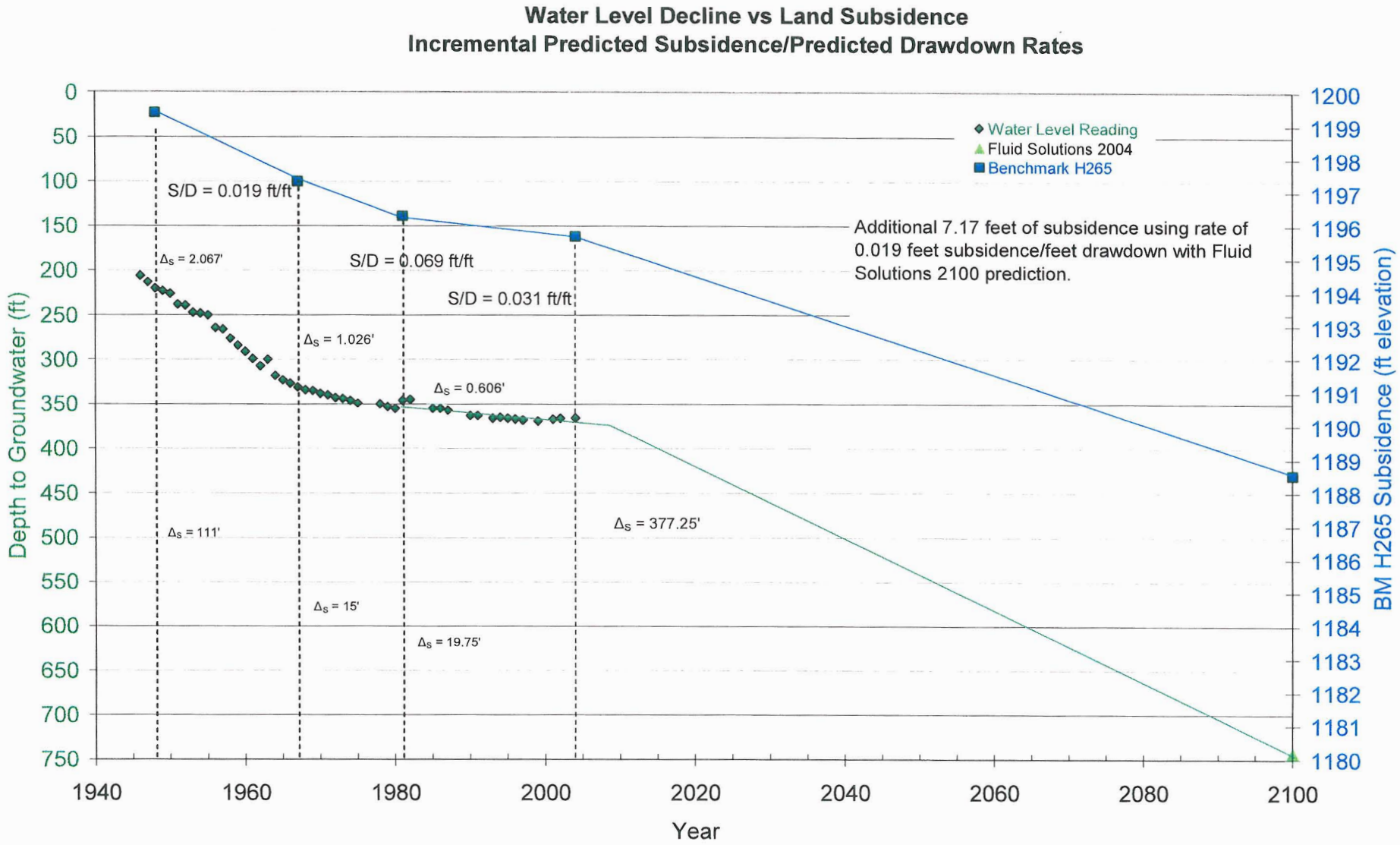

Water Level Decline vs Land Subsidence
Incremental Predicted Subsidence/Predicted Drawdown Rates
Depth to Groundwater (ft)
BM H265 Subsidence (ft elevation)
Year
Water Level Reading
Fluid Solutions 2004
Benchmark H265
S/D = 0.019 ft/ft
S/D = 0.069 ft/ft
S/D = 0.031 ft/ft
Additional 7.17 feet of subsidence using rate of 0.019 feet subsidence/feet drawdown with Fluid Solutions 2100 prediction.
Δs = 2.067'
Δs = 1.026'
Δs = 0.606'
Δs = 111'
Δs = 15'
Δs = 19.75'
Δs = 377.25'
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
1200
1199
1198
1197
1196
1195
1194
1193
1192
1191
1190
1189
1188
1187
1186
1185
1184
1183
1182
1181
1180
1940
1960
1980
2000
2020
2040
2060
2080
2100

**Figure 13**

## APPENDIX A

GWSI Well Reports and Hydrographs (ADWR, 2004)

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

| Well Site ID | Local ID | ADWR File Num 55- |
|---|---|---|
| 333019112275801 | B-02-02 21ABD | |

| Map Scale | Latitude | Longitude | Accuracy | Lat DD | Long DD | UTM East | UTM North | Altitude | Method | Alt Accuracy |
|---|---|---|---|---|---|---|---|---|---|---|
| 024000 | 33 30 19 | 112 27 58 | FIVE SECONDS | 33.505278 | 112.466111 | 363819.107 | 3708073.443 | 1135 | MAP | 10 |

| Meridian | Site Type | Reliability | Topo Setting | Source |
|---|---|---|---|---|
| GILA AND SALT RIVER | WELL | FIELD CHECKED | UNDETERMINED | UNITED STATES GEOLOGICAL SURVEY |

| Site Uses 1 | Site Uses 2 | Site Uses 3 | Hole Depth | Well Depth | Geo Unit |
|---|---|---|---|---|---|
| WITHDRAWAL | | | 1360 | 1360 | |

| Water Uses 1 | Water Uses 2 | Water Uses 3 | Quad Name | Quad |
|---|---|---|---|---|
| IRRIGATION | | | WADDELL | |

| ADWR Basin | Sub-Basin | USGS Basin | County | State | Create Date | Complete? | Updated | Complete? |
|---|---|---|---|---|---|---|---|---|
| PHOENIX AMA | WEST SALT RIVER | SALT RIVER VALLEY | MARICOPA | AZ | 3/24/1979 | | 11/14/1997 | |

**Well Completions**

| Complete? | Drill Method | Finish | Source | Driller Name |
|---|---|---|---|---|
| | H | X | D | CAMERON AND CLAYTON |

**Bore Hole**

**Casing**

| Series | Top | Bottom | Diameter | Material |
|---|---|---|---|---|
| 100 | 889 | 1147 | 12.75 | * |
| 100 | 0 | 889 | 12 | * |

**Perforation**

| Series | Top | Bottom | Diameter | Material | Type | Length | Width |
|---|---|---|---|---|---|---|---|
| 100 | 300 | 889 | 16 | | P | 3 | 0.19 |
| 100 | 889 | 1147 | 12.75 | | P | 3 | 0.19 |
| 100 | 1147 | 1360 | | | X | | |

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

***Well Site ID*** 333019112275801 ***Local ID*** B-02-02 21ABD **ADWR File Num 55-**

**Well Lift**

| Date Visited | Complete? | Lift | Power | Meter Number | Pwr Co | Hp | Account Number | Divider | Source | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/31/1963 | | T | E | | | 150 | | | | |

**Well Log**

| Log Type | Log Start | Log End | Source |
|---|---|---|---|
| D | 0 | 0 | |
| G | 0 | 1340 | S |

**Owner Site Name**

**Well Owner**

**Pumping Discharges**

| Measure Date | Complete? | Discharge Rate | Method | Source | Production Water Level | Static Water Level | Method Stat | Source Stat | Pumping Period | Specific Capacity | Well Drawdown |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/5/1963 | | 674 | P | U | | | | | | | |

**Flowing Discharges**

**Remarks**

**Site Inventories**

**Springs**

**Well Water Levels**

**Water Quality**

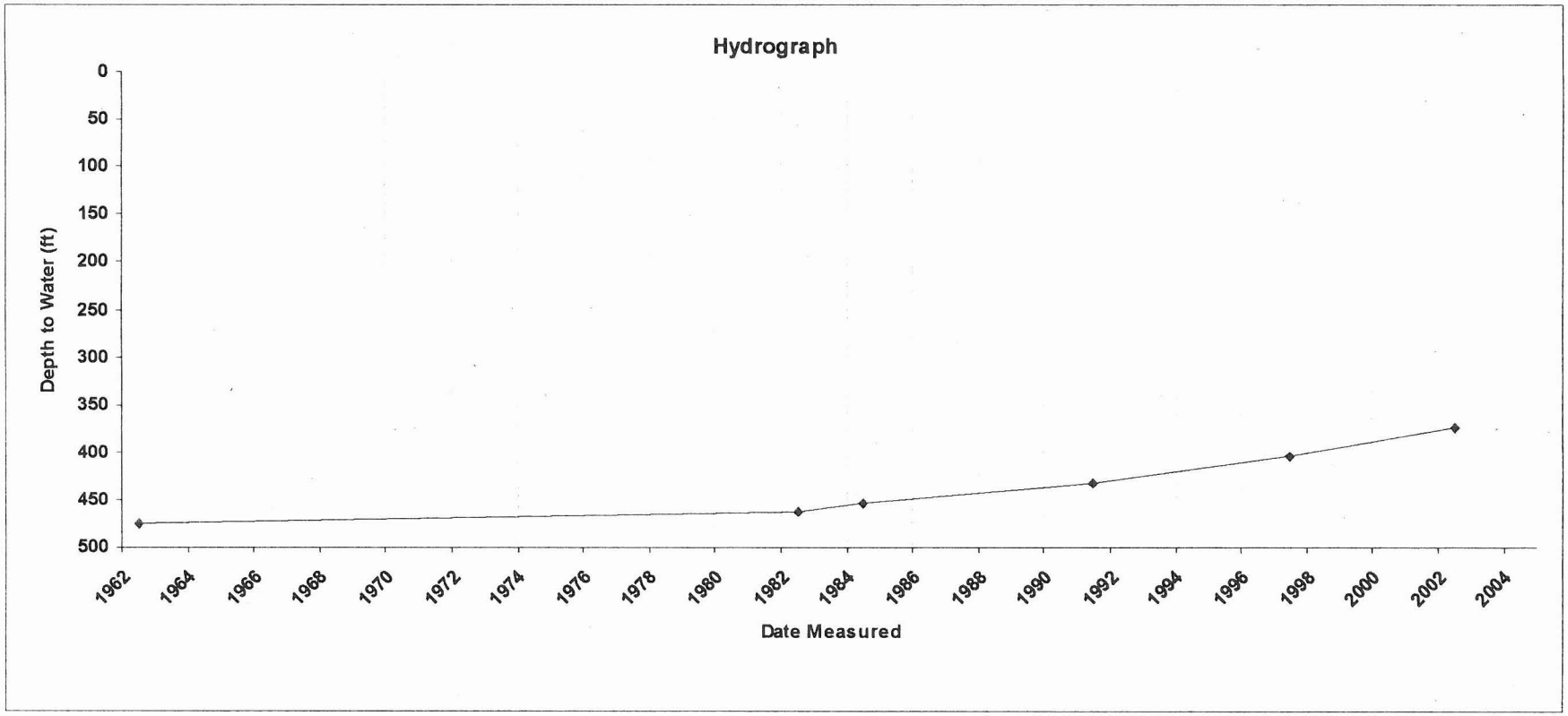
| Date Collected | Complete? | Sp Cond | Fluoride | Deg C | pH | Alk | Dis Oxy | Dis Solids |
|---|---|---|---|---|---|---|---|---|
| 7/5/1963 | | | | 35 | | | | |

**Measuring Point**

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 11BBB | 333213112263301 | 610070 | 33° 32´ 13.19´´ | 112° 26´ 34.4´´ | UNUSED | 880 | 3/19/1949 | 20 | 11/27/2002 | 372.89 | 786.11 | 6 |




GWSI is ADWR's technical database of well locations, construction data, and water levels.

*Thursday, March 04, 2004*

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

| *Well Site ID* | *Local ID* | ADWR File Num 55- |
|---|---|---|
| *333013112275501* | *B-02-02 21ACA2* | 628554 |

| Map Scale | Latitude | Longitude | Accuracy | Lat DD | Long DD | UTM East | UTM North | Altitude | Method | Alt Accuracy |
|---|---|---|---|---|---|---|---|---|---|---|
| 024000 | 33 30 13 | 112 27 55 | TWO SECONDS | 33.503611 | 112.465278 | 363893.909 | 3707887.55 | 1138 | MAP | 5 |

| Meridian | Site Type | Reliability | Topo Setting | Source |
|---|---|---|---|---|
| GILA AND SALT RIVER | WELL | FIELD CHECKED | VALLEY FLAT | ARIZONA DEPARTMENT OF WATER RESOURCES |

| Site Uses 1 | Site Uses 2 | Site Uses 3 | Hole Depth | Well Depth | Geo Unit |
|---|---|---|---|---|---|
| WITHDRAWAL | | | | | |

| Water Uses 1 | Water Uses 2 | Water Uses 3 | Quad Name | Quad |
|---|---|---|---|---|
| DOMESTIC | | | WADDELL | |

| ADWR Basin | Sub-Basin | USGS Basin | County | State | Create Date | Complete? | Updated | Complete? |
|---|---|---|---|---|---|---|---|---|
| PHOENIX AMA | WEST SALT RIVER | SALT RIVER VALLEY | MARICOPA | AZ | 12/31/1987 | | 4/11/2001 | |

**Well Completions**

**Well Lift**

| Date Visited | Complete? | Lift | Power | Meter Number | Pwr Co | Hp | Account Number | Divider | Source | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/22/1987 | | S | E | | | | | | | |

**Well Log**

**Owner Site Name**

| Other ID | Assigner |
|---|---|
| 35-61191 | ASLD |

**Well Owner**

| Date | Complete? | Last Name | First | MI |
|---|---|---|---|---|
| 1/1/1978 | M | BUTTRUM | DON | |

**Pumping Discharges**

**Flowing Discharges**

**Remarks**

| Remark Date | Complete? | Remarks |
|---|---|---|
| 12/31/1987 | | 4762 NORTH 189TH AVE |

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Friday, March 05, 2004

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

***Well Site ID*** 333013112275501 ***Local ID*** B-02-02 21ACA2 **ADWR File Num 55-** 628554

**Site Inventories**

| Inventory Date | Complete? | Inventoried by |
|---|---|---|
| 1/22/1987 | | PEREZ,MK |

**Springs**

**Well Water Levels**

**Water Quality**

**Measuring Point**

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

| *Well Site ID* | *Local ID* | ADWR File Num 55- |
|---|---|---|
| *333015112275501* | *B-02-02 21ACA1* | 624779 |

| Map Scale | Latitude | Longitude | Accuracy | Lat DD | Long DD | UTM East | UTM North | Altitude | Method | Alt Accuracy |
|---|---|---|---|---|---|---|---|---|---|---|
| 024000 | 33 30 15 | 112 27 55 | TWO SECONDS | 33.504167 | 112.465278 | 363894.779 | 3707949.15 | 1138 | MAP | 005 |

| Meridian | Site Type | Reliability | Topo Setting | Source |
|---|---|---|---|---|
| GILA AND SALT RIVER | WELL | FIELD CHECKED | VALLEY FLAT | ARIZONA DEPARTMENT OF WATER RESOURCES |

| Site Uses 1 | Site Uses 2 | Site Uses 3 | Hole Depth | Well Depth | Geo Unit |
|---|---|---|---|---|---|
| WITHDRAWAL | | | | | |

| Water Uses 1 | Water Uses 2 | Water Uses 3 | Quad Name | Quad |
|---|---|---|---|---|
| IRRIGATION | DOMESTIC | | WADDELL | |

| ADWR Basin | Sub-Basin | USGS Basin | County | State | Create Date | Complete? | Updated | Complete? |
|---|---|---|---|---|---|---|---|---|
| PHOENIX AMA | WEST SALT RIVER | SALT RIVER VALLEY | MARICOPA | AZ | 12/31/1987 | | 11/14/1997 | |

**Well Completions**

**Well Lift**

| Date Visited | Complete? | Lift | Power | Meter Number | Pwr Co | Hp | Account Number | Divider | Source | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/22/1987 | | S | E | 218278 | | | | | | |

**Well Log**

**Owner Site Name**

**Well Owner**

| Date | Complete? | Last Name | First | MI |
|---|---|---|---|---|
| 1/22/1987 | | ARIZONA | PIONEER TRUST OF | |

**Pumping Discharges**

**Flowing Discharges**

**Remarks**

| Remark Date | Complete? | Remarks |
|---|---|---|
| 12/31/1987 | | NORTH OF WELL ACA2 |
| 12/31/1987 | | FORMERLY BACA LINDA DAIRY |

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Friday, March 05, 2004

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

***Well Site ID*** 333015112275501 ***Local ID*** B-02-02 21ACA1 **ADWR File Num 55-** 624779

**Site Inventories**

| Inventory Date | Complete? | Inventoried by |
|---|---|---|
| 1/22/1987 | | PEREZ,MK |

**Springs**

**Well Water Levels**

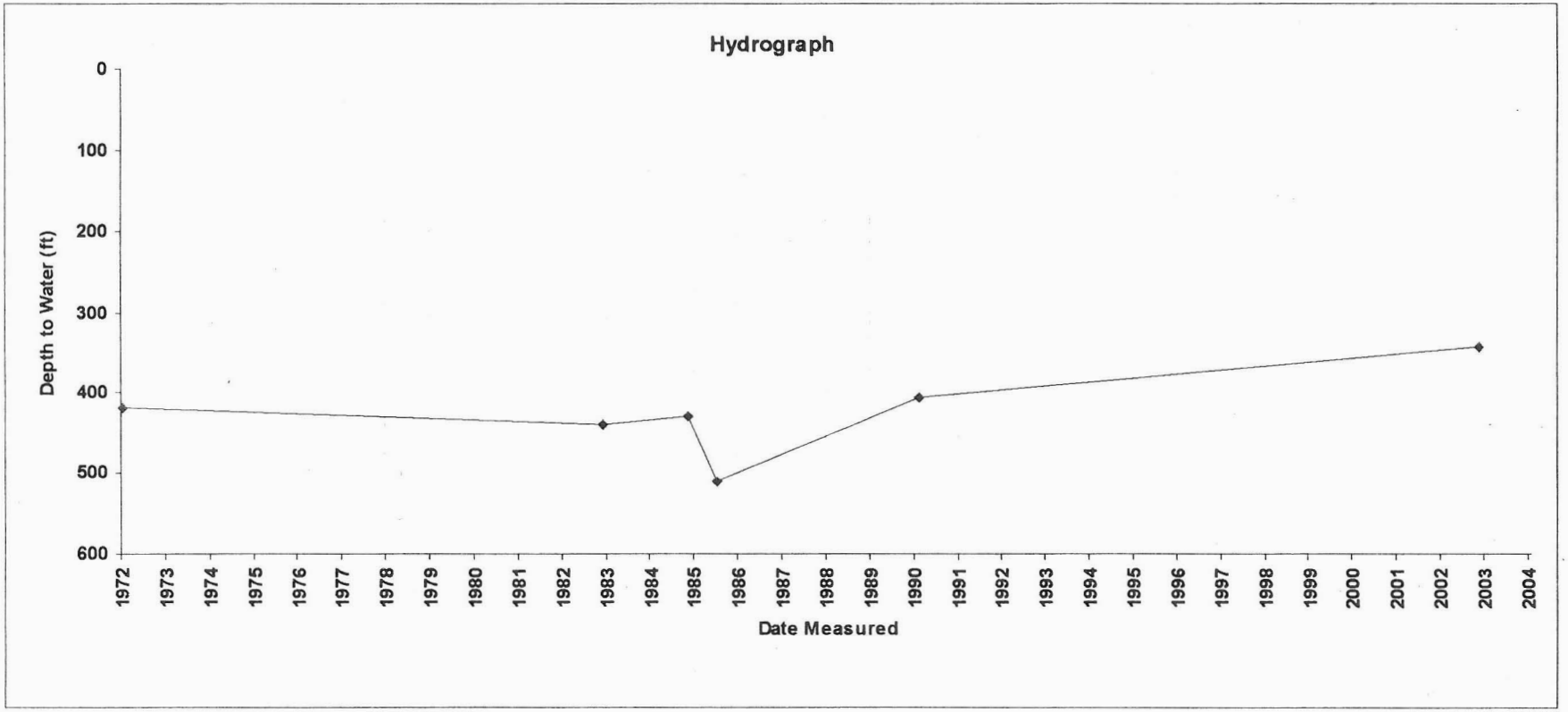
**Water Quality**

**Measuring Point**

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 15AAA | 333120112263701 | 613010 | 33° 31' 21.2" | 112° 26' 39.79" | IRRIGATION | 1000 | 7/23/1961 | 20 | 11/26/2002 | 342.70 | 789.3 | 6 |




GWSI is ADWR's technical database of well locations, construction data, and water levels.

*Thursday, March 04, 2004*

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

| ***Well Site ID*** | ***Local ID*** | **ADWR File Num 55-** |
|---|---|---|
| *333013112275101* | *B-02-02 21ADB* | 639510 |

| Map Scale | Latitude | Longitude | Accuracy | Lat DD | Long DD | UTM East | UTM North | Altitude | Method | Alt Accuracy |
|---|---|---|---|---|---|---|---|---|---|---|
| 024000 | 33 30 13 | 112 27 51 | FIVE SECONDS | 33.503611 | 112.464167 | 363997.126 | 3707886.093 | 1133 | MAP | 5. |

| Meridian | Site Type | Reliability | Topo Setting | Source |
|---|---|---|---|---|
| GILA AND SALT RIVER | WELL | FIELD CHECKED | UNDETERMINED | UNITED STATES GEOLOGICAL SURVEY |

| Site Uses 1 | Site Uses 2 | Site Uses 3 | Hole Depth | Well Depth | Geo Unit |
|---|---|---|---|---|---|
| WITHDRAWAL | | | 527 | 527 | |

| Water Uses 1 | Water Uses 2 | Water Uses 3 | Quad Name | Quad |
|---|---|---|---|---|
| DOMESTIC | | | WADDELL | |

| ADWR Basin | Sub-Basin | USGS Basin | County | State | Create Date | Complete? | Updated | Complete? |
|---|---|---|---|---|---|---|---|---|
| PHOENIX AMA | WEST SALT RIVER | SALT RIVER VALLEY | MARICOPA | AZ | 5/11/1977 | | 4/11/2001 | |

**Well Completions**

| Complete? | Drill Method | Finish | Source | Driller Name |
|---|---|---|---|---|
| | C | X | D | ARIZ WELL DRILLING |

**Bore Hole**

**Casing**

| Series | Top | Bottom | Diameter | Material |
|---|---|---|---|---|
| 100 | 0 | 503 | 8 | S |

**Perforation**

| Series | Top | Bottom | Diameter | Material | Type | Length | Width |
|---|---|---|---|---|---|---|---|
| 100 | 503 | 527 | | | X | | |

**Well Lift**

**Well Log**

| Log Type | Log Start | Log End | Source |
|---|---|---|---|
| D | 0 | 527 | D |

**Owner Site Name**

| Other ID | Assigner |
|---|---|
| 35-24873 | ASLD |

**Well Owner**

| Date | Complete? | Last Name | First | MI |
|---|---|---|---|---|
| 6/14/1982 | | RIFKOHL | D | |

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Friday, March 05, 2004

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

| ***Well Site ID*** | *333013112275101* | ***Local ID*** | *B-02-02 21ADB* | **ADWR File Num 55-** | 639510 |
|---|---|---|---|---|---|

**Pumping Discharges**

**Flowing Discharges**

**Remarks**

**Springs**

**Site Inventories**

| Inventory Date | Complete? | Inventoried by |
|---|---|---|
| 11/29/1973 | | DENIS E |

**Well Water Levels**

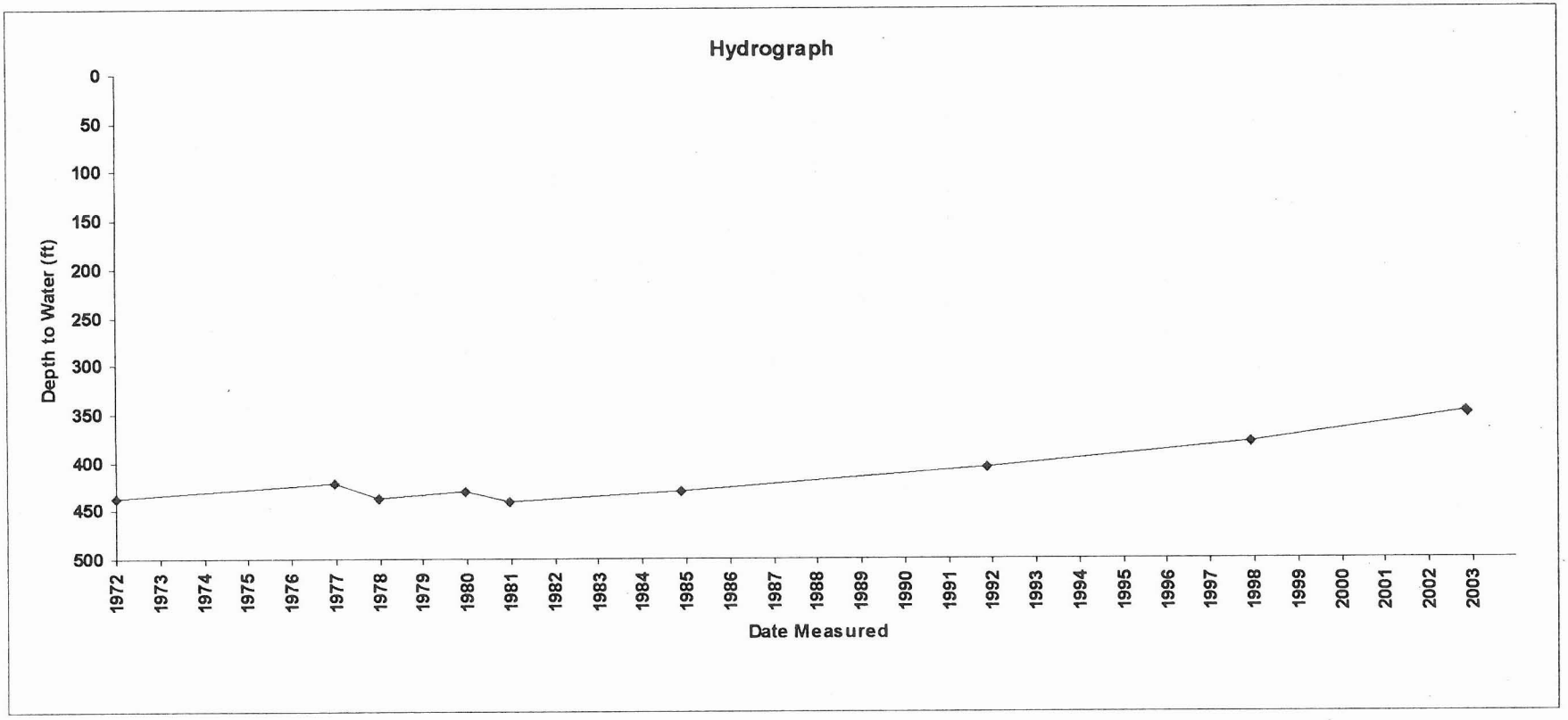
**Water Quality**

**Measuring Point**

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 10DCC | 333123112270501 | 613009 | 33° 31´ 22.39´´ | 112° 27´ 9.3´´ | UNUSED | 1000 | 9/1/1959 | 20 | 11/26/2002 | 349.79 | 795.21 | 10 |



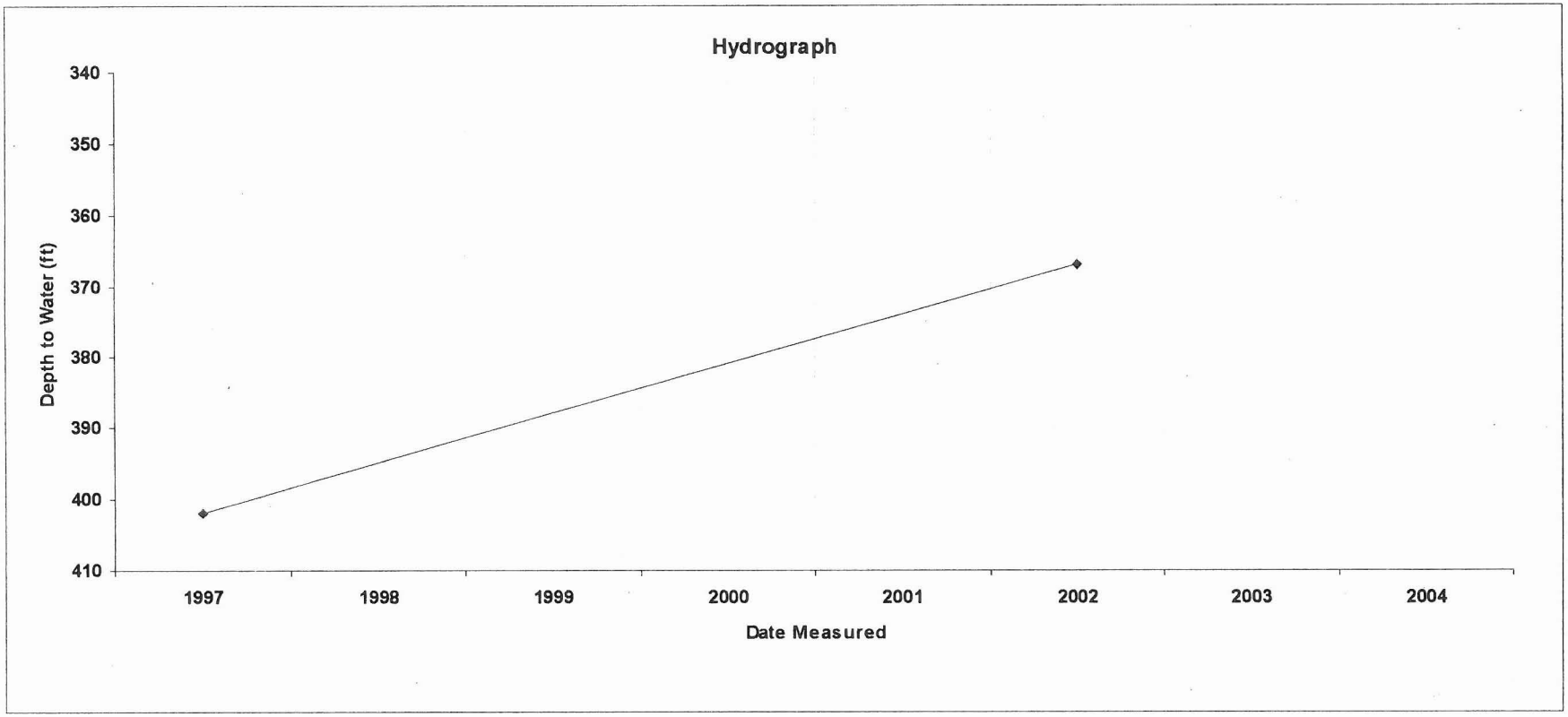

GWSI is ADWR's technical database of well locations, construction data, and water levels.

*Thursday, March 04, 2004*

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 16ABB | 333118112283701 | 562643 | 33° 31´ 18.39´´ | 112° 28´ 8.1´´ | UNUSED | 0 | | 10 | 11/26/2002 | 366.80 | 805.2 | 2 |

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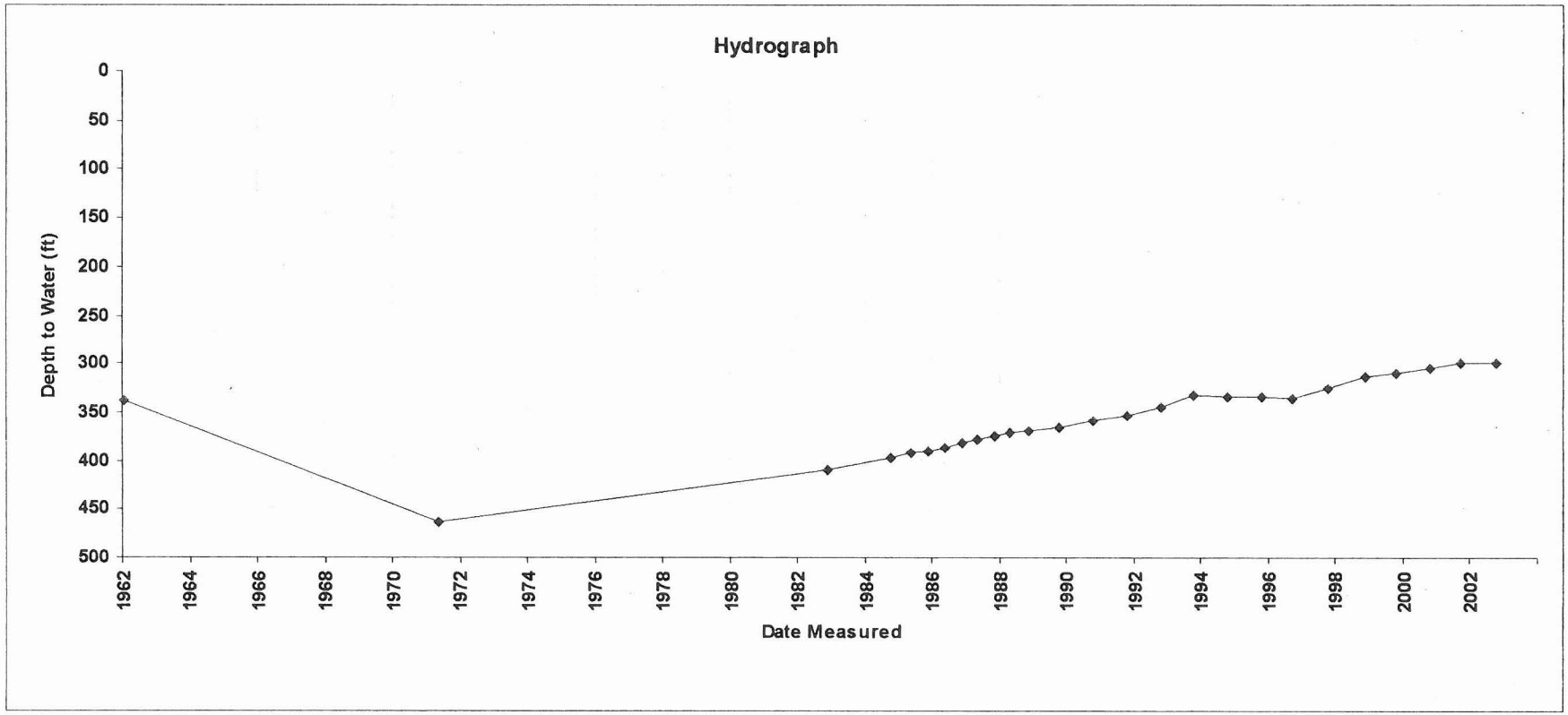
*Thursday, March 04, 2004*

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 22ABB | 333028112270701 | 612055 | 33° 30' 28.79'' | 112° 27' 9.69'' | UNUSED | 1340 | 5/22/1951 | 20 | 11/20/2002 | 299.29 | 819.71 | 26 |




GWSI is ADWR's technical database of well locations, construction data, and water levels.

*Thursday, March 04, 2004*

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

| ***Well Site ID*** | ***Local ID*** | **ADWR File Num 55-** |
|---|---|---|
| *333028112280701* | *B-02-02 21ABB* | 613011 |

| Map Scale | Latitude | Longitude | Accuracy | Lat DD | Long DD | UTM East | UTM North | Altitude | Method | Alt Accuracy |
|---|---|---|---|---|---|---|---|---|---|---|
| 24000 | 33 30 28.89 | 112 28 11.19 | FIVE SECONDS | 33.508025 | 112.469775 | 363488.019 | 3708386.189 | 1149 | MAP | 005 |

| Meridian | Site Type | Reliability | Topo Setting | Source |
|---|---|---|---|---|
| GILA AND SALT RIVER | WELL | FIELD CHECKED | VALLEY FLAT | UNITED STATES GEOLOGICAL SURVEY |

| Site Uses 1 | Site Uses 2 | Site Uses 3 | Hole Depth | Well Depth | Geo Unit |
|---|---|---|---|---|---|
| WITHDRAWAL | | | 988 | 988 | |

| Water Uses 1 | Water Uses 2 | Water Uses 3 | Quad Name | Quad |
|---|---|---|---|---|
| IRRIGATION | | | WADDELL | |

| ADWR Basin | Sub-Basin | USGS Basin | County | State | Create Date | Complete? | Updated | Complete? |
|---|---|---|---|---|---|---|---|---|
| PHOENIX AMA | WEST SALT RIVER | SALT RIVER VALLEY | MARICOPA | AZ | 12:00:00 AM | | 12/10/2002 | |

**Well Completions**

| Complete? | Drill Method | Finish | Source | Driller Name |
|---|---|---|---|---|
| D | | P | D | ROSCOE-MOSS |

**Bore Hole**

**Casing**

| Series | Top | Bottom | Diameter | Material |
|---|---|---|---|---|
| 200 | 504 | 988 | 16 | S |
| 100 | 0 | 504 | 20 | S |

**Perforation**

| Series | Top | Bottom | Diameter | Material | Type | Length | Width |
|---|---|---|---|---|---|---|---|
| 100 | 178 | 488 | 20 | S | P | | |
| 200 | 512 | 988 | 16 | S | P | | |

GWSI is ADWR's technical database of well locations, construction data, and water levels.

Friday, March 05, 2004

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

**Well Site ID** 333028112280701 **Local ID** B-02-02 21ABB **ADWR File Num 55-** 613011

| Complete? | Drill Method | Finish | Source | Driller Name |
|---|---|---|---|---|
| D | | P | D | WS WILLIAMS |

**Bore Hole**

**Casing**

| Series | Top | Bottom | Diameter | Material |
|---|---|---|---|---|
| 200 | 504 | 988 | 16 | S |
| 100 | 0 | 504 | 20 | S |

**Perforation**

| Series | Top | Bottom | Diameter | Material | Type | Length | Width |
|---|---|---|---|---|---|---|---|
| 100 | 178 | 488 | 20 | S | P | | |
| 200 | 512 | 988 | 16 | S | P | | |

**Well Lift**

| Date Visited | Complete? | Lift | Power | Meter Number | Pwr Co | Hp | Account Number | Divider | Source | Method |
|---|---|---|---|---|---|---|---|---|---|---|
| 10/26/1982 | | S | E | 371895 | | | | | | |
| 4/18/1985 | | S | E | 371895 | APS | 150 | | 1111 | A | A |

**Well Log**

| Log Type | Log Start | Log End | Source |
|---|---|---|---|
| D | 0 | 988 | D |

**Owner Site Name**

| Other ID | Assigner |
|---|---|
| NO. 13-21 | MWD |

**Well Owner**

| Date | Complete? | Last Name | First | MI |
|---|---|---|---|---|
| 1/1/1939 | D | MWD | | |

**Pumping Discharges**

| Measure Date | Complete? | Discharge Rate | Method | Source | Production Water Level | Static Water Level | Method Stat | Source Stat | Pumping Period | Specific Capacity | Well Drawdown |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1153 | | | 246 | 165 | R | R | | 14.2 | 81 |
| 4/18/1985 | | 600 | P | A | | | | | | | |

**Flowing Discharges**

**Remarks**

| Remark Date | Complete? | Remarks |
|---|---|---|
| 10/2/1976 | | D02 504/988,1954 WL165.0 01/17/1939 |

**Site Inventories**

| Inventory Date | Complete? | Inventoried by |
|---|---|---|
| 4/30/1962 | | HILL AC |

**Springs**

GWSI is ADWR's technical database of well locations, construction data, and water levels.

Friday, March 05, 2004

# *Groundwater Site Inventory Well Report* — *AZ Dept of Water Resources*

| ***Well Site ID*** | *333028112280701* | ***Local ID*** | *B-02-02 21ABB* | **ADWR File Num 55-** | 613011 |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| 10/26/1982 | | REETER RW |

**Well Water Levels**

| Measurement Date | Complete? | Depth to Water | Water Level Elevation | Method | Remark | Source |
|---|---|---|---|---|---|---|
| 11/30/1982 | | 498 | 651 | V | | A |
| 11/28/1984 | | 433.6 | 715 | V | | A |
| 11/21/1991 | | 385.1 | 764 | V | | A |
| 12/9/1997 | | 414.9 | 734 | V | | A |
| 11/26/2002 | | 433.29 | 715.71 | V | P | A |

**Water Quality**

| Date Collected | Complete? | Sp Cond | Fluoride | Deg C | pH | Alk | Dis Oxy | Dis Solids |
|---|---|---|---|---|---|---|---|---|
| 10/26/1982 | | 360 | 1.3 | 32.5 | | | | |
| 7/10/1984 | | 373 | 1.5 | | | | | |
| 4/18/1985 | | 359 | 1.2 | 33 | | | | |

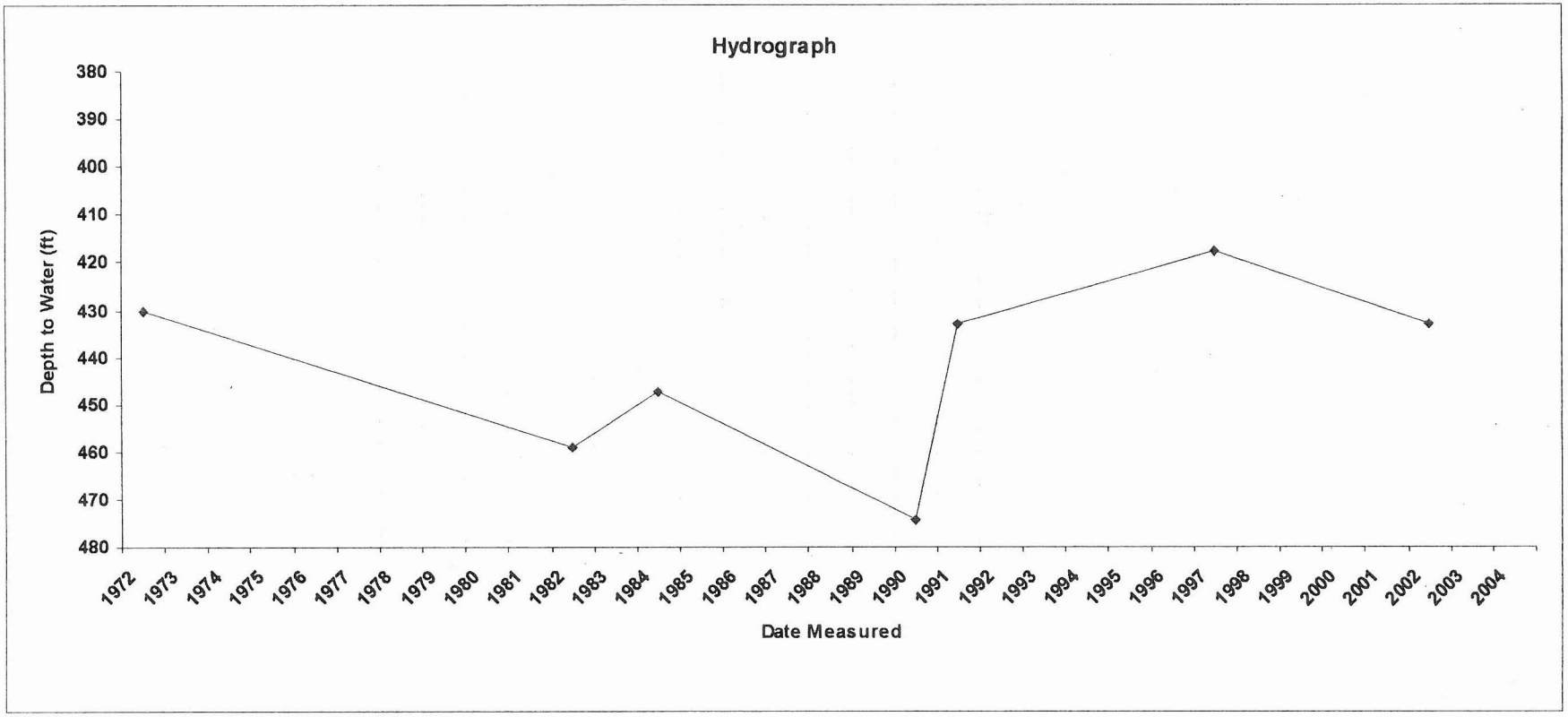
**Measuring Point**

| Date Established | Complete? | Measure Point Height | Description |
|---|---|---|---|
| 11/30/1982 | | 0 | HISP |

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 05AAB | 333303112285301 | 614414 | 33° 33´ 3´´ | 112° 28´ 53.59´´ | DOMESTIC | 747 | 3/24/1960 | 12 | 11/21/2002 | 432.89 | 827.11 | 7 |

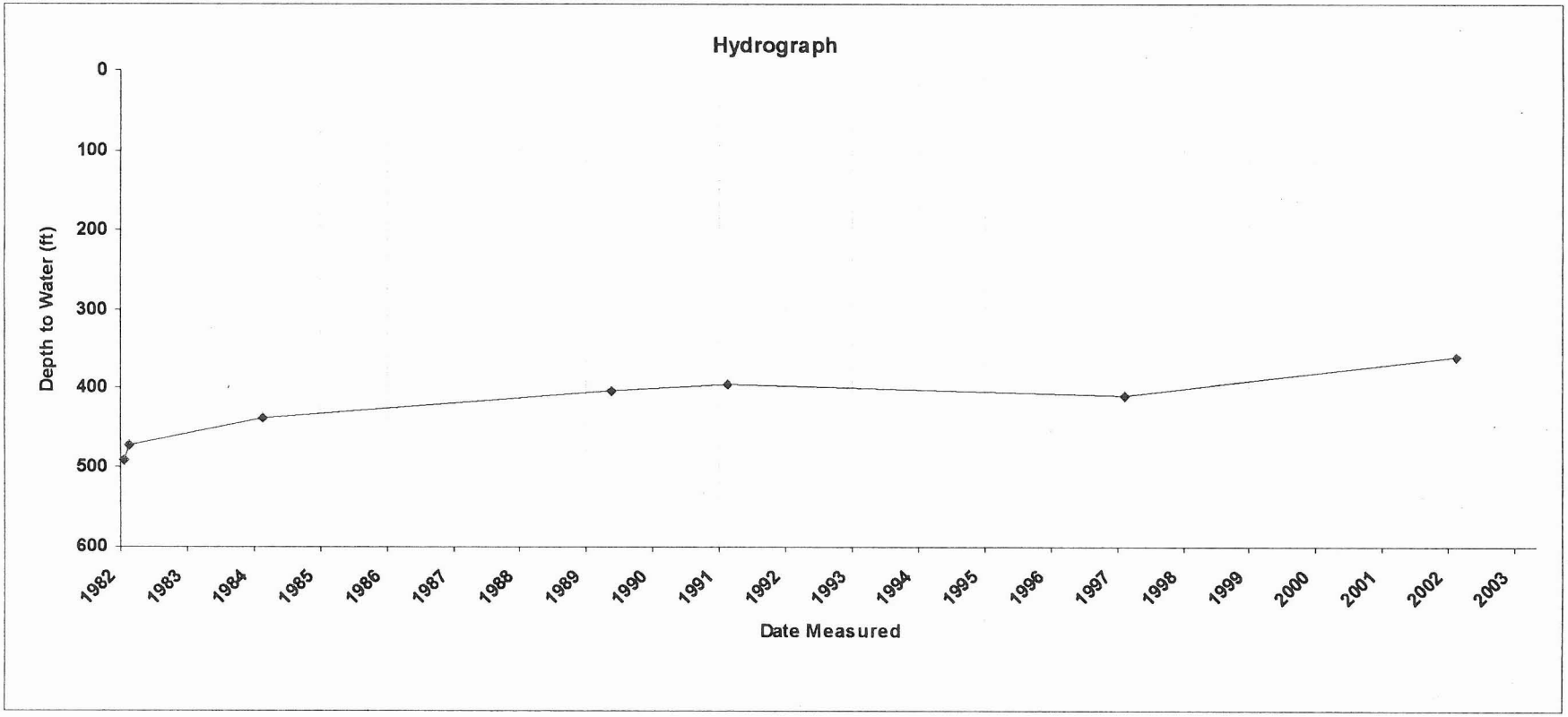



GWSI is ADWR's technical database of well locations, construction data, and water levels.

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 17DDD | 333031112284301 | | 33° 30´ 34´´ | 112° 28´ 44.7´´ | UNUSED | 966 | 5/1/1967 | 8 | 11/20/2002 | 360.10 | 829.9 | 7 |



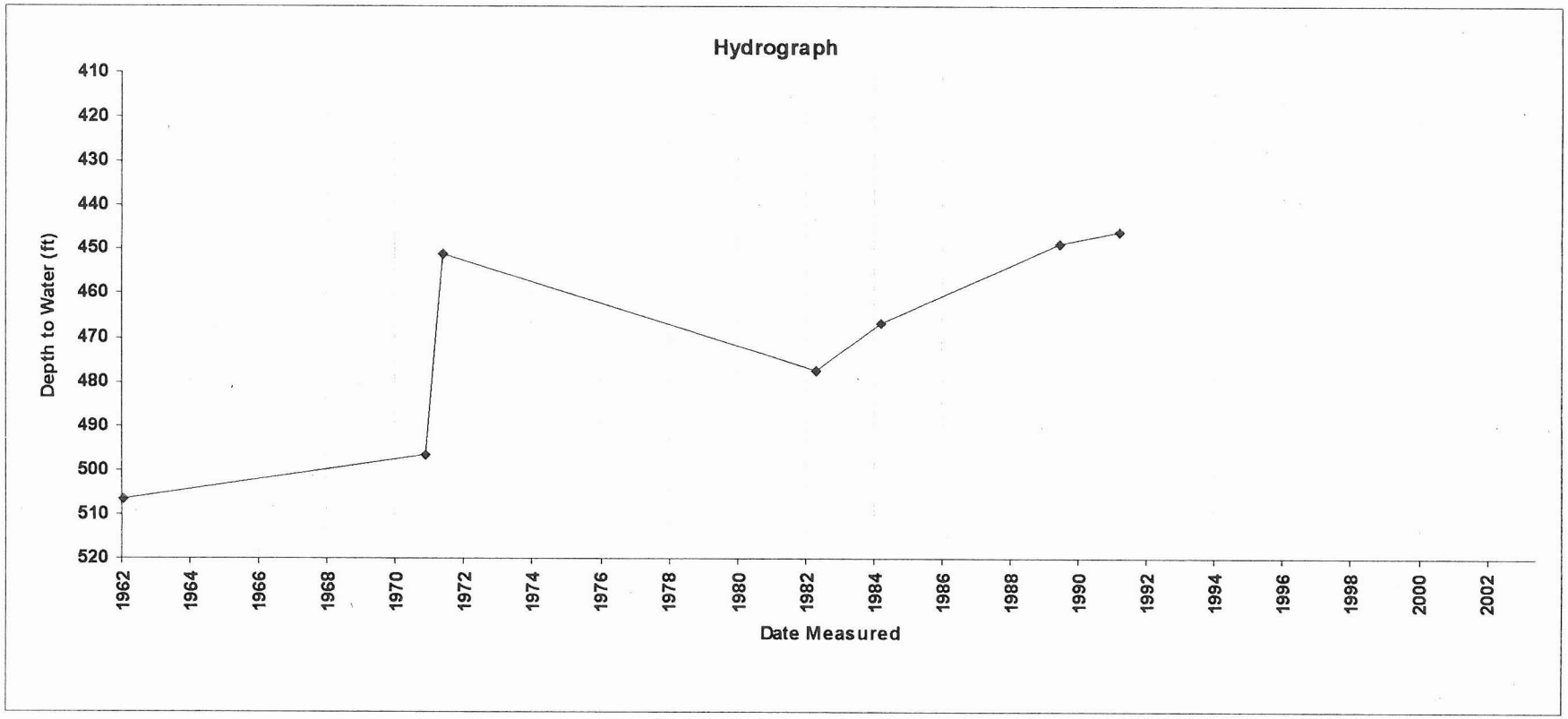

GWSI is ADWR's technical database of well locations, construction data, and water levels.

*Thursday, March 04, 2004*

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 03BAA | 333304112270701 | 601215 | 33° 33' 4'' | 112° 27' 7'' | UNUSED | 1204 | 1/1/1948 | 20 | 11/21/1991 | 446.20 | 761 | 7 |



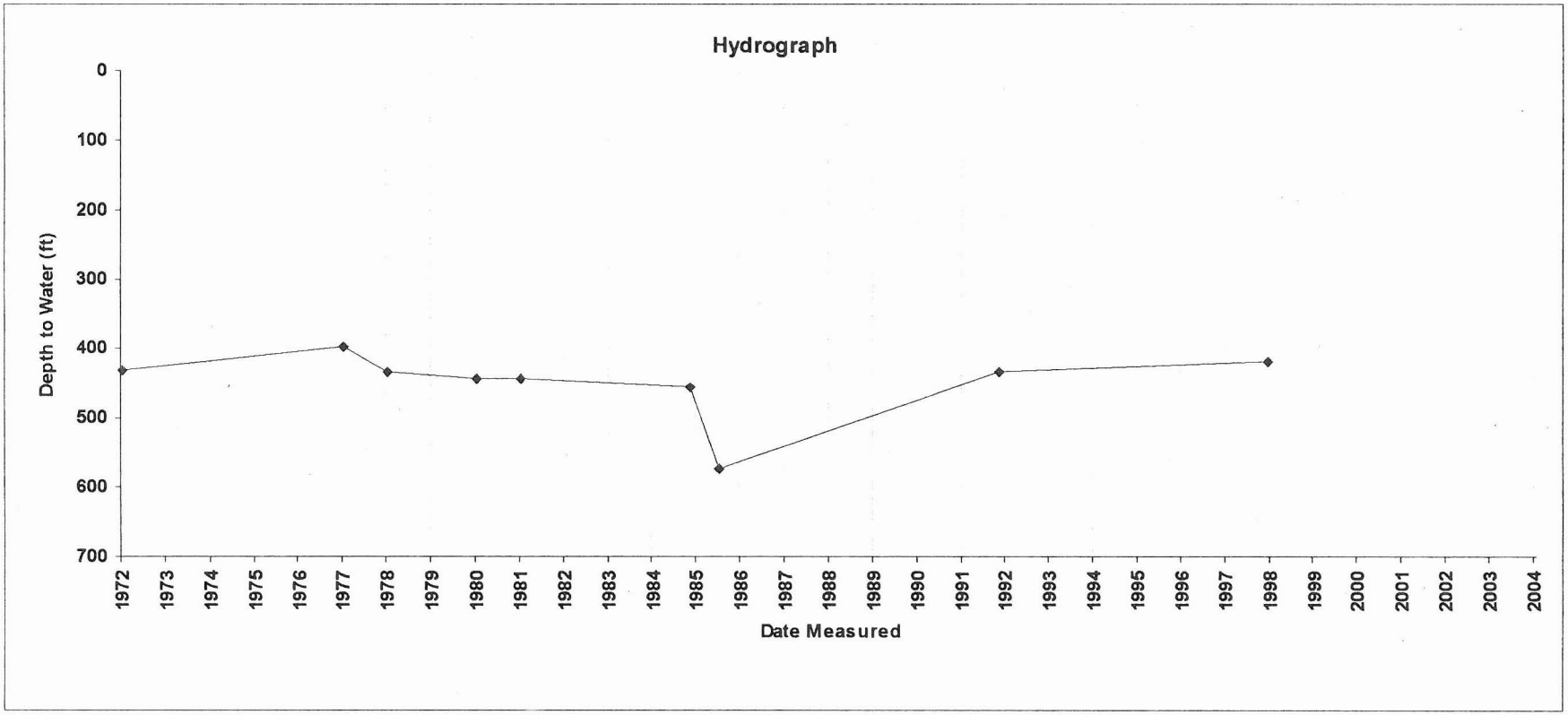

GWSI is ADWR's technical database of well locations, construction data, and water levels.

*Thursday, March 04, 2004*

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 10BAA | 333212112270901 | 613007 | 33° 32′ 12″ | 112° 27′ 9″ | IRRIGATION | 995 | 10/1/1958 | 20 | 12/1/1997 | 420.40 | 750 | 9 |



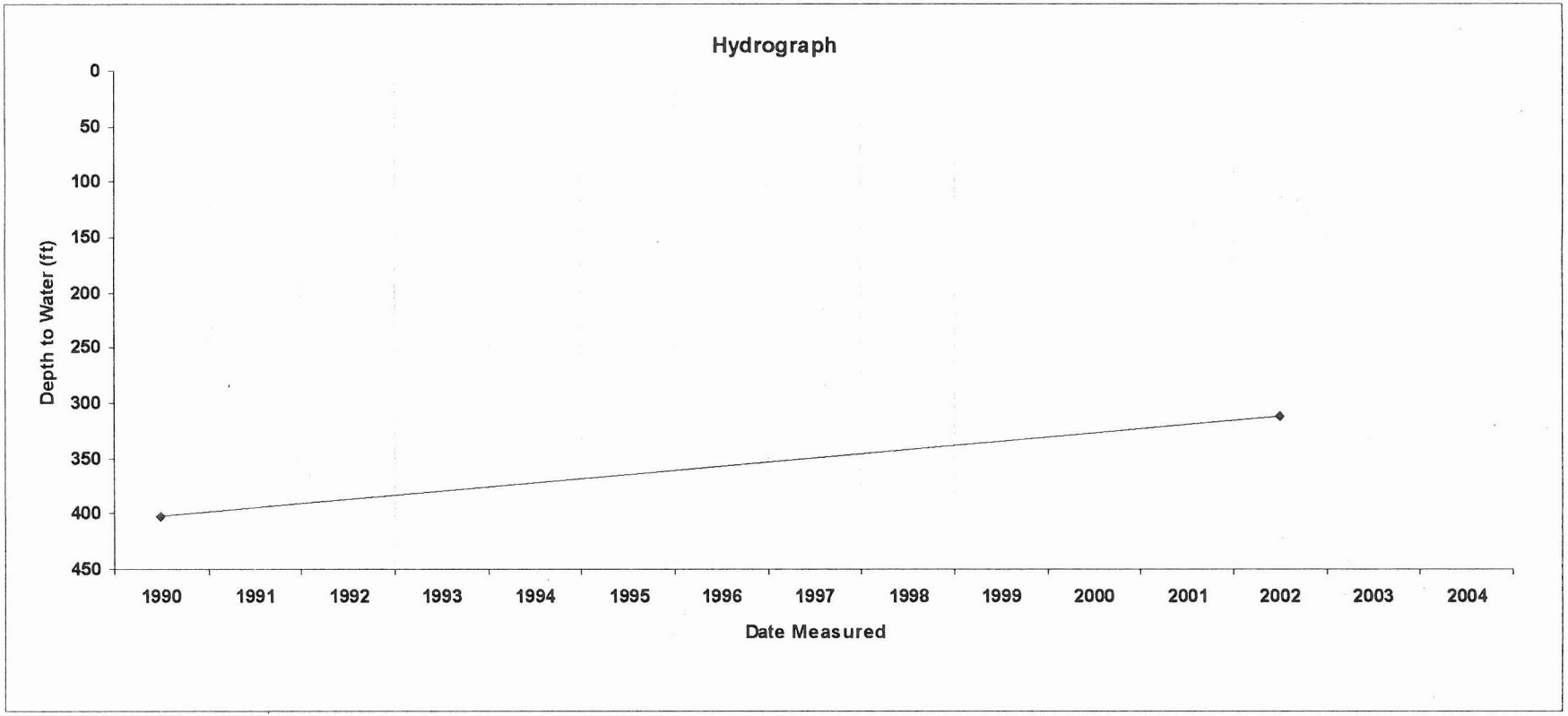

GWSI is ADWR's technical database of well locations, construction data, and water levels.

*Thursday, March 04, 2004*

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 21BDD | 333006112281101 | 617618 | 33° 30' 6" | 112° 28' 11" | INDUSTRIAL | | | | 11/20/2002 | 311.70 | 833.3 | 2 |



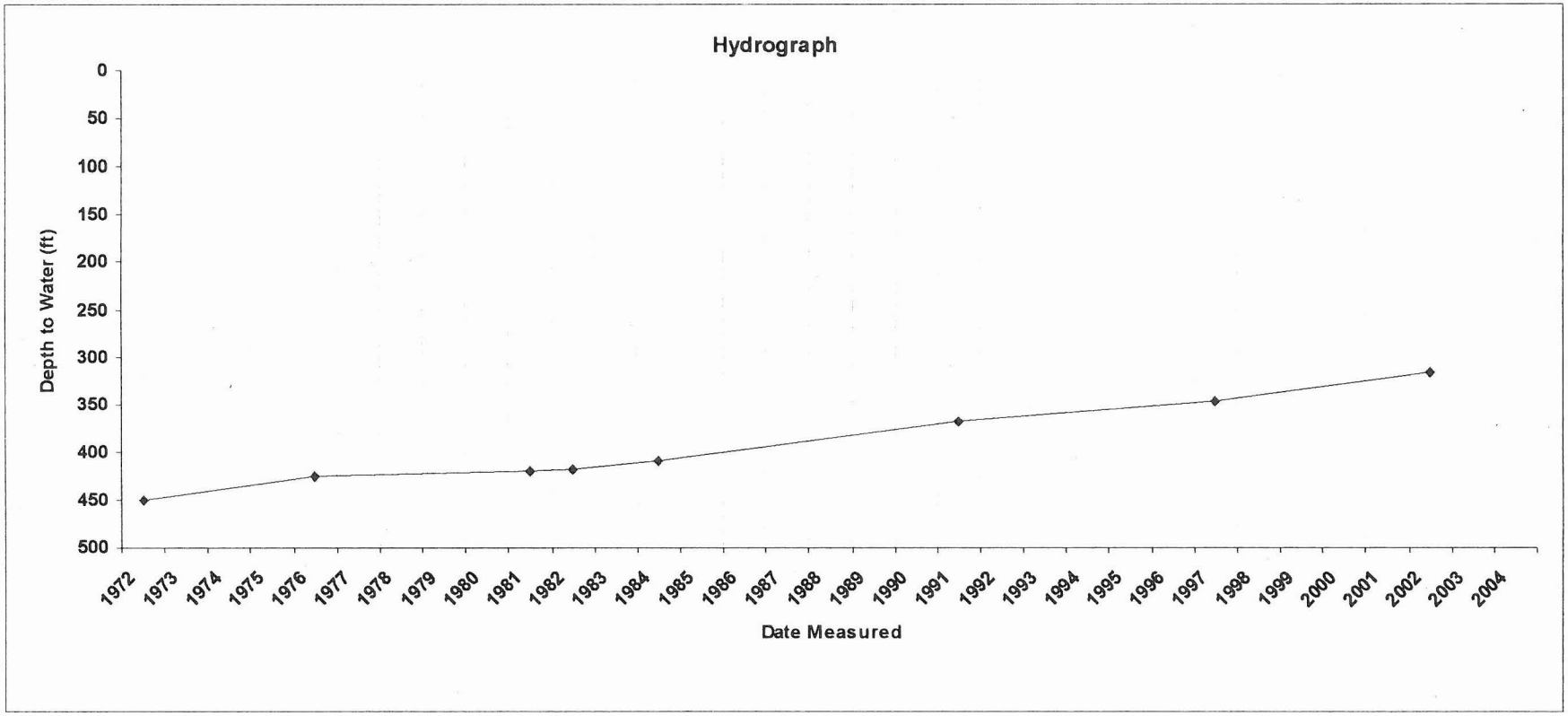

GWSI is ADWR's technical database of well locations, construction data, and water levels.

*Thursday, March 04, 2004*

# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 22BBB | 333028112273701 | 612054 | 33° 30' 28.7'' | 112° 27' 40.4'' | IRRIGATION | 1194 | 5/1/1951 | 20 | 11/20/2002 | 316.79 | 815.21 | 8 |

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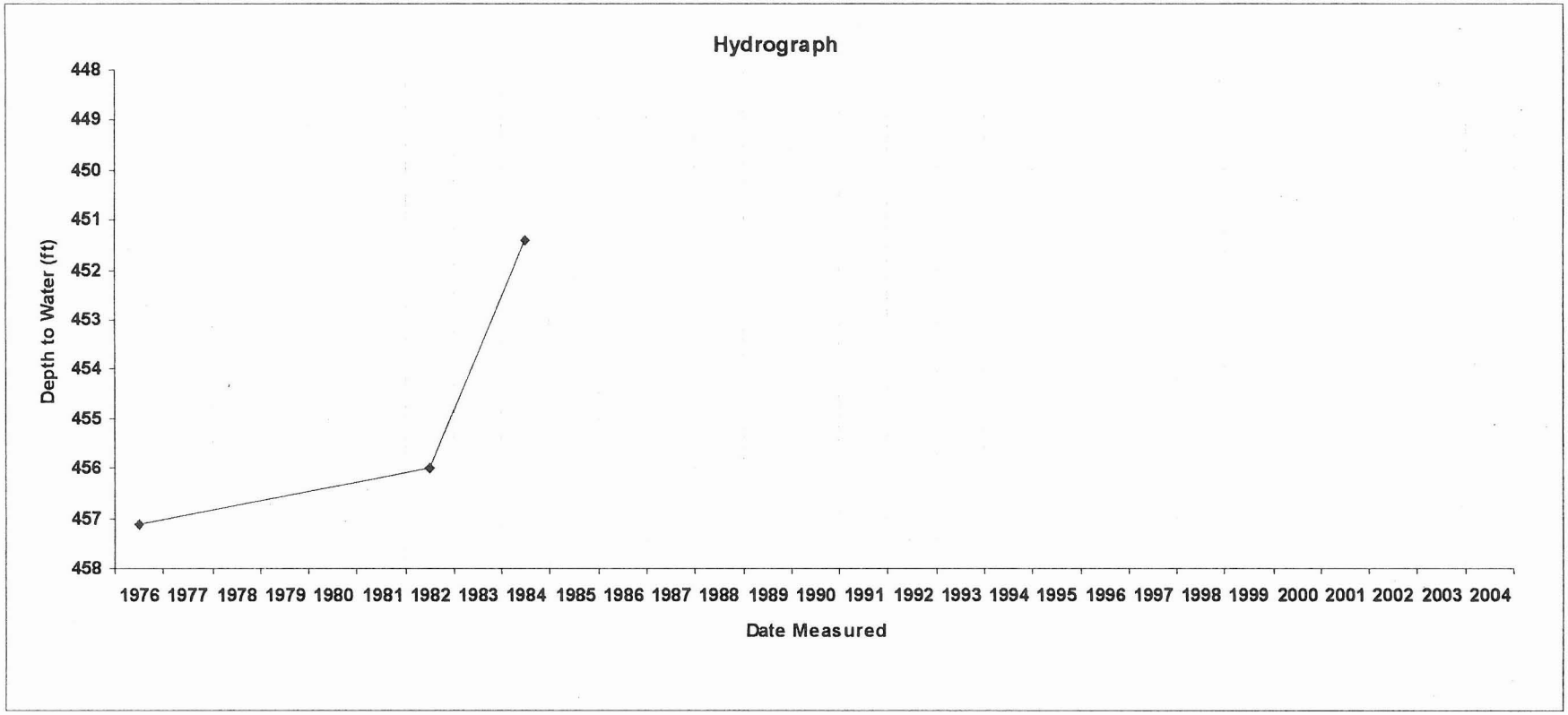
# GWSI Well Report and Hydrograph

# AZ Dept of Water Resources

| Local ID | Site ID | ADWR Reg. No. | Latitude | Longitude | Water Uses | Well Depth | Drill Date | Case Dia. | Latest WL Date | Depth to Water | WL Alt. above Mean Sea Level | Times Meas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-02-02 10BDA | 333200112270701 | 612351 | 33° 32´ 0´´ | 112° 27´ 7´´ | UNUSED | 1000 | 2/8/1958 | 20 | 11/26/1984 | 451.40 | 717 | 3 |




GWSI is ADWR's technical database of well locations, construction data, and water levels.

*Thursday, March 04, 2004*

# APPENDIX B

# SUBSIDENCE EVALUATIONS

# INDEX OF ATTACHMENTS TO APPENDIX B

**(WHITE TANK FLOOD RETARDING STRUCTURE NO. 3 REMEDIATION DESIGN STUDY)**

| Index Number | Title |
|---|---|
| B-1 | GEOLOGICAL CONSULTANTS INC. - SUBSIDENCE AT WHITE TANKS FRS NO. 3 - HISTORICAL AND PREDICTIVE SUBSIDENCE ASSESSMENT, BY GEOLOGICAL CONSULTANTS INC. |
| B-2 | URS MODIFIED APPROACH - SUBSIDENCE EVALUATION |
| B-3 | FLOOD CONTROL DISTRICT OF MARICOPA COUNTY - SUBSIDENCE EVALUATION |

# CALCULATION PACKAGE NO. B-2

**URS**

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County Project Name: White Tanks FRS No. 3

Project/Calculation Number: White Tanks F.R.S. No. 3

Title: Subsidence Calculations

Total Number of Pages (including cover sheet): 20

Total Number of Computer Runs: 1

Prepared by: Juan Sorensen Date: 10/18/04

Checked by: Ed Villano Date: 11/05/04

Description and Purpose: Estimate future subsidence under dam due to groundwater withdrawal

Design Basis/References/Assumptions

Match measured subsidence to establish consolidation parameters to estimate future subsidence.

Remarks/Conclusions/Results:

Calculation Approved by: Todd Ringsmuth 11/6/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| 1 | Revised parameters | 1/16/05 |
| | | |
| | | |

Project Manager/Date

```
=======================================================
CONSOL - 1d Consolidation Analysis Program
         Version 3.0
         Virginia Tech, Department of Civil Engineering
=======================================================

      Date: 12/30/2004
      Input file :
N:\Projects\23443748_White_Tanks_FRS_3\Sub_00\10.0_Calculations_Analyses_Data\Ge
otechnical\Consolidation\Revised Settlement to 1200.cns
      Output file:
N:\Projects\23443748_White_Tanks_FRS_3\Sub_00\10.0_Calculations_Analyses_Data\Ge
otechnical\Consolidation\Revised Settlement to 1200.out
      Plot file  :
N:\Projects\23443748_White_Tanks_FRS_3\Sub_00\10.0_Calculations_Analyses_Data\Ge
otechnical\Consolidation\Revised Settlement to 1200.dat

      Title     : White Tanks FRS No. 3 Remediation

      **** C O N T R O L   D A T A ****

      Number of compressible units ..............................     9
      Number of soil layers .....................................    18
      Number of different soils .................................     4
      Elevation of the ground surface ...........................     0.00
      Elevation of the top of the compressible soil mass ........     0.00
      Ground water elevation ....................................  -220.00
      Unit weight of water ......................................    62.40
      Moist unit wt. of soil btwn grn. surf. & comp. soil mass ...   110.00
      Satur. unit wt. of soil btwn grn. surf. & comp. soil mass ..   122.00


      **** U N I T   B O U N D A R Y   D A T A ****

       Unit          Top          Bottom       Drainage
      Number      Boundary      Boundary     Condition

         1            1             4             2
         2            4             5             2
         3            5             8             2
         4            8             9             2
         5            9            12             2
         6           12            13             2
         7           13            16             2
         8           16            17             2
         9           17            19             1


      **** S O I L   P R O P E R T Y   D A T A ****

      Soil       Unit        Void
      Type     Weight       Ratio        Cc       Ccs       Cv        Cvs
```

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 120.00 | 0.65 | 0.85 | 0.09 | 7000.00 | 7000.00 |
| 2 | 130.00 | 0.52 | 0.50 | 0.05 | 7000.00 | 7000.00 |
| 3 | 135.00 | 0.40 | 0.04 | 0.00 | 7000.00 | 7000.00 |
| 4 | 138.00 | 0.35 | 0.00 | 0.00 | 7000.00 | 7000.00 |

**** S U B L A Y E R  D A T A ****

| Layer | Center Elev | Bottom Elev | Thick | Overbn Pressure | Precons Pressure | Soil Type |
|---|---|---|---|---|---|---|
| 1 | -25.00 | -50.00 | 50.00 | 3000.00 | 3660.00 | 1 |
| 2 | -75.00 | -100.00 | 50.00 | 9000.00 | 10980.00 | 1 |
| 3 | -125.00 | -150.00 | 50.00 | 15000.00 | 18300.00 | 1 |
| 4 | -175.00 | -200.00 | 50.00 | 21000.00 | 25620.00 | 1 |
| 5 | -225.00 | -250.00 | 50.00 | 26688.00 | 32565.00 | 1 |
| 6 | -285.00 | -320.00 | 70.00 | 30144.00 | 36142.00 | 1 |
| 7 | -335.00 | -350.00 | 30.00 | 33174.00 | 36491.00 | 2 |
| 8 | -375.00 | -400.00 | 50.00 | 35878.00 | 39466.00 | 2 |
| 9 | -425.00 | -450.00 | 50.00 | 39258.00 | 43184.00 | 2 |
| 10 | -475.00 | -500.00 | 50.00 | 42638.00 | 46902.00 | 2 |
| 11 | -525.00 | -550.00 | 50.00 | 46143.00 | 50620.00 | 3 |
| 12 | -575.00 | -600.00 | 50.00 | 49773.00 | 53976.02 | 3 |
| 13 | -625.00 | -650.00 | 50.00 | 53403.00 | 57522.22 | 3 |
| 14 | -675.00 | -700.00 | 50.00 | 57033.00 | 61068.42 | 3 |
| 15 | -725.00 | -750.00 | 50.00 | 60663.00 | 64614.62 | 3 |
| 16 | -775.00 | -800.00 | 50.00 | 64368.00 | 65000.00 | 4 |
| 17 | -825.00 | -850.00 | 50.00 | 68148.00 | 68148.00 | 4 |
| 18 | -1025.00 | -1200.00 | 350.00 | 83268.00 | 83268.00 | 4 |

**** Number of Loadcases to be Analysed: 10

**** L O A D C A S E : 1 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00 4.00

Old water elevation ..... -220.00
New water elevation ..... -220.00

| Layer | Change in stress |
|---|---|
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.00 |
| 4 | 0.00 |
| 5 | 0.00 |
| 6 | 0.00 |
| 7 | 0.00 |
| 8 | 0.00 |
| 9 | 0.00 |

| | |
|---|---|
| 10 | 0.00 |
| 11 | 0.00 |
| 12 | 0.00 |
| 13 | 0.00 |
| 14 | 0.00 |
| 15 | 0.00 |
| 16 | 0.00 |
| 17 | 0.00 |
| 18 | 0.00 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21000.00 | 25620.00 | 21000.00 | 0.000 |
| 5 | 50.00 | 0.65 | 26688.00 | 32565.00 | 26688.00 | 0.000 |
| 6 | 70.00 | 0.65 | 30144.00 | 36142.00 | 30144.00 | 0.000 |
| 7 | 30.00 | 0.52 | 33174.00 | 36491.00 | 33174.00 | 0.000 |
| 8 | 50.00 | 0.52 | 35878.00 | 39466.00 | 35878.00 | 0.000 |
| 9 | 50.00 | 0.52 | 39258.00 | 43184.00 | 39258.00 | 0.000 |
| 10 | 50.00 | 0.52 | 42638.00 | 46902.00 | 42638.00 | 0.000 |
| 11 | 50.00 | 0.40 | 46143.00 | 50620.00 | 46143.00 | 0.000 |
| 12 | 50.00 | 0.40 | 49773.00 | 53976.02 | 49773.00 | 0.000 |
| 13 | 50.00 | 0.40 | 53403.00 | 57522.22 | 53403.00 | 0.000 |
| 14 | 50.00 | 0.40 | 57033.00 | 61068.42 | 57033.00 | 0.000 |
| 15 | 50.00 | 0.40 | 60663.00 | 64614.62 | 60663.00 | 0.000 |
| 16 | 50.00 | 0.35 | 64368.00 | 65000.00 | 64368.00 | 0.000 |
| 17 | 50.00 | 0.35 | 68148.00 | 68148.00 | 68148.00 | 0.000 |
| 18 | 350.00 | 0.35 | 83268.00 | 83268.00 | 83268.00 | 0.000 |

Ultimate settlement without correction for buoyancy : 0.000

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -25.00 | 3000.00 | 0.00 |
| -75.00 | 9000.00 | 0.00 |
| -125.00 | 15000.00 | 0.00 |
| -175.00 | 21000.00 | 0.00 |
| -225.00 | 26688.00 | 0.00 |
| -285.00 | 30144.00 | 0.00 |
| -335.00 | 33174.00 | 0.00 |
| -375.00 | 35878.00 | 0.00 |
| -425.00 | 39258.00 | 0.00 |
| -475.00 | 42638.00 | 0.00 |
| -525.00 | 46143.00 | 0.00 |
| -575.00 | 49773.00 | 0.00 |
| -625.00 | 53403.00 | 0.00 |
| -675.00 | 57033.00 | 0.00 |
| -725.00 | 60663.00 | 0.00 |

| | | |
|---|---|---|
| -775.00 | 64368.00 | 0.00 |
| -825.00 | 68148.00 | 0.00 |
| -1025.00 | 83268.00 | 0.00 |

**** Time since load was applied: 4.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -25.00 | 3000.00 | 0.00 |
| -75.00 | 9000.00 | 0.00 |
| -125.00 | 15000.00 | 0.00 |
| -175.00 | 21000.00 | 0.00 |
| -225.00 | 26688.00 | 0.00 |
| -285.00 | 30144.00 | 0.00 |
| -335.00 | 33174.00 | 0.00 |
| -375.00 | 35878.00 | 0.00 |
| -425.00 | 39258.00 | 0.00 |
| -475.00 | 42638.00 | 0.00 |
| -525.00 | 46143.00 | 0.00 |
| -575.00 | 49773.00 | 0.00 |
| -625.00 | 53403.00 | 0.00 |
| -675.00 | 57033.00 | 0.00 |
| -725.00 | 60663.00 | 0.00 |
| -775.00 | 64368.00 | 0.00 |
| -825.00 | 68148.00 | 0.00 |
| -1025.00 | 83268.00 | 0.00 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 0.000 | 2.00 | 0.000 | 0.00 |
| 4.00 | 0.000 | 4.00 | 0.000 | 0.00 |

**** L O A D C A S E : 2 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00 4.00

Old water elevation ..... -220.00
New water elevation ..... -260.00

| Layer | Change in stress |
|---|---|
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.00 |
| 4 | 0.00 |
| 5 | 312.00 |
| 6 | 2496.00 |
| 7 | 2496.00 |

| | |
|---|---|
| 8 | 2496.00 |
| 9 | 2496.00 |
| 10 | 2496.00 |
| 11 | 2496.00 |
| 12 | 2496.00 |
| 13 | 2496.00 |
| 14 | 2496.00 |
| 15 | 2496.00 |
| 16 | 2496.00 |
| 17 | 2496.00 |
| 18 | 2496.00 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21000.00 | 25620.00 | 21000.00 | 0.000 |
| 5 | 50.00 | 0.65 | 26688.00 | 32565.00 | 27000.00 | 0.013 |
| 6 | 70.00 | 0.65 | 30144.00 | 36142.00 | 32640.00 | 0.125 |
| 7 | 30.00 | 0.52 | 33174.00 | 36491.00 | 35670.00 | 0.031 |
| 8 | 50.00 | 0.52 | 35878.00 | 39466.00 | 38374.00 | 0.048 |
| 9 | 50.00 | 0.52 | 39258.00 | 43184.00 | 41754.00 | 0.044 |
| 10 | 50.00 | 0.52 | 42638.00 | 46902.00 | 45134.00 | 0.041 |
| 11 | 50.00 | 0.40 | 46143.00 | 50620.00 | 48639.00 | 0.003 |
| 12 | 50.00 | 0.40 | 49773.00 | 53976.02 | 52269.00 | 0.003 |
| 13 | 50.00 | 0.40 | 53403.00 | 57522.22 | 55899.00 | 0.003 |
| 14 | 50.00 | 0.40 | 57033.00 | 61068.42 | 59529.00 | 0.003 |
| 15 | 50.00 | 0.40 | 60663.00 | 64614.62 | 63159.00 | 0.003 |
| 16 | 50.00 | 0.35 | 64368.00 | 65000.00 | 66864.00 | 0.000 |
| 17 | 50.00 | 0.35 | 68148.00 | 68148.00 | 70644.00 | 0.001 |
| 18 | 350.00 | 0.35 | 83268.00 | 83268.00 | 85764.00 | 0.003 |

Ultimate settlement without correction for buoyancy : 0.320

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -25.31 | 3000.00 | 0.00 |
| -75.31 | 9000.00 | 0.00 |
| -125.31 | 15000.00 | 0.00 |
| -175.30 | 21078.00 | 0.00 |
| -225.29 | 27373.64 | 3.36 |
| -285.23 | 31996.75 | 6.25 |
| -335.16 | 35667.11 | 2.89 |
| -375.12 | 38374.00 | 0.00 |
| -425.08 | 41729.62 | 24.38 |
| -475.04 | 45075.74 | 58.27 |
| -525.02 | 48605.12 | 33.88 |
| -575.01 | 52269.00 | 0.00 |
| -625.01 | 55895.09 | 3.91 |

| | | |
|---|---|---|
| -675.01 | 59521.06 | 7.95 |
| -725.00 | 63154.96 | 4.04 |
| -775.00 | 66864.00 | 0.00 |
| -825.00 | 70346.31 | 297.69 |
| -1025.00 | 84346.70 | 1417.31 |

**** Time since load was applied: 4.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -25.31 | 3000.00 | 0.00 |
| -75.31 | 9000.00 | 0.00 |
| -125.31 | 15000.00 | 0.00 |
| -175.31 | 21078.00 | 0.00 |
| -225.29 | 27376.99 | 0.01 |
| -285.23 | 32002.99 | 0.01 |
| -335.17 | 35669.99 | 0.01 |
| -375.13 | 38374.00 | 0.00 |
| -425.08 | 41753.52 | 0.48 |
| -475.04 | 45132.87 | 1.14 |
| -525.02 | 48638.34 | 0.66 |
| -575.01 | 52269.00 | 0.00 |
| -625.01 | 55898.99 | 0.01 |
| -675.01 | 59528.99 | 0.01 |
| -725.00 | 63159.00 | 0.01 |
| -775.00 | 66864.00 | 0.00 |
| -825.00 | 70510.14 | 133.86 |
| -1025.00 | 84700.00 | 1064.01 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 0.305 | 6.00 | 0.305 | -0.31 |
| 4.00 | 0.307 | 8.00 | 0.307 | -0.31 |

**** L O A D C A S E : 3 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00 4.00

Old water elevation ..... -260.00
New water elevation ..... -300.00

| Layer | Change in stress |
|---|---|
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.00 |
| 4 | 0.00 |
| 5 | 0.00 |

| | |
|---|---|
| 6 | 1574.22 |
| 7 | 2496.00 |
| 8 | 2496.00 |
| 9 | 2496.00 |
| 10 | 2496.00 |
| 11 | 2496.00 |
| 12 | 2496.00 |
| 13 | 2496.00 |
| 14 | 2496.00 |
| 15 | 2496.00 |
| 16 | 2496.01 |
| 17 | 2496.01 |
| 18 | 2496.01 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21078.00 | 25620.00 | 21078.00 | 0.000 |
| 5 | 49.97 | 0.65 | 27376.99 | 32565.00 | 27377.00 | 0.000 |
| 6 | 69.91 | 0.65 | 32002.99 | 36142.00 | 33577.22 | 0.075 |
| 7 | 29.97 | 0.52 | 35669.99 | 36491.00 | 38166.00 | 0.202 |
| 8 | 49.95 | 0.52 | 38374.00 | 39466.00 | 40870.00 | 0.270 |
| 9 | 49.96 | 0.52 | 41753.52 | 43184.00 | 44250.00 | 0.198 |
| 10 | 49.96 | 0.52 | 45132.87 | 46902.00 | 47630.01 | 0.137 |
| 11 | 50.00 | 0.40 | 48638.34 | 50620.00 | 51135.01 | 0.009 |
| 12 | 50.00 | 0.40 | 52269.00 | 53976.02 | 54765.00 | 0.011 |
| 13 | 50.00 | 0.40 | 55898.99 | 57522.22 | 58395.00 | 0.011 |
| 14 | 50.00 | 0.40 | 59528.99 | 61068.42 | 62025.01 | 0.011 |
| 15 | 50.00 | 0.40 | 63159.00 | 64614.62 | 65655.00 | 0.011 |
| 16 | 50.00 | 0.35 | 66864.00 | 66864.00 | 69360.01 | 0.001 |
| 17 | 50.00 | 0.35 | 70510.14 | 70510.14 | 73140.01 | 0.001 |
| 18 | 350.00 | 0.35 | 84700.00 | 84700.00 | 88260.02 | 0.005 |

Ultimate settlement without correction for buoyancy : 0.942

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -26.22 | 3000.00 | 0.00 |
| -76.22 | 9000.00 | 0.00 |
| -126.22 | 15000.00 | 0.00 |
| -176.22 | 21078.00 | 0.00 |
| -226.20 | 27702.79 | 2.32 |
| -286.10 | 33436.46 | 4.35 |
| -335.91 | 38025.67 | 2.03 |
| -375.64 | 40870.13 | 0.00 |
| -425.36 | 44225.80 | 24.25 |
| -475.16 | 47571.79 | 57.93 |
| -525.07 | 51101.29 | 33.68 |

| | | |
|---|---|---|
| -575.05 | 54765.17 | 0.00 |
| -625.04 | 58391.10 | 3.91 |
| -675.03 | 62017.07 | 7.93 |
| -725.01 | 65650.98 | 4.03 |
| -775.01 | 69393.47 | 0.00 |
| -825.00 | 72767.34 | 397.33 |
| -1025.00 | 85973.02 | 2286.98 |

**** Time since load was applied: 4.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -26.24 | 3000.00 | 0.00 |
| -76.24 | 9000.00 | 0.00 |
| -126.24 | 15000.00 | 0.00 |
| -176.24 | 21078.00 | 0.00 |
| -226.21 | 27705.11 | 0.00 |
| -286.11 | 33440.80 | 0.01 |
| -335.92 | 38027.70 | 0.00 |
| -375.65 | 40870.13 | 0.00 |
| -425.37 | 44249.59 | 0.47 |
| -475.16 | 47628.61 | 1.11 |
| -525.07 | 51134.32 | 0.65 |
| -575.06 | 54765.17 | 0.00 |
| -625.04 | 58395.00 | 0.01 |
| -675.03 | 62024.99 | 0.01 |
| -725.01 | 65654.99 | 0.01 |
| -775.01 | 69393.47 | 0.00 |
| -825.00 | 72952.27 | 212.40 |
| -1025.00 | 86486.79 | 1773.21 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 0.917 | 10.00 | 1.224 | -1.22 |
| 4.00 | 0.931 | 12.00 | 1.238 | -1.24 |

**** L O A D C A S E : 4 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00 4.00

Old water elevation ..... -300.00
New water elevation ..... -331.00

| Layer | Change in stress |
|---|---|
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.00 |

| | |
|---|---|
| 4 | 0.00 |
| 5 | 0.00 |
| 6 | 0.00 |
| 7 | 1934.40 |
| 8 | 1934.40 |
| 9 | 1934.40 |
| 10 | 1934.40 |
| 11 | 1934.40 |
| 12 | 1934.40 |
| 13 | 1934.40 |
| 14 | 1934.40 |
| 15 | 1934.41 |
| 16 | 1934.41 |
| 17 | 1934.41 |
| 18 | 1934.41 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21078.00 | 25620.00 | 21078.00 | 0.000 |
| 5 | 49.96 | 0.65 | 27705.11 | 32565.00 | 27705.11 | 0.000 |
| 6 | 69.84 | 0.65 | 33440.80 | 36142.00 | 33440.81 | 0.000 |
| 7 | 29.78 | 0.51 | 38027.70 | 38027.70 | 39962.10 | 0.213 |
| 8 | 49.68 | 0.51 | 40870.13 | 40870.13 | 42804.53 | 0.330 |
| 9 | 49.76 | 0.51 | 44249.59 | 44249.59 | 46184.45 | 0.306 |
| 10 | 49.82 | 0.51 | 47628.61 | 47628.61 | 49564.12 | 0.285 |
| 11 | 49.99 | 0.40 | 51134.32 | 51134.32 | 53069.37 | 0.023 |
| 12 | 49.99 | 0.40 | 54765.17 | 54765.17 | 56699.57 | 0.022 |
| 13 | 49.99 | 0.40 | 58395.00 | 58395.00 | 60329.41 | 0.020 |
| 14 | 49.99 | 0.40 | 62024.99 | 62024.99 | 63959.41 | 0.019 |
| 15 | 49.99 | 0.40 | 65654.99 | 65654.99 | 67589.41 | 0.018 |
| 16 | 50.00 | 0.35 | 69393.47 | 69393.47 | 71327.88 | 0.000 |
| 17 | 50.00 | 0.35 | 72952.27 | 72952.27 | 75099.08 | 0.000 |
| 18 | 350.00 | 0.35 | 86486.79 | 86486.79 | 90194.41 | 0.005 |

Ultimate settlement without correction for buoyancy : 1.241

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -27.47 | 3000.00 | 0.00 |
| -77.47 | 9000.00 | 0.00 |
| -127.47 | 15000.00 | 0.00 |
| -177.46 | 21078.00 | 0.00 |
| -227.44 | 27705.08 | 0.03 |
| -287.32 | 34118.81 | 0.03 |
| -337.03 | 39672.95 | 0.00 |
| -376.50 | 42804.64 | 0.00 |
| -425.91 | 46166.41 | 18.09 |

| | | |
|---|---|---|
| -475.41 | 49520.64 | 43.21 |
| -525.16 | 53044.21 | 25.12 |
| -575.13 | 56699.74 | 0.00 |
| -625.09 | 60326.39 | 3.02 |
| -675.06 | 63953.28 | 6.13 |
| -725.02 | 67586.30 | 3.11 |
| -775.01 | 71380.98 | 0.00 |
| -825.01 | 74747.18 | 396.34 |
| -1025.00 | 87643.81 | 2550.60 |

**** Time since load was applied: 4.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -27.48 | 3000.00 | 0.00 |
| -77.48 | 9000.00 | 0.00 |
| -127.48 | 15000.00 | 0.00 |
| -177.47 | 21078.00 | 0.00 |
| -227.45 | 27705.11 | 0.00 |
| -287.33 | 34118.84 | 0.00 |
| -337.04 | 39672.95 | 0.00 |
| -376.51 | 42804.64 | 0.00 |
| -425.92 | 46184.17 | 0.33 |
| -475.41 | 49563.05 | 0.79 |
| -525.16 | 53068.86 | 0.46 |
| -575.13 | 56699.74 | 0.00 |
| -625.09 | 60329.40 | 0.01 |
| -675.06 | 63959.40 | 0.01 |
| -725.03 | 67589.40 | 0.01 |
| -775.01 | 71380.98 | 0.00 |
| -825.01 | 74907.96 | 235.57 |
| -1025.00 | 88184.27 | 2010.14 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 1.228 | 14.00 | 2.467 | -2.47 |
| 4.00 | 1.238 | 16.00 | 2.477 | -2.48 |

**** L O A D C A S E : 5 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00 4.00

Old water elevation ..... -331.00
New water elevation ..... -346.00

| Layer | Change in stress |
|---|---|
| 1 | 0.00 |

| | |
|---|---|
| 2 | 0.00 |
| 3 | 0.00 |
| 4 | 0.00 |
| 5 | 0.00 |
| 6 | 0.00 |
| 7 | 376.71 |
| 8 | 936.00 |
| 9 | 936.00 |
| 10 | 936.00 |
| 11 | 936.00 |
| 12 | 936.00 |
| 13 | 936.00 |
| 14 | 936.00 |
| 15 | 935.99 |
| 16 | 935.99 |
| 17 | 935.99 |
| 18 | 935.99 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21078.00 | 25620.00 | 21078.00 | 0.000 |
| 5 | 49.96 | 0.65 | 27705.11 | 32565.00 | 27705.11 | 0.000 |
| 6 | 69.81 | 0.65 | 34118.84 | 36142.00 | 34118.84 | 0.000 |
| 7 | 29.60 | 0.50 | 39672.95 | 39675.14 | 40049.66 | 0.040 |
| 8 | 49.35 | 0.50 | 42804.64 | 42804.64 | 43740.64 | 0.155 |
| 9 | 49.45 | 0.50 | 46184.17 | 46184.17 | 47120.50 | 0.143 |
| 10 | 49.54 | 0.51 | 49563.05 | 49563.05 | 50499.84 | 0.134 |
| 11 | 49.96 | 0.40 | 53068.86 | 53068.86 | 54005.32 | 0.011 |
| 12 | 49.96 | 0.40 | 56699.74 | 56699.74 | 57635.74 | 0.010 |
| 13 | 49.97 | 0.40 | 60329.40 | 60329.40 | 61265.41 | 0.010 |
| 14 | 49.97 | 0.40 | 63959.40 | 63959.40 | 64895.41 | 0.009 |
| 15 | 49.97 | 0.40 | 67589.40 | 67589.40 | 68525.40 | 0.009 |
| 16 | 50.00 | 0.35 | 71380.98 | 71380.98 | 72316.97 | 0.000 |
| 17 | 50.00 | 0.35 | 74907.96 | 74907.96 | 76079.52 | 0.000 |
| 18 | 349.99 | 0.35 | 88184.27 | 88184.27 | 91130.40 | 0.004 |

Ultimate settlement without correction for buoyancy : 0.524

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -27.98 | 3000.00 | 0.00 |
| -77.98 | 9000.00 | 0.00 |
| -127.98 | 15000.00 | 0.00 |
| -177.97 | 21078.00 | 0.00 |
| -227.95 | 27704.94 | 0.17 |
| -287.83 | 34250.79 | 0.32 |
| -337.51 | 40098.26 | 0.15 |

| | | |
|---|---|---|
| -376.90 | 43565.93 | 0.00 |
| -426.17 | 47111.95 | 8.58 |
| -475.52 | 50479.17 | 20.48 |
| -525.21 | 53993.38 | 11.90 |
| -575.16 | 57635.86 | 0.00 |
| -625.12 | 61263.95 | 1.46 |
| -675.07 | 64892.45 | 2.96 |
| -725.03 | 68523.90 | 1.50 |
| -775.01 | 72375.86 | 0.00 |
| -825.01 | 75835.67 | 295.87 |
| -1025.00 | 88955.26 | 2175.13 |

**** Time since load was applied: 4.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -27.98 | 3000.00 | 0.00 |
| -77.98 | 9000.00 | 0.00 |
| -127.98 | 15000.00 | 0.00 |
| -177.98 | 21078.00 | 0.00 |
| -227.96 | 27705.11 | 0.00 |
| -287.84 | 34251.11 | 0.00 |
| -337.51 | 40098.41 | 0.00 |
| -376.90 | 43565.93 | 0.00 |
| -426.17 | 47120.38 | 0.15 |
| -475.53 | 50499.28 | 0.37 |
| -525.21 | 54005.07 | 0.21 |
| -575.16 | 57635.86 | 0.00 |
| -625.12 | 61265.40 | 0.00 |
| -675.07 | 64895.40 | 0.01 |
| -725.03 | 68525.40 | 0.00 |
| -775.01 | 72375.86 | 0.00 |
| -825.01 | 75933.16 | 198.38 |
| -1025.00 | 89388.39 | 1742.00 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 0.500 | 18.00 | 2.976 | -2.98 |
| 4.00 | 0.505 | 20.00 | 2.981 | -2.98 |

**** L O A D C A S E : 6 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00 4.00

Old water elevation ..... -346.00
New water elevation ..... -366.00

Layer Change in stress

| | |
|---|---|
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.00 |
| 4 | 0.00 |
| 5 | 0.00 |
| 6 | 0.00 |
| 7 | 0.00 |
| 8 | 1248.00 |
| 9 | 1248.00 |
| 10 | 1248.00 |
| 11 | 1248.00 |
| 12 | 1248.00 |
| 13 | 1248.00 |
| 14 | 1248.00 |
| 15 | 1248.00 |
| 16 | 1248.00 |
| 17 | 1248.00 |
| 18 | 1248.00 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21078.00 | 25620.00 | 21078.00 | 0.000 |
| 5 | 49.96 | 0.65 | 27705.11 | 32565.00 | 27705.11 | 0.000 |
| 6 | 69.80 | 0.65 | 34251.11 | 36142.00 | 34251.11 | 0.000 |
| 7 | 29.56 | 0.50 | 40098.41 | 40098.41 | 40098.41 | 0.000 |
| 8 | 49.23 | 0.50 | 43565.93 | 43565.93 | 44813.93 | 0.202 |
| 9 | 49.31 | 0.50 | 47120.38 | 47120.38 | 48368.53 | 0.187 |
| 10 | 49.40 | 0.50 | 50499.28 | 50499.28 | 51747.65 | 0.174 |
| 11 | 49.95 | 0.40 | 54005.07 | 54005.07 | 55253.29 | 0.014 |
| 12 | 49.95 | 0.40 | 57635.86 | 57635.86 | 58883.86 | 0.013 |
| 13 | 49.96 | 0.40 | 61265.40 | 61265.40 | 62513.40 | 0.013 |
| 14 | 49.96 | 0.40 | 64895.40 | 64895.40 | 66143.41 | 0.012 |
| 15 | 49.96 | 0.40 | 68525.40 | 68525.40 | 69773.40 | 0.011 |
| 16 | 50.00 | 0.35 | 72375.86 | 72375.86 | 73623.86 | 0.000 |
| 17 | 50.00 | 0.35 | 75933.16 | 75933.16 | 77379.54 | 0.000 |
| 18 | 349.99 | 0.35 | 89388.39 | 89388.39 | 92378.39 | 0.004 |

Ultimate settlement without correction for buoyancy : 0.630

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -28.57 | 3000.00 | 0.00 |
| -78.57 | 9000.00 | 0.00 |
| -128.57 | 15000.00 | 0.00 |
| -178.56 | 21078.00 | 0.00 |
| -228.54 | 27705.11 | 0.00 |

| | | |
|---|---|---|
| -288.42 | 34251.11 | 0.00 |
| -338.08 | 40332.51 | 0.00 |
| -377.39 | 44424.06 | 0.00 |
| -426.50 | 48357.38 | 11.17 |
| -475.68 | 51720.89 | 26.68 |
| -525.26 | 55237.77 | 15.51 |
| -575.20 | 58883.91 | 0.00 |
| -625.15 | 62511.47 | 1.94 |
| -675.09 | 66139.47 | 3.93 |
| -725.04 | 69771.41 | 1.99 |
| -775.01 | 73673.45 | 0.00 |
| -825.01 | 77115.88 | 310.53 |
| -1025.00 | 90241.10 | 2137.30 |

**** Time since load was applied: 4.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -28.57 | 3000.00 | 0.00 |
| -78.57 | 9000.00 | 0.00 |
| -128.57 | 15000.00 | 0.00 |
| -178.57 | 21078.00 | 0.00 |
| -228.55 | 27705.11 | 0.00 |
| -288.43 | 34251.11 | 0.00 |
| -338.09 | 40332.51 | 0.00 |
| -377.40 | 44424.06 | 0.00 |
| -426.50 | 48368.35 | 0.20 |
| -475.68 | 51747.10 | 0.47 |
| -525.26 | 55253.00 | 0.27 |
| -575.20 | 58883.91 | 0.00 |
| -625.15 | 62513.40 | 0.00 |
| -675.09 | 66143.40 | 0.01 |
| -725.04 | 69773.41 | 0.00 |
| -775.01 | 73673.45 | 0.00 |
| -825.01 | 77229.72 | 196.68 |
| -1025.00 | 90679.11 | 1699.30 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 0.584 | 22.00 | 3.566 | -3.57 |
| 4.00 | 0.591 | 24.00 | 3.572 | -3.57 |

**** L O A D C A S E : 7 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00 4.00

Old water elevation ..... -366.00
New water elevation ..... -400.00

| Layer | Change in stress |
|---|---|
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.00 |
| 4 | 0.00 |
| 5 | 0.00 |
| 6 | 0.00 |
| 7 | 0.00 |
| 8 | 711.31 |
| 9 | 2121.60 |
| 10 | 2121.60 |
| 11 | 2121.60 |
| 12 | 2121.60 |
| 13 | 2121.60 |
| 14 | 2121.59 |
| 15 | 2121.59 |
| 16 | 2121.59 |
| 17 | 2121.59 |
| 18 | 2121.59 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21078.00 | 25620.00 | 21078.00 | 0.000 |
| 5 | 49.96 | 0.65 | 27705.11 | 32565.00 | 27705.11 | 0.000 |
| 6 | 69.80 | 0.65 | 34251.11 | 36142.00 | 34251.11 | 0.000 |
| 7 | 29.53 | 0.50 | 40332.51 | 40332.51 | 40332.51 | 0.000 |
| 8 | 49.09 | 0.49 | 44424.06 | 44424.06 | 45135.38 | 0.113 |
| 9 | 49.12 | 0.49 | 48368.35 | 48368.35 | 50490.15 | 0.307 |
| 10 | 49.23 | 0.50 | 51747.10 | 51747.10 | 53869.17 | 0.287 |
| 11 | 49.94 | 0.40 | 55253.00 | 55253.00 | 57374.88 | 0.023 |
| 12 | 49.94 | 0.40 | 58883.91 | 58883.91 | 61005.51 | 0.022 |
| 13 | 49.94 | 0.40 | 62513.40 | 62513.40 | 64635.01 | 0.021 |
| 14 | 49.95 | 0.40 | 66143.40 | 66143.40 | 68265.00 | 0.020 |
| 15 | 49.95 | 0.40 | 69773.41 | 69773.41 | 71895.00 | 0.019 |
| 16 | 50.00 | 0.35 | 73673.45 | 73673.45 | 75795.05 | 0.000 |
| 17 | 50.00 | 0.35 | 77229.72 | 77229.72 | 79547.99 | 0.000 |
| 18 | 349.99 | 0.35 | 90679.11 | 90679.11 | 94500.00 | 0.005 |

Ultimate settlement without correction for buoyancy : 0.817

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -29.36 | 3000.00 | 0.00 |
| -79.36 | 9000.00 | 0.00 |
| -129.36 | 15000.00 | 0.00 |

| | | |
|---|---|---|
| -179.36 | 21078.00 | 0.00 |
| -229.34 | 27705.11 | 0.00 |
| -289.22 | 34251.11 | 0.00 |
| -338.87 | 40466.11 | 0.00 |
| -378.11 | 45265.80 | 0.00 |
| -427.02 | 50119.13 | 18.33 |
| -475.93 | 53825.26 | 43.79 |
| -525.36 | 57349.41 | 25.45 |
| -575.28 | 61005.58 | 0.00 |
| -625.20 | 64631.72 | 3.28 |
| -675.12 | 68258.34 | 6.66 |
| -725.05 | 71891.62 | 3.38 |
| -775.01 | 75844.22 | 0.00 |
| -825.01 | 79176.12 | 416.62 |
| -1025.01 | 91895.73 | 2604.26 |

**** Time since load was applied: 4.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -29.37 | 3000.00 | 0.00 |
| -79.37 | 9000.00 | 0.00 |
| -129.37 | 15000.00 | 0.00 |
| -179.37 | 21078.00 | 0.00 |
| -229.35 | 27705.11 | 0.00 |
| -289.22 | 34251.11 | 0.00 |
| -338.88 | 40466.11 | 0.00 |
| -378.12 | 45265.80 | 0.00 |
| -427.03 | 50137.16 | 0.31 |
| -475.93 | 53868.31 | 0.74 |
| -525.36 | 57374.43 | 0.43 |
| -575.28 | 61005.58 | 0.00 |
| -625.20 | 64635.00 | 0.01 |
| -675.12 | 68264.98 | 0.01 |
| -725.05 | 71894.98 | 0.01 |
| -775.02 | 75844.22 | 0.00 |
| -825.01 | 79349.16 | 243.57 |
| -1025.01 | 92452.77 | 2047.24 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 0.790 | 26.00 | 4.361 | -4.36 |
| 4.00 | 0.799 | 28.00 | 4.371 | -4.37 |

**** L O A D C A S E : 8 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00 4.00

Old water elevation ..... -400.00
New water elevation ..... -516.00

| Layer | Change in stress |
|---|---|
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.00 |
| 4 | 0.00 |
| 5 | 0.00 |
| 6 | 0.00 |
| 7 | 0.00 |
| 8 | 0.00 |
| 9 | 1686.43 |
| 10 | 4738.05 |
| 11 | 7238.40 |
| 12 | 7238.41 |
| 13 | 7238.39 |
| 14 | 7238.40 |
| 15 | 7238.40 |
| 16 | 7238.40 |
| 17 | 7238.40 |
| 18 | 7238.40 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21078.00 | 25620.00 | 21078.00 | 0.000 |
| 5 | 49.96 | 0.65 | 27705.11 | 32565.00 | 27705.11 | 0.000 |
| 6 | 69.80 | 0.65 | 34251.11 | 36142.00 | 34251.11 | 0.000 |
| 7 | 29.52 | 0.50 | 40466.11 | 40466.11 | 40466.11 | 0.000 |
| 8 | 48.95 | 0.49 | 45265.80 | 45265.80 | 45265.80 | 0.000 |
| 9 | 48.87 | 0.49 | 50137.16 | 50137.16 | 51823.90 | 0.236 |
| 10 | 48.94 | 0.49 | 53868.31 | 53868.31 | 58607.10 | 0.602 |
| 11 | 49.92 | 0.40 | 57374.43 | 57374.43 | 64613.26 | 0.074 |
| 12 | 49.92 | 0.40 | 61005.58 | 61005.58 | 68243.98 | 0.070 |
| 13 | 49.92 | 0.40 | 64635.00 | 64635.00 | 71873.40 | 0.066 |
| 14 | 49.93 | 0.40 | 68264.98 | 68264.98 | 75503.39 | 0.063 |
| 15 | 49.93 | 0.40 | 71894.98 | 71894.98 | 79133.39 | 0.060 |
| 16 | 50.00 | 0.35 | 75844.22 | 75844.22 | 83082.62 | 0.001 |
| 17 | 50.00 | 0.35 | 79349.16 | 79349.16 | 86831.13 | 0.001 |
| 18 | 349.99 | 0.35 | 92452.77 | 92452.77 | 101738.40 | 0.011 |

Ultimate settlement without correction for buoyancy : 1.183

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -30.62 | 3000.00 | 0.00 |

| | | |
|---|---|---|
| -80.62 | 9000.00 | 0.00 |
| -130.62 | 15000.00 | 0.00 |
| -180.62 | 21078.00 | 0.00 |
| -230.60 | 27705.11 | 0.00 |
| -290.48 | 34251.11 | 0.00 |
| -340.13 | 40466.11 | 0.00 |
| -379.33 | 45687.87 | 0.00 |
| -428.07 | 52129.90 | 35.10 |
| -476.55 | 58378.52 | 83.82 |
| -525.66 | 63933.27 | 48.72 |
| -575.51 | 68244.09 | 0.00 |
| -625.36 | 71862.34 | 11.06 |
| -675.22 | 75480.95 | 22.43 |
| -725.09 | 79122.04 | 11.36 |
| -775.02 | 83143.52 | 0.00 |
| -825.02 | 85787.60 | 1095.37 |
| -1025.01 | 95902.73 | 5835.66 |

**** Time since load was applied: 4.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -30.64 | 3000.00 | 0.00 |
| -80.64 | 9000.00 | 0.00 |
| -130.64 | 15000.00 | 0.00 |
| -180.64 | 21078.00 | 0.00 |
| -230.61 | 27705.11 | 0.00 |
| -290.49 | 34251.11 | 0.00 |
| -340.15 | 40466.11 | 0.00 |
| -379.35 | 45687.87 | 0.00 |
| -428.09 | 52164.47 | 0.53 |
| -476.56 | 58461.06 | 1.28 |
| -525.66 | 63981.25 | 0.74 |
| -575.51 | 68244.09 | 0.00 |
| -625.36 | 71873.38 | 0.02 |
| -675.22 | 75503.35 | 0.04 |
| -725.09 | 79133.39 | 0.02 |
| -775.02 | 83143.52 | 0.00 |
| -825.02 | 86319.02 | 563.95 |
| -1025.01 | 97247.73 | 4490.65 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 1.250 | 30.00 | 5.621 | -5.62 |
| 4.00 | 1.267 | 32.00 | 5.638 | -5.64 |

**** L O A D C A S E : 9 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00 4.00

Old water elevation ..... -516.00
New water elevation ..... -566.00

| Layer | Change in stress |
|---|---|
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.00 |
| 4 | 0.00 |
| 5 | 0.00 |
| 6 | 0.00 |
| 7 | 0.00 |
| 8 | 0.00 |
| 9 | 0.00 |
| 10 | 0.00 |
| 11 | 602.77 |
| 12 | 3120.00 |
| 13 | 3120.00 |
| 14 | 3120.00 |
| 15 | 3120.00 |
| 16 | 3120.00 |
| 17 | 3120.00 |
| 18 | 3120.00 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21078.00 | 25620.00 | 21078.00 | 0.000 |
| 5 | 49.96 | 0.65 | 27705.11 | 32565.00 | 27705.11 | 0.000 |
| 6 | 69.80 | 0.65 | 34251.11 | 36142.00 | 34251.11 | 0.000 |
| 7 | 29.52 | 0.50 | 40466.11 | 40466.11 | 40466.11 | 0.000 |
| 8 | 48.89 | 0.49 | 45687.87 | 45687.87 | 45687.87 | 0.000 |
| 9 | 48.58 | 0.48 | 52164.47 | 52164.47 | 52165.00 | 0.000 |
| 10 | 48.36 | 0.47 | 58461.06 | 58461.06 | 58462.34 | 0.000 |
| 11 | 49.85 | 0.40 | 63981.25 | 63981.25 | 64584.76 | 0.006 |
| 12 | 49.85 | 0.40 | 68244.09 | 68244.09 | 71364.09 | 0.028 |
| 13 | 49.86 | 0.40 | 71873.38 | 71873.38 | 74993.40 | 0.026 |
| 14 | 49.86 | 0.40 | 75503.35 | 75503.35 | 78623.39 | 0.025 |
| 15 | 49.87 | 0.40 | 79133.39 | 79133.39 | 82253.41 | 0.024 |
| 16 | 50.00 | 0.35 | 83143.52 | 83143.52 | 86263.52 | 0.001 |
| 17 | 50.00 | 0.35 | 86319.02 | 86319.02 | 90002.96 | 0.001 |
| 18 | 349.98 | 0.35 | 97247.73 | 97247.73 | 104858.38 | 0.008 |

Ultimate settlement without correction for buoyancy : 0.119

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|

| | | |
|---|---|---|
| -30.77 | 3000.00 | 0.00 |
| -80.77 | 9000.00 | 0.00 |
| -130.77 | 15000.00 | 0.00 |
| -180.77 | 21078.00 | 0.00 |
| -230.74 | 27705.11 | 0.00 |
| -290.62 | 34251.11 | 0.00 |
| -340.28 | 40466.11 | 0.00 |
| -379.48 | 45688.00 | 0.00 |
| -428.22 | 52164.14 | 0.92 |
| -476.68 | 58608.21 | 2.22 |
| -525.77 | 65059.74 | 1.29 |
| -575.60 | 70734.97 | 0.00 |
| -625.43 | 74988.65 | 4.74 |
| -675.26 | 78613.77 | 9.60 |
| -725.11 | 82248.55 | 4.86 |
| -775.03 | 86404.51 | 0.00 |
| -825.02 | 89283.23 | 824.16 |
| -1025.01 | 99379.61 | 5478.77 |

**** Time since load was applied: 4.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -30.77 | 3000.00 | 0.00 |
| -80.77 | 9000.00 | 0.00 |
| -130.77 | 15000.00 | 0.00 |
| -180.77 | 21078.00 | 0.00 |
| -230.74 | 27705.11 | 0.00 |
| -290.62 | 34251.11 | 0.00 |
| -340.28 | 40466.11 | 0.00 |
| -379.48 | 45688.00 | 0.00 |
| -428.22 | 52165.05 | 0.01 |
| -476.68 | 58610.39 | 0.03 |
| -525.77 | 65061.02 | 0.02 |
| -575.60 | 70734.97 | 0.00 |
| -625.43 | 74993.38 | 0.01 |
| -675.26 | 78623.36 | 0.02 |
| -725.11 | 82253.41 | 0.01 |
| -775.03 | 86404.51 | 0.00 |
| -825.02 | 89581.78 | 525.61 |
| -1025.01 | 100498.30 | 4360.08 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 0.130 | 34.00 | 5.768 | -5.77 |
| 4.00 | 0.131 | 36.00 | 5.770 | -5.77 |

**** L O A D C A S E : 10 ****
**** C h a n g e i n G r o u n d w a t e r E l e v a t i o n ****

Time intervals: 2.00

Old water elevation ..... -566.00
New water elevation ..... -595.00

| Layer | Change in stress |
|---|---|
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.00 |
| 4 | 0.00 |
| 5 | 0.00 |
| 6 | 0.00 |
| 7 | 0.00 |
| 8 | 0.00 |
| 9 | 0.00 |
| 10 | 0.00 |
| 11 | 0.00 |
| 12 | 599.06 |
| 13 | 1809.59 |
| 14 | 1809.59 |
| 15 | 1809.59 |
| 16 | 1809.59 |
| 17 | 1809.59 |
| 18 | 1809.59 |

| Layer | Thick. | Void Ratio | Initial Pressure | Precons. Pressure | Final Pressure | Ult. Settl. |
|---|---|---|---|---|---|---|
| 1 | 50.00 | 0.65 | 3000.00 | 3660.00 | 3000.00 | 0.000 |
| 2 | 50.00 | 0.65 | 9000.00 | 10980.00 | 9000.00 | 0.000 |
| 3 | 50.00 | 0.65 | 15000.00 | 18300.00 | 15000.00 | 0.000 |
| 4 | 50.00 | 0.65 | 21078.00 | 25620.00 | 21078.00 | 0.000 |
| 5 | 49.96 | 0.65 | 27705.11 | 32565.00 | 27705.11 | 0.000 |
| 6 | 69.80 | 0.65 | 34251.11 | 36142.00 | 34251.11 | 0.000 |
| 7 | 29.52 | 0.50 | 40466.11 | 40466.11 | 40466.11 | 0.000 |
| 8 | 48.89 | 0.49 | 45688.00 | 45688.00 | 45688.00 | 0.000 |
| 9 | 48.58 | 0.48 | 52165.05 | 52165.05 | 52165.06 | 0.000 |
| 10 | 48.34 | 0.47 | 58610.39 | 58610.39 | 58610.42 | 0.000 |
| 11 | 49.84 | 0.40 | 65061.02 | 65061.02 | 65061.04 | 0.000 |
| 12 | 49.83 | 0.40 | 70734.97 | 70734.97 | 71334.03 | 0.005 |
| 13 | 49.83 | 0.40 | 74993.38 | 74993.38 | 76802.98 | 0.015 |
| 14 | 49.84 | 0.40 | 78623.36 | 78623.36 | 80432.97 | 0.014 |
| 15 | 49.85 | 0.40 | 82253.41 | 82253.41 | 84063.01 | 0.014 |
| 16 | 50.00 | 0.35 | 86404.51 | 86404.51 | 88214.10 | 0.000 |
| 17 | 50.00 | 0.35 | 89581.78 | 89581.78 | 91916.99 | 0.000 |
| 18 | 349.98 | 0.35 | 100498.30 | 100498.30 | 106667.98 | 0.007 |

Ultimate settlement without correction for buoyancy : 0.055

**** Time since load was applied: 2.00 ****

| Elevation | Effective Stress | Pore Pressure |
|---|---|---|
| -30.82 | 3000.00 | 0.00 |
| -80.82 | 9000.00 | 0.00 |
| -130.82 | 15000.00 | 0.00 |
| -180.82 | 21078.00 | 0.00 |
| -230.79 | 27705.11 | 0.00 |
| -290.67 | 34251.11 | 0.00 |
| -340.33 | 40466.11 | 0.00 |
| -379.53 | 45688.00 | 0.00 |
| -428.27 | 52165.06 | 0.00 |
| -476.73 | 58610.41 | 0.00 |
| -525.82 | 65210.82 | 0.00 |
| -575.65 | 71486.91 | 0.00 |
| -625.47 | 76497.59 | 2.74 |
| -675.29 | 80427.42 | 5.55 |
| -725.12 | 84060.21 | 2.81 |
| -775.03 | 88345.51 | 0.00 |
| -825.03 | 91382.88 | 642.36 |
| -1025.01 | 102048.80 | 4619.17 |

| For this load case | | Accumulated | | Surface |
|---|---|---|---|---|
| Time | Settlement | Time | Settlement | elevation |
| 2.00 | 0.050 | 38.00 | 5.820 | -5.82 |

**** Complete Time Settlement Record ****

| Time | Settlement |
|---|---|
| 5.82 | 0.000 |
| 4.00 | 0.000 |
| 6.00 | 0.305 |
| 8.00 | 0.307 |
| 10.00 | 1.224 |
| 12.00 | 1.238 |
| 14.00 | 2.467 |
| 16.00 | 2.477 |
| 18.00 | 2.976 |
| 20.00 | 2.981 |
| 22.00 | 3.566 |
| 24.00 | 3.572 |
| 26.00 | 4.361 |
| 28.00 | 4.371 |
| 30.00 | 5.621 |
| 32.00 | 5.638 |
| 34.00 | 5.768 |
| 36.00 | 5.770 |
| 38.00 | 5.820 |

# Flood Control District
of Maricopa County

**Date:** 11-9-04

**To:** White Tanks FRS No. 3 Design Memo – Subsidence Prediction

**From:** Dennis Duffy and Larry Lambert

**Subject:** White Tanks #3 future subsidence evaluation

Beneath White Tanks #3(WT#3) lie soils to a depth of approximately 900 feet that are believed to have contributed to the previous subsidence at WT#3. Below 900 feet the cemented and dense fanglomerate materials refered to as the Lower Alluvial Unit (LAU) are believed to exist to an approximate depth of 1050 feet, USBR 1977 and ADWR 1994. The present overburden stresses are approximately 80,000 to 85,000 psf at the top of the LAU. The stiffness of the LAU and the great overburden stress produce a rock like response of the LAU to stress change induced by groundwater declines on the order of hundreds of feet. Of the upper 800 feet of the deposits below the structure that there are likely to have existed soils that densified under overburden stresses when they experienced an increase in water content. The elevation changes that are associated with benchmarks around WT#3 and the structure itself may in part be due to this densification or soil collapse and not groundwater induced subsidence. No attempt has been made to adjust the subsidence record for collapse upon wetting of near surface soils. It will be assumed for the following assessment of future subsidence that all soil response is due to increasing stress induced by groundwater declines. This assumption in some areas, however, may cause greater subsidence predictions than are warranted.

Figure 1 presents Bouguer gravity anomaly data referenced to the WT#3 location, AMEC 2004. From station 30+00 North the alignment is parallel with the gravity

contours. In addition to providing correlation with relative deposit thickness to the comparison of "Basement" geometry and past elevation changes, confidence is developed in regards to the understanding of general subsurface conditions.

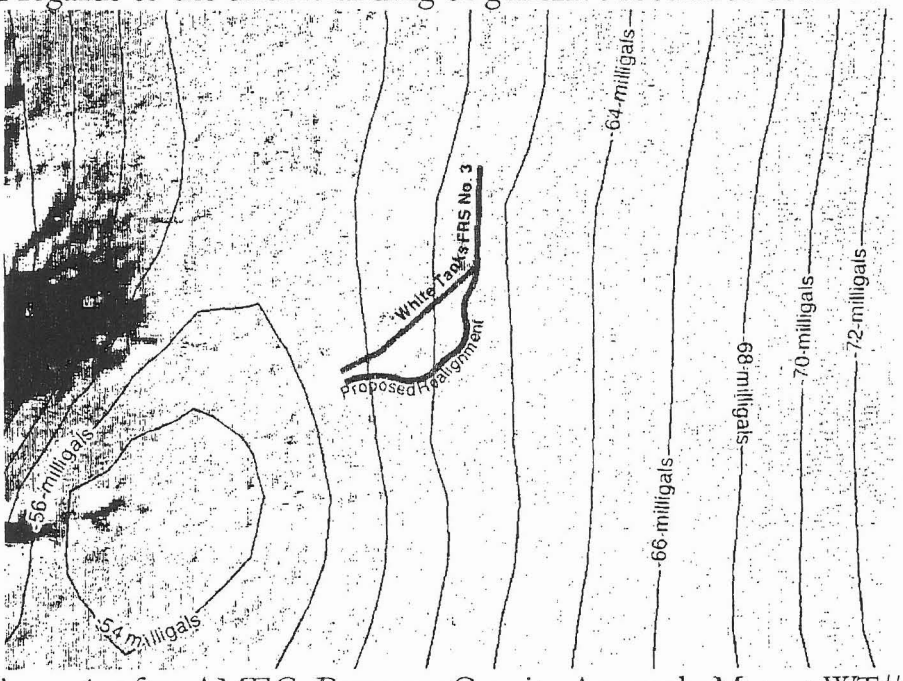



Figure 1, after AMEC Bouguer Gravity Anomaly Map at WT#3

Ground subsidence caused by groundwater decline occurs due to a change in vertical stress. There is a stress increase as declining groundwater levels cause soil particle weight to go from a state of buoyancy to the weight of the particles in air. For most soils, the change in stress in terms of unit weight is 62.4 pcf per foot of groundwater decline. Over a unit area this produces a vertical stress change of 62.4 psf. Since only effective stresses are applied particle to particle, it is change in effective stresses that must be considered. In other words, soil particles only transmit effective stresses.

All soils react to a change in effective stress. If the stress is increasing, the particles move closer together. The move closer produces increased resistance to stress. The more solid particles that are packed into a unit volume the greater will be the resistance to additional compression. Whether sand or clay, all particulate soil systems have the same response, to move to a stronger and denser configuration when stressed. Early soil mechanics researchers depicted this phenomena using e – lop P curves, Figure 2, McCarthy 2000. This format was used in part because it was recognized early that soils retain some of the density and strength when the stresses are removed. The use of a semi-log plot of void ratio and log effective stress produced a graphical depiction of the previous stress history, Figure 2. Point D represents the stress level of the maximum past vertical effective stress that this sample has ever experienced. There are several other techniques using oedometer data

such as depicted on Figure 2 to obtain the maximum past effective stress. All these techniques require an applied stress that is much greater than the maximum past effective stress value. The precision of these techniques is always open to interpretation.

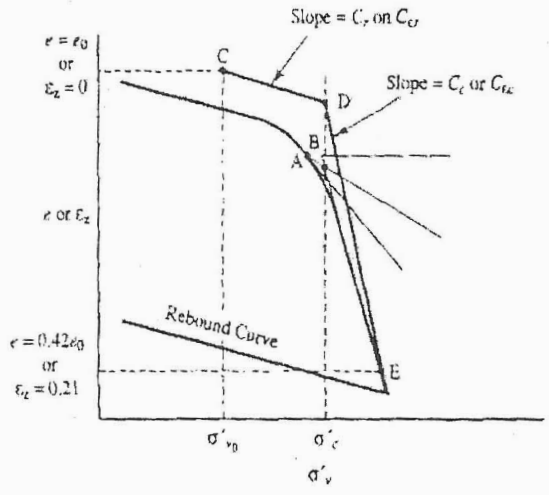



Figure 2, Field curve construction from oedometer data, after McCarthy.

The most common manipulation of the oedometer data is also shown on Figure 2. The segments noted as Slopes Cr and Cc and containing points C, D, and E define the "field curve". The purpose of this curve is to improve the prediction of compressibility by adjusting for sample disturbance. With dense and cemented soils the field curve construction will likely still fail to correctly represent the relationship between compressibility and stress. The effects of sample disturbance may not be removed until very high stresses have been applied. Loading well above 64,000 psf may be required before the maximum past effective stress may be determined.

Discussions concerning soil oedometer data such as shown on Figure 2 sometimes refer to increased soil compressibility once the stresses exceed the maximum vertical effective stress value. It is incorrect to interpret figures such as Figure 2 as showing increased compressibility past the maximum stress value. In fact the soil's resistance to compression only increases as the applied stress is increasing. The error in interpreting oedometer data springs from losing sight of the fact that stress is plotted on a log scale and failing to understand the mechanisms that are at work when soil particles are subjected to increasing stress. Another way to present oedometer data can be seen in Figure 3, Hanson 1989. Figure 3 shows soil strain, one representation of resistance to compression, versus stress plotted on an arithmetic scale. The stress is increased from Point A to B then reduced to point C. Finally the stress is increased until the value of applied effective stress exceeds the maximum past. Figure 3

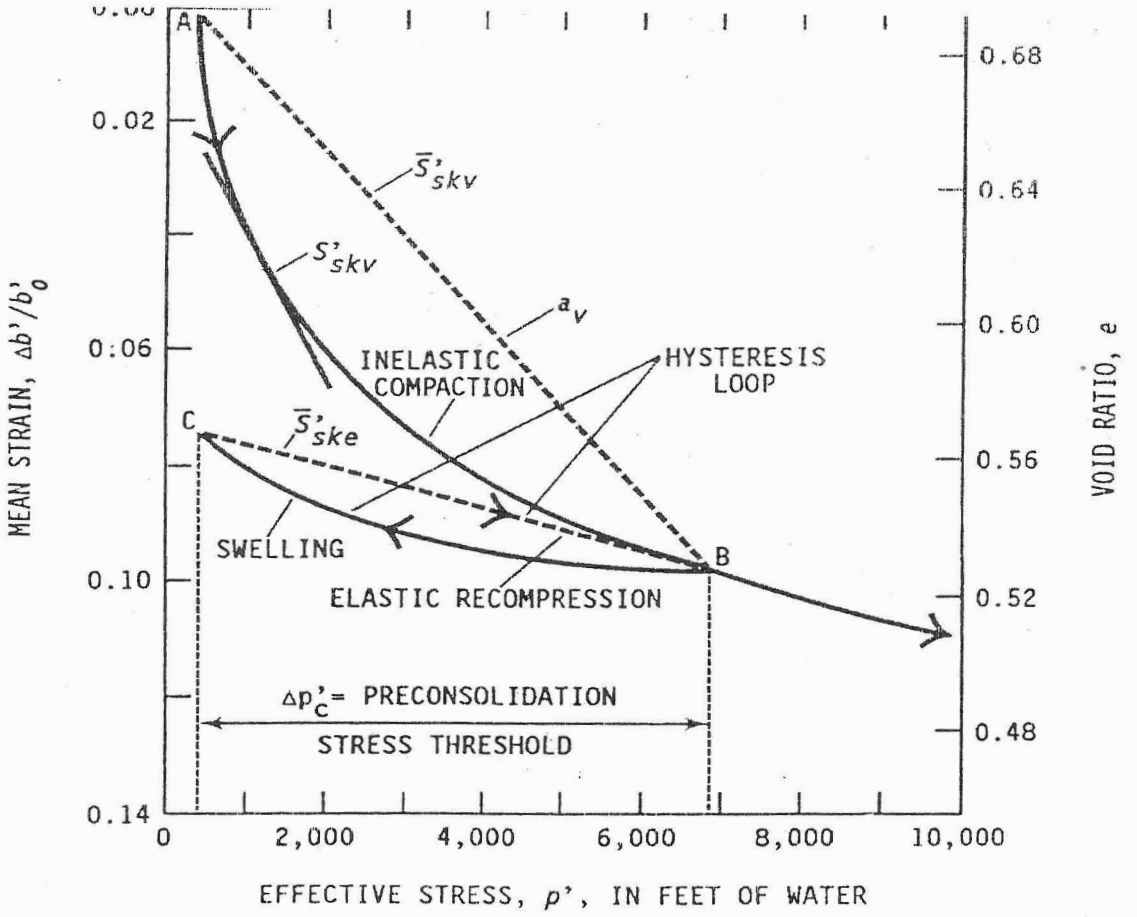



**Figure 7.--Idealized stress-mean strain relation on linear coordinates for a saturated volume element of compacting clay (modified from Helm, 1974, 1975).**

Figure 3, Oedometer data plotted with arithmetic scale, after Hansen, 1989.

correctly shows that resistance to compression only increases as the vertical stress is increased. Figure 3 has some interesting terms such as "elastic recompression" and inelastic compaction" that some would argue are inappropriate terms describing volume stress relationships for soils. The use of these terms aside, Figure 3 correctly represents the relationship between increasing resistance to compression and both stress history and increasing vertical effective stresses.

The relationship between stress and increasing resistance to compression exists for all particulate materials including clays and sands,. Taylor presented oedometer data for both types of soils, Figures 4 and 5, Taylor 1948.

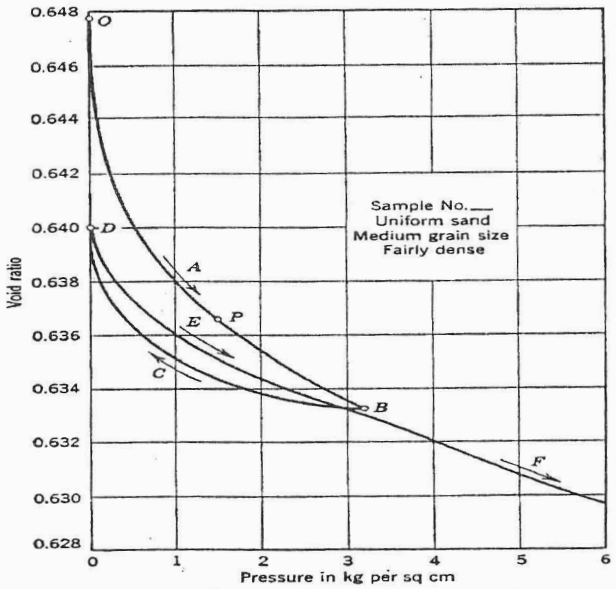



FIG. 10·3 Compression diagram for sand.

Figure 4, Sand compressibility, after Taylor 1948

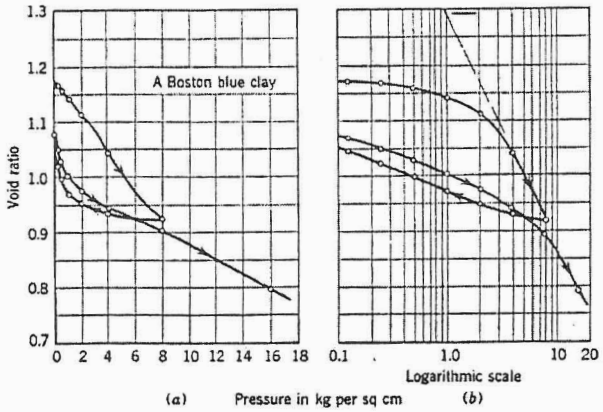



FIG. 10·5 Compression diagrams for clay.

Figure 5, clay compressibility shown in semi-log and arithmetic scales, after Taylor 1948.

Both Figures 4 and 5 present data at very low stress levels compared to the soils below WT#3. These figures do, however, show clearly the trend of increasing resistance to compression as the soils densify in response to previous stresses. Because of the low stress levels Taylor's figures approximate a linear segment after reloading. He understood that both curves become concave upward as stresses continue to increase, Taylor 1948.

The paucity of data on deep soils at the location of WT#3 and the damage caused by sampling dense and cemented soils requires the use of caution when describing specific soil behavior. The Palo Verde Nuclear Generating Station (PVNGS) was the

first soil site to be awarded an operating license in the US. The geotechnical investigation for this project took place from 1972 through 1976. During this investigation borings were drilled to "basement" formations including fanglomerate deposits similar to those described as typical for the LAU lying below WT#3.

Oedometer data was compiled for the soils lying below the PVNGS in order to predict rebound, settlement, and subsidence at the site. Coupled with the oedometer data were subsurface geophysical logs used to establish, in part lithologic variations, and continuity of soil and basement units. Actual rebound, settlement, and subsidence predictions fell well within the predicted ranges. The oedometer data was subject to the sampling disturbance facing dense/stiff and cemented soils. Figure 6 represents stiff clay "undisturbed" laboratory compressibility.

A field curve should not be constructed for this sample which came from a depth of 210 feet below the ground surface. It would not be appropriate since the maximum applied stress of 64,000 psf was not sufficient to define the compressibility past the maximum vertical effective stress. At a depth of 210 feet the calculated pre-construction vertical stress would be approximately 29,000 psf. A conservative estimate of the past maximum vertical effective stress from Figure 6 would be in the range of 30,000 to 40,000 psf (conservative by the assumption that had the curve been extended past 64,000 psf the point of maximum curvature would still be in the vicinity of where it is on the laboratory curve as shown). The difference between the calculated and laboratory curve based values of overburden and maximum past stresses is evidence of the cementation described in boring logs. Cementation is one of the soil conditions that produces an indication of higher than actually applied maximum past pressure. For Figure 6 the sample disturbance produced a higher than actually seen prediction of settlement, Fugro 1976.

The data presented in Figure 6 is also useful in the prediction of subsidence at WT#3 for the rebound portion of this and similar test specimens yields a representative compressibility versus effective stress relationship for soils similarly placed. The rebound reloading curve represents the loading properties of similar soils when the groundwater is lowered. This reloading curve describes, in a conservative fashion, the behavior of the cemented and overconsolidated soils below WT#3.

Some insight into the complexity of the soils can be gained by examining Figure 7, This figure shows the highly stratified and cemented nature of soils deposited close to source areas.

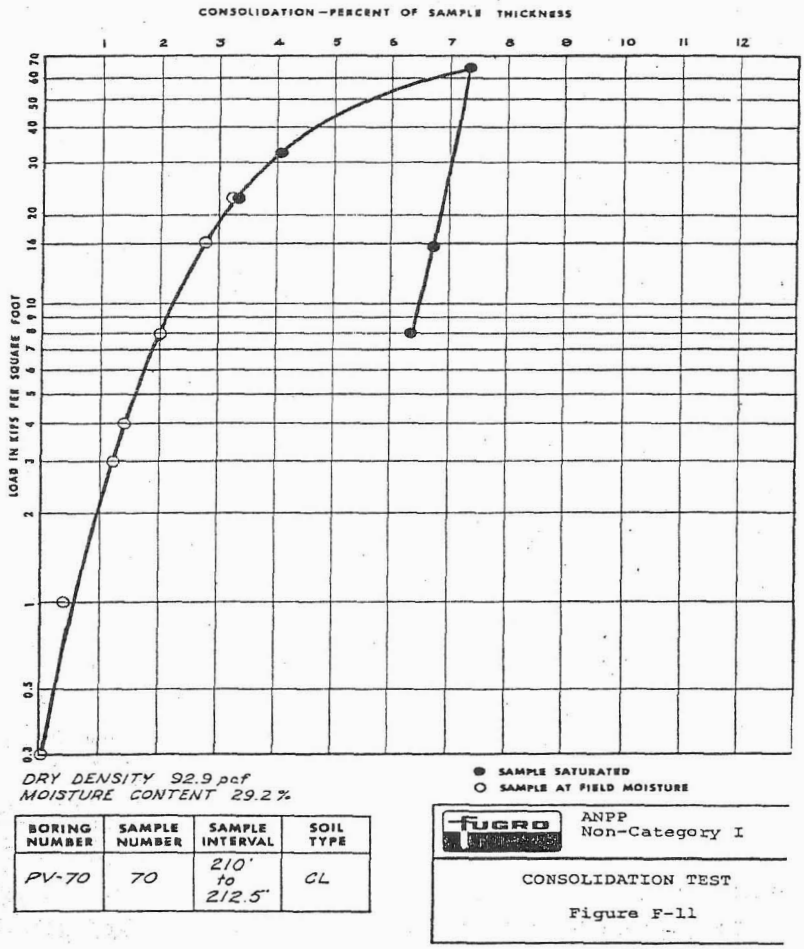



Figure 6, Deep soil sample oedometer data from ANPP project, after Fugro, 1974.

The soils below WT#3 are believed to be similar to those found at the ANPP site. The stiff and cemented nature of these soils reflects the depositional environment which likely included dessication and groundwater fluctuations. The oedometer data in Figures 5 and 6 may be reflecting past stresses or cementation. Either mechanism could contribute to resistance to compression.

Any summary of the soils below the WT#3 would have to include that they are dense or stiff depending upon particle size distributions and cemented. In addition stratification and the inclusion of granular units facilitates the lateral movement of water. Therefore, the buildup of excess pore pressures during water level drops is short lived.

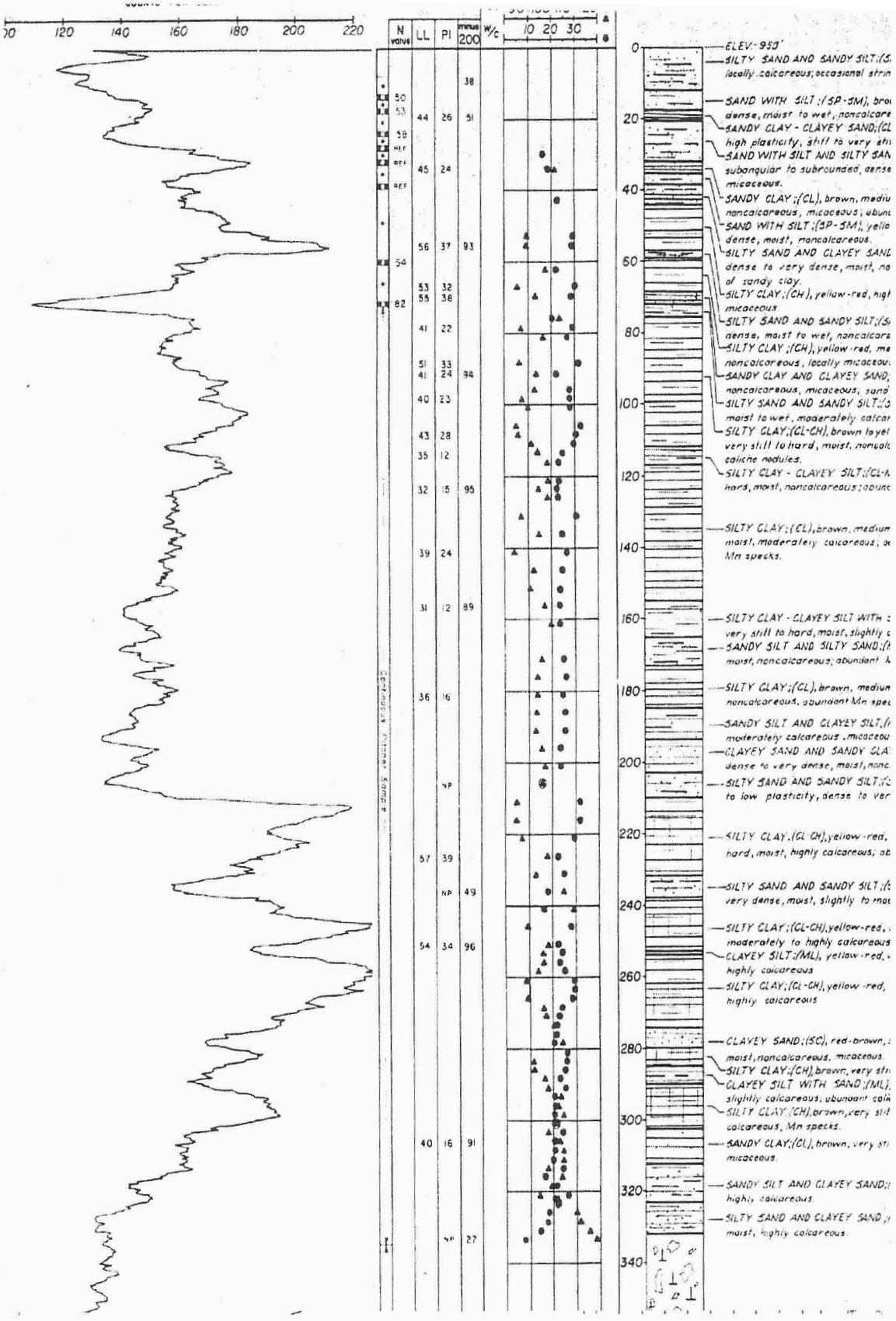



Figure 7, ANPP typical boring log showing density/stiffness and stratification, after Fugro, 1974.

2801 West Durango Street Phoenix, Arizona 85009 Phone: 602-506-1501 Fax: 602-506-4601

The dewatered soils will be in equilibrium once any excess pore water pressures that have been generated are dissipated and soil fabric changes cease. The rate of dissipation of pore water pressures is a function of permeability, drainage distances, and stress history of the soil. Classic soil mechanics theories for predicting times to dissipate the excess pore water pressures are not well suited to soil columns as complex as those found below WT#3 and other soils columns in the Basin and Range province of Arizona. There is, however, a clear indication available of the time required to reach equilibrium. That indication lies in the shapes of the groundwater elevation change compared to ground subsidence with time. If the subsidence closely follows the water level decline then equilibrium is reached rather quickly. It must be noted however, that the times to reach equilibrium reflect the entire soil column, not just the soils already dewatered. This time to equilibrium for the entire soil column is much more useful that just knowing how the dewatered soils reach equilibrium. Figure 8, though under reporting subsidence prior to 1980, provides soil surface changes as the groundwater drops and the matching curve shape shows no significant time lag between the two.

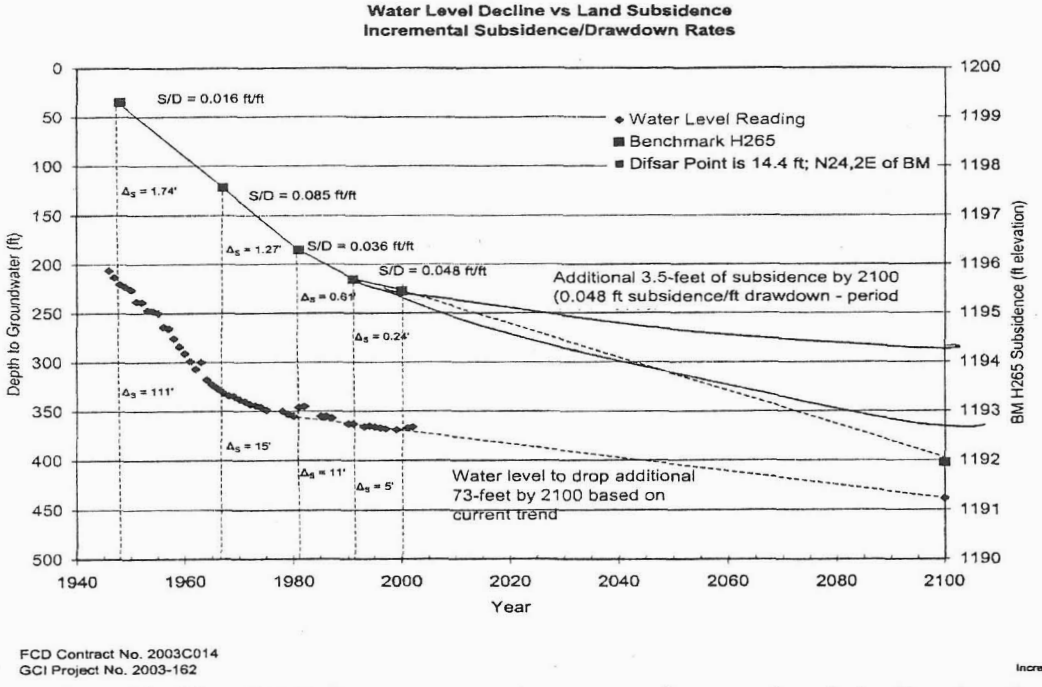



Figure 8, Provided by URS showing subsidence and water level decline by time

Without deep boring information one must rely on adjacent data, typical soil compressibility data, and site deformations. The ANPP site provides some adjacent site information. Typical soil compressibilities can be found in the literature, and the ANPP physical testing. Holtz and Kovacs presented typical void ratio versus stress from previous work, Figure 9.

In order to predict future subsidence general soil compressibilities need to be known. It is impossible to characterize the soils on an individual layer by layer basis because of the complexity, Figure 7. General soil properties must therefore be used. The use of general properties is appropriate since if the stresses are high enough soil compressibilities tend to become the same irrespective of particle size distributions, Figure 9.

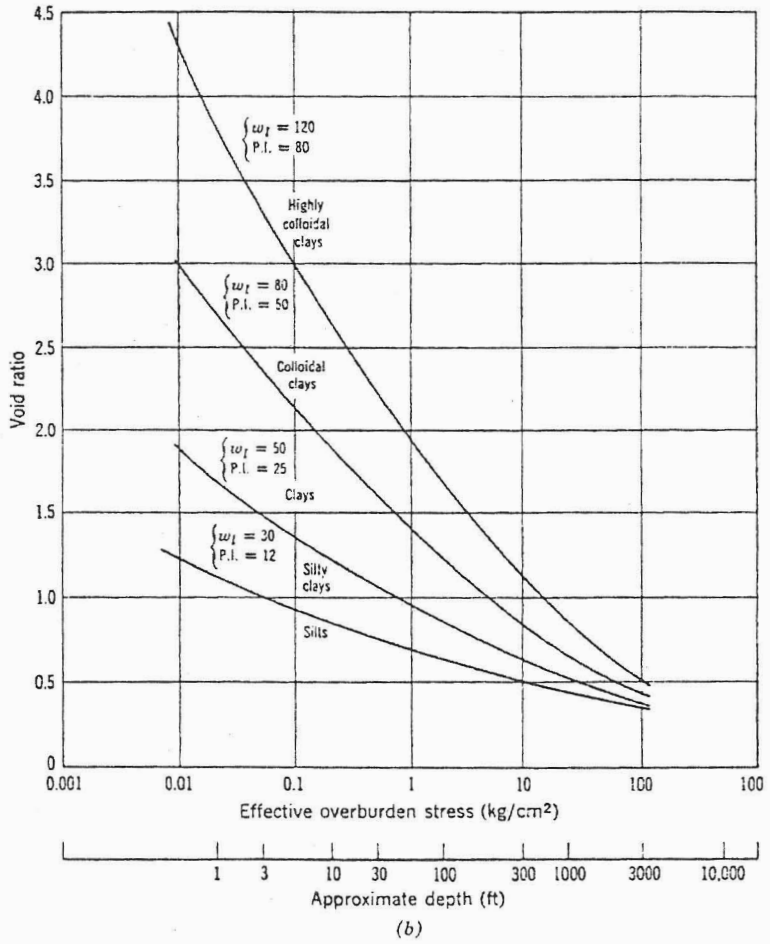



Figure 9, Typical soil void ratio versus stress after Holtz and Kovacs presenting Lamb and Whitman data from 1969

Figure 9 provides insight into how even soils primarily from the Eastern US provide a response to increasing stress that is similar.. This is reasonable since most earth crustial materials are chemically similar. The reason even clay minerals exhibit similar resistance is because of repulsive forces acting between identically charged particles, Figure 10.

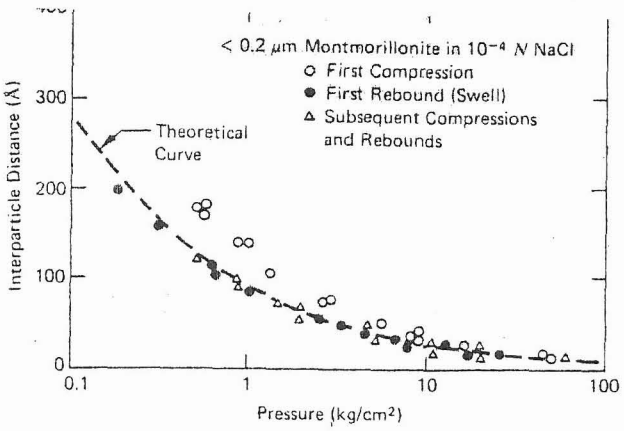



Fig. 13.13 Relationship between interparticle spacing and pressure for montmorillonite (From Warkentin, Bolt, and Miller, 1957).

Figure 10, Particle spacing versus stress for montmorillonite particles, after Mitchell 1976.

So what does this all mean? Well in part it means that it is not so important what we call the soil. Of much greater importance is the soil's stress history and the presence of chemical cementation. Soils that exist in arid regions are likely to be both overconsolidated by stress and exhibiting apparent overconsolidation systems due to cementation.

A comparison of four different soil compressibilities can be found on figure 11. The compressibility's were established by taking either e log p data (Silts and Clays from Figures 4 and 5 and the Battleford till) or strain versus stress from a sample taken from the ANPP boring PV70 from a depth of 210 feet. All data was converted to stress versus strain values. Unit strain (incremental strain divided by incremental stress) was then determined and plotted versus applied stress levels. There is an additional curve on Figure 11 that represents a composite curve that reflects the stiff and cemented soils below WT#3. This composite curve uses the soil stiffness observed at the ANPP site as a lower bound for the deeper sediments and the more compressible portions of the Lamb and Whittman silt and sand curves.

The composite curve was then used to predict past and future subsidence. The first subsidence prediction was for WT#3 when the water level dropped from approximately 200 ft to 365 ft below the ground surface. Using the composite curve from Figure 11, and assuming a compressible soil colum of 900 ft (The fanglomerate deposits below the MAU are rock like) a calculated value of subsidence of 3.6 feet was obtained. This compares to the observed value of 3.7 feet.

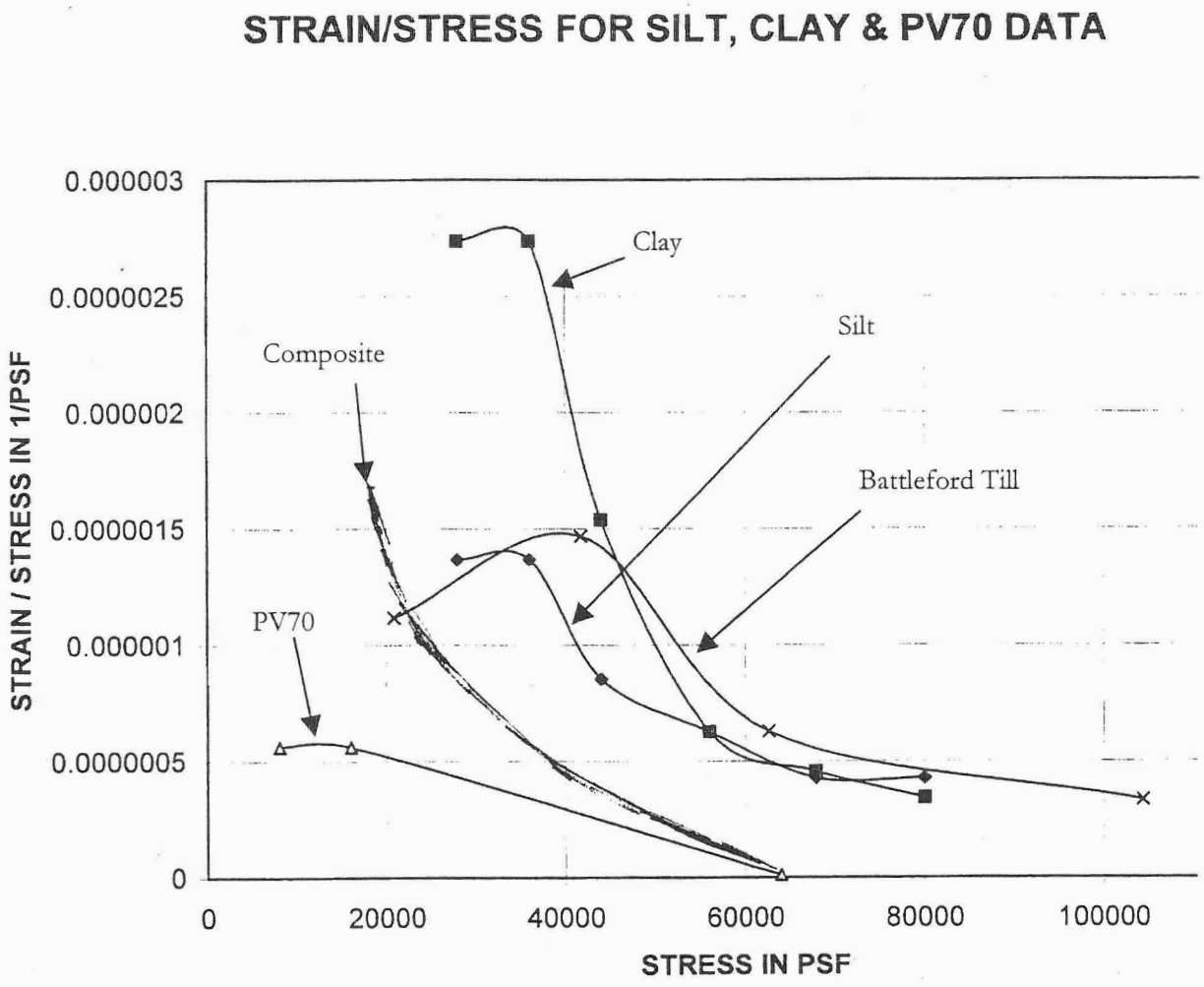



Figure 10, Compressibility versus effective stress for silts, clays, Battleford Till, and PV70 @ 210 ft.

The close correlation between calculated and observed subsidence validated the use of Figure 11 and enabled the next subsidence prediction to be made. Using the composite curve and a groundwater decline of an additional 150 feet a future value of subsidence of 0.7 feet was calculated. The significance of this value extends not only to the impacts on water retention behind WT#3 but to future potential for differential subsidence along the structure as well.

The predicted future subsidence value must be judged reasonable or not. The arguments that must be considered in answering the question of reasonableness need to consider the following:

- Once the groundwater drops all compressible sediments below densify. This contributes to subsidence but it also makes them more resistive to future subsidence.

- Once the groundwater falls below a soil unit it no longer contributes to future subsidence. This means that the thickness of compressible sediments is decreasing with each groundwater decline.

- All particulate materials will exhibit increasing resistance to compression as effective stresses are applied.

- The most compressible materials will generally be near the surface due to smaller overburden stress levels. Soils become less compressible with depth.

When these arguments are considered it is reasonable to expect the soils below WT#3 to be much more resistive to subsidence than in 1900 when the groundwater was approximately 170 feet below the surface.

A comparison of the composite compression relationship was made at Edwards Air Force Base at the Holly extensometer site. At Holly, the thickness of the soil column was approximately 800 ft and the groundwater decline from 22 to 145 feet below the surface produced a subsidence of 3.7 feet, USGS 2000,USGS 1994, USGS 1990. The calculated subsidence using the composite curve for WT#3 was 3.8 feet (a ratio of 1.03 predicted to observed).

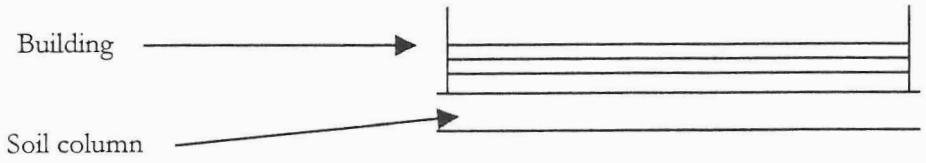
AMEC has been collecting ground subsidence data for the AEPCO generating station in Cochise county Arizona. By personal communication they have provided water level change and ground subsidence data to the District. At bench mark BM 6040 over a 25.5 year period there has been a water level change of approximately 86 feet. The resulting ground subsidence measured approximately 3.01 feet. The lithologic column is believed to be approximately 1000 to 1100 feet thick. Subsidence was calculated using Figure 11, a 1100 foot thick soil column, and a groundwater drop of 86 feet. The calculated value of subsidence that results from using these values is 2.91 feet. This compares very closely with the observed value of 3.01 feet ( a ratio of 0.97 predicted to observed)

The correlation between the EAFB and the AEPCO subsidence with the calculated values validates the use of a composite compressibility at WT#3. The correlation between calculated and predicted values at these three sites also validates the use of

Figure 11 to predict future subsidence as a result of groundwater mining. The appendix provides the spreadsheet calculations for the three case histories.

To better understand the history and the future subsidence at WT#3 an example that draws upon classical one-dimensional settlement theory may be helpful. This example needs to model a wide loaded area that has an increasing loading with time. This example is:
Assume that a multi story office building is being constructed with floors that each apply the same total force. This building is to be constructed on the existing ground surface. Also assume that this building is large relative to the thickness of soil below. Then plot settlement on a floor by floor basis for this site.

When calculated and plotted the theoretical shape of the settlement versus floor loading would have this general shape, Figure 12. One dimensional settlement theory developed by Taylor and his peers would predict this relationship.



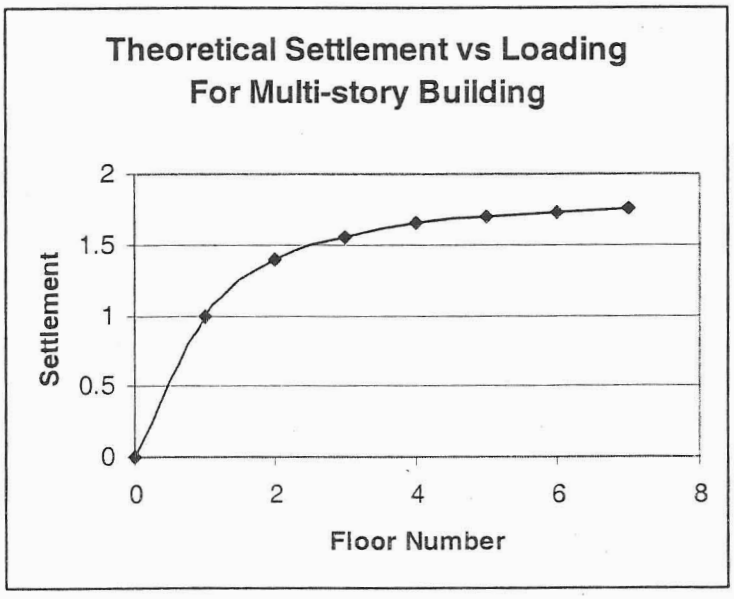




Figure 12, Building settlement example showing the classical total settlement versus loading curve shape.

During the period from 1948 to the present, ground surface elevations and water levels have been collected that are relative to the WT#3 location. Some of this early data is in error. The complexities involved in both elevation control and representative water levels are most likely the cause of these errors. This data is believed to be in error because when plotted as in Figure 12, a curve shape that is not theoretically possible results. This is fortunately not a serious problem because The total subsidence values are all that is necessary to asses future subsidence. The total magnitudes of subsidence that are relied upon in this analysis are believed to be accurate for several reasons including the survey information along the crest of WT#3, Figure 13 and the regional groundwater records. The preponderance of data show that with approximately a 165 ft decline in groundwater there has been approximately 3.7 ft of ground subsidence in the vicinity of WT#3.

amec

**Figure 9**
**White Tanks FRS No. 3**
**Crest Monument Elevations**

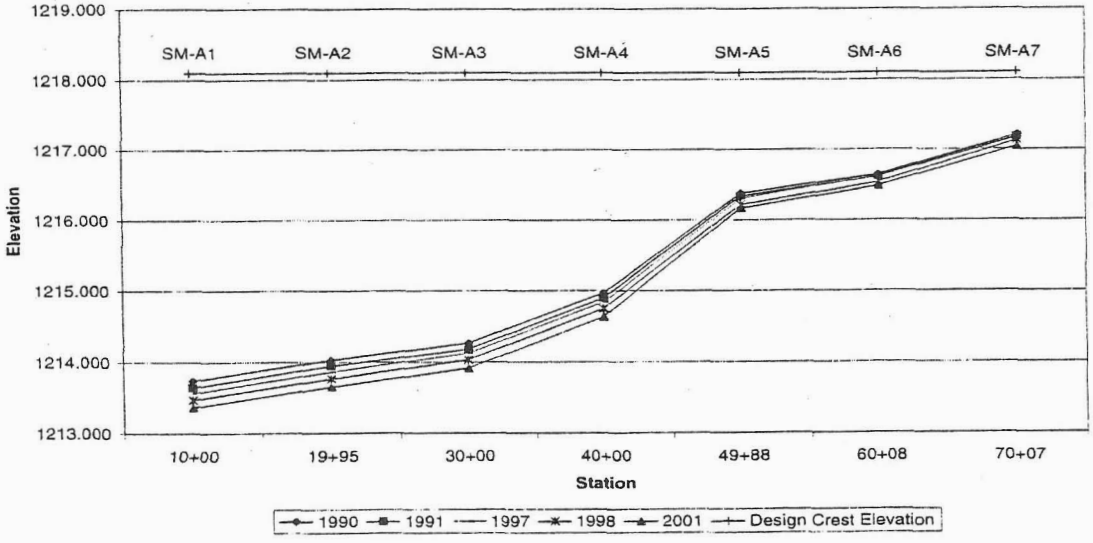



Figure 13, Crest elevations at White Tanks #3, after AMEC

In summary:

The soils below WT#3 are stratified, stiff, and most likely cemented materials that do not allow appreciable time dependent excess pore pressures to persist.

The future subsidence will be much less than that which has already occurred for three reasons:

1) The soils have become denser due to previous groundwater declines.

2) There is a shorter soil column remaining to compress under future groundwater declines.

3) The most compressible soils were near the surface and those that remain to experience additional increases in stress are the strongest and least compressible.

A groundwater decline of 150 ft will produce additional subsidence of less than one foot in the near vicinity of WT#3. White Tanks #3 will be designed for 1.0 foot of subsidence with the provision that the structure can be raised an additional 1.0 foot should that be required in the future.

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# FINAL MEMO SUBSIDENCE CALCULATIONS FOR WT#3 BY D. DUFFY

UNIT WEIGHTS STARTING @ 135 PCF & BOUYANT
@ 76 PCF WITH SLIGHT INCREASES WITH DEPTH
VERTICAL EFFECTIVE STRESS BY YEAR OR FUTURE DROP

| DEPTH | YEAR 1948 | YEAR 2004 | 150' DROP |
|---|---|---|---|
| 200 | 27000 | 27000 | 27000 |
| 400 | 42200 | 53880 | 55200 |
| 600 | 58200 | 69115 | 77870 |
| 800 | 73800 | 84075 | 93870 |

STRAIN FROM VOID RATIO DATA FOR SILTS & CLAYS FROM Lamb & whitman 1969

| STRESS PSF | SILT e | CLAY e | SILT STRAIN | CLAY STRAIN | SILT STRAIN/ STRESS | CLAY STRAIN/ STRESS |
|---|---|---|---|---|---|---|
| 28000 | 0.462 | 0.55 | 0 | 0 | 0 | 0 |
| 36000 | 0.446 | 0.518 | 0.010943912 | 0.021887825 | 1.36799E-06 | 2.73598E-06 |
| 44000 | 0.436 | 0.5 | 0.017783858 | 0.034199726 | 8.54993E-07 | 1.53899E-06 |
| 56000 | 0.425 | 0.489 | 0.025307798 | 0.041723666 | 6.26995E-07 | 6.26995E-07 |
| 68000 | 0.4175 | 0.481 | 0.030437756 | 0.047195622 | 4.27497E-07 | 4.55996E-07 |
| 80000 | 0.41 | 0.475 | 0.035567715 | 0.05129959 | 4.27497E-07 | 3.41997E-07 |

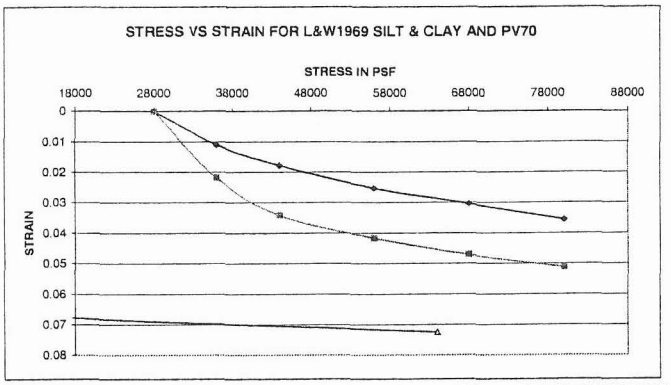
CONVERT L & W TO STRAIN

| STRESS PSF | SILT STRAIN | CLAY STRAIN |
|---|---|---|
| 28000 | 0 | 0 |
| 36000 | 0.010943912 | 0.021887825 |
| 44000 | 0.017783858 | 0.034199726 |
| 56000 | 0.025307798 | 0.041723666 |
| 68000 | 0.030437756 | 0.047195622 |
| 80000 | 0.035567715 | 0.05129959 |

PV70 REBOUND STRESS VS STRAIN

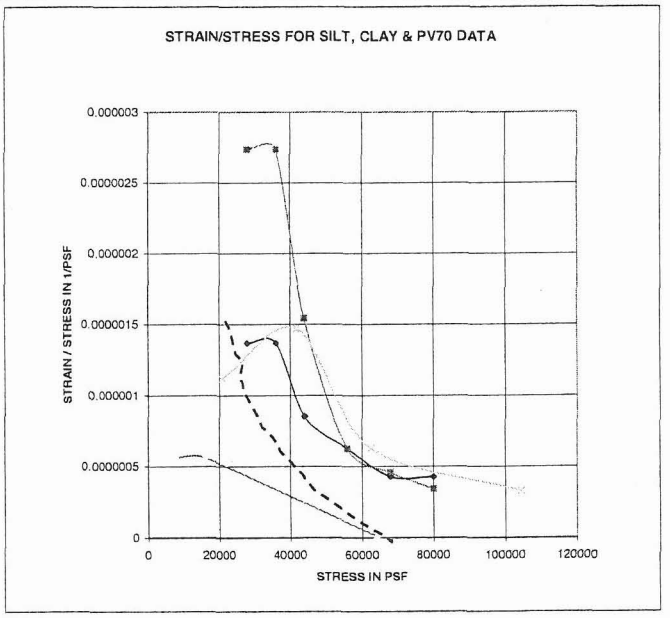
| STRESS PSF | STRAIN | DELTA STRAIN | STRAIN/ STRESS |
|---|---|---|---|
| 8000 | 0.063 | 0 | 0 |
| 16000 | 0.0675 | 0.0045 | 5.625E-07 |
| 64000 | 0.0725 | 0.005 | 1.04167E-08 |

| STRESS PSF | SILT STRAIN/ STRESS | CLAY STRAIN/STRESS |
|---|---|---|
| 28000 | 1.36799E-06 | 2.73598E-06 |
| 36000 | 1.36799E-06 | 2.73598E-06 |
| 44000 | 8.54993E-07 | 1.53899E-06 |
| 56000 | 6.26995E-07 | 6.26995E-07 |
| 68000 | 4.27497E-07 | 4.55996E-07 |
| 80000 | 4.27497E-07 | 3.41997E-07 |




PV70 CONVERTED TO STRAIN
RELOAD DATA

| STRESS PSF | STRAIN/ STRESS |
|---|---|
| 8000 | 5.625E-07 |
| 16000 | 5.625E-07 |
| 64000 | 1.04167E-08 |




BATTLEFORD TILL FROM H & K

| STRESS PSF | e | STRAIN | STRAIN/ STRESS |
|---|---|---|---|
| 2000 | 0.374 | 0.001459854 | 6.72744E-07 |
| 4170 | 0.372 | 0.001459854 | 6.72744E-07 |
| 7727.652464 | 0.37 | 0.002919708 | 4.10342E-07 |
| 10442.7736 | 0.36 | 0.010218978 | 2.68838E-06 |
| 20885.5472 | 0.33 | 0.02189781 | 1.11836E-06 |
| 41771.0944 | 0.302 | 0.052554745 | 1.46785E-06 |
| 62656.6416 | 0.284 | 0.065693431 | 6.2908E-07 |
| 104427.736 | 0.265 | 0.079562044 | 3.32015E-07 |

PLOT BATTLEFORD TILL
STRAIN/STRESS VALUES

| STRESS PSF | STRAIN/ STRESS |
|---|---|
| 2000 | 6.72744E-07 |
| 4170 | 6.72744E-07 |
| 7727.652464 | 4.10342E-07 |
| 10442.7736 | 2.68838E-06 |
| 20885.5472 | 1.11836E-06 |
| 41771.0944 | 1.46785E-06 |
| 62656.6416 | 6.2908E-07 |
| 104427.736 | 3.32015E-07 |

CALCULATE SETTLEMENTS FOR WT#3 AND EAFB HOLLY SITE

| WT#3 SUBSIDENCE IN FT SECTION | COMPOSITE | HOLLY SUBSIDENCE IN FT SECTION | COMPOSITE |
|---|---|---|---|
| A | 1.49 | A | 1.05 |
| B | 1.18 | B | 1.77 |
| C | 0.62 | C | 0.66 |
| D | 0.31 | D | 0.33 |
| TOTAL = | 3.59 | TOTAL = | 3.82 |

NOW PREDICT SUBSIDENCE FOR ANOTHER 150'

| WT#3 | WITH COMPOSITE CURVE |
|---|---|
| A | 0.00 |
| B | 0.21 |
| C | 0.35 |
| D | 0.19 |
| TOTAL = | 0.74 FT |

AEPCO SUBSICDENCE CHECK

| DEPTH (FT) | INITIAL STRESS | 86' DROP STRESS | STRAIN/ STRESS | SUBSIDENCE IN FT |
|---|---|---|---|---|
| 82 | 10660 | 10660 | | |
| 168 | 15820 | 22176 | 0.0000019 | 0.43843488 |
| 200 | 17540 | 24096 | 0.0000016 | 1.13338368 |
| 400 | 29740 | 36328 | 0.0000007 | 0.751296 |
| 600 | 42258 | 48528 | 0.0000004 | 0.429312 |
| 800 | 54458 | 60728 | 0.0000001 | 0.107328 |
| 1000 | 66822 | 73760 | 0.00000005 | 0.053664 |
| | | TOTAL = | | 2.91341856 |

# APPENDIX C

# CALCULATION PACKAGES – HYDROLOGY AND HYDRAULICS: GENERAL

# INDEX OF HYDROLOGY AND HYDRAULICS CALCULATION PACKAGES (GENERAL)

**(WHITE TANK FLOOD RETARDING STRUCTURE NO. 3 REMEDIATION DESIGN STUDY)**

| Index Number | Title |
|---|---|
| C-1 | REVIEW OF TR-20 MODELS |
| C-2 | ESTIMATION OF CURVE NUMBERS FOR DIFFERENT BASIN AREAS OF WHITE TANK FRS NO. 3 WATERSHED WITH AN ANTICIPATION OF FUTURE URBAN GROWTH |
| C-3 | ESTABLISHMENT OF ELEVATION-SPILLWAY DISCHARGE RATING CURVE FOR A BROAD-CRESTED WEIR |
| C-4 | DEVELOPMENT OF ELEVATION-STORAGE CURVE AT THE WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3 |
| C-5 | INFILTRATION RATE ESTIMATION FOR WHITE TANK FRS NO. 3 RESERVOIR |
| C-6 | ESTIMATION OF 200- AND 500-YEAR RAINFALL DEPTHS FOR DIFFERENT DURATIONS FOR THE WHITE TANK FRS NO. 3 WATERSHED |
| C-7 | RESERVOIR ROUTING OF A 100-YEAR, 200-YEAR & 500-YEAR 24-HOUR HYDROGRAPHS FOR INTERIM CONDITION |
| C-8 | RESERVOIR ROUTING OF A 100-YEAR, 200-YEAR & 500-YEAR 24-HOUR HYDROGRAPHS FOR FUTURE CONDITION (PRINCIPAL SPILLWAY CLOSED) |
| C-9 | RESERVOIR ROUTING OF A 100-YEAR, 200-YEAR & 500-YEAR 24-HOUR HYDROGRAPHS FOR FUTURE CONDITION (PRINCIPAL SPILLWAY OPEN) |
| C-10 | ESTIMATION OF THE PRINCIPAL SPILLWAY CAPACITY AT WHITE TANK FRS NO. 3 REMEDIATION PROJECT |
| C-11 | ESTIMATION OF THE GATED OUTLET CAPACITY AT WHITE TANK FRS NO. 3 REMEDIATION PROJECT |
| C-12 | LEVEL POOL RESERVOIR CALCULATIONS AT WHITE TANK FRS NO.3 RESERVOIR |
| C-13 | SUBMERGENCE EFFECTS AT WHITE TANK FRS NO.3 SPILLWAY |
| C-14 | ESTIMATION OF UNIFORM FLOW DEPTH D/S OF WHITE TANK FRS NO. 3 EMERGENCY SPILLWAY |
| C-15 | WAVE RUNUP AND FREEBOARD ESTIMATION AT WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3 |
| C-16 | EVALUATION OF REDUCED STORAGE IMPACTS AT WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3 |

URS

# CALCULATION PACKAGE NO. C-1

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: Review of TR-20 Models

Total Number of Pages (including cover sheet):

Total Number of Computer Runs:

Prepared by: Hammad Hussain Date: 04/22/04

Checked by: Todd Ringsmuth Date: 5-2-04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results: no comments

See Pages 2-4.

Calculation Approved by: 5/19/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# REVIEW OF TR-20 MODELS

(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
23443748

## PROBLEM STATEMENT

The aim of this review package is to review the TR-20 models developed by Natural Resources Conservation Services (NRCS) for the hydrologic analysis of the White Tank Flood Retarding Structure (FRS) No. 3 watershed, and to document any discrepancies.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

NRCS developed these TR-20 models while performing the hydrologic analysis of the White Tank FRS No. 3 watershed in August 1998. NRCS documented its design basis criteria and final results in a report titled as *"Hydrologic Analysis of the White Tank Mountains on Flood Retarding Structure # 3"*, August 1998 (See Page 5).

The NRCS generated 100-year, 24-hour runoff hydrograph using the TR-20 computer model and then routed it through the White Tank FRS No. 3 watershed. Summary of 100-yr, 24-hr design storm is provided in Table II of the NRCS report (See Page 6).

NRCS also developed PMF flood hydrographs based on PMP distributions for 6-hr Local and 6-, 12-, 18-, 24-, 48- and 72-hr General Storms using TR-20. In addition, NRCS also developed PMF inflow hydrograph for Emergency Spillway (ESH) and a 100-year 10-day inflow hydrograph for the Principal Spillway. All of these inflow hydrographs were routed through the reservoir and the peak inflows and outflows are summarized in Table III of NRCS report (See Page 7).

The electronic files of these TR-20 models were submitted to URS by Flood District. As a part of its scope of work, URS reviewed these TR-20 models and the results founded are summarized in the following table.

## RESULTS

The Flood District provided URS with input files as well as output files for all TR-20 models. First, URS opened up these output files and compared the peak inflows with the ones tabulated in NRCS 1998 report and found an exact agreement between them (See Table 1 and Pages 18-27).

URS then generated the new output files by executing the latest input files using TR-20 model and found out minor discrepancies in comparison with NRCS tabulated results for 6-, 12-, 48-, 72-hr general PMF storms, Emergency Spillway Hydrograph (ESH) and 100-year, 24-hour storm (See Table 1 and Pages 8-17). Although these discrepancies are of minor nature, URS has documented them as a part of its review of TR-20 models.

## Table 1: Summary of TR-20 Review

| Storm | Peak Inflows (NRCS Report, August 1998) | Peak Inflows (FCDMC Provided Output Files) | Peak Inflows (Results Based on Execution of Latest Input Files) |
|---|---|---|---|
| 6-Hour Local PMP | 66122 | 66122 | 66122 |
| 6-Hour General PMP | 34212 | 34212 | **34216** |
| 12-Hour General PMP | 32435 | 32435 | **32278** |
| 18-Hour General PMP | 26905 | 26905 | 26905 |
| 24-Hour General PMP | 23800 | 23800 | 23800 |
| 48-Hour General PMP | 31819 | 31819 | **31696** |
| 72-Hour General PMP | 32300 | 32300 | **32296** |
| 100-Year, 24-hour | 10835 | 10835 | **10468** |
| Emergency Spillway Hydrograph (ESH) | 21685 | 21685 | **21674** |
| Principal Spillway (100-year 10-Day) | 3290 | 3290 | 3290 |

15448-005-058 (S)
3.0

# HYDROLOGIC ANALYSIS

# OF THE WHITE TANK MOUNTAINS

# ON FLOOD RETARDING STRUCTURE #3

Prepared By

Water Resources Planning,
Arizona State Office

NATURAL RESOURCES CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

Revised August, 1998

TABLE II
100 YEAR, 24 HOUR DESIGN STORM
INPUT PARAMETER AND 100-YR DISCHARGE COMPARISONS

| ydrologic Parameters | NRCS | WLB |
|---|---|---|
| orm Frequency | 100-yr | 100-yr |
| uration | 24 hr | 24 hr |
| ainfall Amount (inches) | 4.19 (3.85 in w/ areal red) | 4.03 (3.82 in w/areal red) |
| abulation Interval | 6 min. | 5 min. |
| oss Rate | Curve Number | Green-Ampt |
| ainfall Distribution | SCS Type II | SCS Type II |
| real Reduction by: | Hydro 40 | NOAA Atlas II |
| ydrograph Development | SCS Unit Hydrograph<br>Peak Rate Factor determined from WLB Unit Graphs | COE Phoenix<br>Valley S-graph |
| outing Method | Modified Att-Kin<br>(BOSSHEC-2 XS) | Normal Depth |
| omputer Model | TR 20 | HEC-1 |
| ſa: Time Increment | 3 min. | 5 min. |

00-Year Peak Discharge in CFS (CSM):

| ocation | NRCS | WLB |
|---|---|---|
| nflow to White Tank<br>RS #3 | 10835 (529) | 8120 (394) |

Channel routings include proposed design improvements to the inlet of FRS #3 and extending north to Olive Avenue. Transmission losses for the 100-yr discharge have not been considered, nor have the storage effects of he Caterpillar/Case Proving Grounds. Peak Discharge for the 100-year event is shown for comparison to the ther models and assumptions. The primary input parameters: subbasin areas, curve numbers, Time of oncentration, and routing cross sections are used in the PMP studies.

## 3.4 Results

TABLE III. Peak Design Flood Discharges to White Tanks FRS #3 Reservoir

| ocation | | Inflow to White Tanks FRS #3 | | | Outflow from White Tanks FRS #3[1] | | |
|---|---|---|---|---|---|---|---|
| TORM | Drainage Area (sq. miles) | Peak Q cfs (csm) | T Peak hr. | Volume Acre Feet | Peak Q cfs (csm) | T Peak hr. | Stage feet |
| hr Local PMP | (16.89) | 66122 (3915) | 2.75 | 9202 | 21985 (1302) | 3.91 | 1213.9 |
| hr General PMP | (19.92) | 34212 (1717) | 2.86 | 6913 | 13786 (692) | 5.31 | 1212.9 |
| 2 hr General PMP | (19.83) | 32435 (1636) | 5.47 | 9142 | 16394 (827) | 7.40 | 1213.2 |
| 3 hr General PMP | (19.75) | 26906 (1362) | 6.90 | 10327 | 20304 (1028) | 8.32 | 1213.7 |
| 4 hr General PMP | (20.07) | 23800 (1186) | 8.84 | 11229 | 19612 (977) | 10.53 | 1213.6 |
| 8 hr General PMP | (19.92) | 31818 (1597) | 18.16 | 13411 | 19279 (968) | 19.37 | 1213.5 |
| 2 hr General PMP | (19.89) | 32300 (1624) | 27.13 | 14225 | 21903 (1101) | 27.91 | 1213.9 |
| Emergency Spillway | (20.49) | 21685 (1059) | 2.83 | 3567 | 2683 (131) | 6.57 | 1211.0 |
| rincipal Spillway | (20.49) | 3290 (161) | 119.9 | 1614 | 1.7 (.0) | 243 | 1205.8 |

/ Peak outflow discharges and stage is assuming emergency spillway remains 800 feet of earth fill with pillway elevation at 1210.0. After final spillway design, outflow hydrographs will be recompiled and added to eport.

nflow Design Hydrographs (IDF) for sizing the Principal Spillway, Alternate Principal Spillway, Emergency Spillway, and Dam Freeboard are shown in Appendix C and are labeled as Figures 3.4a, 3.4b, 3.4c, and 3.4d espectively.

(Output Results Based on Latest Runs By URS) (87)

```
1WT3PMP6 TR20ECON03/04/**15:05:11
ECON2
TITLE        WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE        6HR LOCAL, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT
FLOW-FREQ    -1          21985.                                    ALT  1   1
FLOW-FREQ     1          17800.                                    ALT  1   2
FLOW-FREQ     2          16251.                                    ALT  1   3
FLOW-FREQ     3          28151.                                    ALT  1   4
FLOW-FREQ     4          12898.                                    ALT  1   5
FLOW-FREQ     5          30967.                                    ALT  1   6
FLOW-FREQ     6          14681.                                    ALT  1   7
FLOW-FREQ     7          20195.                                    ALT  1   8
FLOW-FREQ    10           7031.                                    ALT  1   9
FLOW-FREQ    12           4100.                                    ALT  1  10
FLOW-FREQ    20           4100.                                    ALT  1  11
FLOW-FREQ    25          11624.                                    ALT  1  12
FLOW-FREQ    30          16344.                                    ALT  1  13
FLOW-FREQ    34          13380.                                    ALT  1  14
FLOW-FREQ    35          11000.                                    ALT  1  15
FLOW-FREQ    45          11000.                                    ALT  1  16
FLOW-FREQ    60          11211.                                    ALT  1  17
FLOW-FREQ    64          18510.                                    ALT  1  18
FLOW-FREQ    67           7514.                                    ALT  1  19
FLOW-FREQ    75          49543.                                    ALT  1  20
FLOW-FREQ    76          66122.  same as of NRCS 98 Report         ALT  1  21
FLOW-FREQ   199           6480.                                    ALT  1  22
FLOW-FREQ   200          12405.                                    ALT  1  23
```

(Outputs Results Based on Latest Runs By URS) (9)

```
1WT3PMP6 TR20ECON03/04/**15:29:36
ECON2
TITLE      WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE      6HR GENERAL, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT
FLOW-FREQ   -1          13748.                                    ALT  1   1
FLOW-FREQ    1           8202.                                    ALT  1   2
FLOW-FREQ    2           7157.                                    ALT  1   3
FLOW-FREQ    3          13026.                                    ALT  1   4
FLOW-FREQ    4           5646.                                    ALT  1   5
FLOW-FREQ    5          13620.                                    ALT  1   6
FLOW-FREQ    6           6363.                                    ALT  1   7
FLOW-FREQ    7           9195.                                    ALT  1   8
FLOW-FREQ   10           3645.                                    ALT  1   9
FLOW-FREQ   12           4100.                                    ALT  1  10
FLOW-FREQ   20           4100.                                    ALT  1  11
FLOW-FREQ   25           5631.                                    ALT  1  12
FLOW-FREQ   30           7524.                                    ALT  1  13
FLOW-FREQ   34           6758.                                    ALT  1  14
FLOW-FREQ   35          10858.                                    ALT  1  15
FLOW-FREQ   45          10839.                                    ALT  1  16
FLOW-FREQ   60           4825.                                    ALT  1  17
FLOW-FREQ   64          12860.                                    ALT  1  18
FLOW-FREQ   67           3491.                                    ALT  1  19
FLOW-FREQ   75          22309.                                    ALT  1  20
FLOW-FREQ   76          34216.  NRCS Report 34212 cfs            ALT  1  21
FLOW-FREQ  200           3540.                                    ALT  1  22
```

```
1WT3PMP12TR20ECON03/04/**15:30:50
ECON2
TITLE      WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE      12-HR GENERAL PMP, RESERVOIR INIT EMPTY W/100-YR SEDMNT
FLOW-FREQ    -1          16297.                                    ALT  1   1
FLOW-FREQ     1           6962.                                    ALT  1   2
FLOW-FREQ     2           6256.                                    ALT  1   3
FLOW-FREQ     3          11181.                                    ALT  1   4
FLOW-FREQ     4           4988.                                    ALT  1   5
FLOW-FREQ     5          11988.                                    ALT  1   6
FLOW-FREQ     6           4795.                                    ALT  1   7
FLOW-FREQ     7           8472.                                    ALT  1   8
FLOW-FREQ    10           3716.                                    ALT  1   9
FLOW-FREQ    12           4100.                                    ALT  1  10
FLOW-FREQ    20           4100.                                    ALT  1  11
FLOW-FREQ    25           5833.                                    ALT  1  12
FLOW-FREQ    30           7270.                                    ALT  1  13
FLOW-FREQ    34           7152.                                    ALT  1  14
FLOW-FREQ    35          11000.                                    ALT  1  15
FLOW-FREQ    45          11012.                                    ALT  1  16
FLOW-FREQ    60           4032.                                    ALT  1  17
FLOW-FREQ    64          13248.                                    ALT  1  18
FLOW-FREQ    67           3263.                                    ALT  1  19
FLOW-FREQ    75          20115.                                    ALT  1  20
FLOW-FREQ    76          32278.  32435 as of NRCS Report           ALT  1  21
FLOW-FREQ   199            252.                                    ALT  1  22
FLOW-FREQ   200           3128.                                    ALT  1  23
```

(11)

```
1WT3PMP18TR20ECON03/04/**15:31:37
ECON2
TITLE       WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE       18-HR PMP (MTI=.1), RESERVOIR INIT EMPTY W/100-YR SED
FLOW-FREQ    -1          26905.                                    ALT  1   1
FLOW-FREQ     1           4637.                                    ALT  1   2
FLOW-FREQ     2           4205.                                    ALT  1   3
FLOW-FREQ     3           7458.                                    ALT  1   4
FLOW-FREQ     4           3465.                                    ALT  1   5
FLOW-FREQ     5           8256.                                    ALT  1   6
FLOW-FREQ     6           3064.                                    ALT  1   7
FLOW-FREQ     7           5926.                                    ALT  1   8
FLOW-FREQ    10           3458.                                    ALT  1   9
FLOW-FREQ    12           4100.                                    ALT  1  10
FLOW-FREQ    20           4100.                                    ALT  1  11
FLOW-FREQ    25           5519.                                    ALT  1  12
FLOW-FREQ    30           6070.                                    ALT  1  13
FLOW-FREQ    34           7622.                                    ALT  1  14
FLOW-FREQ    35          11000.                                    ALT  1  15
FLOW-FREQ    45          11000.                                    ALT  1  16
FLOW-FREQ    60           2730.                                    ALT  1  17
FLOW-FREQ    64          13477.                                    ALT  1  18
FLOW-FREQ    67           2502.                                    ALT  1  19
FLOW-FREQ    75          14069.                                    ALT  1  20
FLOW-FREQ    76          26905.  Same as 7 NRCS 98 Report         ALT  1  21
FLOW-FREQ   199            722.                                    ALT  1  22
FLOW-FREQ   200           2067.                                    ALT  1  23
```

```
1WT3PMP24TR20ECON03/04/**15:32:24
ECON2
TITLE      WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE      24-HR PMP MTI=.1), RESERVOIR INIT EMPTY W/100-YR STOR
FLOW-FREQ    -1        19612.                                    ALT  1   1
FLOW-FREQ     1         4000.                                    ALT  1   2
FLOW-FREQ     2         3606.                                    ALT  1   3
FLOW-FREQ     3         6428.                                    ALT  1   4
FLOW-FREQ     4         2989.                                    ALT  1   5
FLOW-FREQ     5         7158.                                    ALT  1   6
FLOW-FREQ     6         2608.                                    ALT  1   7
FLOW-FREQ     7         5139.                                    ALT  1   8
FLOW-FREQ    10         3027.                                    ALT  1   9
FLOW-FREQ    12         4100.                                    ALT  1  10
FLOW-FREQ    20         4100.                                    ALT  1  11
FLOW-FREQ    25         4850.                                    ALT  1  12
FLOW-FREQ    30         5333.                                    ALT  1  13
FLOW-FREQ    34         6794.                                    ALT  1  14
FLOW-FREQ    35        10894.                                    ALT  1  15
FLOW-FREQ    45        10889.                                    ALT  1  16
FLOW-FREQ    60         2375.                                    ALT  1  17
FLOW-FREQ    64        12754.                                    ALT  1  18
FLOW-FREQ    67         2195.                                    ALT  1  19
FLOW-FREQ    75        12237.                                    ALT  1  20
FLOW-FREQ    76        23800.  Same as 7 NRCS 98                 ALT  1  21
FLOW-FREQ   200         1336.          Report                    ALT  1  22
```

```
1WTPMP48 TR20ECON03/04/**15:20:50
ECON2
TITLE      WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE      48-HR PMP (MTI=.15), RESERVOIR INIT EMPTY W/100-YR SED
FLOW-FREQ    -1        19488.                                    ALT  1   1
FLOW-FREQ     1         6222.                                    ALT  1   2
FLOW-FREQ     2         5515.                                    ALT  1   3
FLOW-FREQ     3        10028.                                    ALT  1   4
FLOW-FREQ     4         4601.                                    ALT  1   5
FLOW-FREQ     5        10956.                                    ALT  1   6
FLOW-FREQ     6         3885.                                    ALT  1   7
FLOW-FREQ     7         8027.                                    ALT  1   8
FLOW-FREQ    10         3871.                                    ALT  1   9
FLOW-FREQ    12         4100.                                    ALT  1  10
FLOW-FREQ    20         4100.                                    ALT  1  11
FLOW-FREQ    25         6089.                                    ALT  1  12
FLOW-FREQ    30         7391.                                    ALT  1  13
FLOW-FREQ    34         7712.                                    ALT  1  14
FLOW-FREQ    35        11000.                                    ALT  1  15
FLOW-FREQ    45        11000.                                    ALT  1  16
FLOW-FREQ    60         3617.                                    ALT  1  17
FLOW-FREQ    64        14219.                                    ALT  1  18
FLOW-FREQ    67         3219.                                    ALT  1  19
FLOW-FREQ    75        18983.                                    ALT  1  20
FLOW-FREQ    76        31696.   31818 cfs by NRCS                ALT  1  21
FLOW-FREQ   199          812.   Report 98.                       ALT  1  22
FLOW-FREQ   200         2787.                                    ALT  1  23
```

```
1WT3PMP72TR20ECON03/04/**15:33:04
ECON2
TITLE        WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE        72-HR PMP (MTI=.2), RESERVOIR INIT EMPTY W/100-YR SED
FLOW-FREQ    -1          21877.                                    ALT  1   1
FLOW-FREQ     1           6265.                                    ALT  1   2
FLOW-FREQ     2           5611.                                    ALT  1   3
FLOW-FREQ     3          10091.                                    ALT  1   4
FLOW-FREQ     4           4680.                                    ALT  1   5
FLOW-FREQ     5          11184.                                    ALT  1   6
FLOW-FREQ     6           3945.                                    ALT  1   7
FLOW-FREQ     7           8140.                                    ALT  1   8
FLOW-FREQ    10           3916.                                    ALT  1   9
FLOW-FREQ    12           4100.                                    ALT  1  10
FLOW-FREQ    20           4100.                                    ALT  1  11
FLOW-FREQ    25           6170.                                    ALT  1  12
FLOW-FREQ    30           7472.                                    ALT  1  13
FLOW-FREQ    34           7740.                                    ALT  1  14
FLOW-FREQ    35          11017.                                    ALT  1  15
FLOW-FREQ    45          11017.                                    ALT  1  16
FLOW-FREQ    60           3662.                                    ALT  1  17
FLOW-FREQ    64          14177.                                    ALT  1  18
FLOW-FREQ    67           3279.                                    ALT  1  19
FLOW-FREQ    75          19288.                                    ALT  1  20
FLOW-FREQ    76          32296.                                    ALT  1  21
FLOW-FREQ   199            840.                                    ALT  1  22
FLOW-FREQ   200           3438.                                    ALT  1  23
```

32300 cfs by NRCS Report 1998.

```
1WT3ESH  TR20ECON03/05/**10:28:07
ECON2
TITLE        WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE      ESH HYDROGRAPH, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT
FLOW-FREQ     -1          2655.                                    ALT  1   1
FLOW-FREQ      1          6044.                                    ALT  1   2
FLOW-FREQ      2          4474.                                    ALT  1   3
FLOW-FREQ      3          9583.                                    ALT  1   4
FLOW-FREQ      4          3345.                                    ALT  1   5
FLOW-FREQ      5          8255.                                    ALT  1   6
FLOW-FREQ      6          4872.                                    ALT  1   7
FLOW-FREQ      7          5746.                                    ALT  1   8
FLOW-FREQ     10          2211.                                    ALT  1   9
FLOW-FREQ     12          4100.                                    ALT  1  10
FLOW-FREQ     20          4056.                                    ALT  1  11
FLOW-FREQ     25          3542.                                    ALT  1  12
FLOW-FREQ     30          4930.                                    ALT  1  13
FLOW-FREQ     34          4062.                                    ALT  1  14
FLOW-FREQ     35          7215.                                    ALT  1  15
FLOW-FREQ     45          6924.                                    ALT  1  16
FLOW-FREQ     60          3231.                                    ALT  1  17
FLOW-FREQ     64          9046.                                    ALT  1  18
FLOW-FREQ     67          2301.                                    ALT  1  19
FLOW-FREQ     75         13543.                                    ALT  1  20
FLOW-FREQ     76         21674.  NRCS Report 98. 21685 cfs         ALT  1  21
FLOW-FREQ    200           390.                                    ALT  1  22
```

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.49 | |
| ALTERNATE | 1 | | 3290 |
| ALTERNATE | 2 | | 3290 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

Same As 9 NRCS 98 Report

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.49 | |
| ALTERNATE | 1 | | 3001 |
| ALTERNATE | 2 | | 10468 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

(Output Files Provided By District)



```
XSECTION   75         8.22
----------------------------
   ALTERNATE    1              49543

XSECTION   76        16.89
----------------------------
   ALTERNATE    1              66122

XSECTION  199         1.55
----------------------------
   ALTERNATE    1               6341

XSECTION  200         2.05
----------------------------


   ALTERNATE    1              12405
1                              ECON2 DATA FILE

 ECON2
 TITLE       WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
 TITLE        6HR LOCAL, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT
 FLOW-FREQ    -1          21985.                                    ALT  1   1
 FLOW-FREQ     1          17800.                                    ALT  1   2
 FLOW-FREQ     2          16251.                                    ALT  1   3
 FLOW-FREQ     3          28151.                                    ALT  1   4
 FLOW-FREQ     4          12898.                                    ALT  1   5
 FLOW-FREQ     5          30967.                                    ALT  1   6
 FLOW-FREQ     6          14681.                                    ALT  1   7
 FLOW-FREQ     7          20195.                                    ALT  1   8
 FLOW-FREQ    10           7031.                                    ALT  1   9
 FLOW-FREQ    12           4100.                                    ALT  1  10
 FLOW-FREQ    20           4100.                                    ALT  1  11
 FLOW-FREQ    25          11502.                                    ALT  1  12
 FLOW-FREQ    30          16103.                                    ALT  1  13
 FLOW-FREQ    34          13241.                                    ALT  1  14
 FLOW-FREQ    35          11000.                                    ALT  1  15
 FLOW-FREQ    45          11000.                                    ALT  1  16
 FLOW-FREQ    60          11211.                                    ALT  1  17
 FLOW-FREQ    64          18510.                                    ALT  1  18
 FLOW-FREQ    67           7514.                                    ALT  1  19
 FLOW-FREQ    75          49543.                                    ALT  1  20
 FLOW-FREQ    76          66122.  Same as NRCS 98 Report             ALT  1  21
 FLOW-FREQ   199           6341.                                    ALT  1  22
 FLOW-FREQ   200          12405.                                    ALT  1  23
1
 TR20 ------------------------------------------------------------------- SCS -
 WT3PMP6     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS     VERSION
 11/08/95     6HR LOCAL, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT     2.04TEST


 END OF  1 JOBS IN THIS RUN


                    SCS  TR-20,  VERSION 2.04TEST
                          WT3PMP6   FILES

     INPUT  = WT3PMP6L.DAT                          , GIVEN DATA FILE
     OUTPUT = WT3PMP6L.OUT                          , DATED 11/08/95,13:22:28

              FILES GENERATED - DATED 11/08/95,13:22:28
```

```
ECON2
TITLE        WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE        6HR GENERAL, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT
FLOW-FREQ    -1          13786.                                    ALT  1   1
FLOW-FREQ     1           8202.                                    ALT  1   2
FLOW-FREQ     2           7157.                                    ALT  1   3
FLOW-FREQ     3          13026.                                    ALT  1   4
FLOW-FREQ     4           5646.                                    ALT  1   5
FLOW-FREQ     5          13620.                                    ALT  1   6
FLOW-FREQ     6           6363.                                    ALT  1   7
FLOW-FREQ     7           9195.                                    ALT  1   8
FLOW-FREQ    10           3645.                                    ALT  1   9
FLOW-FREQ    12           4100.                                    ALT  1  10
FLOW-FREQ    20           4100.                                    ALT  1  11
FLOW-FREQ    25           5701.                                    ALT  1  12
FLOW-FREQ    30           7655.                                    ALT  1  13
FLOW-FREQ    34           6832.                                    ALT  1  14
FLOW-FREQ    35          10932.                                    ALT  1  15
FLOW-FREQ    45          10914.                                    ALT  1  16
FLOW-FREQ    60           4791.                                    ALT  1  17
FLOW-FREQ    64          12854.                                    ALT  1  18
FLOW-FREQ    67           3474.                                    ALT  1  19
FLOW-FREQ    75          22309.                                    ALT  1  20
FLOW-FREQ    76          34212.  Same as 5 NRCS 98 Report          ALT  1  21
FLOW-FREQ   200           3540.                                    ALT  1  22
1
TR20 ------------------------------------------------------------------------ SCS -
WT3PMP6      WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS      VERSION
11/08/95     6HR GENERAL, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT     2.04TEST


END OF  1 JOBS IN THIS RUN
```

```
                    SCS  TR-20,  VERSION 2.04TEST
                          WT3PMP6   FILES

     INPUT  = WT3PMP6G.DAT                          , GIVEN DATA FILE
     OUTPUT = WT3PMP6G.OUT                          , DATED 11/08/95,13:21:09

              FILES GENERATED - DATED 11/08/95,13:21:09

    FILE WT3PMP6G.TEC CONTAINS ECON2 INFORMATION

    FILE WT3PMP6G.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   0,  MESSAGES =   3

                    *** TR-20 RUN COMPLETED ***
```

(Output Results Provided By District) (20)

```
   ALTERNATE    1                4016

XSECTION   64         11.61
----------------------------
   ALTERNATE    1               13583

XSECTION   67          1.50
----------------------------
   ALTERNATE    1                3254

XSECTION   75          8.22
----------------------------
   ALTERNATE    1               20115

XSECTION   76         19.83
----------------------------
   ALTERNATE    1               32435

XSECTION  199           .04
----------------------------
   ALTERNATE    1                 398

XSECTION  200           .62
----------------------------
   ALTERNATE    1                3128
1                              ECON2 DATA FILE


ECON2
TITLE      WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE      12-HR GENERAL PMP, RESERVOIR INIT EMPTY W/100-YR SEDMNT
FLOW-FREQ    -1          16394.                                    ALT  1   1
FLOW-FREQ     1           6962.                                    ALT  1   2
FLOW-FREQ     2           6256.                                    ALT  1   3
FLOW-FREQ     3          11181.                                    ALT  1   4
FLOW-FREQ     4           4988.                                    ALT  1   5
FLOW-FREQ     5          11988.                                    ALT  1   6
FLOW-FREQ     6           4795.                                    ALT  1   7
FLOW-FREQ     7           8472.                                    ALT  1   8
FLOW-FREQ    10           3716.                                    ALT  1   9
FLOW-FREQ    12           4100.                                    ALT  1  10
FLOW-FREQ    20           4100.                                    ALT  1  11
FLOW-FREQ    25           5887.                                    ALT  1  12
FLOW-FREQ    30           7360.                                    ALT  1  13
FLOW-FREQ    34           7298.                                    ALT  1  14
FLOW-FREQ    35          11000.                                    ALT  1  15
FLOW-FREQ    45          11005.                                    ALT  1  16
FLOW-FREQ    60           4016.                                    ALT  1  17
FLOW-FREQ    64          13583.                                    ALT  1  18
FLOW-FREQ    67           3254.                                    ALT  1  19
FLOW-FREQ    75          20115.                                    ALT  1  20
FLOW-FREQ    76          32435.  Same as 7 NRCS 98.               ALT  1  21
FLOW-FREQ   199            398.                                    ALT  1  22
FLOW-FREQ   200           3128.                                    ALT  1  23
1
TR20 ------------------------------------------------------------------------ SCS -
WT3PMP12    WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS      VERSION
11/08/95    12-HR GENERAL PMP, RESERVOIR INIT EMPTY W/100-YR SEDMNT     2.04TEST


END OF  1 JOBS IN THIS RUN
```

```
XSECTION  200          .64
---------------------------
   ALTERNATE    1                2067
1                              ECON2 DATA FILE


ECON2
TITLE        WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE        18-HR PMP (MTI=.1), RESERVOIR INIT EMPTY W/100-YR SED
FLOW-FREQ    -1          26905.                                    ALT  1   1
FLOW-FREQ     1           4637.                                    ALT  1   2
FLOW-FREQ     2           4205.                                    ALT  1   3
FLOW-FREQ     3           7458.                                    ALT  1   4
FLOW-FREQ     4           3465.                                    ALT  1   5
FLOW-FREQ     5           8256.                                    ALT  1   6
FLOW-FREQ     6           3064.                                    ALT  1   7
FLOW-FREQ     7           5926.                                    ALT  1   8
FLOW-FREQ    10           3458.                                    ALT  1   9
FLOW-FREQ    12           4100.                                    ALT  1  10
FLOW-FREQ    20           4100.                                    ALT  1  11
FLOW-FREQ    25           5519.                                    ALT  1  12
FLOW-FREQ    30           6070.                                    ALT  1  13
FLOW-FREQ    34           7622.                                    ALT  1  14
FLOW-FREQ    35          11000.                                    ALT  1  15
FLOW-FREQ    45          11000.                                    ALT  1  16
FLOW-FREQ    60           2730.                                    ALT  1  17
FLOW-FREQ    64          13477.                                    ALT  1  18
FLOW-FREQ    67           2502.                                    ALT  1  19
FLOW-FREQ    75          14069.                                    ALT  1  20
FLOW-FREQ    76          26905.  Same As of NRCS 98 Report         ALT  1  21
FLOW-FREQ   199            722.                                    ALT  1  22
FLOW-FREQ   200           2067.                                    ALT  1  23
1
TR20 ------------------------------------------------------------------------ SCS -
WT3PMP18    WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS      VERSION
11/08/95    18-HR PMP (MTI=.1), RESERVOIR INIT EMPTY W/100-YR SED      2.04TEST



END OF  1 JOBS IN THIS RUN



                    SCS  TR-20,  VERSION 2.04TEST
                          WT3PMP18  FILES

     INPUT  = WT3PMP18.DAT                          , GIVEN DATA FILE
     OUTPUT = WT3PMP18.OUT                          , DATED 11/08/95,13:34:56

              FILES GENERATED - DATED 11/08/95,13:34:56

     FILE WT3PMP18.TEC CONTAINS ECON2 INFORMATION

     FILE WT3PMP18.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   1,  MESSAGES =   0

                    *** TR-20 RUN COMPLETED ***
```

```
TITLE        WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE        24-HR PMP (MTI=.1), RESERVOIR INIT EMPTY W/100-YR STOR
FLOW-FREQ     -1          19612.                                      ALT  1   1
FLOW-FREQ      1           4000.                                      ALT  1   2
FLOW-FREQ      2           3606.                                      ALT  1   3
FLOW-FREQ      3           6428.                                      ALT  1   4
FLOW-FREQ      4           2989.                                      ALT  1   5
FLOW-FREQ      5           7158.                                      ALT  1   6
FLOW-FREQ      6           2608.                                      ALT  1   7
FLOW-FREQ      7           5139.                                      ALT  1   8
FLOW-FREQ     10           3027.                                      ALT  1   9
FLOW-FREQ     12           4100.                                      ALT  1  10
FLOW-FREQ     20           4100.                                      ALT  1  11
FLOW-FREQ     25           4850.                                      ALT  1  12
FLOW-FREQ     30           5333.                                      ALT  1  13
FLOW-FREQ     34           6794.                                      ALT  1  14
FLOW-FREQ     35          10894.                                      ALT  1  15
FLOW-FREQ     45          10889.                                      ALT  1  16
FLOW-FREQ     60           2375.                                      ALT  1  17
FLOW-FREQ     64          12754.                                      ALT  1  18
FLOW-FREQ     67           2195.                                      ALT  1  19
FLOW-FREQ     75          12237.                                      ALT  1  20
FLOW-FREQ     76          23800.  Same as 1 NRCS 98 Report             ALT  1  21
FLOW-FREQ    200           1336.                                      ALT  1  22
1
 TR20 ------------------------------------------------------------------------ SCS -
 WT3PMP24    WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS      VERSION
 11/08/95    24-HR PMP (MTI=.1), RESERVOIR INIT EMPTY W/100-YR STOR     2.04TEST


END OF  1 JOBS IN THIS RUN
```

```
                    SCS  TR-20,  VERSION 2.04TEST
                         WT3PMP24  FILES

     INPUT  = WT3PMP24.DAT                          , GIVEN DATA FILE
     OUTPUT = WT3PMP24.OUT                          , DATED 11/08/95,13:35:27

              FILES GENERATED - DATED 11/08/95,13:35:27

     FILE WT3PMP24.TEC CONTAINS ECON2 INFORMATION

     FILE WT3PMP24.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   1,  MESSAGES =   3

                    *** TR-20 RUN COMPLETED ***
```

(23)

```
  ALTERNATE    1                3078
1                               ECON2 DATA FILE

 ECON2
 TITLE       WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
 TITLE       48-HR PMP (MTI=.15), RESERVOIR INIT EMPTY W/100-YR SED
 FLOW-FREQ    -1          19279.                                    ALT  1   1
 FLOW-FREQ     1           6222.                                    ALT  1   2
 FLOW-FREQ     2           5515.                                    ALT  1   3
 FLOW-FREQ     3          10028.                                    ALT  1   4
 FLOW-FREQ     4           4601.                                    ALT  1   5
 FLOW-FREQ     5          10956.                                    ALT  1   6
 FLOW-FREQ     6           3885.                                    ALT  1   7
 FLOW-FREQ     7           8027.                                    ALT  1   8
 FLOW-FREQ    10           3871.                                    ALT  1   9
 FLOW-FREQ    12           4100.                                    ALT  1  10
 FLOW-FREQ    20           4100.                                    ALT  1  11
 FLOW-FREQ    25           6131.                                    ALT  1  12
 FLOW-FREQ    30           7445.                                    ALT  1  13
 FLOW-FREQ    34           7636.                                    ALT  1  14
 FLOW-FREQ    35          11000.                                    ALT  1  15
 FLOW-FREQ    45          11000.                                    ALT  1  16
 FLOW-FREQ    60           3617.                                    ALT  1  17
 FLOW-FREQ    64          14037.                                    ALT  1  18
 FLOW-FREQ    67           3219.                                    ALT  1  19
 FLOW-FREQ    75          18983.                                    ALT  1  20
 FLOW-FREQ    76          31819.  Same as NRCS 98 Report            ALT  1  21
 FLOW-FREQ   199            736.                                    ALT  1  22
 FLOW-FREQ   200           3078.                                    ALT  1  23
1
 TR20 ------------------------------------------------------------------- SCS -
 WTPMP48     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS     VERSION
 11/08/95    48-HR PMP (MTI=.15), RESERVOIR INIT EMPTY W/100-YR SED    2.04TEST


 END OF  1 JOBS IN THIS RUN



                    SCS  TR-20,  VERSION 2.04TEST
                          WTPMP48   FILES

     INPUT  = WT3PMP48.DAT                          , GIVEN DATA FILE
     OUTPUT = WT3PMP48.OUT                          , DATED 11/08/95,13:39:37

              FILES GENERATED - DATED 11/08/95,13:39:37

    FILE WT3PMP48.TEC CONTAINS ECON2 INFORMATION

    FILE WT3PMP48.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   2,  MESSAGES =   2

                    *** TR-20 RUN COMPLETED ***
```

```
ECON2
TITLE       WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE       72-HR PMP (MTI=.2), RESERVOIR INIT EMPTY W/100-YR SED
FLOW-FREQ    -1          21903.                                    ALT  1   1
FLOW-FREQ     1           6265.                                    ALT  1   2
FLOW-FREQ     2           5611.                                    ALT  1   3
FLOW-FREQ     3          10091.                                    ALT  1   4
FLOW-FREQ     4           4680.                                    ALT  1   5
FLOW-FREQ     5          11184.                                    ALT  1   6
FLOW-FREQ     6          13945.                                    ALT  1   7
FLOW-FREQ     7           8140.                                    ALT  1   8
FLOW-FREQ    10           3916.                                    ALT  1   9
FLOW-FREQ    12           4100.                                    ALT  1  10
FLOW-FREQ    20           4100.                                    ALT  1  11
FLOW-FREQ    25           6206.                                    ALT  1  12
FLOW-FREQ    30           7525.                                    ALT  1  13
FLOW-FREQ    34           7783.                                    ALT  1  14
FLOW-FREQ    35          11015.                                    ALT  1  15
FLOW-FREQ    45          11015.                                    ALT  1  16
FLOW-FREQ    60           3662.                                    ALT  1  17
FLOW-FREQ    64          14223.                                    ALT  1  18
FLOW-FREQ    67           3279.                                    ALT  1  19
FLOW-FREQ    75          19288.                                    ALT  1  20
FLOW-FREQ    76          32300.  Same as of NRCS Report             ALT  1  21
FLOW-FREQ   199            883.                                    ALT  1  22
FLOW-FREQ   200           3438.                                    ALT  1  23
1
 TR20 ------------------------------------------------------------------------ SCS -
 WT3PMP72    WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS      VERSION
 11/08/95    72-HR PMP (MTI=.2), RESERVOIR INIT EMPTY W/100-YR SED      2.04TEST


 END OF  1 JOBS IN THIS RUN
```

```
                    SCS  TR-20,  VERSION 2.04TEST
                         WT3PMP72  FILES

     INPUT  = WT3PMP72.DAT                          , GIVEN DATA FILE
     OUTPUT = WT3PMP72.OUT                          , DATED 11/08/95,13:49:25

           FILES GENERATED - DATED 11/08/95,13:49:25

    FILE WT3PMP72.TEC CONTAINS ECON2 INFORMATION

    FILE WT3PMP72.TRD CONTAINS READHD INFORMATION


          TOTAL NUMBER OF WARNINGS =   4,  MESSAGES =   2

                    *** TR-20 RUN COMPLETED ***
```

```
   ALTERNATE    1                3204

XSECTION  64        12.25
----------------------------
   ALTERNATE    1                9061

XSECTION  67         1.50
----------------------------
   ALTERNATE    1                2309

XSECTION  75         8.22
----------------------------
   ALTERNATE    1               13543

XSECTION  76        20.47
----------------------------
   ALTERNATE    1               21685

XSECTION 199          .00
----------------------------
   ALTERNATE    1                   0

XSECTION 200          .02
----------------------------
   ALTERNATE    1                 400
1                             ECON2 DATA FILE


ECON2
TITLE      WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE      ESH HYDROGRAPH, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT
FLOW-FREQ    -1          2683.                                      ALT  1   1
FLOW-FREQ     1          6044.                                      ALT  1   2
FLOW-FREQ     2          4474.                                      ALT  1   3
FLOW-FREQ     3          9583.                                      ALT  1   4
FLOW-FREQ     4          3345.                                      ALT  1   5
FLOW-FREQ     5          8255.                                      ALT  1   6
FLOW-FREQ     6          4872.                                      ALT  1   7
FLOW-FREQ     7          5746.                                      ALT  1   8
FLOW-FREQ    10          2265.                                      ALT  1   9
FLOW-FREQ    12          4100.                                      ALT  1  10
FLOW-FREQ    20          4058.                                      ALT  1  11
FLOW-FREQ    25          3590.                                      ALT  1  12
FLOW-FREQ    30          5031.                                      ALT  1  13
FLOW-FREQ    34          4116.                                      ALT  1  14
FLOW-FREQ    35          7217.                                      ALT  1  15
FLOW-FREQ    45          7068.                                      ALT  1  16
FLOW-FREQ    60          3204.                                      ALT  1  17
FLOW-FREQ    64          9061.                                      ALT  1  18
FLOW-FREQ    67          2309.                                      ALT  1  19
FLOW-FREQ    75         13543.                                      ALT  1  20
FLOW-FREQ    76         21685.   Same As 7 NRCS 78 Report          ALT  1  21
FLOW-FREQ   200           400.                                      ALT  1  22
1
TR20 ------------------------------------------------------------------- SCS -
WT3ESH      WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS      VERSION
11/08/95  ESH HYDROGRAPH, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT    2.04TEST


END OF  1 JOBS IN THIS RUN


                    SCS  TR-20,  VERSION 2.04TEST
                           WT3ESH    FILES

     INPUT  = WT3ESH.DAT                              , GIVEN DATA FILE
```

```
TR20 ------------------------------------------------------------------------ SCS -
 WHTANK3     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS      VERSION
 11/08/95 100-YR 10-DAY RUNOFF & DIST IN TABLE 1, 100-YR SED IN RESVOIR 2.04TEST
 13:56:56                  SUMMARY, JOB NO.   1                        PAGE  71

                            SUMMARY TABLE 3
                            ---------------
      STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
      QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

 XSECTION/          DRAINAGE
 STRUCTURE            AREA       STORM NUMBERS.....
   ID                (SQ MI)          1


 XSECTION   76        20.49
 --------------------------
    ALTERNATE    1                  3290
    ALTERNATE    2                  3290

 XSECTION  199          .00
 --------------------------
    ALTERNATE    1                     0
    ALTERNATE    2                     0

 XSECTION  200          .00
 --------------------------
    ALTERNATE    1                     0
    ALTERNATE    2                     0
1
 TR20 ------------------------------------------------------------------------ SCS -
 WHTANK3     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS      VERSION
 11/08/95 100-YR 10-DAY RUNOFF & DIST IN TABLE 1, 100-YR SED IN RESVOIR 2.04TEST



 END OF  1 JOBS IN THIS RUN



                     SCS  TR-20,  VERSION 2.04TEST
                          WHTANK3   FILES

     INPUT  = WT10DAY.DAT                              , GIVEN DATA FILE
     OUTPUT = WT10DAY.OUT                              , DATED 11/08/95,13:56:56

              FILES GENERATED - DATED 11/08/95,13:56:56

    FILE WT10DAY.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =  25,  MESSAGES =   9

                     *** TR-20 RUN COMPLETED ***
```

Same as 9 NRCS 98 Report.

```
   ALTERNATE    2                1199

 XSECTION   75         8.22
 ---------------------------
   ALTERNATE    1                2117
   ALTERNATE    2                7013
1
 TR20 ------------------------------------------------------------------------ SCS -
 WT100YR  WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
 11/08/95 100-yr, 24-hr, Type II Dist, 100-yr Sediment Storage, 800'Spil2.04TEST
 14:14:17                  SUMMARY, JOB NO.   1                      PAGE  53


                           SUMMARY TABLE 3
                           ---------------
      STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
      QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

 XSECTION/          DRAINAGE
 STRUCTURE            AREA       STORM NUMBERS.....
   ID               (SQ MI)          1

 XSECTION   76        20.49
 ---------------------------
   ALTERNATE    1                3135
   ALTERNATE    2               10835

 XSECTION  199          .00
 ---------------------------
   ALTERNATE    1                   0
   ALTERNATE    2                   0

 XSECTION  200          .00
 ---------------------------
   ALTERNATE    1                   0
   ALTERNATE    2                   0
1
 TR20 ------------------------------------------------------------------------ SCS -
 WT100YR  WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
 11/08/95 100-yr, 24-hr, Type II Dist, 100-yr Sediment Storage, 800'Spil2.04TEST


 END OF  1 JOBS IN THIS RUN



                    SCS  TR-20,  VERSION 2.04TEST
                         WT100YR   FILES

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     OUTPUT = WT100NU.OUT                          , DATED 11/08/95,14:14:17

            FILES GENERATED - DATED 11/08/95,14:14:17

    FILE WT100NU.TRD CONTAINS READHD INFORMATION


          TOTAL NUMBER OF WARNINGS =   3,  MESSAGES =  10

                  *** TR-20 RUN COMPLETED ***
```

(1)

# CALCULATION PACKAGE NO. C-2

URS

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: ESTIMATION OF CURVE NUMBERS FOR DIFFERENT BASIN AREAS OF WHITE TANK FRS NO. 3 WATERSHED WITH AN ANTICIPATION OF FUTURE URBAN GROWTH

Total Number of Pages (including cover sheet):

Total Number of Computer Runs:

Prepared by: Hammad Hussain Date: 04/22/04

Checked by: Todd Ringsmuth Date: 5-2-04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 5.

Calculation Approved by: Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| 1 | Review Comments Incorporated. | 6/11/04 |
| | | |
| | | |

Project Manager/Date

# ESTIMATION OF CURVE NUMBERS FOR DIFFERENT BASIN AREAS OF WHITE TANK FRS NO. 3 WATERSHED WITH AN ANTICIPATION OF FUTURE URBAN GROWTH

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
23443748

## PROBLEM STATEMENT

The aim of this calculation package is to estimate the curve numbers for different basin areas of White Tank FRS No. 3 watershed with an anticipation of the future urban growth.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

### 1) Existing Conditions

The White Tanks FRS No. 3 watershed consists generally of undisturbed desert and mountain areas. The curve numbers presented in the NRCS hydrology report "*Hydrologic Analysis of the White Tank Mountains on Flood Retarding Structure # 3"* (NRCS, August 1998), are presented on page 8. The curve numbers developed by NRCS are reasonable for this application. It should be noted that there is so specific information available in NRCS 1998 report regarding the soil type within different sub-basins.

### 2) Future Conditions – Developable and Undevelopable Areas

To address the issue of impacts due to future development in the watershed, URS updated all TR-20 models to incorporate anticipated future land use. The future urban growth potential of different basins in White Tank Watershed was determined based on the extent of jurisdiction limits of several ownerships. This information was obtained from Figure 2 of the report titled as *"Draft Design Issues Report (DIR) – White Tanks FRS # 3 Modifications Design Project"* (Dames & Moore, November 1998) (See Page 9). URS drew the surface ownership and jurisdiction limits over the White Tank Watershed delineation map (See Figure on Page 10) and divided the White Tank Watershed into 4 major ownership categories:

a) State Trust Land

b) Private Land

c) Regional Park

d) FCDMC Area

An approach was developed to determine which areas would be considered as being developable and undevelopable. Any areas within the County Regional Park and District property were determined to be undevelopable. Private Property and State Trust Land were deemed to have the potential for development. However, a further distinction was made where any of the potentially developable land within the mountainous terrain (i.e., steep slopes) was determined to be undevelopable. All the areas, located within the mountainous terrain (steep slopes), irrespective of the ownership category, were considered un-developable areas. All the areas located within alluvial fans (flatter slopes) were considered developable if they fall under Private Property and State Trust Land jurisdiction limits. The mountainous terrain of the White Tank watershed was separated from the alluvial fans by drawing a boundary line (See Figure on Page 11).

Within the potentially developable properties, the developable areas were separated into low-density and high-density areas based on the information provided at Maricopa Association of Governments (MAG) website for Year 2030 growth projections. Based on this information, all the developable areas located north of Northern Avenue were considered low-density (2 acres per home) and all the developable areas located south of Northern Avenue were considered high-density (1 acre per home). A summary of distribution of White Tank Watershed basin areas into several small sub-basins based on aforementioned criteria is provided in Table 1 (See Page 12) and shown on a Figure on Page 11.

The area of each sub-basin was determined using AutoCAD and summarized in Table 1 (See Page 12).

## 3) Curve Number Estimation for Different Areas

Based on the criteria defined above, White Tank FRS No. 3 watershed was primarily divided into 3 categories:

A) Category A - Undevelopable Area (Mountains Areas)

B) Category B - Undevelopable Areas (Alluvial Fans)

C) Category C - Developable Areas (Alluvial Fans-Low or High Density)

### A) Curve Numbers for Mountainous Areas

NRCS used a single curve number of 87.2 for the mountainous basin areas 1, 3, and 6 in its 1998 report (Please see NRCS's Table 1 provided on Page 8). Given the lack of specific soil type information for any of these basin areas and given that these basin areas were not potentially developable in future, URS decided to use the "single curve number" of 87.2 for mountainous basin areas including Basins 1, 3 and 6A similar to what NRCS used in its 1998 study report.

### B) Curve Numbers for Undevelopable Areas (Alluvial fans)

Basins 2, 4, 5, and 7 have sub-basin areas, which are located on alluvial fans, but still considered undevelopable because they fall outside the developable jurisdiction limits (See Pages 11 & 12 for a list of these areas). For such areas, curve numbers were estimated using the following relationship:

$$\text{Curve Number} = [(A_{total} * CN_{NRCS}) - (A_{Mountainous} * 87.2)] / A_{Alluvial}$$

Where

$A_{total}$ = Total area for that basin;

$CN_{NRCS}$ = Curve number assigned for that basin in NRCS 1998 Report;

$A_{Mountainous}$ = Total area for mountainous portion in that basin;

$A_{Alluvial}$ = $A_{total} - A_{Mountainous}$

## C) Curve Numbers for Developable Areas

Developable areas include those areas, which are located on alluvial fans and potentially developable in future (See Pages 11 & 12 for a list of these areas). These areas are further classified as low-density or high-density populated areas based on the information provided at Maricopa Association of Governments (MAG) website for Year 2030 growth projections. Based on this information, all the developable areas located north of Northern Avenue were considered low-density (2 acres per home) and all the developable areas located south of Northern Avenue were considered high-density (1 acre per home).

The curve numbers for category C areas - Developable Areas were estimated using the following relationship:

⟹ High-Density Populated Areas (1 acre):

(20% Imperviousness * 98) + (80% Perviousness * $CN_{Category\ B\ Area}$)

⟹ Low-Density Populated Areas (2-acre):

(12% Imperviousness * 98) + (88% Perviousness * $CN_{Category\ B\ Area}$)

Here is an explanation how we come up with these relationships. We used the criteria described in TR-55 for "connected impervious areas" (See Page 18 of this calculation package). As per this criteria:

a) Pervious urban areas are equivalent to pasture in good hydrologic condition
b) Impervious areas have CN of 98 and are directly connected to the drainage system.

For the pervious urban areas, instead of using the curve numbers for pasture in good hydrologic condition, we used the curve numbers for Category B sub-basin areas in that basin.

For impervious areas:

As per Table 2-2a of TR-55 manual (See Page 17), for a 2 acre of home (low-density), the average impervious area is 12 percent and for a 1 acre of home (high-density), the

average impervious area is 20 percent. These average impervious percentages (12% and 20%) for low-density and high-density categories were multiplied by CN of 98.

## RESULTS

See Table 1 (Pages 12-14) for the curve numbers estimated for all areas.

15448-005-05 (7)

3.0

# HYDROLOGIC ANALYSIS

# OF THE WHITE TANK MOUNTAINS

# ON FLOOD RETARDING STRUCTURE #3

Prepared By

Water Resources Planning,
Arizona State Office

NATURAL RESOURCES CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

Revised August, 1998

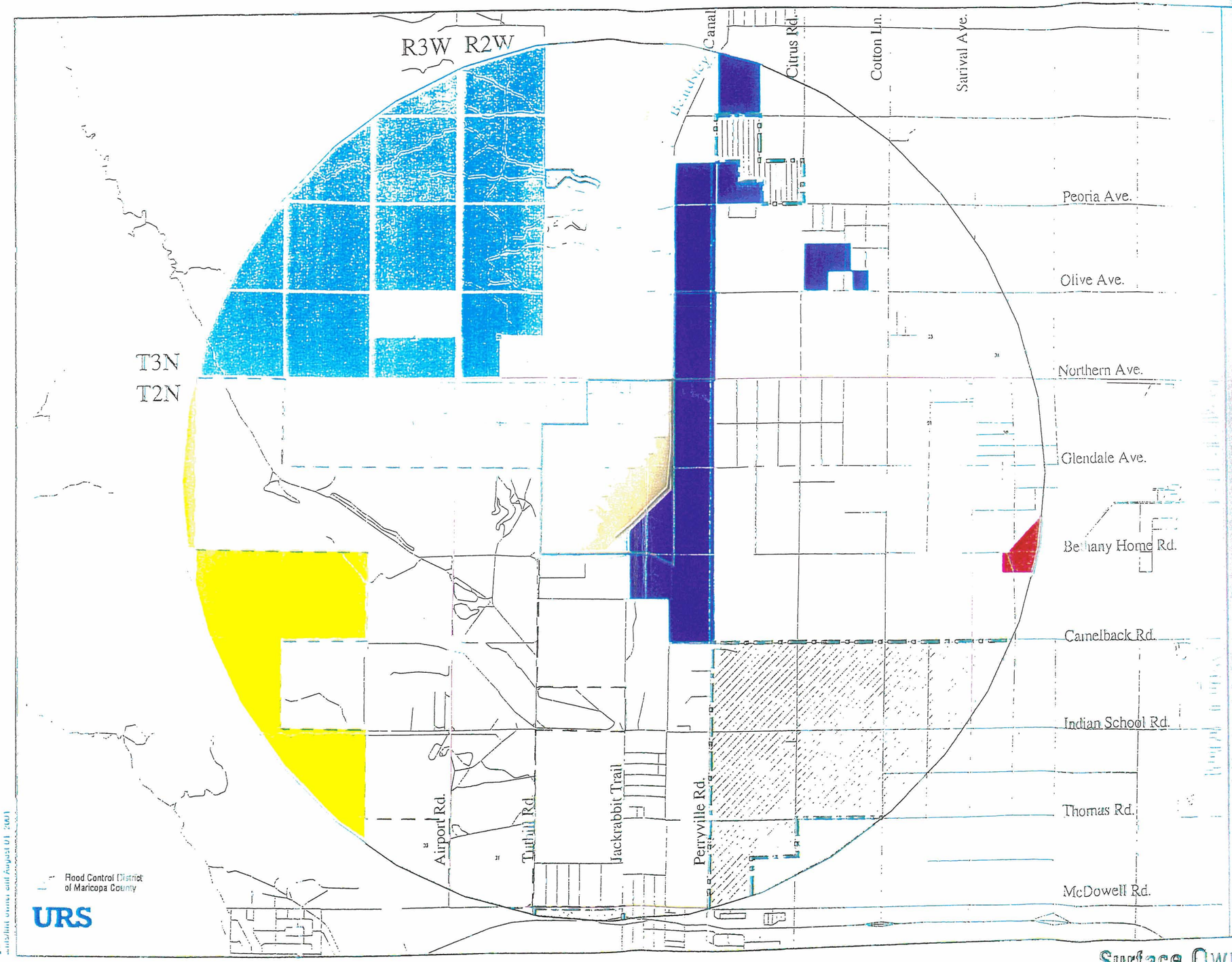
TABLE I
HYDROLOGIC PARAMETERS
For White Tank FRS #3 Watershed

| SUBBASIN | DRAINAGE AREA sq. miles | CURVE NUMBER ARC I | CURVE NUMBER ARC II | $T_C$ hours. | Vavg fps | WATERSHED LENGTH miles |
|---|---|---|---|---|---|---|
| 1 | 2.45 | 73.4 | 87.2 | 0.85 | 8.6 | 4.97 |
| 2 | 2.34 | 60.2 | 78.2 | 0.73 | 7.4 | 3.71 |
| 3 | 3.96 | 73.4 | 87.2 | 0.88 | 7.8 | 4.67 |
| 4 | 2.02 | 57.4 | 75.5 | 0.79 | 7.3 | 3.94 |
| 5 | 4.76 | 58.6 | 76.5 | 0.78 | 8.6 | 4.56 |
| 6 | 1.50 | 73.3 | 87.2 | 0.47 | 7.7 | 2.5 |
| 7 | 3.46 | 61.8 | 78.9 | 1.01 | 5.1 | 3.48 |
| nposite for Watershed | 20.49 | 64.9 | 81.1 | 1.85 | 8.1 | 10.21 |

NOTE: The division between Antecedent Runoff Condition (ARC) I and ARC II is based on the proceeding 5 day precipitation total and the time of year. During the growing season, if the land receives less than 1.4" precipitation in the past 5 days, then the soil is in ARC I, if the land receives more than 1.4" but less than 2.1", then the soil is in ARC II, if the land receives greater than 2.1" precipitation in the previous 5 days then the soil is in ARC III. During the dormant season, the range of precipitation limits are 0.9 inches lower between ARC I and II, and 1.0 inches lower between ARC II and III [Ref. 13].

## PHYSIOGRAPHY

White Tank FRS #3 watershed is approximately 20.49 square miles with elevations ranging from 1210 to 4083 feet above sea level. Mean annual precipitation is approximately 10 inches and mean annual lake evaporation is 72 inches [Ref. 14]. Above 1600 feet, the land is steep and the soils are predominately Quilotosa - Vaiva Rock Outcrop complex - D Hydrologic Soil Group (HSG) with 20 percent rock outcrop or Cherioni-Rock Outcrop - D HSG with 15 percent rock outcrop. From 1200 feet up to 1600 feet AMSL, on the alluvial fans, stream terraces, and floodplains, Ebon-Pinamt, Pinamt-Tremant, and Gilman associations are predominate. These are gravelly loam to gravelly sandy loam soils, B HSG. The channel bottoms are predominately Carrizo series - sands and gravels and are A HSG [Ref. 4&5]. Vegetation throughout is desert shrubs - Creosote Bush, ckbrush, Bursage, Palo Verde, Mesquite, and various cactus [Ref. 15]. The cover density is poor, estimated oe 20 percent for curve number computations. Cover density may have been under-estimated as indicated by he calibration results discussed in Section 3.5.




Legend

Study Boundary

Surface Ownership

Private

State Trust

Bureau of Land Management

Military Reservation

Regional Parks

Rose Gumms District of Maricopa County

Maricopa Water District

Jurisdiction

City Boundaries

Buckeye Annexation

Maricopa County

City of Buckeye

City of Goodyear

City of Surprise

Sources:

Arizona Land Resources Information System (ALRIS), 1997

Maricopa Association of Governments, 1999

Bureau of Land Management, 1999

0

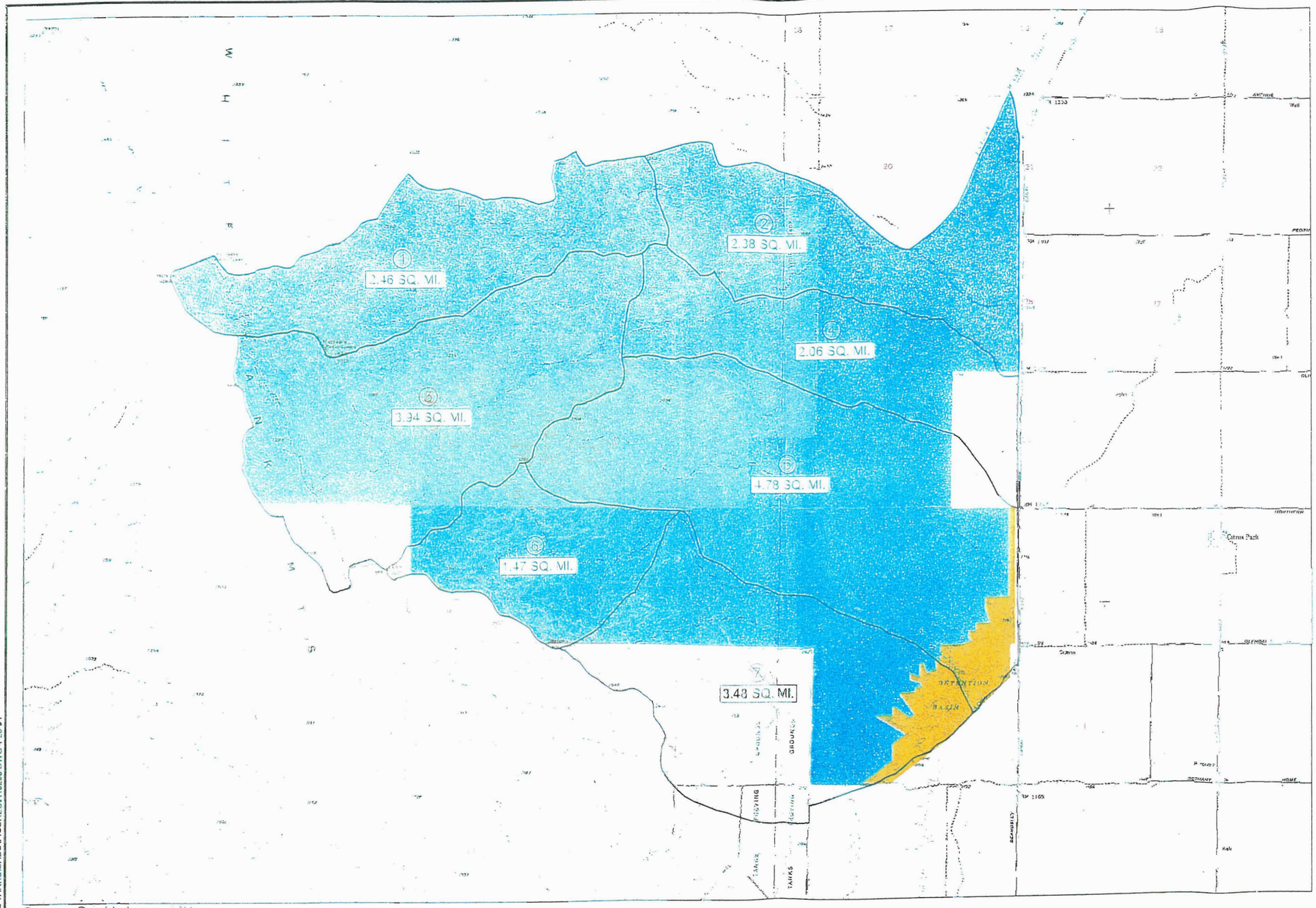
Scale in Miles

WHITE TANK FRS

Surface Ownership and Jurisdictio

Figure 2

Barnes & Moore Job No. 15448-007-058




Source: Provided by FCDMC
Reference: USGS Topographic 7.5 Minute Quadrangles
Weddell, AZ 1957, Photorevised 1971 and
White Tank Mts., AZ 1957, Photorevised 1971.

Legend

Surface Ownership
- Private
- State Trust
- Flood Control District of Maricopa County
- Regional Parks

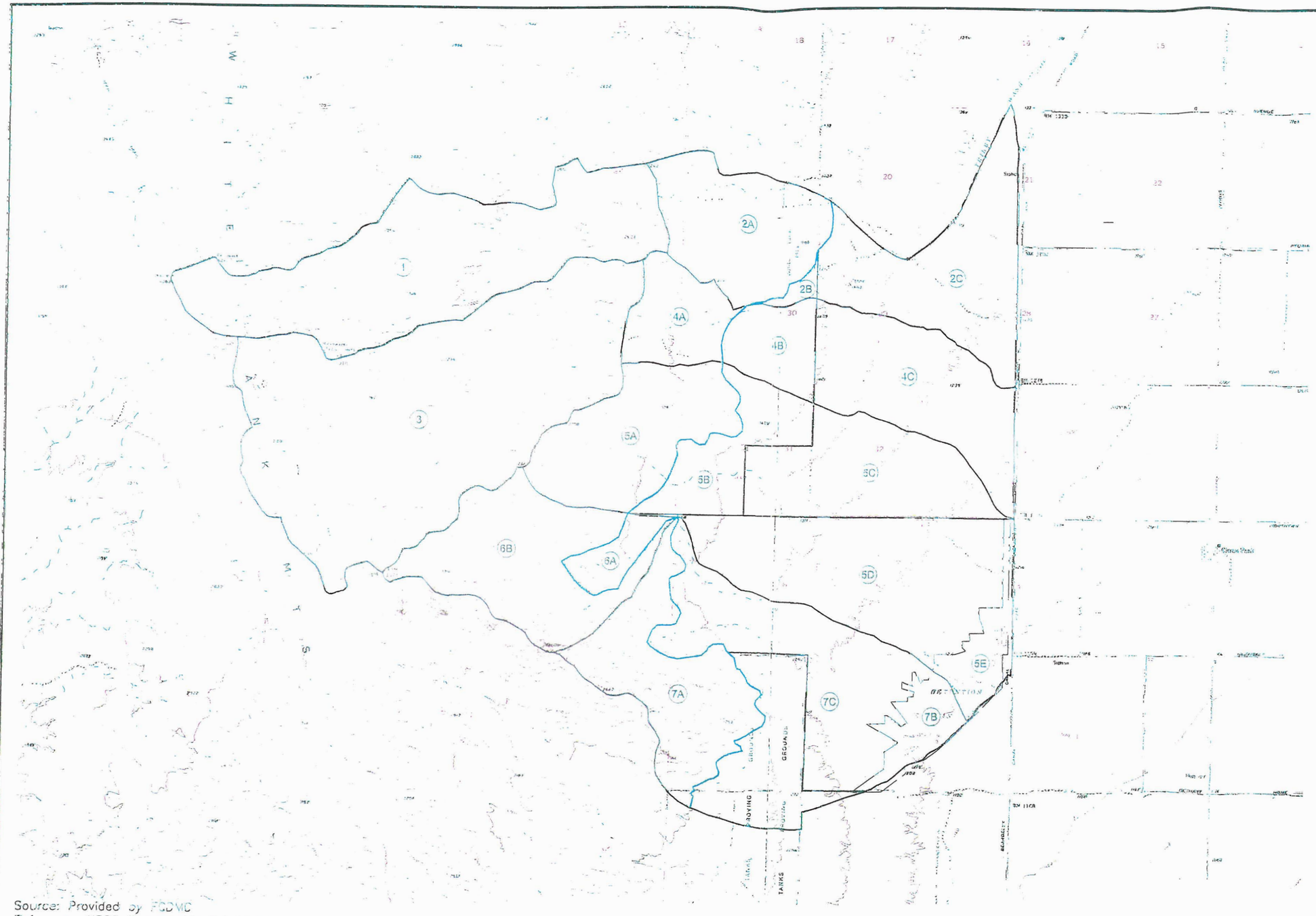
0 2000 4000
Scale in Feet

WHITE TANKS FRS # 3

URS

Surface Ownership and Jurisdiction
Figure 8-3

P:\FCDMC\26434\998 WHITE TANKS\CAD\DFIGURES\A16200.DWG 4:26:04




Legend

- 1 Undevelopable Area (Mountains)
- 2A Undevelopable Area (Mountains)
- 2B Undevelopable Area (Alluvial Fans)
- 2C Developable Area (Alluvial Fans-Low Density Population)
- 3 Undevelopable Area (Mountains)
- 4A Undevelopable Area (Mountains)
- 4B Undevelopable Area (Alluvial Fans)
- 4C Developable Area (Alluvial Fans-Low Density Population)
- 5A Undevelopable Area (Mountains)
- 5B Undevelopable Area (Alluvial Fans)
- 5C Developable Area (Alluvial Fans-Low Density Population)
- 5D Developable Area (Alluvial Fans-High Density Population)
- 5E Undevelopable Area (Alluvial Fans)
- 6A Developable Area (Alluvial Fans-High Density Population)
- 6B Undevelopable Area (Mountains)
- 7A Undevelopable Area (Mountains)
- 7B Undevelopable Area (Alluvial Fans)
- 7C Developable Area (Alluvial Fans-High Density Population)

Boundary Limit Between the Mountains and Alluvial Fans

0 2000 4000
Scale in Feet

WHITE TANKS FRS # 3

Source: Provided by FCDMC
Reference: USGS Topographic 7.5 Minute Quadrangles
Weddell, AZ 1957, Photorevised 1971 and
White Tank Mts., AZ 1957, Photorevised 1971.

URS

P:\FCDMC\23443698 WHITE TANKS\CADD\FIGURES\A16207.DWG 4-22-04

Basin Distribution of White Tank FRS #3 Watershed
Based on Urban Growth Projection By Year 2030
Figure 8-4

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | TABLE 1 | | | | | | | |
| 2 | ESTIMATION OF CURVE NUMBERS (CN) FOR WHITE TANK MOUNTAIN FRS NO. 3 WATERSHED | | | | | | | |
| 3 | | | | | | | | |
| 4 | Basin No. | Land Ownership Category | Urban Growth Status (Year 2030) | Drainage Area | Area Per Home | NRCS Curve Numbers (Existing) | URS Curve Numbers (Future) | Average Curve Numbers (Future) |
| 5 | | | | (Sq. Miles) | (Acres) | (CN) | (CN) | (CN) |
| 6 | 1 | Regional Park Area | Undevelopable Area (Mountains) | 2.460 | - | 87.2 | 87.2 | 87.20 |
| 7 | 2A | Regional Park Area | Undevelopable Area (Mountains) | 1.020 | - | 78.2 | 87.2 | 79.93 |
| 8 | 2B | Regional Park Area | Undevelopable Area (Alluvial Fans)*1 | 0.070 | - | | 71.45 | |
| 9 | 2C | State Trust Land | Developable Area (Alluvial Fans-Low Density Population) | 1.291 | 2 | | 74.6 | |
| 10 | 3 | Regional Park Area+ Private Land + State Trust Land | Undevelopable Area (Mountains) | 3.940 | - | 87.2 | 87.2 | 87.20 |
| 11 | 4A | Regional Park Area | Undevelopable Area (Mountains) | 0.430 | - | 75.5 | 87.2 | 77.27 |
| 12 | 4B | Regional Park Area | Undevelopable Area (Alluvial Fans)*1 | 0.440 | - | | 72.41 | |
| 13 | 4C | State Trust Land+Private Land | Developable Area (Alluvial Fans-Low Density Population) | 1.190 | 2 | | 75.5 | |
| 14 | 5A | Regional Park Area | Undevelopable Area (Mountains) | 1.000 | - | 76.5 | 87.2 | 78.83 |
| 15 | 5B | Regional Park Area | Undevelopable Area (Alluvial Fans)*1 | 0.879 | - | | 73.67 | |
| 16 | 5C | State Trust Land+Private Land | Developable Area (Alluvial Fans-Low Density Population) | 0.978 | 2 | | 76.6 | |
| 17 | 5D | State Trust Land | Developable Area (Alluvial Fans-High Density Population) | 1.700 | 1 | | 78.5 | |
| 18 | 5E | FCDMC Area | Undevelopable Area (Alluvial Fans)*1 | 0.222 | - | | 73.67 | |
| 19 | 6A | State Trust Land | Developable Area (Alluvial Fans-High Density Population) | 0.310 | 1 | 87.2 | 89.4 | 87.66 |
| 20 | 6B | Regional Park Area+ Private Land + State Trust Land | Undevelopable Area (Mountains) | 1.160 | - | | 87.2 | |
| 21 | 7A | State Trust Land+Private Land | Undevelopable Area (Mountains) | 1.098 | - | 78.9 | 87.2 | 81.67 |
| 22 | 7B | FCDMC Area | Undevelopable Area (Alluvial Fans)*1 | 0.278 | - | | 75.07 | |
| 23 | 7C | State Trust Land+Private Land | Developable Area (Alluvial Fans-High Density Population) | 2.104 | 1 | | 79.7 | |
| 24 | | | | | | | Avg CN: | 82.5 |
| 25 | * 1= Even though these areas are located on alluvial fans but they are considered to be undevelopable because they fall outside the developable jurisdiction limits. | | | | | | | |

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | TABLE 1 | | | | | |
| 2 | ESTIMATION OF CURVE NUMBERS (CN) FOR WHITE TANK MOUNTAIN FRS NO. 3 WATERSHED | | | | | |
| 3 | | | | | | |
| 4 | Basin No. | Land Ownership Category | Urban Growth Status (Year 2030) | Drainage Area | Area Per Home | NRCS Curve Numbers (Existing) |
| 5 | | | | (Sq. Miles) | (Acres) | (CN) |
| 6 | 1 | Regional Park Area | Undevelopable Area (Mountains) | 2.46 | - | 87.2 |
| 7 | 2A | Regional Park Area | Undevelopable Area (Mountains) | 1.02 | - | |
| 8 | 2B | Regional Park Area | Undevelopable Area (Alluvial Fans)*1 | 0.0695 | - | |
| 9 | 2C | State Trust Land | Developable Area (Alluvial Fans-Low Density Population) | 1.2905 | 2 | 78.2 |
| 10 | 3 | Regional Park Area+ Private Land + State Trust Land | Undevelopable Area (Mountains) | 3.94 | - | 87.2 |
| 11 | 4A | Regional Park Area | Undevelopable Area (Mountains) | 0.43 | - | |
| 12 | 4B | Regional Park Area | Undevelopable Area (Alluvial Fans)*1 | 0.44 | - | |
| 13 | 4C | State Trust Land+Private Land | Developable Area (Alluvial Fans-Low Density Population) | 1.19 | 2 | 75.5 |
| 14 | 5A | Regional Park Area | Undevelopable Area (Mountains) | 1 | - | |
| 15 | 5B | Regional Park Area | Undevelopable Area (Alluvial Fans)*1 | 0.879 | - | |
| 16 | 5C | State Trust Land+Private Land | Developable Area (Alluvial Fans-Low Density Population) | 0.978 | 2 | |
| 17 | 5D | State Trust Land | Developable Area (Alluvial Fans-High Density Population) | 1.7 | 1 | |
| 18 | 5E | FCDMC Area | Undevelopable Area (Alluvial Fans)*1 | 0.2218 | - | 76.5 |
| 19 | 6A | State Trust Land | Developable Area (Alluvial Fans-High Density Population) | 0.31 | 1 | |
| 20 | 6B | Regional Park Area+ Private Land + State Trust Land | Undevelopable Area (Mountains) | 1.16 | - | 87.2 |
| 21 | 7A | State Trust Land+Private Land | Undevelopable Area (Mountains) | 1.0982 | - | |
| 22 | 7B | FCDMC Area | Undevelopable Area (Alluvial Fans)*1 | 0.2784 | - | |
| 23 | 7C | State Trust Land+Private Land | Developable Area (Alluvial Fans-High Density Population) | 2.104 | 1 | 78.9 |
| 24 | | | | | | |
| 25 | * 1= Even though these areas are located on alluvial fans but they are considered to be undevelopable because they fall outside the developable jurisdiction limits. | | | | | |

| | A | B | G | H |
|---|---|---|---|---|
| 1 | TABLE 1 | | | |
| 2 | ESTIMATION OF CURVE NU | | ESTIMATION OF CURVE NUMBERS (CN) FOR WHITE TANK MOUNTAIN FRS NO. 3 WATERSHED | |
| 3 | | | | |
| 4 | Basin No. | Land Ownership Category | URS Curve Numbers (Future) | Average Curve Numbers (Future) |
| 5 | | | (CN) | (CN) |
| 6 | 1 | Regional Park Area | 87.2 | 87.2 |
| 7 | 2A | Regional Park Area | 87.2 | |
| 8 | 2B | Regional Park Area | =(((D7+D8+D9)*F7)-(D7*G7))/(D8+D9) | |
| 9 | 2C | State Trust Land | =(0.88*G8)+0.12*98 | =((G7*D7)+(G8*D8)+(G9*D9))/(D7+D8+D9) |
| 10 | 3 | Regional Park Area+ Private Land + State Trust Land | 87.2 | 87.2 |
| 11 | 4A | Regional Park Area | 87.2 | |
| 12 | 4B | Regional Park Area | =(((D11+D12+D13)*F11)-(D11*G11))/(D12+D13) | |
| 13 | 4C | State Trust Land+Private Land | =(0.88*G12)+0.12*98 | =((G11*D11)+(G12*D12)+(G13*D13))/(D11+D12+D13) |
| 14 | 5A | Regional Park Area | 87.2 | |
| 15 | 5B | Regional Park Area | =(((D14+D15+D16+D17+D18)*F14)-(D14*G14))/(D15+D16+D17+D18) | |
| 16 | 5C | State Trust Land+Private Land | =(0.88*G15)+0.12*98 | |
| 17 | 5D | State Trust Land | =(0.8*G15)+0.2*98 | |
| 18 | 5E | FCDMC Area | =G15 | =((G14*D14)+(G15*D15)+(G16*D16)+(G17*D17)+(G18*D18))/(D14+D15+D16+D17+D18) |
| 19 | 6A | State Trust Land | =(0.8*G20)+0.2*98 | |
| 20 | 6B | Regional Park Area+ Private Land + State Trust Land | 87.2 | =((G19*D19)+(G20*D20))/(D19+D20) |
| 21 | 7A | State Trust Land+Private Land | 87.2 | |
| 22 | 7B | FCDMC Area | =(((D21+D22+D23)*F21)-(D21*G21))/(D22+D23) | |
| 23 | 7C | State Trust Land+Private Land | =(0.8*G22)+0.2*98 | =((G21*D21)+(G22*D22)+(G23*D23))/(D21+D22+D23) |
| 24 | | | | |
| 25 | * 1= Even though these areas are located on alluvial fans but they are con | | | |

(15)

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Soil
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Engineering
Division

Technical
Release 55

June 1986

# Urban Hydrology for Small Watersheds

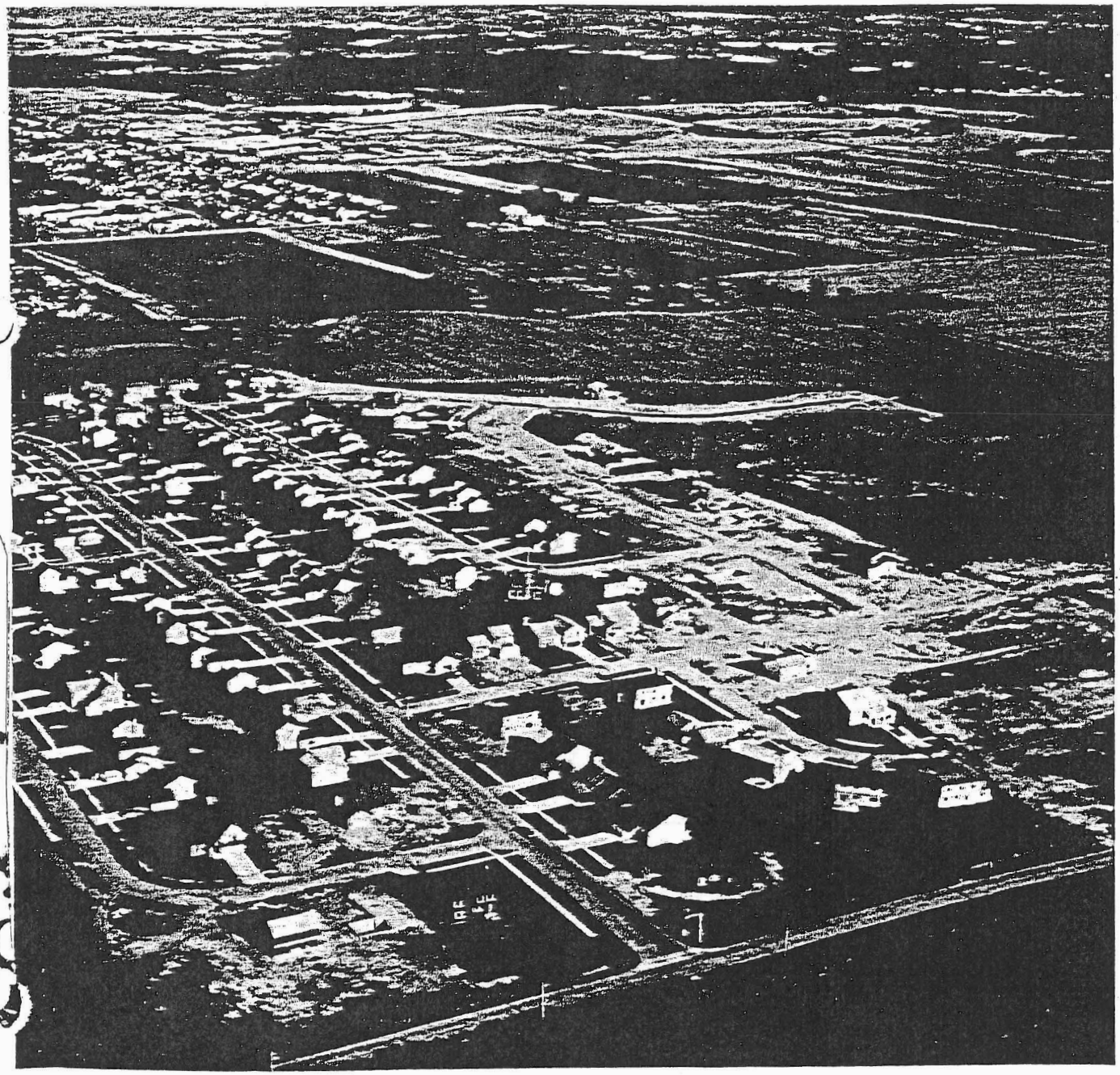


Table 2-2d.—Runoff curve numbers for arid and semiarid rangelands[1]

| Cover description | | Curve numbers for hydrologic soil group— | | | |
|---|---|---|---|---|---|
| Cover type | Hydrologic condition[2] | A[3] | B | C | D |
| Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element. | Poor | | 80 | 87 | 93 |
| | Fair | | 71 | 81 | 89 |
| | Good | | 62 | 74 | 85 |
| Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush. | Poor | | 66 | 74 | 79 |
| | Fair | | 48 | 57 | 63 |
| | Good | | 30 | 41 | 48 |
| Pinyon-juniper—pinyon, juniper, or both; grass understory. | Poor | | 75 | 85 | 89 |
| | Fair | | 58 | 73 | 80 |
| | Good | | 41 | 61 | 71 |
| Sagebrush with grass understory. | Poor | | 67 | 80 | 85 |
| | Fair | | 51 | 63 | 70 |
| | Good | | 35 | 47 | 55 |
| Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus. | Poor | 63 | 77 | 85 | 88 |
| | Fair | 55 | 72 | 81 | 86 |
| | Good | 49 | 68 | 79 | 84 |

[1]Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.

[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
*Fair:* 30 to 70% ground cover.
*Good:* >70% ground cover.

[3]Curve numbers for group A have been developed only for desert shrub.

Table 2-2a.—Runoff curve numbers for urban areas[1]

| Cover description | | Curve numbers for hydrologic soil group— | | | |
|---|---|---|---|---|---|
| Cover type and hydrologic condition | Average percent impervious area[2] | A | B | C | D |
| *Fully developed urban areas (vegetation established)* | | | | | |
| Open space (lawns, parks, golf courses, cemeteries, etc.)[3]: | | | | | |
| Poor condition (grass cover < 50%) | | 68 | 79 | 86 | 89 |
| Fair condition (grass cover 50% to 75%) | | 49 | 69 | 79 | 84 |
| Good condition (grass cover > 75%) | | 39 | 61 | 74 | 80 |
| Impervious areas: | | | | | |
| Paved parking lots, roofs, driveways, etc. (excluding right-of-way) | | 98 | 98 | 98 | 98 |
| Streets and roads: | | | | | |
| Paved; curbs and storm sewers (excluding right-of-way) | | 98 | 98 | 98 | 98 |
| Paved; open ditches (including right-of-way) | | 83 | 89 | 92 | 93 |
| Gravel (including right-of-way) | | 76 | 85 | 89 | 91 |
| Dirt (including right-of-way) | | 72 | 82 | 87 | 89 |
| Western desert urban areas: | | | | | |
| Natural desert landscaping (pervious areas only)[4] | | 63 | 77 | 85 | 88 |
| Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders) | | 96 | 96 | 96 | 96 |
| Urban districts: | | | | | |
| Commercial and business | 85 | 89 | 92 | 94 | 95 |
| Industrial | 72 | 81 | 88 | 91 | 93 |
| Residential districts by average lot size: | | | | | |
| 1/8 acre or less (town houses) | 65 | 77 | 85 | 90 | 92 |
| 1/4 acre | 38 | 61 | 75 | 83 | 87 |
| 1/3 acre | 30 | 57 | 72 | 81 | 86 |
| 1/2 acre | 25 | 54 | 70 | 80 | 85 |
| 1 acre | 20 | 51 | 68 | 79 | 84 |
| 2 acres | 12 | 46 | 65 | 77 | 82 |
| *Developing urban areas* | | | | | |
| Newly graded areas (pervious areas only, no vegetation)[5] | | 77 | 86 | 91 | 94 |
| Idle lands (CN's are determined using cover types similar to those in table 2-2c). | | | | | |

[1]Average runoff condition, and $I_a = 0.2S$.
[2]The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
[3]CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
[4]Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
[5]Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4, based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

## Antecedent runoff condition

The index of runoff potential before a storm event is the antecedent runoff condition (ARC). ARC is an attempt to account for the variation in CN at a site from storm to storm. CN for the average ARC at a site is the median value as taken from sample rainfall and runoff data. The CN's in table 2-2 are for the average ARC, which is used primarily for design applications. See NEH-4 (SCS 1985) and Rallison and Miller (1981) for more detailed discussion of storm-to-storm variation and a demonstration of upper and lower enveloping curves.

## Urban impervious area modifications

Several factors, such as the percentage of impervious area and the means of conveying runoff from impervious areas to the drainage system, should be considered in computing CN for urban areas (Rawls et al., 1981). For example, do the impervious areas connect directly to the drainage system, or do they outlet onto lawns or other pervious areas where infiltration can occur?

### Connected impervious areas

An impervious area is considered connected if runoff from it flows directly into the drainage system. It is also considered connected if runoff from it occurs as concentrated shallow flow that runs over a pervious area and then into a drainage system.

Urban CN's (table 2-2a) were developed for typical land use relationships based on specific assumed percentages of impervious area. These CN values were developed on the assumptions that (a) pervious urban areas are equivalent to pasture in good hydrologic condition and (b) impervious areas have a CN of 98 and are directly connected to the drainage system. Some assumed percentages of impervious area are shown in table 2-2a.

If all of the impervious area is directly connected to the drainage system, but the impervious area percentages or the pervious land use assumptions in table 2-2a are not applicable, use figure 2-3 to compute a composite CN. For example, table 2-2a gives a CN of 70 for a ½-acre lot in HSG B, with an assumed impervious area of 25 percent. However, if the lot has 20 percent impervious area and a pervious area CN of 61, the composite CN obtained from figure 2-3 is 68. The CN difference between 70 and 68 reflects the difference in percent impervious area.

### Unconnected impervious areas

Runoff from these areas is spread over a pervious area as sheet flow. To determine CN when all or part of the impervious area is not directly connected to the drainage system, (1) use figure 2-4 if total impervious area is less than 30 percent or (2) use figure 2-3 if the total impervious area is equal to or greater than 30 percent, because the absorptive capacity of the remaining pervious areas will not significantly affect runoff.

When impervious area is less than 30 percent, obtain the composite CN by entering the right half of figure 2-4 with the percentage of total impervious area and the ratio of total unconnected impervious area to total impervious area. Then move left to the appropriate pervious CN and read down to find the composite CN. For example, for a ½-acre lot with 20 percent total impervious area (75 percent of which is unconnected) and pervious CN of 61, the composite CN from figure 2-4 is 66. If all of the impervious area is connected, the resulting CN (from figure 2-3) would be 68.

(1)

# CALCULATION PACKAGE NO. C-3

URS

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **ESTABLISHMENT OF ELEVATION-SPILLWAY DISCHARGE RATING CURVE FOR A BROAD-CRESTED WEIR**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 06/21/04

Checked by: _____ Date: _____

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 5.

Calculation Approved by: _____ 7/23/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# ESTABLISHMENT OF ELEVATION-SPILLWAY DISCHARGE RATING CURVE FOR A BROAD-CRESTED WEIR

**(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)**
**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)**
**23443748**

## PROBLEM STATEMENT

The purpose of this calculation package is to present the calculations involved in developing the elevation-discharge rating curve for a broad-crested weir at the White Tank FRS No. 3 project.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

The broad-crested weir was evaluated as a replacement to the current emergency spillway at the White Tank FRS No. 3 project. The elevation-discharge rating curve for a broad-crested weir was established using the following relationship as expressed in *Handbook of Hydraulics by King, H.W. and Barter, E.F, 1963* (See page 11):

$$Q = C * L * H^{1.5}$$

Where

Q = Spillway Discharge (cfs)

C = Broad-Crested Weir Spillway Coefficient

L = Crest Length (ft)

H = Head Above the Spillway (ft)

### Spillway Coefficient (C)

Experiments on broad crested weir has indicated that for heads from 0.5 ft to 1.5 ft, the spillway crest coefficient (C) becomes more uniform, and for heads from 1.5 ft and above, the spillway crest coefficient as given by the different experiments is nearly constant and equals approximately 2.63 (See page 11). Table 5-3 of *Handbook of Hydraulics by King H.W and Barter, E.F, 1963* also indicates the spillway coefficient to be equal to 2.64 for heads equal to 1.5 ft or above when the breadth of crest of weir is equal to 10 ft (See page 12). For this a particular analysis, the head above spillway varied between 1 and 7 ft. URS decided to use a spillway coefficient of 2.64 to develop the elevation-discharge rating curve.

**Spillway Crest Length (L)**

It should be noted that the proposed broad crested weir has a curvature with a radius of 700 ft (See Figure on page 13). The spillway crest length (L) was estimated using the following relationship:

$$L = 100*\Delta/D$$

where

L = Length of the spillway crest (ft)

$\Delta$ = Central angle of the curve (angle of curvature)

D = Degree of curvature (degrees)

The central angle of the curve was estimated using AutoCAD and found to be equal to 62 degree. The degree of curvature (D) was estimated using the following relationship:

$$D = 5729.28 /R$$

where

R = Radius of the Curve (700 ft)

The degree of curvature was found to be equal to 8.18 degree. The length of curve was estimated to be equal to 760 ft. The Point of Curvature (PC) was equal to 1+00 stations and Point of Tangency PT was estimated to be equal to 3+68 station (See Figure on page 11). The total length of the spillway was found to be equal to:

$$760 + 100 + 368 = 1228 \text{ ft}$$

URS therefore decided to use a length of spillway crest equal to 1200 ft in developing the elevation-spillway discharge curve.

**Head Above the Spillway (H)**

The spillway crest was set at an elevation of 1212.0 ft (NAVD 88.0). The preliminary reservoir routing indicated the embankment height to be equal to 1218.25 ft. Therefore, the elevation-discharge rating curve was estimated between 1213 ft and 1220 ft (between 1 and 7 ft). The emergency spillway cross section is provided on Page 14.

## RESULTS

The elevation-spillway discharge-rating curve for a 10-ft broad-crested weir also include the infiltration amounts in addition to the discharges released through the emergency spillway. It should be noted that infiltration amounts were estimated for the future condition and interim condition separately. Interim condition refers to the existing condition with no sediment pool. Future condition refers to the scenario with a 100-year sediment accumulated in the reservoir.

The elevation-spillway discharge rating curve for the interim condition is provided in Table 1 (See page 5). All the formulas involved in establishing the rating curve provided in Table 1 are provided on page 6. For the interim condition, the discharges will be released through the emergency spillway and infiltration only. The procedure related to the estimation of the infiltration rates for the interim condition is provided in a separate calculation package.

The elevation-spillway discharge rating curve for the future condition (principal spillway closed) is provided in Table 2 (See page 7). All the formulas involved in establishing the rating curve provided in Table 2 are provided on page 8. For the future condition (principal spillway closed), the discharges will be released through the emergency spillway and infiltration ( for future condition). The procedure related to the estimation of the infiltration rates for the future condition is provided in a separate calculation package.

The elevation-spillway discharge rating curve for the future condition (principal spillway open) is provided in Table 3 (See page 9). All the formulas involved in establishing the rating curve provided in Table 3 are provided on page 10. For the future condition (principal spillway open), the discharges will be released through the emergency spillway, infiltration (for future condition) and a 48-inch principal spillway. The procedure related to the estimation of the capacity of the principal spillway and infiltration rates for the future condition are provided in a separate calculation package.

(It should be noted that the reservoir upstream of the White tank FRS No. 3 Spillway gets narrower at the south end of the spillway. URS determined the conveyance effects in the reservoir upstream of the White Tank FRS No. 3 Spillway in a separate calculation package and found out that the water surface elevation in the reservoir drops by 0.25 ft as it travels from North end of reservoir to the South end. The calculations indicated that the water surface elevation drops by approximately 0.25 ft at the North end of the spillway and approximately by zero ft at South end of the spillway. Therefore, URS decided to lower the actual head available at the broad crested weir by 0.125 ft (average of maximum and minimum drop).

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | **TABLE 1** | | | | | | | |
| 2 | **ELEVATION-DISCHARGE CURVE FOR BROAD-CRESTED WEIR** | | | | | | | |
| 3 | **INTERIM CONDITION** | | | | | | | |
| 4 | **Spillway Length** | **1200** | **ft** | | | | | |
| 5 | **Broad-crested weir rating curve (10-ft wide crest)** | | | | | | | |
| 6 | | | | | | | | |
| 7 | **Reservoir Elevation (NAVD 88)** | **Conveyance Effects** | **Effective Head For Discharge Calculation** | **'C' Coefficient** | **Flow rate, 'Q'** | **Infiltration Amount** | **Total Discharge** | |
| 8 | **(feet)** | **(ft)** | **(ft)** | | **(cfs)** | **(cfs)** | **(cfs)** | |
| 9 | **1212.0** | 0.000 | 1212.00 | - | 0 | 85.95 | 86 | |
| 10 | 1213.0 | 0.125 | 1212.88 | 2.64 | 2593 | 92.00 | 2685 | |
| 11 | 1214.0 | 0.125 | 1213.88 | 2.64 | 8134 | 97.00 | 8231 | |
| 12 | 1215.0 | 0.125 | 1214.88 | 2.64 | 15443 | 102.00 | 15545 | |
| 13 | 1216.0 | 0.125 | 1215.88 | 2.64 | 24165 | 107.00 | 24272 | |
| 14 | 1217.0 | 0.125 | 1216.88 | 2.64 | 34099 | 113.00 | 34212 | |
| 15 | 1218.0 | 0.125 | 1217.88 | 2.64 | 45113 | 119.00 | 45232 | |
| 16 | 1219.0 | 0.125 | 1218.88 | 2.64 | 57108 | 125.00 | 57233 | |
| 17 | 1220.0 | 0.125 | 1219.88 | 2.64 | 70010 | 132.00 | 70142 | |

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | **TABLE 1** | | | | | | | |
| 2 | **ELEVATION-DISCHARGE CURVE FOR BROAD-CRESTED WEIR** | | | | | | | |
| 3 | INTERIM CONDITION | | | | | | | |
| 4 | Spillway Length | 1200 | ft | | | | | |
| 5 | Broad-crested weir rating curve (10-ft wide crest) | | | | | | | |
| 6 | | | | | | | | |
| 7 | Reservoir Elevation (NAVD 88) | Conveyance Effects | Effective Head For Discharge Calculation | 'C' Coefficient | Flow rate, 'Q' | Infiltration Amount | Total Discharge | |
| 8 | (feet) | (ft) | (ft) | | (cfs) | (cfs) | (cfs) | |
| 9 | 1212 | 0 | =A9-B9 | - | 0 | 85.95 | =SUM(E9:F9) | |
| 10 | =(A9+1) | 0.125 | =A10-B10 | 2.64 | =D10*$B$4*((C10-$A$9)^1.5) | 92 | =SUM(E10:F10) | |
| 11 | =(A10+1) | 0.125 | =A11-B11 | 2.64 | =D11*$B$4*((C11-$A$9)^1.5) | 97 | =SUM(E11:F11) | |
| 12 | =(A11+1) | 0.125 | =A12-B12 | 2.64 | =D12*$B$4*((C12-$A$9)^1.5) | 102 | =SUM(E12:F12) | |
| 13 | =(A12+1) | 0.125 | =A13-B13 | 2.64 | =D13*$B$4*((C13-$A$9)^1.5) | 107 | =SUM(E13:F13) | |
| 14 | =(A13+1) | 0.125 | =A14-B14 | 2.64 | =D14*$B$4*((C14-$A$9)^1.5) | 113 | =SUM(E14:F14) | |
| 15 | =(A14+1) | 0.125 | =A15-B15 | 2.64 | =D15*$B$4*((C15-$A$9)^1.5) | 119 | =SUM(E15:F15) | |
| 16 | =(A15+1) | 0.125 | =A16-B16 | 2.64 | =D16*$B$4*((C16-$A$9)^1.5) | 125 | =SUM(E16:F16) | |
| 17 | =(A16+1) | 0.125 | =A17-B17 | 2.64 | =D17*$B$4*((C17-$A$9)^1.5) | 132 | =SUM(E17:F17) | |

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 18 | | | | | | | | |
| 19 | **TABLE 2** | | | | | | | |
| 20 | **ELEVATION-DISCHARGE CURVE FOR BROAD-CRESTED WEIR** | | | | | | | |
| 21 | **FUTURE CONDITION - PRINCIPAL SPILLWAY CLOSED** | | | | | | | |
| 22 | | | | | | | | |
| 23 | | | | | | | | |
| 24 | **Effective Spillway Width** | | | **1200** | **ft** | | | |
| 25 | **Broad-crested weir rating curve (10-ft wide crest)** | | | | | | | |
| 26 | | | | | | | | |
| 27 | **Reservoir Elevation (NAVD 88)** | **Conveyance Effects** | **Effective Head For Discharge Calculation** | **'C' Coefficient** | **Flow rate, 'Q'** | **Infiltration Amount** | **Total Discharge** | |
| 28 | **(feet)** | **(ft)** | **(ft)** | | **(cfs)** | **(cfs)** | **(cfs)** | |
| 29 | **1212.0** | 0.000 | 1212.00 | - | 0 | 72.7 | 73 | |
| 30 | 1213.0 | 0.125 | 1212.88 | 2.64 | 2593 | 78.96 | 2672 | |
| 31 | 1214.0 | 0.125 | 1213.88 | 2.64 | 8134 | 84.41 | 8218 | |
| 32 | 1215.0 | 0.125 | 1214.88 | 2.64 | 15443 | 89.86 | 15533 | |
| 33 | 1216.0 | 0.125 | 1215.88 | 2.64 | 24165 | 96.02 | 24261 | |
| 34 | 1217.0 | 0.125 | 1216.88 | 2.64 | 34099 | 102.14 | 34202 | |
| 35 | 1218.0 | 0.125 | 1217.88 | 2.64 | 45113 | 108.43 | 45221 | |
| 36 | 1219.0 | 0.125 | 1218.88 | 2.64 | 57108 | 114.54 | 57222 | |
| 37 | 1220.0 | 0.125 | 1219.88 | 2.64 | 70010 | 121.34 | 70131 | |

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 18 | | | | | | | | |
| 19 | TABLE 2 | | | | | | | |
| 20 | ELEVATION-DISCHARGE CURVE FOR BROAD-CRESTED WEIR | | | | | | | |
| 21 | FUTURE CONDITION - PRINCIPAL SPILLWAY CLOSED | | | | | | | |
| 22 | | | | | | | | |
| 23 | | | | | | | | |
| 24 | Effective Spillway Width | | | 1200 | ft | | | |
| 25 | Broad-crested weir rating curve (10-ft wide crest) | | | | | | | |
| 26 | | | | | | | | |
| 27 | Reservoir Elevation (NAVD 88) | Conveyance Effects | Effective Head For Discharge Calculation | 'C' Coefficient | Flow rate, 'Q' | Infiltration Amount | Total Discharge | |
| 28 | (feet) | (ft) | (ft) | | (cfs) | (cfs) | (cfs) | |
| 29 | 1212 | 0 | =A29-B29 | - | 0 | 72.7 | =SUM(E29:F29) | |
| 30 | =(A29+1) | 0.125 | =A30-B30 | 2.64 | =D30*$D$24*((C30-$A$29)^1.5) | 78.96 | =SUM(E30:F30) | |
| 31 | =(A30+1) | 0.125 | =A31-B31 | 2.64 | =D31*$D$24*((C31-$A$29)^1.5) | 84.412 | =SUM(E31:F31) | |
| 32 | =(A31+1) | 0.125 | =A32-B32 | 2.64 | =D32*$D$24*((C32-$A$29)^1.5) | 89.861 | =SUM(E32:F32) | |
| 33 | =(A32+1) | 0.125 | =A33-B33 | 2.64 | =D33*$D$24*((C33-$A$29)^1.5) | 96.018 | =SUM(E33:F33) | |
| 34 | =(A33+1) | 0.125 | =A34-B34 | 2.64 | =D34*$D$24*((C34-$A$29)^1.5) | 102.143 | =SUM(E34:F34) | |
| 35 | =(A34+1) | 0.125 | =A35-B35 | 2.64 | =D35*$D$24*((C35-$A$29)^1.5) | 108.43 | =SUM(E35:F35) | |
| 36 | =(A35+1) | 0.125 | =A36-B36 | 2.64 | =D36*$D$24*((C36-$A$29)^1.5) | 114.544 | =SUM(E36:F36) | |
| 37 | =(A36+1) | 0.125 | =A37-B37 | 2.64 | =D37*$D$24*((C37-$A$29)^1.5) | 121.344 | =SUM(E37:F37) | |

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 38 | | | | | | | | |
| 39 | **TABLE 3** | | | | | | | |
| 40 | **ELEVATION-DISCHARGE CURVE FOR BROAD-CRESTED WEIR** | | | | | | | |
| 41 | **FUTURE - PRINCIPAL SPILLWAY OPEN** | | | | | | | |
| 42 | | | | | | | | |
| 43 | **Effective Spillway Width** | | | **1200 ft** | | | | |
| 44 | **Broad-crested weir rating curve (10-ft wide crest)** | | | | | | | |
| 45 | | | | | | | | |
| 46 | **Reservoir Elevation (NAVD 88)** | **Conveyance Effects** | **Effective Head For Discharge Calculation** | **'C' Coefficient** | **Flow rate, 'Q'** | **Infiltration Amount** | **Principal Spillway Discharge** | **Total Discharge** |
| 47 | **(feet)** | **(ft)** | **(ft)** | | **(cfs)** | **(cfs)** | **(cfs)** | **(cfs)** |
| 48 | **1212.0** | 0.0 | 1212.00 | - | 0 | 72.7 | 257 | 330 |
| 49 | 1213.0 | 0.125 | 1212.875 | 2.64 | 2593 | 78.96 | 264 | 2936 |
| 50 | 1214.0 | 0.125 | 1213.875 | 2.64 | 8134 | 84.41 | 270 | 8488 |
| 51 | 1215.0 | 0.125 | 1214.875 | 2.64 | 15443 | 89.86 | 277 | 15810 |
| 52 | 1216.0 | 0.125 | 1215.875 | 2.64 | 24165 | 96.02 | 284 | 24545 |
| 53 | 1217.0 | 0.125 | 1216.875 | 2.64 | 34099 | 102.14 | 290 | 34492 |
| 54 | 1218.0 | 0.125 | 1217.875 | 2.64 | 45113 | 108.43 | 296 | 45517 |
| 55 | 1219.0 | 0.125 | 1218.875 | 2.64 | 57108 | 114.54 | 302 | 57524 |
| 56 | 1220.0 | 0.125 | 1219.875 | 2.64 | 70010 | 121.34 | 308 | 70439 |

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 38 | | | | | | | | |
| 39 | TABLE 3 | | | | | | | |
| 40 | ELEVATION-DISCHARGE CURVE FOR BROAD-CRESTED WEIR | | | | | | | |
| 41 | FUTURE - PRINCIPAL SPILLWAY OPEN | | | | | | | |
| 42 | | | | | | | | |
| 43 | Effective Spillway Width | | | 1200 | ft | | | |
| 44 | Broad-crested weir rating curve (10-ft wide crest) | | | | | | | |
| 45 | | | | | | | | |
| 46 | Reservoir Elevation (NAVD 88) | Conveyance Effects | Effective Head For Discharge Calculation | 'C' | Flow rate, 'Q' | Infiltration Amount | Principal Spillway Discharge | Total Discharge |
| 47 | (feet) | (ft) | (ft) | Coefficient | (cfs) | (cfs) | (cfs) | (cfs) |
| 48 | 1212 | 0 | =A48-B48 | - | 0 | 72.7 | 250.815056361964 | =SUM(E48:G48) |
| 49 | =(A48+1) | 0.125 | =A49-B49 | 2.64 | =D49*$D$43*((C49-$A$48)^1.5) | 78.96 | 257.854689850408 | =SUM(E49:G49) |
| 50 | =(A49+1) | 0.125 | =A50-B50 | 2.64 | =D50*$D$43*((C50-$A$48)^1.5) | 84.412 | 264.715240316595 | =SUM(E50:G50) |
| 51 | =(A50+1) | 0.125 | =A51-B51 | 2.64 | =D51*$D$43*((C51-$A$48)^1.5) | 89.861 | 271.409882170227 | =SUM(E51:G51) |
| 52 | =(A51+1) | 0.125 | =A52-B52 | 2.64 | =D52*$D$43*((C52-$A$48)^1.5) | 96.018 | 277.950245542574 | =SUM(E52:G52) |
| 53 | =(A52+1) | 0.125 | =A53-B53 | 2.64 | =D53*$D$43*((C53-$A$48)^1.5) | 102.143 | 284.346658648372 | =SUM(E53:G53) |
| 54 | =(A53+1) | 0.125 | =A54-B54 | 2.64 | =D54*$D$43*((C54-$A$48)^1.5) | 108.43 | 290.608343345509 | =SUM(E54:G54) |
| 55 | =(A54+1) | 0.125 | =A55-B55 | 2.64 | =D55*$D$43*((C55-$A$48)^1.5) | 114.544 | 296.743574451081 | =SUM(E55:G55) |
| 56 | =(A55+1) | 0.125 | =A56-B56 | 2.64 | =D56*$D$43*((C56-$A$48)^1.5) | 121.344 | 302.759810703472 | =SUM(E56:G56) |

crest is likely to become dulled or rusted, or it may be damaged by floating ice and debris. Under such conditions it may be advisable to use a weir with a thicker crest. It is often convenient to use an existing weir or overflow dam for measuring discharges. Weirs of various dimensions and shapes are used in hydraulic structures. When designing such structures it is important to be able to estimate approximately the discharges over these weirs (p. 2-15).

The amount of water which will pass over a weir, not sharp-crested, depends to a large extent upon its sectional form and the shape of its crest, and it is necessary to resort to experiment to determine the discharge over any particular shape. Inasmuch as the number of shapes of weirs is unlimited, it is not to be expected that experimental data are or ever will be available for them all. There are available, however, the results of several series of experiments on weirs of different cross sections which furnish much valuable information for determining discharges over weirs of the same or similar shapes.

The available experiments are not extensive enough for a comprehensive study of the effect of velocity of approach on weirs not sharp-crested. The coefficients given in this chapter probably apply more accurately where the velocity of approach is not high. From a consideration of sharp-crested weirs it appears that discharges, for high velocities of approach, will be somewhat greater than is given by formula (5-10).

Since experimental conditions will seldom be duplicated in practice, it is probable that errors may result from the general use of the coefficients given in this chapter. Extreme accuracy, however, is not always necessary in design, where uncertainty as to the exact quantity of water to be provided for may exist.

The problem of establishing a fixed relation between head and discharge, for weirs not sharp-crested, is complicated by the fact that the nappe may assume a variety of forms in passing over the weir. For each modification of nappe form, there is a corresponding change in the relation between head and discharge. The effect of this condition is more noticeable for low heads.

The nappe may undergo several of these modifications in succession as the head is varied. The successive forms that appear with an increasing stage may differ from those pertaining to similar stages with a decreasing head. The head at which the changes of nappe form occur varies with the rate of



change of head, whether increasing or decreasing, and with other conditions.

Among weirs of irregular section there is a large class for which, from the nature of their section, the nappe can assume only one form unless drowned. Such weirs, it is suggested, may, if properly calibrated, equal or exceed the usefulness of the thin-edged weir for purposes of stream gaging, because of their stability of section and because the thin-edged weir is not free from modification of nappe form for low heads.

**Broad-crested Weirs.** A weir approximately rectangular in cross section is termed a broad-crested weir. Unless otherwise noted, it will be assumed to have vertical faces, a plane level

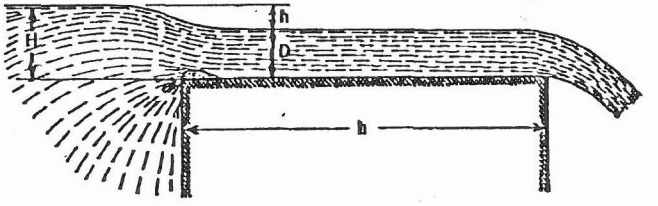



FIG. 5-6. Broad-crested weir.

crest, and sharp right-angled corners. Figure 5-6 represents a broad-crested weir of breadth $b$. The head $H$ should be measured at least $2.5H$ upstream from the weir. Because of the sharp upstream edge, contraction of the nappe occurs. Surface contraction begins at a point slightly upstream from the weir.

The discharge over broad-crested weirs is usually expressed by the equation

$$Q = CLH^{3/2} \qquad (5\text{-}10)$$

Experiments on broad-crested weirs have been performed by Blackwell, Bazin, Woodburn, the U.S. Deep Waterways Board, and the U.S. Geological Survey. These experiments cover a wide range of conditions as to head, breadth, and height of weir. Considerable discrepancy exists in the results of the different experimenters, especially for heads below 0.5 ft. For heads from 0.5 to about 1.5 ft the coefficient becomes more uniform, and for heads from 1.5 ft to that at which the nappe becomes detached from the crest, the coefficient as given by the different experiments is nearly constant and equals approximately 2.63.

May-12-04 10:40am From-UKS PTC 05/12/2004 WED 09:40 [TX/RX NO 7099] 013

Table 5-3. Values of $C$ in the Formula $Q = CLH^{3/2}$ for Broad-crested Weirs

| Measured head in feet, $H$ | Breadth of crest of weir in feet | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.50 | 0.75 | 1.00 | 1.50 | 2.00 | 2.50 | 3.00 | 4.00 | 5.00 | 10.00 | 15.00 |
| 0.2 | 2.80 | 2.75 | 2.69 | 2.62 | 2.54 | 2.48 | 2.44 | 2.38 | 2.34 | 2.49 | 2.68 |
| 0.4 | 2.92 | 2.80 | 2.72 | 2.64 | 2.61 | 2.60 | 2.58 | 2.54 | 2.50 | 2.56 | 2.70 |
| 0.6 | 3.08 | 2.89 | 2.75 | 2.64 | 2.61 | 2.60 | 2.68 | 2.69 | 2.70 | 2.70 | 2.70 |
| 0.8 | 3.30 | 3.04 | 2.85 | 2.68 | 2.60 | 2.60 | 2.67 | 2.68 | 2.68 | 2.69 | 2.64 |
| 1.0 | 3.32 | 3.14 | 2.98 | 2.75 | 2.66 | 2.64 | 2.65 | 2.67 | 2.68 | 2.68 | 2.63 |
| 1.2 | 3.32 | 3.20 | 3.08 | 2.86 | 2.70 | 2.65 | 2.64 | 2.67 | 2.68 | 2.69 | 2.64 |
| 1.4 | 3.32 | 3.26 | 3.20 | 2.92 | 2.77 | 2.68 | 2.64 | 2.66 | 2.65 | 2.67 | 2.64 |
| 1.6 | 3.32 | 3.29 | 3.28 | 3.07 | 2.89 | 2.75 | 2.68 | 2.68 | 2.65 | 2.64 | 2.63 |
| 1.8 | 3.32 | 3.32 | 3.31 | 3.07 | 2.88 | 2.74 | 2.68 | 2.66 | 2.65 | 2.64 | 2.63 |
| 2.0 | 3.32 | 3.31 | 3.30 | 3.03 | 2.86 | 2.76 | 2.72 | 2.68 | 2.65 | 2.64 | 2.63 |
| 2.5 | 3.32 | 3.32 | 3.31 | 3.28 | 3.07 | 2.89 | 2.81 | 2.72 | 2.67 | 2.64 | 2.63 |
| 3.0 | 3.32 | 3.32 | 3.32 | 3.32 | 3.20 | 3.05 | 2.92 | 2.73 | 2.68 | 2.64 | 2.63 |
| 3.5 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.19 | 2.97 | 2.76 | 2.68 | 2.64 | 2.63 |
| 4.0 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.07 | 2.79 | 2.70 | 2.64 | 2.63 |
| 4.5 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 2.88 | 2.74 | 2.64 | 2.63 |
| 5.0 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.07 | 2.79 | 2.64 | 2.63 |
| 5.5 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 3.32 | 2.88 | 2.64 | 2.63 |

Table 5-4. Values of $C$ in the Formula $Q = CLH^{3/2}$ for Models of Broad-crested Weirs with Rounded Upstream Corner

| Name of experimenter | Radius of curve in feet | Breadth of weir in feet, $B$ | Height of weir in feet, $P$ | Head in feet, $H$ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.4 | 0.6 | 0.8 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 4.0 | 5.0 |
| Basin | 0.33 | 1.63 | 2.46 | 3.03 | 2.97 | 2.93 | 3.01 | 3.04 | | | | | |
| Basin | 0.33 | 3.56 | 2.46 | 3.70 | 2.89 | 2.87 | 2.89 | 2.92 | | | | | |
| U. S. Deep Waterways | 0.33 | 1.62 | 4.67 | .... | 2.77 | 2.80 | 2.83 | 2.92 | 3.00 | 3.08 | 3.17 | 3.34 | 3.50 |
| U. S. Deep Waterways | 0.33 | 3.56 | 4.66 | .... | .... | 2.81 | 2.83 | 2.83 | 2.82 | 2.82 | 2.82 | 2.82 | 2.81 |



Table 5-5. Values of $C$ in the Formula $Q = CLH^{3/2}$ for Broad-crested Weirs with Crests Inclined Slightly Downward

(a)

| Crest | Energy head = $H_e$ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.2 | 1.4 | 1.6 |
| Level | 2.78 | 2.79 | 2.80 | 2.81 | 2.82 | 2.83 | 2.85 | 2.85 | 2.85 |
| Slope = 0.004 | 2.95 | 2.94 | 2.93 | 2.92 | 2.91 | 2.90 | 2.88 | 2.87 | 2.87 |
| Slope = 0.020 | 3.07 | 3.06 | 3.05 | 3.04 | 3.03 | 3.02 | 3.00 | 2.99 | |

(b)

| Slope of crest | Length of weir in feet | Head in feet, $H$ | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| 12 to 1 | 3.0 | 2.58 | 2.57 | 2.57 | 2.60 | 2.84 | 2.81 | 2.70 |
| 18 to 1 | 3.0 | 2.91 | 2.92 | 2.53 | 2.60 | 2.80 | 2.74 | 2.62 |
| 18 to 1 | 10.0 | 2.52 | 2.88 | 2.73 | 2.80 | 2.90 | 2.80 | 2.68 |

Table 5-6. Values of $C$ in the Formula $Q = CLH^{3/2}$ for Weirs of Triangular Cross Section with Vertical Upstream Face and Sloping Downstream Face

| Slope of downstream face | Height of weir in feet, $P$ | Head in feet, $H$ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.2 | 1.6 |
| Hor.-Vert. | | | | | | | | | | | | |
| 1 to 1 | 2.46 | 3.88 | 3.85 | 3.85 | 3.85 | 3.85 | 3.85 | 3.85 | 3.85 | 3.85 | 3.85 | 3.85 |
| 2 to 1 | 2.46 | 3.48 | 3.48 | 3.49 | 3.49 | 3.50 | 3.50 | 3.50 | 3.50 | 3.50 | 3.51 | 3.51 |
| 2 to 1 | 1.64 | 3.56 | 3.47 | 3.47 | 3.51 | 3.54 | 3.57 | 3.58 | 3.58 | 3.58 | 3.59 | 3.57 |
| 3 to 1 | 1.64 | .... | 2.90 | 3.11 | 3.22 | 3.28 | 3.33 | 3.37 | 3.40 | 3.40 | 3.41 | 3.41 |
| 5 to 1 | 2.46 | .... | 3.08 | 3.06 | 3.05 | 3.05 | 3.07 | 3.09 | 3.12 | 3.13 | 3.13 | 3.13 |
| 10 to 1 | 2.46 | .... | 2.82 | 2.83 | 2.84 | 2.86 | 2.89 | 2.90 | 2.91 | 2.91 | 2.92 | 2.93 |

Pipes
05/12/2004 WED 09:40 [TX/RX NO 7099] 022
May-12-04 10:43am FROM-URS

SOURCE: SURVEY DATA FROM 2003 WITH AN EXTENSION FROM A FCDMC DTM FILE ON 3.22.04 TO CURRENT USGS NAVD88

P:\FCDMC\23443698 White Tanks\Calcs\SpillwayPlan.dgn

XREFS: 52604,TOPO.DGN, PL-FCD.DGN

| ITEM NO. | ITEM DESCRIPTION | QUANTITY |
|---|---|---|

13

N

50 0 50 100
Scale in Feet

TWO WORKING DAYS BEFORE YOU DIG, CALL
263-1100
BLUE STAKE

ADWR APPROVAL

| NO. | REVISION | BY | DATE |
|---|---|---|---|
| B | 60% DESIGN SUBMITTAL | TER | 6-04 |
| A | 30% DESIGN SUBMITTAL | TER | 4-04 |

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

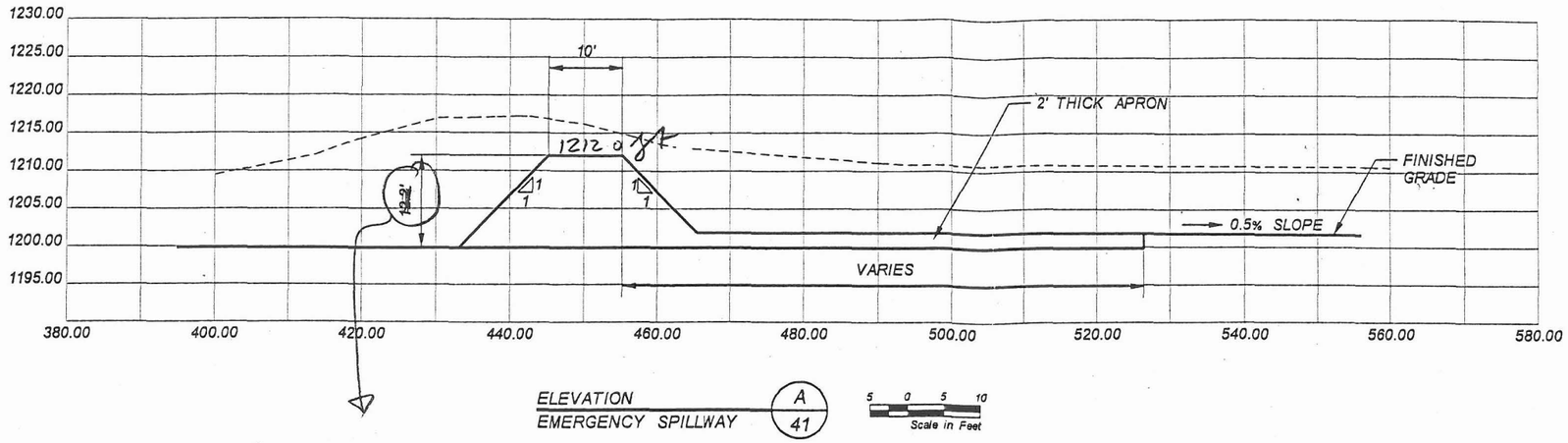
WHITE TANKS FRS NO. 3
REMEDIATION DESIGN - PHASE 2
PCN 470.04.30, FCD CONTRACT NO. 2004CO17

PRELIMINARY NOT FOR CONSTRUCTION

| | BY | DATE |
|---|---|---|
| DESIGNED | TER | 6-04 |
| DRAWN | MSJ | 6-04 |
| CHECKED | RM | 6-04 |

URS
7720 NORTH 16TH STREET
SUITE 100
PHOENIX, AZ 85020

DRAWING NO. | EMERGENCY SPILLWAY PLAN | SHEET C




ELEVATION EMERGENCY SPILLWAY (A / 41)

5 0 5 10
Scale in Feet

(varies b/w 6 to 9 ft)

| ITEM NO. | ITEM DESCRIPTION | QUANTITY |
|---|---|---|

14

TWO WORKING DAYS BEFORE YOU DIG, CALL
263-1100
BLUE STAKE

ADWR APPROVAL

| NO. | REVISION | BY | DATE |
|---|---|---|---|
| A | 60% DESIGN SUBMITTAL | TER | 6-04 |

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FRS NO. 3
REMEDIATION DESIGN - PHASE 2
PCN 470.04.30, FCD CONTRACT NO. 2004C017

| | | BY | DATE |
|---|---|---|---|
| PRELIMINARY NOT FOR CONSTRUCTION | DESIGNED | TER | 6-04 |
| | DRAWN | MSJ | 6-04 |
| | CHECKED | RM | 6-04 |

URS
7720 NORTH 16TH STREET
SUITE 100
PHOENIX, AZ 85020

| DRAWING NO. | | SHEET OF |
|---|---|---|
| XS16 | EMERGENCY SPILLWAY SECTIONS AND DETAILS | 41 43 |

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# CALCULATION PACKAGE NO. C-4

URS

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: ELEVATION-STORAGE CURVE AT THE WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 04/22/04

Checked by: Todd Ringsmuth Date: 5-6-04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results: no comments.

See Page 3.

Calculation Approved by: _____ 5/19/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# ELEVATION-STORAGE CURVE AT THE WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
## 23443748

## PROBLEM STATEMENT

The aim of this calculation package is to develop the elevation-storage curve at the White Tank Flood Retarding Structure (FRS) No.3.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

All TR-20 models were updated by incorporating a new elevation-storage curve representing the existing conditions at White Tank FRS No. 3. The elevation-storage curve was established using the end-area method as described in Table 17-2 of *National Engineering Handbook, Section 4 Hydrology* (U.S Department of Agriculture, March 1985) (See Pages 5-9).

The District provided the latest topographic mapping comprised of 1-ft interval. It was imported into AutoCAD. The surface area corresponding to a given elevation was obtained from the latest available USGS topographical map for every 1 feet using AutoCad. The reservoir bottom was found to be at 1178 ft and spillway elevation was set at 1212 ft. Table 1 summarizes all the calculations involved in estimating the elevation-storage curve (See Page 3). All the formulas involved in these calculations are shown on a formula spreadsheet on Page 4.

## RESULTS

Please see the Table 1 on Page 3 for the elevation-storage curve data for the White Tank FRS No. 3.

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | TABLE 1 | | | | | | |
| 2 | ELEVATION-STORAGE CURVE AT WHITE TANK FRS NO. 3 | | | | | | |
| 3 | | | | | | | |
| 4 | Reservoir Elevation | Surface Area | Average Surface Area | Elevation Difference | Reservoir Storage | Accumulative Storage | Comments |
| 5 | (ft) | (acre) | (acre) | (ft) | (acre-ft) | (acre-ft) | |
| 6 | 1178 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7 | 1179 | 0.51 | 0.25 | 1.00 | 0.25 | 0.25 | |
| 8 | 1180 | 1.05 | 0.78 | 1.00 | 0.78 | 1.03 | |
| 9 | 1181 | 1.75 | 1.40 | 1.00 | 1.40 | 2.43 | |
| 10 | 1182 | 3.07 | 2.41 | 1.00 | 2.41 | 4.84 | |
| 11 | 1183 | 4.79 | 3.93 | 1.00 | 3.93 | 8.77 | |
| 12 | 1184 | 5.81 | 5.30 | 1.00 | 5.30 | 14.07 | |
| 13 | 1185 | 6.60 | 6.21 | 1.00 | 6.21 | 20.28 | |
| 14 | 1186 | 7.44 | 7.02 | 1.00 | 7.02 | 27.30 | |
| 15 | 1187 | 8.65 | 8.05 | 1.00 | 8.05 | 35.34 | |
| 16 | 1188 | 10.32 | 9.49 | 1.00 | 9.49 | 44.83 | |
| 17 | 1189 | 11.93 | 11.13 | 1.00 | 11.13 | 55.95 | |
| 18 | 1190 | 13.93 | 12.93 | 1.00 | 12.93 | 68.88 | |
| 19 | 1191 | 15.98 | 14.96 | 1.00 | 14.96 | 83.84 | |
| 20 | 1192 | 22.46 | 19.22 | 1.00 | 19.22 | 103.06 | |
| 21 | 1193 | 27.82 | 25.14 | 1.00 | 25.14 | 128.20 | |
| 22 | 1194 | 33.83 | 30.83 | 1.00 | 30.83 | 159.02 | |
| 23 | 1195 | 44.05 | 38.94 | 1.00 | 38.94 | 197.96 | |
| 24 | 1196 | 56.65 | 50.35 | 1.00 | 50.35 | 248.31 | |
| 25 | 1197 | 69.49 | 63.07 | 1.00 | 63.07 | 311.38 | |
| 26 | 1198 | 83.88 | 76.69 | 1.00 | 76.69 | 388.07 | |
| 27 | 1199 | 98.77 | 91.33 | 1.00 | 91.33 | 479.39 | |
| 28 | 1199.2 | 102.0 | 100.39 | 0.21 | 20.63 | 500.02 | 100-yr Sediment Pool Level |
| 29 | 1200 | 112.95 | 105.86 | 1.00 | 105.86 | 585.25 | |
| 30 | 1201 | 130.05 | 121.50 | 1.00 | 121.50 | 706.75 | |
| 31 | 1202 | 147.55 | 138.80 | 1.00 | 138.80 | 845.55 | |
| 32 | 1203 | 165.40 | 156.48 | 1.00 | 156.48 | 1002.03 | |
| 33 | 1204 | 183.11 | 174.25 | 1.00 | 174.25 | 1176.28 | |
| 34 | 1205 | 199.09 | 191.10 | 1.00 | 191.10 | 1367.38 | |
| 35 | 1206 | 216.66 | 207.88 | 1.00 | 207.88 | 1575.25 | |
| 36 | 1207 | 234.81 | 225.74 | 1.00 | 225.74 | 1800.99 | |
| 37 | 1208 | 253.15 | 243.98 | 1.00 | 243.98 | 2044.97 | |
| 38 | 1209 | 274.77 | 263.96 | 1.00 | 263.96 | 2308.93 | |
| 39 | 1210 | 294.10 | 284.44 | 1.00 | 284.44 | 2593.36 | |
| 40 | 1211 | 313.41 | 303.76 | 1.00 | 303.76 | 2897.12 | |
| 41 | 1212 | 327.85 | 320.63 | 1.00 | 320.63 | 3217.75 | Crest of Emergency Spillway |
| 42 | 1213 | 350.00 | 338.93 | 1.00 | 338.93 | 3556.67 | |
| 43 | 1214 | 368.69 | 359.35 | 1.00 | 359.35 | 3916.02 | |
| 44 | 1215 | 387.54 | 378.12 | 1.00 | 378.12 | 4294.13 | |
| 45 | 1216 | 409.55 | 398.55 | 1.00 | 398.55 | 4692.68 | |
| 46 | 1217 | 431.48 | 420.52 | 1.00 | 420.52 | 5113.19 | |
| 47 | 1218 | 454.15 | 442.82 | 1.00 | 442.82 | 5556.01 | |
| 48 | 1219 | 476.15 | 465.15 | 1.00 | 465.15 | 6021.16 | |
| 49 | 1220 | 501.04 | 488.60 | 1.00 | 488.60 | 6509.75 | |
| 50 | 1221 | 523.89 | 512.47 | 1.00 | 512.47 | 7022.22 | |
| 51 | 1222 | 547.70 | 535.80 | 1.00 | 535.80 | 7558.01 | |
| 52 | 1223 | 573.22 | 560.46 | 1.00 | 560.46 | 8118.47 | |
| 53 | 1224 | 600.00 | 586.61 | 1.00 | 586.61 | 8705.08 | |
| 54 | 1225 | 628.20 | 614.10 | 1.00 | 614.10 | 9319.18 | |
| 55 | 1226 | 657.43 | 642.82 | 1.00 | 642.82 | 9962.00 | |

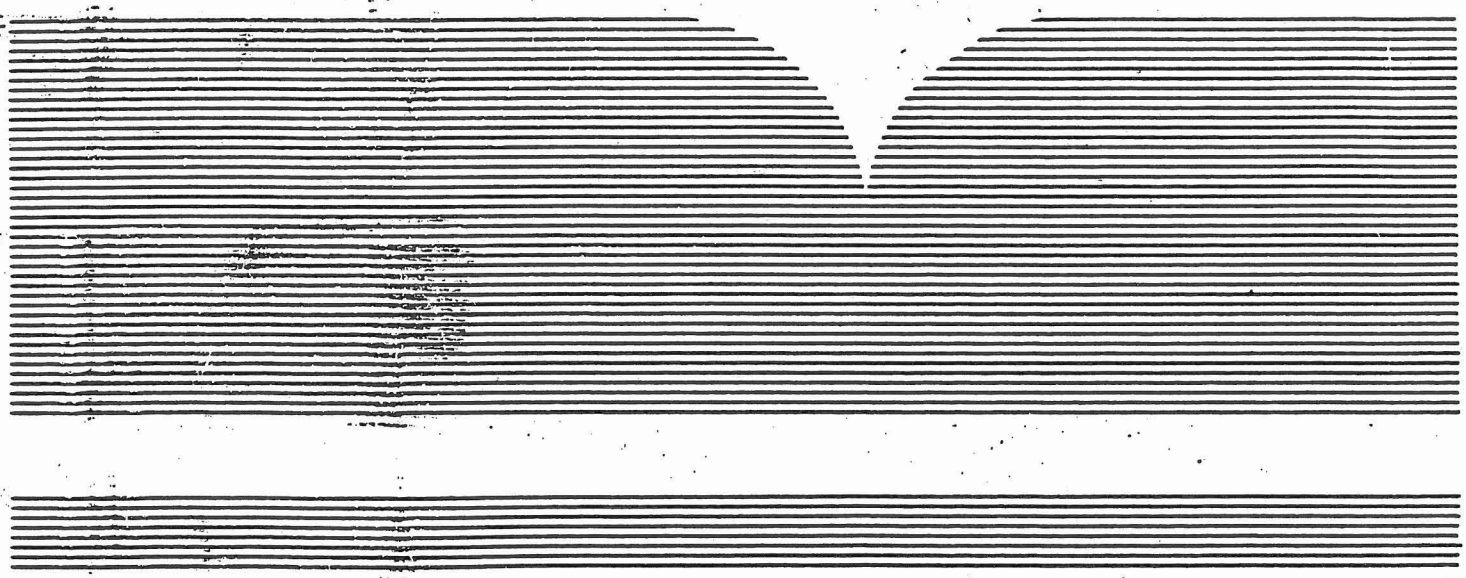
| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | TABLE 1 | | | | | |
| 2 | ELEVATION-STORAGE CURVE AT WHITE TANK FRS NO. 3 | | | | | |
| 3 | | | | | | |
| 4 | Reservoir Elevation | Surface Area | Average Surface Area | Elevation Difference | Reservoir Storage | Accumulative Storage |
| 5 | (ft) | (acre) | (acre) | (ft) | (acre-ft) | (acre-ft) |
| 6 | 1178 | 0 | 0 | 0 | =C6*D6 | 0 |
| 7 | =(A6+1) | 0.5066 | =(B7+B6)/2 | =A7-A6 | =C7*D7 | =(F6+E7) |
| 8 | =(A7+1) | 1.0486 | =(B8+B7)/2 | =A8-A7 | =C8*D8 | =(F7+E8) |
| 9 | =(A8+1) | 1.75 | =(B9+B8)/2 | =A9-A8 | =C9*D9 | =(F8+E9) |
| 10 | =(A9+1) | 3.07 | =(B10+B9)/2 | =A10-A9 | =C10*D10 | =(F9+E10) |
| 11 | =(A10+1) | 4.79 | =(B11+B10)/2 | =A11-A10 | =C11*D11 | =(F10+E11) |
| 12 | =A11+1 | 5.81 | =(B12+B11)/2 | =A12-A11 | =C12*D12 | =(F11+E12) |
| 13 | =A12+1 | 6.6 | =(B13+B12)/2 | =A13-A12 | =C13*D13 | =(F12+E13) |
| 14 | =A13+1 | 7.44 | =(B14+B13)/2 | =A14-A13 | =C14*D14 | =(F13+E14) |
| 15 | =A14+1 | 8.65 | =(B15+B14)/2 | =A15-A14 | =C15*D15 | =(F14+E15) |
| 16 | =A15+1 | 10.32 | =(B16+B15)/2 | =A16-A15 | =C16*D16 | =(F15+E16) |
| 17 | =A16+1 | 11.93 | =(B17+B16)/2 | =A17-A16 | =C17*D17 | =(F16+E17) |
| 18 | =A17+1 | 13.93 | =(B18+B17)/2 | =A18-A17 | =C18*D18 | =(F17+E18) |
| 19 | =A18+1 | 15.98 | =(B19+B18)/2 | =A19-A18 | =C19*D19 | =(F18+E19) |
| 20 | =A19+1 | 22.46 | =(B20+B19)/2 | =A20-A19 | =C20*D20 | =(F19+E20) |
| 21 | =A20+1 | 27.82 | =(B21+B20)/2 | =A21-A20 | =C21*D21 | =(F20+E21) |
| 22 | =A21+1 | 33.83 | =(B22+B21)/2 | =A22-A21 | =C22*D22 | =(F21+E22) |
| 23 | =A22+1 | 44.05 | =(B23+B22)/2 | =A23-A22 | =C23*D23 | =(F22+E23) |
| 24 | =A23+1 | 56.65 | =(B24+B23)/2 | =A24-A23 | =C24*D24 | =(F23+E24) |
| 25 | =A24+1 | 69.49 | =(B25+B24)/2 | =A25-A24 | =C25*D25 | =(F24+E25) |
| 26 | =A25+1 | 83.88 | =(B26+B25)/2 | =A26-A25 | =C26*D26 | =(F25+E26) |
| 27 | =A26+1 | 98.77 | =(B27+B26)/2 | =A27-A26 | =C27*D27 | =(F26+E27) |
| 28 | 1199.2055 | 102 | =(B28+B27)/2 | =A28-A27 | =C28*D28 | =(F27+E28) |
| 29 | =A27+1 | 112.95 | =(B29+B27)/2 | =A29-A27 | =C29*D29 | =(F27+E29) |
| 30 | =A29+1 | 130.05 | =(B30+B29)/2 | =A30-A29 | =C30*D30 | =(F29+E30) |
| 31 | =A30+1 | 147.55 | =(B31+B30)/2 | =A31-A30 | =C31*D31 | =(F30+E31) |
| 32 | =A31+1 | 165.4 | =(B32+B31)/2 | =A32-A31 | =C32*D32 | =(F31+E32) |
| 33 | =A32+1 | 183.105 | =(B33+B32)/2 | =A33-A32 | =C33*D33 | =(F32+E33) |
| 34 | =A33+1 | 199.09 | =(B34+B33)/2 | =A34-A33 | =C34*D34 | =(F33+E34) |
| 35 | =A34+1 | 216.66 | =(B35+B34)/2 | =A35-A34 | =C35*D35 | =(F34+E35) |
| 36 | =A35+1 | 234.81 | =(B36+B35)/2 | =A36-A35 | =C36*D36 | =(F35+E36) |
| 37 | =A36+1 | 253.15 | =(B37+B36)/2 | =A37-A36 | =C37*D37 | =(F36+E37) |
| 38 | =A37+1 | 274.77 | =(B38+B37)/2 | =A38-A37 | =C38*D38 | =(F37+E38) |
| 39 | =A38+1 | 294.1 | =(B39+B38)/2 | =A39-A38 | =C39*D39 | =(F38+E39) |
| 40 | =A39+1 | 313.41 | =(B40+B39)/2 | =A40-A39 | =C40*D40 | =(F39+E40) |
| 41 | =A40+1 | 327.85 | =(B41+B40)/2 | =A41-A40 | =C41*D41 | =(F40+E41) |
| 42 | =A41+1 | 350 | =(B42+B41)/2 | =A42-A41 | =C42*D42 | =(F41+E42) |
| 43 | =A42+1 | 368.69 | =(B43+B42)/2 | =A43-A42 | =C43*D43 | =(F42+E43) |
| 44 | =A43+1 | 387.54 | =(B44+B43)/2 | =A44-A43 | =C44*D44 | =(F43+E44) |
| 45 | =A44+1 | 409.55 | =(B45+B44)/2 | =A45-A44 | =C45*D45 | =(F44+E45) |
| 46 | =A45+1 | 431.48 | =(B46+B45)/2 | =A46-A45 | =C46*D46 | =(F45+E46) |
| 47 | =A46+1 | 454.15 | =(B47+B46)/2 | =A47-A46 | =C47*D47 | =(F46+E47) |
| 48 | =A47+1 | 476.15 | =(B48+B47)/2 | =A48-A47 | =C48*D48 | =(F47+E48) |
| 49 | =A48+1 | 501.04 | =(B49+B48)/2 | =A49-A48 | =C49*D49 | =(F48+E49) |
| 50 | =A49+1 | 523.89 | =(B50+B49)/2 | =A50-A49 | =C50*D50 | =(F49+E50) |
| 51 | =A50+1 | 547.7 | =(B51+B50)/2 | =A51-A50 | =C51*D51 | =(F50+E51) |
| 52 | =A51+1 | 573.22 | =(B52+B51)/2 | =A52-A51 | =C52*D52 | =(F51+E52) |
| 53 | =A52+1 | 600 | =(B53+B52)/2 | =A53-A52 | =C53*D53 | =(F52+E53) |
| 54 | =A53+1 | 628.2 | =(B54+B53)/2 | =A54-A53 | =C54*D54 | =(F53+E54) |
| 55 | =A54+1 | 657.43 | =(B55+B54)/2 | =A55-A54 | =C55*D55 | =(F54+E55) |

PB86-180494

# NATIONAL ENGINEERING HANDBOOK, SECTION 4 HYDROLOGY

(U.S.) DEPARTMENT OF AGRICULTURE
WASHINGTON, DC

MAR 85



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National Technical Information Service
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3. U.S. Department of the Army, Corps of Engineers, 1960, Routing of floods through river channels: Eng. Manual EM 1110-2-1408.

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5. Yevdjevich, Vujica M., 1964, Bibliography and discussion of flood-routing methods and unsteady flow in channels: U.S. Geol. Survey Water-Supply Paper 1690. Prepared in cooperation with the Soil Conservation Service.

6. Lawler, Edward A., 1964, Flood routing: Handbook of Applied Hydrology (V.T. Chow, ed.), New York, McGraw-Hill Book Co., section 25-II, pp. 34-59.

Summary of chapter contents

The remainder of this chapter is divided into four parts: elevation-storage and elevation-discharge relationships, reservoir routing methods, channel routing methods, and unit-hydrograph routing methods. In the first part, some relationships used in reservoir or channel routing are discussed and exhibits of typical results are given; in the second, the continuity equation is discussed and methods of using it in reservoir routings are shown in examples of typical applications; in the third, the theory of the Convex method is presented and examples of typical applications in channel routings are given; and in the fourth, the unit hydrograph theory is discussed and methods of applying it in systems analysis are shown in examples using systems of floodwater-retarding structures.

## Elevation-Storage and Elevation-Discharge Relationships

In the examples of routing through reservoirs and stream channels it will be necessary to use elevation-storage or elevation-discharge curves (or both) in making a routing or as a preliminary to routing. Preparation of such curves is not emphasized in the examples because their construction is described in other SCS publications. The relationships are briefly discussed here as preliminary material; exhibits of tables and curves used in routings are given here and in some of the examples. Conversion equations used in preparing the tables and curves are given in Table 17-1.

Elevation storage relationships for reservoirs

Table 17-2 is a working table that shows data and computed results for an elevation-storage relationship to be used in some of the examples given later. Columns 1 and 7 or 1 and 8 give the relationship in different units of storage.

The relationship is developed from a contour map (or equivalent) of the reservoir area and the table is a record of the computations that were made. Once the map is available, the work goes as follows: (1) select contours close enough to define the topography with reasonable accuracy and tabulate the contour elevations in column 1; (2) determine the

reservoir surface area at each elevation; for this table the areas were determined in square feet as shown in column 2 and converted to acres as shown in column 3; (3) compute average surface areas as shown in column 4; (4) tabulate the increments of depth in column 5; (5) compute the increments of storage for column 6 by multiplying an average area in column 4 by its appropriate depth increment in column 5; (6) accumulate the storage increments of column 6 to get accumulated storage in column 7 for each elevation of column 1; (7) convert storages of column 7 to storages in another unit, if required, and show them in the next column. The relationship of data in columns 1 and 8 is plotted in figure 17.1 as an elevation-storage curve.

Table 17-1. Equations for conversions of units

| Conversion | Equation No. |
|---|---|
| cfs-hours = 12.1 (AF) | (Eq. 17.1) |
| cfs-days = 0.504 (AF) | (Eq. 17-2) |
| inches = (AF)/53.3 A | (Eq. 17-3) |
| $q_{id}$ = $q_{cfs}$/26.9 A | (Eq. 17-4) |
| $q_{ih}$ = $q_{cfs}$/645 A | (Eq. 17-5) |
| $q_{ad}$ = 1.98 $q_{cfs}$ | (Eq. 17-6) |
| $q_{ah}$ = 0.0821 $q_{cfs}$ | (Eq. 17-7) |
| $S_x$ = L ($A_x$)/3600 | (Eq. 17-8) |
| $S'_x$ = L ($A_x$)/297 | (Eq. 17-9) |

where A = drainage area in square miles

$A_x$ = cross section end-area in square feet for discharge x

AF = acre-feet

L = reach length in feet

$q_{ad}$ = discharge in acre-feet per day

$q_{ah}$ = discharge in acre-feet per hour

$q_{cfs}$ = discharge in cfs

$q_{id}$ = discharge in inches per day

$q_{ih}$ = discharge in inches per hour

$S_x$ = reach storage in cfs-hours for a given discharge x

$S'_x$ = reach storage in acre-feet for a given discharge x

(95)

Table 17-2. Elevation-storage relationship for a reservoir.

| Elevation (feet) | Surface area (sq.ft.) | Surface area (acres) | Average surface area (acres) | Δ depth (feet) | Δ storage (AF) | Storage (AF) | Storage (inches) |
|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 570 | 0 | 0 | | | | 0 | 0 |
| | | | 4.82 | 2.00 | 9.64 | | |
| 572 | 420,000 | 9.64 | | | | 9.64 | .022 |
| | | | 18.36 | 2.00 | 36.72 | | |
| 574 | 1,180,000 | 27.09 | | | | 46.36 | .109 |
| | | | 38.34 | 2.00 | 76.68 | | |
| 576 | 2,374,000 | 54.50 | | | | 123.04 | .288 |
| | | | 71.62 | 4.00 | 286.49 | | |
| 580 | 3,866,000 | 88.75 | | | | 409.53 | .960 |
| | | | 106.67 | 5.00 | 533.35 | | |
| 585 | 5,427,000 | 124.59 | | | | 942.88 | 2.210 |
| | | | 153.60 | 5.00 | 768.00 | | |
| 590 | 7,954,000 | 182.60 | | | | 1710.88 | 4.010 |
| | | | 205.64 | 5.00 | 1028.20 | | |
| 595 | 9,961,000 | 228.67 | | | | 2739.08 | 6.420 |
| | | | 250.01 | 5.00 | 1250.05 | | |
| 600 | 11,820,000 | 271.35 | | | | 3989.13 | 9.351 |

# CALCULATION PACKAGE NO. C-5

URS

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: INFILTRATION RATE ESTIMATION FOR WHITE TANK FRS NO. 3 RESERVOIR

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: 1

Prepared by: Hammad Hussain Date: 04/28/04

Checked by: Todd Ringsmuth Date: 5-6-04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results: no comments

See Page 3.

Calculation Approved by: _____ 5/19/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# INFILTRATION RATE ESTIMATION FOR WHITE TANK FRS NO. 3 RESERVOIR
(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
23443748

## PROBLEM STATEMENT

The aim of this calculation package is to estimate the infiltration rate for the White Tank FRS No. 3 Reservoir.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

Infiltration rates for the White Tank FRS No. 3 reservoir at different reservoir elevations were estimated for future and interim conditions. Future condition refers to a scenario that represents a full sediment pool where as interim condition refers to a scenario that reflects the existing condition with no sediment. As a part of a previous study conducted by Dames & Moore for White Tank FRS No. 3, infiltration tests were conducted within the White Tanks reservoir to collect site-specific infiltration values. The results of the infiltration tests were presented in the *Draft Design Issues Report (DIR) – White Tanks FRS # 3 Modifications Design Project* (Dames & Moore 1998) (See Pages 8-11). The results estimated an infiltration rate of 0.002 in/hr for the sediment pool, and a weighted average of 0.26 in/hr for the natural ground making up the remainder of the reservoir pool area. The estimated infiltration rate for natural ground was compared with similar studies performed in the area and determined to be reasonable (See Pages 5-8 for previous infiltration study).

For the future condition, the percentage of sediment pool and natural ground was determined with a reference to 100-year sediment storage value of 500 ac-ft (1199.2 ft). For the interim condition, the percentage of sediment pool was zero and natural ground percentage was 100 percent. Based on percentage of sediment pool and natural ground for each elevation and based on an infiltration rate of 0.002 in/hr for the sediment pool, and a weighted average of 0.26 in/hr for the natural ground, total infiltration rate (cfs) at each elevation was estimated for both future and interim conditions.

## RESULTS

Estimated infiltration rates for White Tank FRS No. 3 reservoir corresponding to the future condition (full sediment) at different reservoir elevations are provided in Table 1 with all calculations involved shown in Table 2. The infiltration rates were estimated for elevations varying between 1178 and 1226 ft and the corresponding infiltration rates were found to be varying between 0.001 cfs and 164 cfs (See Page 4).

Estimated infiltration rates for White Tank FRS No. 3 reservoir corresponding to the interim condition (zero sediment) at different reservoir elevations are provided in Table 3 with all calculations involved shown in Table 4. The infiltration rates were estimated for elevations varying between 1178 and 1226 ft and the corresponding infiltration rates were found to be varying between 0.026 cfs and 173 cfs (See page 6).

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TABLE 1 | | | | | | | | | | | | | | | |
| 2 | Infiltration Rate Estimation For White Tanks FRS No. 3 Rmediation Project | | | | | | | | | | | | | | | |
| 3 | ( Full Sediment Pool - 500 ac-ft) | | | | | | | | | | | | | | | |
| 4 | NAVD88 Reservoir Elevation | Surface Area (AC) | Average Surface Area | Elevation Difference | Reservoir Storage | Cumulative Storage (ACRE-FT) | Sediment Area (SF) | Natural Ground Area(SF) | Total Surface Area (SF) | % Sediment Pool | % Natural Ground | Sediment (CFS) | Natural Ground (CFS) | Total Combined Rate (FT/S) | Estimated Infiltration Rate (CFS) | Estimated Infiltration Rate (AC FT/HR) |
| 5 | 1178.0 | 0.10 | 0.049 | 0 | 0.00 | 0.00 | 4,268.88 | 0.0 | 4,268.88 | 100.00% | 0.00% | 0.0002 | 0.0 | 4.630E-08 | 0.000 | 0.0000 |
| 6 | 1179.0 | 0.50 | 0.299 | 1.00 | 0.30 | 0.30 | 21,780.00 | 0.0 | 21,780.00 | 100.00% | 0.00% | 0.0010 | 0.0 | 4.630E-08 | 0.001 | 0.0001 |
| 7 | 1180.0 | 1.05 | 0.774 | 1.00 | 0.77 | 1.07 | 45,677.02 | 0.0 | 45,677.02 | 100.00% | 0.00% | 0.0021 | 0.0 | 4.630E-08 | 0.002 | 0.0002 |
| 8 | 1181.0 | 1.76 | 1.403 | 1.00 | 1.40 | 2.48 | 76,534.92 | 0.0 | 76,534.92 | 100.00% | 0.00% | 0.0035 | 0.0 | 4.630E-08 | 0.004 | 0.0003 |
| 9 | 1182.0 | 3.07 | 2.415 | 1.00 | 2.41 | 4.89 | 133,816.32 | 0.0 | 133,816.32 | 100.00% | 0.00% | 0.0062 | 0.0 | 4.630E-08 | 0.006 | 0.0005 |
| 10 | 1183.0 | 4.79 | 3.932 | 1.00 | 3.93 | 8.82 | 208,695.96 | 0.0 | 208,695.96 | 100.00% | 0.00% | 0.0097 | 0.0 | 4.630E-08 | 0.010 | 0.0008 |
| 11 | 1184.0 | 5.82 | 5.304 | 1.00 | 5.30 | 14.13 | 253,388.52 | 0.0 | 253,388.52 | 100.00% | 0.00% | 0.0117 | 0.0 | 4.630E-08 | 0.012 | 0.0010 |
| 12 | 1185.0 | 6.60 | 6.210 | 1.00 | 6.21 | 20.34 | 287,591.83 | 0.0 | 287,591.83 | 100.00% | 0.00% | 0.0133 | 0.0 | 4.630E-08 | 0.013 | 0.0011 |
| 13 | 1186.0 | 7.44 | 7.022 | 1.00 | 7.02 | 27.36 | 324,173.52 | 0.0 | 324,173.52 | 100.00% | 0.00% | 0.0150 | 0.0 | 4.630E-08 | 0.015 | 0.0012 |
| 14 | 1187.0 | 8.65 | 8.048 | 1.00 | 8.05 | 35.41 | 376,968.24 | 0.0 | 376,968.24 | 100.00% | 0.00% | 0.0175 | 0.0 | 4.630E-08 | 0.017 | 0.0014 |
| 15 | 1188.0 | 10.32 | 9.487 | 1.00 | 9.49 | 44.89 | 449,539.20 | 0.0 | 449,539.20 | 100.00% | 0.00% | 0.0208 | 0.0 | 4.630E-08 | 0.021 | 0.0017 |
| 16 | 1189.0 | 11.93 | 11.125 | 1.00 | 11.13 | 56.02 | 519,670.80 | 0.0 | 519,670.80 | 100.00% | 0.00% | 0.0241 | 0.0 | 4.630E-08 | 0.024 | 0.0020 |
| 17 | 1190.0 | 13.93 | 12.930 | 1.00 | 12.93 | 68.95 | 606,790.80 | 0.0 | 606,790.80 | 100.00% | 0.00% | 0.0281 | 0.0 | 4.630E-08 | 0.028 | 0.0023 |
| 18 | 1191.0 | 15.98 | 14.955 | 1.00 | 14.96 | 83.90 | 696,088.80 | 0.0 | 696,088.80 | 100.00% | 0.00% | 0.0322 | 0.0 | 4.630E-08 | 0.032 | 0.0027 |
| 19 | 1192.0 | 22.46 | 19.220 | 1.00 | 19.22 | 103.12 | 978,357.60 | 0.0 | 978,357.60 | 100.00% | 0.00% | 0.0453 | 0.0 | 4.630E-08 | 0.045 | 0.0037 |
| 20 | 1193.0 | 27.82 | 25.140 | 1.00 | 25.14 | 128.26 | 1,211,839.20 | 0.0 | 1,211,839.20 | 100.00% | 0.00% | 0.0561 | 0.0 | 4.630E-08 | 0.056 | 0.0046 |
| 21 | 1194.0 | 33.83 | 30.825 | 1.00 | 30.83 | 159.09 | 1,473,634.80 | 0.0 | 1,473,634.80 | 100.00% | 0.00% | 0.0682 | 0.0 | 4.630E-08 | 0.068 | 0.0056 |
| 22 | 1195.0 | 44.05 | 38.940 | 1.00 | 38.94 | 198.03 | 1,918,818.00 | 0.0 | 1,918,818.00 | 100.00% | 0.00% | 0.0888 | 0.0 | 4.630E-08 | 0.089 | 0.0073 |
| 23 | 1196.0 | 56.65 | 50.350 | 1.00 | 50.35 | 248.38 | 2,467,674.00 | 0.0 | 2,467,674.00 | 100.00% | 0.00% | 0.1142 | 0.0 | 4.630E-08 | 0.114 | 0.0094 |
| 24 | 1196.8 | 67.18 | 61.914 | 0.82 | 50.77 | 299.15 | 2,926,308.53 | 0.0 | 2,926,308.53 | 100.00% | 0.00% | 0.1355 | 0.0 | 4.630E-08 | 0.135 | 0.0112 |
| 25 | 1197.0 | 69.49 | 68.334 | 0.18 | 12.30 | 311.45 | 3,026,984.40 | 0.0 | 3,026,984.40 | 100.00% | 0.00% | 0.1401 | 0.0 | 4.630E-08 | 0.140 | 0.0116 |
| 26 | 1198.0 | 83.88 | 76.685 | 1.00 | 76.69 | 388.13 | 3,653,812.80 | 0.0 | 3,653,812.80 | 100.00% | 0.00% | 0.1692 | 0.0 | 4.630E-08 | 0.169 | 0.0140 |
| 27 | 1199.0 | 98.77 | 91.325 | 1.00 | 91.33 | 479.46 | 4,302,421.20 | 0.0 | 4,302,421.20 | 100.00% | 0.00% | 0.1992 | 0.0 | 4.630E-08 | 0.199 | 0.0165 |
| 28 | 1199.2 | 102.00 | 100.385 | 0.20 | 20.58 | 500.04 | 4,443,120.00 | 0.0 | 4,443,120.00 | 100.00% | 0.00% | 0.2057 | 0.0 | 4.630E-08 | 0.206 | 0.0170 |
| 29 | 1200.0 | 112.95 | 107.475 | 0.80 | 85.44 | 585.48 | 4,202,081.07 | 718,020.9 | 4,920,102.00 | 85.406% | 14.59% | 0.1945 | 4.3 | 9.179E-07 | 4.516 | 0.3732 |
| 30 | 1200.1 | 115.02 | 113.985 | 0.12 | 13.79 | 599.27 | 4,180,576.05 | 829,655.9 | 5,010,232.00 | 83.441% | 16.56% | 0.1935 | 5.0 | 1.015E-06 | 5.187 | 0.4287 |
| 31 | 1201.0 | 130.05 | 122.535 | 0.88 | 107.71 | 706.98 | 4,006,760.66 | 1,658,217.3 | 5,664,978.00 | 70.729% | 29.27% | 0.1855 | 10.0 | 1.794E-06 | 10.166 | 0.8401 |
| 32 | 1202.0 | 147.55 | 138.800 | 1.00 | 138.80 | 845.78 | 3,799,897.74 | 2,627,380.3 | 6,427,278.00 | 59.121% | 40.88% | 0.1759 | 15.8 | 2.488E-06 | 15.989 | 1.3214 |
| 33 | 1203.0 | 165.40 | 156.475 | 1.00 | 156.48 | 1002.25 | 3,594,573.17 | 3,610,250.8 | 7,204,824.00 | 49.891% | 50.11% | 0.1664 | 21.7 | 3.039E-06 | 21.895 | 1.8095 |
| 34 | 1204.0 | 183.11 | 174.253 | 1.00 | 174.25 | 1176.51 | 3,389,967.36 | 4,586,086.4 | 7,976,053.80 | 42.502% | 57.50% | 0.1569 | 27.6 | 3.480E-06 | 27.758 | 2.2941 |
| 35 | 1205.0 | 199.09 | 191.098 | 1.00 | 191.10 | 1367.60 | 3,170,872.26 | 5,501,488.1 | 8,672,360.40 | 36.563% | 63.44% | 0.1468 | 33.1 | 3.835E-06 | 33.258 | 2.7486 |
| 36 | 1206.0 | 216.66 | 207.875 | 1.00 | 207.88 | 1575.48 | 2,995,406.70 | 6,442,302.9 | 9,437,709.60 | 31.739% | 68.26% | 0.1387 | 38.8 | 4.123E-06 | 38.912 | 3.2159 |
| 37 | 1207.0 | 234.81 | 225.735 | 1.00 | 225.74 | 1801.21 | 2,839,494.05 | 7,388,829.5 | 10,228,323.60 | 27.761% | 72.24% | 0.1315 | 44.5 | 4.361E-06 | 44.601 | 3.6861 |
| 38 | 1208.0 | 253.15 | 243.980 | 1.00 | 243.98 | 2045.19 | 2,696,082.15 | 8,331,131.9 | 11,027,214.00 | 24.449% | 75.55% | 0.1248 | 50.1 | 4.558E-06 | 50.266 | 4.1542 |
| 39 | 1209.0 | 274.77 | 263.960 | 1.00 | 263.96 | 2309.15 | 2,591,827.68 | 9,377,153.5 | 11,968,981.20 | 21.655% | 78.35% | 0.1200 | 56.4 | 4.725E-06 | 56.557 | 4.6741 |
| 40 | 1210.0 | 294.10 | 284.435 | 1.00 | 284.44 | 2593.59 | 2,469,923.96 | 10,341,072.0 | 12,810,996.00 | 19.280% | 80.72% | 0.1143 | 62.2 | 4.867E-06 | 62.352 | 5.1531 |
| 41 | 1211.0 | 313.41 | 303.755 | 1.00 | 303.76 | 2897.34 | 2,356,147.68 | 11,295,991.9 | 13,652,139.60 | 17.258% | 82.74% | 0.1091 | 68.0 | 4.988E-06 | 68.094 | 5.6276 |
| 42 | 1212.0 | 327.85 | 320.630 | 1.00 | 320.63 | 3217.97 | 2,219,128.15 | 12,062,017.8 | 14,281,146.00 | 15.539% | 84.46% | 0.1027 | 72.6 | 5.091E-06 | 72.698 | 6.0081 |
| 43 | 1213.0 | 350.00 | 338.925 | 1.00 | 338.93 | 3556.90 | 2,143,316.17 | 13,102,683.8 | 15,246,000.00 | 14.058% | 85.94% | 0.0992 | 78.9 | 5.179E-06 | 78.958 | 6.5255 |
| 44 | 1214.0 | 368.69 | 359.345 | 1.00 | 359.35 | 3916.24 | 2,050,601.88 | 14,009,534.5 | 16,060,136.40 | 12.768% | 87.23% | 0.0949 | 84.3 | 5.256E-06 | 84.412 | 6.9762 |
| 45 | 1215.0 | 387.54 | 378.115 | 1.00 | 378.12 | 4294.36 | 1,965,657.85 | 14,915,584.6 | 16,881,242.40 | 11.644% | 88.36% | 0.0910 | 89.8 | 5.323E-06 | 89.861 | 7.4265 |
| 46 | 1216.0 | 409.55 | 398.545 | 1.00 | 398.55 | 4692.90 | 1,900,881.31 | 15,939,116.7 | 17,839,998.00 | 10.655% | 89.34% | 0.0880 | 95.9 | 5.382E-06 | 96.018 | 7.9354 |
| 47 | 1217.0 | 431.48 | 420.515 | 1.00 | 420.52 | 5113.42 | 1,837,972.60 | 16,957,296.2 | 18,795,268.80 | 9.779% | 90.22% | 0.0851 | 102.1 | 5.435E-06 | 102.143 | 8.4416 |
| 48 | 1218.0 | 454.15 | 442.815 | 1.00 | 442.82 | 5556.23 | 1,780,362.90 | 18,002,411.1 | 19,782,774.00 | 9.000% | 91.00% | 0.0824 | 108.3 | 5.481E-06 | 108.430 | 8.9612 |
| 49 | 1219.0 | 476.15 | 465.150 | 1.00 | 465.15 | 6021.38 | 1,722,412.67 | 19,018,681.3 | 20,741,094.00 | 8.304% | 91.70% | 0.0797 | 114.5 | 5.523E-06 | 114.544 | 9.4664 |
| 50 | 1220.0 | 501.04 | 488.595 | 1.00 | 488.60 | 6509.98 | 1,676,418.95 | 20,148,883.5 | 21,825,302.40 | 7.681% | 92.32% | 0.0776 | 121.3 | 5.560E-06 | 121.344 | 10.0284 |
| 51 | 1221.0 | 523.89 | 512.465 | 1.00 | 512.47 | 7022.44 | 1,624,955.89 | 21,195,692.5 | 22,820,648.40 | 7.121% | 92.88% | 0.0752 | 127.6 | 5.593E-06 | 127.642 | 10.5489 |
| 52 | 1222.0 | 547.70 | 535.795 | 1.00 | 535.80 | 7558.24 | 1,578,381.11 | 22,279,430.9 | 23,857,812.00 | 6.616% | 93.38% | 0.0731 | 134.1 | 5.623E-06 | 134.162 | 11.0878 |
| 53 | 1223.0 | 573.22 | 560.460 | 1.00 | 560.46 | 8118.70 | 1,537,887.79 | 23,431,575.4 | 24,969,463.20 | 6.159% | 93.84% | 0.0712 | 141.0 | 5.651E-06 | 141.095 | 11.6607 |
| 54 | 1224.0 | 600.00 | 586.610 | 1.00 | 586.61 | 8705.31 | 1,501,263.12 | 24,634,736.9 | 26,136,000.00 | 5.744% | 94.26% | 0.0695 | 148.3 | 5.675E-06 | 148.334 | 12.2590 |
| 55 | 1225.0 | 628.20 | 614.100 | 1.00 | 614.10 | 9319.41 | 1,468,247.66 | 25,896,144.3 | 27,364,392.00 | 5.366% | 94.63% | 0.0680 | 155.9 | 5.698E-06 | 155.924 | 12.8863 |
| 56 | 1226.0 | 657.43 | 642.815 | 1.00 | 642.82 | 9962.22 | 1,437,417.65 | 27,200,233.1 | 28,637,650.80 | 5.019% | 94.98% | 0.0665 | 163.7 | 5.719E-06 | 163.772 | 13.5348 |
| 57 | | | | | | | | | | | | | | | | |
| 58 | SEDIMENT POOL | 0.02 IN/HR => 0.26 in/hr | FT/S | | | | | | 4.629630E-08 | | | | | | | |
| 59 | NATURAL GROUND | => | FT/S | | | | | | 6.018519E-06 | | | | | | | |

# TABLE 2

## Formula Sheet - Infiltration Rate Estimation For White Tanks FRS No. 3 Rmediation Project

### ( Full Sediment Pool - 500 ac-ft)

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | NAVD88 Reservoir Elevation | Surface Area (AC) | Average Surface Area | Elevation Difference | Reservoir Storage | Cumulative Storage (ACRE-FT) | Sediment Area (SF) | Natural Ground Area(SF) | Total Surface Area (SF) | % Sediment Pool | % Natural Ground | Sediment (CFS) | Natural Ground (CFS) | Total Combined Rate (FT/S) | Estimated Infiltration Rate (CFS) | Estimated Infiltration Rate (AC-FT/HR) |
| 5 | 1178 | 0 098 | =(SUM(0+B5))/2 | 0 | =D5*C5 | =E5 | =B5*15*43560 | =B5*K5*43560 | =B5*43560 | 1 | =1-I5 | =I5*G5*SIS58 | =SIS59*K5*H5 | =(I5*SIS58)+(K5*SIS59) | =L5+M5 | =O5*3600/43560 |
| 6 | =(A5+1) | 0 5 | =(SUM(B5:B6))/2 | =A6-A5 | =D6*C6 | =F5+E6 | =B6*16*43560 | =B6*K6*43560 | =B6*43560 | 1 | =1-I6 | =I6*G6*SIS58 | =SIS59*K6*H6 | =(I6*SIS58)+(K6*SIS59) | =L6+M6 | =O6*3600/43560 |
| 7 | =(A6+1) | 1 0486 | =(SUM(B6:B7))/2 | =A7-A6 | =D7*C7 | =F6+E7 | =B7*17*43560 | =B7*K7*43560 | =B7*43560 | 1 | =1-I7 | =I7*G7*SIS58 | =SIS59*K7*H7 | =(I7*SIS58)+(K7*SIS59) | =L7+M7 | =O7*3600/43560 |
| 8 | =(A7+1) | 1 757 | =(SUM(B7:B8))/2 | =A8-A7 | =D8*C8 | =F7+E8 | =B8*18*43560 | =B8*K8*43560 | =B8*43560 | 1 | =1-I8 | =I8*G8*SIS58 | =SIS59*K8*H8 | =(I8*SIS58)+(K8*SIS59) | =L8+M8 | =O8*3600/43560 |
| 9 | =(A8+1) | 3 072 | =(SUM(B8:B9))/2 | =A9-A8 | =D9*C9 | =F8+E9 | =B9*19*43560 | =B9*K9*43560 | =B9*43560 | 1 | =1-I9 | =I9*G9*SIS58 | =SIS59*K9*H9 | =(I9*SIS58)+(K9*SIS59) | =L9+M9 | =O9*3600/43560 |
| 10 | =(A9+1) | 4 791 | =(SUM(B9:B10))/2 | =A10-A9 | =D10*C10 | =F9+E10 | =B10*110*43560 | =B10*K10*43560 | =B10*43560 | 1 | =1-I10 | =I10*G10*SIS58 | =SIS59*K10*H10 | =(I10*SIS58)+(K10*SIS59) | =L10+M10 | =O10*3600/43560 |
| 11 | =(A10+1) | 5 817 | =(SUM(B10:B11))/2 | =A11-A10 | =D11*C11 | =F10+E11 | =B11*111*43560 | =B11*K11*43560 | =B11*43560 | 1 | =1-I11 | =I11*G11*SIS58 | =SIS59*K11*H11 | =(I11*SIS58)+(K11*SIS59) | =L11+M11 | =O11*3600/43560 |
| 12 | =(A11+1) | 6 6022 | =(SUM(B11:B12))/2 | =A12-A11 | =D12*C12 | =F11+E12 | =B12*112*43560 | =B12*K12*43560 | =B12*43560 | 1 | =1-I12 | =I12*G12*SIS58 | =SIS59*K12*H12 | =(I12*SIS58)+(K12*SIS59) | =L12+M12 | =O12*3600/43560 |
| 13 | =(A12+1) | 7 442 | =(SUM(B12:B13))/2 | =A13-A12 | =D13*C13 | =F12+E13 | =B13*113*43560 | =B13*K13*43560 | =B13*43560 | 1 | =1-I13 | =I13*G13*SIS58 | =SIS59*K13*H13 | =(I13*SIS58)+(K13*SIS59) | =L13+M13 | =O13*3600/43560 |
| 14 | =(A13+1) | 8 654 | =(SUM(B13:B14))/2 | =A14-A13 | =D14*C14 | =F13+E14 | =B14*114*43560 | =B14*K14*43560 | =B14*43560 | 1 | =1-I14 | =I14*G14*SIS58 | =SIS59*K14*H14 | =(I14*SIS58)+(K14*SIS59) | =L14+M14 | =O14*3600/43560 |
| 15 | =(A14+1) | 10 32 | =(SUM(B14:B15))/2 | =A15-A14 | =D15*C15 | =F14+E15 | =B15*115*43560 | =B15*K15*43560 | =B15*43560 | 1 | =1-I15 | =I15*G15*SIS58 | =SIS59*K15*H15 | =(I15*SIS58)+(K15*SIS59) | =L15+M15 | =O15*3600/43560 |
| 16 | =(A15+1) | 11 93 | =(SUM(B15:B16))/2 | =A16-A15 | =D16*C16 | =F15+E16 | =B16*116*43560 | =B16*K16*43560 | =B16*43560 | 1 | =1-I16 | =I16*G16*SIS58 | =SIS59*K16*H16 | =(I16*SIS58)+(K16*SIS59) | =L16+M16 | =O16*3600/43560 |
| 17 | =(A16+1) | 13 93 | =(SUM(B16:B17))/2 | =A17-A16 | =D17*C17 | =F16+E17 | =B17*117*43560 | =B17*K17*43560 | =B17*43560 | 1 | =1-I17 | =I17*G17*SIS58 | =SIS59*K17*H17 | =(I17*SIS58)+(K17*SIS59) | =L17+M17 | =O17*3600/43560 |
| 18 | =(A17+1) | 15 98 | =(SUM(B17:B18))/2 | =A18-A17 | =D18*C18 | =F17+E18 | =B18*118*43560 | =B18*K18*43560 | =B18*43560 | 1 | =1-I18 | =I18*G18*SIS58 | =SIS59*K18*H18 | =(I18*SIS58)+(K18*SIS59) | =L18+M18 | =O18*3600/43560 |
| 19 | =(A18+1) | 22 46 | =(SUM(B18:B19))/2 | =A19-A18 | =D19*C19 | =F18+E19 | =B19*119*43560 | =B19*K19*43560 | =B19*43560 | 1 | =1-I19 | =I19*G19*SIS58 | =SIS59*K19*H19 | =(I19*SIS58)+(K19*SIS59) | =L19+M19 | =O19*3600/43560 |
| 20 | =(A19+1) | 27 82 | =(SUM(B19:B20))/2 | =A20-A19 | =D20*C20 | =F19+E20 | =B20*120*43560 | =B20*K20*43560 | =B20*43560 | 1 | =1-I20 | =I20*G20*SIS58 | =SIS59*K20*H20 | =(I20*SIS58)+(K20*SIS59) | =L20+M20 | =O20*3600/43560 |
| 21 | =(A20+1) | 33 83 | =(SUM(B20:B21))/2 | =A21-A20 | =D21*C21 | =F20+E21 | =B21*121*43560 | =B21*K21*43560 | =B21*43560 | 1 | =1-I21 | =I21*G21*SIS58 | =SIS59*K21*H21 | =(I21*SIS58)+(K21*SIS59) | =L21+M21 | =O21*3600/43560 |
| 22 | =(A21+1) | 44 05 | =(SUM(B21:B22))/2 | =A22-A21 | =D22*C22 | =F21+E22 | =B22*122*43560 | =B22*K22*43560 | =B22*43560 | 1 | =1-I22 | =I22*G22*SIS58 | =SIS59*K22*H22 | =(I22*SIS58)+(K22*SIS59) | =L22+M22 | =O22*3600/43560 |
| 23 | =(A22+1) | 56 65 | =(SUM(B22:B23))/2 | =A23-A22 | =D23*C23 | =F22+E23 | =B23*123*43560 | =B23*K23*43560 | =B23*43560 | 1 | =1-I23 | =I23*G23*SIS58 | =SIS59*K23*H23 | =(I23*SIS58)+(K23*SIS59) | =L23+M23 | =O23*3600/43560 |
| 24 | 1196 82 | 67 1788 | =(SUM(B23:B24))/2 | =A24-A23 | =D24*C24 | =F23+E24 | =B24*124*43560 | =B24*K24*43560 | =B24*43560 | 1 | =1-I24 | =I24*G24*SIS58 | =SIS59*K24*H24 | =(I24*SIS58)+(K24*SIS59) | =L24+M24 | =O24*3600/43560 |
| 25 | 1197 | 69 49 | =(SUM(B24:B25))/2 | =A25-A24 | =D25*C25 | =F24+E25 | =B25*125*43560 | =B25*K25*43560 | =B25*43560 | 1 | =1-I25 | =I25*G25*SIS58 | =SIS59*K25*H25 | =(I25*SIS58)+(K25*SIS59) | =L25+M25 | =O25*3600/43560 |
| 26 | =A25+1 | 83 88 | =(SUM(B25:B26))/2 | =A26-A25 | =D26*C26 | =F25+E26 | =B26*126*43560 | =B26*K26*43560 | =B26*43560 | 1 | =1-I26 | =I26*G26*SIS58 | =SIS59*K26*H26 | =(I26*SIS58)+(K26*SIS59) | =L26+M26 | =O26*3600/43560 |
| 27 | =A26+1 | 98 77 | =(SUM(B26:B27))/2 | =A27-A26 | =D27*C27 | =F26+E27 | =B27*127*43560 | =B27*K27*43560 | =B27*43560 | 1 | =1-I27 | =I27*G27*SIS58 | =SIS59*K27*H27 | =(I27*SIS58)+(K27*SIS59) | =L27+M27 | =O27*3600/43560 |
| 28 | 1199 305 | 102 | =(SUM(B27:B28))/2 | =A28-A27 | =D28*C28 | =F27+E28 | =B28*128*43560 | =B28*K28*43560 | =B28*43560 | 1 | =1-I28 | =I28*G28*SIS58 | =SIS59*K28*H28 | =(I28*SIS58)+(K28*SIS59) | =L28+M28 | =O28*3600/43560 |
| 29 | 1200 | 112 95 | =(SUM(B28:B29))/2 | =A29-A28 | =D29*C29 | =F28+E29 | =B29*129*43560 | =B29*K29*43560 | =B29*43560 | =$F$28/F29 | =1-I29 | =G29*SIS58 | =SIS59*H29 | =(I29*SIS58)+(K29*SIS59) | =L29+M29 | =O29*3600/43560 |
| 30 | 1200 121 | 115 0191 | =(SUM(B29:B30))/2 | =A30-A29 | =D30*C30 | =F29+E30 | =B30*130*43560 | =B30*K30*43560 | =B30*43560 | =$F$28/F30 | =1-I30 | =G30*SIS58 | =SIS59*H30 | =(I30*SIS58)+(K30*SIS59) | =L30+M30 | =O30*3600/43560 |
| 31 | 1201 | 130 05 | =(SUM(B30:B31))/2 | =A31-A30 | =D31*C31 | =F30+E31 | =(B31*131)*43560 | =(B31*K31)*43560 | =B31*43560 | =$F$28/F31 | =1-I31 | =G31*SIS58 | =SIS59*H31 | =(I31*SIS58)+(K31*SIS59) | =L31+M31 | =O31*3600/43560 |
| 32 | =A31+1 | 147 55 | =(SUM(B31:B32))/2 | =A32-A31 | =D32*C32 | =F31+E32 | =(B32*132)*43560 | =(B32*K32)*43560 | =B32*43560 | =$F$28/F32 | =1-I32 | =G32*SIS58 | =SIS59*H32 | =(I32*SIS58)+(K32*SIS59) | =L32+M32 | =O32*3600/43560 |
| 33 | =A32+1 | 165 4 | =(SUM(B32:B33))/2 | =A33-A32 | =D33*C33 | =F32+E33 | =(B33*133)*43560 | =(B33*K33)*43560 | =B33*43560 | =$F$28/F33 | =1-I33 | =G33*SIS58 | =SIS59*H33 | =(I33*SIS58)+(K33*SIS59) | =L33+M33 | =O33*3600/43560 |
| 34 | =A33+1 | 183 105 | =(SUM(B33:B34))/2 | =A34-A33 | =D34*C34 | =F33+E34 | =(B34*134)*43560 | =(B34*K34)*43560 | =B34*43560 | =$F$28/F34 | =1-I34 | =G34*SIS58 | =SIS59*H34 | =(I34*SIS58)+(K34*SIS59) | =L34+M34 | =O34*3600/43560 |
| 35 | =A34+1 | 199 09 | =(SUM(B34:B35))/2 | =A35-A34 | =D35*C35 | =F34+E35 | =(B35*135)*43560 | =(B35*K35)*43560 | =B35*43560 | =$F$28/F35 | =1-I35 | =G35*SIS58 | =SIS59*H35 | =(I35*SIS58)+(K35*SIS59) | =L35+M35 | =O35*3600/43560 |
| 36 | =A35+1 | 216 66 | =(SUM(B35:B36))/2 | =A36-A35 | =D36*C36 | =F35+E36 | =(B36*136)*43560 | =(B36*K36)*43560 | =B36*43560 | =$F$28/F36 | =1-I36 | =G36*SIS58 | =SIS59*H36 | =(I36*SIS58)+(K36*SIS59) | =L36+M36 | =O36*3600/43560 |
| 37 | =A36+1 | 234 81 | =(SUM(B36:B37))/2 | =A37-A36 | =D37*C37 | =F36+E37 | =(B37*137)*43560 | =(B37*K37)*43560 | =B37*43560 | =$F$28/F37 | =1-I37 | =G37*SIS58 | =SIS59*H37 | =(I37*SIS58)+(K37*SIS59) | =L37+M37 | =O37*3600/43560 |
| 38 | =A37+1 | 253 15 | =(SUM(B37:B38))/2 | =A38-A37 | =D38*C38 | =F37+E38 | =(B38*138)*43560 | =(B38*K38)*43560 | =B38*43560 | =$F$28/F38 | =1-I38 | =G38*SIS58 | =SIS59*H38 | =(I38*SIS58)+(K38*SIS59) | =L38+M38 | =O38*3600/43560 |
| 39 | =A38+1 | 274 77 | =(SUM(B38:B39))/2 | =A39-A38 | =D39*C39 | =F38+E39 | =(B39*139)*43560 | =(B39*K39)*43560 | =B39*43560 | =$F$28/F39 | =1-I39 | =G39*SIS58 | =SIS59*H39 | =(I39*SIS58)+(K39*SIS59) | =L39+M39 | =O39*3600/43560 |
| 40 | =A39+1 | 294 1 | =(SUM(B39:B40))/2 | =A40-A39 | =D40*C40 | =F39+E40 | =(B40*140)*43560 | =(B40*K40)*43560 | =B40*43560 | =$F$28/F40 | =1-I40 | =G40*SIS58 | =SIS59*H40 | =(I40*SIS58)+(K40*SIS59) | =L40+M40 | =O40*3600/43560 |
| 41 | =A40+1 | 313 41 | =(SUM(B40:B41))/2 | =A41-A40 | =D41*C41 | =F40+E41 | =(B41*141)*43560 | =(B41*K41)*43560 | =B41*43560 | =$F$28/F41 | =1-I41 | =G41*SIS58 | =SIS59*H41 | =(I41*SIS58)+(K41*SIS59) | =L41+M41 | =O41*3600/43560 |
| 42 | =A41+1 | 327 85 | =(SUM(B41:B42))/2 | =A42-A41 | =D42*C42 | =F41+E42 | =(B42*142)*43560 | =(B42*K42)*43560 | =B42*43560 | =$F$28/F42 | =1-I42 | =G42*SIS58 | =SIS59*H42 | =(I42*SIS58)+(K42*SIS59) | =L42+M42 | =O42*3600/43560 |
| 43 | =A42+1 | 350 | =(SUM(B42:B43))/2 | =A43-A42 | =D43*C43 | =F42+E43 | =(B43*143)*43560 | =(B43*K43)*43560 | =B43*43560 | =$F$28/F43 | =1-I43 | =G43*SIS58 | =SIS59*H43 | =(I43*SIS58)+(K43*SIS59) | =L43+M43 | =O43*3600/43560 |
| 44 | =A43+1 | 368 69 | =(SUM(B43:B44))/2 | =A44-A43 | =D44*C44 | =F43+E44 | =(B44*144)*43560 | =(B44*K44)*43560 | =B44*43560 | =$F$28/F44 | =1-I44 | =G44*SIS58 | =SIS59*H44 | =(I44*SIS58)+(K44*SIS59) | =L44+M44 | =O44*3600/43560 |
| 45 | =A44+1 | 387 54 | =(SUM(B44:B45))/2 | =A45-A44 | =D45*C45 | =F44+E45 | =(B45*145)*43560 | =(B45*K45)*43560 | =B45*43560 | =$F$28/F45 | =1-I45 | =G45*SIS58 | =SIS59*H45 | =(I45*SIS58)+(K45*SIS59) | =L45+M45 | =O45*3600/43560 |
| 46 | =A45+1 | 409 55 | =(SUM(B45:B46))/2 | =A46-A45 | =D46*C46 | =F45+E46 | =(B46*146)*43560 | =(B46*K46)*43560 | =B46*43560 | =$F$28/F46 | =1-I46 | =G46*SIS58 | =SIS59*H46 | =(I46*SIS58)+(K46*SIS59) | =L46+M46 | =O46*3600/43560 |
| 47 | =A46+1 | 431 48 | =(SUM(B46:B47))/2 | =A47-A46 | =D47*C47 | =F46+E47 | =(B47*147)*43560 | =(B47*K47)*43560 | =B47*43560 | =$F$28/F47 | =1-I47 | =G47*SIS58 | =SIS59*H47 | =(I47*SIS58)+(K47*SIS59) | =L47+M47 | =O47*3600/43560 |
| 48 | =A47+1 | 454 15 | =(SUM(B47:B48))/2 | =A48-A47 | =D48*C48 | =F47+E48 | =(B48*148)*43560 | =(B48*K48)*43560 | =B48*43560 | =$F$28/F48 | =1-I48 | =G48*SIS58 | =SIS59*H48 | =(I48*SIS58)+(K48*SIS59) | =L48+M48 | =O48*3600/43560 |
| 49 | =A48+1 | 476 15 | =(SUM(B48:B49))/2 | =A49-A48 | =D49*C49 | =F48+E49 | =(B49*149)*43560 | =(B49*K49)*43560 | =B49*43560 | =$F$28/F49 | =1-I49 | =G49*SIS58 | =SIS59*H49 | =(I49*SIS58)+(K49*SIS59) | =L49+M49 | =O49*3600/43560 |
| 50 | =A49+1 | 501 04 | =(SUM(B49:B50))/2 | =A50-A49 | =D50*C50 | =F49+E50 | =(B50*150)*43560 | =(B50*K50)*43560 | =B50*43560 | =$F$28/F50 | =1-I50 | =G50*SIS58 | =SIS59*H50 | =(I50*SIS58)+(K50*SIS59) | =L50+M50 | =O50*3600/43560 |
| 51 | =A50+1 | 523 89 | =(SUM(B50:B51))/2 | =A51-A50 | =D51*C51 | =F50+E51 | =(B51*151)*43560 | =(B51*K51)*43560 | =B51*43560 | =$F$28/F51 | =1-I51 | =G51*SIS58 | =SIS59*H51 | =(I51*SIS58)+(K51*SIS59) | =L51+M51 | =O51*3600/43560 |
| 52 | =A51+1 | 547 7 | =(SUM(B51:B52))/2 | =A52-A51 | =D52*C52 | =F51+E52 | =(B52*152)*43560 | =(B52*K52)*43560 | =B52*43560 | =$F$28/F52 | =1-I52 | =G52*SIS58 | =SIS59*H52 | =(I52*SIS58)+(K52*SIS59) | =L52+M52 | =O52*3600/43560 |
| 53 | =A52+1 | 573 22 | =(SUM(B52:B53))/2 | =A53-A52 | =D53*C53 | =F52+E53 | =(B53*153)*43560 | =(B53*K53)*43560 | =B53*43560 | =$F$28/F53 | =1-I53 | =G53*SIS58 | =SIS59*H53 | =(I53*SIS58)+(K53*SIS59) | =L53+M53 | =O53*3600/43560 |
| 54 | =A53+1 | 600 | =(SUM(B53:B54))/2 | =A54-A53 | =D54*C54 | =F53+E54 | =(B54*154)*43560 | =(B54*K54)*43560 | =B54*43560 | =$F$28/F54 | =1-I54 | =G54*SIS58 | =SIS59*H54 | =(I54*SIS58)+(K54*SIS59) | =L54+M54 | =O54*3600/43560 |
| 55 | =A54+1 | 628 2 | =(SUM(B54:B55))/2 | =A55-A54 | =D55*C55 | =F54+E55 | =(B55*155)*43560 | =(B55*K55)*43560 | =B55*43560 | =$F$28/F55 | =1-I55 | =G55*SIS58 | =SIS59*H55 | =(I55*SIS58)+(K55*SIS59) | =L55+M55 | =O55*3600/43560 |
| 56 | =A55+1 | 657 43 | =(SUM(B55:B56))/2 | =A56-A55 | =D56*C56 | =F55+E56 | =(B56*156)*43560 | =(B56*K56)*43560 | =B56*43560 | =$F$28/F56 | =1-I56 | =G56*SIS58 | =SIS59*H56 | =(I56*SIS58)+(K56*SIS59) | =L56+M56 | =O56*3600/43560 |
| 57 | | | | | | | | | | | | | | | | |
| 58 | Sediment Pool | 002 IN/HR => | FT/S | | | | | | =(0.002/3600)/12 | | | | | | | |
| 59 | Natural Ground | 0.26 IN/HR => | Ft/S | | | | | | =(0.26/3600)/12 | | | | | | | |



5

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TABLE 3 | | | | | | | | | | | | | | | |
| 2 | Infiltration Rate Estimation For White Tanks FRS No. 3 Rmediation Project | | | | | | | | | | | | | | | |
| 3 | ( No Sediment Scenario - Interim Condition) | | | | | | | | | | | | | | | |
| 4 | NAVD88 Reservoir Elevation | Surface Area (AC) | Average Surface Area | Elevation Difference | Reservoir Storage | Cumulative Storage (ACRE-FT) | Sediment Area (SF) | Natural Ground Area(SF) | Total Surface Area (SF) | % Sediment Pool | % Natural Ground | Sediment (CFS) | Natural Ground (CFS) | Total Combined Rate (FT/S) | Estimated Infiltration Rate (CFS) | Estimated Infiltration Rate (AC-FT/HR) |
| 5 | 1178.0 | 0.10 | 0.049 | 0 | 0.00 | 0.00 | 0.00 | 4,268.9 | 4,268.88 | 0.00% | 100.00% | 0.0000 | 0.0 | 6.019E-06 | 0.026 | 0.0021 |
| 6 | 1179.0 | 0.50 | 0.299 | 1.00 | 0.30 | 0.30 | 0.00 | 21,780.0 | 21,780.00 | 0.00% | 100.00% | 0.0000 | 0.1 | 6.019E-06 | 0.131 | 0.0108 |
| 7 | 1180.0 | 1.05 | 0.774 | 1.00 | 0.77 | 1.07 | 0.00 | 45,677.0 | 45,677.02 | 0.00% | 100.00% | 0.0000 | 0.3 | 6.019E-06 | 0.275 | 0.0227 |
| 8 | 1181.0 | 1.76 | 1.403 | 1.00 | 1.40 | 2.48 | 0.00 | 76,534.9 | 76,534.92 | 0.00% | 100.00% | 0.0000 | 0.5 | 6.019E-06 | 0.461 | 0.0381 |
| 9 | 1182.0 | 3.07 | 2.415 | 1.00 | 2.41 | 4.89 | 0.00 | 133,816.3 | 133,816.32 | 0.00% | 100.00% | 0.0000 | 0.8 | 6.019E-06 | 0.805 | 0.0666 |
| 10 | 1183.0 | 4.79 | 3.932 | 1.00 | 3.93 | 8.82 | 0.00 | 208,696.0 | 208,695.96 | 0.00% | 100.00% | 0.0000 | 1.3 | 6.019E-06 | 1.256 | 0.1038 |
| 11 | 1184.0 | 5.82 | 5.304 | 1.00 | 5.30 | 14.13 | 0.00 | 253,388.5 | 253,388.52 | 0.00% | 100.00% | 0.0000 | 1.5 | 6.019E-06 | 1.525 | 0.1260 |
| 12 | 1185.0 | 6.60 | 6.210 | 1.00 | 6.21 | 20.34 | 0.00 | 287,591.8 | 287,591.83 | 0.00% | 100.00% | 0.0000 | 1.7 | 6.019E-06 | 1.731 | 0.1430 |
| 13 | 1186.0 | 7.44 | 7.022 | 1.00 | 7.02 | 27.36 | 0.00 | 324,173.5 | 324,173.52 | 0.00% | 100.00% | 0.0000 | 2.0 | 6.019E-06 | 1.951 | 0.1612 |
| 14 | 1187.0 | 8.65 | 8.048 | 1.00 | 8.05 | 35.41 | 0.00 | 376,968.2 | 376,968.24 | 0.00% | 100.00% | 0.0000 | 2.3 | 6.019E-06 | 2.269 | 0.1875 |
| 15 | 1188.0 | 10.32 | 9.487 | 1.00 | 9.49 | 44.89 | 0.00 | 449,539.2 | 449,539.20 | 0.00% | 100.00% | 0.0000 | 2.7 | 6.019E-06 | 2.706 | 0.2236 |
| 16 | 1189.0 | 11.93 | 11.125 | 1.00 | 11.13 | 56.02 | 0.00 | 519,670.8 | 519,670.80 | 0.00% | 100.00% | 0.0000 | 3.1 | 6.019E-06 | 3.128 | 0.2585 |
| 17 | 1190.0 | 13.93 | 12.930 | 1.00 | 12.93 | 68.95 | 0.00 | 606,790.8 | 606,790.80 | 0.00% | 100.00% | 0.0000 | 3.7 | 6.019E-06 | 3.652 | 0.3018 |
| 18 | 1191.0 | 15.98 | 14.955 | 1.00 | 14.96 | 83.90 | 0.00 | 696,088.8 | 696,088.80 | 0.00% | 100.00% | 0.0000 | 4.2 | 6.019E-06 | 4.189 | 0.3462 |
| 19 | 1192.0 | 22.46 | 19.220 | 1.00 | 19.22 | 103.12 | 0.00 | 978,357.6 | 978,357.60 | 0.00% | 100.00% | 0.0000 | 5.9 | 6.019E-06 | 5.888 | 0.4866 |
| 20 | 1193.0 | 27.82 | 25.140 | 1.00 | 25.14 | 128.26 | 0.00 | 1,211,839.2 | 1,211,839.20 | 0.00% | 100.00% | 0.0000 | 7.3 | 6.019E-06 | 7.293 | 0.6028 |
| 21 | 1194.0 | 33.83 | 30.825 | 1.00 | 30.83 | 159.09 | 0.00 | 1,473,634.8 | 1,473,634.80 | 0.00% | 100.00% | 0.0000 | 8.9 | 6.019E-06 | 8.869 | 0.7330 |
| 22 | 1195.0 | 44.05 | 38.940 | 1.00 | 38.94 | 198.03 | 0.00 | 1,918,818.0 | 1,918,818.00 | 0.00% | 100.00% | 0.0000 | 11.5 | 6.019E-06 | 11.548 | 0.9544 |
| 23 | 1196.0 | 56.65 | 50.350 | 1.00 | 50.35 | 248.38 | 0.00 | 2,467,674.0 | 2,467,674.00 | 0.00% | 100.00% | 0.0000 | 14.9 | 6.019E-06 | 14.852 | 1.2274 |
| 24 | 1196.8 | 67.18 | 61.914 | 0.82 | 50.77 | 299.15 | 0.00 | 2,926,308.5 | 2,926,308.53 | 0.00% | 100.00% | 0.0000 | 17.6 | 6.019E-06 | 17.612 | 1.4555 |
| 25 | 1197.0 | 69.49 | 68.334 | 0.18 | 12.30 | 311.45 | 0.00 | 3,026,984.4 | 3,026,984.40 | 0.00% | 100.00% | 0.0000 | 18.2 | 6.019E-06 | 18.218 | 1.5056 |
| 26 | 1198.0 | 83.88 | 76.685 | 1.00 | 76.69 | 388.13 | 0.00 | 3,653,812.8 | 3,653,812.80 | 0.00% | 100.00% | 0.0000 | 22.0 | 6.019E-06 | 21.991 | 1.8174 |
| 27 | 1199.0 | 98.77 | 91.325 | 1.00 | 91.33 | 479.46 | 0.00 | 4,302,421.2 | 4,302,421.20 | 0.00% | 100.00% | 0.0000 | 25.9 | 6.019E-06 | 25.894 | 2.1400 |
| 28 | 1199.2 | 102.00 | 100.385 | 0.20 | 20.58 | 500.04 | 0.00 | 4,443,120.0 | 4,443,120.00 | 0.00% | 100.00% | 0.0000 | 26.7 | 6.019E-06 | 26.741 | 2.2100 |
| 29 | 1200.0 | 112.95 | 107.475 | 0.80 | 85.44 | 585.48 | 0.00 | 4,920,102.0 | 4,920,102.00 | 0.00% | 100.00% | 0.0000 | 29.6 | 6.019E-06 | 29.612 | 2.4473 |
| 30 | 1200.1 | 115.02 | 113.985 | 0.12 | 13.79 | 599.27 | 0.00 | 5,010,232.0 | 5,010,232.00 | 0.00% | 100.00% | 0.0000 | 30.2 | 6.019E-06 | 30.154 | 2.4921 |
| 31 | 1201.0 | 130.05 | 122.535 | 0.88 | 107.71 | 706.98 | 0.00 | 5,664,978.0 | 5,664,978.00 | 0.00% | 100.00% | 0.0000 | 34.1 | 6.019E-06 | 34.095 | 2.8178 |
| 32 | 1202.0 | 147.55 | 138.800 | 1.00 | 138.80 | 845.78 | 0.00 | 6,427,278.0 | 6,427,278.00 | 0.00% | 100.00% | 0.0000 | 38.7 | 6.019E-06 | 38.683 | 3.1969 |
| 33 | 1203.0 | 165.40 | 156.475 | 1.00 | 156.48 | 1002.25 | 0.00 | 7,204,824.0 | 7,204,824.00 | 0.00% | 100.00% | 0.0000 | 43.4 | 6.019E-06 | 43.362 | 3.5837 |
| 34 | 1204.0 | 183.11 | 174.253 | 1.00 | 174.25 | 1176.51 | 0.00 | 7,976,053.8 | 7,976,053.80 | 0.00% | 100.00% | 0.0000 | 48.0 | 6.019E-06 | 48.004 | 3.9673 |
| 35 | 1205.0 | 199.09 | 191.098 | 1.00 | 191.10 | 1367.60 | 0.00 | 8,672,360.4 | 8,672,360.40 | 0.00% | 100.00% | 0.0000 | 52.2 | 6.019E-06 | 52.195 | 4.3136 |
| 36 | 1206.0 | 216.66 | 207.875 | 1.00 | 207.88 | 1575.48 | 0.00 | 9,437,709.6 | 9,437,709.60 | 0.00% | 100.00% | 0.0000 | 56.8 | 6.019E-06 | 56.801 | 4.6943 |
| 37 | 1207.0 | 234.81 | 225.735 | 1.00 | 225.74 | 1801.21 | 0.00 | 10,228,323.6 | 10,228,323.60 | 0.00% | 100.00% | 0.0000 | 61.6 | 6.019E-06 | 61.559 | 5.0876 |
| 38 | 1208.0 | 253.15 | 243.980 | 1.00 | 243.98 | 2045.19 | 0.00 | 11,027,214.0 | 11,027,214.00 | 0.00% | 100.00% | 0.0000 | 66.4 | 6.019E-06 | 66.367 | 5.4849 |
| 39 | 1209.0 | 274.77 | 263.960 | 1.00 | 263.96 | 2309.15 | 0.00 | 11,968,981.2 | 11,968,981.20 | 0.00% | 100.00% | 0.0000 | 72.0 | 6.019E-06 | 72.036 | 5.9534 |
| 40 | 1210.0 | 294.10 | 284.435 | 1.00 | 284.44 | 2593.59 | 0.00 | 12,810,996.0 | 12,810,996.00 | 0.00% | 100.00% | 0.0000 | 77.1 | 6.019E-06 | 77.103 | 6.3722 |
| 41 | 1211.0 | 313.41 | 303.755 | 1.00 | 303.76 | 2897.34 | 0.00 | 13,652,139.6 | 13,652,139.60 | 0.00% | 100.00% | 0.0000 | 82.2 | 6.019E-06 | 82.166 | 6.7906 |
| 42 | 1212.0 | 327.85 | 320.630 | 1.00 | 320.63 | 3217.97 | 0.00 | 14,281,146.0 | 14,281,146.00 | 0.00% | 100.00% | 0.0000 | 86.0 | 6.019E-06 | 85.951 | 7.1034 |
| 43 | 1213.0 | 350.00 | 338.925 | 1.00 | 338.93 | 3556.90 | 0.00 | 15,246,000.0 | 15,246,000.00 | 0.00% | 100.00% | 0.0000 | 91.8 | 6.019E-06 | 91.758 | 7.5833 |
| 44 | 1214.0 | 368.69 | 359.345 | 1.00 | 359.35 | 3916.24 | 0.00 | 16,060,136.4 | 16,060,136.40 | 0.00% | 100.00% | 0.0000 | 96.7 | 6.019E-06 | 96.658 | 7.9883 |
| 45 | 1215.0 | 387.54 | 378.115 | 1.00 | 378.12 | 4294.36 | 0.00 | 16,881,242.4 | 16,881,242.40 | 0.00% | 100.00% | 0.0000 | 101.6 | 6.019E-06 | 101.600 | 8.3967 |
| 46 | 1216.0 | 409.55 | 398.545 | 1.00 | 398.55 | 4692.90 | 0.00 | 17,839,998.0 | 17,839,998.00 | 0.00% | 100.00% | 0.0000 | 107.4 | 6.019E-06 | 107.370 | 8.8736 |
| 47 | 1217.0 | 431.48 | 420.515 | 1.00 | 420.52 | 5113.42 | 0.00 | 18,795,268.8 | 18,795,268.80 | 0.00% | 100.00% | 0.0000 | 113.1 | 6.019E-06 | 113.120 | 9.3487 |
| 48 | 1218.0 | 454.15 | 442.815 | 1.00 | 442.82 | 5556.23 | 0.00 | 19,782,774.0 | 19,782,774.00 | 0.00% | 100.00% | 0.0000 | 119.1 | 6.019E-06 | 119.063 | 9.8399 |
| 49 | 1219.0 | 476.15 | 465.150 | 1.00 | 465.15 | 6021.38 | 0.00 | 20,741,094.0 | 20,741,094.00 | 0.00% | 100.00% | 0.0000 | 124.8 | 6.019E-06 | 124.831 | 10.3166 |
| 50 | 1220.0 | 501.04 | 488.595 | 1.00 | 488.60 | 6509.98 | 0.00 | 21,825,302.4 | 21,825,302.40 | 0.00% | 100.00% | 0.0000 | 131.4 | 6.019E-06 | 131.356 | 10.8559 |
| 51 | 1221.0 | 523.89 | 512.465 | 1.00 | 512.47 | 7022.44 | 0.00 | 22,820,648.4 | 22,820,648.40 | 0.00% | 100.00% | 0.0000 | 137.3 | 6.019E-06 | 137.346 | 11.3510 |
| 52 | 1222.0 | 547.70 | 535.795 | 1.00 | 535.80 | 7558.24 | 0.00 | 23,857,812.0 | 23,857,812.00 | 0.00% | 100.00% | 0.0000 | 143.6 | 6.019E-06 | 143.589 | 11.8668 |
| 53 | 1223.0 | 573.22 | 560.460 | 1.00 | 560.46 | 8118.70 | 0.00 | 24,969,463.2 | 24,969,463.20 | 0.00% | 100.00% | 0.0000 | 150.3 | 6.019E-06 | 150.279 | 12.4198 |
| 54 | 1224.0 | 600.00 | 586.610 | 1.00 | 586.61 | 8705.31 | 0.00 | 26,136,000.0 | 26,136,000.00 | 0.00% | 100.00% | 0.0000 | 157.3 | 6.019E-06 | 157.300 | 13.0000 |
| 55 | 1225.0 | 628.20 | 614.100 | 1.00 | 614.10 | 9319.41 | 0.00 | 27,364,392.0 | 27,364,392.00 | 0.00% | 100.00% | 0.0000 | 164.7 | 6.019E-06 | 164.693 | 13.6110 |
| 56 | 1226.0 | 657.43 | 642.815 | 1.00 | 642.82 | 9962.22 | 0.00 | 28,637,650.8 | 28,637,650.80 | 0.00% | 100.00% | 0.0000 | 172.4 | 6.019E-06 | 172.356 | 14.2443 |
| 57 | | | | | | | | | | | | | | | | |
| 58 | SEDIMENT POOL | IN/HR => FT/S | | | | | | | 4.629630E-08 | | | | | | | |
| 59 | NATURAL GROUND | IN/HR => FT/S | | | | | | | 6.018519E-06 | | | | | | | |

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# TABLE 4

## Formula Sheet - Infiltration Rate Estimation For White Tanks FRS No. 3 Rmediation Project

### ( No Sediment Scenario - Interim Condition)

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | NAVD88 Reservoir Elevation | Surface Area (AC) | Average Surface Area | Elevation Difference | Reservoir Storage | Cumulative Storage (ACRE-FT) | Sediment Area (SF) | Natural Ground Area(SF) | Total Surface Area (SF) | % Sediment Pool | % Natural Ground | Sediment (CFS) | Natural Ground (CFS) | Total Combined Rate (FT/S) | Estimated Infiltration Rate (CFS) | Estimated Infiltration Rate (AC-FT/HR) |
| 5 | 1178 | 0.098 | =(SUM(0+B5))/2 | 0 | =D5*C5 | =E5 | =B5*J5*43560 | =B5*K5*43560 | =B5*43560 | 0 | =1-J5 | =J5*G5*$I$58 | =$I$59*K5*H5 | =(J5*$I$58)+(K5*$I$59) | =L5+M5 | =O5*3600/43560 |
| 6 | =(A5+1) | 0.5 | =(SUM(B5:B6))/2 | =A6-A5 | =D6*C6 | =F5+E6 | =B6*J6*43560 | =B6*K6*43560 | =B6*43560 | 0 | =1-J6 | =J6*G6*$I$58 | =$I$59*K6*H6 | =(J6*$I$58)+(K6*$I$59) | =L6+M6 | =O6*3600/43560 |
| 7 | =(A6+1) | 1.0486 | =(SUM(B6:B7))/2 | =A7-A6 | =D7*C7 | =F6+E7 | =B7*J7*43560 | =B7*K7*43560 | =B7*43560 | 0 | =1-J7 | =J7*G7*$I$58 | =$I$59*K7*H7 | =(J7*$I$58)+(K7*$I$59) | =L7+M7 | =O7*3600/43560 |
| 8 | =(A7+1) | 1.757 | =(SUM(B7:B8))/2 | =A8-A7 | =D8*C8 | =F7+E8 | =B8*J8*43560 | =B8*K8*43560 | =B8*43560 | 0 | =1-J8 | =J8*G8*$I$58 | =$I$59*K8*H8 | =(J8*$I$58)+(K8*$I$59) | =L8+M8 | =O8*3600/43560 |
| 9 | =(A8+1) | 3.072 | =(SUM(B8:B9))/2 | =A9-A8 | =D9*C9 | =F8+E9 | =B9*J9*43560 | =B9*K9*43560 | =B9*43560 | 0 | =1-J9 | =J9*G9*$I$58 | =$I$59*K9*H9 | =(J9*$I$58)+(K9*$I$59) | =L9+M9 | =O9*3600/43560 |
| 10 | =(A9+1) | 4.791 | =(SUM(B9:B10))/2 | =A10-A9 | =D10*C10 | =F9+E10 | =B10*J10*43560 | =B10*K10*43560 | =B10*43560 | 0 | =1-J10 | =J10*G10*$I$58 | =$I$59*K10*H10 | =(J10*$I$58)+(K10*$I$59) | =L10+M10 | =O10*3600/43560 |
| 11 | =(A10+1) | 5.817 | =(SUM(B10:B11))/2 | =A11-A10 | =D11*C11 | =F10+E11 | =B11*J11*43560 | =B11*K11*43560 | =B11*43560 | 0 | =1-J11 | =J11*G11*$I$58 | =$I$59*K11*H11 | =(J11*$I$58)+(K11*$I$59) | =L11+M11 | =O11*3600/43560 |
| 12 | =(A11+1) | 6.6022 | =(SUM(B11:B12))/2 | =A12-A11 | =D12*C12 | =F11+E12 | =B12*J12*43560 | =B12*K12*43560 | =B12*43560 | 0 | =1-J12 | =J12*G12*$I$58 | =$I$59*K12*H12 | =(J12*$I$58)+(K12*$I$59) | =L12+M12 | =O12*3600/43560 |
| 13 | =(A12+1) | 7.442 | =(SUM(B12:B13))/2 | =A13-A12 | =D13*C13 | =F12+E13 | =B13*J13*43560 | =B13*K13*43560 | =B13*43560 | 0 | =1-J13 | =J13*G13*$I$58 | =$I$59*K13*H13 | =(J13*$I$58)+(K13*$I$59) | =L13+M13 | =O13*3600/43560 |
| 14 | =(A13+1) | 8.654 | =(SUM(B13:B14))/2 | =A14-A13 | =D14*C14 | =F13+E14 | =B14*J14*43560 | =B14*K14*43560 | =B14*43560 | 0 | =1-J14 | =J14*G14*$I$58 | =$I$59*K14*H14 | =(J14*$I$58)+(K14*$I$59) | =L14+M14 | =O14*3600/43560 |
| 15 | 1188 | 10.32 | =(SUM(B14:B15))/2 | =A15-A14 | =D15*C15 | =F14+E15 | =B15*J15*43560 | =B15*K15*43560 | =B15*43560 | 0 | =1-J15 | =J15*G15*$I$58 | =$I$59*K15*H15 | =(J15*$I$58)+(K15*$I$59) | =L15+M15 | =O15*3600/43560 |
| 16 | 1189 | 11.93 | =(SUM(B15:B16))/2 | =A16-A15 | =D16*C16 | =F15+E16 | =B16*J16*43560 | =B16*K16*43560 | =B16*43560 | 0 | =1-J16 | =J16*G16*$I$58 | =$I$59*K16*H16 | =(J16*$I$58)+(K16*$I$59) | =L16+M16 | =O16*3600/43560 |
| 17 | 1190 | 13.93 | =(SUM(B16:B17))/2 | =A17-A16 | =D17*C17 | =F16+E17 | =B17*J17*43560 | =B17*K17*43560 | =B17*43560 | 0 | =1-J17 | =J17*G17*$I$58 | =$I$59*K17*H17 | =(J17*$I$58)+(K17*$I$59) | =L17+M17 | =O17*3600/43560 |
| 18 | 1191 | 15.98 | =(SUM(B17:B18))/2 | =A18-A17 | =D18*C18 | =F17+E18 | =B18*J18*43560 | =B18*K18*43560 | =B18*43560 | 0 | =1-J18 | =J18*G18*$I$58 | =$I$59*K18*H18 | =(J18*$I$58)+(K18*$I$59) | =L18+M18 | =O18*3600/43560 |
| 19 | 1192 | 22.46 | =(SUM(B18:B19))/2 | =A19-A18 | =D19*C19 | =F18+E19 | =B19*J19*43560 | =B19*K19*43560 | =B19*43560 | 0 | =1-J19 | =J19*G19*$I$58 | =$I$59*K19*H19 | =(J19*$I$58)+(K19*$I$59) | =L19+M19 | =O19*3600/43560 |
| 20 | 1193 | 27.82 | =(SUM(B19:B20))/2 | =A20-A19 | =D20*C20 | =F19+E20 | =B20*J20*43560 | =B20*K20*43560 | =B20*43560 | 0 | =1-J20 | =J20*G20*$I$58 | =$I$59*K20*H20 | =(J20*$I$58)+(K20*$I$59) | =L20+M20 | =O20*3600/43560 |
| 21 | 1194 | 33.83 | =(SUM(B20:B21))/2 | =A21-A20 | =D21*C21 | =F20+E21 | =B21*J21*43560 | =B21*K21*43560 | =B21*43560 | 0 | =1-J21 | =J21*G21*$I$58 | =$I$59*K21*H21 | =(J21*$I$58)+(K21*$I$59) | =L21+M21 | =O21*3600/43560 |
| 22 | 1195 | 44.05 | =(SUM(B21:B22))/2 | =A22-A21 | =D22*C22 | =F21+E22 | =B22*J22*43560 | =B22*K22*43560 | =B22*43560 | 0 | =1-J22 | =J22*G22*$I$58 | =$I$59*K22*H22 | =(J22*$I$58)+(K22*$I$59) | =L22+M22 | =O22*3600/43560 |
| 23 | 1196 | 56.65 | =(SUM(B22:B23))/2 | =A23-A22 | =D23*C23 | =F22+E23 | =B23*J23*43560 | =B23*K23*43560 | =B23*43560 | 0 | =1-J23 | =J23*G23*$I$58 | =$I$59*K23*H23 | =(J23*$I$58)+(K23*$I$59) | =L23+M23 | =O23*3600/43560 |
| 24 | 1196.82 | 67.1788 | =(SUM(B23:B24))/2 | =A24-A23 | =D24*C24 | =F23+E24 | =B24*J24*43560 | =B24*K24*43560 | =B24*43560 | 0 | =1-J24 | =J24*G24*$I$58 | =$I$59*K24*H24 | =(J24*$I$58)+(K24*$I$59) | =L24+M24 | =O24*3600/43560 |
| 25 | 1197 | 69.49 | =(SUM(B24:B25))/2 | =A25-A24 | =D25*C25 | =F24+E25 | =B25*J25*43560 | =B25*K25*43560 | =B25*43560 | 0 | =1-J25 | =J25*G25*$I$58 | =$I$59*K25*H25 | =(J25*$I$58)+(K25*$I$59) | =L25+M25 | =O25*3600/43560 |
| 26 | 1198 | 83.88 | =(SUM(B25:B26))/2 | =A26-A25 | =D26*C26 | =F25+E26 | =B26*J26*43560 | =B26*K26*43560 | =B26*43560 | 0 | =1-J26 | =J26*G26*$I$58 | =$I$59*K26*H26 | =(J26*$I$58)+(K26*$I$59) | =L26+M26 | =O26*3600/43560 |
| 27 | 1199 | 98.77 | =(SUM(B26:B27))/2 | =A27-A26 | =D27*C27 | =F26+E27 | =B27*J27*43560 | =B27*K27*43560 | =B27*43560 | 0 | =1-J27 | =J27*G27*$I$58 | =$I$59*K27*H27 | =(J27*$I$58)+(K27*$I$59) | =L27+M27 | =O27*3600/43560 |
| 28 | 1199.205 | 102 | =(SUM(B27:B28))/2 | =A28-A27 | =D28*C28 | =F27+E28 | =B28*J28*43560 | =B28*K28*43560 | =B28*43560 | 0 | =1-J28 | =J28*G28*$I$58 | =$I$59*K28*H28 | =(J28*$I$58)+(K28*$I$59) | =L28+M28 | =O28*3600/43560 |
| 29 | 1200 | 112.95 | =(SUM(B28:B29))/2 | =A29-A28 | =D29*C29 | =F28+E29 | =B29*J29*43560 | =B29*K29*43560 | =B29*43560 | 0 | =1-J29 | =G29*$I$58 | =$I$59*H29 | =(J29*$I$58)+(K29*$I$59) | =L29+M29 | =O29*3600/43560 |
| 30 | 1200.121 | 115.0191 | =(SUM(B29:B30))/2 | =A30-A29 | =D30*C30 | =F29+E30 | =B30*J30*43560 | =B30*K30*43560 | =B30*43560 | 0 | =1-J30 | =G30*$I$58 | =$I$59*H30 | =(J30*$I$58)+(K30*$I$59) | =L30+M30 | =O30*3600/43560 |
| 31 | 1201 | 130.05 | =(SUM(B30:B31))/2 | =A31-A30 | =D31*C31 | =F30+E31 | =(B31*J31)*43560 | =(B31*K31)*43560 | =B31*43560 | 0 | =1-J31 | =G31*$I$58 | =$I$59*H31 | =(J31*$I$58)+(K31*$I$59) | =L31+M31 | =O31*3600/43560 |
| 32 | 1202 | 147.55 | =(SUM(B31:B32))/2 | =A32-A31 | =D32*C32 | =F31+E32 | =(B32*J32)*43560 | =(B32*K32)*43560 | =B32*43560 | 0 | =1-J32 | =G32*$I$58 | =$I$59*H32 | =(J32*$I$58)+(K32*$I$59) | =L32+M32 | =O32*3600/43560 |
| 33 | 1203 | 165.4 | =(SUM(B32:B33))/2 | =A33-A32 | =D33*C33 | =F32+E33 | =(B33*J33)*43560 | =(B33*K33)*43560 | =B33*43560 | 0 | =1-J33 | =G33*$I$58 | =$I$59*H33 | =(J33*$I$58)+(K33*$I$59) | =L33+M33 | =O33*3600/43560 |
| 34 | 1204 | 183.105 | =(SUM(B33:B34))/2 | =A34-A33 | =D34*C34 | =F33+E34 | =(B34*J34)*43560 | =(B34*K34)*43560 | =B34*43560 | 0 | =1-J34 | =G34*$I$58 | =$I$59*H34 | =(J34*$I$58)+(K34*$I$59) | =L34+M34 | =O34*3600/43560 |
| 35 | 1205 | 199.09 | =(SUM(B34:B35))/2 | =A35-A34 | =D35*C35 | =F34+E35 | =(B35*J35)*43560 | =(B35*K35)*43560 | =B35*43560 | 0 | =1-J35 | =G35*$I$58 | =$I$59*H35 | =(J35*$I$58)+(K35*$I$59) | =L35+M35 | =O35*3600/43560 |
| 36 | 1206 | 216.66 | =(SUM(B35:B36))/2 | =A36-A35 | =D36*C36 | =F35+E36 | =(B36*J36)*43560 | =(B36*K36)*43560 | =B36*43560 | 0 | =1-J36 | =G36*$I$58 | =$I$59*H36 | =(J36*$I$58)+(K36*$I$59) | =L36+M36 | =O36*3600/43560 |
| 37 | 1207 | 234.81 | =(SUM(B36:B37))/2 | =A37-A36 | =D37*C37 | =F36+E37 | =(B37*J37)*43560 | =(B37*K37)*43560 | =B37*43560 | 0 | =1-J37 | =G37*$I$58 | =$I$59*H37 | =(J37*$I$58)+(K37*$I$59) | =L37+M37 | =O37*3600/43560 |
| 38 | 1208 | 253.15 | =(SUM(B37:B38))/2 | =A38-A37 | =D38*C38 | =F37+E38 | =(B38*J38)*43560 | =(B38*K38)*43560 | =B38*43560 | 0 | =1-J38 | =G38*$I$58 | =$I$59*H38 | =(J38*$I$58)+(K38*$I$59) | =L38+M38 | =O38*3600/43560 |
| 39 | 1209 | 274.77 | =(SUM(B38:B39))/2 | =A39-A38 | =D39*C39 | =F38+E39 | =(B39*J39)*43560 | =(B39*K39)*43560 | =B39*43560 | 0 | =1-J39 | =G39*$I$58 | =$I$59*H39 | =(J39*$I$58)+(K39*$I$59) | =L39+M39 | =O39*3600/43560 |
| 40 | 1210 | 294.1 | =(SUM(B39:B40))/2 | =A40-A39 | =D40*C40 | =F39+E40 | =(B40*J40)*43560 | =(B40*K40)*43560 | =B40*43560 | 0 | =1-J40 | =G40*$I$58 | =$I$59*H40 | =(J40*$I$58)+(K40*$I$59) | =L40+M40 | =O40*3600/43560 |
| 41 | 1211 | 313.41 | =(SUM(B40:B41))/2 | =A41-A40 | =D41*C41 | =F40+E41 | =(B41*J41)*43560 | =(B41*K41)*43560 | =B41*43560 | 0 | =1-J41 | =G41*$I$58 | =$I$59*H41 | =(J41*$I$58)+(K41*$I$59) | =L41+M41 | =O41*3600/43560 |
| 42 | 1212 | 327.85 | =(SUM(B41:B42))/2 | =A42-A41 | =D42*C42 | =F41+E42 | =(B42*J42)*43560 | =(B42*K42)*43560 | =B42*43560 | 0 | =1-J42 | =G42*$I$58 | =$I$59*H42 | =(J42*$I$58)+(K42*$I$59) | =L42+M42 | =O42*3600/43560 |
| 43 | 1213 | 350 | =(SUM(B42:B43))/2 | =A43-A42 | =D43*C43 | =F42+E43 | =(B43*J43)*43560 | =(B43*K43)*43560 | =B43*43560 | 0 | =1-J43 | =G43*$I$58 | =$I$59*H43 | =(J43*$I$58)+(K43*$I$59) | =L43+M43 | =O43*3600/43560 |
| 44 | 1214 | 368.69 | =(SUM(B43:B44))/2 | =A44-A43 | =D44*C44 | =F43+E44 | =(B44*J44)*43560 | =(B44*K44)*43560 | =B44*43560 | 0 | =1-J44 | =G44*$I$58 | =$I$59*H44 | =(J44*$I$58)+(K44*$I$59) | =L44+M44 | =O44*3600/43560 |
| 45 | 1215 | 387.54 | =(SUM(B44:B45))/2 | =A45-A44 | =D45*C45 | =F44+E45 | =(B45*J45)*43560 | =(B45*K45)*43560 | =B45*43560 | 0 | =1-J45 | =G45*$I$58 | =$I$59*H45 | =(J45*$I$58)+(K45*$I$59) | =L45+M45 | =O45*3600/43560 |
| 46 | 1216 | 409.55 | =(SUM(B45:B46))/2 | =A46-A45 | =D46*C46 | =F45+E46 | =(B46*J46)*43560 | =(B46*K46)*43560 | =B46*43560 | 0 | =1-J46 | =G46*$I$58 | =$I$59*H46 | =(J46*$I$58)+(K46*$I$59) | =L46+M46 | =O46*3600/43560 |
| 47 | 1217 | 431.48 | =(SUM(B46:B47))/2 | =A47-A46 | =D47*C47 | =F46+E47 | =(B47*J47)*43560 | =(B47*K47)*43560 | =B47*43560 | 0 | =1-J47 | =G47*$I$58 | =$I$59*H47 | =(J47*$I$58)+(K47*$I$59) | =L47+M47 | =O47*3600/43560 |
| 48 | 1218 | 454.15 | =(SUM(B47:B48))/2 | =A48-A47 | =D48*C48 | =F47+E48 | =(B48*J48)*43560 | =(B48*K48)*43560 | =B48*43560 | 0 | =1-J48 | =G48*$I$58 | =$I$59*H48 | =(J48*$I$58)+(K48*$I$59) | =L48+M48 | =O48*3600/43560 |
| 49 | 1219 | 476.15 | =(SUM(B48:B49))/2 | =A49-A48 | =D49*C49 | =F48+E49 | =(B49*J49)*43560 | =(B49*K49)*43560 | =B49*43560 | 0 | =1-J49 | =G49*$I$58 | =$I$59*H49 | =(J49*$I$58)+(K49*$I$59) | =L49+M49 | =O49*3600/43560 |
| 50 | 1220 | 501.04 | =(SUM(B49:B50))/2 | =A50-A49 | =D50*C50 | =F49+E50 | =(B50*J50)*43560 | =(B50*K50)*43560 | =B50*43560 | 0 | =1-J50 | =G50*$I$58 | =$I$59*H50 | =(J50*$I$58)+(K50*$I$59) | =L50+M50 | =O50*3600/43560 |
| 51 | 1221 | 523.89 | =(SUM(B50:B51))/2 | =A51-A50 | =D51*C51 | =F50+E51 | =(B51*J51)*43560 | =(B51*K51)*43560 | =B51*43560 | 0 | =1-J51 | =G51*$I$58 | =$I$59*H51 | =(J51*$I$58)+(K51*$I$59) | =L51+M51 | =O51*3600/43560 |
| 52 | 1222 | 547.7 | =(SUM(B51:B52))/2 | =A52-A51 | =D52*C52 | =F51+E52 | =(B52*J52)*43560 | =(B52*K52)*43560 | =B52*43560 | 0 | =1-J52 | =G52*$I$58 | =$I$59*H52 | =(J52*$I$58)+(K52*$I$59) | =L52+M52 | =O52*3600/43560 |
| 53 | 1223 | 573.22 | =(SUM(B52:B53))/2 | =A53-A52 | =D53*C53 | =F52+E53 | =(B53*J53)*43560 | =(B53*K53)*43560 | =B53*43560 | 0 | =1-J53 | =G53*$I$58 | =$I$59*H53 | =(J53*$I$58)+(K53*$I$59) | =L53+M53 | =O53*3600/43560 |
| 54 | 1224 | 600 | =(SUM(B53:B54))/2 | =A54-A53 | =D54*C54 | =F53+E54 | =(B54*J54)*43560 | =(B54*K54)*43560 | =B54*43560 | 0 | =1-J54 | =G54*$I$58 | =$I$59*H54 | =(J54*$I$58)+(K54*$I$59) | =L54+M54 | =O54*3600/43560 |
| 55 | 1225 | 628.2 | =(SUM(B54:B55))/2 | =A55-A54 | =D55*C55 | =F54+E55 | =(B55*J55)*43560 | =(B55*K55)*43560 | =B55*43560 | 0 | =1-J55 | =G55*$I$58 | =$I$59*H55 | =(J55*$I$58)+(K55*$I$59) | =L55+M55 | =O55*3600/43560 |
| 56 | 1226 | 657.43 | =(SUM(B55:B56))/2 | =A56-A55 | =D56*C56 | =F55+E56 | =(B56*J56)*43560 | =(B56*K56)*43560 | =B56*43560 | 0 | =1-J56 | =G56*$I$58 | =$I$59*H56 | =(J56*$I$58)+(K56*$I$59) | =L56+M56 | =O56*3600/43560 |
| 57 | | | | | | | | | | | | | | | | |
| 58 | SEDIMENT PO IN/HR => F | | | | | | | | =(0.002/3600)/12 | | | | | | | |
| 59 | NATURAL GR IN/HR => F | | | | | | | | =(0.26/3600)/12 | | | | | | | |

(4)

## 4.3 RESERVOIR INFILTRATION

### 4.3.1 Infiltration Design Criteria

The purpose of performing infiltration tests within the White Tanks FRS #3 reservoir was to develop an infiltration rate for estimating reservoir drawdown. According to design procedures in Technical Release No. 60 (TR 60) (USDA, 1985) and summarized in "Procedures for White Tanks FRS #3 Emergency Spillway Hydrologic and Hydraulic Design" (FCD, 1998), the crest elevation of the primary emergency spillway, also called the notch spillway, should satisfy two criteria:

1. The maximum volume of the retarding storage (the storage volume below the emergency spillway) of the reservoir will not exceed 2,500 acre-ft, and

2. The principal spillway capacity should allow for drawdown of the retarding storage volume in 10 days. This criterion is met if 15 percent or less of the maximum reservoir volume remains after the 10-day drawdown.

For the White Tanks FRS #3 project, the NRCS has granted an exception in that infiltration may be used for reservoir drawdown in lieu of discharge through the principal (gated conduit) outlet(s). The design procedures document also states that the infiltration rate to be used in design should be determined from field infiltration tests.

TR 60 states that if Criterion (b) is not satisfied then an alternative approach may be used to determine the required crest elevation of the emergency spillway. Using the alternative approach, the emergency spillway crest elevation must be above the elevation corresponding to the maximum volume attained during the passage of the principal spillway hydrograph plus the volume remaining after the 10-day drawdown. The principal spillway hydrograph is the 100-year, 10-day storm developed by NRCS (USDA, 1998) and has a runoff volume of approximately 1,600 acre-ft. It should be noted that this alternative approach is not presented in the FCD Spillway Design procedures (FCD, 1998).

### 4.3.2 Infiltration Testing

Dames & Moore conducted infiltration tests within the White Tanks reservoir to collect site specific infiltration values to use in modeling the infiltration capacity as part of the NRCS design criteria. The infiltration tests results were compared to the infiltration test results at a recharge site located to the north of the White Tanks dam. The results were also compared to the Soil

Conservation Service (SCS) soil survey for the area. The comparison was made to evaluate the validity of the test method and results. The infiltrometer test procedure, results and comparison with existing data are detailed in the following paragraphs.

Dames & Moore performed four single ring infiltrometer tests within the reservoir. The single ring infiltrometer test provides a convenient and cost effective method for estimating long-term infiltration rates. The tests consisted of installing a 2-foot diameter metal ring at the test location. The ring was embedded 4 to 6 inches into the ground and a thick bentonite grout was placed along the inner and outer periphery of the ring to minimize leakage. The infiltrometer was filled to a pre-determined level (between 12 and 16 inches). The drop in water level was noted with time. Water was added to the infiltrometer periodically to maintain a relatively constant head during the test. The tests were run over a period of approximately 48 hours. After the tests were complete, the infiltrometers were removed from the ground. The soil within the test area was excavated to delineate the extent of lateral spreading of the wetting front. This data was used to correct the measured infiltration rate for lateral spreading.

The four test locations are shown on Figure 4-3. As expected, the rates of infiltration during the initial stages of the test were relatively high but drop progressively with time until the rates are generally constant. The uncorrected infiltration rates for the four tests ranged from 0.012 to 2.75 inches per hour (in/hr). When corrected for lateral spreading of the wetting front, the vertical rates for the four tests ranged from 0.002 to 0.44 in/hr. The lowest infiltration rate (0.002 in/hr) was recorded at a test location within a former borrow area now filled with sediment. This value represents the infiltration rate for the sediment pool within the reservoir.

### 4.3.3 Infiltration Comparisons

Dames & Moore reviewed soil survey data published by the SCS. The SCS defines the soils in the area of two of the infiltration tests as the Antho-Trement-Mohall series (USDA, 1977). The permeability provided by the SCS ranges from 0.20 to 6.0 in/hr. The vertical infiltration rates obtained from the infiltration tests by Dames & Moore were 0.24 and 0.44 in/hr for an average of 0.34 in/hr. The results of these infiltration tests fall towards the lower permeability values given by SCS. A third infiltration test was performed in the Antho-Valencia series that is described as a clay to silty sand by the SCS. The infiltration rate for this test was 0.11 in/hr compared to the permeability range given by the SCS of 0.20 to 6.0 in/hr. Thus, the average infiltration rate reported during our field tests exceeded the minimum permeability reported by SCS by approximately 2.5 percent of the range of permeabilities for that particular soil series. This relationship was used to assign infiltration values for the remainder of the soil series delineated

(10)

by the SCS. The infiltration rates were weighted in proportion to the area covered by each soil series within the reservoir. This procedure yielded an average infiltration rate of approximately 0.30 in/hr.

The City of Surprise conducted four single ring infiltrometer tests near the southern end of McMicken Dam to determine the feasibility of implementing an artificial groundwater recharge project (Bouwer, 1996). The McMicken Dam infiltration test location is approximately 5 miles north of the White Tanks infiltration test sites. The soils in the test area consist of the Tremant-Rillito series which are generally similar to the soils at White Tanks. The McMicken infiltrometer tests produced an infiltration rate of 0.3 in/hr after correcting for an assumed lateral wetting of 12 inches. The permeability range for the Tremant-Rillito series provided by the SCS is 0.2 to 2.0 in/hr. The infiltration rate reported for the McMicken Dam tests exceeded the minimum permeability reported by the SCS by approximately 5.5 percent for the soil series permeability range.

In addition to the single ring infiltrometer tests, the City of Surprise conducted infiltration tests using a one-acre test basin. The test basin better represents infiltration rates over a large area in comparison to the single ring infiltrometer. The short term infiltration rate obtained at the test basin after approximately one week of testing was 0.50 in/hr. The test results indicate that the test basin tends to provide infiltration rates closer to the high end of the permeability range given by the SCS. Thus, it appears that at the McMicken site, the results of infiltrometer tests are comparable to results from the basin tests, with the infiltration rates reported from the basin tests being marginally higher than those from the infiltrometer tests. Both sets of results were marginally higher than the minimum permeability values reported by the SCS. Furthermore, the infiltration rates at the McMicken site are also comparable to the infiltration rates measured by Dames & Moore at White Tanks FRS #3.

### 4.3.4 Results

Based on the above evaluation, we recommend the final design be based on an infiltration rate of 0.002 in/hr for the sediment pool, and a weighted average of 0.3 in/hr for the remainder of the reservoir. The surface area of the sediment pool was estimated to be 99 acres, based on the area covered when the reservoir fills with 500 ac-ft of sediment (100-year sediment yield).

The hydrology and hydraulic analyses presented in this report were performed prior to finalization of the infiltration estimates. Therefore, conservative values for infiltration were developed based on the preliminary range of testing results that would meet the NRCS criteria of a maximum volume of 2,500 acre-ft. The values used in the analyses were 0.002 in/hr for the

sediment pool and 0.26 in/hr for the remainder of the reservoir. Using these conservative infiltration rates and starting at 500 ac-ft of storage, the maximum volume attained during the passage of the principal spillway hydrograph was estimated to be 1,829 acre-ft. The volume remaining after 10 days of drawdown is 1,171 acre-ft, or 671 acre-ft when excluding the sediment volume. Combining the maximum volume and the remaining volume after drawdown results in a total required storage volume of 2,500 acre-ft, which meets the volume requirement under the NRCS criteria. The reservoir volume remaining after drawdown (1,171 acre-ft), which corresponds to a water surface elevation of 1,201.9 ft, was used in the design analyses presented in Sections 4.2 and 4.4.

The reservoir volume corresponding to the recommended infiltration estimates will be incorporated in the final design of the embankment and spillway. Using an infiltration rate of 0.3 in/hr for the non-sediment portions of the reservoir, the maximum volume attained during the passage of the principal spillway hydrograph was estimated to be 1,810 acre-ft. The volume remaining after 10 days of drawdown is 1,080 acre-ft, or 580 acre-ft when excluding the sediment volume. Adding the maximum volume and the remaining volume after drawdown results in a total required storage volume of 2,390 acre-ft, which is below the established design emergency spillway volume of 2,500 acre-ft. Therefore, the requirements of NRCS for determining the minimum emergency spillway crest elevation will be satisfied.

### 4.3.5 Qualification of Results

While the single ring infiltrometer test is a simple and cost-effective method for evaluating infiltration, this method is not without its disadvantages. The test does not allow for evaluation of the effect of sediment deposition cycles that may occur during the life of the facility. "Clogging" of the pore space due to biological factors is also not considered. These limitations not withstanding, we believe that the infiltration testing program implemented for this project is satisfactory and adequately conservative to demonstrate that the NRCS criteria discussed earlier in this section are met. However, if the infiltration rate is to be used in designing elements of the dam, we would recommend a more detailed and extensive field testing program. If used as the basis of emergency spillway or embankment sizing, it is also likely that ADWR will require a more thorough investigation of the infiltration rates at the site.

(1)

URS

# CALCULATION PACKAGE NO. C-6

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title:

**ESTIMATION OF 200- AND 500-YEAR RAINFALL DEPTHS FOR DIFFERENT DURATIONS FOR THE WHITE TANK FRS NO. 3 WATERSHED**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: 1

Prepared by: Hammad Hussain Date: 04/22/04

Checked by: Todd Ringsmuth Date: 5-2-04

Description and Purpose:

See Page 2.

Design Basis /Assumptions

See Pages 2 and 3.

Remarks/Conclusions/Results:

no comments

See Page 3.

Calculation Approved by: _____ 5/19/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

# ESTIMATION OF 200- AND 500-YEAR RAINFALL DEPTHS FOR DIFFERENT DURATIONS FOR THE WHITE TANK FRS NO. 3 WATERSHED

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
## 23443748

## PROBLEM STATEMENT

The aim of this calculation package is to estimate the 200- and 500-year rainfall depths for different durations at White Tank FRS No.3 watershed.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

URS developed the 200- and 500-year rainfall depths for different durations at White Tank FRS No. 3 watershed. URS first consulted the *Drainage Design Manual for Maricopa County, Volume 1,Hydrology (FCDMC, 1995)* to develop these rainfall depths. However, the *Drainage Design Manual for Maricopa County, Volume 1,Hydrology (FCDMC, 1995)* had isopluvial maps only up to 100-year frequency. There was no other methodology provided in *Drainage Design Manual for Maricopa County, Volume 1,Hydrology (FCDMC, 1995)* to estimate the rainfall depths for a frequency larger than 100 year. Therefore, rainfall depths for 500-year for different durations were determined based on a step-wise methodology described in *Highway Drainage Design Manual Hydrology, Arizona Department of Transportation* (ADOT, March 1993). The relative pages from the ADOT Manual describing this step-wise procedure are copied and are attached at end of this calculation package (See Pages 23-30). The calculations involved in estimating 500-year rainfall depth for different durations based on ADOT procedure are provided on Pages 4-5. All the formulas involved in these calculations are shown on a formula spreadsheet on Pages 7-8.

The ADOT manual did not provide necessary information required to develop 200-year, rainfall depths for different durations. In order to estimate the 200-year rainfall depths for different durations, URS first developed 5-, 10-, 50- and 100-year rainfall depths for different durations based on the methodology described in *Highway Drainage Design Manual Hydrology, Arizona Department of Transportation* (ADOT, March 1993). All relative calculations are shown on Pages 4-5. All the formulas involved in these calculations are shown on a formula spreadsheet on Pages 7-8.

URS then plotted the rainfall depth for each duration against the 5-, 10-, 25-, 100-, and 500-year frequency period on a semi-log scale (See Pages 10-18). Based on the depth-frequency relationship developed for each duration, the corresponding 200-year rainfall depth was determined (See Page 6). All the formulas involved in estimating 200-year rainfall depths for different durations are shown on a formula spreadsheet on Page 9.

## RESULT

Please refer to the Pages 5 and 6 for 200- and 500-year rainfall depths for different durations.

# Estimation of Rainfall Depths for a 200-year and 500-year Storm for Different Frequencies

| Rainfall Duration & Frequency | Rainfall (in) |
|---|---|
| P (2 year, 6 hour)*1 | 1.35 |
| P(2 year, 24 hour)*1 | 1.6 |
| P (100 year, 6 hour)*1 | 3.2 |
| P(100 year, 24 hour)*1 | 4.2 |

*1 Using Isopluvial Maps Provided in Appendix A of Drainage Design Manual For Maricopa County (See Pages 19-22 of this Calc. Package):

| Rainfall Duration & Frequency | Rainfall (in) |
|---|---|
| P (2 year, 1 hour) | 1.06 |
| P (2 year, 2 hour) | 1.16 |
| P (2 year, 3 hour) | 1.23 |
| P (2 year,12 hour) | 1.48 |
| P (100 year,1 hour) | 2.33 |
| P (100 year, 2 hour) | 2.63 |
| P (100 year, 3 hour) | 2.83 |
| P (100 year, 12 hour) | 3.70 |

**Goodyear Falls Under Zone 8 (Please See Page 29)**

Ratio for 2-year and 100-year was obtained using Table 1-1 of ADOT Manual (Please See Attached Page 30):

| Duration (minutes) | Ratio | |
|---|---|---|
| | 2-yr | 100-yr |
| 5 | 0.34 | 0.3 |
| 10 | 0.51 | 0.46 |
| 15 | 0.62 | 0.59 |
| 30 | 0.82 | 0.8 |

| Rainfall Duration & Frequency | Rainfall (in) |
|---|---|
| P (2 year, 5 minutes) | 0.36 |
| P (2 year, 10 minutes) | 0.54 |
| P (2 year, 15 minutes) | 0.66 |
| P (2 year, 30 minutes) | 0.87 |
| P (100 year, 5 minutes) | 0.70 |
| P (100 year, 10 minutes) | 1.07 |
| P (100 year, 15 minutes) | 1.38 |
| P (100 year, 30 minutes) | 1.87 |

(Please See Attached Page 26 Of This Calc. Package for X and Y Values)

| Year | X | Y |
|---|---|---|
| 5 | 0.674 | 0.278 |
| 10 | 0.496 | 0.449 |
| 50 | 0.146 | 0.835 |
| 500 | -0.337 | 1.381 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48 | **5-Year** | | | | | | | | | | | |
| 49 | Rainfall Duration & Frequency | Rainfall (in) | | | | | | | | | | |
| 50 | P(5 year, 10 minutes) | 0.66 | | | | | | | | | | |
| 51 | P(5 year, 15 minutes) | 0.83 | | | | | | | | | | |
| 52 | P(5 year, 30 minutes) | 1.11 | | | | | | | | | | |
| 53 | P(5 year, 1 hour) | 1.36 | | | | | | | | | | |
| 54 | P(5 year, 2 hour) | 1.51 | | | | | | | | | | |
| 55 | P(5 year, 3 hour) | 1.61 | | | | | | | | | | |
| 56 | P(5 year, 6 hour) | 1.80 | | | | | | | | | | |
| 57 | P(5 year, 12 hour) | 2.02 | | | | | | | | | | |
| 58 | P(5 year, 24 hour) | 2.25 | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | **10-Year** | | | | | | | | | | | |
| 61 | Rainfall Duration & Frequency | Rainfall (in) | | | | | | | | | | |
| 62 | P(10 year, 10 minutes) | 0.75 | | | | | | | | | | |
| 63 | P(10 year, 15 minutes) | 0.95 | | | | | | | | | | |
| 64 | P(10 year, 30 minutes) | 1.27 | | | | | | | | | | |
| 65 | P(10 year, 1 hour) | 1.58 | | | | | | | | | | |
| 66 | P(10 year, 2 hour) | 1.76 | | | | | | | | | | |
| 67 | P(10 year, 3 hour) | 1.88 | | | | | | | | | | |
| 68 | P(10 year, 6 hour) | 2.11 | | | | | | | | | | |
| 69 | P(10 year, 12 hour) | 2.39 | | | | | | | | | | |
| 70 | P(10 year, 24 hour) | 2.68 | | | | | | | | | | |
| 71 | | | | | | | | | | | | |
| 72 | **50-Year** | | | | | | | | | | | |
| 73 | Rainfall Duration & Frequency | Rainfall (in) | | | | | | | | | | |
| 74 | P(50 year, 10 minutes) | 0.98 | | | | | | | | | | |
| 75 | P(50 year, 15 minutes) | 1.25 | | | | | | | | | | |
| 76 | P(50 year, 30 minutes) | 1.69 | | | | | | | | | | |
| 77 | P(50 year, 1 hour) | 2.10 | | | | | | | | | | |
| 78 | P(50 year, 2 hour) | 2.37 | | | | | | | | | | |
| 79 | P(50 year, 3 hour) | 2.54 | | | | | | | | | | |
| 80 | P(50 year, 6 hour) | 2.87 | | | | | | | | | | |
| 81 | P(50 year, 12 hour) | 3.30 | | | | | | | | | | |
| 82 | P(50- year, 24 hour) | 3.74 | | | | | | | | | | |
| 83 | | | | | | | | | | | | |
| 84 | **100-Year** | | | | | | | | | | | |
| 85 | Rainfall Duration & Frequency | Rainfall (in) | | | | | | | | | | |
| 86 | P(100 year, 10 minutes) | 1.07 | | | | | | | | | | |
| 87 | P(100 year, 15 minutes) | 1.38 | | | | | | | | | | |
| 88 | P(100 year, 30 minutes) | 1.87 | | | | | | | | | | |
| 89 | P(100 year, 1 hour) | 2.33 | | | | | | | | | | |
| 90 | P(100 year, 2 hour) | 2.63 | | | | | | | | | | |
| 91 | P(100 year, 3 hour) | 2.83 | | | | | | | | | | |
| 92 | P(100 year, 6 hour) | 3.20 | | | | | | | | | | |
| 93 | P(100 year, 12 hour) | 3.70 | | | | | | | | | | |
| 94 | P(100 year, 24 hour) | 4.20 | | | | | | | | | | |
| 95 | | | | | | | | | | | | |
| 96 | **500-Year** | | | | | | | | | | | |
| 97 | Rainfall Duration & Frequency | Rainfall (in) | | | | | | | | | | |
| 98 | P(500 year, 10 minutes) | 1.30 | | | | | | | | | | |
| 99 | P(500 year, 15 minutes) | 1.68 | | | | | | | | | | |
| 100 | P(500 year, 30 minutes) | 2.29 | | | | | | | | | | |
| 101 | P(500 year, 1 hour) | 2.87 | | | | | | | | | | |
| 102 | P(500 year, 2 hour) | 3.24 | | | | | | | | | | |
| 103 | P(500 year, 3 hour) | 3.49 | | | | | | | | | | |
| 104 | P(500 year, 6 hour) | 3.96 | | | | | | | | | | |
| 105 | P(500 year, 12 hour) | 4.61 | | | | | | | | | | |
| 106 | P(500 year, 24 hour) | 5.26 | | | | | | | | | | |

## Estimation of 200-Year Rainfall Depth for Various Durations

| Duration | Slope[1] | Intercept[1] | Return Frequency (year) | Rainfall Depth (inches) |
|---|---|---|---|---|
| 10 minutes | 0.1389 | 0.4351 | 200 | 1.17 |
| 15 minutes | 0.1861 | 0.5215 | 200 | 1.51 |
| 30 minutes | 0.257 | 0.6849 | 200 | 2.05 |
| 1-hour | 0.327 | 0.8293 | 200 | 2.56 |
| 2-hour | 0.3763 | 0.8978 | 200 | 2.89 |
| 3-hour | 0.4092 | 0.9436 | 200 | 3.11 |
| 6-hour | 0.471 | 1.03 | 200 | 3.53 |
| 12-hour | 0.5638 | 1.1043 | 200 | 4.09 |
| 24-hour | 0.656 | 1.178 | 200 | 4.65 |

1) Slope and intercept values for a 200-year storm for different duration are extracted from Figures 1-9 attached with this calculation package (Please See Attached Pages 10-18).

| | A | B | C | D |
|---|---|---|---|---|
| 1 | **Estimation of Rainfall Depths for a 200-year and 500-year Storm for Different Frequencies** | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | **Rainfall Duration & Frequency** | **Rainfall (in)** | | |
| 5 | P (2 year, 6 hour)*1 | 1.35 | | |
| 6 | P(2 year, 24 hour)*1 | 1.6 | | |
| 7 | P (100 year, 6 hour)*1 | 3.2 | | |
| 8 | P(100 year, 24 hour)*1 | 4.2 | | |
| 9 | *1 Using Isopluvial Maps Provided in Appendix A of Drainage Design Manual For Maricopa County (See Pages 19-22 of this Calc Package): | | | |
| 10 | **Rainfall Duration & Frequency** | **Rainfall (in)** | | |
| 11 | P (2 year, 1 hour) | =-0.011+((0.942)*(B5^2))/(B6) | | |
| 12 | P (2 year, 2 hour) | =0.341*(B5)+0.659*(B11) | | |
| 13 | P (2 year, 3 hour) | =0.569*(B5)+0.431*(B11) | | |
| 14 | P (2 year,12 hour) | =0.5*(B5)+0.5*(B6) | | |
| 15 | P (100 year,1 hour) | =0.494+((0.755)*(B7^2))/(B8) | | |
| 16 | P (100 year, 2 hour) | =0.341*($B$7)+0.659*($B$15) | | |
| 17 | P (100 year, 3 hour) | =0.569*($B$7)+0.431*($B$15) | | |
| 18 | P (100 year, 12 hour) | =0.5*($B$7)+0.5*($B$8) | | |
| 19 | | | | |
| 20 | **Goodyear Falls Under Zone 8 (Please See Page 29)** | | | |
| 21 | | | | |
| 22 | Ratio for 2-year and 100-year was obtained using Table 1-1 of ADOT Manual (Please See Attached Page 30): | | | |
| 23 | **Duration (minutes)** | **Ratio** | | |
| 24 | | 2-yr | 100-yr | |
| 25 | 5 | 0.34 | 0.3 | |
| 26 | 10 | 0.51 | 0.46 | |
| 27 | 15 | 0.62 | 0.59 | |
| 28 | 30 | 0.82 | 0.8 | |
| 29 | | | | |
| 30 | **Rainfall Duration & Frequency** | **Rainfall (in)** | | |
| 31 | P (2 year, 5 minutes) | =B25*$B$11 | | |
| 32 | P (2 year, 10 minutes) | =B26*$B$11 | | |
| 33 | P (2 year, 15 minutes) | =B27*$B$11 | | |
| 34 | P (2 year, 30 minutes) | =B28*$B$11 | | |
| 35 | P (100 year, 5 minutes) | =C25*$B$15 | | |
| 36 | P (100 year, 10 minutes) | =C26*$B$15 | | |
| 37 | P (100 year, 15 minutes) | =C27*$B$15 | | |
| 38 | P (100 year, 30 minutes) | =C28*$B$15 | | |
| 39 | | | | |
| 40 | (Please See Attached Page 26 Of This Calc. Package) | | | |
| 41 | **Year** | **X** | **Y** | |
| 42 | 5 | 0.674 | 0.278 | |
| 43 | 10 | 0.496 | 0.449 | |
| 44 | 50 | 0.146 | 0.835 | |
| 45 | 500 | -0.337 | 1.381 | |
| 46 | | | | |
| 47 | | | | |

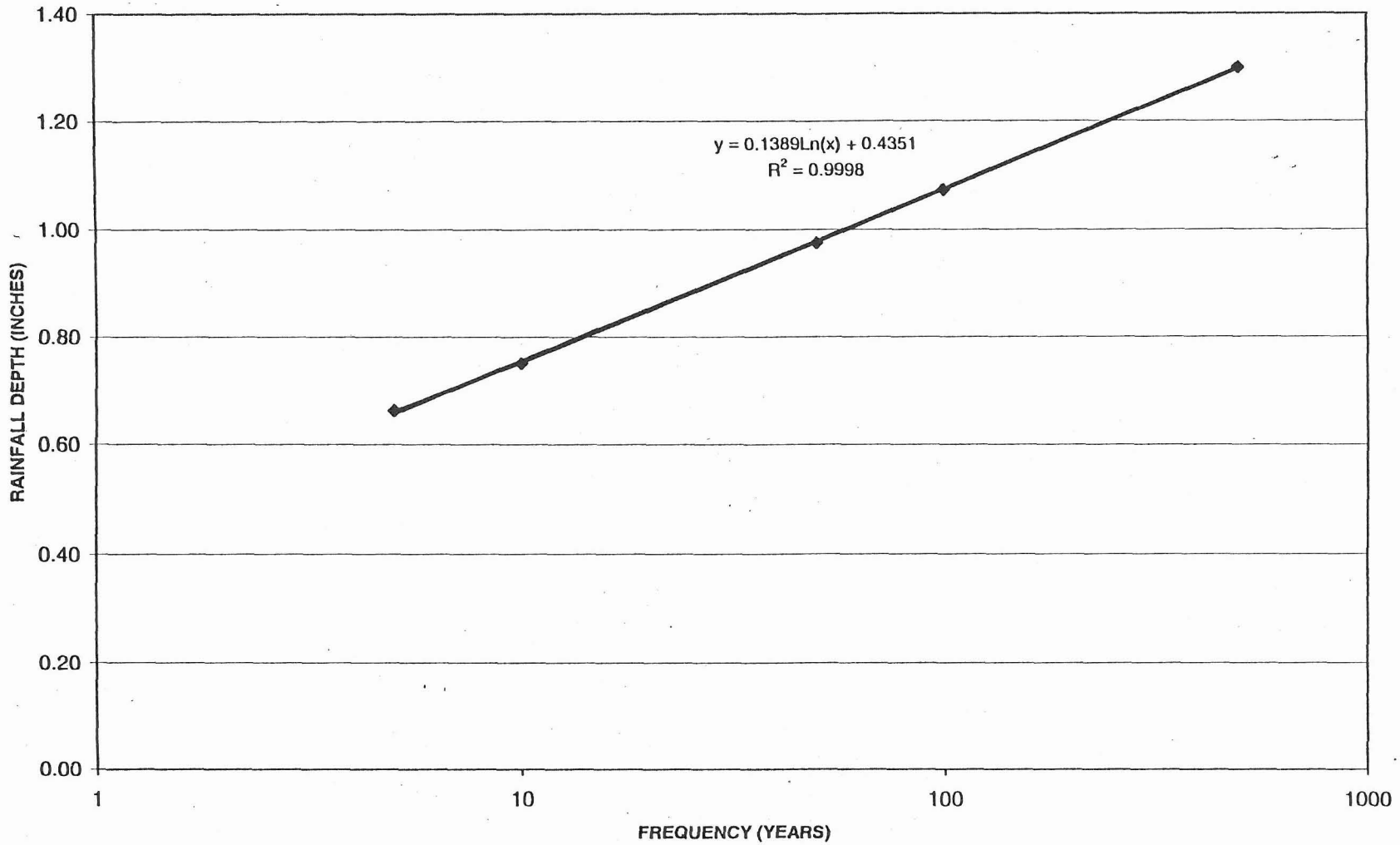
| | A | B | C | D |
|---|---|---|---|---|
| 48 | 5-Year | | | |
| 49 | Rainfall Duration & Frequency | Rainfall (in) | | |
| 50 | P(5 year, 10 minutes) | =($B$42*$B$32)+($C$42*$B$36) | | |
| 51 | P(5 year, 15 minutes) | =($B$42*$B$33)+($C$42*$B$37) | | |
| 52 | P(5 year, 30 minutes) | =($B$42*$B$34)+($C$42*$B$38) | | |
| 53 | P(5 year, 1 hour) | =($B$42*$B$11)+($C$42*$B$15) | | |
| 54 | P(5 year, 2 hour) | =($B$42*$B$12)+($C$42*$B$16) | | |
| 55 | P(5 year, 3 hour) | =($B$42*$B$13)+($C$42*$B$17) | | |
| 56 | P(5 year, 6 hour) | =($B$42*$B$5)+($C$42*$B$7) | | |
| 57 | P(5 year, 12 hour) | =($B$42*$B$14)+($C$42*$B$18) | | |
| 58 | P(5 year, 24 hour) | =($B$42*$B$6)+($C$42*$B$8) | | |
| 59 | | | | |
| 60 | 10-Year | | | |
| 61 | Rainfall Duration & Frequency | Rainfall (in) | | |
| 62 | P(10 year, 10 minutes) | =($B$43*$B$32)+($C$43*$B$36) | | |
| 63 | P(10 year, 15 minutes) | =($B$43*$B$33)+($C$43*$B$37) | | |
| 64 | P(10 year, 30 minutes) | =($B$43*$B$34)+($C$43*$B$38) | | |
| 65 | P(10 year, 1 hour) | =($B$43*$B$11)+($C$43*$B$15) | | |
| 66 | P(10 year, 2 hour) | =($B$43*$B$12)+($C$43*$B$16) | | |
| 67 | P(10 year, 3 hour) | =($B$43*$B$13)+($C$43*$B$17) | | |
| 68 | P(10 year, 6 hour) | =($B$43*$B$5)+($C$43*$B$7) | | |
| 69 | P(10 year, 12 hour) | =($B$43*$B$14)+($C$43*$B$18) | | |
| 70 | P(10 year, 24 hour) | =($B$43*$B$6)+($C$43*$B$8) | | |
| 71 | | | | |
| 72 | 50-Year | | | |
| 73 | Rainfall Duration & Frequency | Rainfall (in) | | |
| 74 | P(50 year, 10 minutes) | =($B$44*$B$32)+($C$44*$B$36) | | |
| 75 | P(50 year, 15 minutes) | =($B$44*$B$33)+($C$44*$B$37) | | |
| 76 | P(50 year, 30 minutes) | =($B$44*$B$34)+($C$44*$B$38) | | |
| 77 | P(50 year, 1 hour) | =($B$44*$B$11)+($C$44*$B$15) | | |
| 78 | P(50 year, 2 hour) | =($B$44*$B$12)+($C$44*$B$16) | | |
| 79 | P(50 year, 3 hour) | =($B$44*$B$13)+($C$44*$B$17) | | |
| 80 | P(50 year, 6 hour) | =($B$44*$B$5)+($C$44*$B$7) | | |
| 81 | P(50 year, 12 hour) | =($B$44*$B$14)+($C$44*$B$18) | | |
| 82 | P(50- year, 24 hour) | =($B$44*$B$6)+($C$44*$B$8) | | |
| 83 | | | | |
| 84 | 100-Year | | | |
| 85 | Rainfall Duration & Frequency | Rainfall (in) | | |
| 86 | P(100 year, 10 minutes) | =$B$36 | | |
| 87 | P(100 year, 15 minutes) | =$B$37 | | |
| 88 | P(100 year, 30 minutes) | =$B$38 | | |
| 89 | P(100 year, 1 hour) | =$B$15 | | |
| 90 | P(100 year, 2 hour) | =$B$16 | | |
| 91 | P(100 year, 3 hour) | =$B$17 | | |
| 92 | P(100 year, 6 hour) | =$B$7 | | |
| 93 | P(100 year, 12 hour) | =$B$18 | | |
| 94 | P(100 year, 24 hour) | =$B$8 | | |
| 95 | | | | |
| 96 | 500-Year | | | |
| 97 | Rainfall Duration & Frequency | Rainfall (in) | | |
| 98 | P(500 year, 10 minutes) | =($B$45*$B$32)+($C$45*$B$36) | | |
| 99 | P(500 year, 15 minutes) | =($B$45*$B$33)+($C$45*$B$37) | | |
| 100 | P(500 year, 30 minutes) | =($B$45*$B$34)+($C$45*$B$38) | | |
| 101 | P(500 year, 1 hour) | =($B$45*$B$11)+($C$45*$B$15) | | |
| 102 | P(500 year, 2 hour) | =($B$45*$B$12)+($C$45*$B$16) | | |
| 103 | P(500 year, 3 hour) | =($B$45*$B$13)+($C$45*$B$17) | | |
| 104 | P(500 year, 6 hour) | =($B$45*$B$5)+($C$45*$B$7) | | |
| 105 | P(500 year, 12 hour) | =($B$45*$B$14)+($C$45*$B$18) | | |
| 106 | P(500 year, 24 hour) | =($B$45*$B$6)+($C$45*$B$8) | | |

## Estimation of 200-Year Rainfall Depth for Various Durations

| Duration | Slope[1] | Intercept[1] | Return Frequency (year) | Rainfall Depth (inches) |
|---|---|---|---|---|
| 10 minutes | 0.1389 | 0.4351 | 200 | =F5*LN(H5)+G5 |
| 15 minutes | 0.1861 | 0.5215 | 200 | =F6*LN(H6)+G6 |
| 30 minutes | 0.257 | 0.6849 | 200 | =F7*LN(H7)+G7 |
| 1-hour | 0.327 | 0.8293 | 200 | =F8*LN(H8)+G8 |
| 2-hour | 0.3763 | 0.8978 | 200 | =F9*LN(H9)+G9 |
| 3-hour | 0.4092 | 0.9436 | 200 | =F10*LN(H10)+G10 |
| 6-hour | 0.471 | 1.03 | 200 | =F11*LN(H11)+G11 |
| 12-hour | 0.5638 | 1.1043 | 200 | =F12*LN(H12)+G12 |
| 24-hour | 0.656 | 1.178 | 200 | =F13*LN(H13)+G13 |

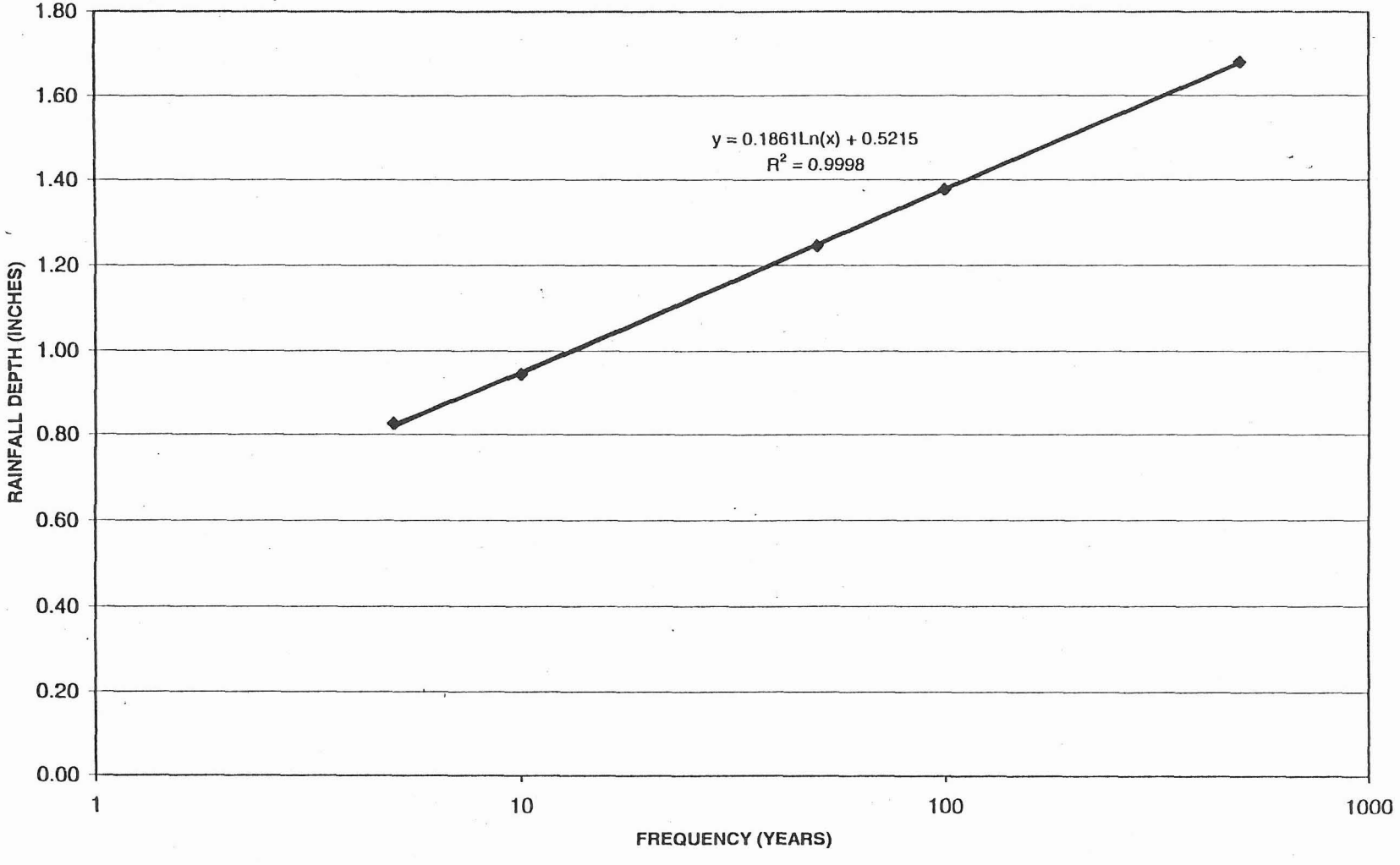
1) Slope and intercept values for a 200-year storm for different duration are extracted from Figure 1-9 attached with this calculation package (Please See Attached Pages 10-18).

**Figure 1**
**DEPTH-FREQUENCY CURVE FOR A 10-MINUTE DURATION AT WHITE TANK FRS No. 3 STRUCTURE**
**(Semi-Log)**



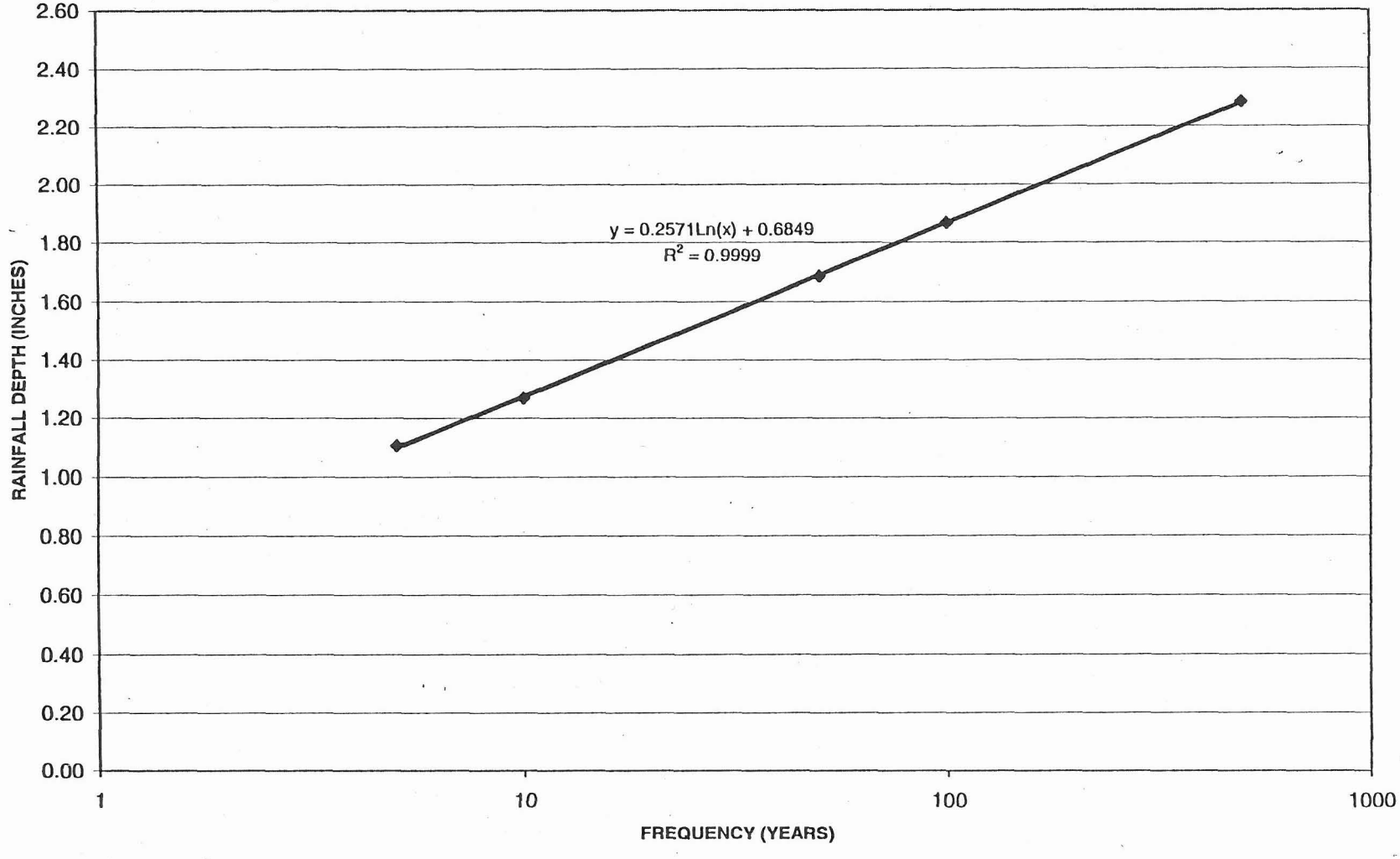

P:\\FCDMC\23443698 White Tanks\Hydrology and Hydraulics\Hydrology\Hydrology Report\Calculation Packages\200 500 Year Rainfall\Rainfall Estimation for 200 and 500-year at FRS #3

## Figure 2
## DEPTH-FREQUENCY CURVE FOR A 15-MINUTE DURATION AT WHITE TANK FRS No. 3 STRUCTURE
## (Semi-Log)




P:\\FCDMC\23443698 White Tanks\Hydrology and Hydraulics\Hydrology\Hydrology Report\Calculation Packages\200 500 Year Rainfall\Rainfall Estimation for 200 and 500-year at FRS #3

## Figure 3
## DEPTH-FREQUENCY CURVE FOR A 30-MINUTE DURATION AT WHITE TANK FRS No. 3 STRUCTURE
## (Semi-Log)




P:\\FCDMC\23443698 White Tanks\Hydrology and Hydraulics\Hydrology\Hydrology Report\Calculation Packages\200 500 Year Rainfall\Rainfall Estimation for 200 and 500-year at FRS #3

## Figure 4
## DEPTH-FREQUENCY CURVE FOR A 1-HOUR DURATION AT WHITE TANK FRS No. 3 STRUCTURE (Semi-Log)

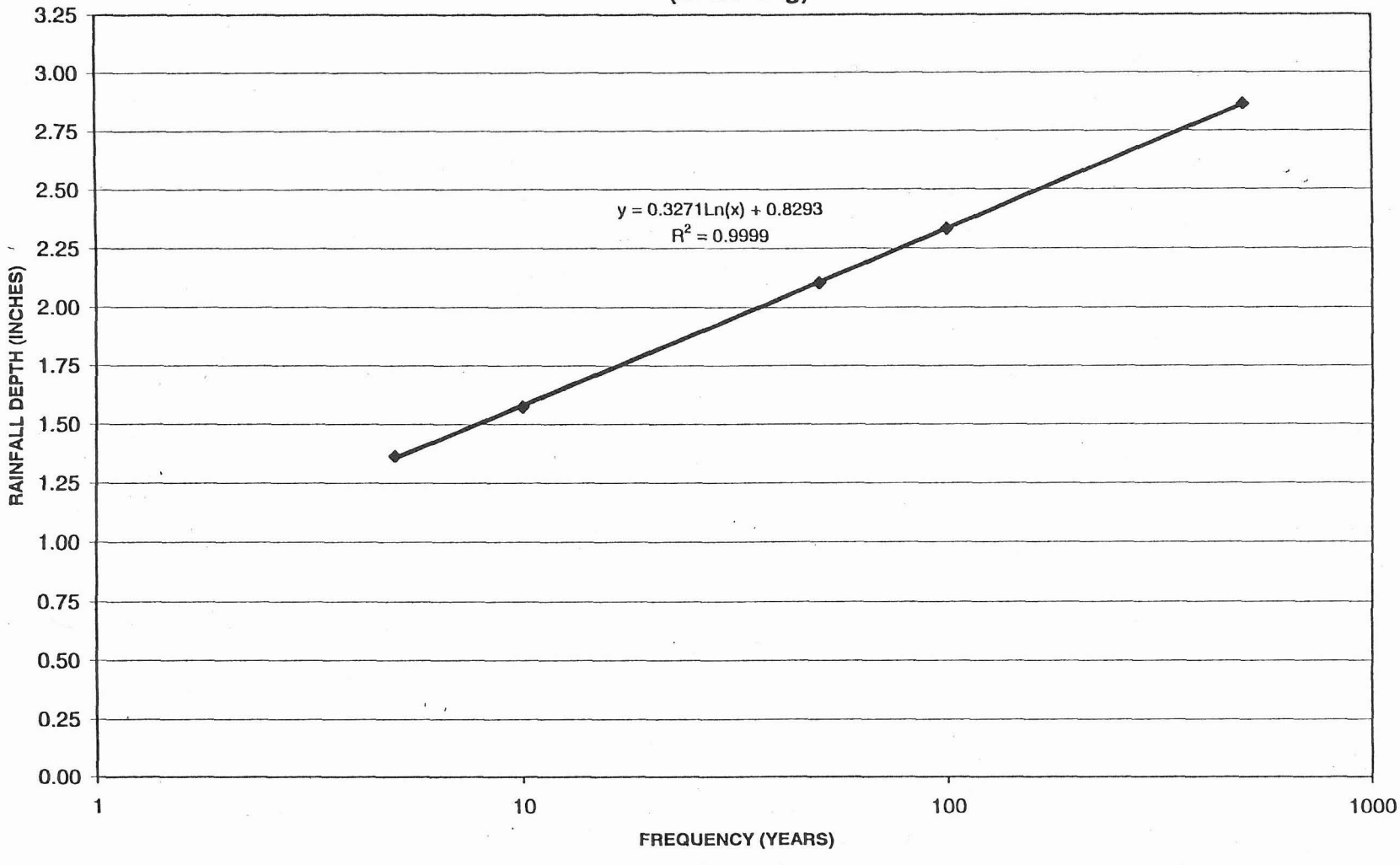
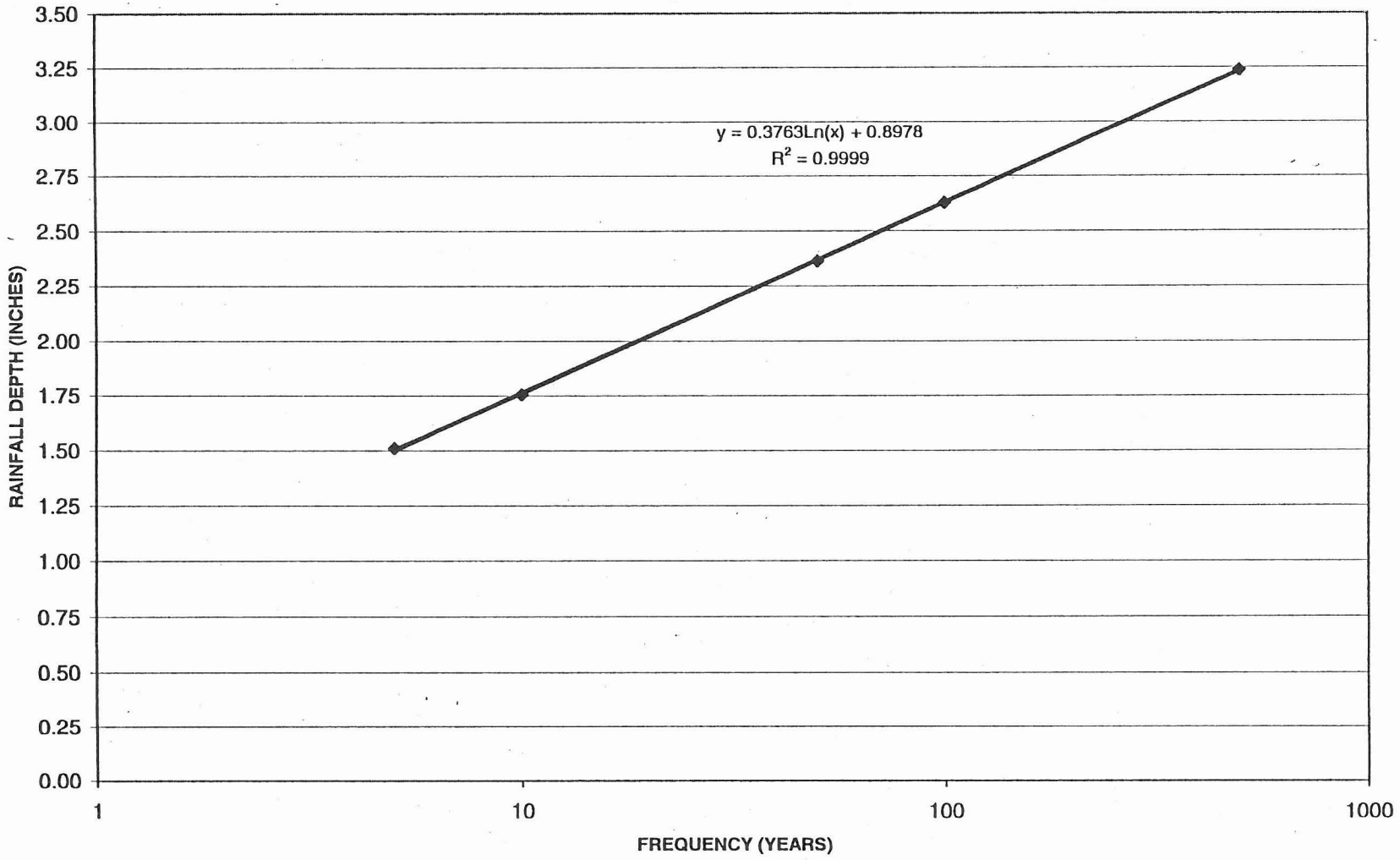
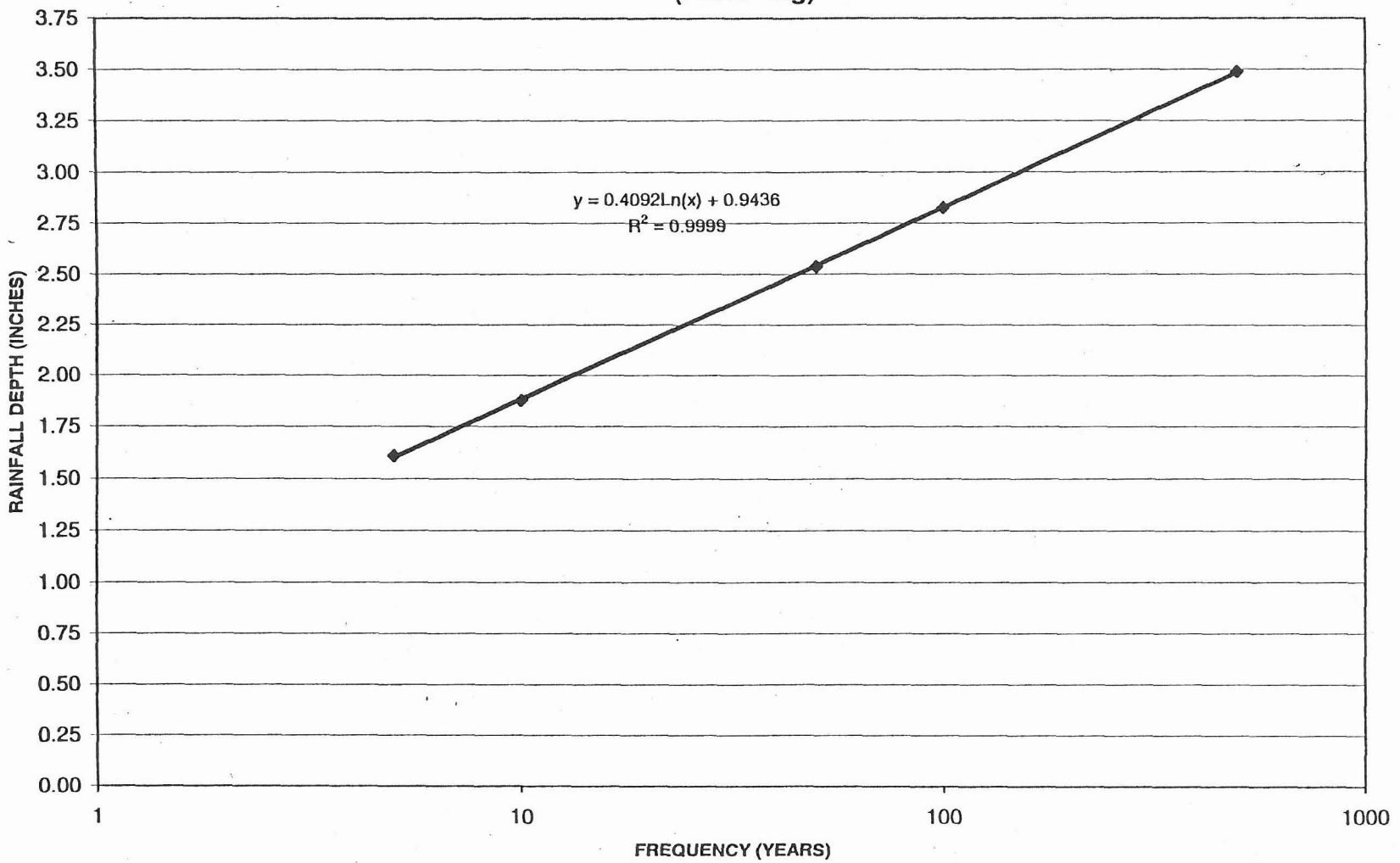


**Figure 5**
**DEPTH-FREQUENCY CURVE FOR A 2-HOUR DURATION AT WHITE TANK FRS No. 3 STRUCTURE (Semi-Log)**



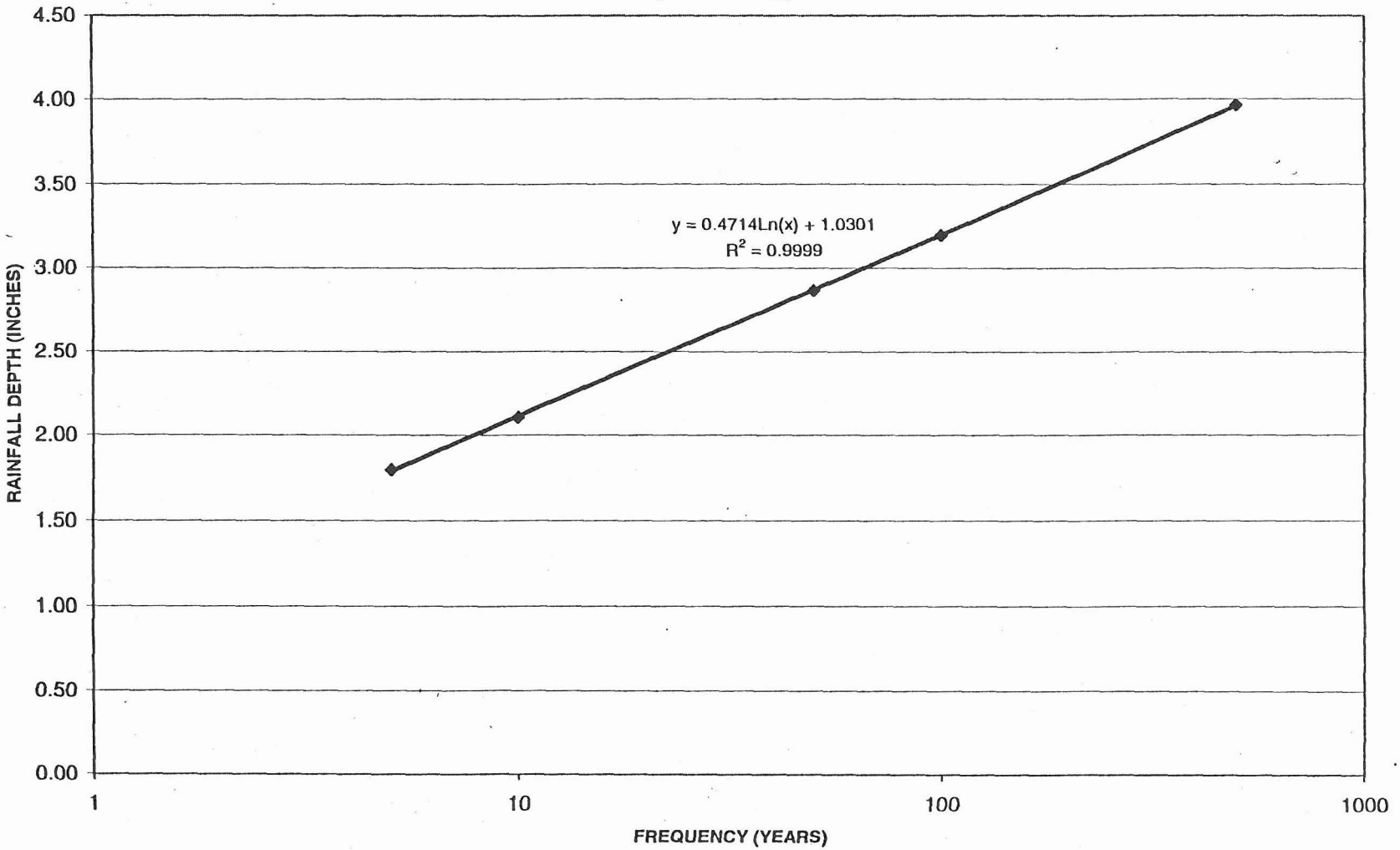

P:\\FCDMC\23443698 White Tanks\Hydrology and Hydraulics\Hydrology\Hydrology Report\Calculation Packages\200 500 Year Rainfall\Rainfall Estimation for 200 and 500-year at FRS #3

## Figure 6
## DEPTH-FREQUENCY CURVE FOR A 3-HOUR DURATION AT WHITE TANK FRS No. 3 STRUCTURE
## (Semi-Log)



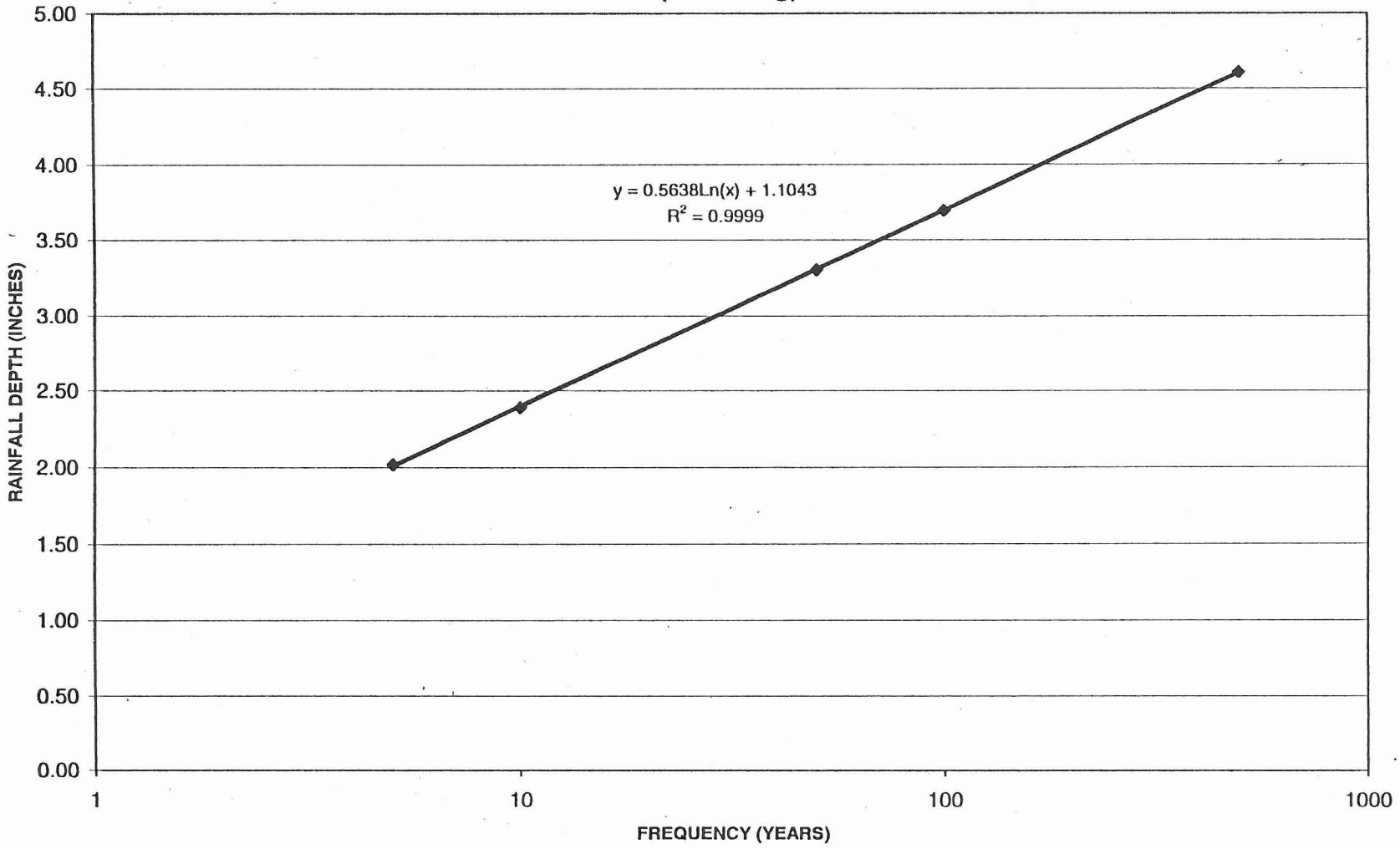

P:\\FCDMC\23443698 White Tanks\Hydrology and Hydraulics\Hydrology\Hydrology Report\Calculation Packages\200 500 Year Rainfall\Rainfall Estimation for 200 and 500-year at FRS #3

## Figure 7
## DEPTH-FREQUENCY CURVE FOR A 6-HOUR DURATION AT WHITE TANK FRS No. 3 STRUCTURE (Semi-Log)



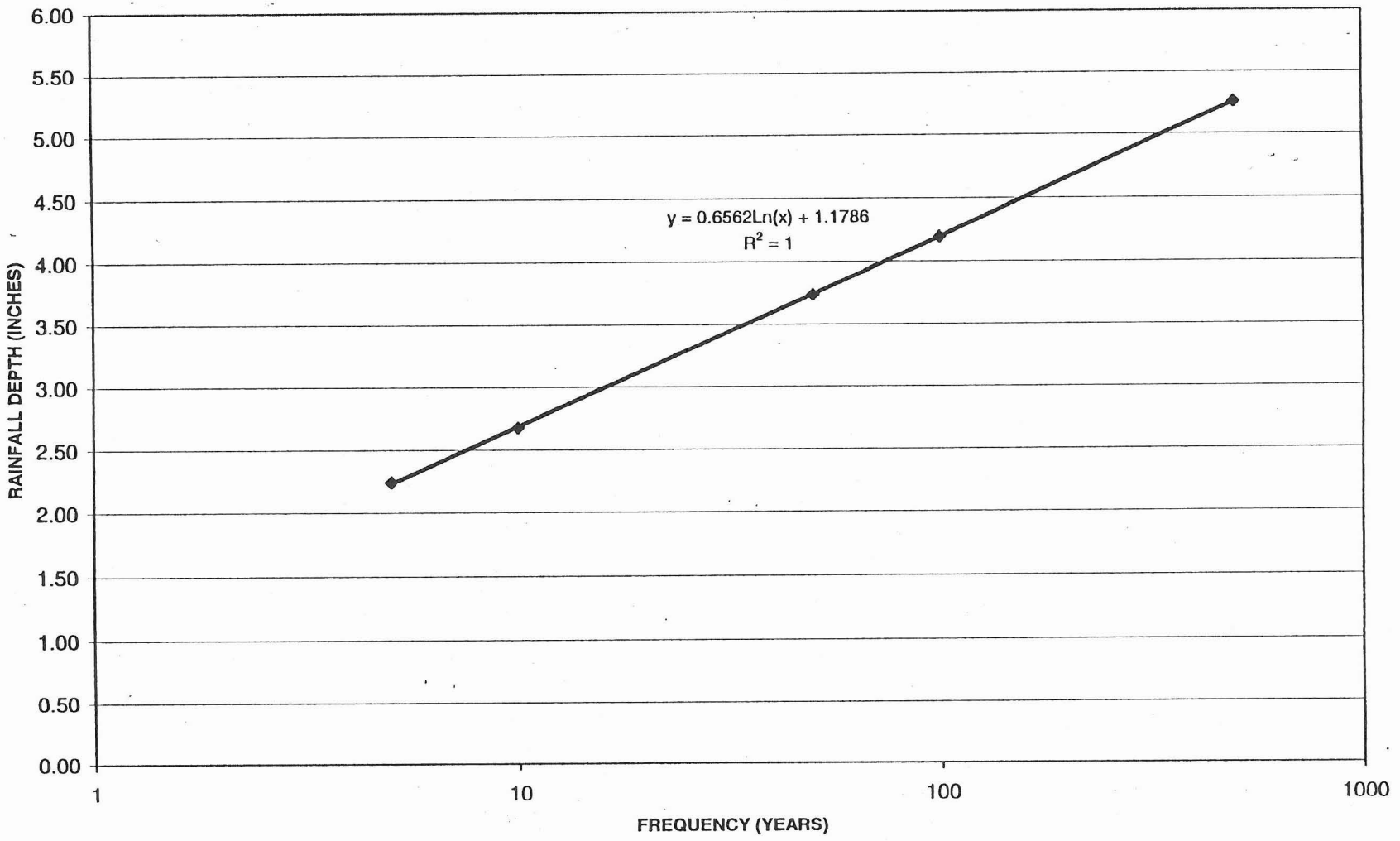

P:\\FCDMC\23443698 White Tanks\Hydrology and Hydraulics\Hydrology\Hydrology Report\Calculation Packages\200 500 Year Rainfall\Rainfall Estimation for 200 and 500-year at FRS #3

## Figure 8
## DEPTH-FREQUENCY CURVE FOR A 12-HOUR DURATION AT WHITE TANK FRS No. 3 STRUCTURE
## (Semi-Log)




P:\\FCDMC\23443698 White Tanks\Hydrology and Hydraulics\Hydrology\Hydrology Report\Calculation Packages\200 500 Year Rainfall\Rainfall Estimation for 200 and 500-year at FRS #3

**Figure 9**
**DEPTH-FREQUENCY CURVE FOR A 24-HOUR DURATION AT WHITE TANK FRS No. 3 STRUCTURE**
**(Semi-Log)**




P:\\FCDMC\23443698 White Tanks\Hydrology and Hydraulics\Hydrology\Hydrology Report\Calculation Packages\200 500 Year Rainfall\Rainfall Estimation for 200 and 500-year at FRS #3

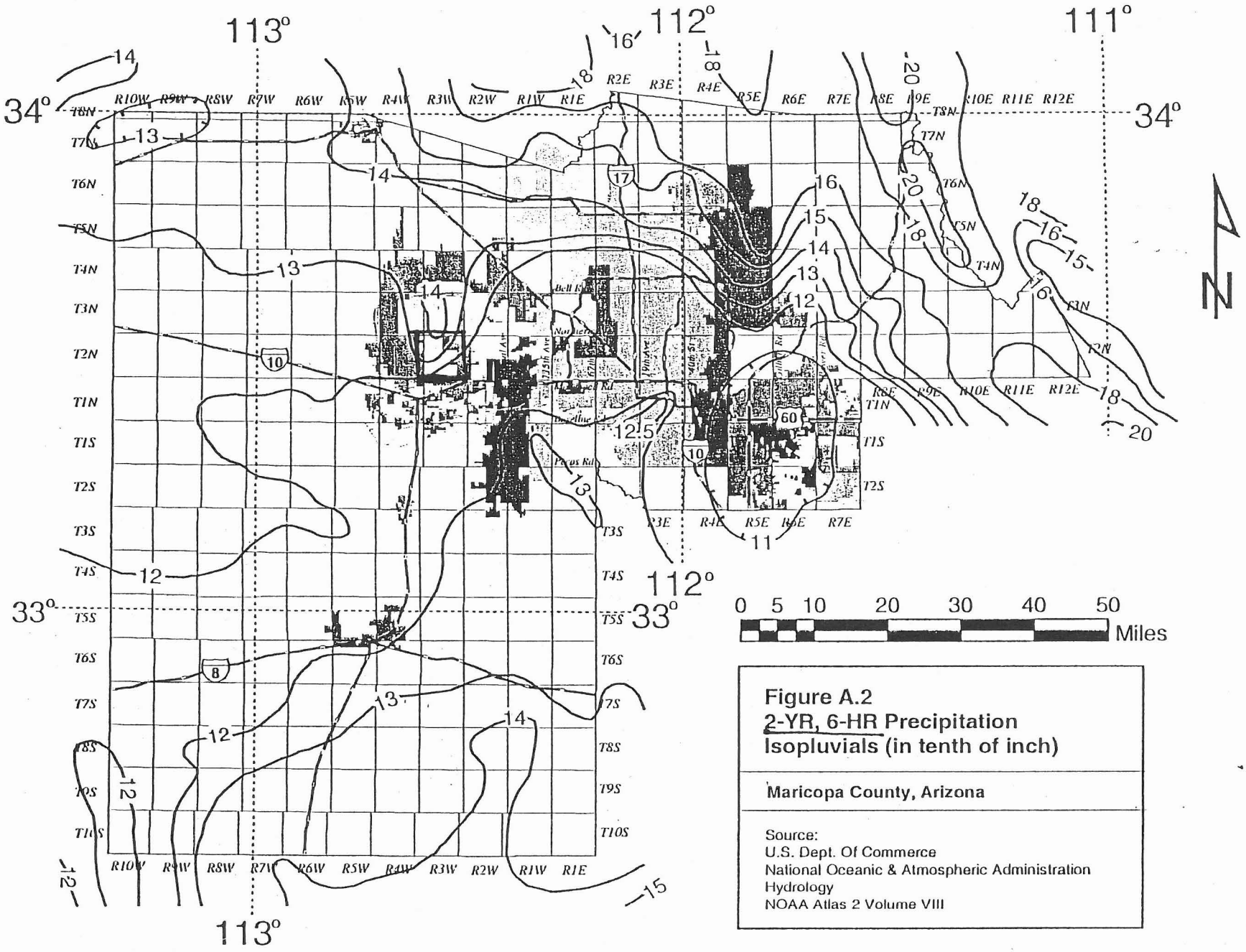



**Figure A.2**
**2-YR, 6-HR Precipitation Isopluvials (in tenth of inch)**

**Maricopa County, Arizona**

Source:
U.S. Dept. Of Commerce
National Oceanic & Atmospheric Administration
Hydrology
NOAA Atlas 2 Volume VIII

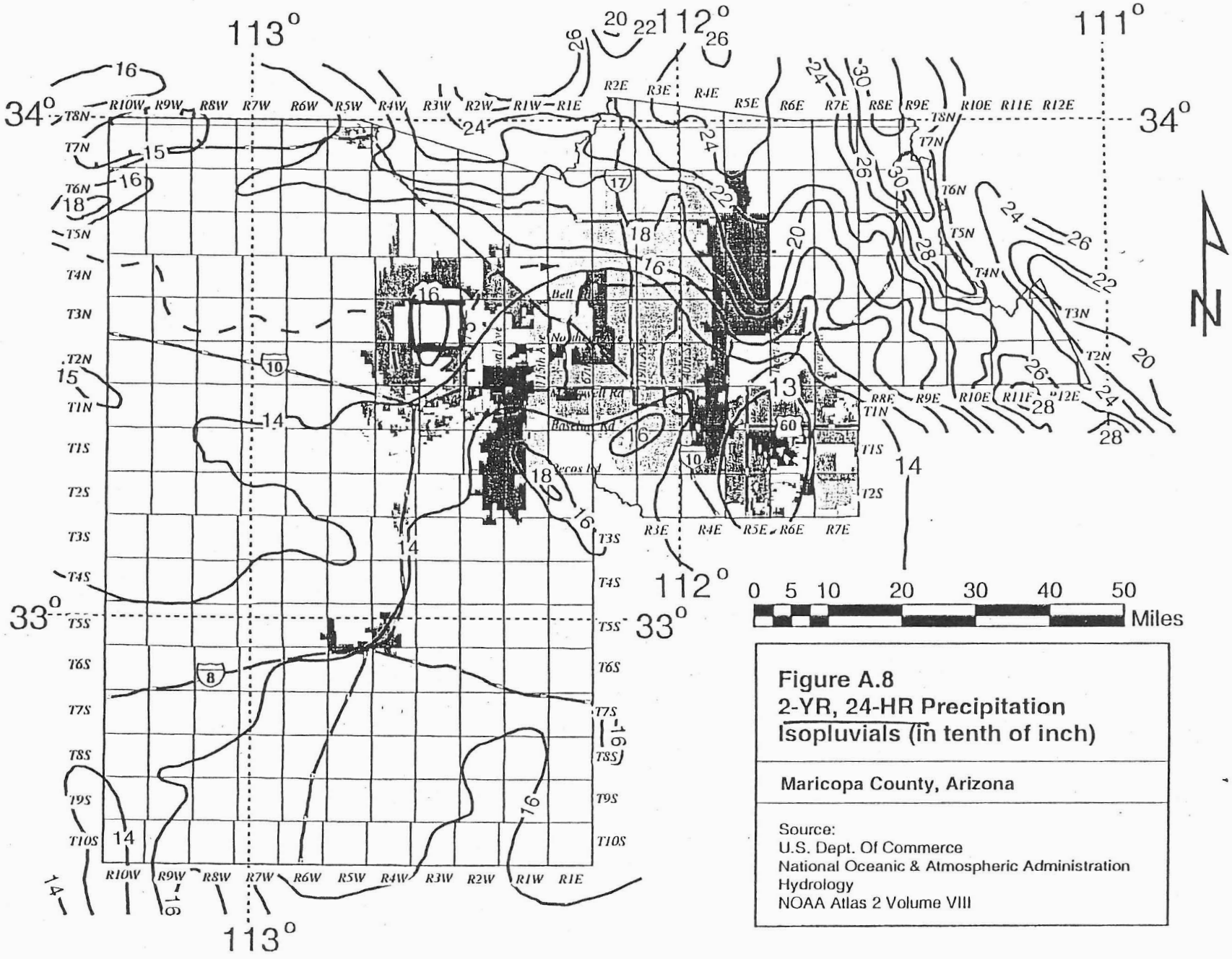



**Figure A.8**
**2-YR, 24-HR Precipitation**
**Isopluvials (in tenth of inch)**

**Maricopa County, Arizona**

Source:
U.S. Dept. Of Commerce
National Oceanic & Atmospheric Administration
Hydrology
NOAA Atlas 2 Volume VIII

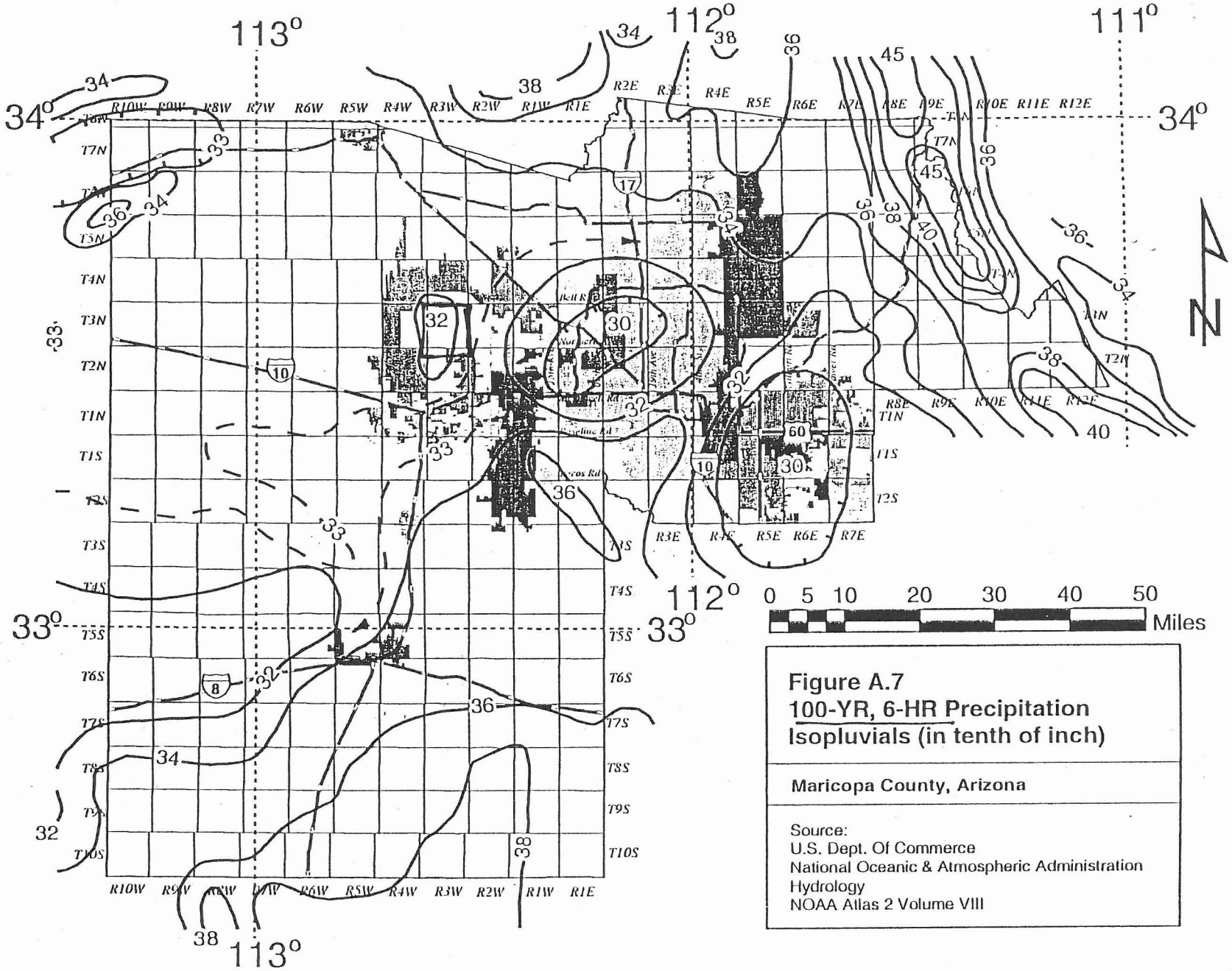



**Figure A.7**
**100-YR, 6-HR Precipitation**
**Isopluvials (in tenth of inch)**

**Maricopa County, Arizona**

Source:
U.S. Dept. Of Commerce
National Oceanic & Atmospheric Administration
Hydrology
NOAA Atlas 2 Volume VIII

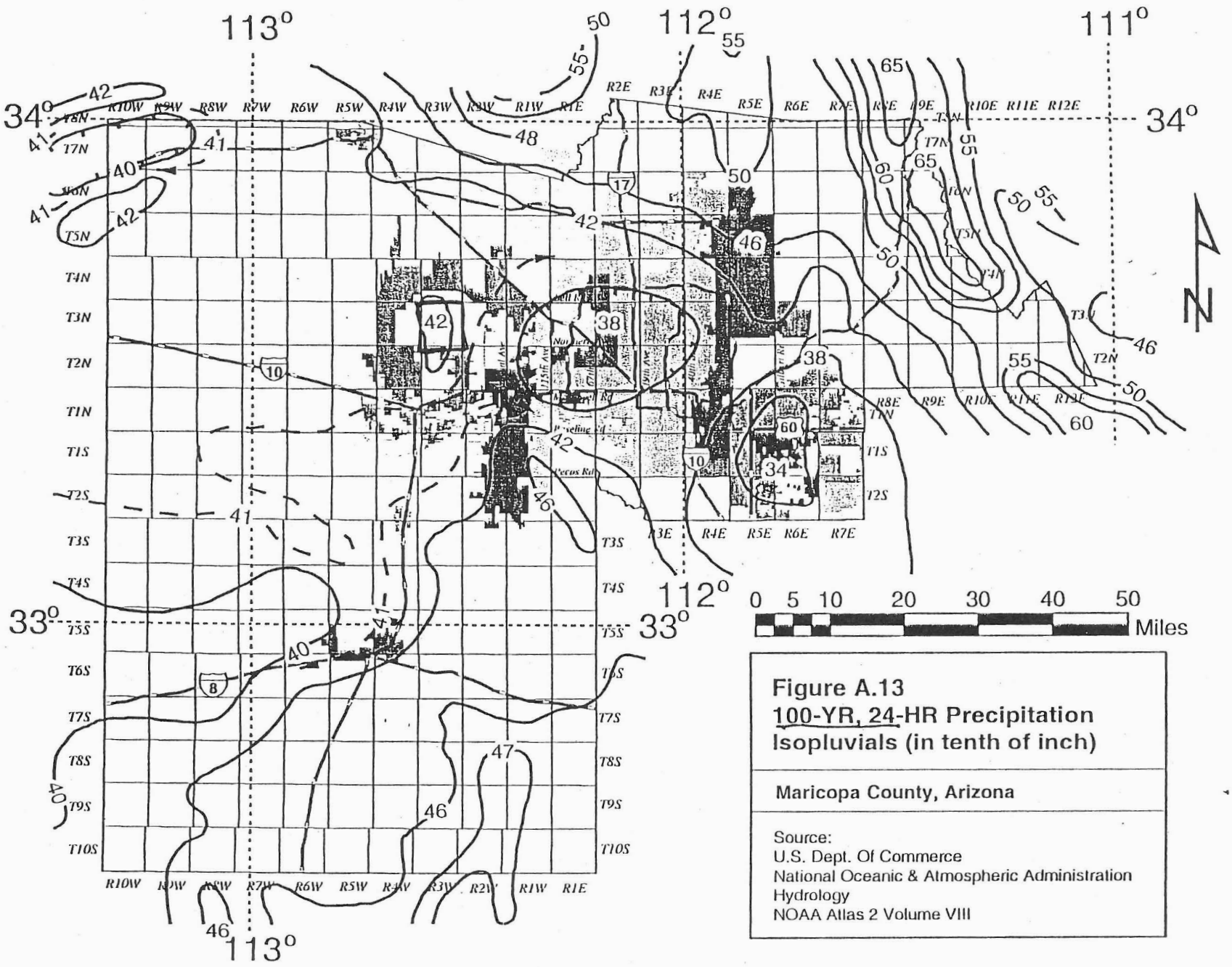



**Figure A.13**
**100-YR, 24-HR Precipitation Isopluvials (in tenth of inch)**

**Maricopa County, Arizona**

Source:
U.S. Dept. Of Commerce
National Oceanic & Atmospheric Administration
Hydrology
NOAA Atlas 2 Volume VIII



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ARIZONA DEPARTMENT OF TRANSPORTATION

REPORT NUMBER: FHWA-AZ93-281

# HIGHWAY DRAINAGE DESIGN MANUAL HYDROLOGY

Final Report

Prepared by:
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1351 East 141st Avenue
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March, 1993

Prepared for:
Arizona Department of Transportation
206 South 17th Avenue
Phoenix, Arizona 85007
in cooperation with

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# ARIZONA DEPARTMENT OF TRANSPORTATION
# HYDROLOGIC DESIGN DATA

Project No. _____ TRACS No. _____
Project Name _____ Date _____
Location/Station _____
Designer _____ Checker _____

FIGURE 1-2 Sheet 1 of 4
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET

## PART A

Determine rainfall depths from the isopluvial maps (Appendix B):

| | | |
|---|---|---|
| 2-year, 6-hour | | $P_{2,6'}$ = 1.35 |
| 2-year, 24-hour | | $P_{2,24'}$ = 1.60 |
| 100-year, 6-hour | | $P_{100,6'}$ = 3.20 |
| 100-year, 24-hour | | $P_{100,24'}$ = 4.20 |

## PART B

Compute the following:

| | | |
|---|---|---|
| 2-year, 1-hour | $-0.011 + \frac{.942\,(P_{2,6'})^2}{(P_{2,24'})} = -0.011 + \frac{.942\,(\quad)^2}{(\quad)}$ | $P_{2,1'}$ = _____ |
| 100-year, 1-hour | $.494 + \frac{.755\,(P_{100,6'})^2}{(P_{100,24'})} = .494 + \frac{.755\,(\quad)^2}{(\quad)}$ | $P_{100,1'}$ = _____ |
| 2-year, 2-hour | $.341(P_{2,5'}) + .659(P_{2,1'}) = .341(\quad) + .659(\quad)$ | $P_{2,2'}$ = _____ |
| 2-year, 3-hour | $.569(P_{2,5'}) + .431(P_{2,1'}) = .569(\quad) + .431(\quad)$ | $P_{2,3'}$ = _____ |
| 2-year, 12-hour | $.500(P_{2,5'}) + .500(P_{2,24'}) = .500(\quad) + .500(\quad)$ | $P_{2,12'}$ = _____ |
| 100-year, 2-hour | $.341(P_{100,5'}) + .659(P_{100,1'}) = .341(\quad) + .659(\quad)$ | $P_{100,2'}$ = _____ |
| 100-year, 3-hour | $.569(P_{100,5'}) + .431(P_{100,1'}) = .569(\quad) + .431(\quad)$ | $P_{100,3'}$ = _____ |
| 100-year, 12-hour | $.500(P_{100,5'}) + .500(P_{100,24'}) = .500(\quad) + .500(\quad)$ | $P_{100,12'}$ = _____ |

Note: 5" denotes 5 minutes, etc.; 1' denotes 1 hour, etc.

FIGURE 1-2



RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET
(Continued)

**PART C**

Determine the short-duration rainfall zone (Figure 1-1):

Zone = _____

Determine the short-duration rainfall ratios (Table 1-1):

| Duration (Minutes) | Ratio | |
|---|---|---|
| | 2-Year | 100-Year |
| 5 | A = _____ | E = _____ |
| 10 | B = _____ | F = _____ |
| 15 | C = _____ | G = _____ |
| 30 | D = _____ | H = _____ |

Compute the following:

| | | |
|---|---|---|
| 2-year, 5-min | (A) $(P_{2,1'})$ = ( ) ( ) | $P_{2,5'}$ = _____ |
| 2-year, 10-min | (B) $(P_{2,1'})$ = ( ) ( ) | $P_{2,10'}$ = _____ |
| 2-year, 15-min | (C) $(P_{2,1'})$ = ( ) ( ) | $P_{2,15'}$ = _____ |
| 2-year, 30-min | (D) $(P_{2,1'})$ = ( ) ( ) | $P_{2,30'}$ = _____ |
| 100-year, 5-min | (E) $(P_{100,1'})$ = ( ) ( ) | $P_{100,5'}$ = _____ |
| 100-year, 10-min | (F) $(P_{100,1'})$ = ( ) ( ) | $P_{100,10'}$ = _____ |
| 100-year, 15-min | (G) $(P_{100,1'})$ = ( ) ( ) | $P_{100,15'}$ = _____ |
| 100-year, 30-min | (H) $(P_{100,1'})$ = ( ) ( ) | $P_{100,30'}$ = _____ |

Note: 5' denotes 5 minutes, etc.; 1' denotes 1 hour, etc.

FIGURE 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET
(Continued)



**PART D**

For any flood frequency (T-yr) other than 2-year or 100-year, calculate the rainfall depth for each rainfall duration ($t$) by the following equation:

$$P_{T,t} = (X)(P_{2,t}) + (Y)(P_{100,t})$$

where X and Y for a selected frequency (T-yr) are:

| Frequency (T-yr) | X | Y |
|---|---|---|
| 5-year | .674 | .278 |
| 10-year | .496 | .449 |
| 25-year | .293 | .669 |
| 50-year | .146 | .835 |
| 500-year | -.337 | 1.381 |

Selected frequency (T-yr) = _____ X = _____ Y = _____

| | | |
|---|---|---|
| 5-min | $(X)(P_{2,5"}) + (Y)(P_{100,5"})$ = (  )(  ) + (  )(  ) | $P_{\_,5"}$ = _____ |
| 10-min | $(X)(P_{2,10"}) + (Y)(P_{100,10"})$ = (  )(  ) + (  )(  ) | $P_{\_,10"}$ = _____ |
| 15-min | $(X)(P_{2,15"}) + (Y)(P_{100,15"})$ = (  )(  ) + (  )(  ) | $P_{\_,15"}$ = _____ |
| 30-min | $(X)(P_{2,30"}) + (Y)(P_{100,30"})$ = (  )(  ) + (  )(  ) | $P_{\_,30"}$ = _____ |
| 1-hour | $(X)(P_{2,1'}) + (Y)(P_{100,1'})$ = (  )(  ) + (  )(  ) | $P_{\_,1'}$ = _____ |
| 2-hour | $(X)(P_{2,2'}) + (Y)(P_{100,2'})$ = (  )(  ) + (  )(  ) | $P_{\_,2'}$ = _____ |
| 3-hour | $(X)(P_{2,3'}) + (Y)(P_{100,3'})$ = (  )(  ) + (  )(  ) | $P_{\_,3'}$ = _____ |
| 6-hour | $(X)(P_{2,6'}) + (Y)(P_{100,6'})$ = (  )(  ) + (  )(  ) | $P_{\_,6'}$ = _____ |
| 12-hour | $(X)(P_{2,12'}) + (Y)(P_{100,12'})$ = (  )(  ) + (  )(  ) | $P_{\_,12'}$ = _____ |
| 24-hour | $(X)(P_{2,24'}) + (Y)(P_{100,24'})$ = (  )(  ) + (  )(  ) | $P_{\_,24'}$ = _____ |

Note: 5" denotes 5 minutes, etc.; 1' denotes 1 hour, etc.

FIGURE 1-2
RAINFALL DEPTH-DURATION-FREQUENCY (D-D-F) WORKSHEET
(Continued)



**PART E**

Tabulate the rainfall Depth-Duration-Frequency statistics below:

| Duration | Rainfall Depth, In Inches — Frequency, In Years | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2 | 5 | 10 | 25 | 50 | 100 | 500 |
| 5-min. | | | | | | | |
| 10-min.* | | | | | | | |
| 15-min. | | | | | | | |
| 30-min.* | | | | | | | |
| 1-hour | | | | | | | |
| 2-hour | | | | | | | |
| 3-hour | | | | | | | |
| 6-hour | | | | | | | |
| 12-hour | | | | | | | |
| 24-hour | | | | | | | |

* - Note: 10-min. and 30-min. values are not coded into the PH record.
5" denotes 5 minutes, etc.; 1' denotes 1 hour, etc.

# ARIZONA DEPARTMENT OF TRANSPORTATION
# HYDROLOGIC DESIGN DATA

Project No. _____ TRACS No. _____
Project Name _____ Date _____
Location/Station _____
Designer _____ Checker _____

## FIGURE 1-3
## RAINFALL INTENSITY-DURATION-FREQUENCY (I-D-F) WORKSHEET

Divide each rainfall depth from the D-D-F Worksheet (Figure 1-2 Part E) by each corresponding duration, in hours, and tabulate below:

| Duration | Rainfall Intensity, In Inches/Hour<br>Frequency, In Years | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2 | 5 | 10 | 25 | 50 | 100 | 500 |
| 5-min. | | | | | | | |
| 10-min. | | | | | | | |
| 15-min. | | | | | | | |
| 30-min. | | | | | | | |
| 1-hour | | | | | | | |
| 2-hour | | | | | | | |
| 3-hour | | | | | | | |
| 6-hour | | | | | | | |
| 12-hour | | | | | | | |
| 24-hour | | | | | | | |

Note: 5" denotes 5 minutes, etc.; 1' denotes 1 hour, etc.

# FIGURE 1-1

## SHORT-DURATION RAINFALL RATIO ZONES FOR ARIZONA

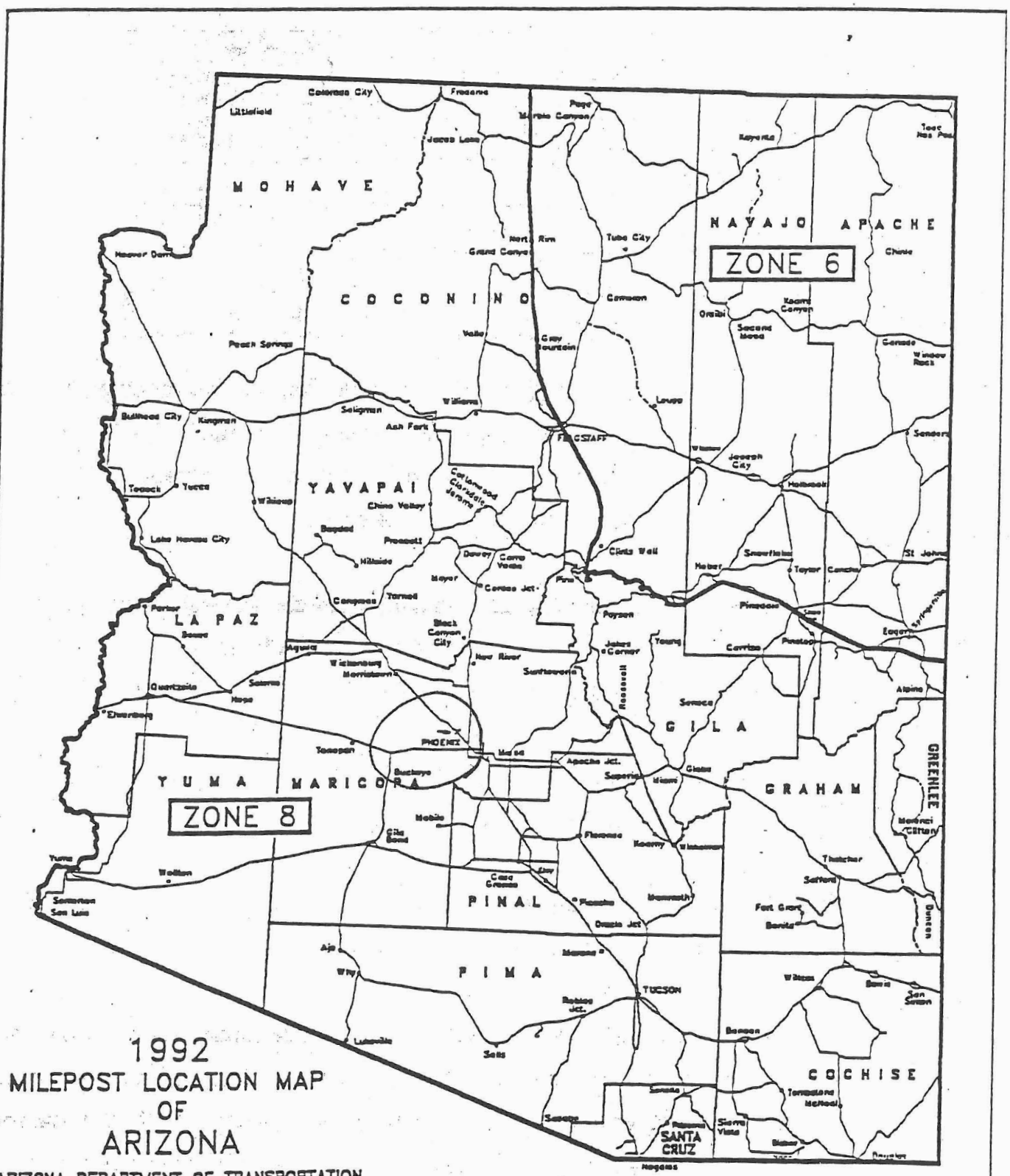


TABLE 1-1

SHORT DURATION RAINFALL RATIOS FOR ARIZONA
(Arkell and Richards, 1986)

| | RATIOS TO 1-HOUR RAINFALL DEPTH | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2-Year Return Period | | | | 100-Year Return Period | | | |
| | Duration, in minutes | | | | Duration, in minutes | | | |
| Zone | 5 | 10 | 15 | 30 | 5 | 10 | 15 | 30 |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| 6 | .35 | .54 | .65 | .83 | .32 | .50 | .62 | .81 |
| 8 | .34 | .51 | .62 | .82 | .30 | .46 | .59 | .80 |

A rainfall depth-duration-frequency (D-D-F) table must be developed prior to coding input in the PH record or developing a site-specific I-D-F graph. The D-D-F statistics can be calculated by use of the PREFRE Program (U.S. Bureau of Reclamation, 1988) or by the following procedure and equations:

1. Determine the following point rainfall depth-duration-frequency values for the watershed using the isopluvial maps in **Appendix B**:
   a. 2-year, 6-hour ($P_{2,\ 6'}$)
   b. 2-year, 24-hour ($P_{2,\ 24'}$)
   c. 100-year, 6-hour ($P_{100,\ 6'}$)
   d. 100-year, 24-hour ($P_{100,\ 24'}$)

Note: 5" denotes 5 minutes, etc.
1' denotes 1 hour, etc.

1. If the watershed is small or if there is little variation in the isopluvial lines for the drainage area, then the rainfall values can be taken from the isopluvial maps at the centroid of the watershed. If the watershed is large enough to indicate significant variation in rainfall depth throughout the watershed, calculate the area weighted rainfall values. Area-weighted rainfall values are calculated by laying a transparent

(1)

URS

# CALCULATION PACKAGE NO. C-7

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **RESERVOIR ROUTING OF 100-YEAR, 200-YEAR & 500-YEAR 24-HOUR HYDROGRAPHS FOR INTERIM PRINCIPAL SPILLWAY CONDITION**

Total Number of Pages (including cover sheet):

Total Number of Computer Runs:

Prepared by: Hammad Hussain Date: 08/12/04

Checked by: Todd Ringsmuth Date: 8-17-04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 4.
(TR-20 Modeling Schematic Map for White Tank FRS No. 3 has been added. See Page 6)

Calculation Approved by: Todd Ringsmuth 8-17-04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| 1 | A Schematic Plan of TR-20 Modeling Added | 3/1/05 |

Project Manager/Date

# RESERVOIR ROUTING OF 100-YEAR, 200-YEAR & 500-YEAR 24-HOUR HYDROGRAPHS FOR INTERIM PRINCIPAL SPILLWAY CONDITION

**(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)**
**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)**
**23443748**

## PROBLEM STATEMENT

This particular calculation package addresses the reservoir routing results for a 100-year, 200-year and 500-year 24-hour hydrographs for the **Interim Condition.**

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

## INTERIM CONDITION

The Interim Condition represents the time period following construction of the facilities included in the Remediation Project and the installation of the downstream conveyance channel. Since this time period is anticipated to be short (less than 10 years), it is assumed that no additional sediment has accumulated in the reservoir. The principal spillway is closed and does not convey flow out of the reservoir. Under this condition the only outflow from the reservoir occurs through infiltration and flow through the emergency spillway. The detailed calculations involved in estimating the infiltration rates for the Interim condition are provided in a separate calculation package.

Given that the Interim Condition was assumed a short period following construction of the dam and prior to construction of a dedicated downstream conveyance, the routing for the Interim Condition was performed based on the current topographic condition in the reservoir (i.e., no additional sediment). Therefore, the Antecedent Reservoir Condition (ARC) for the reservoir routing under the interim condition is the invert elevation of the proposed gated outlet or at elevation 1197.0 ft (NAVD 88). Please also note that a schematic map for TR-20 modeling is included in this calculation package ( See page 6)

100-year 24-hour hydrograph was developed by NRCS in its 1998 study. URS updated TR-20 model for 100-year 24-hour hydrograph with an anticipation of future conditions at the request of Flood District.

## SPECIAL NOTE ABOUT 200-YR AND 500-YR 24-HR HYDROGRAPHS

NRCS did not develop 200-year and 500-year 24-hour models in its 1998 hydrologic/hydraulic study of the White Tank FRS No. 3 Watershed. URS developed TR-20 models for 200-year and 500-year 24-hour storms with an anticipation of future conditions at the request of Flood District. The methodology

involved in developing 200-year and 500-year 24-hour rainfall and all relevant computations are provided in a separate calculation package. It should be noted that the 200-year and 500-year 24-hour rainfall depths were found to be equal to 4.65 and 5.26 inches. However, given the fact that NRCS reduced the 100-year 24-hour rainfall amount for the aerial reduction purposes from 4.12 inches to 3.85 inches in its August 1998 report "*Hydrologic Analysis of the White Tank Mountains on FRS No. 3*", URS also decided to reduce the actual 200-year and 500-year 24-hour rainfall amounts (4.65 & 5.26 inches respectively) by the same factor. Therefore, instead of using the actual amount of 200-year and 500-year rainfall amount, a reduced rainfall amount of 4.28 and 4.84 inches was used for the routing purposes of 200-year and 500-year 24-hour storms.

A new elevation-storage curve for the White Tank FRS No. 3 was developed using the 2003 topographic map in combination with the modified 1998 topographic map, both of which were provided by the District. The new elevation-storage curve was based on 500 ac-ft of sediment storage for the 100-year sediment pool level. The infiltration rates were also estimated for the Interim condition. An elevation-spillway rating curve for the White Tank FRS No. 3 emergency spillway was also developed. The procedure and calculations involved in establishing new curve numbers, new elevation-spillway discharge rating curve, new infiltration numbers and new elevation-storage curve are provided in separate calculation packages.

Please also note that the URS used the same lag times (times of concentrations) as well as antecedent moisture condition (AMC) in developing 200-year and 500- year 24-hour models as used by NRCS for 100-year 24-hour model.

**DIVERSIONS**

The TR-20 models developed by NRCS included two diversions from the watershed. The diversions occur along the eastern edge of the watershed at Olive Avenue and Northern Avenue where a stormwater channel is restricted by culverts at the road crossings. The effect of the diversions is to reduce the peak flow and volume reaching the reservoir from the northern half of the watershed.

At Olive Avenue, flows greater than 4,100 cfs are diverted out of the watershed. At Northern Avenue, flows greater than 11,000 cfs are diverted out of the watershed. The base hydraulic calculations for these diversion estimates were not presented in the NRCS hydrologic report (NRCS 1998), nor were the flows out of the reservoir watershed quantified. However, in order to be consistent with 100-year 24-hour model, URS provided the same diversions for 200-year and 500-year 24-hour models also.

## ROUTING RESULTS

The ARC for the routing of 100-year, 200-year and 500-year 24-hour hydrographs for interim condition was set at the invert elevation of the proposed gated outlet, or elevation 1,197.0 ft (NAVD 88). The reservoir routing results i.e. ARC, peak inflows, peak outflows, and the maximum reservoir elevation for 100-year, 200-year and 500-year 24-hour hydrographs under Interim Condition are provided in Table 1 (Please See Page 5). The results indicated that 100-year and 200-yr 24-hr hydrograph would be contained within the reservoir with no spillage. 500-year 24-hour hydrograph would result in some spillage. (See Table 1 on Page 5).

The input file and the detailed output results of TR-20 modeling for reservoir routing of 100-year, 200-year and 500-year 24-hour hydrographs under interim condition are attached at the end of this calculation package.

# TABLE 1
# RESERVOIR ROUTING RESULTS FOR 100-YEAR, 200-YEAR & 500-YEAR 24-HR HYDROGRAPHS

## (INTERIM CONDITON)

| Storm Event | Inflow to White Tank FRS No.3 | | Outflow from White Tank FRS No.3 | | |
|---|---|---|---|---|---|
| | Precipitation (inches) | Peak Inflow (cfs) | Antecedent Reservoir Condition (ARC) | Peak Outflow (cfs) | Maximum Reservoir Elevation (NAVD 88) (ft) |
| 100-yr 24-hr | 3.85 | 11,750 | 1197.0 | 77.4[1] | 1210.1 |
| 200-yr 24-hr | 4.28 | 14,530 | 1197.0 | 83.1[1] | 1211.4 |
| 500-yr 24-hr | 4.84 | 17,782 | 1197.0 | 711.9 | 1212.2 |

Notes:

1) It should be noted that the peak out flow reflects the infiltration amount only.

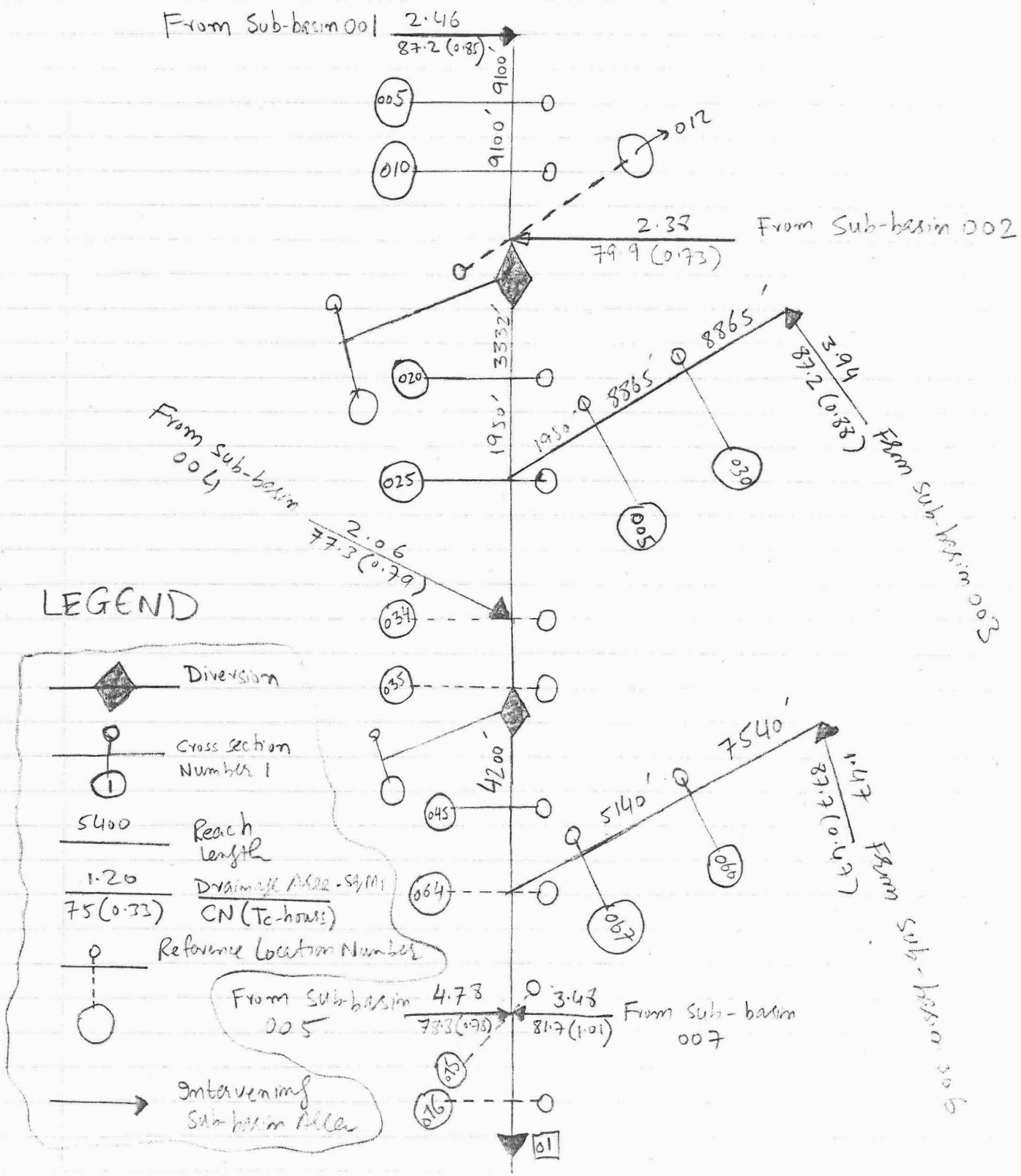
URS White Tanks FRS No. 3

DATE 6

PROJECT NO.

PAGE NO. ____ OF ____ BY ____

# TR-20 Schematic Map



100-yr 24-hr Modeling Results

(Interim Condition)

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20 WT100YR                          PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROUTING
TITLE     100-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spillway
 4 DIMHYD                .0556                                          WT3
 8          0.0          .03          .10          .19          .31
 8          .47          .66          .82          .93          .99
 8          1.0          .99          .93          .82          .66
 8          .47          .31          .03          .00          .00
 9 ENDTBL
 5 RAINFL 2              .1000                                          TYPE II
 8          .0000        .0010        .0020        .0030        .0041
 8          .0051        .0062        .0072        .0083        .0094
 8          .0105        .0116        .0127        .0138        .0150
 8          .0161        .0173        .0184        .0196        .0208
 8          .0220        .0232        .0244        .0257        .0269
 8          .0281        .0294        .0306        .0319        .0332
 8          .0345        .0358        .0371        .0384        .0398
 8          .0411        .0425        .0439        .0452        .0466
 8          .0480        .0494        .0508        .0523        .0538
 8          .0553        .0568        .0583        .0598        .0614
 8          .0630        .0646        .0662        .0679        .0696
 8          .0712        .0730        .0747        .0764        .0782
 8          .0800        .0818        .0836        .0855        .0874
 8          .0892        .0912        .0931        .0950        .0970
 8          .0990        .1010        .1030        .1051        .1072
 8          .1093        .1114        .1135        .1156        .1178
 8          .1200        .1222        .1246        .1270        .1296
 8          .1322        .1350        .1379        .1408        .1438
 8          .1470        .1502        .1534        .1566        .1598
 8          .1630        .1663        .1697        .1733        .1771
 8          .1810        .1851        .1895        .1941        .1989
 8          .2040        .2094        .2152        .2214        .2280
 8          .2350        .2427        .2513        .2609        .2715
 8          .2830        .3068        .3544        .4308        .5679
 8          .6630        .6820        .6986        .7130        .7252
 8          .7350        .7434        .7514        .7588        .7656
 8          .7720        .7780        .7836        .7890        .7942
 8          .7990        .8036        .8080        .8122        .8162
 8          .8200        .8237        .8273        .8308        .8342
 8          .8376        .8409        .8442        .8474        .8505
 8          .8535        .8565        .8594        .8622        .8649
 8          .8676        .8702        .8728        .8753        .8777
 8          .8800        .8823        .8845        .8868        .8890
 8          .8912        .8934        .8955        .8976        .8997
 8          .9018        .9038        .9058        .9078        .9097
 8          .9117        .9136        .9155        .9173        .9192
 8          .9210        .9228        .9245        .9263        .9280
 8          .9297        .9313        .9330        .9346        .9362
 8          .9377        .9393        .9408        .9423        .9438
 8          .9452        .9466        .9480        .9493        .9507
 8          .9520        .9533        .9546        .9559        .9572
 8          .9584        .9597        .9610        .9622        .9635
 8          .9647        .9660        .9672        .9685        .9697
 8          .9709        .9722        .9734        .9746        .9758
 8          .9770        .9782        .9794        .9806        .9818
 8          .9829        .9841        .9853        .9864        .9876
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8          .9887       .9899       .9910       .9922       .9933
 8          .9944       .9956       .9967       .9978       .9989
 8          1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         10.41                             BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.86        5.          4.39
 8                      2.01        50.         24.22
 8                      2.58        100.        40.12
 8                      3.46        200.        80.99
 8                      4.14        400.        129.44
 8                      5.16        800.        214.74
 8                      6.39        1600.       441.84
 8                      7.80        3200.       980.75
 8                      9.16        6400.       1891.44
 8                      10.41       12800.      3516.14
 8                      11.75       25600.      6548.98
 8                      13.26       51200.      11081.19
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
```

```
 8                       1.56        500.        203.28
 8                       2.30        1000.       302.00
 8                       3.38        2000.       449.24
 8                       4.97        4000.       673.73
 8                       6.23        6000.       855.96
 8                       7.31        8000.       1016.35
 8                       8.24        10000.      1158.51
 8                       9.09        12000.      1293.31
 8                       9.90        14000.      1425.57
 8                       10.64       16000.      1549.17
 8                       11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030         1.0         9.45                            BOSSCS#6
 8                       0.          0.0         0.0
 8                       0.77        5.          4.67
 8                       1.54        50.         32.06
 8                       1.78        100.        56.64
 8                       2.10        200.        100.59
 8                       2.50        400.        179.97
 8                       3.01        800.        320.25
 8                       3.63        1600.       589.66
 8                       4.35        3200.       1110.72
 8                       5.21        6400.       2084.48
 8                       6.03        12800.      4119.83
 8                       6.99        25600.      6856.75
 8                       8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045         1.0         4.87                            REACHA
 8                       0.          0.0         0.0
 8                       0.60        100.        85.69
 8                       0.90        200.        127.94
 8                       1.13        300.        161.93
 8                       1.52        500.        217.27
 8                       2.25        1000.       324.03
 8                       3.31        2000.       483.02
 8                       4.87        4000.       722.17
 8                       6.09        6000.       914.99
 8                       7.15        8000.       1084.61
 8                       8.05        10000.      1234.17
 8                       8.87        12000.      1373.80
 8                       9.64        14000.      1507.84
 8                       10.34       16000.      1633.45
 8                       11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060         1.0         4.7                             2CP6CP7
 8                       0.          0.0         0.0
 8                       2.36        100.        45.12
 8                       2.88        200.        83.75
 8                       3.18        300.        114.33
 8                       3.64        500.        172.72
 8                       4.42        1000.       289.04
 8                       5.40        2000.       470.72
 8                       6.87        4000.       782.74
 8                       7.91        6000.       1020.12
 8                       8.79        8000.       1231.25
 8                       9.60        10000.      1435.05
```

```
 8                       10.26       12000.      1618.34
 8                       10.94       14000.      1812.58
 8                       11.47       16000.      1983.46
 8                       11.96       18000.      2150.12
 9 ENDTBL
 2 XSECTN   067          1.0         8.77                                BOSSCS#5
 8                       0.          0.0         0.0
 8                       0.35        5.          5.56
 8                       1.03        50.         30.95
 8                       1.39        100.        52.16
 8                       1.94        200.        88.72
 8                       2.63        400.        148.61
 8                       3.51        800.        260.63
 8                       4.62        1600.       459.66
 8                       6.04        3200.       929.36
 8                       7.38        6400.       1811.51
 8                       8.77        12800.      3374.20
 8                       10.17       25600.      6398.87
 8                       11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT      01                                                        95/11/6
 8                       1178.0      0.00        0.0
 8                       1188.0      2.71        44.8
 8                       1193.0      7.29        129.0
 8                       1199.2      26.75       500.0
 8                       1202.0      38.68       845.55
 8                       1204.0      48.00       1176.28
 8                       1206.0      56.80       1575.25
 8                       1208.0      66.40       2044.97
 8                       1210.0      77.10       2593.40
 8                       1212.0      85.95       3218.00
 8                       1213.0      2685.00     3556.67
 8                       1214.0      8231.00     3916.02
 8                       1215.0      15545.0     4294.13
 8                       1216.0      24272.0     4692.68
 8                       1217.0      34212.0     5113.19
 8                       1218.0      45232.0     5556.01
 8                       1219.0      57233.0     6021.50
 8                       1220.0      70142.0     6509.75
 9 ENDTBL
 6 RUNOFF 1 001        1 2.46        87.2        0.85        1 1
 6 REACH  3 005   1    7 9100.                               1           BOSS#6
 6 REACH  3 010   7    2 9100.                               1           BOSS#4
 6 RUNOFF 1 002        3 2.38        79.9        0.73        1 1
 6 ADDHYD 4 012   2 3 1                                      1 1
 6 DIVERT 6 012   1 4 7 4100.       1.00        200.        1 1         OLIVE
 6 REACH  3 020   4    7 3332.                               1           REACH C
 6 REACH  3 025   7    5 1950.                               1           REACH B
 6 RUNOFF 1 003        6 3.94        87.2        0.88        1 1
 6 REACH  3 030   6    7 8865.                               1           BOSS#6
 6 REACH  3 005   7    1 8865.                               1           BOSS#5
 6 REACH  3 025   1    7 1950.                               1           REACH B
 6 RUNOFF 1 004        1 2.06        77.3        0.79        1 1
 6 ADDHYD 4 034   7 1 2                                      1 1
 6 ADDHYD 4 035   5 2 3                                      1 1
 6 DIVERT 6 035   3 4 7 11000.      1.00        199.        1 1         NORTHERN
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 REACH   3 045    4    5 4200.                                  1            REACH A
 6 RUNOFF  1 006         2 1.47          87.7          0.47      1 1
 6 REACH   3 060    2    3 7540.                                  1            CP6CP7
 6 REACH   3 067    3    4 5140.                                  1            BOSS#5
 6 ADDHYD  4 064    5 4  3                                        1 1
 6 RUNOFF  1 005         6 4.78          78.8          0.78      1 1
 6 RUNOFF  1 007         7 3.48          81.7          1.01      1 1
 6 ADDHYD  4 075    6 7  1                                        1 1
 6 ADDHYD  4 076    1 3  2                                        1 1       1
 6 RESVOR  2     01 2    1 1197.0                                 1 1       1
 ENDATA
 7 LIST                  1.0                          1.
 7 INCREM  6             0.15
 7 COMPUT  7 001       01 0.           3.85          1.0         2 1  01   01
   ENDCMP  1
 7 COMPUT  7 001       01 0.           3.85          1.0         2 2  02   01
   ENDCMP  1
   ENDJOB  2

**********END OF 80-80 LIST**********
```

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

```
EXECUTIVE CONTROL  LIST            1.          0.          1.

          LISTING OF CURRENT DATA


                     COMPUTED TIME INCREMENT
DIMHYD                           .0556

                  .0000       .0300       .1000       .1900       .3100
                  .4700       .6600       .8200       .9300       .9900
                 1.0000       .9900       .9300       .8200       .6600
                  .4700       .3100       .0300       .0000       .0000
ENDTBL

   COMPUTED PEAK RATE FACTOR =  664.607
```

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0017 | .0035 | .0052 | .0070 |
| .0087 | .0105 | .0122 | .0139 | .0157 |
| .0174 | .0192 | .0210 | .0227 | .0245 |
| .0262 | .0280 | .0297 | .0315 | .0332 |
| .0350 | .0368 | .0386 | .0404 | .0423 |
| .0442 | .0461 | .0480 | .0500 | .0520 |
| .0540 | .0561 | .0582 | .0603 | .0625 |
| .0647 | .0669 | .0691 | .0714 | .0737 |
| .0760 | .0784 | .0807 | .0831 | .0855 |
| .0878 | .0902 | .0926 | .0951 | .0975 |
| .1000 | .1024 | .1049 | .1073 | .1098 |
| .1123 | .1148 | .1174 | .1199 | .1225 |
| .1250 | .1276 | .1303 | .1332 | .1361 |
| .1391 | .1423 | .1456 | .1489 | .1524 |
| .1560 | .1597 | .1633 | .1671 | .1708 |
| .1746 | .1784 | .1823 | .1861 | .1901 |
| .1940 | .1982 | .2027 | .2077 | .2132 |
| .2190 | .2252 | .2318 | .2388 | .2462 |
| .2540 | .2623 | .2714 | .2812 | .2917 |
| .3030 | .3194 | .3454 | .3878 | .4632 |
| .5150 | .5322 | .5476 | .5612 | .5730 |
| .5830 | .5919 | .6003 | .6083 | .6159 |
| .6230 | .6298 | .6365 | .6430 | .6493 |
| .6555 | .6615 | .6674 | .6731 | .6786 |
| .6840 | .6892 | .6944 | .6995 | .7044 |
| .7092 | .7140 | .7186 | .7232 | .7276 |
| .7320 | .7362 | .7404 | .7444 | .7484 |
| .7523 | .7560 | .7596 | .7632 | .7667 |
| .7700 | .7733 | .7766 | .7798 | .7830 |
| .7862 | .7894 | .7926 | .7958 | .7989 |
| .8020 | .8051 | .8082 | .8112 | .8142 |
| .8173 | .8202 | .8232 | .8262 | .8291 |
| .8320 | .8349 | .8378 | .8406 | .8434 |
| .8462 | .8490 | .8518 | .8546 | .8573 |
| .8600 | .8627 | .8654 | .8680 | .8706 |
| .8733 | .8758 | .8784 | .8810 | .8835 |
| .8860 | .8885 | .8910 | .8934 | .8958 |
| .8982 | .9006 | .9030 | .9054 | .9077 |
| .9100 | .9123 | .9146 | .9168 | .9190 |
| .9212 | .9234 | .9256 | .9278 | .9299 |
| .9320 | .9341 | .9362 | .9382 | .9402 |
| .9423 | .9442 | .9462 | .9482 | .9501 |
| .9520 | .9539 | .9558 | .9576 | .9594 |
| .9613 | .9630 | .9648 | .9666 | .9683 |
| .9700 | .9717 | .9734 | .9750 | .9766 |
| .9783 | .9798 | .9814 | .9830 | .9845 |
| .9860 | .9875 | .9890 | .9904 | .9918 |
| .9933 | .9946 | .9960 | .9974 | .9987 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RUNOFF | 1 | | | 1 | 2.4600 | 87.2000 | .85001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 5 | 1 | | 7 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 10 | 7 | | 2 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 2 | | | 3 | 2.3800 | 79.9000 | .73001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 12 | 2 | 3 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 12 | 1 | 4 | 7 | 4100.0000 | 1.0000 | 200.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 20 | 4 | | 7 | 3332.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 7 | | 5 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 3 | | | 6 | 3.9400 | 87.2000 | .88001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 30 | 6 | | 7 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 5 | 7 | | 1 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 1 | | 7 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 4 | | | 1 | 2.0600 | 77.3000 | .79001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 34 | 7 | 1 | 2 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 35 | 5 | 2 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 35 | 3 | 4 | 7 | 11000.0000 | 1.0000 | 199.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 45 | 4 | | 5 | 4200.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 6 | | | 2 | 1.4700 | 87.7000 | .47001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 60 | 2 | | 3 | 7540.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 67 | 3 | | 4 | 5140.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| ADDHYD | 64 | 5 | 4 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 5 | | | 6 | 4.7800 | 78.8000 | .78001 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 7 | | | 7 | 3.4800 | 81.7000 | 1.01001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 75 | 6 | 7 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 76 | 1 | 3 | 2 | | | 1 | 1 | 0 | 0 | 1 | 1 |
| RESVOR | | 1 | 2 | 1 | 1197.0000 | | 1 | 1 | 0 | 0 | 1 | 1 |
| ENDATA | | | | | | | | | | | | |

END OF LISTING

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .150 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 3.85 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 1 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 1 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.40 | 1705.4 | |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .11 | .66 | 2.14 | 5.21 | 9.95 | 16.55 | 25.17 | 36.44 |
| 11.55 CFS | 53 | 93 | 223 | 594 | 1159 | 1622 | 1678 | 1323 |
| 12.75 CFS | 765 | 438 | 344 | 292 | 259 | 236 | 217 | 201 |
| 13.95 CFS | 187 | 175 | 164 | 154 | 146 | 140 | 136 | 132 |
| 15.15 CFS | 129 | 125 | 121 | 117 | 113 | 109 | 105 | 102 |
| 16.35 CFS | 98.10 | 94.78 | 92.50 | 90.97 | 89.66 | 88.22 | 86.72 | 85.20 |
| 17.55 CFS | 83.77 | 82.32 | 80.94 | 79.63 | 78.29 | 76.83 | 75.34 | 73.97 |
| 18.75 CFS | 72.45 | 71.01 | 69.58 | 68.03 | 66.64 | 65.23 | 63.78 | 62.23 |
| 19.95 CFS | 60.50 | 58.85 | 57.48 | 56.44 | 55.60 | 54.88 | 54.31 | 53.94 |
| 21.15 CFS | 53.61 | 53.49 | 53.30 | 53.14 | 52.97 | 52.77 | 52.42 | 52.05 |
| 22.35 CFS | 51.72 | 51.38 | 51.16 | 50.80 | 50.43 | 50.06 | 49.85 | 49.69 |
| 23.55 CFS | 49.47 | 49.33 | 49.13 | 48.76 | 46.52 | 40.20 | 28.38 | 15.34 |
| 24.75 CFS | 4.55 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 2289 CFS-HRS; 189.1 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.07 | 1008.9 | 3.80 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 2289 CFS-HRS; 189.1 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.72 | 733.5 | 4.99 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 2289 CFS-HRS; 189.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 899.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 2 | 49 | 246 | 612 | 875 | 850 | 576 |
| 12.75 CFS | 315 | 238 | 200 | 177 | 161 | 148 | 138 | 128 |
| 13.95 CFS | 120 | 113 | 106 | 100 | 96 | 93 | 91 | 89 |
| 15.15 CFS | 86.57 | 84.12 | 81.45 | 78.76 | 76.21 | 73.81 | 71.53 | 69.00 |
| 16.35 CFS | 66.47 | 64.57 | 63.46 | 62.71 | 61.85 | 60.87 | 59.94 | 58.99 |
| 17.55 CFS | 58.03 | 57.09 | 56.27 | 55.40 | 54.51 | 53.51 | 52.58 | 51.64 |
| 18.75 CFS | 50.61 | 49.68 | 48.65 | 47.65 | 46.71 | 45.73 | 44.80 | 43.64 |
| 19.95 CFS | 42.39 | 41.32 | 40.50 | 39.88 | 39.37 | 38.90 | 38.62 | 38.39 |
| 21.15 CFS | 38.27 | 38.18 | 38.08 | 38.02 | 37.90 | 37.75 | 37.51 | 37.26 |
| 22.35 CFS | 37.02 | 36.93 | 36.72 | 36.43 | 36.18 | 36.00 | 35.92 | 35.77 |
| 23.55 CFS | 35.73 | 35.58 | 35.44 | 35.04 | 33.04 | 26.18 | 16.04 | 6.40 |
| 24.75 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.84 WATERSHED INCHES; 1290 CFS-HRS; 106.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 914.7 | (NULL) |
| 13.68 | 867.8 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.40 CFS | 0 | 1 | 4 | 52 | 250 | 620 | 887 | 870 |
| 12.60 CFS | 612 | 393 | 404 | 501 | 637 | 762 | 840 | 867 |
| 13.80 CFS | 856 | 822 | 773 | 718 | 661 | 607 | 556 | 509 |
| 15.00 CFS | 467 | 428 | 393 | 362 | 335 | 311 | 290 | 272 |
| 16.20 CFS | 255 | 241 | 229 | 218 | 209 | 201 | 194 | 187 |
| 17.40 CFS | 180 | 174 | 169 | 164 | 160 | 156 | 152 | 149 |
| 18.60 CFS | 145 | 142 | 139 | 136 | 133 | 131 | 128 | 126 |
| 19.80 CFS | 123 | 120 | 117 | 115 | 113 | 111 | 109 | 107 |
| 21.00 CFS | 105 | 104 | 102 | 101 | 99 | 98 | 97 | 96 |
| 22.20 CFS | 94.68 | 93.70 | 92.98 | 92.22 | 91.43 | 90.72 | 90.11 | 89.62 |
| 23.40 CFS | 89.09 | 88.68 | 88.17 | 87.68 | 86.93 | 84.61 | 77.44 | 67.01 |
| 24.60 CFS | 57.09 | 50.42 | 50.03 | 49.24 | 47.55 | 44.69 | 40.69 | 36.01 |
| 25.80 CFS | 31.21 | 26.63 | 22.43 | 18.72 | 15.48 | 12.72 | 10.39 | 8.44 |
| 27.00 CFS | 6.83 | 5.51 | 4.43 | 3.54 | 2.83 | 2.26 | 1.79 | 1.42 |
| 28.20 CFS | 1.13 | .89 | .70 | .55 | .44 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 914.7 | (DIVERT) |
| 13.68 | 867.8 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.40 CFS | 0 | 1 | 4 | 52 | 250 | 620 | 887 | 870 |
| 12.60 CFS | 612 | 393 | 404 | 501 | 637 | 762 | 840 | 867 |
| 13.80 CFS | 856 | 822 | 773 | 718 | 661 | 607 | 556 | 509 |
| 15.00 CFS | 467 | 428 | 393 | 362 | 335 | 311 | 290 | 272 |
| 16.20 CFS | 255 | 241 | 229 | 218 | 209 | 201 | 194 | 187 |
| 17.40 CFS | 180 | 174 | 169 | 164 | 160 | 156 | 152 | 149 |
| 18.60 CFS | 145 | 142 | 139 | 136 | 133 | 131 | 128 | 126 |
| 19.80 CFS | 123 | 120 | 117 | 115 | 113 | 111 | 109 | 107 |
| 21.00 CFS | 105 | 104 | 102 | 101 | 99 | 98 | 97 | 96 |
| 22.20 CFS | 94.68 | 93.70 | 92.98 | 92.22 | 91.43 | 90.72 | 90.11 | 89.62 |
| 23.40 CFS | 89.09 | 88.68 | 88.17 | 87.68 | 86.93 | 84.61 | 77.44 | 67.01 |
| 24.60 CFS | 57.09 | 50.42 | 50.03 | 49.24 | 47.55 | 44.69 | 40.69 | 36.01 |
| 25.80 CFS | 31.21 | 26.63 | 22.43 | 18.72 | 15.48 | 12.72 | 10.39 | 8.44 |
| 27.00 CFS | 6.83 | 5.51 | 4.43 | 3.54 | 2.83 | 2.26 | 1.79 | 1.42 |
| 28.20 CFS | 1.13 | .89 | .70 | .55 | .44 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
138 CFS-HRS; 295.7 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.57 | 852.8 | 3.33 |
| 13.90 | 856.6 | 3.34 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.74 | 831.7 | 2.05 |
| 14.08 | 853.3 | 2.08 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 2671.2 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .17 | .94 | 3.21 | 7.75 | 15.01 | 25.35 | 38.68 | 56.91 |
| 11.55 CFS | 83 | 146 | 350 | 890 | 1742 | 2507 | 2652 | 2209 |
| 12.75 CFS | 1349 | 739 | 565 | 477 | 420 | 382 | 351 | 325 |
| 13.95 CFS | 303 | 282 | 264 | 248 | 236 | 226 | 219 | 213 |
| 15.15 CFS | 207 | 201 | 195 | 188 | 182 | 176 | 170 | 164 |
| 16.35 CFS | 158 | 153 | 149 | 146 | 144 | 142 | 139 | 137 |
| 17.55 CFS | 134 | 132 | 130 | 128 | 126 | 123 | 121 | 119 |
| 18.75 CFS | 116 | 114 | 112 | 109 | 107 | 105 | 102 | 100 |
| 19.95 CFS | 97.28 | 94.58 | 92.30 | 90.56 | 89.15 | 88.02 | 87.06 | 86.48 |
| 21.15 CFS | 85.94 | 85.68 | 85.41 | 85.12 | 84.87 | 84.56 | 84.01 | 83.41 |
| 22.35 CFS | 82.92 | 82.35 | 81.98 | 81.43 | 80.86 | 80.25 | 79.84 | 79.64 |
| 23.55 CFS | 79.27 | 79.04 | 78.72 | 78.08 | 74.68 | 65.35 | 47.59 | 27.26 |
| 24.75 CFS | 10.18 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.42 | 1395.2 | 3.47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 14.04 | 1007.9 | 3.80 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 14.22 | 1005.7 | 2.31 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 527.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 16 | 100 | 286 | 466 | 526 | 431 | 262 |
| 12.90 CFS | 177 | 149 | 130 | 118 | 109 | 101 | 94 | 89 |
| 14.10 CFS | 83.10 | 78.21 | 74.15 | 70.86 | 68.51 | 66.79 | 65.35 | 63.88 |
| 15.30 CFS | 62.22 | 60.38 | 58.46 | 56.65 | 54.91 | 53.22 | 51.44 | 49.63 |
| 16.50 CFS | 48.15 | 47.18 | 46.60 | 46.03 | 45.38 | 44.70 | 44.01 | 43.34 |
| 17.70 CFS | 42.67 | 42.05 | 41.44 | 40.79 | 40.08 | 39.40 | 38.72 | 37.97 |
| 18.90 CFS | 37.29 | 36.58 | 35.81 | 35.14 | 34.44 | 33.73 | 32.92 | 32.02 |
| 20.10 CFS | 31.19 | 30.53 | 30.04 | 29.64 | 29.31 | 29.07 | 28.91 | 28.79 |
| 21.30 CFS | 28.74 | 28.67 | 28.63 | 28.55 | 28.46 | 28.30 | 28.13 | 27.96 |
| 22.50 CFS | 27.83 | 27.73 | 27.55 | 27.37 | 27.21 | 27.13 | 27.07 | 26.99 |
| 23.70 CFS | 26.91 | 26.83 | 26.57 | 25.15 | 20.92 | 14.00 | 6.83 | 1.61 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.66 WATERSHED INCHES; 881 CFS-HRS; 72.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.44 | 535.4 | (NULL) |
| 14.19 | 1085.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 17 | 101 | 289 | 471 | 535 | 445 | 284 |
| 12.90 CFS | 217 | 233 | 306 | 444 | 625 | 809 | 954 | 1042 |
| 14.10 CFS | 1081 | 1083 | 1060 | 1020 | 970 | 914 | 856 | 798 |
| 15.30 CFS | 742 | 687 | 636 | 589 | 546 | 506 | 470 | 438 |
| 16.50 CFS | 409 | 384 | 362 | 342 | 324 | 307 | 292 | 279 |
| 17.70 CFS | 266 | 255 | 245 | 236 | 227 | 220 | 213 | 206 |
| 18.90 CFS | 201 | 195 | 190 | 185 | 181 | 177 | 173 | 169 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 20.10 CFS | 165 | 161 | 158 | 155 | 152 | 149 | 146 | 144 |
| 21.30 CFS | 141 | 139 | 136 | 134 | 131 | 129 | 127 | 125 |
| 22.50 CFS | 123 | 122 | 120 | 119 | 118 | 117 | 116 | 115 |
| 23.70 CFS | 114 | 113 | 112 | 110 | 105 | 98 | 90 | 84 |
| 24.90 CFS | 82.31 | 81.82 | 81.23 | 80.24 | 78.36 | 75.16 | 70.55 | 64.78 |
| 26.10 CFS | 58.47 | 52.07 | 45.88 | 40.08 | 34.76 | 29.96 | 25.69 | 21.94 |
| 27.30 CFS | 18.66 | 15.82 | 13.37 | 11.27 | 9.48 | 7.95 | 6.66 | 5.57 |
| 28.50 CFS | 4.65 | 3.88 | 3.23 | 2.69 | 2.23 | 1.85 | 1.54 | 1.27 |
| 29.70 CFS | 1.05 | .87 | .72 | .60 | .49 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.17 WATERSHED INCHES; 4547 CFS-HRS; 375.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.64 | 1189.0 | (NULL) |
| 14.14 | 1936.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | DRAINAGE AREA = 10.84 SQ.MI. | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 17 | 104 | 322 | 641 | 991 | 1182 | 1115 |
| 12.90 CFS | 915 | 735 | 739 | 917 | 1202 | 1506 | 1745 | 1884 |
| 14.10 CFS | 1934 | 1917 | 1855 | 1765 | 1660 | 1550 | 1440 | 1333 |
| 15.30 CFS | 1232 | 1137 | 1049 | 969 | 896 | 831 | 772 | 720 |
| 16.50 CFS | 674 | 633 | 598 | 566 | 538 | 513 | 490 | 469 |
| 17.70 CFS | 450 | 433 | 417 | 403 | 390 | 378 | 367 | 357 |
| 18.90 CFS | 348 | 339 | 331 | 323 | 316 | 309 | 302 | 295 |
| 20.10 CFS | 289 | 283 | 277 | 271 | 266 | 261 | 256 | 252 |
| 21.30 CFS | 247 | 243 | 239 | 235 | 232 | 228 | 225 | 222 |
| 22.50 CFS | 219 | 216 | 214 | 212 | 210 | 208 | 206 | 205 |
| 23.70 CFS | 204 | 202 | 201 | 198 | 193 | 184 | 171 | 156 |
| 24.90 CFS | 145 | 136 | 133 | 130 | 127 | 121 | 113 | 103 |
| 26.10 CFS | 92.19 | 81.18 | 70.64 | 60.89 | 52.08 | 44.27 | 37.43 | 31.52 |
| 27.30 CFS | 26.44 | 22.10 | 18.43 | 15.34 | 12.73 | 10.55 | 8.73 | 7.22 |
| 28.50 CFS | 5.96 | 4.91 | 4.05 | 3.33 | 2.74 | 2.25 | 1.85 | 1.52 |
| 29.70 CFS | 1.24 | 1.02 | .84 | .68 | .56 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.16 WATERSHED INCHES; 8125 CFS-HRS; 671.5 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.64 | 1189.0 | (DIVERT) |
| 14.14 | 1936.0 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | DRAINAGE AREA = 10.84 SQ.MI. | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 17 | 104 | 322 | 641 | 991 | 1182 | 1115 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12.90 CFS | 915 | 735 | 739 | 917 | 1202 | 1506 | 1745 | 1884 |
| 14.10 CFS | 1934 | 1917 | 1855 | 1765 | 1660 | 1550 | 1440 | 1333 |
| 15.30 CFS | 1232 | 1137 | 1049 | 969 | 896 | 831 | 772 | 720 |
| 16.50 CFS | 674 | 633 | 598 | 566 | 538 | 513 | 490 | 469 |
| 17.70 CFS | 450 | 433 | 417 | 403 | 390 | 378 | 367 | 357 |
| 18.90 CFS | 348 | 339 | 331 | 323 | 316 | 309 | 302 | 295 |
| 20.10 CFS | 289 | 283 | 277 | 271 | 266 | 261 | 256 | 252 |
| 21.30 CFS | 247 | 243 | 239 | 235 | 232 | 228 | 225 | 222 |
| 22.50 CFS | 219 | 216 | 214 | 212 | 210 | 208 | 206 | 205 |
| 23.70 CFS | 204 | 202 | 201 | 198 | 193 | 184 | 171 | 156 |
| 24.90 CFS | 145 | 136 | 133 | 130 | 127 | 121 | 113 | 103 |
| 26.10 CFS | 92.19 | 81.18 | 70.64 | 60.89 | 52.08 | 44.27 | 37.43 | 31.52 |
| 27.30 CFS | 26.44 | 22.10 | 18.43 | 15.34 | 12.73 | 10.55 | 8.73 | 7.22 |
| 28.50 CFS | 5.96 | 4.91 | 4.05 | 3.33 | 2.74 | 2.25 | 1.85 | 1.52 |
| 29.70 CFS | 1.24 | 1.02 | .84 | .68 | .56 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.16 WATERSHED INCHES; 8125 CFS-HRS; 671.5 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
152 CFS-HRS; 671.5 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.87 | 1089.5 | 2.34 |
| 14.40 | 1901.2 | 3.21 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.16 WATERSHED INCHES; 8126 CFS-HRS; 671.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.15 | 1541.1 | (RUNOFF) |
| 21.35 | 33.1 | (RUNOFF) |
| 22.30 | 31.9 | (RUNOFF) |
| 23.30 | 30.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 1.47 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.05 CFS | .06 | .54 | 2.04 | 4.48 | 7.57 | 11.47 | 16.34 | 22.43 |
| 11.25 CFS | 31 | 42 | 60 | 120 | 370 | 1034 | 1541 | 1088 |
| 12.45 CFS | 447 | 286 | 227 | 189 | 169 | 153 | 140 | 130 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 13.65 CFS | 121 | 113 | 105 | 98 | 93 | 89 | 86 | 83 |
| 14.85 CFS | 81.76 | 79.54 | 76.76 | 74.30 | 71.72 | 68.90 | 66.82 | 64.95 |
| 16.05 CFS | 62.34 | 59.47 | 57.64 | 56.95 | 56.39 | 55.37 | 54.26 | 53.51 |
| 17.25 CFS | 52.69 | 51.51 | 50.61 | 50.01 | 49.17 | 48.07 | 47.41 | 46.42 |
| 18.45 CFS | 45.46 | 44.69 | 43.53 | 42.77 | 41.93 | 40.79 | 40.12 | 39.38 |
| 19.65 CFS | 38.16 | 36.89 | 35.92 | 35.31 | 34.74 | 34.20 | 33.88 | 33.42 |
| 20.85 CFS | 33.37 | 33.29 | 32.99 | 33.07 | 33.05 | 32.69 | 32.65 | 32.58 |
| 22.05 CFS | 32.00 | 31.88 | 31.90 | 31.77 | 31.24 | 31.08 | 31.08 | 30.72 |
| 23.25 CFS | 30.75 | 30.75 | 30.48 | 30.33 | 30.31 | 29.88 | 25.48 | 12.73 |
| 24.45 CFS | 1.53 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.53 WATERSHED INCHES; 1451 CFS-HRS; 119.9 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.59 | 858.3 | 4.20 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.53 WATERSHED INCHES; 1451 CFS-HRS; 119.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.11 | 620.8 | 3.12 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.53 WATERSHED INCHES; 1451 CFS-HRS; 119.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.95 | 1651.8 | (NULL) |
| 14.31 | 2131.2 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | .29 | .84 | 1.79 | 3.23 | 5.26 | 8.02 | 11.79 | 27.36 |
| 12.15 CFS | 92 | 264 | 563 | 998 | 1430 | 1638 | 1594 | 1436 |
| 13.35 CFS | 1339 | 1371 | 1521 | 1731 | 1929 | 2065 | 2125 | 2120 |
| 14.55 CFS | 2065 | 1976 | 1867 | 1749 | 1630 | 1513 | 1401 | 1297 |
| 15.75 CFS | 1199 | 1110 | 1029 | 955 | 889 | 830 | 777 | 730 |
| 16.95 CFS | 689 | 652 | 620 | 591 | 565 | 541 | 520 | 500 |
| 18.15 CFS | 482 | 466 | 451 | 438 | 425 | 414 | 403 | 393 |
| 19.35 CFS | 383 | 374 | 366 | 358 | 350 | 342 | 335 | 328 |
| 20.55 CFS | 321 | 314 | 307 | 302 | 296 | 291 | 286 | 281 |
| 21.75 CFS | 276 | 272 | 268 | 264 | 260 | 257 | 253 | 251 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22.95 CFS | 248 | 245 | 243 | 241 | 239 | 237 | 236 | 234 |
| 24.15 CFS | 233 | 230 | 226 | 219 | 207 | 192 | 176 | 162 |
| 25.35 CFS | 152 | 145 | 138 | 131 | 123 | 112 | 101 | 90 |
| 26.55 CFS | 78.57 | 68.07 | 58.47 | 49.87 | 42.30 | 35.70 | 30.01 | 25.14 |
| 27.75 CFS | 21.00 | 17.49 | 14.54 | 12.06 | 9.99 | 8.26 | 6.82 | 5.62 |
| 28.95 CFS | 4.64 | 3.82 | 3.14 | 2.58 | 2.12 | 1.74 | 1.43 | 1.17 |
| 30.15 CFS | .96 | .79 | .64 | .53 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.21 WATERSHED INCHES; 9577 CFS-HRS; 791.4 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 1543.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 2 | 68 | 351 | 919 | 1422 | 1528 | 1183 |
| 12.75 CFS | 683 | 467 | 391 | 341 | 308 | 284 | 264 | 246 |
| 13.95 CFS | 230 | 216 | 203 | 192 | 184 | 177 | 173 | 169 |
| 15.15 CFS | 165 | 161 | 156 | 151 | 146 | 141 | 137 | 132 |
| 16.35 CFS | 128 | 124 | 121 | 120 | 118 | 116 | 115 | 113 |
| 17.55 CFS | 111 | 109 | 108 | 106 | 104 | 102 | 101 | 99 |
| 18.75 CFS | 96.99 | 95.21 | 93.32 | 91.36 | 89.62 | 87.79 | 85.98 | 83.87 |
| 19.95 CFS | 81.51 | 79.39 | 77.72 | 76.49 | 75.45 | 74.58 | 73.99 | 73.55 |
| 21.15 CFS | 73.24 | 73.12 | 72.91 | 72.79 | 72.60 | 72.34 | 71.89 | 71.44 |
| 22.35 CFS | 71.00 | 70.72 | 70.42 | 69.92 | 69.45 | 69.03 | 68.84 | 68.65 |
| 23.55 CFS | 68.44 | 68.27 | 68.02 | 67.33 | 63.66 | 52.85 | 34.70 | 16.00 |
| 24.75 CFS | 3.91 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.77 WATERSHED INCHES; 2385 CFS-HRS; 197.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.54 | 1321.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 7 | 56 | 243 | 590 | 1005 | 1271 | 1301 |
| 12.75 CFS | 1066 | 684 | 427 | 341 | 295 | 264 | 242 | 224 |
| 13.95 CFS | 209 | 195 | 183 | 172 | 163 | 156 | 150 | 146 |
| 15.15 CFS | 142 | 138 | 135 | 130 | 126 | 122 | 118 | 114 |
| 16.35 CFS | 110 | 107 | 104 | 101 | 100 | 98 | 97 | 95 |
| 17.55 CFS | 93.73 | 92.24 | 90.76 | 89.27 | 87.90 | 86.46 | 84.94 | 83.37 |
| 18.75 CFS | 81.87 | 80.25 | 78.67 | 77.11 | 75.46 | 73.98 | 72.45 | 70.77 |
| 19.95 CFS | 69.06 | 67.26 | 65.57 | 64.16 | 63.09 | 62.22 | 61.55 | 61.02 |
| 21.15 CFS | 60.65 | 60.37 | 60.23 | 60.07 | 59.87 | 59.71 | 59.47 | 59.09 |
| 22.35 CFS | 58.73 | 58.44 | 58.06 | 57.76 | 57.42 | 57.04 | 56.69 | 56.48 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23.55 CFS | 56.36 | 56.10 | 55.95 | 55.66 | 53.94 | 48.95 | 39.51 | 26.85 |
| 24.75 CFS | 14.39 | 4.78 | .38 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.96 WATERSHED INCHES; 2161 CFS-HRS; 178.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 2799.7 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 9 | 124 | 593 | 1509 | 2427 | 2799 | 2485 |
| 12.75 CFS | 1749 | 1150 | 817 | 682 | 603 | 548 | 506 | 470 |
| 13.95 CFS | 439 | 411 | 386 | 364 | 347 | 333 | 323 | 315 |
| 15.15 CFS | 307 | 299 | 290 | 281 | 272 | 263 | 255 | 246 |
| 16.35 CFS | 238 | 230 | 225 | 221 | 218 | 215 | 211 | 208 |
| 17.55 CFS | 205 | 201 | 198 | 195 | 192 | 189 | 186 | 182 |
| 18.75 CFS | 179 | 175 | 172 | 168 | 165 | 162 | 158 | 155 |
| 19.95 CFS | 151 | 147 | 143 | 141 | 139 | 137 | 136 | 135 |
| 21.15 CFS | 134 | 133 | 133 | 133 | 132 | 132 | 131 | 131 |
| 22.35 CFS | 130 | 129 | 128 | 128 | 127 | 126 | 126 | 125 |
| 23.55 CFS | 125 | 124 | 124 | 123 | 118 | 102 | 74 | 43 |
| 24.75 CFS | 18.30 | 4.78 | .38 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.85 WATERSHED INCHES; 4546 CFS-HRS; 375.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.57 | 3492.5 | (NULL) |
| 14.26 | 2511.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 1 | 2 | 3 | 6 | 17 | 136 | 621 |
| 12.15 CFS | 1601 | 2691 | 3362 | 3483 | 3179 | 2789 | 2411 | 2118 |
| 13.35 CFS | 1942 | 1919 | 2026 | 2201 | 2368 | 2476 | 2511 | 2484 |
| 14.55 CFS | 2411 | 2309 | 2190 | 2064 | 1937 | 1812 | 1692 | 1578 |
| 15.75 CFS | 1471 | 1373 | 1284 | 1201 | 1127 | 1060 | 1002 | 951 |
| 16.95 CFS | 907 | 867 | 831 | 799 | 770 | 743 | 718 | 695 |
| 18.15 CFS | 674 | 655 | 637 | 620 | 604 | 589 | 575 | 561 |
| 19.35 CFS | 548 | 536 | 524 | 513 | 501 | 489 | 478 | 468 |
| 20.55 CFS | 459 | 451 | 443 | 436 | 430 | 424 | 419 | 414 |
| 21.75 CFS | 409 | 404 | 399 | 394 | 390 | 386 | 382 | 378 |
| 22.95 CFS | 375 | 372 | 369 | 366 | 364 | 362 | 360 | 357 |
| 24.15 CFS | 350 | 332 | 300 | 261 | 225 | 197 | 177 | 162 |
| 25.35 CFS | 152 | 145 | 138 | 131 | 123 | 112 | 101 | 90 |
| 26.55 CFS | 78.57 | 68.07 | 58.47 | 49.87 | 42.30 | 35.70 | 30.01 | 25.14 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27.75 CFS | 21.00 | 17.49 | 14.54 | 12.06 | 9.99 | 8.26 | 6.82 | 5.62 |
| 28.95 CFS | 4.64 | 3.82 | 3.14 | 2.58 | 2.12 | 1.74 | 1.43 | 1.17 |
| 30.15 CFS | .96 | .79 | .64 | .53 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.06 WATERSHED INCHES; 14124 CFS-HRS; 1167.2 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1197.0 FEET) CAN ADD .336 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 1287.26 AC-FT ( .10 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1204.56. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.85 | 54.5 * | 1205.48 |

* FIRST POINT OF FLAT PEAK

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 50 CFS
RESVOR ( 93. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.20 CFS | 19.84 | 19.83 | 19.82 | 19.81 | 19.79 | 19.78 | 19.77 | 19.76 |
| 11.40 CFS | 19.74 | 19.74 | 19.73 | 19.77 | 20.00 | 20.71 | 22.09 | 24.04 |
| 12.60 CFS | 26.25 | 27.84 | 29.10 | 30.20 | 31.16 | 32.01 | 32.82 | 33.65 |
| 13.80 CFS | 34.54 | 35.51 | 36.53 | 37.58 | 38.63 | 39.48 | 40.29 | 41.07 |
| 15.00 CFS | 41.79 | 42.48 | 43.12 | 43.71 | 44.27 | 44.79 | 45.27 | 45.72 |
| 16.20 CFS | 46.13 | 46.52 | 46.89 | 47.23 | 47.56 | 47.87 | 48.13 | 48.34 |
| 17.40 CFS | 48.55 | 48.75 | 48.95 | 49.13 | 49.31 | 49.49 | 49.66 | 49.82 |
| 18.60 CFS | 49.98 | 50.13 | 50.28 | 50.43 | 50.57 | 50.71 | 50.84 | 50.97 |
| 19.80 CFS | 51.10 | 51.22 | 51.34 | 51.46 | 51.58 | 51.69 | 51.80 | 51.91 |
| 21.00 CFS | 52.01 | 52.12 | 52.22 | 52.32 | 52.42 | 52.52 | 52.62 | 52.71 |
| 22.20 CFS | 52.81 | 52.90 | 52.99 | 53.08 | 53.17 | 53.26 | 53.35 | 53.43 |
| 23.40 CFS | 53.52 | 53.60 | 53.69 | 53.77 | 53.86 | 53.94 | 54.02 | 54.09 |
| 24.60 CFS | 54.15 | 54.20 | 54.24 | 54.28 | 54.31 | 54.34 | 54.37 | 54.39 |
| 25.80 CFS | 54.41 | 54.43 | 54.45 | 54.46 | 54.47 | 54.48 | 54.49 | 54.49 |
| 27.00 CFS | 54.49 | 54.49 | 54.48 | 54.48 | 54.47 | 54.46 | 54.45 | 54.44 |
| 28.20 CFS | 54.43 | 54.42 | 54.41 | 54.39 | 54.38 | 54.37 | 54.35 | 54.34 |
| 29.40 CFS | 54.33 | 54.31 | 54.30 | 54.28 | 54.27 | 54.25 | 54.24 | 54.22 |
| 30.60 CFS | 54.21 | 54.19 | 54.18 | 54.17 | 54.15 | 54.14 | 54.12 | 54.11 |
| 31.80 CFS | 54.09 | 54.08 | 54.06 | 54.05 | 54.03 | 54.02 | 54.00 | 53.99 |
| 33.00 CFS | 53.97 | 53.96 | 53.94 | 53.93 | 53.91 | 53.90 | 53.88 | 53.87 |
| 34.20 CFS | 53.86 | 53.84 | 53.83 | 53.81 | 53.80 | 53.78 | 53.77 | 53.75 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 35.40 | CFS | 53.74 | 53.72 | 53.71 | 53.69 | 53.68 | 53.66 | 53.65 | 53.63 |
| 36.60 | CFS | 53.62 | 53.61 | 53.59 | 53.58 | 53.56 | 53.55 | 53.53 | 53.52 |
| 37.80 | CFS | 53.50 | 53.49 | 53.47 | 53.46 | 53.44 | 53.43 | 53.42 | 53.40 |
| 39.00 | CFS | 53.39 | 53.37 | 53.36 | 53.34 | 53.33 | 53.31 | 53.30 | 53.28 |
| 40.20 | CFS | 53.27 | 53.25 | 53.24 | 53.23 | 53.21 | 53.20 | 53.18 | 53.17 |
| 41.40 | CFS | 53.15 | 53.14 | 53.12 | 53.11 | 53.09 | 53.08 | 53.07 | 53.05 |
| 42.60 | CFS | 53.04 | 53.02 | 53.01 | 52.99 | 52.98 | 52.96 | 52.95 | 52.94 |
| 43.80 | CFS | 52.92 | 52.91 | 52.89 | 52.88 | 52.86 | 52.85 | 52.83 | 52.82 |
| 45.00 | CFS | 52.81 | 52.79 | 52.78 | 52.76 | 52.75 | 52.73 | 52.72 | 52.70 |
| 46.20 | CFS | 52.69 | 52.68 | 52.66 | 52.65 | 52.63 | 52.62 | 52.60 | 52.59 |
| 47.40 | CFS | 52.57 | 52.56 | 52.55 | 52.53 | 52.52 | 52.50 | 52.49 | 52.47 |
| 48.60 | CFS | 52.46 | 52.45 | 52.43 | 52.42 | 52.40 | 52.39 | 52.37 | 52.36 |
| 49.80 | CFS | 52.35 | 52.33 | 52.32 | 52.30 | 52.29 | 52.27 | 52.26 | 52.25 |
| 51.00 | CFS | 52.23 | 52.22 | 52.20 | 52.19 | 52.17 | 52.16 | 52.15 | 52.13 |
| 52.20 | CFS | 52.12 | 52.10 | 52.09 | 52.07 | 52.06 | 52.05 | 52.03 | 52.02 |
| 53.40 | CFS | 52.00 | 51.99 | 51.97 | 51.96 | 51.95 | 51.93 | 51.92 | 51.90 |
| 54.60 | CFS | 51.89 | 51.88 | 51.86 | 51.85 | 51.83 | 51.82 | 51.80 | 51.79 |
| 55.80 | CFS | 51.78 | 51.76 | 51.75 | 51.73 | 51.72 | 51.71 | 51.69 | 51.68 |
| 57.00 | CFS | 51.66 | 51.65 | 51.63 | 51.62 | 51.61 | 51.59 | 51.58 | 51.56 |
| 58.20 | CFS | 51.55 | 51.54 | 51.52 | 51.51 | 51.49 | 51.48 | 51.47 | 51.45 |
| 59.40 | CFS | 51.44 | 51.42 | 51.41 | 51.40 | 51.38 | 51.37 | 51.35 | 51.34 |
| 60.60 | CFS | 51.32 | 51.31 | 51.30 | 51.28 | 51.27 | 51.25 | 51.24 | 51.23 |
| 61.80 | CFS | 51.21 | 51.20 | 51.18 | 51.17 | 51.16 | 51.14 | 51.13 | 51.11 |
| 63.00 | CFS | 51.10 | 51.09 | 51.07 | 51.06 | 51.04 | 51.03 | 51.02 | 51.00 |
| 64.20 | CFS | 50.99 | 50.98 | 50.96 | 50.95 | 50.93 | 50.92 | 50.91 | 50.89 |
| 65.40 | CFS | 50.88 | 50.86 | 50.85 | 50.84 | 50.82 | 50.81 | 50.79 | 50.78 |
| 66.60 | CFS | 50.77 | 50.75 | 50.74 | 50.72 | 50.71 | 50.70 | 50.68 | 50.67 |
| 67.80 | CFS | 50.66 | 50.64 | 50.63 | 50.61 | 50.60 | 50.59 | 50.57 | 50.56 |
| 69.00 | CFS | 50.54 | 50.53 | 50.52 | 50.50 | 50.49 | 50.48 | 50.46 | 50.45 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.23 WATERSHED INCHES; 3005 CFS-HRS; 248.3 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 3.85 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 2 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 3097.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .30 | .90 | 1.89 | 3.27 | 4.83 | 6.45 | 8.11 | 9.81 |
| 7.35 CFS | 11.57 | 13.40 | 15.30 | 17.17 | 19.02 | 20.87 | 22.87 | 25.19 |
| 8.55 CFS | 28.06 | 31.50 | 35.48 | 39.89 | 44.47 | 49.13 | 53.53 | 57.54 |
| 9.75 CFS | 61 | 65 | 70 | 77 | 86 | 96 | 108 | 121 |
| 10.95 CFS | 138 | 157 | 181 | 212 | 256 | 357 | 655 | 1341 |
| 12.15 CFS | 2330 | 3036 | 2952 | 2164 | 1134 | 635 | 496 | 418 |
| 13.35 CFS | 370 | 334 | 306 | 282 | 261 | 243 | 226 | 213 |
| 14.55 CFS | 202 | 193 | 186 | 181 | 176 | 171 | 165 | 159 |
| 15.75 CFS | 153 | 148 | 142 | 137 | 132 | 127 | 124 | 122 |
| 16.95 CFS | 120 | 118 | 116 | 114 | 111 | 109 | 107 | 106 |
| 18.15 CFS | 104 | 102 | 100 | 98 | 96 | 94 | 92 | 89 |
| 19.35 CFS | 87.52 | 85.62 | 83.66 | 81.59 | 79.27 | 77.02 | 75.14 | 73.73 |
| 20.55 CFS | 72.56 | 71.58 | 70.82 | 70.29 | 69.83 | 69.59 | 69.30 | 69.06 |
| 21.75 CFS | 68.80 | 68.48 | 67.99 | 67.48 | 67.01 | 66.55 | 66.22 | 65.70 |
| 22.95 CFS | 65.19 | 64.66 | 64.35 | 64.13 | 63.82 | 63.58 | 63.30 | 62.67 |
| 24.15 CFS | 59.98 | 51.28 | 36.44 | 19.69 | 6.44 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.50 WATERSHED INCHES; 3976 CFS-HRS; 328.6 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.88 | 1859.8 | 4.85 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 3979 CFS-HRS; 328.8 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.54 | 1302.8 | 5.93 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 3979 CFS-HRS; 328.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 2510.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.70 CFS | .21 | .88 | 2.23 | 4.30 | 6.80 | 9.44 | 12.09 | 14.76 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.90 CFS | 17.74 | 21.27 | 25.63 | 30.77 | 36.93 | 44.11 | 52.80 | 63.27 |
| 11.10 CFS | 76 | 92 | 114 | 146 | 221 | 497 | 1150 | 2058 |
| 12.30 CFS | 2511 | 2106 | 1248 | 615 | 451 | 373 | 325 | 293 |
| 13.50 CFS | 267 | 246 | 229 | 212 | 198 | 185 | 175 | 167 |
| 14.70 CFS | 160 | 156 | 152 | 148 | 143 | 138 | 133 | 128 |
| 15.90 CFS | 124 | 120 | 115 | 111 | 107 | 105 | 104 | 102 |
| 17.10 CFS | 100 | 99 | 97 | 95 | 93 | 92 | 90 | 89 |
| 18.30 CFS | 86.85 | 85.20 | 83.52 | 81.75 | 80.12 | 78.36 | 76.62 | 75.02 |
| 19.50 CFS | 73.35 | 71.77 | 69.81 | 67.70 | 65.90 | 64.54 | 63.47 | 62.59 |
| 20.70 CFS | 61.76 | 61.28 | 60.84 | 60.58 | 60.38 | 60.15 | 59.99 | 59.75 |
| 21.90 CFS | 59.45 | 59.01 | 58.56 | 58.13 | 57.92 | 57.56 | 57.05 | 56.61 |
| 23.10 CFS | 56.27 | 56.07 | 55.81 | 55.68 | 55.39 | 55.14 | 54.52 | 51.23 |
| 24.30 CFS | 40.74 | 24.86 | 9.87 | 1.02 | .00 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.93 WATERSHED INCHES; 2962 CFS-HRS; 244.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 2655.3 | (NULL) |
| 13.48 | 1568.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .80 | 1.32 | 1.97 | 2.77 | 3.70 | 4.76 | 5.94 |
| 8.40 CFS | 7.22 | 8.63 | 10.26 | 12.47 | 15.44 | 19.24 | 23.63 | 28.37 |
| 9.60 CFS | 33.35 | 38.62 | 44.47 | 51.09 | 58.73 | 67.28 | 76.97 | 87.82 |
| 10.80 CFS | 100 | 115 | 133 | 155 | 183 | 223 | 306 | 592 |
| 12.00 CFS | 1257 | 2180 | 2654 | 2288 | 1514 | 1037 | 1102 | 1280 |
| 13.20 CFS | 1449 | 1548 | 1568 | 1533 | 1461 | 1368 | 1266 | 1161 |
| 14.40 CFS | 1059 | 965 | 878 | 800 | 730 | 667 | 610 | 559 |
| 15.60 CFS | 515 | 476 | 442 | 412 | 385 | 361 | 341 | 324 |
| 16.80 CFS | 310 | 296 | 284 | 273 | 263 | 254 | 246 | 238 |
| 18.00 CFS | 232 | 225 | 219 | 214 | 209 | 204 | 199 | 195 |
| 19.20 CFS | 190 | 186 | 182 | 178 | 174 | 170 | 166 | 162 |
| 20.40 CFS | 159 | 156 | 153 | 151 | 148 | 146 | 144 | 142 |
| 21.60 CFS | 140 | 138 | 137 | 135 | 133 | 132 | 131 | 130 |
| 22.80 CFS | 129 | 127 | 127 | 126 | 125 | 124 | 123 | 123 |
| 24.00 CFS | 122 | 118 | 107 | 91 | 75 | 66 | 64 | 62 |
| 25.20 CFS | 58.43 | 53.71 | 48.12 | 42.28 | 36.61 | 31.33 | 26.56 | 22.33 |
| 26.40 CFS | 18.65 | 15.49 | 12.81 | 10.54 | 8.64 | 7.06 | 5.75 | 4.67 |
| 27.60 CFS | 3.78 | 3.06 | 2.47 | 1.99 | 1.60 | 1.28 | 1.03 | .82 |
| 28.80 CFS | .66 | .52 | .42 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6941 CFS-HRS; 573.6 ACRE-FEET.

OPERATION DIVERT XSECTION 12

OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 2655.3 | (DIVERT) |
| 13.48 | 1568.6 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | | 4.84 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .80 | 1.32 | 1.97 | 2.77 | 3.70 | 4.76 | 5.94 |
| 8.40 CFS | 7.22 | 8.63 | 10.26 | 12.47 | 15.44 | 19.24 | 23.63 | 28.37 |
| 9.60 CFS | 33.35 | 38.62 | 44.47 | 51.09 | 58.73 | 67.28 | 76.97 | 87.82 |
| 10.80 CFS | 100 | 115 | 133 | 155 | 183 | 223 | 306 | 592 |
| 12.00 CFS | 1257 | 2180 | 2654 | 2288 | 1514 | 1037 | 1102 | 1280 |
| 13.20 CFS | 1449 | 1548 | 1568 | 1533 | 1461 | 1368 | 1266 | 1161 |
| 14.40 CFS | 1059 | 965 | 878 | 800 | 730 | 667 | 610 | 559 |
| 15.60 CFS | 515 | 476 | 442 | 412 | 385 | 361 | 341 | 324 |
| 16.80 CFS | 310 | 296 | 284 | 273 | 263 | 254 | 246 | 238 |
| 18.00 CFS | 232 | 225 | 219 | 214 | 209 | 204 | 199 | 195 |
| 19.20 CFS | 190 | 186 | 182 | 178 | 174 | 170 | 166 | 162 |
| 20.40 CFS | 159 | 156 | 153 | 151 | 148 | 146 | 144 | 142 |
| 21.60 CFS | 140 | 138 | 137 | 135 | 133 | 132 | 131 | 130 |
| 22.80 CFS | 129 | 127 | 127 | 126 | 125 | 124 | 123 | 123 |
| 24.00 CFS | 122 | 118 | 107 | 91 | 75 | 66 | 64 | 62 |
| 25.20 CFS | 58.43 | 53.71 | 48.12 | 42.28 | 36.61 | 31.33 | 26.56 | 22.33 |
| 26.40 CFS | 18.65 | 15.49 | 12.81 | 10.54 | 8.64 | 7.06 | 5.75 | 4.67 |
| 27.60 CFS | 3.78 | 3.06 | 2.47 | 1.99 | 1.60 | 1.28 | 1.03 | .82 |
| 28.80 CFS | .66 | .52 | .42 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6941 CFS-HRS; 573.6 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
171 CFS-HRS; 573.6 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 2617.9 | 6.16 |
| 13.64 | 1565.9 | 4.65 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6942 CFS-HRS; 573.7 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 2617.9 | 3.87 |
| 13.64 | 1565.9 | 2.91 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6942 CFS-HRS; 573.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 4801.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .45 | 1.32 | 2.85 | 4.98 | 7.45 | 10.06 | 12.71 | 15.43 |
| 7.35 CFS | 18.23 | 21.12 | 24.12 | 27.10 | 30.07 | 33.05 | 36.25 | 39.92 |
| 8.55 CFS | 44.44 | 49.84 | 56.11 | 63.06 | 70.34 | 77.81 | 84.96 | 91.43 |
| 9.75 CFS | 97 | 104 | 112 | 122 | 136 | 152 | 170 | 192 |
| 10.95 CFS | 218 | 248 | 286 | 335 | 401 | 560 | 990 | 2050 |
| 12.15 CFS | 3517 | 4649 | 4686 | 3657 | 2120 | 1084 | 820 | 685 |
| 13.35 CFS | 600 | 542 | 495 | 456 | 422 | 393 | 366 | 343 |
| 14.55 CFS | 325 | 311 | 300 | 291 | 283 | 274 | 265 | 255 |
| 15.75 CFS | 246 | 237 | 229 | 221 | 212 | 205 | 199 | 195 |
| 16.95 CFS | 192 | 189 | 186 | 182 | 179 | 176 | 172 | 169 |
| 18.15 CFS | 166 | 163 | 160 | 157 | 153 | 150 | 147 | 144 |
| 19.35 CFS | 141 | 138 | 134 | 131 | 127 | 124 | 121 | 118 |
| 20.55 CFS | 116 | 115 | 114 | 113 | 112 | 112 | 111 | 111 |
| 21.75 CFS | 110 | 110 | 109 | 108 | 107 | 107 | 106 | 105 |
| 22.95 CFS | 105 | 104 | 103 | 103 | 102 | 102 | 101 | 100 |
| 24.15 CFS | 96.11 | 83.61 | 61.19 | 35.11 | 13.28 | 1.30 | .00 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.23 | 2639.1 | 4.10 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.79 | 1910.5 | 4.90 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.79 | 1910.5 | 3.28 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1790.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.45 CFS | .23 | .84 | 2.02 | 3.86 | 6.19 | 9.02 | 12.33 | 16.32 |
| 10.65 CFS | 21 | 27 | 34 | 42 | 53 | 68 | 90 | 144 |
| 11.85 CFS | 317 | 764 | 1384 | 1766 | 1685 | 1187 | 640 | 384 |
| 13.05 CFS | 317 | 271 | 243 | 221 | 203 | 188 | 175 | 163 |
| 14.25 CFS | 153 | 144 | 137 | 131 | 128 | 124 | 121 | 117 |
| 15.45 CFS | 113 | 109 | 105 | 102 | 98 | 95 | 91 | 88 |
| 16.65 CFS | 86.31 | 84.98 | 83.69 | 82.29 | 80.88 | 79.42 | 78.03 | 76.61 |
| 17.85 CFS | 75.31 | 74.10 | 72.80 | 71.41 | 70.03 | 68.70 | 67.26 | 65.92 |
| 19.05 CFS | 64.53 | 63.08 | 61.77 | 60.42 | 59.10 | 57.59 | 55.90 | 54.42 |
| 20.25 CFS | 53.19 | 52.28 | 51.51 | 50.84 | 50.38 | 50.01 | 49.76 | 49.62 |
| 21.45 CFS | 49.42 | 49.30 | 49.09 | 48.88 | 48.55 | 48.18 | 47.87 | 47.59 |
| 22.65 CFS | 47.35 | 46.99 | 46.64 | 46.32 | 46.13 | 45.95 | 45.77 | 45.61 |
| 23.85 CFS | 45.45 | 44.86 | 42.52 | 35.27 | 23.59 | 11.46 | 3.06 | .00 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.73 WATERSHED INCHES; 2305 CFS-HRS; 190.5 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 1978.7 | (NULL) |
| 13.75 | 2101.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 6.00 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .25 | .55 | 1.03 | 1.72 | 2.61 | 3.72 | 5.03 | 6.53 |
| 8.40 CFS | 8.22 | 10.08 | 12.10 | 14.25 | 16.54 | 18.97 | 21.60 | 24.64 |
| 9.60 CFS | 28.37 | 33.02 | 38.70 | 45.27 | 52.71 | 60.94 | 70.08 | 80.18 |
| 10.80 CFS | 91 | 104 | 119 | 138 | 160 | 192 | 257 | 442 |
| 12.00 CFS | 904 | 1541 | 1945 | 1893 | 1447 | 1008 | 954 | 1187 |
| 13.20 CFS | 1490 | 1785 | 1991 | 2087 | 2098 | 2050 | 1962 | 1850 |
| 14.40 CFS | 1727 | 1600 | 1476 | 1356 | 1244 | 1139 | 1042 | 954 |
| 15.60 CFS | 874 | 802 | 738 | 682 | 631 | 586 | 547 | 513 |
| 16.80 CFS | 483 | 456 | 432 | 410 | 390 | 372 | 356 | 342 |
| 18.00 CFS | 329 | 317 | 307 | 297 | 288 | 280 | 272 | 265 |
| 19.20 CFS | 258 | 252 | 246 | 240 | 234 | 229 | 223 | 218 |
| 20.40 CFS | 214 | 209 | 205 | 201 | 197 | 194 | 190 | 187 |
| 21.60 CFS | 184 | 181 | 178 | 175 | 173 | 170 | 168 | 167 |
| 22.80 CFS | 165 | 163 | 162 | 160 | 159 | 158 | 157 | 156 |
| 24.00 CFS | 154 | 151 | 143 | 131 | 118 | 109 | 105 | 103 |
| 25.20 CFS | 101 | 96 | 90 | 82 | 74 | 65 | 57 | 50 |
| 26.40 CFS | 43.14 | 37.03 | 31.62 | 26.88 | 22.76 | 19.21 | 16.16 | 13.56 |
| 27.60 CFS | 11.35 | 9.49 | 7.91 | 6.58 | 5.47 | 4.54 | 3.76 | 3.12 |
| 28.80 CFS | 2.58 | 2.13 | 1.75 | 1.45 | 1.19 | .98 | .81 | .66 |
| 30.00 CFS | .54 | .44 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.24 WATERSHED INCHES; 8676 CFS-HRS; 717.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 4512.7 | (NULL) |
| 13.70 | 3662.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .97 | 1.80 | 2.99 | 4.53 | 6.42 | 8.65 | 11.20 |
| 8.40 CFS | 14.06 | 17.20 | 20.61 | 24.38 | 28.83 | 34.16 | 40.52 | 47.91 |
| 9.60 CFS | 56 | 66 | 77 | 89 | 103 | 119 | 137 | 156 |
| 10.80 CFS | 178 | 204 | 233 | 269 | 313 | 373 | 476 | 742 |
| 12.00 CFS | 1473 | 2745 | 4050 | 4504 | 3759 | 2584 | 2032 | 2287 |
| 13.20 CFS | 2756 | 3220 | 3530 | 3653 | 3634 | 3517 | 3338 | 3124 |
| 14.40 CFS | 2897 | 2668 | 2448 | 2242 | 2051 | 1875 | 1715 | 1569 |
| 15.60 CFS | 1438 | 1321 | 1218 | 1126 | 1046 | 974 | 910 | 855 |
| 16.80 CFS | 808 | 767 | 729 | 695 | 664 | 636 | 611 | 588 |
| 18.00 CFS | 568 | 549 | 533 | 517 | 502 | 489 | 476 | 465 |
| 19.20 CFS | 453 | 443 | 432 | 423 | 413 | 403 | 393 | 384 |
| 20.40 CFS | 376 | 369 | 361 | 354 | 348 | 342 | 336 | 331 |
| 21.60 CFS | 326 | 321 | 316 | 312 | 308 | 304 | 300 | 298 |
| 22.80 CFS | 295 | 292 | 289 | 287 | 285 | 283 | 281 | 279 |
| 24.00 CFS | 277 | 273 | 261 | 238 | 210 | 185 | 172 | 167 |
| 25.20 CFS | 163 | 155 | 144 | 131 | 117 | 103 | 89 | 77 |
| 26.40 CFS | 65.83 | 55.99 | 47.38 | 39.91 | 33.49 | 28.01 | 23.35 | 19.42 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27.60 CFS | 16.11 | 13.34 | 11.03 | 9.10 | 7.50 | 6.17 | 5.07 | 4.16 |
| 28.80 CFS | 3.41 | 2.80 | 2.29 | 1.87 | 1.53 | 1.25 | 1.02 | .83 |
| 30.00 CFS | .67 | .55 | .44 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.23 WATERSHED INCHES; 15618 CFS-HRS; 1290.7 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 4512.7 | (DIVERT) |
| 13.70 | 3662.3 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .97 | 1.80 | 2.99 | 4.53 | 6.42 | 8.65 | 11.20 |
| 8.40 CFS | 14.06 | 17.20 | 20.61 | 24.38 | 28.83 | 34.16 | 40.52 | 47.91 |
| 9.60 CFS | 56 | 66 | 77 | 89 | 103 | 119 | 137 | 156 |
| 10.80 CFS | 178 | 204 | 233 | 269 | 313 | 373 | 476 | 742 |
| 12.00 CFS | 1473 | 2745 | 4050 | 4504 | 3759 | 2584 | 2032 | 2287 |
| 13.20 CFS | 2756 | 3220 | 3530 | 3653 | 3634 | 3517 | 3338 | 3124 |
| 14.40 CFS | 2897 | 2668 | 2448 | 2242 | 2051 | 1875 | 1715 | 1569 |
| 15.60 CFS | 1438 | 1321 | 1218 | 1126 | 1046 | 974 | 910 | 855 |
| 16.80 CFS | 808 | 767 | 729 | 695 | 664 | 636 | 611 | 588 |
| 18.00 CFS | 568 | 549 | 533 | 517 | 502 | 489 | 476 | 465 |
| 19.20 CFS | 453 | 443 | 432 | 423 | 413 | 403 | 393 | 384 |
| 20.40 CFS | 376 | 369 | 361 | 354 | 348 | 342 | 336 | 331 |
| 21.60 CFS | 326 | 321 | 316 | 312 | 308 | 304 | 300 | 298 |
| 22.80 CFS | 295 | 292 | 289 | 287 | 285 | 283 | 281 | 279 |
| 24.00 CFS | 277 | 273 | 261 | 238 | 210 | 185 | 172 | 167 |
| 25.20 CFS | 163 | 155 | 144 | 131 | 117 | 103 | 89 | 77 |
| 26.40 CFS | 65.83 | 55.99 | 47.38 | 39.91 | 33.49 | 28.01 | 23.35 | 19.42 |
| 27.60 CFS | 16.11 | 13.34 | 11.03 | 9.10 | 7.50 | 6.17 | 5.07 | 4.16 |
| 28.80 CFS | 3.41 | 2.80 | 2.29 | 1.87 | 1.53 | 1.25 | 1.02 | .83 |
| 30.00 CFS | .67 | .55 | .44 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.23 WATERSHED INCHES; 15618 CFS-HRS; 1290.7 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
180 CFS-HRS; 1290.7 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.61 | 4335.5 | 5.07 |
| 13.90 | 3632.8 | 4.58 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.23 WATERSHED INCHES; 15617 CFS-HRS; 1290.6 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.14 | 2639.3 | (RUNOFF) |
| 21.28 | 42.2 | (RUNOFF) |
| 22.28 | 40.6 | (RUNOFF) |
| 23.21 | 39.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 1.47 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.85 CFS | .24 | .83 | 1.72 | 2.68 | 3.68 | 4.69 | 5.72 | 6.77 |
| 7.05 CFS | 7.84 | 8.97 | 10.10 | 11.33 | 12.54 | 13.59 | 14.69 | 16.01 |
| 8.25 CFS | 17.53 | 19.47 | 21.91 | 24.61 | 27.56 | 30.43 | 33.48 | 36.44 |
| 9.45 CFS | 38.52 | 40.31 | 42.66 | 46.38 | 51.48 | 57.22 | 63.96 | 71.87 |
| 10.65 CFS | 81 | 91 | 105 | 120 | 140 | 168 | 210 | 346 |
| 11.85 CFS | 871 | 1989 | 2633 | 1712 | 643 | 410 | 320 | 265 |
| 13.05 CFS | 236 | 212 | 193 | 179 | 166 | 153 | 143 | 133 |
| 14.25 CFS | 125 | 119 | 115 | 112 | 109 | 106 | 102 | 99 |
| 15.45 CFS | 95.26 | 91.36 | 88.46 | 85.86 | 82.27 | 78.35 | 75.81 | 74.83 |
| 16.65 CFS | 74.05 | 72.59 | 71.03 | 69.96 | 68.82 | 67.19 | 65.93 | 65.11 |
| 17.85 CFS | 63.99 | 62.49 | 61.53 | 60.16 | 58.86 | 57.83 | 56.30 | 55.28 |
| 19.05 CFS | 54.14 | 52.62 | 51.68 | 50.69 | 49.11 | 47.43 | 46.17 | 45.34 |
| 20.25 CFS | 44.55 | 43.84 | 43.43 | 42.80 | 42.69 | 42.58 | 42.19 | 42.25 |
| 21.45 CFS | 42.16 | 41.70 | 41.66 | 41.51 | 40.75 | 40.58 | 40.59 | 40.40 |
| 22.65 CFS | 39.71 | 39.46 | 39.42 | 39.00 | 39.02 | 38.97 | 38.58 | 38.41 |
| 23.85 CFS | 38.36 | 37.64 | 31.99 | 16.10 | 2.28 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.59 WATERSHED INCHES; 2454 CFS-HRS; 202.8 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.54 | 1673.3 | 5.08 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.59 WATERSHED INCHES; 2455 CFS-HRS; 202.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.86 | 1234.3 | 4.11 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.59 WATERSHED INCHES; 2455 CFS-HRS; 202.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.65 | 5342.9 | (NULL) |
| 13.81 | 4072.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .41 | .82 | 1.37 | 2.06 | 2.93 | 4.01 | 5.38 | 7.09 |
| 7.80 CFS | 9.19 | 11.68 | 14.57 | 17.81 | 21.38 | 25.29 | 29.55 | 34.21 |
| 9.00 CFS | 39 | 45 | 53 | 61 | 70 | 81 | 93 | 106 |
| 10.20 CFS | 120 | 137 | 155 | 176 | 199 | 225 | 255 | 291 |
| 11.40 CFS | 333 | 385 | 452 | 560 | 807 | 1468 | 2710 | 4252 |
| 12.60 CFS | 5272 | 5083 | 4092 | 3342 | 3253 | 3479 | 3783 | 4001 |
| 13.80 CFS | 4072 | 4016 | 3868 | 3661 | 3421 | 3169 | 2919 | 2678 |
| 15.00 CFS | 2454 | 2247 | 2058 | 1886 | 1730 | 1589 | 1464 | 1352 |
| 16.20 CFS | 1254 | 1167 | 1088 | 1019 | 958 | 906 | 860 | 819 |
| 17.40 CFS | 782 | 748 | 718 | 690 | 665 | 643 | 623 | 604 |
| 18.60 CFS | 587 | 571 | 556 | 542 | 529 | 516 | 504 | 492 |
| 19.80 CFS | 481 | 470 | 459 | 448 | 438 | 428 | 419 | 411 |
| 21.00 CFS | 403 | 395 | 388 | 382 | 376 | 370 | 365 | 360 |
| 22.20 CFS | 355 | 351 | 347 | 343 | 340 | 337 | 333 | 330 |
| 23.40 CFS | 328 | 325 | 323 | 321 | 319 | 317 | 313 | 303 |
| 24.60 CFS | 282 | 251 | 221 | 199 | 186 | 177 | 166 | 153 |
| 25.80 CFS | 139 | 124 | 109 | 94 | 81 | 70 | 59 | 50 |
| 27.00 CFS | 42.25 | 35.47 | 29.67 | 24.75 | 20.59 | 17.09 | 14.16 | 11.71 |
| 28.20 CFS | 9.66 | 7.96 | 6.56 | 5.39 | 4.43 | 3.63 | 2.98 | 2.44 |
| 29.40 CFS | 1.99 | 1.63 | 1.33 | 1.09 | .88 | .72 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.27 WATERSHED INCHES; 18073 CFS-HRS; 1493.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 4518.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | .32 | 1.49 | 3.96 | 7.80 | 12.57 | 17.70 | 23.26 | 29.57 |
| 10.20 CFS | 37 | 46 | 57 | 70 | 85 | 104 | 126 | 155 |
| 11.40 CFS | 193 | 251 | 382 | 846 | 1965 | 3523 | 4470 | 4209 |
| 12.60 CFS | 2843 | 1440 | 924 | 760 | 653 | 584 | 532 | 490 |
| 13.80 CFS | 453 | 422 | 393 | 367 | 346 | 329 | 316 | 307 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.00 CFS | 299 | 291 | 282 | 272 | 262 | 253 | 245 | 236 |
| 16.20 CFS | 228 | 219 | 212 | 207 | 204 | 201 | 197 | 194 |
| 17.40 CFS | 190 | 187 | 184 | 181 | 178 | 175 | 171 | 168 |
| 18.60 CFS | 165 | 161 | 158 | 155 | 151 | 148 | 145 | 141 |
| 19.80 CFS | 138 | 134 | 130 | 127 | 125 | 123 | 122 | 121 |
| 21.00 CFS | 120 | 119 | 119 | 118 | 118 | 118 | 117 | 116 |
| 22.20 CFS | 115 | 114 | 114 | 113 | 112 | 112 | 111 | 110 |
| 23.40 CFS | 110 | 109 | 109 | 109 | 108 | 102 | 85 | 55 |
| 24.60 CFS | 25.49 | 5.84 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.84 WATERSHED INCHES; 5687 CFS-HRS; 470.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 3227.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.25 CFS | .45 | 1.25 | 2.62 | 4.72 | 7.41 | 10.60 | 14.21 | 18.16 |
| 9.45 CFS | 22.35 | 26.61 | 30.89 | 35.37 | 40.30 | 46.22 | 53.40 | 62.01 |
| 10.65 CFS | 72 | 84 | 99 | 117 | 138 | 166 | 205 | 282 |
| 11.85 CFS | 510 | 1047 | 1935 | 2809 | 3220 | 2998 | 2258 | 1294 |
| 13.05 CFS | 737 | 593 | 508 | 450 | 410 | 377 | 348 | 323 |
| 14.25 CFS | 301 | 282 | 266 | 253 | 243 | 236 | 229 | 222 |
| 15.45 CFS | 215 | 208 | 201 | 194 | 187 | 180 | 174 | 168 |
| 16.65 CFS | 162 | 159 | 156 | 153 | 151 | 148 | 145 | 143 |
| 17.85 CFS | 140 | 138 | 135 | 133 | 130 | 128 | 125 | 123 |
| 19.05 CFS | 120 | 118 | 115 | 113 | 110 | 107 | 105 | 102 |
| 20.25 CFS | 99.17 | 96.93 | 95.23 | 93.83 | 92.68 | 91.80 | 91.16 | 90.65 |
| 21.45 CFS | 90.35 | 90.04 | 89.67 | 89.35 | 88.88 | 88.23 | 87.61 | 87.10 |
| 22.65 CFS | 86.42 | 85.95 | 85.38 | 84.75 | 84.17 | 83.79 | 83.52 | 83.08 |
| 23.85 CFS | 82.81 | 82.25 | 79.54 | 72.48 | 58.11 | 39.66 | 21.26 | 7.26 |
| 25.05 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.05 WATERSHED INCHES; 4597 CFS-HRS; 379.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.39 | 7577.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.25 CFS | .45 | 1.25 | 2.62 | 4.72 | 7.45 | 10.92 | 15.71 | 22.12 |
| 9.45 CFS | 30 | 39 | 49 | 59 | 70 | 83 | 100 | 119 |
| 10.65 CFS | 142 | 169 | 203 | 243 | 294 | 359 | 456 | 663 |
| 11.85 CFS | 1356 | 3013 | 5458 | 7279 | 7429 | 5841 | 3698 | 2217 |
| 13.05 CFS | 1497 | 1246 | 1092 | 982 | 900 | 830 | 770 | 716 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 14.25 CFS | 668 | 628 | 595 | 569 | 550 | 534 | 520 | 504 |
| 15.45 CFS | 488 | 470 | 454 | 438 | 423 | 408 | 393 | 379 |
| 16.65 CFS | 370 | 363 | 357 | 351 | 345 | 339 | 333 | 327 |
| 17.85 CFS | 321 | 315 | 310 | 304 | 298 | 292 | 286 | 281 |
| 19.05 CFS | 275 | 269 | 263 | 257 | 252 | 245 | 238 | 232 |
| 20.25 CFS | 226 | 222 | 218 | 216 | 213 | 212 | 210 | 209 |
| 21.45 CFS | 209 | 208 | 207 | 206 | 205 | 204 | 202 | 201 |
| 22.65 CFS | 200 | 198 | 197 | 195 | 194 | 194 | 193 | 192 |
| 23.85 CFS | 191 | 190 | 181 | 157 | 113 | 65 | 27 | 7 |
| 25.05 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.93 WATERSHED INCHES; 10285 CFS-HRS; 850.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.49 | 11750.6 | (NULL) |
| 13.73 | 4916.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .41 | .82 | 1.37 | 2.06 | 2.93 | 4.01 | 5.38 | 7.09 |
| 7.80 CFS | 9.19 | 11.70 | 14.68 | 18.26 | 22.63 | 27.91 | 34.27 | 41.66 |
| 9.00 CFS | 50 | 61 | 75 | 91 | 110 | 130 | 152 | 176 |
| 10.20 CFS | 204 | 236 | 274 | 318 | 368 | 428 | 498 | 584 |
| 11.40 CFS | 692 | 840 | 1115 | 1915 | 3820 | 6925 | 9989 | 11681 |
| 12.60 CFS | 11112 | 8780 | 6310 | 4839 | 4499 | 4570 | 4765 | 4901 |
| 13.80 CFS | 4902 | 4785 | 4584 | 4329 | 4049 | 3764 | 3488 | 3229 |
| 15.00 CFS | 2988 | 2767 | 2562 | 2374 | 2201 | 2043 | 1902 | 1776 |
| 16.20 CFS | 1662 | 1559 | 1468 | 1389 | 1321 | 1263 | 1211 | 1164 |
| 17.40 CFS | 1120 | 1081 | 1044 | 1011 | 981 | 953 | 927 | 902 |
| 18.60 CFS | 879 | 857 | 836 | 817 | 797 | 779 | 761 | 744 |
| 19.80 CFS | 726 | 709 | 691 | 674 | 660 | 646 | 635 | 624 |
| 21.00 CFS | 614 | 606 | 598 | 591 | 584 | 577 | 571 | 565 |
| 22.20 CFS | 559 | 553 | 548 | 543 | 538 | 533 | 529 | 525 |
| 23.40 CFS | 522 | 518 | 515 | 513 | 509 | 498 | 470 | 416 |
| 24.60 CFS | 347 | 279 | 228 | 199 | 186 | 177 | 166 | 153 |
| 25.80 CFS | 139 | 124 | 109 | 94 | 81 | 70 | 59 | 50 |
| 27.00 CFS | 42.25 | 35.47 | 29.67 | 24.75 | 20.59 | 17.09 | 14.16 | 11.71 |
| 28.20 CFS | 9.66 | 7.96 | 6.56 | 5.39 | 4.43 | 3.63 | 2.98 | 2.44 |
| 29.40 CFS | 1.99 | 1.63 | 1.33 | 1.09 | .88 | .72 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.14 WATERSHED INCHES; 28358 CFS-HRS; 2343.5 ACRE-FEET.

--- XSECTION 76, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1197.0 FEET) CAN ADD .336 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS
WITH 2377.12 AC-FT ( .18 WATERSHED INCHES) FLOOD STORAGE
REMAINING IN RESERVOIR AT ELEV. 1209.21. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.40 | 77.4 * | 1210.07 |

* FIRST POINT OF FLAT PEAK

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 73 CFS
RESVOR ( 94. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 20.57 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 5.55 CFS | 19.84 | 19.83 | 19.82 | 19.81 | 19.79 | 19.78 | 19.77 | 19.76 |
| 6.75 CFS | 19.74 | 19.73 | 19.72 | 19.71 | 19.70 | 19.69 | 19.68 | 19.67 |
| 7.95 CFS | 19.67 | 19.66 | 19.66 | 19.66 | 19.66 | 19.67 | 19.68 | 19.70 |
| 9.15 CFS | 19.72 | 19.75 | 19.80 | 19.85 | 19.91 | 19.99 | 20.08 | 20.19 |
| 10.35 CFS | 20.32 | 20.48 | 20.66 | 20.87 | 21.11 | 21.40 | 21.74 | 22.14 |
| 11.55 CFS | 22.62 | 23.24 | 24.21 | 26.06 | 28.58 | 32.19 | 36.81 | 41.12 |
| 12.75 CFS | 44.58 | 47.20 | 48.89 | 50.15 | 51.38 | 52.64 | 53.95 | 55.27 |
| 13.95 CFS | 56.58 | 57.77 | 58.88 | 59.93 | 60.90 | 61.81 | 62.64 | 63.41 |
| 15.15 CFS | 64.13 | 64.78 | 65.39 | 65.96 | 66.47 | 66.93 | 67.36 | 67.76 |
| 16.35 CFS | 68.14 | 68.49 | 68.81 | 69.13 | 69.42 | 69.70 | 69.97 | 70.23 |
| 17.55 CFS | 70.48 | 70.72 | 70.95 | 71.18 | 71.39 | 71.60 | 71.81 | 72.01 |
| 18.75 CFS | 72.20 | 72.39 | 72.57 | 72.75 | 72.92 | 73.09 | 73.25 | 73.41 |
| 19.95 CFS | 73.57 | 73.72 | 73.87 | 74.01 | 74.15 | 74.29 | 74.42 | 74.55 |
| 21.15 CFS | 74.68 | 74.81 | 74.93 | 75.06 | 75.18 | 75.30 | 75.42 | 75.54 |
| 22.35 CFS | 75.65 | 75.77 | 75.88 | 75.99 | 76.11 | 76.22 | 76.33 | 76.43 |
| 23.55 CFS | 76.54 | 76.65 | 76.75 | 76.86 | 76.96 | 77.06 | 77.13 | 77.19 |
| 24.75 CFS | 77.23 | 77.26 | 77.28 | 77.30 | 77.32 | 77.34 | 77.35 | 77.37 |
| 25.95 CFS | 77.38 | 77.38 | 77.39 | 77.39 | 77.39 | 77.39 | 77.38 | 77.38 |
| 27.15 CFS | 77.37 | 77.36 | 77.35 | 77.34 | 77.33 | 77.32 | 77.31 | 77.30 |
| 28.35 CFS | 77.29 | 77.27 | 77.26 | 77.25 | 77.24 | 77.22 | 77.21 | 77.20 |
| 29.55 CFS | 77.18 | 77.17 | 77.16 | 77.14 | 77.13 | 77.12 | 77.10 | 77.09 |
| 30.75 CFS | 77.07 | 77.05 | 77.03 | 77.01 | 76.99 | 76.98 | 76.96 | 76.94 |
| 31.95 CFS | 76.92 | 76.90 | 76.88 | 76.86 | 76.85 | 76.83 | 76.81 | 76.79 |
| 33.15 CFS | 76.77 | 76.75 | 76.73 | 76.72 | 76.70 | 76.68 | 76.66 | 76.64 |
| 34.35 CFS | 76.62 | 76.60 | 76.59 | 76.57 | 76.55 | 76.53 | 76.51 | 76.49 |
| 35.55 CFS | 76.47 | 76.46 | 76.44 | 76.42 | 76.40 | 76.38 | 76.36 | 76.34 |
| 36.75 CFS | 76.33 | 76.31 | 76.29 | 76.27 | 76.25 | 76.23 | 76.22 | 76.20 |
| 37.95 CFS | 76.18 | 76.16 | 76.14 | 76.12 | 76.11 | 76.09 | 76.07 | 76.05 |
| 39.15 CFS | 76.03 | 76.01 | 75.99 | 75.98 | 75.96 | 75.94 | 75.92 | 75.90 |
| 40.35 CFS | 75.88 | 75.87 | 75.85 | 75.83 | 75.81 | 75.79 | 75.77 | 75.76 |
| 41.55 CFS | 75.74 | 75.72 | 75.70 | 75.68 | 75.66 | 75.65 | 75.63 | 75.61 |
| 42.75 CFS | 75.59 | 75.57 | 75.56 | 75.54 | 75.52 | 75.50 | 75.48 | 75.46 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 43.95 CFS | 75.45 | 75.43 | 75.41 | 75.39 | 75.37 | 75.35 | 75.34 | 75.32 |
| 45.15 CFS | 75.30 | 75.28 | 75.26 | 75.25 | 75.23 | 75.21 | 75.19 | 75.17 |
| 46.35 CFS | 75.15 | 75.14 | 75.12 | 75.10 | 75.08 | 75.06 | 75.05 | 75.03 |
| 47.55 CFS | 75.01 | 74.99 | 74.97 | 74.95 | 74.94 | 74.92 | 74.90 | 74.88 |
| 48.75 CFS | 74.86 | 74.85 | 74.83 | 74.81 | 74.79 | 74.77 | 74.76 | 74.74 |
| 49.95 CFS | 74.72 | 74.70 | 74.68 | 74.66 | 74.65 | 74.63 | 74.61 | 74.59 |
| 51.15 CFS | 74.57 | 74.56 | 74.54 | 74.52 | 74.50 | 74.48 | 74.47 | 74.45 |
| 52.35 CFS | 74.43 | 74.41 | 74.39 | 74.38 | 74.36 | 74.34 | 74.32 | 74.30 |
| 53.55 CFS | 74.29 | 74.27 | 74.25 | 74.23 | 74.21 | 74.20 | 74.18 | 74.16 |
| 54.75 CFS | 74.14 | 74.13 | 74.11 | 74.09 | 74.07 | 74.05 | 74.04 | 74.02 |
| 55.95 CFS | 74.00 | 73.98 | 73.96 | 73.95 | 73.93 | 73.91 | 73.89 | 73.87 |
| 57.15 CFS | 73.86 | 73.84 | 73.82 | 73.80 | 73.79 | 73.77 | 73.75 | 73.73 |
| 58.35 CFS | 73.71 | 73.70 | 73.68 | 73.66 | 73.64 | 73.62 | 73.61 | 73.59 |
| 59.55 CFS | 73.57 | 73.55 | 73.54 | 73.52 | 73.50 | 73.48 | 73.46 | 73.45 |
| 60.75 CFS | 73.43 | 73.41 | 73.39 | 73.38 | 73.36 | 73.34 | 73.32 | 73.31 |
| 61.95 CFS | 73.29 | 73.27 | 73.25 | 73.23 | 73.22 | 73.20 | 73.18 | 73.16 |
| 63.15 CFS | 73.15 | 73.13 | 73.11 | 73.09 | 73.07 | 73.06 | 73.04 | 73.02 |
| 64.35 CFS | 73.00 | 72.99 | 72.97 | 72.95 | 72.93 | 72.92 | 72.90 | 72.88 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.31 WATERSHED INCHES; 4051 CFS-HRS; 334.8 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 2

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

RAINFALL OF 3.85 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.
RAINTABLE NUMBER 2, ARC 1
MAIN TIME INCREMENT .150 HOURS

ALTERNATE 1 STORM 1

| XSECTION/ STRUCTURE ID | | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|---|
| XSECTION | 1 | RUNOFF | 2.46 | 1.44 | --- | 12.40 | 1705 | 693.1 |
| XSECTION | 5 | REACH | 2.46 | 1.44 | 3.80 | 13.07 | 1009 | 410.2 |
| XSECTION | 10 | REACH | 2.46 | 1.44 | 4.99 | 13.72 | 733 | 298.0 |
| XSECTION | 2 | RUNOFF | 2.38 | .84 | --- | 12.36 | 900 | 378.2 |
| XSECTION | 12 | ADDHYD | 4.84 | 1.15 | --- | 12.37 | 915 | 189.0 |
| XSECTION | 12 | DIVERT | 4.84 | 1.15 | --- | 12.37 | 915 | 189.0 |
| XSECTION | 200 | DIVERT | .00 | 1.15 | --- | .00 | 0 | ******** |
| XSECTION | 20 | REACH | 4.84 | 1.15 | 3.34 | 13.90 | 857 | 177.1 |
| XSECTION | 25 | REACH | 4.84 | 1.15 | 2.08 | 14.08 | 853 | 176.2 |
| XSECTION | 3 | RUNOFF | 3.94 | 1.44 | --- | 12.41 | 2671 | 677.9 |
| XSECTION | 30 | REACH | 3.94 | 1.44 | 3.47 | 13.42 | 1395 | 354.1 |
| XSECTION | 5 | REACH | 3.94 | 1.44 | 3.80 | 14.04 | 1008 | 255.8 |
| XSECTION | 25 | REACH | 3.94 | 1.44 | 2.31 | 14.22 | 1006 | 255.3 |
| XSECTION | 4 | RUNOFF | 2.06 | .66 | --- | 12.43 | 527 | 255.8 |
| XSECTION | 34 | ADDHYD | 6.00 | 1.17 | --- | 14.19 | 1085 | 180.8 |
| XSECTION | 35 | ADDHYD | 10.84 | 1.16 | --- | 14.14 | 1936 | 178.6 |
| XSECTION | 35 | DIVERT | 10.84 | 1.16 | --- | 14.14 | 1936 | 178.6 |
| XSECTION | 199 | DIVERT | .00 | 1.16 | --- | .00 | 0 | ******** |
| XSECTION | 45 | REACH | 10.84 | 1.16 | 3.21 | 14.40 | 1901 | 175.4 |
| XSECTION | 6 | RUNOFF | 1.47 | 1.53 | --- | 12.15 | 1541 | 1048.3 |
| XSECTION | 60 | REACH | 1.47 | 1.53 | 4.20 | 12.59 | 858 | 583.7 |
| XSECTION | 67 | REACH | 1.47 | 1.53 | 3.12 | 13.11 | 621 | 422.4 |
| XSECTION | 64 | ADDHYD | 12.31 | 1.21 | --- | 14.31 | 2131 | 173.1 |
| XSECTION | 5 | RUNOFF | 4.78 | .77 | --- | 12.41 | 1544 | 323.0 |
| XSECTION | 7 | RUNOFF | 3.48 | .96 | --- | 12.54 | 1321 | 379.6 |
| XSECTION | 75 | ADDHYD | 8.26 | .85 | --- | 12.46 | 2800 | 339.0 |
| XSECTION | 76 | ADDHYD | 20.57 | 1.06 | --- | 12.57 | 3492 | 169.8 |
| STRUCTURE | 1 | RESVOR | 20.57 | .23 | 1205.48 | 26.85F | 54F | 2.6 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINTABLE NUMBER 2, ARC 2 | | | | | | | |
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 2.50 | --- | 12.36 | 3097 | 1258.9 |
| XSECTION 5 | REACH | 2.46 | 2.51 | 4.85 | 12.88 | 1860 | 756.1 |
| XSECTION 10 | REACH | 2.46 | 2.51 | 5.93 | 13.54 | 1303 | 529.7 |
| XSECTION 2 | RUNOFF | 2.38 | 1.93 | --- | 12.30 | 2511 | 1055.0 |
| XSECTION 12 | ADDHYD | 4.84 | 2.22 | --- | 12.31 | 2655 | 548.6 |
| XSECTION 12 | DIVERT | 4.84 | 2.22 | --- | 12.31 | 2655 | 548.6 |
| XSECTION 200 | DIVERT | .00 | 2.22 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 2.22 | 6.16 | 12.47 | 2618 | 540.9 |
| XSECTION 25 | REACH | 4.84 | 2.22 | 3.87 | 12.47 | 2618 | 540.9 |
| XSECTION 3 | RUNOFF | 3.94 | 2.51 | --- | 12.38 | 4801 | 1218.5 |
| XSECTION 30 | REACH | 3.94 | 2.51 | 4.10 | 13.23 | 2639 | 669.8 |
| XSECTION 5 | REACH | 3.94 | 2.51 | 4.90 | 13.79 | 1910 | 484.8 |
| XSECTION 25 | REACH | 3.94 | 2.51 | 3.28 | 13.79 | 1910 | 484.8 |
| XSECTION 4 | RUNOFF | 2.06 | 1.73 | --- | 12.35 | 1790 | 868.9 |
| XSECTION 34 | ADDHYD | 6.00 | 2.24 | --- | 13.75 | 2101 | 350.2 |
| XSECTION 35 | ADDHYD | 10.84 | 2.23 | --- | 12.43 | 4513 | 416.3 |
| XSECTION 35 | DIVERT | 10.84 | 2.23 | --- | 12.43 | 4513 | 416.3 |
| XSECTION 199 | DIVERT | .00 | 2.23 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 2.23 | 5.07 | 12.61 | 4335 | 399.9 |
| XSECTION 6 | RUNOFF | 1.47 | 2.59 | --- | 12.14 | 2639 | 1795.2 |
| XSECTION 60 | REACH | 1.47 | 2.59 | 5.08 | 12.54 | 1673 | 1138.1 |
| XSECTION 67 | REACH | 1.47 | 2.59 | 4.11 | 12.86 | 1234 | 839.5 |
| XSECTION 64 | ADDHYD | 12.31 | 2.27 | --- | 12.65 | 5343 | 434.0 |
| XSECTION 5 | RUNOFF | 4.78 | 1.84 | --- | 12.34 | 4519 | 945.4 |
| XSECTION 7 | RUNOFF | 3.48 | 2.05 | --- | 12.47 | 3227 | 927.3 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 75 | ADDHYD | 8.26 | 1.93 | --- | 12.39 | 7577 | 917.3 |
| XSECTION 76 | ADDHYD | 20.57 | 2.14 | --- | 12.49 | 11751 | 571.3 |
| STRUCTURE 1 | RESVOR | 20.57 | .31 | 1210.07 | 26.40F | 77F | 3.7 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | HYDROGRAPH INFLOW PEAK (CFS) | HYDROGRAPH INFLOW TIME (HR) | HYDROGRAPH OUTFLOW PEAK (CFS) | HYDROGRAPH OUTFLOW TIME (HR) | ROUTING PARAMETERS Q-A EQ. COEFF (X) | Q-A EQ. POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 1678 | 12.4 | 1008 | 13.1 | .78 | 1.24 | .457 | .600 | .23 |
| 10 | 9100 | | 1008 | 13.1 | 729 | 13.6 | .67 | 1.31 | .199 | .724 | .26 |
| 20 | 3332 | | 887 | 12.3 | 855 | 13.9 | .11 | 1.68 | .007 | .963 | .73? |
| 25 | 1950 | | 855 | 13.9 | 853 | 14.1 | .046 | 1.75 | .004 | .998 | .86? |
| 30 | 8865 | | 2652 | 12.4 | 1374 | 13.4 | 1.08 | 1.14 | .588 | .518 | .18 |
| 5 | 8865 | | 1374 | 13.4 | 1006 | 14.1 | .71 | 1.26 | .195 | .732 | .23 |
| 25 | 1950 | | 1006 | 14.1 | 1005 | 14.3 | .046 | 1.75 | .004 | .999 | .89? |
| 45 | 4200 | | 1934 | 14.1 | 1901 | 14.4 | .044 | 1.73 | .009 | .983 | .63 |
| 60 | 7540 | | 1541 | 12.1 | 858 | 12.6 | .67 | 1.29 | .493 | .557 | .30 |
| 67 | 5140 | | 858 | 12.6 | 615 | 13.1 | .65 | 1.28 | .189 | .717 | .35 |
| ALTERNATE 2 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 3036 | 12.3 | 1857 | 12.9 | 1.09 | 1.18 | .473 | .612 | .23 |
| 10 | 9100 | | 1857 | 12.9 | 1301 | 13.5 | 1.29 | 1.17 | .260 | .700 | .23 |
| 20 | 3332 | | 2654 | 12.3 | 2611 | 12.4 | .13 | 1.65 | .008 | .984 | .92? |
| 25 | 1950 | | 2611 | 12.4 | 2611 | 12.4 | .048 | 1.74 | .004 | 1.000 | 1.00? |
| 30 | 8865 | | 4686 | 12.4 | 2632 | 13.2 | 1.21 | 1.12 | .571 | .562 | .19 |
| 5 | 8865 | | 2632 | 13.2 | 1910 | 13.8 | 1.03 | 1.19 | .225 | .726 | .23 |
| 25 | 1950 | | 1910 | 13.8 | 1910 | 13.8 | .046 | 1.75 | .003 | 1.000 | 1.00? |
| 45 | 4200 | | 4504 | 12.4 | 4332 | 12.6 | .046 | 1.73 | .007 | .962 | .79? |
| 60 | 7540 | | 2633 | 12.1 | 1641 | 12.6 | .49 | 1.35 | .383 | .623 | .36 |
| 67 | 5140 | | 1641 | 12.6 | 1230 | 12.9 | .76 | 1.25 | .199 | .749 | .37 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE 1 | | 20.57 | |
| ALTERNATE | 1 | | 54 |
| ALTERNATE | 2 | | 77 |
| XSECTION 1 | | 2.46 | |
| ALTERNATE | 1 | | 1705 |
| ALTERNATE | 2 | | 3097 |
| XSECTION 2 | | 2.38 | |
| ALTERNATE | 1 | | 900 |
| ALTERNATE | 2 | | 2511 |
| XSECTION 3 | | 3.94 | |
| ALTERNATE | 1 | | 2671 |
| ALTERNATE | 2 | | 4801 |
| XSECTION 4 | | 2.06 | |
| ALTERNATE | 1 | | 527 |
| ALTERNATE | 2 | | 1790 |
| XSECTION 5 | | 4.78 | |
| ALTERNATE | 1 | | 1544 |
| ALTERNATE | 2 | | 4519 |
| XSECTION 6 | | 1.47 | |
| ALTERNATE | 1 | | 1541 |
| ALTERNATE | 2 | | 2639 |
| XSECTION 7 | | 3.48 | |
| ALTERNATE | 1 | | 1321 |
| ALTERNATE | 2 | | 3227 |
| XSECTION 10 | | 2.46 | |
| ALTERNATE | 1 | | 733 |
| ALTERNATE | 2 | | 1303 |
| XSECTION 12 | | 4.84 | |
| ALTERNATE | 1 | | 915 |
| ALTERNATE | 2 | | 2655 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: *OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.*

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 20 | | 4.84 | |
| ALTERNATE | 1 | | 857 |
| ALTERNATE | 2 | | 2618 |
| XSECTION 25 | | 3.94 | |
| ALTERNATE | 1 | | 1006 |
| ALTERNATE | 2 | | 1910 |
| XSECTION 30 | | 3.94 | |
| ALTERNATE | 1 | | 1395 |
| ALTERNATE | 2 | | 2639 |
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 1085 |
| ALTERNATE | 2 | | 2101 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 1936 |
| ALTERNATE | 2 | | 4513 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 1901 |
| ALTERNATE | 2 | | 4335 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 858 |
| ALTERNATE | 2 | | 1673 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 2131 |
| ALTERNATE | 2 | | 5343 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 621 |
| ALTERNATE | 2 | | 1234 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 2800 |
| ALTERNATE | 2 | | 7577 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 3492 |
| ALTERNATE | 2 | | 11751 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

```
TR20 ------------------------------------------------------------------- SCS -
WT100YR   WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
01/21/**  100-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spil2.04TEST


END OF  1 JOBS IN THIS RUN
```

```
                    SCS  TR-20,  VERSION 2.04TEST
                          WT100YR   FILES

     INPUT  = 100INN.DAT                              , GIVEN DATA FILE
     OUTPUT = 100OUT.OUT                              , DATED 01/21/**,15:14:21

              FILES GENERATED - DATED 01/21/**,15:14:21

    FILE 100OUT.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   4,  MESSAGES =   8

                       JOB ENDED AT 15:14:21
                    *** TR-20 RUN COMPLETED ***
```

200-year 24-hr Modeling Results

(Interim Condition)

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20 WT100YR                          PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROUTING
TITLE     200-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spillway
 4 DIMHYD                .0556                                          WT3
 8          0.0          .03          .10          .19          .31
 8          .47          .66          .82          .93          .99
 8          1.0          .99          .93          .82          .66
 8          .47          .31          .03          .00          .00
 9 ENDTBL
 5 RAINFL 2              .1000                                          TYPE II
 8          .0000        .0010        .0020        .0030        .0041
 8          .0051        .0062        .0072        .0083        .0094
 8          .0105        .0116        .0127        .0138        .0150
 8          .0161        .0173        .0184        .0196        .0208
 8          .0220        .0232        .0244        .0257        .0269
 8          .0281        .0294        .0306        .0319        .0332
 8          .0345        .0358        .0371        .0384        .0398
 8          .0411        .0425        .0439        .0452        .0466
 8          .0480        .0494        .0508        .0523        .0538
 8          .0553        .0568        .0583        .0598        .0614
 8          .0630        .0646        .0662        .0679        .0696
 8          .0712        .0730        .0747        .0764        .0782
 8          .0800        .0818        .0836        .0855        .0874
 8          .0892        .0912        .0931        .0950        .0970
 8          .0990        .1010        .1030        .1051        .1072
 8          .1093        .1114        .1135        .1156        .1178
 8          .1200        .1222        .1246        .1270        .1296
 8          .1322        .1350        .1379        .1408        .1438
 8          .1470        .1502        .1534        .1566        .1598
 8          .1630        .1663        .1697        .1733        .1771
 8          .1810        .1851        .1895        .1941        .1989
 8          .2040        .2094        .2152        .2214        .2280
 8          .2350        .2427        .2513        .2609        .2715
 8          .2830        .3068        .3544        .4308        .5679
 8          .6630        .6820        .6986        .7130        .7252
 8          .7350        .7434        .7514        .7588        .7656
 8          .7720        .7780        .7836        .7890        .7942
 8          .7990        .8036        .8080        .8122        .8162
 8          .8200        .8237        .8273        .8308        .8342
 8          .8376        .8409        .8442        .8474        .8505
 8          .8535        .8565        .8594        .8622        .8649
 8          .8676        .8702        .8728        .8753        .8777
 8          .8800        .8823        .8845        .8868        .8890
 8          .8912        .8934        .8955        .8976        .8997
 8          .9018        .9038        .9058        .9078        .9097
 8          .9117        .9136        .9155        .9173        .9192
 8          .9210        .9228        .9245        .9263        .9280
 8          .9297        .9313        .9330        .9346        .9362
 8          .9377        .9393        .9408        .9423        .9438
 8          .9452        .9466        .9480        .9493        .9507
 8          .9520        .9533        .9546        .9559        .9572
 8          .9584        .9597        .9610        .9622        .9635
 8          .9647        .9660        .9672        .9685        .9697
 8          .9709        .9722        .9734        .9746        .9758
 8          .9770        .9782        .9794        .9806        .9818
 8          .9829        .9841        .9853        .9864        .9876
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8          .9887       .9899       .9910       .9922       .9933
 8          .9944       .9956       .9967       .9978       .9989
 8         1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         10.41                             BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.86        5.          4.39
 8                      2.01        50.         24.22
 8                      2.58        100.        40.12
 8                      3.46        200.        80.99
 8                      4.14        400.        129.44
 8                      5.16        800.        214.74
 8                      6.39        1600.       441.84
 8                      7.80        3200.       980.75
 8                      9.16        6400.       1891.44
 8                      10.41       12800.      3516.14
 8                      11.75       25600.      6548.98
 8                      13.26       51200.      11081.19
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
```

```
 8                      1.56        500.        203.28
 8                      2.30        1000.       302.00
 8                      3.38        2000.       449.24
 8                      4.97        4000.       673.73
 8                      6.23        6000.       855.96
 8                      7.31        8000.       1016.35
 8                      8.24        10000.      1158.51
 8                      9.09        12000.      1293.31
 8                      9.90        14000.      1425.57
 8                      10.64       16000.      1549.17
 8                      11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030        1.0         9.45                                BOSSCS#6
 8                      0.          0.0         0.0
 8                      0.77        5.          4.67
 8                      1.54        50.         32.06
 8                      1.78        100.        56.64
 8                      2.10        200.        100.59
 8                      2.50        400.        179.97
 8                      3.01        800.        320.25
 8                      3.63        1600.       589.66
 8                      4.35        3200.       1110.72
 8                      5.21        6400.       2084.48
 8                      6.03        12800.      4119.83
 8                      6.99        25600.      6856.75
 8                      8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045        1.0         4.87                                REACHA
 8                      0.          0.0         0.0
 8                      0.60        100.        85.69
 8                      0.90        200.        127.94
 8                      1.13        300.        161.93
 8                      1.52        500.        217.27
 8                      2.25        1000.       324.03
 8                      3.31        2000.       483.02
 8                      4.87        4000.       722.17
 8                      6.09        6000.       914.99
 8                      7.15        8000.       1084.61
 8                      8.05        10000.      1234.17
 8                      8.87        12000.      1373.80
 8                      9.64        14000.      1507.84
 8                      10.34       16000.      1633.45
 8                      11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060        1.0         4.7                                 2CP6CP7
 8                      0.          0.0         0.0
 8                      2.36        100.        45.12
 8                      2.88        200.        83.75
 8                      3.18        300.        114.33
 8                      3.64        500.        172.72
 8                      4.42        1000.       289.04
 8                      5.40        2000.       470.72
 8                      6.87        4000.       782.74
 8                      7.91        6000.       1020.12
 8                      8.79        8000.       1231.25
 8                      9.60        10000.      1435.05
```

```
 8                        10.26       12000.      1618.34
 8                        10.94       14000.      1812.58
 8                        11.47       16000.      1983.46
 8                        11.96       18000.      2150.12
 9 ENDTBL
 2 XSECTN   067           1.0         8.77                                BOSSCS#5
 8                        0.          0.0         0.0
 8                        0.35        5.          5.56
 8                        1.03        50.         30.95
 8                        1.39        100.        52.16
 8                        1.94        200.        88.72
 8                        2.63        400.        148.61
 8                        3.51        800.        260.63
 8                        4.62        1600.       459.66
 8                        6.04        3200.       929.36
 8                        7.38        6400.       1811.51
 8                        8.77        12800.      3374.20
 8                        10.17       25600.      6398.87
 8                        11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT      01                                                         95/11/6
 8                        1178.0      0.00        0.0
 8                        1188.0      2.71        44.8
 8                        1193.0      7.29        129.0
 8                        1199.2      26.75       500.0
 8                        1202.0      38.68       845.55
 8                        1204.0      48.00       1176.28
 8                        1206.0      56.80       1575.25
 8                        1208.0      66.40       2044.97
 8                        1210.0      77.10       2593.40
 8                        1212.0      85.95       3218.00
 8                        1213.0      2685.00     3556.67
 8                        1214.0      8231.00     3916.02
 8                        1215.0      15545.0     4294.13
 8                        1216.0      24272.0     4692.68
 8                        1217.0      34212.0     5113.19
 8                        1218.0      45232.0     5556.01
 8                        1219.0      57233.0     6021.50
 8                        1220.0      70142.0     6509.75
 9 ENDTBL
 6 RUNOFF 1 001         1 2.46        87.2        0.85        1 1
                                                              1          BOSS#6
 6 REACH  3 005    1    7 9100.                                1          BOSS#4
 6 REACH  3 010    7    2 9100.
 6 RUNOFF 1 002         3 2.38        79.9        0.73        1 1
                                                              1 1
 6 ADDHYD 4 012    2 3 1                                      1 1        OLIVE
 6 DIVERT 6 012    1 4 7 4100.       1.00        200.                   REACH C
 6 REACH  3 020    4    7 3332.                                1          REACH B
 6 REACH  3 025    7    5 1950.
 6 RUNOFF 1 003         6 3.94        87.2        0.88        1 1
 6 REACH  3 030    6    7 8865.                                1          BOSS#6
 6 REACH  3 005    7    1 8865.                                1          BOSS#5
 6 REACH  3 025    1    7 1950.                                1          REACH B
 6 RUNOFF 1 004         1 2.06        77.3        0.79        1 1
 6 ADDHYD 4 034    7 1 2                                      1 1
 6 ADDHYD 4 035    5 2 3                                      1 1
 6 DIVERT 6 035    3 4 7 11000.      1.00        199.        1 1        NORTHERN
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 REACH  3 045   4   5 4200.                                  1          REACH A
 6 RUNOFF 1 006       2 1.47        87.7        0.47          1 1
 6 REACH  3 060   2   3 7540.                                  1          CP6CP7
 6 REACH  3 067   3   4 5140.                                  1          BOSS#5
 6 ADDHYD 4 064   5 4 3                                       1 1
 6 RUNOFF 1 005       6 4.78        78.8        0.78          1 1
 6 RUNOFF 1 007       7 3.48        81.7        1.01          1 1
 6 ADDHYD 4 075   6 7 1                                       1 1
 6 ADDHYD 4 076   1 3 2                                       1 1      1
 6 RESVOR 2    01 2   1 1197.0                                1 1      1
 ENDATA
 7 LIST               1.0                      1.
 7 INCREM 6           0.15
 7 COMPUT 7 001     01 0.          4.28        1.0           2 1  01  01
   ENDCMP 1
 7 COMPUT 7 001     01 0.          4.28        1.0           2 2  02  01
   ENDCMP 1
   ENDJOB 2

**********END OF 80-80 LIST**********
```

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST 1. 0. 1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT

DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0017 | .0035 | .0052 | .0070 |
| .0087 | .0105 | .0122 | .0139 | .0157 |
| .0174 | .0192 | .0210 | .0227 | .0245 |
| .0262 | .0280 | .0297 | .0315 | .0332 |
| .0350 | .0368 | .0386 | .0404 | .0423 |
| .0442 | .0461 | .0480 | .0500 | .0520 |
| .0540 | .0561 | .0582 | .0603 | .0625 |
| .0647 | .0669 | .0691 | .0714 | .0737 |
| .0760 | .0784 | .0807 | .0831 | .0855 |
| .0878 | .0902 | .0926 | .0951 | .0975 |
| .1000 | .1024 | .1049 | .1073 | .1098 |
| .1123 | .1148 | .1174 | .1199 | .1225 |
| .1250 | .1276 | .1303 | .1332 | .1361 |
| .1391 | .1423 | .1456 | .1489 | .1524 |
| .1560 | .1597 | .1633 | .1671 | .1708 |
| .1746 | .1784 | .1823 | .1861 | .1901 |
| .1940 | .1982 | .2027 | .2077 | .2132 |
| .2190 | .2252 | .2318 | .2388 | .2462 |
| .2540 | .2623 | .2714 | .2812 | .2917 |
| .3030 | .3194 | .3454 | .3878 | .4632 |
| .5150 | .5322 | .5476 | .5612 | .5730 |
| .5830 | .5919 | .6003 | .6083 | .6159 |
| .6230 | .6298 | .6365 | .6430 | .6493 |
| .6555 | .6615 | .6674 | .6731 | .6786 |
| .6840 | .6892 | .6944 | .6995 | .7044 |
| .7092 | .7140 | .7186 | .7232 | .7276 |
| .7320 | .7362 | .7404 | .7444 | .7484 |
| .7523 | .7560 | .7596 | .7632 | .7667 |
| .7700 | .7733 | .7766 | .7798 | .7830 |
| .7862 | .7894 | .7926 | .7958 | .7989 |
| .8020 | .8051 | .8082 | .8112 | .8142 |
| .8173 | .8202 | .8232 | .8262 | .8291 |
| .8320 | .8349 | .8378 | .8406 | .8434 |
| .8462 | .8490 | .8518 | .8546 | .8573 |
| .8600 | .8627 | .8654 | .8680 | .8706 |
| .8733 | .8758 | .8784 | .8810 | .8835 |
| .8860 | .8885 | .8910 | .8934 | .8958 |
| .8982 | .9006 | .9030 | .9054 | .9077 |
| .9100 | .9123 | .9146 | .9168 | .9190 |
| .9212 | .9234 | .9256 | .9278 | .9299 |
| .9320 | .9341 | .9362 | .9382 | .9402 |
| .9423 | .9442 | .9462 | .9482 | .9501 |
| .9520 | .9539 | .9558 | .9576 | .9594 |
| .9613 | .9630 | .9648 | .9666 | .9683 |
| .9700 | .9717 | .9734 | .9750 | .9766 |
| .9783 | .9798 | .9814 | .9830 | .9845 |
| .9860 | .9875 | .9890 | .9904 | .9918 |
| .9933 | .9946 | .9960 | .9974 | .9987 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RUNOFF | 1 | | | 1 | 2.4600 | 87.2000 | .85001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 5 | 1 | | 7 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 10 | 7 | | 2 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 2 | | | 3 | 2.3800 | 79.9000 | .73001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 12 | 2 | 3 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 12 | 1 | 4 | 7 | 4100.0000 | 1.0000 | 200.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 20 | 4 | | 7 | 3332.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 7 | | 5 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 3 | | | 6 | 3.9400 | 87.2000 | .88001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 30 | 6 | | 7 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 5 | 7 | | 1 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 1 | | 7 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 4 | | | 1 | 2.0600 | 77.3000 | .79001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 34 | 7 | 1 | 2 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 35 | 5 | 2 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 35 | 3 | 4 | 7 | 11000.0000 | 1.0000 | 199.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 45 | 4 | | 5 | 4200.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 6 | | | 2 | 1.4700 | 87.7000 | .47001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 60 | 2 | | 3 | 7540.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 67 | 3 | | 4 | 5140.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| ADDHYD | 64 | 5 | 4 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 5 | | | 6 | 4.7800 | 78.8000 | .78001 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 7 | | | 7 | 3.4800 | 81.7000 | 1.01001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 75 | 6 | 7 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 76 | 1 | 3 | 2 | | | 1 | 1 | 0 | 0 | 1 | 1 |
| RESVOR | | 1 | 2 | 1 | 1197.0000 | | 1 | 1 | 0 | 0 | 1 | 1 |
| ENDATA | | | | | | | | | | | | |

END OF LISTING

EXECUTIVE CONTROL  INCREM  MAIN TIME INCREMENT = .150 HOURS

EXECUTIVE CONTROL  COMPUT  FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00  RAIN DEPTH = 4.28  RAIN DURATION = 1.00
ANT. RUNOFF COND. = 1  MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 1  STORM NO. = 1  RAIN TABLE NO. = 2

OPERATION RUNOFF  XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.39 | 2110.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.90 | CFS | .14 | .66 | 2.05 | 4.52 | 8.28 | 13.13 | 19.03 | 26.41 |
| 11.10 | CFS | 35 | 47 | 63 | 85 | 140 | 314 | 763 | 1461 |
| 12.30 | CFS | 2030 | 2064 | 1596 | 891 | 518 | 407 | 346 | 308 |
| 13.50 | CFS | 280 | 257 | 238 | 221 | 206 | 193 | 181 | 172 |
| 14.70 | CFS | 165 | 160 | 156 | 152 | 147 | 142 | 137 | 133 |
| 15.90 | CFS | 128 | 124 | 120 | 115 | 111 | 108 | 107 | 105 |
| 17.10 | CFS | 103 | 102 | 100 | 98 | 96 | 95 | 93 | 92 |
| 18.30 | CFS | 89.87 | 88.14 | 86.52 | 84.73 | 83.01 | 81.32 | 79.48 | 77.83 |
| 19.50 | CFS | 76.19 | 74.49 | 72.71 | 70.67 | 68.72 | 67.10 | 65.87 | 64.87 |
| 20.70 | CFS | 64.02 | 63.38 | 62.94 | 62.57 | 62.39 | 62.16 | 61.97 | 61.76 |
| 21.90 | CFS | 61.51 | 61.11 | 60.68 | 60.29 | 59.90 | 59.63 | 59.20 | 58.76 |
| 23.10 | CFS | 58.31 | 58.06 | 57.89 | 57.63 | 57.45 | 57.22 | 56.69 | 54.24 |
| 24.30 | CFS | 46.42 | 32.99 | 17.83 | 5.79 | .35 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 2783 CFS-HRS; 230.0 ACRE-FEET.

OPERATION REACH  XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.06 | 1263.0 | 4.15 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 2783 CFS-HRS; 230.0 ACRE-FEET.

OPERATION REACH  XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.71 | 908.0 | 5.33 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 2783 CFS-HRS; 230.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1217.2 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.40 CFS | 0 | 1 | 10 | 93 | 383 | 875 | 1197 | 1128 |
| 12.60 CFS | 742 | 397 | 298 | 250 | 220 | 200 | 184 | 170 |
| 13.80 CFS | 159 | 148 | 139 | 131 | 124 | 118 | 114 | 111 |
| 15.00 CFS | 109 | 106 | 103 | 100 | 96 | 93 | 90 | 87 |
| 16.20 CFS | 84.29 | 81.16 | 78.81 | 77.42 | 76.48 | 75.40 | 74.18 | 73.02 |
| 17.40 CFS | 71.83 | 70.63 | 69.46 | 68.44 | 67.37 | 66.26 | 65.02 | 63.88 |
| 18.60 CFS | 62.71 | 61.45 | 60.30 | 59.03 | 57.80 | 56.65 | 55.44 | 54.30 |
| 19.80 CFS | 52.89 | 51.36 | 50.05 | 49.05 | 48.29 | 47.66 | 47.08 | 46.73 |
| 21.00 CFS | 46.45 | 46.29 | 46.18 | 46.04 | 45.96 | 45.81 | 45.62 | 45.32 |
| 22.20 CFS | 45.02 | 44.71 | 44.59 | 44.34 | 43.98 | 43.67 | 43.44 | 43.34 |
| 23.40 CFS | 43.16 | 43.10 | 42.91 | 42.74 | 42.24 | 39.85 | 31.55 | 19.34 |
| 24.60 CFS | 7.71 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.08 WATERSHED INCHES; 1655 CFS-HRS; 136.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1245.6 | (NULL) |
| 13.67 | 1075.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 1 | 1 | 2 | 4 | 16 | 103 | 396 |
| 12.15 CFS | 893 | 1222 | 1163 | 801 | 510 | 521 | 642 | 807 |
| 13.35 CFS | 958 | 1048 | 1075 | 1058 | 1011 | 949 | 879 | 808 |
| 14.55 CFS | 739 | 676 | 618 | 565 | 518 | 475 | 437 | 403 |
| 15.75 CFS | 373 | 348 | 326 | 306 | 288 | 273 | 260 | 250 |
| 16.95 CFS | 240 | 231 | 222 | 214 | 207 | 201 | 195 | 190 |
| 18.15 CFS | 185 | 181 | 176 | 172 | 169 | 165 | 162 | 158 |
| 19.35 CFS | 155 | 152 | 149 | 145 | 142 | 139 | 136 | 134 |
| 20.55 CFS | 131 | 129 | 127 | 125 | 123 | 121 | 119 | 118 |
| 21.75 CFS | 116 | 115 | 113 | 112 | 111 | 110 | 109 | 108 |
| 22.95 CFS | 107 | 107 | 106 | 105 | 105 | 104 | 104 | 103 |
| 24.15 CFS | 99.95 | 91.29 | 78.74 | 66.78 | 58.74 | 58.29 | 57.33 | 55.36 |
| 25.35 CFS | 52.02 | 47.40 | 41.98 | 36.41 | 31.08 | 26.20 | 21.86 | 18.09 |
| 26.55 CFS | 14.86 | 12.14 | 9.86 | 7.98 | 6.43 | 5.16 | 4.14 | 3.30 |
| 27.75 CFS | 2.63 | 2.09 | 1.66 | 1.31 | 1.03 | .82 | .64 | .50 |
| 28.95 CFS | .40 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1245.6 | (DIVERT) |
| 13.67 | 1075.3 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 1 | 1 | 2 | 4 | 16 | 103 | 396 |
| 12.15 CFS | 893 | 1222 | 1163 | 801 | 510 | 521 | 642 | 807 |
| 13.35 CFS | 958 | 1048 | 1075 | 1058 | 1011 | 949 | 879 | 808 |
| 14.55 CFS | 739 | 676 | 618 | 565 | 518 | 475 | 437 | 403 |
| 15.75 CFS | 373 | 348 | 326 | 306 | 288 | 273 | 260 | 250 |
| 16.95 CFS | 240 | 231 | 222 | 214 | 207 | 201 | 195 | 190 |
| 18.15 CFS | 185 | 181 | 176 | 172 | 169 | 165 | 162 | 158 |
| 19.35 CFS | 155 | 152 | 149 | 145 | 142 | 139 | 136 | 134 |
| 20.55 CFS | 131 | 129 | 127 | 125 | 123 | 121 | 119 | 118 |
| 21.75 CFS | 116 | 115 | 113 | 112 | 111 | 110 | 109 | 108 |
| 22.95 CFS | 107 | 107 | 106 | 105 | 105 | 104 | 104 | 103 |
| 24.15 CFS | 99.95 | 91.29 | 78.74 | 66.78 | 58.74 | 58.29 | 57.33 | 55.36 |
| 25.35 CFS | 52.02 | 47.40 | 41.98 | 36.41 | 31.08 | 26.20 | 21.86 | 18.09 |
| 26.55 CFS | 14.86 | 12.14 | 9.86 | 7.98 | 6.43 | 5.16 | 4.14 | 3.30 |
| 27.75 CFS | 2.63 | 2.09 | 1.66 | 1.31 | 1.03 | .82 | .64 | .50 |
| 28.95 CFS | .40 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
141 CFS-HRS; 366.8 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.54 | 1180.6 | 3.99 |
| 13.86 | 1067.3 | 3.80 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.70 | 1166.3 | 2.48 |
| 14.02 | 1065.1 | 2.37 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 3318.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.90 CFS | .19 | .99 | 3.02 | 6.78 | 12.56 | 20.09 | 29.57 | 41.05 |
| 11.10 CFS | 56 | 74 | 98 | 133 | 209 | 472 | 1128 | 2207 |
| 12.30 CFS | 3132 | 3285 | 2681 | 1592 | 876 | 669 | 566 | 498 |
| 13.50 CFS | 453 | 416 | 384 | 357 | 333 | 311 | 293 | 278 |
| 14.70 CFS | 266 | 257 | 250 | 244 | 237 | 229 | 221 | 213 |
| 15.90 CFS | 206 | 199 | 192 | 185 | 179 | 174 | 171 | 169 |
| 17.10 CFS | 166 | 163 | 160 | 157 | 155 | 152 | 149 | 147 |
| 18.30 CFS | 144 | 141 | 139 | 136 | 133 | 131 | 128 | 125 |
| 19.50 CFS | 122 | 120 | 117 | 114 | 110 | 108 | 106 | 104 |
| 20.70 CFS | 103 | 102 | 101 | 100 | 100 | 100 | 99 | 99 |
| 21.90 CFS | 98.62 | 97.95 | 97.24 | 96.66 | 95.97 | 95.54 | 94.89 | 94.21 |
| 23.10 CFS | 93.50 | 93.03 | 92.76 | 92.34 | 92.05 | 91.68 | 91.11 | 87.22 |
| 24.30 CFS | 76.37 | 55.46 | 31.71 | 11.28 | 1.18 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.26 | 1740.0 | 3.69 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.86 | 1258.8 | 4.15 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 14.02 | 1257.3 | 2.58 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 751.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 2.06 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 1 | 34 | 171 | 440 | 682 | 747 | 587 |
| 12.75 CFS | 345 | 228 | 191 | 166 | 150 | 138 | 128 | 119 |
| 13.95 CFS | 112 | 105 | 98 | 93 | 89 | 86 | 84 | 82 |
| 15.15 CFS | 79.95 | 77.82 | 75.45 | 72.99 | 70.68 | 68.45 | 66.30 | 64.04 |
| 16.35 CFS | 61.75 | 59.90 | 58.66 | 57.90 | 57.15 | 56.32 | 55.45 | 54.57 |
| 17.55 CFS | 53.71 | 52.86 | 52.07 | 51.29 | 50.47 | 49.57 | 48.71 | 47.86 |
| 18.75 CFS | 46.91 | 46.05 | 45.16 | 44.20 | 43.36 | 42.48 | 41.59 | 40.58 |
| 19.95 CFS | 39.45 | 38.42 | 37.60 | 36.99 | 36.48 | 36.07 | 35.77 | 35.56 |
| 21.15 CFS | 35.40 | 35.34 | 35.24 | 35.18 | 35.07 | 34.96 | 34.75 | 34.53 |
| 22.35 CFS | 34.33 | 34.16 | 34.03 | 33.79 | 33.56 | 33.37 | 33.26 | 33.18 |
| 23.55 CFS | 33.07 | 32.96 | 32.87 | 32.53 | 30.81 | 25.59 | 17.14 | 8.38 |
| 24.75 CFS | 2.04 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.87 WATERSHED INCHES; 1160 CFS-HRS; 95.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 780.6 | (NULL) |
| 14.00 | 1366.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 6.00 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 11.10 CFS | 0 | 1 | 1 | 2 | 5 | 41 | 182 | 456 |
| 12.30 CFS | 704 | 777 | 630 | 414 | 356 | 440 | 609 | 834 |
| 13.50 CFS | 1059 | 1229 | 1326 | 1364 | 1356 | 1318 | 1261 | 1193 |
| 14.70 CFS | 1120 | 1045 | 971 | 900 | 832 | 768 | 709 | 656 |
| 15.90 CFS | 607 | 563 | 524 | 489 | 458 | 430 | 406 | 384 |
| 17.10 CFS | 365 | 347 | 331 | 316 | 302 | 290 | 279 | 269 |
| 18.30 CFS | 260 | 252 | 245 | 238 | 231 | 225 | 220 | 214 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19.50 CFS | 209 | 205 | 200 | 195 | 191 | 187 | 183 | 179 |
| 20.70 CFS | 176 | 173 | 169 | 166 | 163 | 160 | 158 | 155 |
| 21.90 CFS | 152 | 150 | 148 | 146 | 144 | 142 | 141 | 139 |
| 23.10 CFS | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 129 |
| 24.30 CFS | 123 | 114 | 105 | 98 | 95 | 95 | 93 | 91 |
| 25.50 CFS | 87.29 | 81.73 | 74.89 | 67.45 | 59.94 | 52.70 | 45.93 | 39.75 |
| 26.70 CFS | 34.19 | 29.26 | 24.93 | 21.16 | 17.90 | 15.10 | 12.70 | 10.66 |
| 27.90 CFS | 8.93 | 7.47 | 6.23 | 5.19 | 4.32 | 3.59 | 2.98 | 2.47 |
| 29.10 CFS | 2.05 | 1.70 | 1.40 | 1.16 | .96 | .79 | .65 | .54 |
| 30.30 CFS | .44 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.45 WATERSHED INCHES; 5618 CFS-HRS; 464.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.61 | 1725.8 | (NULL) |
| 14.01 | 2430.9 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
HRS MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.10 CFS | 0 | 1 | 2 | 3 | 7 | 45 | 194 | 534 |
| 12.30 CFS | 1014 | 1513 | 1725 | 1564 | 1254 | 1053 | 1151 | 1447 |
| 13.50 CFS | 1814 | 2133 | 2337 | 2423 | 2415 | 2343 | 2231 | 2096 |
| 14.70 CFS | 1953 | 1809 | 1670 | 1539 | 1417 | 1304 | 1200 | 1106 |
| 15.90 CFS | 1023 | 948 | 882 | 823 | 771 | 725 | 685 | 650 |
| 17.10 CFS | 618 | 590 | 564 | 541 | 520 | 500 | 483 | 467 |
| 18.30 CFS | 452 | 439 | 427 | 416 | 405 | 395 | 386 | 377 |
| 19.50 CFS | 369 | 361 | 353 | 345 | 338 | 330 | 323 | 317 |
| 20.70 CFS | 311 | 305 | 299 | 294 | 289 | 284 | 279 | 275 |
| 21.90 CFS | 271 | 267 | 263 | 259 | 256 | 253 | 251 | 249 |
| 23.10 CFS | 246 | 244 | 242 | 241 | 239 | 238 | 236 | 233 |
| 24.30 CFS | 226 | 215 | 199 | 181 | 166 | 157 | 153 | 149 |
| 25.50 CFS | 143 | 135 | 124 | 111 | 98 | 86 | 74 | 63 |
| 26.70 CFS | 53.69 | 45.34 | 38.10 | 31.89 | 26.60 | 22.12 | 18.35 | 15.19 |
| 27.90 CFS | 12.55 | 10.35 | 8.53 | 7.01 | 5.76 | 4.73 | 3.88 | 3.18 |
| 29.10 CFS | 2.61 | 2.13 | 1.74 | 1.43 | 1.17 | .95 | .78 | .63 |
| 30.30 CFS | .51 | .42 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 10056 CFS-HRS; 831.1 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.61 | 1725.8 | (DIVERT) |
| 14.01 | 2430.9 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 11.10 CFS | 0 | 1 | 2 | 3 | 7 | 45 | 194 | 534 |
| 12.30 CFS | 1014 | 1513 | 1725 | 1564 | 1254 | 1053 | 1151 | 1447 |
| 13.50 CFS | 1814 | 2133 | 2337 | 2423 | 2415 | 2343 | 2231 | 2096 |
| 14.70 CFS | 1953 | 1809 | 1670 | 1539 | 1417 | 1304 | 1200 | 1106 |
| 15.90 CFS | 1023 | 948 | 882 | 823 | 771 | 725 | 685 | 650 |
| 17.10 CFS | 618 | 590 | 564 | 541 | 520 | 500 | 483 | 467 |
| 18.30 CFS | 452 | 439 | 427 | 416 | 405 | 395 | 386 | 377 |
| 19.50 CFS | 369 | 361 | 353 | 345 | 338 | 330 | 323 | 317 |
| 20.70 CFS | 311 | 305 | 299 | 294 | 289 | 284 | 279 | 275 |
| 21.90 CFS | 271 | 267 | 263 | 259 | 256 | 253 | 251 | 249 |
| 23.10 CFS | 246 | 244 | 242 | 241 | 239 | 238 | 236 | 233 |
| 24.30 CFS | 226 | 215 | 199 | 181 | 166 | 157 | 153 | 149 |
| 25.50 CFS | 143 | 135 | 124 | 111 | 98 | 86 | 74 | 63 |
| 26.70 CFS | 53.69 | 45.34 | 38.10 | 31.89 | 26.60 | 22.12 | 18.35 | 15.19 |
| 27.90 CFS | 12.55 | 10.35 | 8.53 | 7.01 | 5.76 | 4.73 | 3.88 | 3.18 |
| 29.10 CFS | 2.61 | 2.13 | 1.74 | 1.43 | 1.17 | .95 | .78 | .63 |
| 30.30 CFS | .51 | .42 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 10056 CFS-HRS; 831.1 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
154 CFS-HRS; 831.1 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.82 | 1610.4 | 2.90 |
| 14.26 | 2394.9 | 3.62 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 10056 CFS-HRS; 831.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.15 | 1881.8 | (RUNOFF) |
| 21.35 | 38.5 | (RUNOFF) |
| 22.30 | 37.1 | (RUNOFF) |
| 23.29 | 35.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 1.47 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 9.60 CFS | .13 | .80 | 2.25 | 4.30 | 6.73 | 9.68 | 13.21 | 17.42 |
| 10.80 CFS | 23 | 29 | 37 | 48 | 63 | 87 | 165 | 480 |
| 12.00 CFS | 1292 | 1882 | 1313 | 533 | 339 | 268 | 223 | 200 |
| 13.20 CFS | 181 | 165 | 153 | 143 | 132 | 124 | 116 | 109 |
| 14.40 CFS | 104 | 100 | 98 | 96 | 93 | 90 | 87 | 84 |
| 15.60 CFS | 80.64 | 78.18 | 75.98 | 72.91 | 69.53 | 67.38 | 66.55 | 65.89 |
| 16.80 CFS | 64.68 | 63.37 | 62.48 | 61.51 | 60.12 | 59.06 | 58.34 | 57.36 |
| 18.00 CFS | 56.06 | 55.29 | 54.13 | 53.00 | 52.10 | 50.73 | 49.84 | 48.84 |
| 19.20 CFS | 47.51 | 46.73 | 45.87 | 44.44 | 42.95 | 41.82 | 41.10 | 40.43 |
| 20.40 CFS | 39.80 | 39.42 | 38.88 | 38.83 | 38.73 | 38.37 | 38.45 | 38.43 |
| 21.60 CFS | 38.02 | 37.96 | 37.87 | 37.20 | 37.05 | 37.08 | 36.92 | 36.29 |
| 22.80 CFS | 36.11 | 36.11 | 35.69 | 35.72 | 35.71 | 35.39 | 35.22 | 35.20 |
| 24.00 CFS | 34.68 | 29.57 | 14.80 | 1.79 | .00 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.85 WATERSHED INCHES; 1757 CFS-HRS; 145.2 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.58 | 1096.7 | 4.51 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.85 WATERSHED INCHES; 1758 CFS-HRS; 145.3 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.93 | 797.6 | 3.50 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.85 WATERSHED INCHES; 1758 CFS-HRS; 145.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.85 | 2376.9 | (NULL) |
| 14.18 | 2649.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 12.31 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .40 | .97 | 1.89 | 3.18 | 4.90 | 7.12 | 10.00 | 13.78 |
| 11.55 CFS | 19 | 26 | 36 | 71 | 198 | 517 | 1085 | 1808 |
| 12.75 CFS | 2306 | 2363 | 2130 | 1858 | 1770 | 1882 | 2114 | 2363 |
| 13.95 CFS | 2548 | 2639 | 2642 | 2577 | 2466 | 2327 | 2175 | 2021 |
| 15.15 CFS | 1870 | 1728 | 1594 | 1471 | 1358 | 1255 | 1162 | 1079 |
| 16.35 CFS | 1005 | 939 | 880 | 828 | 782 | 742 | 707 | 675 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 17.55 CFS | 646 | 620 | 596 | 574 | 555 | 537 | 520 | 505 |
| 18.75 CFS | 492 | 479 | 467 | 455 | 445 | 435 | 425 | 416 |
| 19.95 CFS | 407 | 398 | 389 | 380 | 372 | 364 | 357 | 350 |
| 21.15 CFS | 344 | 338 | 332 | 326 | 321 | 316 | 312 | 307 |
| 22.35 CFS | 303 | 300 | 296 | 293 | 290 | 287 | 285 | 282 |
| 23.55 CFS | 280 | 278 | 276 | 275 | 273 | 270 | 265 | 254 |
| 24.75 CFS | 238 | 217 | 196 | 180 | 169 | 161 | 153 | 144 |
| 25.95 CFS | 133 | 120 | 107 | 93 | 81 | 70 | 59 | 50 |
| 27.15 CFS | 42.25 | 35.43 | 29.61 | 24.66 | 20.48 | 16.97 | 14.04 | 11.59 |
| 28.35 CFS | 9.55 | 7.86 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.40 |
| 29.55 CFS | 1.96 | 1.60 | 1.31 | 1.07 | .88 | .71 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.49 WATERSHED INCHES; 11814 CFS-HRS; 976.3 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.40 | 2122.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 10 | 131 | 567 | 1352 | 1997 | 2083 | 1560 |
| 12.75 CFS | 871 | 590 | 492 | 428 | 386 | 355 | 329 | 306 |
| 13.95 CFS | 287 | 268 | 252 | 238 | 228 | 220 | 214 | 209 |
| 15.15 CFS | 204 | 198 | 192 | 186 | 180 | 174 | 168 | 163 |
| 16.35 CFS | 157 | 152 | 149 | 147 | 145 | 143 | 140 | 138 |
| 17.55 CFS | 136 | 134 | 132 | 130 | 128 | 125 | 123 | 121 |
| 18.75 CFS | 118 | 116 | 114 | 111 | 109 | 107 | 105 | 102 |
| 19.95 CFS | 99.32 | 96.74 | 94.67 | 93.16 | 91.86 | 90.79 | 90.05 | 89.49 |
| 21.15 CFS | 89.10 | 88.93 | 88.66 | 88.50 | 88.25 | 87.91 | 87.34 | 86.78 |
| 22.35 CFS | 86.23 | 85.87 | 85.49 | 84.87 | 84.29 | 83.77 | 83.52 | 83.27 |
| 23.55 CFS | 83.01 | 82.78 | 82.46 | 81.65 | 77.17 | 64.16 | 42.06 | 19.40 |
| 24.75 CFS | 4.66 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.00 WATERSHED INCHES; 3087 CFS-HRS; 255.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.53 | 1733.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 1 | 5 | 24 | 103 | 371 | 839 | 1375 |
| 12.45 CFS | 1686 | 1695 | 1361 | 863 | 516 | 419 | 361 | 324 |
| 13.65 CFS | 297 | 274 | 255 | 238 | 223 | 209 | 198 | 189 |
| 14.85 CFS | 182 | 177 | 172 | 168 | 163 | 158 | 153 | 148 |
| 16.05 CFS | 143 | 138 | 133 | 129 | 125 | 122 | 120 | 119 |
| 17.25 CFS | 117 | 115 | 113 | 111 | 109 | 107 | 106 | 104 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.45 CFS | 102 | 100 | 98 | 96 | 95 | 93 | 91 | 89 |
| 19.65 CFS | 86.96 | 84.91 | 82.83 | 80.65 | 78.62 | 76.91 | 75.64 | 74.58 |
| 20.85 CFS | 73.75 | 73.12 | 72.66 | 72.31 | 72.11 | 71.92 | 71.67 | 71.46 |
| 22.05 CFS | 71.15 | 70.70 | 70.27 | 69.89 | 69.42 | 69.06 | 68.66 | 68.19 |
| 23.25 CFS | 67.77 | 67.50 | 67.33 | 67.03 | 66.83 | 66.40 | 64.43 | 58.31 |
| 24.45 CFS | 47.04 | 32.03 | 17.30 | 5.67 | .61 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.22 WATERSHED INCHES; 2734 CFS-HRS; 225.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.44 | 3771.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 1 | 5 | 33 | 234 | 938 | 2191 | 3372 |
| 12.45 CFS | 3769 | 3255 | 2233 | 1452 | 1008 | 848 | 747 | 679 |
| 13.65 CFS | 626 | 581 | 542 | 506 | 475 | 448 | 425 | 408 |
| 14.85 CFS | 396 | 386 | 376 | 366 | 355 | 344 | 332 | 322 |
| 16.05 CFS | 311 | 300 | 290 | 281 | 274 | 269 | 265 | 261 |
| 17.25 CFS | 257 | 253 | 249 | 245 | 241 | 237 | 233 | 229 |
| 18.45 CFS | 225 | 221 | 217 | 213 | 208 | 204 | 200 | 196 |
| 19.65 CFS | 192 | 187 | 182 | 177 | 173 | 170 | 168 | 165 |
| 20.85 CFS | 164 | 163 | 162 | 161 | 161 | 160 | 160 | 159 |
| 22.05 CFS | 158 | 157 | 156 | 156 | 155 | 154 | 153 | 152 |
| 23.25 CFS | 151 | 151 | 150 | 150 | 149 | 148 | 142 | 122 |
| 24.45 CFS | 89.10 | 51.43 | 21.95 | 5.67 | .61 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.09 WATERSHED INCHES; 5822 CFS-HRS; 481.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.57 | 5080.1 | (NULL) |
| 14.12 | 3146.8 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .40 | .97 | 1.89 | 3.18 | 4.90 | 7.12 | 10.09 | 14.70 |
| 11.55 CFS | 24 | 59 | 270 | 1009 | 2389 | 3889 | 4854 | 5063 |
| 12.75 CFS | 4539 | 3816 | 3138 | 2705 | 2517 | 2560 | 2739 | 2944 |
| 13.95 CFS | 3090 | 3146 | 3117 | 3025 | 2891 | 2735 | 2571 | 2406 |
| 15.15 CFS | 2246 | 2094 | 1949 | 1815 | 1690 | 1576 | 1473 | 1379 |
| 16.35 CFS | 1295 | 1219 | 1154 | 1097 | 1047 | 1003 | 964 | 928 |
| 17.55 CFS | 895 | 865 | 837 | 812 | 788 | 766 | 746 | 727 |
| 18.75 CFS | 708 | 691 | 675 | 660 | 645 | 631 | 617 | 603 |
| 19.95 CFS | 589 | 575 | 562 | 550 | 540 | 530 | 521 | 513 |
| 21.15 CFS | 505 | 499 | 493 | 487 | 481 | 476 | 470 | 465 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22.35 CFS | 460 | 455 | 451 | 447 | 443 | 439 | 436 | 433 |
| 23.55 CFS | 430 | 428 | 426 | 423 | 414 | 393 | 354 | 306 |
| 24.75 CFS | 260 | 222 | 197 | 180 | 169 | 161 | 153 | 144 |
| 25.95 CFS | 133 | 120 | 107 | 93 | 81 | 70 | 59 | 50 |
| 27.15 CFS | 42.25 | 35.43 | 29.61 | 24.66 | 20.48 | 16.97 | 14.04 | 11.59 |
| 28.35 CFS | 9.55 | 7.86 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.40 |
| 29.55 CFS | 1.96 | 1.60 | 1.31 | 1.07 | .88 | .71 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.33 WATERSHED INCHES; 17636 CFS-HRS; 1457.4 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1197.0 FEET) CAN ADD .336 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 1552.34 AC-FT ( .12 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1205.89. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.84 | 60.4 | 1206.76 |

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 56 CFS
RESVOR ( 93. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 20.57 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 9.45 CFS | 19.84 | 19.83 | 19.82 | 19.81 | 19.79 | 19.78 | 19.77 | 19.76 |
| 10.65 CFS | 19.74 | 19.73 | 19.72 | 19.71 | 19.71 | 19.70 | 19.70 | 19.72 |
| 11.85 CFS | 19.81 | 20.21 | 21.30 | 23.33 | 26.16 | 28.47 | 30.51 | 32.29 |
| 13.05 CFS | 33.76 | 35.00 | 36.10 | 37.17 | 38.29 | 39.34 | 40.38 | 41.45 |
| 14.25 CFS | 42.53 | 43.59 | 44.61 | 45.58 | 46.49 | 47.34 | 48.11 | 48.69 |
| 15.45 CFS | 49.23 | 49.73 | 50.19 | 50.62 | 51.03 | 51.40 | 51.76 | 52.08 |
| 16.65 CFS | 52.39 | 52.69 | 52.97 | 53.23 | 53.49 | 53.73 | 53.97 | 54.19 |
| 17.85 CFS | 54.41 | 54.62 | 54.82 | 55.02 | 55.21 | 55.40 | 55.58 | 55.76 |
| 19.05 CFS | 55.93 | 56.09 | 56.26 | 56.42 | 56.57 | 56.72 | 56.86 | 57.00 |
| 20.25 CFS | 57.13 | 57.25 | 57.38 | 57.50 | 57.62 | 57.73 | 57.85 | 57.96 |
| 21.45 CFS | 58.07 | 58.18 | 58.29 | 58.39 | 58.50 | 58.60 | 58.71 | 58.81 |
| 22.65 CFS | 58.91 | 59.01 | 59.10 | 59.20 | 59.30 | 59.39 | 59.49 | 59.58 |
| 23.85 CFS | 59.67 | 59.76 | 59.86 | 59.94 | 60.02 | 60.09 | 60.15 | 60.19 |
| 25.05 CFS | 60.23 | 60.26 | 60.29 | 60.32 | 60.34 | 60.36 | 60.38 | 60.40 |
| 26.25 CFS | 60.41 | 60.42 | 60.43 | 60.44 | 60.44 | 60.43 | 60.43 | 60.43 |
| 27.45 CFS | 60.42 | 60.41 | 60.40 | 60.39 | 60.38 | 60.37 | 60.35 | 60.34 |
| 28.65 CFS | 60.33 | 60.31 | 60.30 | 60.29 | 60.27 | 60.26 | 60.24 | 60.23 |
| 29.85 CFS | 60.21 | 60.20 | 60.18 | 60.17 | 60.15 | 60.14 | 60.12 | 60.11 |
| 31.05 CFS | 60.09 | 60.08 | 60.06 | 60.05 | 60.03 | 60.02 | 60.00 | 59.98 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 32.25 CFS | 59.97 | 59.95 | 59.94 | 59.92 | 59.91 | 59.89 | 59.88 | 59.86 |
| 33.45 CFS | 59.85 | 59.83 | 59.82 | 59.80 | 59.79 | 59.77 | 59.76 | 59.74 |
| 34.65 CFS | 59.73 | 59.71 | 59.70 | 59.68 | 59.67 | 59.65 | 59.64 | 59.62 |
| 35.85 CFS | 59.61 | 59.59 | 59.58 | 59.56 | 59.55 | 59.53 | 59.52 | 59.50 |
| 37.05 CFS | 59.49 | 59.47 | 59.46 | 59.44 | 59.43 | 59.41 | 59.40 | 59.38 |
| 38.25 CFS | 59.37 | 59.35 | 59.34 | 59.32 | 59.30 | 59.29 | 59.27 | 59.26 |
| 39.45 CFS | 59.24 | 59.23 | 59.21 | 59.20 | 59.18 | 59.17 | 59.15 | 59.14 |
| 40.65 CFS | 59.12 | 59.11 | 59.09 | 59.08 | 59.07 | 59.05 | 59.04 | 59.02 |
| 41.85 CFS | 59.01 | 58.99 | 58.98 | 58.96 | 58.95 | 58.93 | 58.92 | 58.90 |
| 43.05 CFS | 58.89 | 58.87 | 58.86 | 58.84 | 58.83 | 58.81 | 58.80 | 58.78 |
| 44.25 CFS | 58.77 | 58.75 | 58.74 | 58.72 | 58.71 | 58.69 | 58.68 | 58.66 |
| 45.45 CFS | 58.65 | 58.63 | 58.62 | 58.60 | 58.59 | 58.57 | 58.56 | 58.54 |
| 46.65 CFS | 58.53 | 58.51 | 58.50 | 58.48 | 58.47 | 58.45 | 58.44 | 58.43 |
| 47.85 CFS | 58.41 | 58.40 | 58.38 | 58.37 | 58.35 | 58.34 | 58.32 | 58.31 |
| 49.05 CFS | 58.29 | 58.28 | 58.26 | 58.25 | 58.23 | 58.22 | 58.20 | 58.19 |
| 50.25 CFS | 58.17 | 58.16 | 58.14 | 58.13 | 58.12 | 58.10 | 58.09 | 58.07 |
| 51.45 CFS | 58.06 | 58.04 | 58.03 | 58.01 | 58.00 | 57.98 | 57.97 | 57.95 |
| 52.65 CFS | 57.94 | 57.92 | 57.91 | 57.89 | 57.88 | 57.87 | 57.85 | 57.84 |
| 53.85 CFS | 57.82 | 57.81 | 57.79 | 57.78 | 57.76 | 57.75 | 57.73 | 57.72 |
| 55.05 CFS | 57.70 | 57.69 | 57.67 | 57.66 | 57.65 | 57.63 | 57.62 | 57.60 |
| 56.25 CFS | 57.59 | 57.57 | 57.56 | 57.54 | 57.53 | 57.51 | 57.50 | 57.49 |
| 57.45 CFS | 57.47 | 57.46 | 57.44 | 57.43 | 57.41 | 57.40 | 57.38 | 57.37 |
| 58.65 CFS | 57.35 | 57.34 | 57.33 | 57.31 | 57.30 | 57.28 | 57.27 | 57.25 |
| 59.85 CFS | 57.24 | 57.22 | 57.21 | 57.19 | 57.18 | 57.17 | 57.15 | 57.14 |
| 61.05 CFS | 57.12 | 57.11 | 57.09 | 57.08 | 57.06 | 57.05 | 57.04 | 57.02 |
| 62.25 CFS | 57.01 | 56.99 | 56.98 | 56.96 | 56.95 | 56.93 | 56.92 | 56.91 |
| 63.45 CFS | 56.89 | 56.88 | 56.86 | 56.85 | 56.83 | 56.82 | 56.80 | 56.79 |
| 64.65 CFS | 56.77 | 56.76 | 56.74 | 56.73 | 56.71 | 56.70 | 56.68 | 56.67 |
| 65.85 CFS | 56.65 | 56.63 | 56.62 | 56.60 | 56.59 | 56.57 | 56.56 | 56.54 |
| 67.05 CFS | 56.53 | 56.51 | 56.50 | 56.48 | 56.46 | 56.45 | 56.43 | 56.42 |
| 68.25 CFS | 56.40 | 56.39 | 56.37 | 56.36 | 56.34 | 56.33 | 56.31 | 56.29 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.25 WATERSHED INCHES; 3310 CFS-HRS; 273.5 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.28 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 2 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 3560.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.70 CFS | .34 | .97 | 2.10 | 3.60 | 5.35 | 7.17 | 9.05 | 10.97 |
| 6.90 CFS | 12.93 | 14.93 | 16.98 | 19.09 | 21.26 | 23.50 | 25.69 | 27.86 |
| 8.10 CFS | 30.04 | 32.42 | 35.28 | 38.77 | 43.02 | 47.91 | 53.24 | 58.80 |
| 9.30 CFS | 64 | 70 | 74 | 79 | 83 | 89 | 98 | 108 |
| 10.50 CFS | 120 | 134 | 150 | 170 | 193 | 221 | 258 | 309 |
| 11.70 CFS | 414 | 759 | 1558 | 2705 | 3483 | 3425 | 2495 | 1338 |
| 12.90 CFS | 723 | 566 | 476 | 419 | 379 | 346 | 320 | 296 |
| 14.10 CFS | 275 | 257 | 241 | 228 | 218 | 211 | 205 | 199 |
| 15.30 CFS | 193 | 186 | 180 | 173 | 167 | 161 | 155 | 149 |
| 16.50 CFS | 144 | 140 | 138 | 136 | 133 | 131 | 128 | 126 |
| 17.70 CFS | 124 | 121 | 119 | 117 | 115 | 112 | 110 | 108 |
| 18.90 CFS | 106 | 103 | 101 | 99 | 97 | 94 | 92 | 89 |
| 20.10 CFS | 86.91 | 84.80 | 83.23 | 81.92 | 80.80 | 79.93 | 79.33 | 78.79 |
| 21.30 CFS | 78.54 | 78.20 | 77.92 | 77.62 | 77.28 | 76.70 | 76.12 | 75.58 |
| 22.50 CFS | 75.05 | 74.68 | 74.10 | 73.52 | 72.93 | 72.59 | 72.32 | 71.97 |
| 23.70 CFS | 71.70 | 71.38 | 70.66 | 67.37 | 58.11 | 41.09 | 22.26 | 7.14 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 4608 CFS-HRS; 380.8 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.88 | 2127.1 | 5.09 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 4608 CFS-HRS; 380.8 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.56 | 1475.8 | 6.20 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 4608 CFS-HRS; 380.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 2955.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.25 CFS | .49 | 1.39 | 2.94 | 5.01 | 7.46 | 10.23 | 13.28 | 16.56 |
| 9.45 CFS | 19.86 | 23.05 | 26.21 | 29.84 | 34.28 | 39.84 | 46.48 | 54.31 |
| 10.65 CFS | 63 | 74 | 88 | 104 | 124 | 150 | 189 | 279 |
| 11.85 CFS | 613 | 1406 | 2474 | 2956 | 2493 | 1476 | 720 | 525 |
| 13.05 CFS | 433 | 377 | 339 | 310 | 285 | 264 | 246 | 229 |
| 14.25 CFS | 214 | 202 | 192 | 185 | 180 | 175 | 170 | 165 |
| 15.45 CFS | 159 | 153 | 148 | 143 | 138 | 133 | 127 | 123 |
| 16.65 CFS | 121 | 119 | 117 | 115 | 113 | 111 | 109 | 107 |
| 17.85 CFS | 105 | 104 | 102 | 100 | 98 | 96 | 94 | 92 |
| 19.05 CFS | 89.94 | 87.94 | 86.09 | 84.15 | 82.33 | 80.09 | 77.68 | 75.63 |
| 20.25 CFS | 74.04 | 72.81 | 71.79 | 70.85 | 70.26 | 69.77 | 69.46 | 69.23 |
| 21.45 CFS | 68.96 | 68.78 | 68.48 | 68.14 | 67.63 | 67.12 | 66.61 | 66.38 |
| 22.65 CFS | 65.95 | 65.35 | 64.83 | 64.44 | 64.25 | 63.92 | 63.77 | 63.45 |
| 23.85 CFS | 63.14 | 62.36 | 58.77 | 46.53 | 28.51 | 11.37 | .00 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 3513 CFS-HRS; 290.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 3128.1 | (NULL) |
| 13.50 | 1780.7 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.75 CFS | .46 | .84 | 1.39 | 2.09 | 2.95 | 3.96 | 5.11 | 6.39 |
| 7.95 CFS | 7.79 | 9.38 | 11.38 | 13.99 | 17.31 | 21.22 | 25.58 | 30.35 |
| 9.15 CFS | 35.52 | 41.10 | 46.94 | 52.96 | 59.24 | 66.30 | 74.45 | 83.93 |
| 10.35 CFS | 95 | 107 | 120 | 136 | 154 | 176 | 202 | 236 |
| 11.55 CFS | 284 | 384 | 730 | 1537 | 2621 | 3127 | 2707 | 1781 |
| 12.75 CFS | 1199 | 1255 | 1448 | 1637 | 1751 | 1781 | 1748 | 1673 |
| 13.95 CFS | 1574 | 1462 | 1346 | 1233 | 1126 | 1027 | 938 | 857 |
| 15.15 CFS | 784 | 718 | 658 | 606 | 559 | 519 | 483 | 451 |
| 16.35 CFS | 423 | 398 | 378 | 360 | 344 | 330 | 316 | 304 |
| 17.55 CFS | 293 | 283 | 275 | 267 | 259 | 252 | 246 | 239 |
| 18.75 CFS | 234 | 228 | 223 | 218 | 213 | 208 | 204 | 199 |
| 19.95 CFS | 194 | 189 | 185 | 181 | 178 | 175 | 172 | 169 |
| 21.15 CFS | 166 | 164 | 162 | 160 | 158 | 156 | 154 | 152 |
| 22.35 CFS | 150 | 149 | 148 | 146 | 145 | 144 | 143 | 142 |
| 23.55 CFS | 141 | 140 | 140 | 138 | 134 | 121 | 103 | 85 |
| 24.75 CFS | 73.30 | 72.19 | 70.00 | 66.33 | 61.22 | 55.12 | 48.73 | 42.47 |
| 25.95 CFS | 36.60 | 31.25 | 26.47 | 22.28 | 18.65 | 15.53 | 12.88 | 10.65 |
| 27.15 CFS | 8.77 | 7.20 | 5.90 | 4.82 | 3.93 | 3.19 | 2.59 | 2.10 |
| 28.35 CFS | 1.70 | 1.37 | 1.11 | .89 | .72 | .58 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

OPERATION DIVERT XSECTION 12
*OUTPUT #1 HYDROGRAPH*

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 3128.1 | (DIVERT) |
| 13.50 | 1780.7 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.75 CFS | .46 | .84 | 1.39 | 2.09 | 2.95 | 3.96 | 5.11 | 6.39 |
| 7.95 CFS | 7.79 | 9.38 | 11.38 | 13.99 | 17.31 | 21.22 | 25.58 | 30.35 |
| 9.15 CFS | 35.52 | 41.10 | 46.94 | 52.96 | 59.24 | 66.30 | 74.45 | 83.93 |
| 10.35 CFS | 95 | 107 | 120 | 136 | 154 | 176 | 202 | 236 |
| 11.55 CFS | 284 | 384 | 730 | 1537 | 2621 | 3127 | 2707 | 1781 |
| 12.75 CFS | 1199 | 1255 | 1448 | 1637 | 1751 | 1781 | 1748 | 1673 |
| 13.95 CFS | 1574 | 1462 | 1346 | 1233 | 1126 | 1027 | 938 | 857 |
| 15.15 CFS | 784 | 718 | 658 | 606 | 559 | 519 | 483 | 451 |
| 16.35 CFS | 423 | 398 | 378 | 360 | 344 | 330 | 316 | 304 |
| 17.55 CFS | 293 | 283 | 275 | 267 | 259 | 252 | 246 | 239 |
| 18.75 CFS | 234 | 228 | 223 | 218 | 213 | 208 | 204 | 199 |
| 19.95 CFS | 194 | 189 | 185 | 181 | 178 | 175 | 172 | 169 |
| 21.15 CFS | 166 | 164 | 162 | 160 | 158 | 156 | 154 | 152 |
| 22.35 CFS | 150 | 149 | 148 | 146 | 145 | 144 | 143 | 142 |
| 23.55 CFS | 141 | 140 | 140 | 138 | 134 | 121 | 103 | 85 |
| 24.75 CFS | 73.30 | 72.19 | 70.00 | 66.33 | 61.22 | 55.12 | 48.73 | 42.47 |
| 25.95 CFS | 36.60 | 31.25 | 26.47 | 22.28 | 18.65 | 15.53 | 12.88 | 10.65 |
| 27.15 CFS | 8.77 | 7.20 | 5.90 | 4.82 | 3.93 | 3.19 | 2.59 | 2.10 |
| 28.35 CFS | 1.70 | 1.37 | 1.11 | .89 | .72 | .58 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

*OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)*

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
176 CFS-HRS; 671.1 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3103.5 | 6.75 |
| 13.65 | 1779.0 | 5.02 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3103.5 | 4.26 |
| 13.65 | 1779.0 | 3.14 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 5581.6 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.70 CFS | .48 | 1.45 | 3.14 | 5.48 | 8.24 | 11.15 | 14.17 | 17.24 |
| 6.90 CFS | 20.37 | 23.55 | 26.79 | 30.14 | 33.59 | 37.17 | 40.72 | 44.22 |
| 8.10 CFS | 47.74 | 51.52 | 55.99 | 61.46 | 68.12 | 75.78 | 84.32 | 93.21 |
| 9.30 CFS | 102 | 111 | 118 | 125 | 133 | 142 | 154 | 171 |
| 10.50 CFS | 190 | 212 | 238 | 269 | 305 | 349 | 406 | 486 |
| 11.70 CFS | 668 | 1188 | 2390 | 4087 | 5423 | 5399 | 4218 | 2407 |
| 12.90 CFS | 1238 | 928 | 776 | 679 | 614 | 561 | 517 | 479 |
| 14.10 CFS | 445 | 415 | 389 | 368 | 352 | 339 | 329 | 320 |
| 15.30 CFS | 310 | 300 | 289 | 278 | 269 | 259 | 249 | 240 |
| 16.50 CFS | 232 | 225 | 221 | 217 | 214 | 210 | 206 | 202 |
| 17.70 CFS | 198 | 195 | 191 | 188 | 184 | 181 | 177 | 173 |
| 18.90 CFS | 170 | 166 | 162 | 159 | 155 | 152 | 148 | 144 |
| 20.10 CFS | 140 | 136 | 134 | 131 | 130 | 128 | 127 | 126 |
| 21.30 CFS | 126 | 125 | 125 | 124 | 124 | 123 | 122 | 121 |
| 22.50 CFS | 120 | 120 | 119 | 118 | 117 | 116 | 116 | 115 |
| 23.70 CFS | 115 | 114 | 113 | 108 | 95 | 69 | 40 | 15 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.1 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.08 | 3079.4 | 4.30 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.64 | 2205.4 | 5.16 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.1 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.64 | 2205.4 | 3.54 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 2177.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | .39 | 1.25 | 2.80 | 4.89 | 7.30 | 9.79 | 12.49 | 15.58 |
| 10.20 CFS | 19.28 | 23.72 | 28.94 | 35.21 | 42.64 | 51.83 | 63.05 | 77.19 |
| 11.40 CFS | 96 | 122 | 195 | 408 | 948 | 1688 | 2157 | 2007 |
| 12.60 CFS | 1402 | 751 | 458 | 370 | 316 | 282 | 258 | 237 |
| 13.80 CFS | 219 | 204 | 190 | 178 | 167 | 159 | 153 | 148 |
| 15.00 CFS | 144 | 140 | 136 | 131 | 127 | 122 | 118 | 114 |
| 16.20 CFS | 110 | 106 | 102 | 100 | 98 | 97 | 95 | 94 |
| 17.40 CFS | 91.92 | 90.32 | 88.68 | 87.17 | 85.73 | 84.23 | 82.61 | 81.00 |
| 18.60 CFS | 79.47 | 77.77 | 76.19 | 74.58 | 72.88 | 71.36 | 69.83 | 68.27 |
| 19.80 CFS | 66.52 | 64.60 | 62.86 | 61.44 | 60.37 | 59.48 | 58.68 | 58.14 |
| 21.00 CFS | 57.72 | 57.42 | 57.27 | 57.02 | 56.86 | 56.65 | 56.41 | 55.99 |
| 22.20 CFS | 55.58 | 55.21 | 54.90 | 54.62 | 54.17 | 53.77 | 53.38 | 53.17 |
| 23.40 CFS | 52.98 | 52.75 | 52.59 | 52.35 | 51.79 | 48.97 | 40.98 | 27.20 |
| 24.60 CFS | 12.99 | 3.32 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.08 WATERSHED INCHES; 2761 CFS-HRS; 228.2 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 2448.8 | (NULL) |
| 13.60 | 2446.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 6.00 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .27 | .60 | 1.12 | 1.87 | 2.86 | 4.08 | 5.53 | 7.20 |
| 7.80 CFS | 9.07 | 11.13 | 13.37 | 15.77 | 18.33 | 21.03 | 23.84 | 26.85 |
| 9.00 CFS | 30.23 | 34.35 | 39.42 | 45.37 | 52.04 | 59.24 | 67.12 | 75.82 |
| 10.20 CFS | 85 | 96 | 108 | 121 | 135 | 152 | 172 | 196 |
| 11.40 CFS | 226 | 265 | 352 | 583 | 1143 | 1909 | 2413 | 2323 |
| 12.60 CFS | 1842 | 1423 | 1474 | 1786 | 2102 | 2327 | 2433 | 2442 |
| 13.80 CFS | 2384 | 2281 | 2151 | 2007 | 1859 | 1713 | 1573 | 1443 |
| 15.00 CFS | 1321 | 1209 | 1107 | 1014 | 931 | 856 | 790 | 732 |
| 16.20 CFS | 679 | 632 | 591 | 556 | 524 | 496 | 471 | 448 |
| 17.40 CFS | 427 | 409 | 392 | 377 | 364 | 352 | 340 | 330 |
| 18.60 CFS | 320 | 312 | 303 | 296 | 288 | 281 | 275 | 268 |
| 19.80 CFS | 262 | 256 | 250 | 244 | 239 | 234 | 229 | 225 |
| 21.00 CFS | 220 | 216 | 213 | 209 | 206 | 202 | 199 | 197 |
| 22.20 CFS | 194 | 192 | 190 | 188 | 186 | 184 | 182 | 181 |
| 23.40 CFS | 180 | 178 | 177 | 176 | 174 | 171 | 162 | 147 |
| 24.60 CFS | 132 | 122 | 117 | 114 | 109 | 102 | 93 | 84 |
| 25.80 CFS | 74.17 | 65.14 | 56.71 | 49.03 | 42.13 | 36.01 | 30.65 | 25.98 |
| 27.00 CFS | 21.95 | 18.49 | 15.53 | 13.01 | 10.88 | 9.08 | 7.56 | 6.29 |
| 28.20 CFS | 5.22 | 4.33 | 3.59 | 2.96 | 2.45 | 2.02 | 1.67 | 1.37 |
| 29.40 CFS | 1.13 | .93 | .76 | .63 | .51 | .42 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.62 WATERSHED INCHES; 10145 CFS-HRS; 838.4 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 5438.9 | (NULL) |
| 13.62 | 4222.9 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .34 | .80 | 1.56 | 2.70 | 4.22 | 6.14 | 8.44 | 11.11 |
| 7.80 CFS | 14.12 | 17.45 | 21.08 | 25.07 | 29.61 | 34.88 | 40.99 | 47.87 |
| 9.00 CFS | 56 | 64 | 75 | 86 | 99 | 112 | 126 | 142 |
| 10.20 CFS | 160 | 180 | 202 | 227 | 255 | 287 | 325 | 371 |
| 11.40 CFS | 427 | 500 | 634 | 962 | 1856 | 3405 | 4980 | 5423 |
| 12.60 CFS | 4568 | 3250 | 2703 | 3040 | 3540 | 3954 | 4178 | 4221 |
| 13.80 CFS | 4133 | 3958 | 3730 | 3474 | 3210 | 2951 | 2704 | 2475 |
| 15.00 CFS | 2264 | 2071 | 1895 | 1735 | 1592 | 1465 | 1352 | 1252 |
| 16.20 CFS | 1164 | 1085 | 1015 | 955 | 903 | 858 | 816 | 778 |
| 17.40 CFS | 744 | 714 | 686 | 661 | 639 | 618 | 600 | 582 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.60 CFS | 566 | 551 | 537 | 524 | 511 | 499 | 488 | 477 |
| 19.80 CFS | 466 | 455 | 444 | 433 | 424 | 416 | 407 | 400 |
| 21.00 CFS | 392 | 385 | 379 | 373 | 367 | 362 | 357 | 352 |
| 22.20 CFS | 348 | 344 | 340 | 337 | 334 | 330 | 327 | 325 |
| 23.40 CFS | 323 | 320 | 319 | 316 | 314 | 309 | 296 | 269 |
| 24.60 CFS | 236 | 208 | 191 | 186 | 179 | 168 | 154 | 139 |
| 25.80 CFS | 123 | 108 | 94 | 81 | 69 | 59 | 49 | 42 |
| 27.00 CFS | 34.97 | 29.25 | 24.39 | 20.29 | 16.84 | 13.95 | 11.53 | 9.52 |
| 28.20 CFS | 7.84 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.39 | 1.96 |
| 29.40 CFS | 1.60 | 1.30 | 1.06 | .87 | .70 | .57 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.61 WATERSHED INCHES; 18266 CFS-HRS; 1509.5 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 5438.9 | (DIVERT) |
| 13.62 | 4222.9 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .34 | .80 | 1.56 | 2.70 | 4.22 | 6.14 | 8.44 | 11.11 |
| 7.80 CFS | 14.12 | 17.45 | 21.08 | 25.07 | 29.61 | 34.88 | 40.99 | 47.87 |
| 9.00 CFS | 56 | 64 | 75 | 86 | 99 | 112 | 126 | 142 |
| 10.20 CFS | 160 | 180 | 202 | 227 | 255 | 287 | 325 | 371 |
| 11.40 CFS | 427 | 500 | 634 | 962 | 1856 | 3405 | 4980 | 5423 |
| 12.60 CFS | 4568 | 3250 | 2703 | 3040 | 3540 | 3954 | 4178 | 4221 |
| 13.80 CFS | 4133 | 3958 | 3730 | 3474 | 3210 | 2951 | 2704 | 2475 |
| 15.00 CFS | 2264 | 2071 | 1895 | 1735 | 1592 | 1465 | 1352 | 1252 |
| 16.20 CFS | 1164 | 1085 | 1015 | 955 | 903 | 858 | 816 | 778 |
| 17.40 CFS | 744 | 714 | 686 | 661 | 639 | 618 | 600 | 582 |
| 18.60 CFS | 566 | 551 | 537 | 524 | 511 | 499 | 488 | 477 |
| 19.80 CFS | 466 | 455 | 444 | 433 | 424 | 416 | 407 | 400 |
| 21.00 CFS | 392 | 385 | 379 | 373 | 367 | 362 | 357 | 352 |
| 22.20 CFS | 348 | 344 | 340 | 337 | 334 | 330 | 327 | 325 |
| 23.40 CFS | 323 | 320 | 319 | 316 | 314 | 309 | 296 | 269 |
| 24.60 CFS | 236 | 208 | 191 | 186 | 179 | 168 | 154 | 139 |
| 25.80 CFS | 123 | 108 | 94 | 81 | 69 | 59 | 49 | 42 |
| 27.00 CFS | 34.97 | 29.25 | 24.39 | 20.29 | 16.84 | 13.95 | 11.53 | 9.52 |
| 28.20 CFS | 7.84 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.39 | 1.96 |
| 29.40 CFS | 1.60 | 1.30 | 1.06 | .87 | .70 | .57 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.61 WATERSHED INCHES; 18266 CFS-HRS; 1509.5 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
182 CFS-HRS; 1509.5 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.60 | 5284.0 | 5.65 |
| 13.81 | 4203.8 | 4.99 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.61 WATERSHED INCHES; 18264 CFS-HRS; 1509.3 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.14 | 3017.4 | (RUNOFF) |
| 21.36 | 47.5 | (RUNOFF) |
| 22.28 | 45.8 | (RUNOFF) |
| 22.88 | 44.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 1.47 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.40 CFS | .23 | .86 | 1.83 | 2.90 | 3.99 | 5.13 | 6.29 | 7.50 |
| 6.60 CFS | 8.72 | 9.95 | 11.17 | 12.44 | 13.81 | 15.13 | 16.61 | 18.05 |
| 7.80 CFS | 19.25 | 20.51 | 22.08 | 23.92 | 26.29 | 29.33 | 32.65 | 36.22 |
| 9.00 CFS | 39.69 | 43.35 | 46.89 | 49.23 | 51.20 | 53.92 | 58.31 | 64.38 |
| 10.20 CFS | 71 | 79 | 89 | 99 | 112 | 127 | 145 | 169 |
| 11.40 CFS | 202 | 249 | 418 | 1018 | 2294 | 3010 | 1975 | 731 |
| 12.60 CFS | 465 | 363 | 301 | 268 | 241 | 219 | 202 | 188 |
| 13.80 CFS | 174 | 162 | 151 | 142 | 135 | 130 | 127 | 124 |
| 15.00 CFS | 120 | 116 | 112 | 108 | 103 | 100 | 97 | 93 |
| 16.20 CFS | 88.45 | 85.66 | 84.53 | 83.59 | 81.94 | 80.20 | 79.02 | 77.69 |
| 17.40 CFS | 75.82 | 74.44 | 73.51 | 72.19 | 70.47 | 69.38 | 67.83 | 66.41 |
| 18.60 CFS | 65.29 | 63.55 | 62.36 | 60.99 | 59.26 | 58.30 | 57.21 | 55.38 |
| 19.80 CFS | 53.51 | 52.08 | 51.10 | 50.21 | 49.43 | 48.96 | 48.24 | 48.15 |
| 21.00 CFS | 48.03 | 47.50 | 47.54 | 47.54 | 47.06 | 46.95 | 46.79 | 45.96 |
| 22.20 CFS | 45.73 | 45.74 | 45.54 | 44.73 | 44.46 | 44.48 | 43.96 | 43.89 |
| 23.40 CFS | 43.83 | 43.50 | 43.31 | 43.20 | 42.33 | 36.27 | 18.23 | 2.58 |
| 24.60 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.99 WATERSHED INCHES; 2836 CFS-HRS; 234.3 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.39 | 1957.2 | 5.36 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.99 WATERSHED INCHES; 2836 CFS-HRS; 234.3 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.71 | 1427.4 | 4.38 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.99 WATERSHED INCHES; 2836 CFS-HRS; 234.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.62 | 6687.0 | (NULL) |
| 13.72 | 4667.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.00 CFS | .43 | .88 | 1.48 | 2.23 | 3.15 | 4.29 | 5.72 | 7.49 |
| 7.20 CFS | 9.66 | 12.26 | 15.29 | 18.75 | 22.62 | 26.88 | 31.46 | 36.34 |
| 8.40 CFS | 42 | 47 | 54 | 62 | 71 | 81 | 92 | 105 |
| 9.60 CFS | 119 | 135 | 151 | 167 | 186 | 207 | 230 | 257 |
| 10.80 CFS | 287 | 322 | 361 | 407 | 463 | 530 | 617 | 762 |
| 12.00 CFS | 1098 | 2014 | 3745 | 5737 | 6675 | 6117 | 4811 | 3976 |
| 13.20 CFS | 3952 | 4227 | 4507 | 4652 | 4644 | 4517 | 4308 | 4050 |
| 14.40 CFS | 3768 | 3480 | 3199 | 2933 | 2687 | 2462 | 2257 | 2070 |
| 15.60 CFS | 1900 | 1748 | 1612 | 1492 | 1385 | 1290 | 1205 | 1129 |
| 16.80 CFS | 1064 | 1007 | 957 | 913 | 872 | 835 | 802 | 772 |
| 18.00 CFS | 745 | 721 | 699 | 678 | 659 | 641 | 625 | 609 |
| 19.20 CFS | 594 | 580 | 566 | 553 | 541 | 528 | 516 | 503 |
| 20.40 CFS | 491 | 481 | 471 | 461 | 452 | 444 | 437 | 430 |
| 21.60 CFS | 423 | 417 | 411 | 406 | 401 | 396 | 392 | 387 |
| 22.80 CFS | 384 | 380 | 377 | 374 | 371 | 368 | 366 | 363 |
| 24.00 CFS | 361 | 358 | 353 | 341 | 313 | 275 | 239 | 214 |
| 25.20 CFS | 202 | 191 | 178 | 162 | 146 | 129 | 113 | 98 |
| 26.40 CFS | 84.20 | 71.96 | 61.16 | 51.73 | 43.58 | 36.58 | 30.60 | 25.53 |
| 27.60 CFS | 21.24 | 17.64 | 14.62 | 12.09 | 9.98 | 8.22 | 6.77 | 5.57 |
| 28.80 CFS | 4.57 | 3.75 | 3.07 | 2.52 | 2.06 | 1.68 | 1.37 | 1.12 |
| 30.00 CFS | .91 | .74 | .60 | .49 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.66 WATERSHED INCHES; 21100 CFS-HRS; 1743.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 5366.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.40 | CFS | .08 | .63 | 2.13 | 5.05 | 9.35 | 14.65 | 20.55 | 26.65 |
| 9.60 | CFS | 33 | 39 | 46 | 54 | 63 | 75 | 89 | 106 |
| 10.80 | CFS | 125 | 149 | 178 | 215 | 263 | 335 | 513 | 1060 |
| 12.00 | CFS | 2437 | 4291 | 5327 | 4955 | 3355 | 1745 | 1077 | 887 |
| 13.20 | CFS | 758 | 679 | 618 | 568 | 526 | 489 | 455 | 425 |
| 14.40 | CFS | 401 | 381 | 366 | 355 | 346 | 336 | 326 | 315 |
| 15.60 | CFS | 303 | 293 | 283 | 273 | 263 | 253 | 244 | 239 |
| 16.80 | CFS | 235 | 232 | 228 | 224 | 220 | 216 | 212 | 208 |
| 18.00 | CFS | 205 | 201 | 197 | 193 | 190 | 186 | 182 | 178 |
| 19.20 | CFS | 174 | 170 | 166 | 163 | 159 | 154 | 150 | 146 |
| 20.40 | CFS | 144 | 142 | 140 | 139 | 138 | 137 | 137 | 136 |
| 21.60 | CFS | 136 | 135 | 134 | 133 | 132 | 132 | 131 | 130 |
| 22.80 | CFS | 129 | 128 | 127 | 127 | 126 | 126 | 125 | 125 |
| 24.00 | CFS | 124 | 117 | 97 | 64 | 30 | 0 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.20 WATERSHED INCHES; 6779 CFS-HRS; 560.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 3789.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.65 | CFS | .34 | 1.02 | 2.20 | 3.98 | 6.21 | 8.79 | 11.68 | 14.95 |
| 8.85 | CFS | 18.73 | 23.03 | 27.81 | 32.98 | 38.30 | 43.54 | 48.66 | 53.93 |
| 10.05 | CFS | 60 | 67 | 76 | 87 | 100 | 115 | 133 | 155 |
| 11.25 | CFS | 182 | 215 | 261 | 357 | 621 | 1288 | 2308 | 3320 |
| 12.45 | CFS | 3780 | 3543 | 2634 | 1521 | 877 | 686 | 583 | 518 |
| 13.65 | CFS | 471 | 433 | 400 | 372 | 347 | 324 | 306 | 291 |
| 14.85 | CFS | 279 | 270 | 263 | 255 | 247 | 239 | 230 | 222 |
| 16.05 | CFS | 214 | 206 | 199 | 192 | 186 | 182 | 178 | 176 |
| 17.25 | CFS | 173 | 169 | 166 | 163 | 160 | 158 | 155 | 152 |
| 18.45 | CFS | 149 | 146 | 143 | 140 | 137 | 134 | 131 | 129 |
| 19.65 | CFS | 126 | 123 | 120 | 116 | 113 | 111 | 109 | 107 |
| 20.85 | CFS | 106 | 105 | 104 | 103 | 103 | 103 | 102 | 102 |
| 22.05 | CFS | 101 | 101 | 100 | 99 | 99 | 98 | 97 | 97 |
| 23.25 | CFS | 95.98 | 95.54 | 95.25 | 94.74 | 94.41 | 93.80 | 90.87 | 82.34 |
| 24.45 | CFS | 66.46 | 45.14 | 24.24 | 8.03 | .73 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.41 WATERSHED INCHES; 5420 CFS-HRS; 447.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 8933.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.65 CFS | .34 | 1.02 | 2.20 | 3.98 | 6.21 | 8.88 | 12.31 | 17.07 |
| 8.85 CFS | 23.77 | 32.38 | 42.46 | 53.53 | 64.95 | 76.31 | 87.58 | 99.60 |
| 10.05 CFS | 114 | 131 | 151 | 176 | 206 | 240 | 282 | 333 |
| 11.25 CFS | 396 | 477 | 597 | 871 | 1680 | 3726 | 6600 | 8648 |
| 12.45 CFS | 8735 | 6899 | 4380 | 2598 | 1764 | 1444 | 1262 | 1136 |
| 13.65 CFS | 1040 | 959 | 889 | 827 | 772 | 725 | 686 | 657 |
| 14.85 CFS | 634 | 616 | 599 | 581 | 562 | 542 | 523 | 505 |
| 16.05 CFS | 487 | 469 | 452 | 436 | 425 | 417 | 410 | 403 |
| 17.25 CFS | 396 | 389 | 382 | 375 | 369 | 362 | 356 | 349 |
| 18.45 CFS | 342 | 336 | 329 | 322 | 315 | 308 | 302 | 295 |
| 19.65 CFS | 289 | 281 | 273 | 266 | 260 | 255 | 251 | 247 |
| 20.85 CFS | 245 | 242 | 241 | 240 | 239 | 238 | 237 | 236 |
| 22.05 CFS | 235 | 233 | 232 | 230 | 229 | 227 | 225 | 224 |
| 23.25 CFS | 223 | 222 | 221 | 220 | 219 | 217 | 207 | 179 |
| 24.45 CFS | 130 | 75 | 24 | 8 | 1 | 0 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 12200 CFS-HRS; 1008.2 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.48 | 14530.5 | (NULL) |
| 13.63 | 5693.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.00 CFS | .43 | .88 | 1.48 | 2.23 | 3.15 | 4.29 | 5.72 | 7.49 |
| 7.20 CFS | 9.66 | 12.27 | 15.37 | 19.09 | 23.64 | 29.08 | 35.44 | 42.55 |
| 8.40 CFS | 50 | 60 | 71 | 86 | 103 | 123 | 146 | 170 |
| 9.60 CFS | 196 | 222 | 250 | 281 | 316 | 358 | 407 | 463 |
| 10.80 CFS | 528 | 604 | 694 | 804 | 940 | 1127 | 1487 | 2442 |
| 12.00 CFS | 4824 | 8613 | 12392 | 14472 | 13574 | 10496 | 7409 | 5739 |
| 13.20 CFS | 5397 | 5490 | 5643 | 5692 | 5603 | 5405 | 5134 | 4822 |
| 14.40 CFS | 4493 | 4166 | 3856 | 3567 | 3303 | 3060 | 2837 | 2631 |
| 15.60 CFS | 2442 | 2271 | 2117 | 1979 | 1854 | 1742 | 1641 | 1554 |
| 16.80 CFS | 1481 | 1417 | 1361 | 1309 | 1261 | 1217 | 1177 | 1141 |
| 18.00 CFS | 1107 | 1077 | 1048 | 1020 | 995 | 970 | 947 | 924 |
| 19.20 CFS | 902 | 881 | 861 | 842 | 822 | 802 | 782 | 763 |
| 20.40 CFS | 746 | 731 | 718 | 706 | 695 | 685 | 677 | 669 |
| 21.60 CFS | 661 | 654 | 648 | 641 | 634 | 628 | 622 | 616 |
| 22.80 CFS | 611 | 606 | 601 | 596 | 592 | 589 | 585 | 582 |
| 24.00 CFS | 578 | 566 | 533 | 471 | 388 | 299 | 247 | 215 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 25.20 CFS | 202 | 191 | 178 | 162 | 146 | 129 | 113 | 98 |
| 26.40 CFS | 84.20 | 71.96 | 61.16 | 51.73 | 43.58 | 36.58 | 30.60 | 25.53 |
| 27.60 CFS | 21.24 | 17.64 | 14.62 | 12.09 | 9.98 | 8.22 | 6.77 | 5.57 |
| 28.80 CFS | 4.57 | 3.75 | 3.07 | 2.52 | 2.06 | 1.68 | 1.37 | 1.12 |
| 30.00 CFS | .91 | .74 | .60 | .49 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 33301 CFS-HRS; 2752.0 ACRE-FEET.

--- XSECTION 76, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1197.0 FEET) CAN ADD .336 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 2761.84 AC-FT ( .21 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1210.54. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.40 | 83.1 * | 1211.35 |

* FIRST POINT OF FLAT PEAK

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 79 CFS
RESVOR ( 96. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4.95 CFS | 19.84 | 19.83 | 19.82 | 19.81 | 19.79 | 19.78 | 19.77 | 19.76 |
| 6.15 CFS | 19.74 | 19.73 | 19.72 | 19.71 | 19.70 | 19.69 | 19.68 | 19.67 |
| 7.35 CFS | 19.67 | 19.66 | 19.66 | 19.66 | 19.67 | 19.67 | 19.69 | 19.70 |
| 8.55 CFS | 19.73 | 19.76 | 19.80 | 19.84 | 19.90 | 19.98 | 20.07 | 20.17 |
| 9.75 CFS | 20.30 | 20.44 | 20.60 | 20.78 | 20.98 | 21.22 | 21.49 | 21.80 |
| 10.95 CFS | 22.15 | 22.56 | 23.03 | 23.58 | 24.24 | 25.07 | 26.33 | 28.02 |
| 12.15 CFS | 30.88 | 35.36 | 40.65 | 45.53 | 49.35 | 51.78 | 53.57 | 55.07 |
| 13.35 CFS | 56.55 | 57.96 | 59.38 | 60.80 | 62.18 | 63.50 | 64.74 | 65.90 |
| 14.55 CFS | 66.96 | 67.91 | 68.79 | 69.61 | 70.36 | 71.06 | 71.70 | 72.30 |
| 15.75 CFS | 72.85 | 73.36 | 73.84 | 74.28 | 74.70 | 75.09 | 75.46 | 75.81 |
| 16.95 CFS | 76.14 | 76.46 | 76.76 | 77.06 | 77.27 | 77.47 | 77.66 | 77.84 |
| 18.15 CFS | 78.02 | 78.19 | 78.36 | 78.52 | 78.68 | 78.84 | 78.99 | 79.13 |
| 19.35 CFS | 79.28 | 79.42 | 79.55 | 79.68 | 79.81 | 79.94 | 80.06 | 80.18 |
| 20.55 CFS | 80.29 | 80.41 | 80.52 | 80.63 | 80.73 | 80.84 | 80.94 | 81.05 |
| 21.75 CFS | 81.15 | 81.25 | 81.35 | 81.44 | 81.54 | 81.63 | 81.73 | 81.82 |
| 22.95 CFS | 81.92 | 82.01 | 82.10 | 82.19 | 82.28 | 82.37 | 82.45 | 82.54 |
| 24.15 CFS | 82.63 | 82.71 | 82.78 | 82.84 | 82.89 | 82.92 | 82.95 | 82.97 |
| 25.35 CFS | 82.99 | 83.01 | 83.02 | 83.04 | 83.05 | 83.05 | 83.06 | 83.06 |
| 26.55 CFS | 83.06 | 83.05 | 83.05 | 83.04 | 83.04 | 83.03 | 83.02 | 83.01 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27.75 CFS | 83.00 | 82.98 | 82.97 | 82.96 | 82.95 | 82.93 | 82.92 | 82.91 |
| 28.95 CFS | 82.89 | 82.88 | 82.86 | 82.85 | 82.84 | 82.82 | 82.81 | 82.79 |
| 30.15 CFS | 82.78 | 82.76 | 82.75 | 82.73 | 82.72 | 82.71 | 82.69 | 82.68 |
| 31.35 CFS | 82.66 | 82.65 | 82.63 | 82.62 | 82.60 | 82.59 | 82.58 | 82.56 |
| 32.55 CFS | 82.55 | 82.53 | 82.52 | 82.50 | 82.49 | 82.47 | 82.46 | 82.44 |
| 33.75 CFS | 82.43 | 82.42 | 82.40 | 82.39 | 82.37 | 82.36 | 82.34 | 82.33 |
| 34.95 CFS | 82.31 | 82.30 | 82.29 | 82.27 | 82.26 | 82.24 | 82.23 | 82.21 |
| 36.15 CFS | 82.20 | 82.18 | 82.17 | 82.16 | 82.14 | 82.13 | 82.11 | 82.10 |
| 37.35 CFS | 82.08 | 82.07 | 82.05 | 82.04 | 82.03 | 82.01 | 82.00 | 81.98 |
| 38.55 CFS | 81.97 | 81.95 | 81.94 | 81.92 | 81.91 | 81.90 | 81.88 | 81.87 |
| 39.75 CFS | 81.85 | 81.84 | 81.82 | 81.81 | 81.80 | 81.78 | 81.77 | 81.75 |
| 40.95 CFS | 81.74 | 81.72 | 81.71 | 81.70 | 81.68 | 81.67 | 81.65 | 81.64 |
| 42.15 CFS | 81.62 | 81.61 | 81.59 | 81.58 | 81.57 | 81.55 | 81.54 | 81.52 |
| 43.35 CFS | 81.51 | 81.49 | 81.48 | 81.47 | 81.45 | 81.44 | 81.42 | 81.41 |
| 44.55 CFS | 81.39 | 81.38 | 81.37 | 81.35 | 81.34 | 81.32 | 81.31 | 81.29 |
| 45.75 CFS | 81.28 | 81.27 | 81.25 | 81.24 | 81.22 | 81.21 | 81.19 | 81.18 |
| 46.95 CFS | 81.17 | 81.15 | 81.14 | 81.12 | 81.11 | 81.09 | 81.08 | 81.07 |
| 48.15 CFS | 81.05 | 81.04 | 81.02 | 81.01 | 80.99 | 80.98 | 80.97 | 80.95 |
| 49.35 CFS | 80.94 | 80.92 | 80.91 | 80.90 | 80.88 | 80.87 | 80.85 | 80.84 |
| 50.55 CFS | 80.82 | 80.81 | 80.80 | 80.78 | 80.77 | 80.75 | 80.74 | 80.73 |
| 51.75 CFS | 80.71 | 80.70 | 80.68 | 80.67 | 80.65 | 80.64 | 80.63 | 80.61 |
| 52.95 CFS | 80.60 | 80.58 | 80.57 | 80.56 | 80.54 | 80.53 | 80.51 | 80.50 |
| 54.15 CFS | 80.48 | 80.47 | 80.46 | 80.44 | 80.43 | 80.41 | 80.40 | 80.39 |
| 55.35 CFS | 80.37 | 80.36 | 80.34 | 80.33 | 80.31 | 80.30 | 80.29 | 80.27 |
| 56.55 CFS | 80.26 | 80.24 | 80.23 | 80.22 | 80.20 | 80.19 | 80.17 | 80.16 |
| 57.75 CFS | 80.15 | 80.13 | 80.12 | 80.10 | 80.09 | 80.08 | 80.06 | 80.05 |
| 58.95 CFS | 80.03 | 80.02 | 80.01 | 79.99 | 79.98 | 79.96 | 79.95 | 79.93 |
| 60.15 CFS | 79.92 | 79.91 | 79.89 | 79.88 | 79.86 | 79.85 | 79.84 | 79.82 |
| 61.35 CFS | 79.81 | 79.79 | 79.78 | 79.77 | 79.75 | 79.74 | 79.72 | 79.71 |
| 62.55 CFS | 79.70 | 79.68 | 79.67 | 79.65 | 79.64 | 79.63 | 79.61 | 79.60 |
| 63.75 CFS | 79.58 | 79.57 | 79.56 | 79.54 | 79.53 | 79.51 | 79.50 | 79.49 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.33 WATERSHED INCHES; 4339 CFS-HRS; 358.6 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 2

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

RAINFALL OF 4.28 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.
RAINTABLE NUMBER 2, ARC 1
MAIN TIME INCREMENT .150 HOURS

ALTERNATE 1 STORM 1

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| XSECTION 1 | RUNOFF | 2.46 | 1.75 | --- | 12.39 | 2111 | 858.1 |
| XSECTION 5 | REACH | 2.46 | 1.75 | 4.15 | 13.06 | 1263 | 513.4 |
| XSECTION 10 | REACH | 2.46 | 1.75 | 5.33 | 13.71 | 908 | 369.1 |
| XSECTION 2 | RUNOFF | 2.38 | 1.08 | --- | 12.35 | 1217 | 511.3 |
| XSECTION 12 | ADDHYD | 4.84 | 1.42 | --- | 12.35 | 1246 | 257.4 |
| XSECTION 12 | DIVERT | 4.84 | 1.42 | --- | 12.35 | 1246 | 257.4 |
| XSECTION 200 | DIVERT | .00 | 1.42 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 1.42 | 3.99 | 12.54 | 1181 | 244.0 |
| XSECTION 25 | REACH | 4.84 | 1.42 | 2.48 | 12.70 | 1166 | 240.9 |
| XSECTION 3 | RUNOFF | 3.94 | 1.75 | --- | 12.41 | 3318 | 842.1 |
| XSECTION 30 | REACH | 3.94 | 1.75 | 3.69 | 13.26 | 1740 | 441.6 |
| XSECTION 5 | REACH | 3.94 | 1.75 | 4.15 | 13.86 | 1259 | 319.5 |
| XSECTION 25 | REACH | 3.94 | 1.75 | 2.58 | 14.02 | 1257 | 319.0 |
| XSECTION 4 | RUNOFF | 2.06 | .87 | --- | 12.42 | 752 | 365.0 |
| XSECTION 34 | ADDHYD | 6.00 | 1.45 | --- | 14.00 | 1366 | 227.7 |
| XSECTION 35 | ADDHYD | 10.84 | 1.44 | --- | 14.01 | 2431 | 224.3 |
| XSECTION 35 | DIVERT | 10.84 | 1.44 | --- | 14.01 | 2431 | 224.3 |
| XSECTION 199 | DIVERT | .00 | 1.44 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 1.44 | 3.62 | 14.26 | 2395 | 220.9 |
| XSECTION 6 | RUNOFF | 1.47 | 1.85 | --- | 12.15 | 1882 | 1280.3 |
| XSECTION 60 | REACH | 1.47 | 1.85 | 4.51 | 12.58 | 1097 | 746.3 |
| XSECTION 67 | REACH | 1.47 | 1.85 | 3.50 | 12.93 | 798 | 542.9 |
| XSECTION 64 | ADDHYD | 12.31 | 1.49 | --- | 14.18 | 2650 | 215.3 |
| XSECTION 5 | RUNOFF | 4.78 | 1.00 | --- | 12.40 | 2122 | 443.9 |
| XSECTION 7 | RUNOFF | 3.48 | 1.22 | --- | 12.53 | 1734 | 498.3 |
| XSECTION 75 | ADDHYD | 8.26 | 1.09 | --- | 12.44 | 3771 | 456.5 |
| XSECTION 76 | ADDHYD | 20.57 | 1.33 | --- | 12.57 | 5080 | 247.0 |
| STRUCTURE 1 | RESVOR | 20.57 | .25 | 1206.76 | 26.84T | 60T | 2.9 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINTABLE NUMBER 2, ARC 2 | | | | | | | |
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 2.90 | --- | 12.36 | 3561 | 1447.6 |
| XSECTION 5 | REACH | 2.46 | 2.90 | 5.09 | 12.88 | 2127 | 864.6 |
| XSECTION 10 | REACH | 2.46 | 2.90 | 6.20 | 13.56 | 1476 | 600.0 |
| XSECTION 2 | RUNOFF | 2.38 | 2.29 | --- | 12.30 | 2956 | 1242.0 |
| XSECTION 12 | ADDHYD | 4.84 | 2.60 | --- | 12.31 | 3128 | 646.3 |
| XSECTION 12 | DIVERT | 4.84 | 2.60 | --- | 12.31 | 3128 | 646.3 |
| XSECTION 200 | DIVERT | .00 | 2.60 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 2.60 | 6.75 | 12.46 | 3103 | 641.1 |
| XSECTION 25 | REACH | 4.84 | 2.60 | 4.26 | 12.46 | 3103 | 641.1 |
| XSECTION 3 | RUNOFF | 3.94 | 2.90 | --- | 12.37 | 5582 | 1416.8 |
| XSECTION 30 | REACH | 3.94 | 2.90 | 4.30 | 13.08 | 3079 | 781.5 |
| XSECTION 5 | REACH | 3.94 | 2.90 | 5.16 | 13.64 | 2205 | 559.6 |
| XSECTION 25 | REACH | 3.94 | 2.90 | 3.54 | 13.64 | 2205 | 559.6 |
| XSECTION 4 | RUNOFF | 2.06 | 2.08 | --- | 12.34 | 2178 | 1057.3 |
| XSECTION 34 | ADDHYD | 6.00 | 2.62 | --- | 12.35 | 2449 | 408.2 |
| XSECTION 35 | ADDHYD | 10.84 | 2.61 | --- | 12.43 | 5439 | 501.8 |
| XSECTION 35 | DIVERT | 10.84 | 2.61 | --- | 12.43 | 5439 | 501.8 |
| XSECTION 199 | DIVERT | .00 | 2.61 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 2.61 | 5.65 | 12.60 | 5284 | 487.5 |
| XSECTION 6 | RUNOFF | 1.47 | 2.99 | --- | 12.14 | 3017 | 2052.4 |
| XSECTION 60 | REACH | 1.47 | 2.99 | 5.36 | 12.39 | 1957 | 1331.3 |
| XSECTION 67 | REACH | 1.47 | 2.99 | 4.38 | 12.71 | 1427 | 970.7 |
| XSECTION 64 | ADDHYD | 12.31 | 2.66 | --- | 12.62 | 6687 | 543.2 |
| XSECTION 5 | RUNOFF | 4.78 | 2.20 | --- | 12.34 | 5366 | 1122.6 |
| XSECTION 7 | RUNOFF | 3.48 | 2.41 | --- | 12.47 | 3789 | 1088.8 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 75 | ADDHYD | 8.26 | 2.29 | --- | 12.38 | 8934 | 1081.6 |
| XSECTION 76 | ADDHYD | 20.57 | 2.51 | --- | 12.48 | 14531 | 706.4 |
| STRUCTURE 1 | RESVOR | 20.57 | .33 | 1211.35 | 26.40F | 83F | 4.0 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| | | | HYDROGRAPH INFORMATION | | | | ROUTING PARAMETERS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | INFLOW | | OUTFLOW | | Q-A EQ. | | | PEAK | ATT- |
| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | PEAK (CFS) | TIME (HR) | PEAK (CFS) | TIME (HR) | COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | RATIO Q/I (Q*) | KIN COEFF (C) |
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 2064 | 12.4 | 1263 | 13.1 | .82 | 1.23 | .451 | .612 | .23 |
| 10 | 9100 | | 1263 | 13.1 | 905 | 13.6 | .81 | 1.27 | .215 | .716 | .25 |
| 20 | 3332 | | 1222 | 12.3 | 1155 | 12.6 | .11 | 1.67 | .007 | .945 | .79? |
| 25 | 1950 | | 1155 | 12.6 | 1151 | 12.8 | .046 | 1.75 | .004 | .996 | .92? |
| 30 | 8865 | | 3285 | 12.4 | 1721 | 13.2 | 1.15 | 1.13 | .591 | .524 | .18 |
| 5 | 8865 | | 1721 | 13.2 | 1255 | 13.8 | .80 | 1.24 | .201 | .729 | .23 |
| 25 | 1950 | | 1255 | 13.8 | 1252 | 13.9 | .046 | 1.75 | .004 | .998 | .94? |
| 45 | 4200 | | 2423 | 13.9 | 2395 | 14.3 | .045 | 1.73 | .008 | .988 | .67? |
| 60 | 7540 | | 1882 | 12.1 | 1094 | 12.6 | .60 | 1.31 | .454 | .581 | .32 |
| 67 | 5140 | | 1094 | 12.6 | 795 | 12.9 | .68 | 1.27 | .193 | .727 | .36 |
| ALTERNATE 2 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 3483 | 12.3 | 2125 | 12.9 | 1.22 | 1.16 | .477 | .610 | .22 |
| 10 | 9100 | | 2125 | 12.9 | 1471 | 13.5 | 1.51 | 1.14 | .271 | .692 | .22 |
| 20 | 3332 | | 3127 | 12.3 | 3100 | 12.4 | .14 | 1.64 | .008 | .991 | .95? |
| 25 | 1950 | | 3100 | 12.4 | 3100 | 12.4 | .050 | 1.74 | .004 | 1.000 | 1.00? |
| 30 | 8865 | | 5423 | 12.3 | 3073 | 13.1 | 1.23 | 1.12 | .562 | .567 | .19 |
| 5 | 8865 | | 3073 | 13.1 | 2205 | 13.6 | 1.21 | 1.16 | .237 | .718 | .22 |
| 25 | 1950 | | 2205 | 13.6 | 2205 | 13.6 | .047 | 1.74 | .003 | 1.000 | 1.00? |
| 45 | 4200 | | 5423 | 12.4 | 5284 | 12.6 | .047 | 1.73 | .007 | .974 | .82? |
| 60 | 7540 | | 3010 | 12.1 | 1914 | 12.4 | .49 | 1.35 | .359 | .636 | .37 |
| 67 | 5140 | | 1914 | 12.4 | 1421 | 12.8 | .89 | 1.22 | .211 | .742 | .36 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE 1 | | 20.57 | |
| ALTERNATE | 1 | | 60 |
| ALTERNATE | 2 | | 83 |
| XSECTION 1 | | 2.46 | |
| ALTERNATE | 1 | | 2111 |
| ALTERNATE | 2 | | 3561 |
| XSECTION 2 | | 2.38 | |
| ALTERNATE | 1 | | 1217 |
| ALTERNATE | 2 | | 2956 |
| XSECTION 3 | | 3.94 | |
| ALTERNATE | 1 | | 3318 |
| ALTERNATE | 2 | | 5582 |
| XSECTION 4 | | 2.06 | |
| ALTERNATE | 1 | | 752 |
| ALTERNATE | 2 | | 2178 |
| XSECTION 5 | | 4.78 | |
| ALTERNATE | 1 | | 2122 |
| ALTERNATE | 2 | | 5366 |
| XSECTION 6 | | 1.47 | |
| ALTERNATE | 1 | | 1882 |
| ALTERNATE | 2 | | 3017 |
| XSECTION 7 | | 3.48 | |
| ALTERNATE | 1 | | 1734 |
| ALTERNATE | 2 | | 3789 |
| XSECTION 10 | | 2.46 | |
| ALTERNATE | 1 | | 908 |
| ALTERNATE | 2 | | 1476 |
| XSECTION 12 | | 4.84 | |
| ALTERNATE | 1 | | 1246 |
| ALTERNATE | 2 | | 3128 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 20 | | 4.84 | |
| ALTERNATE | 1 | | 1181 |
| ALTERNATE | 2 | | 3103 |
| XSECTION 25 | | 3.94 | |
| ALTERNATE | 1 | | 1257 |
| ALTERNATE | 2 | | 2205 |
| XSECTION 30 | | 3.94 | |
| ALTERNATE | 1 | | 1740 |
| ALTERNATE | 2 | | 3079 |
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 1366 |
| ALTERNATE | 2 | | 2449 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 2431 |
| ALTERNATE | 2 | | 5439 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 2395 |
| ALTERNATE | 2 | | 5284 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 1097 |
| ALTERNATE | 2 | | 1957 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 2650 |
| ALTERNATE | 2 | | 6687 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 798 |
| ALTERNATE | 2 | | 1427 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 3771 |
| ALTERNATE | 2 | | 8934 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 5080 |
| ALTERNATE | 2 | | 14531 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

```
TR20 ------------------------------------------------------------------- SCS -
WT100YR   WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
01/21/**  200-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spil2.04TEST


END OF  1 JOBS IN THIS RUN




                    SCS  TR-20,  VERSION 2.04TEST
                         WT100YR   FILES

     INPUT  = 200INN.DAT                              , GIVEN DATA FILE
     OUTPUT = 200OUT.OUT                              , DATED 01/21/**,15:16:33

              FILES GENERATED - DATED 01/21/**,15:16:33

    FILE 200OUT.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   4,  MESSAGES =   8

                       JOB ENDED AT 15:16:33
                   *** TR-20 RUN COMPLETED ***
```

500-Year 24-hr Modeling Results

(Interim Conditions)

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20 WT100YR                          PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROUTING
TITLE     500-yr, 24-hr, Type II Dist, 100-yr Sediment Storage, 1200'Spillway
 4 DIMHYD               .0556                                          WT3
 8          0.0         .03         .10         .19         .31
 8          .47         .66         .82         .93         .99
 8          1.0         .99         .93         .82         .66
 8          .47         .31         .03         .00         .00
 9 ENDTBL
 5 RAINFL 2             .1000                                          TYPE II
 8          .0000       .0010       .0020       .0030       .0041
 8          .0051       .0062       .0072       .0083       .0094
 8          .0105       .0116       .0127       .0138       .0150
 8          .0161       .0173       .0184       .0196       .0208
 8          .0220       .0232       .0244       .0257       .0269
 8          .0281       .0294       .0306       .0319       .0332
 8          .0345       .0358       .0371       .0384       .0398
 8          .0411       .0425       .0439       .0452       .0466
 8          .0480       .0494       .0508       .0523       .0538
 8          .0553       .0568       .0583       .0598       .0614
 8          .0630       .0646       .0662       .0679       .0696
 8          .0712       .0730       .0747       .0764       .0782
 8          .0800       .0818       .0836       .0855       .0874
 8          .0892       .0912       .0931       .0950       .0970
 8          .0990       .1010       .1030       .1051       .1072
 8          .1093       .1114       .1135       .1156       .1178
 8          .1200       .1222       .1246       .1270       .1296
 8          .1322       .1350       .1379       .1408       .1438
 8          .1470       .1502       .1534       .1566       .1598
 8          .1630       .1663       .1697       .1733       .1771
 8          .1810       .1851       .1895       .1941       .1989
 8          .2040       .2094       .2152       .2214       .2280
 8          .2350       .2427       .2513       .2609       .2715
 8          .2830       .3068       .3544       .4308       .5679
 8          .6630       .6820       .6986       .7130       .7252
 8          .7350       .7434       .7514       .7588       .7656
 8          .7720       .7780       .7836       .7890       .7942
 8          .7990       .8036       .8080       .8122       .8162
 8          .8200       .8237       .8273       .8308       .8342
 8          .8376       .8409       .8442       .8474       .8505
 8          .8535       .8565       .8594       .8622       .8649
 8          .8676       .8702       .8728       .8753       .8777
 8          .8800       .8823       .8845       .8868       .8890
 8          .8912       .8934       .8955       .8976       .8997
 8          .9018       .9038       .9058       .9078       .9097
 8          .9117       .9136       .9155       .9173       .9192
 8          .9210       .9228       .9245       .9263       .9280
 8          .9297       .9313       .9330       .9346       .9362
 8          .9377       .9393       .9408       .9423       .9438
 8          .9452       .9466       .9480       .9493       .9507
 8          .9520       .9533       .9546       .9559       .9572
 8          .9584       .9597       .9610       .9622       .9635
 8          .9647       .9660       .9672       .9685       .9697
 8          .9709       .9722       .9734       .9746       .9758
 8          .9770       .9782       .9794       .9806       .9818
 8          .9829       .9841       .9853       .9864       .9876
```

```
 8          .9887       .9899       .9910       .9922       .9933
 8          .9944       .9956       .9967       .9978       .9989
 8          1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         10.41                             BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.86        5.          4.39
 8                      2.01        50.         24.22
 8                      2.58        100.        40.12
 8                      3.46        200.        80.99
 8                      4.14        400.        129.44
 8                      5.16        800.        214.74
 8                      6.39        1600.       441.84
 8                      7.80        3200.       980.75
 8                      9.16        6400.       1891.44
 8                      10.41       12800.      3516.14
 8                      11.75       25600.      6548.98
 8                      13.26       51200.      11081.19
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8                       1.56        500.        203.28
 8                       2.30        1000.       302.00
 8                       3.38        2000.       449.24
 8                       4.97        4000.       673.73
 8                       6.23        6000.       855.96
 8                       7.31        8000.       1016.35
 8                       8.24        10000.      1158.51
 8                       9.09        12000.      1293.31
 8                       9.90        14000.      1425.57
 8                       10.64       16000.      1549.17
 8                       11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030         1.0         9.45                                BOSSCS#6
 8                       0.          0.0         0.0
 8                       0.77        5.          4.67
 8                       1.54        50.         32.06
 8                       1.78        100.        56.64
 8                       2.10        200.        100.59
 8                       2.50        400.        179.97
 8                       3.01        800.        320.25
 8                       3.63        1600.       589.66
 8                       4.35        3200.       1110.72
 8                       5.21        6400.       2084.48
 8                       6.03        12800.      4119.83
 8                       6.99        25600.      6856.75
 8                       8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045         1.0         4.87                                REACHA
 8                       0.          0.0         0.0
 8                       0.60        100.        85.69
 8                       0.90        200.        127.94
 8                       1.13        300.        161.93
 8                       1.52        500.        217.27
 8                       2.25        1000.       324.03
 8                       3.31        2000.       483.02
 8                       4.87        4000.       722.17
 8                       6.09        6000.       914.99
 8                       7.15        8000.       1084.61
 8                       8.05        10000.      1234.17
 8                       8.87        12000.      1373.80
 8                       9.64        14000.      1507.84
 8                       10.34       16000.      1633.45
 8                       11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060         1.0         4.7                                 2CP6CP7
 8                       0.          0.0         0.0
 8                       2.36        100.        45.12
 8                       2.88        200.        83.75
 8                       3.18        300.        114.33
 8                       3.64        500.        172.72
 8                       4.42        1000.       289.04
 8                       5.40        2000.       470.72
 8                       6.87        4000.       782.74
 8                       7.91        6000.       1020.12
 8                       8.79        8000.       1231.25
 8                       9.60        10000.      1435.05
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8                       10.26       12000.      1618.34
 8                       10.94       14000.      1812.58
 8                       11.47       16000.      1983.46
 8                       11.96       18000.      2150.12
 9 ENDTBL
 2 XSECTN    067         1.0         8.77                                BOSSCS#5
 8                       0.          0.0         0.0
 8                       0.35        5.          5.56
 8                       1.03        50.         30.95
 8                       1.39        100.        52.16
 8                       1.94        200.        88.72
 8                       2.63        400.        148.61
 8                       3.51        800.        260.63
 8                       4.62        1600.       459.66
 8                       6.04        3200.       929.36
 8                       7.38        6400.       1811.51
 8                       8.77        12800.      3374.20
 8                       10.17       25600.      6398.87
 8                       11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT      01                                                        95/11/6
 8                       1178.0      0.00        0.0
 8                       1188.0      2.71        44.8
 8                       1193.0      7.29        129.0
 8                       1199.2      26.75       500.0
 8                       1202.0      38.68       845.55
 8                       1204.0      48.00       1176.28
 8                       1206.0      56.80       1575.25
 8                       1208.0      66.40       2044.97
 8                       1210.0      77.10       2593.40
 8                       1212.0      85.95       3218.00
 8                       1213.0      2685.00     3556.67
 8                       1214.0      8231.00     3916.02
 8                       1215.0      15545.0     4294.13
 8                       1216.0      24272.0     4692.68
 8                       1217.0      34212.0     5113.19
 8                       1218.0      45232.0     5556.01
 8                       1219.0      57233.0     6021.50
 8                       1220.0      70142.0     6509.75
 9 ENDTBL
 6 RUNOFF 1 001          1 2.46      87.2        0.85        1 1
 6 REACH  3 005   1      7 9100.                             1           BOSS#6
 6 REACH  3 010   7      2 9100.                             1           BOSS#4
 6 RUNOFF 1 002          3 2.38      79.9        0.73        1 1
 6 ADDHYD 4 012   2 3 1                                      1 1
 6 DIVERT 6 012   1 4 7  4100.       1.00        200.        1 1         OLIVE
 6 REACH  3 020   4      7 3332.                             1           REACH C
 6 REACH  3 025   7      5 1950.                             1           REACH B
 6 RUNOFF 1 003          6 3.94      87.2        0.88        1 1
 6 REACH  3 030   6      7 8865.                             1           BOSS#6
 6 REACH  3 005   7      1 8865.                             1           BOSS#5
 6 REACH  3 025   1      7 1950.                             1           REACH B
 6 RUNOFF 1 004          1 2.06      77.3        0.79        1 1
 6 ADDHYD 4 034   7 1 2                                      1 1
 6 ADDHYD 4 035   5 2 3                                      1 1
 6 DIVERT 6 035   3 4 7  11000.      1.00        199.        1 1         NORTHERN
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 REACH   3 045    4    5 4200.                                  1           REACH A
 6 RUNOFF  1 006         2 1.47         87.7         0.47        1 1
 6 REACH   3 060    2    3 7540.                                  1           CP6CP7
 6 REACH   3 067    3    4 5140.                                  1           BOSS#5
 6 ADDHYD  4 064    5 4  3                                       1 1
 6 RUNOFF  1 005         6 4.78         78.8         0.78        1 1
 6 RUNOFF  1 007         7 3.48         81.7         1.01        1 1
 6 ADDHYD  4 075    6 7  1                                       1 1
 6 ADDHYD  4 076    1 3  2                                       1 1       1
 6 RESVOR  2     01 2    1 1197.0                                1 1       1
 ENDATA
 7 LIST                    1.0                      1.
 7 INCREM  6               0.15
 7 COMPUT  7 001       01  0.          4.84         1.0         2 1  01   01
   ENDCMP  1
 7 COMPUT  7 001       01  0.          4.84         1.0         2 2  02   01
   ENDCMP  1
   ENDJOB  2

**********END OF 80-80 LIST**********
```

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST 1. 0. 1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT
DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0017 | .0035 | .0052 | .0070 |
| .0087 | .0105 | .0122 | .0139 | .0157 |
| .0174 | .0192 | .0210 | .0227 | .0245 |
| .0262 | .0280 | .0297 | .0315 | .0332 |
| .0350 | .0368 | .0386 | .0404 | .0423 |
| .0442 | .0461 | .0480 | .0500 | .0520 |
| .0540 | .0561 | .0582 | .0603 | .0625 |
| .0647 | .0669 | .0691 | .0714 | .0737 |
| .0760 | .0784 | .0807 | .0831 | .0855 |
| .0878 | .0902 | .0926 | .0951 | .0975 |
| .1000 | .1024 | .1049 | .1073 | .1098 |
| .1123 | .1148 | .1174 | .1199 | .1225 |
| .1250 | .1276 | .1303 | .1332 | .1361 |
| .1391 | .1423 | .1456 | .1489 | .1524 |
| .1560 | .1597 | .1633 | .1671 | .1708 |
| .1746 | .1784 | .1823 | .1861 | .1901 |
| .1940 | .1982 | .2027 | .2077 | .2132 |
| .2190 | .2252 | .2318 | .2388 | .2462 |
| .2540 | .2623 | .2714 | .2812 | .2917 |
| .3030 | .3194 | .3454 | .3878 | .4632 |
| .5150 | .5322 | .5476 | .5612 | .5730 |
| .5830 | .5919 | .6003 | .6083 | .6159 |
| .6230 | .6298 | .6365 | .6430 | .6493 |
| .6555 | .6615 | .6674 | .6731 | .6786 |
| .6840 | .6892 | .6944 | .6995 | .7044 |
| .7092 | .7140 | .7186 | .7232 | .7276 |
| .7320 | .7362 | .7404 | .7444 | .7484 |
| .7523 | .7560 | .7596 | .7632 | .7667 |
| .7700 | .7733 | .7766 | .7798 | .7830 |
| .7862 | .7894 | .7926 | .7958 | .7989 |
| .8020 | .8051 | .8082 | .8112 | .8142 |
| .8173 | .8202 | .8232 | .8262 | .8291 |
| .8320 | .8349 | .8378 | .8406 | .8434 |
| .8462 | .8490 | .8518 | .8546 | .8573 |
| .8600 | .8627 | .8654 | .8680 | .8706 |
| .8733 | .8758 | .8784 | .8810 | .8835 |
| .8860 | .8885 | .8910 | .8934 | .8958 |
| .8982 | .9006 | .9030 | .9054 | .9077 |
| .9100 | .9123 | .9146 | .9168 | .9190 |
| .9212 | .9234 | .9256 | .9278 | .9299 |
| .9320 | .9341 | .9362 | .9382 | .9402 |
| .9423 | .9442 | .9462 | .9482 | .9501 |
| .9520 | .9539 | .9558 | .9576 | .9594 |
| .9613 | .9630 | .9648 | .9666 | .9683 |
| .9700 | .9717 | .9734 | .9750 | .9766 |
| .9783 | .9798 | .9814 | .9830 | .9845 |
| .9860 | .9875 | .9890 | .9904 | .9918 |
| .9933 | .9946 | .9960 | .9974 | .9987 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

```
RUNOFF      1        1      2.4600     87.2000      .85001 1 0 0 0 1
REACH       5   1    7   9100.0000       .0000      .00001 0 0 0 0 1
REACH      10   7    2   9100.0000       .0000      .00001 0 0 0 0 1
RUNOFF      2        3      2.3800     79.9000      .73001 1 0 0 0 1
ADDHYD     12   2 3  1                                   1 1 0 0 0 1
DIVERT     12   1 4  7   4100.0000      1.0000   200.00001 1 0 0 0 1
REACH      20   4    7   3332.0000       .0000      .00001 0 0 0 0 1
REACH      25   7    5   1950.0000       .0000      .00001 0 0 0 0 1
RUNOFF      3        6      3.9400     87.2000      .88001 1 0 0 0 1
REACH      30   6    7   8865.0000       .0000      .00001 0 0 0 0 1
REACH       5   7    1   8865.0000       .0000      .00001 0 0 0 0 1
REACH      25   1    7   1950.0000       .0000      .00001 0 0 0 0 1
RUNOFF      4        1      2.0600     77.3000      .79001 1 0 0 0 1
ADDHYD     34   7 1  2                                   1 1 0 0 0 1
ADDHYD     35   5 2  3                                   1 1 0 0 0 1
DIVERT     35   3 4  7  11000.0000      1.0000   199.00001 1 0 0 0 1
REACH      45   4    5   4200.0000       .0000      .00001 0 0 0 0 1
RUNOFF      6        2      1.4700     87.7000      .47001 1 0 0 0 1
REACH      60   2    3   7540.0000       .0000      .00001 0 0 0 0 1
REACH      67   3    4   5140.0000       .0000      .00001 0 0 0 0 1
ADDHYD     64   5 4  3                                   1 1 0 0 0 1
RUNOFF      5        6      4.7800     78.8000      .78001 1 0 0 0 1
RUNOFF      7        7      3.4800     81.7000     1.01001 1 0 0 0 1
ADDHYD     75   6 7  1                                   1 1 0 0 0 1
ADDHYD     76   1 3  2                                   1 1 0 0 1 1
RESVOR        1 2    1   1197.0000                       1 1 0 0 1 1
ENDATA
```

END OF LISTING

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .150 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.84 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 1 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 1 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.39 | 2652.3 | |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.30 | CFS | .14 | .64 | 1.88 | 3.93 | 6.85 | 10.39 | 14.51 | 19.43 |
| 10.50 | CFS | 25 | 32 | 41 | 51 | 64 | 80 | 101 | 131 |
| 11.70 | CFS | 196 | 419 | 998 | 1876 | 2542 | 2593 | 1984 | 1122 |
| 12.90 | CFS | 627 | 495 | 419 | 370 | 337 | 309 | 286 | 266 |
| 14.10 | CFS | 248 | 232 | 218 | 207 | 198 | 192 | 186 | 182 |
| 15.30 | CFS | 176 | 171 | 164 | 159 | 153 | 148 | 143 | 137 |
| 16.50 | CFS | 133 | 129 | 127 | 125 | 123 | 121 | 119 | 117 |
| 17.70 | CFS | 115 | 113 | 111 | 109 | 107 | 105 | 103 | 101 |
| 18.90 | CFS | 98.76 | 96.75 | 94.57 | 92.62 | 90.65 | 88.60 | 86.41 | 83.97 |
| 20.10 | CFS | 81.66 | 79.74 | 78.28 | 77.10 | 76.07 | 75.28 | 74.75 | 74.28 |
| 21.30 | CFS | 74.09 | 73.81 | 73.57 | 73.32 | 73.03 | 72.52 | 72.00 | 71.52 |
| 22.50 | CFS | 71.05 | 70.72 | 70.21 | 69.69 | 69.16 | 68.86 | 68.63 | 68.32 |
| 23.70 | CFS | 68.10 | 67.82 | 67.20 | 64.08 | 55.49 | 39.11 | 21.20 | 6.63 |
| 24.90 | CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 3461 CFS-HRS; 286.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.05 | 1590.2 | 4.61 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 3461 CFS-HRS; 286.0 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.72 | 1122.9 | 5.66 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 3461 CFS-HRS; 286.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 1660.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 2 | 10 | 40 | 181 | 604 | 1257 | 1644 |
| 12.45 CFS | 1515 | 972 | 508 | 381 | 317 | 279 | 253 | 232 |
| 13.65 CFS | 215 | 200 | 187 | 175 | 164 | 155 | 148 | 143 |
| 14.85 CFS | 139 | 136 | 133 | 129 | 124 | 120 | 116 | 112 |
| 16.05 CFS | 109 | 105 | 101 | 98 | 96 | 95 | 94 | 92 |
| 17.25 CFS | 90.62 | 89.11 | 87.59 | 86.11 | 84.82 | 83.46 | 82.06 | 80.49 |
| 18.45 CFS | 79.06 | 77.60 | 76.00 | 74.55 | 72.96 | 71.43 | 70.01 | 68.50 |
| 19.65 CFS | 67.07 | 65.29 | 63.40 | 61.78 | 60.53 | 59.57 | 58.78 | 58.06 |
| 20.85 CFS | 57.62 | 57.25 | 57.05 | 56.90 | 56.72 | 56.62 | 56.41 | 56.17 |
| 22.05 CFS | 55.79 | 55.41 | 55.01 | 54.86 | 54.55 | 54.10 | 53.70 | 53.42 |
| 23.25 CFS | 53.28 | 53.05 | 52.96 | 52.73 | 52.50 | 51.88 | 48.81 | 38.76 |
| 24.45 CFS | 23.78 | 9.43 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.41 WATERSHED INCHES; 2172 CFS-HRS; 179.5 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 1708.7 | (NULL) |
| 13.67 | 1333.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .45 | .97 | 1.79 | 2.97 | 4.58 | 6.97 | 11.49 | 22.39 |
| 11.70 CFS | 57 | 203 | 632 | 1293 | 1689 | 1574 | 1059 | 662 |
| 12.90 CFS | 669 | 809 | 1005 | 1186 | 1297 | 1332 | 1314 | 1260 |
| 14.10 CFS | 1185 | 1101 | 1014 | 930 | 851 | 779 | 713 | 653 |
| 15.30 CFS | 599 | 550 | 507 | 469 | 436 | 407 | 381 | 358 |
| 16.50 CFS | 339 | 323 | 309 | 296 | 284 | 273 | 263 | 254 |
| 17.70 CFS | 246 | 239 | 232 | 226 | 220 | 215 | 210 | 205 |
| 18.90 CFS | 201 | 196 | 192 | 188 | 184 | 180 | 176 | 172 |
| 20.10 CFS | 168 | 165 | 162 | 159 | 156 | 153 | 151 | 149 |
| 21.30 CFS | 146 | 144 | 142 | 141 | 139 | 137 | 135 | 134 |
| 22.50 CFS | 133 | 132 | 131 | 129 | 129 | 128 | 127 | 126 |
| 23.70 CFS | 126 | 125 | 124 | 120 | 110 | 94 | 80 | 70 |
| 24.90 CFS | 69.23 | 68.15 | 65.91 | 62.13 | 56.85 | 50.62 | 44.17 | 37.96 |
| 26.10 CFS | 32.23 | 27.09 | 22.59 | 18.71 | 15.40 | 12.62 | 10.29 | 8.36 |
| 27.30 CFS | 6.77 | 5.46 | 4.40 | 3.53 | 2.83 | 2.26 | 1.80 | 1.44 |
| 28.50 CFS | 1.14 | .91 | .72 | .57 | .45 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5633 CFS-HRS; 465.5 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 1708.7 | (DIVERT) |
| 13.67 | 1333.0 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 | CFS | .45 | .97 | 1.79 | 2.97 | 4.58 | 6.97 | 11.49 | 22.39 |
| 11.70 | CFS | 57 | 203 | 632 | 1293 | 1689 | 1574 | 1059 | 662 |
| 12.90 | CFS | 669 | 809 | 1005 | 1186 | 1297 | 1332 | 1314 | 1260 |
| 14.10 | CFS | 1185 | 1101 | 1014 | 930 | 851 | 779 | 713 | 653 |
| 15.30 | CFS | 599 | 550 | 507 | 469 | 436 | 407 | 381 | 358 |
| 16.50 | CFS | 339 | 323 | 309 | 296 | 284 | 273 | 263 | 254 |
| 17.70 | CFS | 246 | 239 | 232 | 226 | 220 | 215 | 210 | 205 |
| 18.90 | CFS | 201 | 196 | 192 | 188 | 184 | 180 | 176 | 172 |
| 20.10 | CFS | 168 | 165 | 162 | 159 | 156 | 153 | 151 | 149 |
| 21.30 | CFS | 146 | 144 | 142 | 141 | 139 | 137 | 135 | 134 |
| 22.50 | CFS | 133 | 132 | 131 | 129 | 129 | 128 | 127 | 126 |
| 23.70 | CFS | 126 | 125 | 124 | 120 | 110 | 94 | 80 | 70 |
| 24.90 | CFS | 69.23 | 68.15 | 65.91 | 62.13 | 56.85 | 50.62 | 44.17 | 37.96 |
| 26.10 | CFS | 32.23 | 27.09 | 22.59 | 18.71 | 15.40 | 12.62 | 10.29 | 8.36 |
| 27.30 | CFS | 6.77 | 5.46 | 4.40 | 3.53 | 2.83 | 2.26 | 1.80 | 1.44 |
| 28.50 | CFS | 1.14 | .91 | .72 | .57 | .45 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5633 CFS-HRS; 465.5 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
149 CFS-HRS; 465.5 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.52 | 1652.9 | 4.80 |
| 13.85 | 1326.9 | 4.24 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5633 CFS-HRS; 465.5 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.67 | 1650.4 | 3.00 |
| 14.01 | 1326.7 | 2.65 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5632 CFS-HRS; 465.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 4180.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.30 CFS | .19 | .96 | 2.77 | 5.91 | 10.42 | 15.98 | 22.58 | 30.28 |
| 10.50 CFS | 40 | 51 | 64 | 80 | 100 | 125 | 157 | 204 |
| 11.70 CFS | 304 | 643 | 1501 | 2830 | 3913 | 4137 | 3309 | 1968 |
| 12.90 CFS | 1099 | 812 | 685 | 603 | 546 | 501 | 463 | 430 |
| 14.10 CFS | 400 | 374 | 351 | 333 | 319 | 308 | 300 | 292 |
| 15.30 CFS | 283 | 274 | 265 | 255 | 247 | 238 | 230 | 221 |
| 16.50 CFS | 214 | 208 | 204 | 201 | 198 | 194 | 191 | 188 |
| 17.70 CFS | 184 | 181 | 178 | 175 | 172 | 168 | 165 | 162 |
| 18.90 CFS | 159 | 155 | 152 | 149 | 146 | 142 | 139 | 135 |
| 20.10 CFS | 131 | 128 | 126 | 124 | 122 | 121 | 120 | 119 |
| 21.30 CFS | 119 | 118 | 118 | 117 | 117 | 116 | 115 | 115 |
| 22.50 CFS | 114 | 113 | 113 | 112 | 111 | 110 | 110 | 109 |
| 23.70 CFS | 109 | 109 | 108 | 103 | 90 | 66 | 38 | 14 |
| 24.90 CFS | 1.99 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.0 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.25 | 2215.5 | 3.91 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.1 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.84 | 1612.8 | 4.63 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.1 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.99 | 1612.6 | 2.96 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.40 | 1081.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 6 | 71 | 295 | 685 | 1006 | 1065 | 806 |
| 12.75 CFS | 462 | 299 | 249 | 216 | 195 | 178 | 165 | 154 |
| 13.95 CFS | 144 | 134 | 126 | 119 | 114 | 110 | 107 | 104 |
| 15.15 CFS | 102 | 99 | 96 | 93 | 90 | 87 | 84 | 81 |
| 16.35 CFS | 78.26 | 75.89 | 74.28 | 73.27 | 72.29 | 71.20 | 70.08 | 68.92 |
| 17.55 CFS | 67.81 | 66.69 | 65.67 | 64.67 | 63.62 | 62.46 | 61.35 | 60.25 |
| 18.75 CFS | 59.05 | 57.94 | 56.79 | 55.57 | 54.49 | 53.37 | 52.24 | 50.95 |
| 19.95 CFS | 49.52 | 48.21 | 47.16 | 46.41 | 45.76 | 45.22 | 44.84 | 44.55 |
| 21.15 CFS | 44.36 | 44.27 | 44.14 | 44.05 | 43.90 | 43.74 | 43.47 | 43.19 |
| 22.35 CFS | 42.93 | 42.71 | 42.53 | 42.23 | 41.94 | 41.68 | 41.55 | 41.43 |
| 23.55 CFS | 41.30 | 41.15 | 41.02 | 40.57 | 38.45 | 31.89 | 21.36 | 10.46 |
| 24.75 CFS | 2.62 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.17 WATERSHED INCHES; 1562 CFS-HRS; 129.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 1137.5 | (NULL) |
| 13.97 | 1754.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .20 | .53 | 1.17 | 2.20 | 3.73 | 5.82 | 8.59 | 12.44 |
| 11.70 CFS | 23 | 94 | 324 | 722 | 1054 | 1126 | 886 | 577 |
| 12.90 CFS | 496 | 611 | 833 | 1124 | 1405 | 1611 | 1721 | 1754 |
| 14.10 CFS | 1732 | 1673 | 1591 | 1497 | 1398 | 1298 | 1201 | 1109 |
| 15.30 CFS | 1021 | 940 | 865 | 797 | 736 | 682 | 633 | 590 |
| 16.50 CFS | 551 | 518 | 488 | 462 | 438 | 416 | 397 | 379 |
| 17.70 CFS | 363 | 348 | 335 | 323 | 312 | 302 | 293 | 285 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.90 CFS | 277 | 270 | 263 | 257 | 251 | 246 | 240 | 234 |
| 20.10 CFS | 229 | 224 | 219 | 215 | 211 | 207 | 203 | 199 |
| 21.30 CFS | 196 | 192 | 189 | 186 | 183 | 180 | 177 | 175 |
| 22.50 CFS | 172 | 171 | 169 | 167 | 165 | 164 | 163 | 162 |
| 23.70 CFS | 160 | 159 | 158 | 155 | 148 | 136 | 125 | 116 |
| 24.90 CFS | 113 | 112 | 110 | 108 | 103 | 96 | 88 | 79 |
| 26.10 CFS | 69.67 | 61.03 | 53.00 | 45.70 | 39.17 | 33.39 | 28.35 | 23.97 |
| 27.30 CFS | 20.20 | 16.98 | 14.23 | 11.90 | 9.93 | 8.27 | 6.88 | 5.71 |
| 28.50 CFS | 4.74 | 3.92 | 3.24 | 2.68 | 2.21 | 1.82 | 1.50 | 1.24 |
| 29.70 CFS | 1.02 | .84 | .69 | .56 | .46 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.83 WATERSHED INCHES; 7105 CFS-HRS; 587.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.58 | 2495.4 | (NULL) |
| 13.99 | 3080.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .23 | .68 | 1.57 | 3.07 | 5.37 | 8.58 | 12.86 | 18.96 |
| 11.70 CFS | 34 | 114 | 374 | 900 | 1611 | 2298 | 2491 | 2157 |
| 12.90 CFS | 1641 | 1352 | 1513 | 1911 | 2375 | 2761 | 2994 | 3077 |
| 14.10 CFS | 3048 | 2942 | 2790 | 2614 | 2429 | 2245 | 2068 | 1902 |
| 15.30 CFS | 1747 | 1605 | 1474 | 1357 | 1252 | 1158 | 1076 | 1002 |
| 16.50 CFS | 938 | 880 | 831 | 788 | 749 | 714 | 683 | 654 |
| 17.70 CFS | 628 | 604 | 583 | 563 | 546 | 530 | 515 | 501 |
| 18.90 CFS | 488 | 476 | 465 | 454 | 444 | 434 | 425 | 415 |
| 20.10 CFS | 406 | 397 | 389 | 381 | 373 | 366 | 360 | 353 |
| 21.30 CFS | 347 | 341 | 336 | 330 | 326 | 321 | 316 | 312 |
| 22.50 CFS | 308 | 305 | 302 | 299 | 296 | 294 | 292 | 290 |
| 23.70 CFS | 288 | 286 | 284 | 280 | 272 | 257 | 236 | 213 |
| 24.90 CFS | 195 | 184 | 180 | 176 | 169 | 159 | 145 | 130 |
| 26.10 CFS | 115 | 100 | 86 | 74 | 63 | 53 | 44 | 37 |
| 27.30 CFS | 30.97 | 25.73 | 21.32 | 17.63 | 14.55 | 11.98 | 9.85 | 8.09 |
| 28.50 CFS | 6.63 | 5.43 | 4.45 | 3.63 | 2.97 | 2.42 | 1.98 | 1.61 |
| 29.70 CFS | 1.31 | 1.07 | .87 | .71 | .57 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.82 WATERSHED INCHES; 12737 CFS-HRS; 1052.6 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.58 | 2495.4 | (DIVERT) |
| 13.99 | 3080.1 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .23 | .68 | 1.57 | 3.07 | 5.37 | 8.58 | 12.86 | 18.96 |
| 11.70 CFS | 34 | 114 | 374 | 900 | 1611 | 2298 | 2491 | 2157 |
| 12.90 CFS | 1641 | 1352 | 1513 | 1911 | 2375 | 2761 | 2994 | 3077 |
| 14.10 CFS | 3048 | 2942 | 2790 | 2614 | 2429 | 2245 | 2068 | 1902 |
| 15.30 CFS | 1747 | 1605 | 1474 | 1357 | 1252 | 1158 | 1076 | 1002 |
| 16.50 CFS | 938 | 880 | 831 | 788 | 749 | 714 | 683 | 654 |
| 17.70 CFS | 628 | 604 | 583 | 563 | 546 | 530 | 515 | 501 |
| 18.90 CFS | 488 | 476 | 465 | 454 | 444 | 434 | 425 | 415 |
| 20.10 CFS | 406 | 397 | 389 | 381 | 373 | 366 | 360 | 353 |
| 21.30 CFS | 347 | 341 | 336 | 330 | 326 | 321 | 316 | 312 |
| 22.50 CFS | 308 | 305 | 302 | 299 | 296 | 294 | 292 | 290 |
| 23.70 CFS | 288 | 286 | 284 | 280 | 272 | 257 | 236 | 213 |
| 24.90 CFS | 195 | 184 | 180 | 176 | 169 | 159 | 145 | 130 |
| 26.10 CFS | 115 | 100 | 86 | 74 | 63 | 53 | 44 | 37 |
| 27.30 CFS | 30.97 | 25.73 | 21.32 | 17.63 | 14.55 | 11.98 | 9.85 | 8.09 |
| 28.50 CFS | 6.63 | 5.43 | 4.45 | 3.63 | 2.97 | 2.42 | 1.98 | 1.61 |
| 29.70 CFS | 1.31 | 1.07 | .87 | .71 | .57 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.82 WATERSHED INCHES; 12737 CFS-HRS; 1052.6 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
159 CFS-HRS; 1052.6 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.78 | 2366.0 | 3.60 |
| 14.21 | 3043.2 | 4.12 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.82 WATERSHED INCHES; 12737 CFS-HRS; 1052.6 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.15 | 2337.1 | (RUNOFF) |
| 21.38 | 45.5 | (RUNOFF) |
| 22.30 | 43.9 | (RUNOFF) |
| 22.89 | 42.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 1.47 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | .12 | .81 | 2.31 | 4.21 | 6.13 | 8.18 | 10.60 | 13.56 |
| 10.20 CFS | 17.04 | 21.18 | 26.13 | 31.94 | 39.10 | 48.05 | 58.88 | 73.09 |
| 11.40 CFS | 93 | 123 | 229 | 641 | 1641 | 2337 | 1620 | 629 |
| 12.60 CFS | 410 | 323 | 269 | 240 | 217 | 198 | 184 | 171 |
| 13.80 CFS | 158 | 148 | 138 | 130 | 124 | 120 | 117 | 114 |
| 15.00 CFS | 111 | 107 | 104 | 100 | 96 | 93 | 90 | 87 |
| 16.20 CFS | 82.70 | 80.16 | 79.19 | 78.39 | 76.91 | 75.34 | 74.29 | 73.10 |
| 17.40 CFS | 71.40 | 70.15 | 69.34 | 68.15 | 66.58 | 65.58 | 64.15 | 62.87 |
| 18.60 CFS | 61.85 | 60.24 | 59.15 | 57.89 | 56.28 | 55.38 | 54.38 | 52.67 |
| 19.80 CFS | 50.92 | 49.59 | 48.68 | 47.85 | 47.12 | 46.71 | 46.04 | 45.97 |
| 21.00 CFS | 45.88 | 45.40 | 45.46 | 45.46 | 45.02 | 44.95 | 44.81 | 44.03 |
| 22.20 CFS | 43.83 | 43.86 | 43.69 | 42.93 | 42.68 | 42.71 | 42.24 | 42.19 |
| 23.40 CFS | 42.14 | 41.84 | 41.67 | 41.59 | 40.75 | 34.87 | 17.56 | 2.53 |
| 24.60 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 2172 CFS-HRS; 179.5 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.56 | 1443.4 | 4.85 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 2174 CFS-HRS; 179.6 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.90 | 1051.8 | 3.86 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 2174 CFS-HRS; 179.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.81 | 3398.3 | (NULL) |
| 14.14 | 3348.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 12.31 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 9.75 CFS | .45 | 1.07 | 1.98 | 3.16 | 4.61 | 6.39 | 8.64 | 11.51 |
| 10.95 CFS | 15 | 20 | 26 | 34 | 44 | 58 | 80 | 154 |
| 12.15 CFS | 383 | 898 | 1753 | 2767 | 3352 | 3266 | 2798 | 2364 |
| 13.35 CFS | 2260 | 2432 | 2742 | 3050 | 3260 | 3344 | 3320 | 3215 |
| 14.55 CFS | 3059 | 2873 | 2676 | 2479 | 2289 | 2110 | 1944 | 1790 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.75 CFS | 1650 | 1522 | 1407 | 1305 | 1214 | 1133 | 1061 | 997 |
| 16.95 CFS | 941 | 893 | 850 | 811 | 776 | 745 | 716 | 689 |
| 18.15 CFS | 666 | 644 | 625 | 607 | 590 | 574 | 560 | 546 |
| 19.35 CFS | 533 | 521 | 509 | 498 | 487 | 477 | 466 | 455 |
| 20.55 CFS | 445 | 436 | 427 | 419 | 411 | 404 | 397 | 391 |
| 21.75 CFS | 385 | 379 | 374 | 368 | 364 | 359 | 355 | 351 |
| 22.95 CFS | 348 | 344 | 341 | 338 | 336 | 333 | 331 | 329 |
| 24.15 CFS | 327 | 324 | 316 | 303 | 281 | 254 | 228 | 208 |
| 25.35 CFS | 197 | 188 | 179 | 168 | 154 | 139 | 123 | 107 |
| 26.55 CFS | 92.95 | 79.67 | 67.79 | 57.34 | 48.25 | 40.42 | 33.74 | 28.07 |
| 27.75 CFS | 23.29 | 19.27 | 15.91 | 13.12 | 10.79 | 8.87 | 7.28 | 5.96 |
| 28.95 CFS | 4.88 | 3.99 | 3.26 | 2.66 | 2.17 | 1.77 | 1.44 | 1.17 |
| 30.15 CFS | .96 | .78 | .63 | .51 | .41 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.88 WATERSHED INCHES; 14911 CFS-HRS; 1232.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 2948.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 1 | 7 | 45 | 264 | 936 | 2010 | 2815 |
| 12.45 CFS | 2869 | 2084 | 1153 | 759 | 632 | 547 | 493 | 452 |
| 13.65 CFS | 418 | 389 | 363 | 340 | 319 | 301 | 287 | 277 |
| 14.85 CFS | 269 | 263 | 256 | 249 | 241 | 233 | 225 | 218 |
| 16.05 CFS | 211 | 204 | 196 | 190 | 186 | 184 | 181 | 178 |
| 17.25 CFS | 175 | 172 | 170 | 167 | 164 | 162 | 159 | 156 |
| 18.45 CFS | 153 | 150 | 147 | 145 | 142 | 139 | 136 | 133 |
| 19.65 CFS | 130 | 127 | 123 | 120 | 117 | 116 | 114 | 113 |
| 20.85 CFS | 112 | 111 | 110 | 110 | 110 | 110 | 109 | 109 |
| 22.05 CFS | 108 | 107 | 107 | 106 | 106 | 105 | 104 | 104 |
| 23.25 CFS | 103 | 103 | 103 | 102 | 102 | 101 | 95 | 80 |
| 24.45 CFS | 51.97 | 23.95 | 5.33 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.33 WATERSHED INCHES; 4091 CFS-HRS; 338.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.51 | 2316.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 2 | 5 | 14 | 29 | 68 | 200 | 557 |
| 12.15 CFS | 1200 | 1896 | 2284 | 2235 | 1778 | 1088 | 639 | 525 |
| 13.35 CFS | 453 | 404 | 370 | 342 | 317 | 295 | 276 | 259 |
| 14.55 CFS | 245 | 234 | 225 | 219 | 213 | 207 | 201 | 195 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.75 CFS | 188 | 182 | 176 | 170 | 164 | 158 | 154 | 150 |
| 16.95 CFS | 148 | 146 | 143 | 141 | 139 | 136 | 134 | 132 |
| 18.15 CFS | 130 | 127 | 125 | 123 | 120 | 118 | 116 | 113 |
| 19.35 CFS | 111 | 109 | 106 | 104 | 101 | 99 | 96 | 94 |
| 20.55 CFS | 92.39 | 91.09 | 90.02 | 89.23 | 88.66 | 88.22 | 87.97 | 87.72 |
| 21.75 CFS | 87.42 | 87.16 | 86.74 | 86.16 | 85.61 | 85.16 | 84.55 | 84.12 |
| 22.95 CFS | 83.62 | 83.05 | 82.52 | 82.19 | 81.96 | 81.59 | 81.36 | 80.80 |
| 24.15 CFS | 78.20 | 71.11 | 57.14 | 39.02 | 21.01 | 7.17 | .42 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.57 WATERSHED INCHES; 3534 CFS-HRS; 292.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 5168.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
HRS MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 2 | 5 | 14 | 36 | 113 | 464 | 1492 |
| 12.15 CFS | 3209 | 4711 | 5153 | 4318 | 2931 | 1847 | 1271 | 1072 |
| 13.35 CFS | 946 | 856 | 788 | 730 | 680 | 635 | 595 | 560 |
| 14.55 CFS | 532 | 511 | 495 | 482 | 469 | 456 | 443 | 428 |
| 15.75 CFS | 414 | 400 | 387 | 373 | 360 | 348 | 340 | 334 |
| 16.95 CFS | 329 | 324 | 319 | 313 | 308 | 303 | 298 | 293 |
| 18.15 CFS | 289 | 284 | 278 | 273 | 268 | 263 | 257 | 252 |
| 19.35 CFS | 247 | 242 | 237 | 231 | 224 | 219 | 214 | 210 |
| 20.55 CFS | 206 | 204 | 202 | 200 | 199 | 198 | 198 | 197 |
| 21.75 CFS | 197 | 196 | 195 | 194 | 192 | 191 | 190 | 189 |
| 22.95 CFS | 188 | 187 | 186 | 185 | 185 | 184 | 183 | 182 |
| 24.15 CFS | 174 | 151 | 109 | 63 | 26 | 7 | 0 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.43 WATERSHED INCHES; 7625 CFS-HRS; 630.2 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.55 | 7134.6 | (NULL) |
| 14.08 | 3980.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
HRS MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.75 CFS | .45 | 1.07 | 1.98 | 3.16 | 4.61 | 6.39 | 8.64 | 11.52 |
| 10.95 CFS | 16 | 22 | 32 | 48 | 80 | 171 | 544 | 1646 |
| 12.15 CFS | 3592 | 5609 | 6906 | 7085 | 6283 | 5114 | 4069 | 3436 |
| 13.35 CFS | 3206 | 3288 | 3530 | 3781 | 3940 | 3979 | 3914 | 3775 |
| 14.55 CFS | 3591 | 3384 | 3171 | 2961 | 2759 | 2567 | 2386 | 2218 |
| 15.75 CFS | 2063 | 1922 | 1794 | 1679 | 1574 | 1481 | 1401 | 1331 |
| 16.95 CFS | 1270 | 1216 | 1169 | 1125 | 1085 | 1048 | 1014 | 983 |
| 18.15 CFS | 954 | 928 | 903 | 880 | 858 | 837 | 817 | 798 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19.35 CFS | 780 | 763 | 746 | 729 | 712 | 695 | 679 | 665 |
| 20.55 CFS | 652 | 640 | 629 | 619 | 611 | 603 | 595 | 588 |
| 21.75 CFS | 581 | 575 | 568 | 562 | 556 | 550 | 545 | 540 |
| 22.95 CFS | 535 | 531 | 527 | 523 | 520 | 517 | 514 | 511 |
| 24.15 CFS | 501 | 474 | 426 | 366 | 308 | 261 | 228 | 208 |
| 25.35 CFS | 197 | 188 | 179 | 168 | 154 | 139 | 123 | 107 |
| 26.55 CFS | 92.95 | 79.67 | 67.79 | 57.34 | 48.25 | 40.42 | 33.74 | 28.07 |
| 27.75 CFS | 23.29 | 19.27 | 15.91 | 13.12 | 10.79 | 8.87 | 7.28 | 5.96 |
| 28.95 CFS | 4.88 | 3.99 | 3.26 | 2.66 | 2.17 | 1.77 | 1.44 | 1.17 |
| 30.15 CFS | .96 | .78 | .63 | .51 | .41 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.70 WATERSHED INCHES; 22536 CFS-HRS; 1862.4 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1197.0 FEET) CAN
ADD .336 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS
WITH 1923.83 AC-FT ( .14 WATERSHED INCHES) FLOOD STORAGE
REMAINING IN RESERVOIR AT ELEV. 1207.48. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.85 | 68.4 | 1208.38 |

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 64 CFS
RESVOR ( 93. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 20.57 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 8.85 CFS | 19.84 | 19.83 | 19.82 | 19.81 | 19.79 | 19.78 | 19.77 | 19.76 |
| 10.05 CFS | 19.74 | 19.73 | 19.72 | 19.71 | 19.71 | 19.70 | 19.69 | 19.69 |
| 11.25 CFS | 19.70 | 19.71 | 19.74 | 19.81 | 20.03 | 20.73 | 22.42 | 25.39 |
| 12.45 CFS | 28.52 | 31.50 | 34.35 | 36.78 | 38.72 | 40.01 | 41.16 | 42.28 |
| 13.65 CFS | 43.45 | 44.72 | 46.05 | 47.42 | 48.61 | 49.65 | 50.64 | 51.58 |
| 14.85 CFS | 52.46 | 53.29 | 54.05 | 54.77 | 55.43 | 56.04 | 56.61 | 57.12 |
| 16.05 CFS | 57.57 | 58.00 | 58.40 | 58.77 | 59.12 | 59.45 | 59.76 | 60.06 |
| 17.25 CFS | 60.35 | 60.63 | 60.89 | 61.14 | 61.39 | 61.63 | 61.86 | 62.08 |
| 18.45 CFS | 62.30 | 62.51 | 62.71 | 62.91 | 63.10 | 63.29 | 63.48 | 63.65 |
| 19.65 CFS | 63.83 | 64.00 | 64.17 | 64.33 | 64.49 | 64.64 | 64.79 | 64.94 |
| 20.85 CFS | 65.08 | 65.22 | 65.36 | 65.50 | 65.64 | 65.77 | 65.90 | 66.03 |
| 22.05 CFS | 66.16 | 66.28 | 66.41 | 66.53 | 66.64 | 66.76 | 66.87 | 66.98 |
| 23.25 CFS | 67.10 | 67.21 | 67.32 | 67.43 | 67.53 | 67.64 | 67.75 | 67.85 |
| 24.45 CFS | 67.94 | 68.02 | 68.09 | 68.14 | 68.18 | 68.22 | 68.25 | 68.28 |
| 25.65 CFS | 68.31 | 68.33 | 68.36 | 68.37 | 68.39 | 68.40 | 68.41 | 68.41 |
| 26.85 CFS | 68.41 | 68.41 | 68.41 | 68.40 | 68.40 | 68.39 | 68.38 | 68.37 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 28.05 CFS | 68.35 | 68.34 | 68.33 | 68.31 | 68.30 | 68.28 | 68.27 | 68.25 |
| 29.25 CFS | 68.24 | 68.22 | 68.20 | 68.19 | 68.17 | 68.16 | 68.14 | 68.12 |
| 30.45 CFS | 68.11 | 68.09 | 68.08 | 68.06 | 68.04 | 68.03 | 68.01 | 67.99 |
| 31.65 CFS | 67.98 | 67.96 | 67.94 | 67.93 | 67.91 | 67.89 | 67.88 | 67.86 |
| 32.85 CFS | 67.85 | 67.83 | 67.81 | 67.80 | 67.78 | 67.76 | 67.75 | 67.73 |
| 34.05 CFS | 67.71 | 67.70 | 67.68 | 67.67 | 67.65 | 67.63 | 67.62 | 67.60 |
| 35.25 CFS | 67.58 | 67.57 | 67.55 | 67.53 | 67.52 | 67.50 | 67.49 | 67.47 |
| 36.45 CFS | 67.45 | 67.44 | 67.42 | 67.40 | 67.39 | 67.37 | 67.35 | 67.34 |
| 37.65 CFS | 67.32 | 67.31 | 67.29 | 67.27 | 67.26 | 67.24 | 67.22 | 67.21 |
| 38.85 CFS | 67.19 | 67.18 | 67.16 | 67.14 | 67.13 | 67.11 | 67.09 | 67.08 |
| 40.05 CFS | 67.06 | 67.05 | 67.03 | 67.01 | 67.00 | 66.98 | 66.97 | 66.95 |
| 41.25 CFS | 66.93 | 66.92 | 66.90 | 66.88 | 66.87 | 66.85 | 66.84 | 66.82 |
| 42.45 CFS | 66.80 | 66.79 | 66.77 | 66.75 | 66.74 | 66.72 | 66.71 | 66.69 |
| 43.65 CFS | 66.67 | 66.66 | 66.64 | 66.63 | 66.61 | 66.59 | 66.58 | 66.56 |
| 44.85 CFS | 66.55 | 66.53 | 66.51 | 66.50 | 66.48 | 66.46 | 66.45 | 66.43 |
| 46.05 CFS | 66.42 | 66.40 | 66.38 | 66.37 | 66.35 | 66.33 | 66.32 | 66.30 |
| 47.25 CFS | 66.28 | 66.27 | 66.25 | 66.23 | 66.22 | 66.20 | 66.18 | 66.17 |
| 48.45 CFS | 66.15 | 66.13 | 66.12 | 66.10 | 66.08 | 66.07 | 66.05 | 66.03 |
| 49.65 CFS | 66.01 | 66.00 | 65.98 | 65.96 | 65.95 | 65.93 | 65.91 | 65.90 |
| 50.85 CFS | 65.88 | 65.86 | 65.85 | 65.83 | 65.81 | 65.80 | 65.78 | 65.76 |
| 52.05 CFS | 65.75 | 65.73 | 65.71 | 65.70 | 65.68 | 65.66 | 65.65 | 65.63 |
| 53.25 CFS | 65.61 | 65.60 | 65.58 | 65.56 | 65.55 | 65.53 | 65.51 | 65.50 |
| 54.45 CFS | 65.48 | 65.47 | 65.45 | 65.43 | 65.42 | 65.40 | 65.38 | 65.37 |
| 55.65 CFS | 65.35 | 65.33 | 65.32 | 65.30 | 65.28 | 65.27 | 65.25 | 65.23 |
| 56.85 CFS | 65.22 | 65.20 | 65.18 | 65.17 | 65.15 | 65.13 | 65.12 | 65.10 |
| 58.05 CFS | 65.08 | 65.07 | 65.05 | 65.04 | 65.02 | 65.00 | 64.99 | 64.97 |
| 59.25 CFS | 64.95 | 64.94 | 64.92 | 64.90 | 64.89 | 64.87 | 64.85 | 64.84 |
| 60.45 CFS | 64.82 | 64.81 | 64.79 | 64.77 | 64.76 | 64.74 | 64.72 | 64.71 |
| 61.65 CFS | 64.69 | 64.67 | 64.66 | 64.64 | 64.62 | 64.61 | 64.59 | 64.58 |
| 62.85 CFS | 64.56 | 64.54 | 64.53 | 64.51 | 64.49 | 64.48 | 64.46 | 64.44 |
| 64.05 CFS | 64.43 | 64.41 | 64.40 | 64.38 | 64.36 | 64.35 | 64.33 | 64.31 |
| 65.25 CFS | 64.30 | 64.28 | 64.27 | 64.25 | 64.23 | 64.22 | 64.20 | 64.18 |
| 66.45 CFS | 64.17 | 64.15 | 64.14 | 64.12 | 64.10 | 64.09 | 64.07 | 64.05 |
| 67.65 CFS | 64.04 | 64.02 | 64.01 | 63.99 | 63.97 | 63.96 | 63.94 | 63.92 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.28 WATERSHED INCHES; 3715 CFS-HRS; 307.0 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.84 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 2 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.35 | 4184.8 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.10 CFS | .13 | .52 | 1.40 | 2.79 | 4.63 | 6.64 | 8.71 | 10.84 |
| 6.30 CFS | 13.04 | 15.32 | 17.69 | 20.07 | 22.48 | 24.89 | 27.34 | 29.88 |
| 7.50 CFS | 32.51 | 35.26 | 37.94 | 40.58 | 43.19 | 46.02 | 49.47 | 53.81 |
| 8.70 CFS | 59 | 65 | 72 | 79 | 86 | 92 | 98 | 103 |
| 9.90 CFS | 108 | 115 | 125 | 138 | 153 | 170 | 190 | 213 |
| 11.10 CFS | 240 | 274 | 317 | 379 | 522 | 915 | 1887 | 3187 |
| 12.30 CFS | 4117 | 3956 | 2908 | 1555 | 847 | 650 | 548 | 483 |
| 13.50 CFS | 437 | 400 | 369 | 342 | 318 | 296 | 278 | 263 |
| 14.70 CFS | 251 | 243 | 236 | 229 | 222 | 215 | 207 | 199 |
| 15.90 CFS | 192 | 185 | 178 | 172 | 165 | 161 | 158 | 156 |
| 17.10 CFS | 153 | 150 | 147 | 145 | 142 | 139 | 137 | 135 |
| 18.30 CFS | 132 | 129 | 127 | 124 | 121 | 119 | 116 | 113 |
| 19.50 CFS | 111 | 108 | 106 | 103 | 100 | 97 | 96 | 94 |
| 20.70 CFS | 92.72 | 91.70 | 91.01 | 90.41 | 90.12 | 89.73 | 89.41 | 89.04 |
| 21.90 CFS | 88.64 | 87.99 | 87.32 | 86.72 | 86.09 | 85.65 | 84.99 | 84.34 |
| 23.10 CFS | 83.65 | 83.23 | 82.92 | 82.49 | 82.21 | 81.83 | 81.21 | 77.53 |
| 24.30 CFS | 66.71 | 47.19 | 25.43 | 7.73 | .56 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 5435 CFS-HRS; 449.1 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.88 | 2472.1 | 5.39 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 5435 CFS-HRS; 449.2 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.57 | 1695.1 | 6.47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 5435 CFS-HRS; 449.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 3544.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.50 CFS | .18 | .76 | 1.87 | 3.49 | 5.37 | 7.39 | 9.65 | 12.23 |
| 8.70 CFS | 15.26 | 18.71 | 22.53 | 26.64 | 30.95 | 35.15 | 39.09 | 42.91 |
| 9.90 CFS | 47 | 53 | 60 | 69 | 79 | 91 | 105 | 122 |
| 11.10 CFS | 142 | 168 | 202 | 251 | 377 | 784 | 1764 | 3027 |
| 12.30 CFS | 3544 | 3002 | 1767 | 849 | 621 | 512 | 445 | 400 |
| 13.50 CFS | 365 | 336 | 311 | 289 | 269 | 252 | 237 | 226 |
| 14.70 CFS | 217 | 211 | 205 | 200 | 193 | 186 | 180 | 173 |
| 15.90 CFS | 167 | 162 | 155 | 149 | 145 | 142 | 140 | 137 |
| 17.10 CFS | 135 | 133 | 130 | 128 | 125 | 123 | 121 | 119 |
| 18.30 CFS | 117 | 114 | 112 | 110 | 107 | 105 | 103 | 101 |
| 19.50 CFS | 98.28 | 96.12 | 93.47 | 90.67 | 88.28 | 86.41 | 84.96 | 83.75 |
| 20.70 CFS | 82.66 | 81.96 | 81.37 | 81.02 | 80.75 | 80.42 | 80.23 | 79.86 |
| 21.90 CFS | 79.45 | 78.84 | 78.25 | 77.61 | 77.35 | 76.85 | 76.17 | 75.55 |
| 23.10 CFS | 75.10 | 74.86 | 74.48 | 74.29 | 73.93 | 73.56 | 72.64 | 68.18 |
| 24.30 CFS | 54.27 | 33.26 | 13.11 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.77 WATERSHED INCHES; 4254 CFS-HRS; 351.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 3754.5 | (NULL) |
| 13.51 | 2051.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .28 | .59 | 1.05 | 1.69 | 2.51 | 3.49 | 4.64 | 5.95 |
| 7.35 CFS | 7.43 | 9.18 | 11.47 | 14.39 | 17.93 | 21.83 | 25.96 | 30.40 |
| 8.55 CFS | 35.24 | 40.60 | 46.43 | 52.71 | 59.43 | 66.56 | 73.86 | 81.23 |
| 9.75 CFS | 89 | 97 | 108 | 120 | 133 | 149 | 166 | 185 |
| 10.95 CFS | 208 | 235 | 269 | 311 | 371 | 508 | 930 | 1926 |
| 12.15 CFS | 3209 | 3754 | 3262 | 2132 | 1409 | 1464 | 1673 | 1882 |
| 13.35 CFS | 2013 | 2051 | 2020 | 1942 | 1834 | 1710 | 1581 | 1454 |
| 14.55 CFS | 1332 | 1220 | 1117 | 1023 | 937 | 859 | 788 | 725 |
| 15.75 CFS | 670 | 621 | 578 | 539 | 504 | 474 | 449 | 427 |
| 16.95 CFS | 408 | 390 | 373 | 359 | 345 | 333 | 322 | 313 |
| 18.15 CFS | 303 | 295 | 287 | 280 | 272 | 266 | 260 | 253 |
| 19.35 CFS | 248 | 242 | 237 | 231 | 225 | 220 | 215 | 211 |
| 20.55 CFS | 207 | 203 | 199 | 196 | 193 | 190 | 188 | 185 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21.75 CFS | 183 | 181 | 178 | 176 | 174 | 173 | 171 | 170 |
| 22.95 CFS | 168 | 167 | 166 | 165 | 164 | 163 | 161 | 160 |
| 24.15 CFS | 155 | 140 | 119 | 98 | 84 | 83 | 81 | 77 |
| 25.35 CFS | 71.00 | 64.28 | 57.19 | 50.18 | 43.55 | 37.46 | 31.98 | 27.13 |
| 26.55 CFS | 22.89 | 19.22 | 16.07 | 13.39 | 11.12 | 9.21 | 7.61 | 6.27 |
| 27.75 CFS | 5.15 | 4.23 | 3.46 | 2.83 | 2.31 | 1.88 | 1.53 | 1.25 |
| 28.95 CFS | 1.01 | .82 | .66 | .54 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9689 CFS-HRS; 800.7 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 3754.5 | (DIVERT) |
| 13.51 | 2051.4 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .28 | .59 | 1.05 | 1.69 | 2.51 | 3.49 | 4.64 | 5.95 |
| 7.35 CFS | 7.43 | 9.18 | 11.47 | 14.39 | 17.93 | 21.83 | 25.96 | 30.40 |
| 8.55 CFS | 35.24 | 40.60 | 46.43 | 52.71 | 59.43 | 66.56 | 73.86 | 81.23 |
| 9.75 CFS | 89 | 97 | 108 | 120 | 133 | 149 | 166 | 185 |
| 10.95 CFS | 208 | 235 | 269 | 311 | 371 | 508 | 930 | 1926 |
| 12.15 CFS | 3209 | 3754 | 3262 | 2132 | 1409 | 1464 | 1673 | 1882 |
| 13.35 CFS | 2013 | 2051 | 2020 | 1942 | 1834 | 1710 | 1581 | 1454 |
| 14.55 CFS | 1332 | 1220 | 1117 | 1023 | 937 | 859 | 788 | 725 |
| 15.75 CFS | 670 | 621 | 578 | 539 | 504 | 474 | 449 | 427 |
| 16.95 CFS | 408 | 390 | 373 | 359 | 345 | 333 | 322 | 313 |
| 18.15 CFS | 303 | 295 | 287 | 280 | 272 | 266 | 260 | 253 |
| 19.35 CFS | 248 | 242 | 237 | 231 | 225 | 220 | 215 | 211 |
| 20.55 CFS | 207 | 203 | 199 | 196 | 193 | 190 | 188 | 185 |
| 21.75 CFS | 183 | 181 | 178 | 176 | 174 | 173 | 171 | 170 |
| 22.95 CFS | 168 | 167 | 166 | 165 | 164 | 163 | 161 | 160 |
| 24.15 CFS | 155 | 140 | 119 | 98 | 84 | 83 | 81 | 77 |
| 25.35 CFS | 71.00 | 64.28 | 57.19 | 50.18 | 43.55 | 37.46 | 31.98 | 27.13 |
| 26.55 CFS | 22.89 | 19.22 | 16.07 | 13.39 | 11.12 | 9.21 | 7.61 | 6.27 |
| 27.75 CFS | 5.15 | 4.23 | 3.46 | 2.83 | 2.31 | 1.88 | 1.53 | 1.25 |
| 28.95 CFS | 1.01 | .82 | .66 | .54 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9689 CFS-HRS; 800.7 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
181 CFS-HRS; 800.7 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3745.9 | 7.54 |
| 13.66 | 2050.8 | 5.46 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9688 CFS-HRS; 800.7 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3745.9 | 4.77 |
| 13.66 | 2050.8 | 3.42 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9688 CFS-HRS; 800.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 6595.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | 3.94 | SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 5.10 CFS | .18 | .77 | 2.08 | 4.21 | 7.06 | 10.26 | 13.60 | 17.00 |
| 6.30 CFS | 20.52 | 24.14 | 27.88 | 31.66 | 35.49 | 39.36 | 43.29 | 47.37 |
| 7.50 CFS | 51.57 | 55.98 | 60.28 | 64.50 | 68.70 | 73.17 | 78.64 | 85.39 |
| 8.70 CFS | 94 | 103 | 114 | 125 | 136 | 147 | 156 | 164 |
| 9.90 CFS | 172 | 184 | 199 | 219 | 242 | 269 | 300 | 337 |
| 11.10 CFS | 381 | 434 | 502 | 599 | 801 | 1425 | 2812 | 4862 |
| 12.30 CFS | 6417 | 6374 | 4913 | 2732 | 1425 | 1070 | 899 | 785 |
| 13.50 CFS | 710 | 648 | 597 | 553 | 513 | 478 | 448 | 424 |
| 14.70 CFS | 405 | 391 | 379 | 368 | 357 | 345 | 332 | 320 |
| 15.90 CFS | 309 | 298 | 287 | 276 | 266 | 259 | 254 | 250 |
| 17.10 CFS | 246 | 241 | 237 | 232 | 228 | 224 | 220 | 216 |
| 18.30 CFS | 212 | 207 | 203 | 199 | 195 | 191 | 186 | 182 |
| 19.50 CFS | 178 | 174 | 170 | 165 | 160 | 156 | 153 | 151 |
| 20.70 CFS | 149 | 147 | 146 | 145 | 144 | 144 | 143 | 143 |
| 21.90 CFS | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 135 |
| 23.10 CFS | 134 | 133 | 133 | 132 | 132 | 131 | 130 | 125 |

24.30 CFS 109 79 45 16 2 0

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.07 | 3654.0 | 4.47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.65 | 2549.9 | 5.46 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.65 | 2549.9 | 3.82 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 2706.6 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.40 CFS | .37 | 1.15 | 2.56 | 4.55 | 7.03 | 9.79 | 12.80 | 15.90 |
| 9.60 CFS | 18.97 | 22.03 | 25.35 | 29.41 | 34.33 | 40.38 | 47.54 | 55.92 |
| 10.80 CFS | 66 | 78 | 93 | 111 | 135 | 170 | 252 | 530 |
| 12.00 CFS | 1174 | 2106 | 2683 | 2487 | 1692 | 848 | 537 | 440 |
| 13.20 CFS | 377 | 337 | 306 | 282 | 261 | 242 | 225 | 211 |
| 14.40 CFS | 198 | 188 | 181 | 175 | 171 | 166 | 161 | 155 |
| 15.60 CFS | 150 | 145 | 140 | 135 | 130 | 125 | 121 | 118 |
| 16.80 CFS | 116 | 114 | 112 | 110 | 108 | 106 | 104 | 103 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.00 CFS | 101 | 99 | 97 | 95 | 93 | 91 | 90 | 88 |
| 19.20 CFS | 85.71 | 83.93 | 82.12 | 80.26 | 78.21 | 75.94 | 73.86 | 72.20 |
| 20.40 CFS | 70.92 | 69.85 | 68.93 | 68.30 | 67.81 | 67.43 | 67.23 | 66.97 |
| 21.60 CFS | 66.76 | 66.52 | 66.22 | 65.72 | 65.24 | 64.77 | 64.41 | 64.08 |
| 22.80 CFS | 63.57 | 63.07 | 62.63 | 62.37 | 62.15 | 61.89 | 61.64 | 61.38 |
| 24.00 CFS | 60.82 | 57.46 | 47.91 | 31.95 | 15.41 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.54 WATERSHED INCHES; 3372 CFS-HRS; 278.7 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 3037.8 | (NULL) |
| 13.61 | 2834.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .37 | .78 | 1.42 | 2.31 | 3.46 | 4.88 | 6.55 | 8.46 |
| 7.35 CFS | 10.61 | 12.97 | 15.53 | 18.27 | 21.18 | 24.25 | 27.54 | 31.20 |
| 8.55 CFS | 35.47 | 40.49 | 46.18 | 52.50 | 59.30 | 66.66 | 74.50 | 82.81 |
| 9.75 CFS | 92 | 101 | 112 | 124 | 138 | 153 | 170 | 188 |
| 10.95 CFS | 209 | 234 | 264 | 302 | 352 | 452 | 750 | 1419 |
| 12.15 CFS | 2380 | 2997 | 2871 | 2217 | 1634 | 1714 | 2074 | 2434 |
| 13.35 CFS | 2691 | 2815 | 2832 | 2772 | 2660 | 2516 | 2355 | 2187 |
| 14.55 CFS | 2020 | 1860 | 1709 | 1569 | 1438 | 1318 | 1208 | 1109 |
| 15.75 CFS | 1021 | 942 | 871 | 808 | 752 | 702 | 659 | 621 |
| 16.95 CFS | 587 | 557 | 529 | 504 | 481 | 461 | 443 | 427 |
| 18.15 CFS | 412 | 398 | 386 | 374 | 364 | 354 | 345 | 336 |
| 19.35 CFS | 327 | 320 | 312 | 305 | 297 | 290 | 283 | 277 |
| 20.55 CFS | 271 | 266 | 261 | 256 | 251 | 247 | 242 | 238 |
| 21.75 CFS | 235 | 231 | 228 | 225 | 222 | 220 | 217 | 215 |
| 22.95 CFS | 213 | 211 | 209 | 208 | 206 | 205 | 203 | 202 |
| 24.15 CFS | 197 | 187 | 170 | 152 | 136 | 134 | 131 | 125 |
| 25.35 CFS | 118 | 108 | 97 | 87 | 77 | 67 | 58 | 50 |
| 26.55 CFS | 43.26 | 37.00 | 31.52 | 26.76 | 22.65 | 19.11 | 16.09 | 13.52 |
| 27.75 CFS | 11.33 | 9.48 | 7.92 | 6.61 | 5.50 | 4.57 | 3.80 | 3.15 |
| 28.95 CFS | 2.61 | 2.16 | 1.79 | 1.48 | 1.22 | 1.00 | .83 | .68 |
| 30.15 CFS | .56 | .46 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.12 WATERSHED INCHES; 12073 CFS-HRS; 997.7 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 6655.4 | (NULL) |
| 13.63 | 4883.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .47 | 1.06 | 2.00 | 3.35 | 5.14 | 7.37 | 10.02 | 13.09 |
| 7.35 CFS | 16.54 | 20.38 | 24.68 | 29.70 | 35.53 | 42.12 | 49.31 | 57.09 |
| 8.55 CFS | 66 | 76 | 87 | 99 | 112 | 126 | 141 | 157 |
| 9.75 CFS | 173 | 190 | 210 | 232 | 258 | 286 | 318 | 353 |
| 10.95 CFS | 394 | 442 | 499 | 570 | 663 | 822 | 1257 | 2342 |
| 12.15 CFS | 4290 | 6186 | 6616 | 5486 | 3784 | 3135 | 3537 | 4103 |
| 13.35 CFS | 4569 | 4825 | 4882 | 4792 | 4603 | 4352 | 4067 | 3770 |
| 14.55 CFS | 3476 | 3195 | 2931 | 2687 | 2462 | 2256 | 2068 | 1898 |
| 15.75 CFS | 1747 | 1612 | 1493 | 1387 | 1291 | 1207 | 1134 | 1071 |
| 16.95 CFS | 1015 | 965 | 919 | 877 | 840 | 806 | 776 | 749 |
| 18.15 CFS | 725 | 702 | 681 | 661 | 643 | 626 | 611 | 595 |
| 19.35 CFS | 581 | 568 | 554 | 541 | 528 | 515 | 503 | 492 |
| 20.55 CFS | 482 | 473 | 464 | 455 | 447 | 440 | 433 | 426 |
| 21.75 CFS | 420 | 414 | 409 | 403 | 398 | 394 | 390 | 386 |
| 22.95 CFS | 383 | 379 | 376 | 374 | 371 | 368 | 366 | 363 |
| 24.15 CFS | 357 | 342 | 310 | 272 | 234 | 219 | 214 | 206 |
| 25.35 CFS | 194 | 179 | 162 | 144 | 127 | 111 | 96 | 82 |
| 26.55 CFS | 70.47 | 59.96 | 50.80 | 42.89 | 36.08 | 30.27 | 25.33 | 21.15 |
| 27.75 CFS | 17.62 | 14.65 | 12.16 | 10.08 | 8.34 | 6.89 | 5.69 | 4.69 |
| 28.95 CFS | 3.86 | 3.18 | 2.61 | 2.14 | 1.76 | 1.44 | 1.18 | .96 |
| 30.15 CFS | .79 | .64 | .52 | .43 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.11 WATERSHED INCHES; 21762 CFS-HRS; 1798.4 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 6655.4 | (DIVERT) |
| 13.63 | 4883.1 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .47 | 1.06 | 2.00 | 3.35 | 5.14 | 7.37 | 10.02 | 13.09 |
| 7.35 CFS | 16.54 | 20.38 | 24.68 | 29.70 | 35.53 | 42.12 | 49.31 | 57.09 |
| 8.55 CFS | 66 | 76 | 87 | 99 | 112 | 126 | 141 | 157 |
| 9.75 CFS | 173 | 190 | 210 | 232 | 258 | 286 | 318 | 353 |
| 10.95 CFS | 394 | 442 | 499 | 570 | 663 | 822 | 1257 | 2342 |
| 12.15 CFS | 4290 | 6186 | 6616 | 5486 | 3784 | 3135 | 3537 | 4103 |
| 13.35 CFS | 4569 | 4825 | 4882 | 4792 | 4603 | 4352 | 4067 | 3770 |
| 14.55 CFS | 3476 | 3195 | 2931 | 2687 | 2462 | 2256 | 2068 | 1898 |
| 15.75 CFS | 1747 | 1612 | 1493 | 1387 | 1291 | 1207 | 1134 | 1071 |
| 16.95 CFS | 1015 | 965 | 919 | 877 | 840 | 806 | 776 | 749 |
| 18.15 CFS | 725 | 702 | 681 | 661 | 643 | 626 | 611 | 595 |
| 19.35 CFS | 581 | 568 | 554 | 541 | 528 | 515 | 503 | 492 |
| 20.55 CFS | 482 | 473 | 464 | 455 | 447 | 440 | 433 | 426 |
| 21.75 CFS | 420 | 414 | 409 | 403 | 398 | 394 | 390 | 386 |
| 22.95 CFS | 383 | 379 | 376 | 374 | 371 | 368 | 366 | 363 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 24.15 CFS | 357 | 342 | 310 | 272 | 234 | 219 | 214 | 206 |
| 25.35 CFS | 194 | 179 | 162 | 144 | 127 | 111 | 96 | 82 |
| 26.55 CFS | 70.47 | 59.96 | 50.80 | 42.89 | 36.08 | 30.27 | 25.33 | 21.15 |
| 27.75 CFS | 17.62 | 14.65 | 12.16 | 10.08 | 8.34 | 6.89 | 5.69 | 4.69 |
| 28.95 CFS | 3.86 | 3.18 | 2.61 | 2.14 | 1.76 | 1.44 | 1.18 | .96 |
| 30.15 CFS | .79 | .64 | .52 | .43 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.11 WATERSHED INCHES; 21762 CFS-HRS; 1798.4 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
187 CFS-HRS; 1798.4 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.59 | 6518.7 | 6.36 |
| 13.81 | 4868.2 | 5.40 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.11 WATERSHED INCHES; 21764 CFS-HRS; 1798.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.13 | 3533.0 | (RUNOFF) |
| 21.34 | 54.5 | (RUNOFF) |
| 22.28 | 52.4 | (RUNOFF) |
| 22.88 | 51.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 1.47 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 4.95 CFS | .35 | 1.16 | 2.30 | 3.54 | 4.82 | 6.10 | 7.41 | 8.75 |
| 6.15 CFS | 10.17 | 11.60 | 13.10 | 14.60 | 16.08 | 17.56 | 19.08 | 20.76 |
| 7.35 CFS | 22.35 | 24.15 | 25.90 | 27.28 | 28.75 | 30.65 | 32.91 | 35.85 |
| 8.55 CFS | 39.68 | 43.85 | 48.29 | 52.55 | 57.02 | 61.30 | 63.97 | 66.18 |
| 9.75 CFS | 69 | 75 | 82 | 90 | 100 | 111 | 124 | 139 |
| 10.95 CFS | 158 | 180 | 207 | 247 | 303 | 504 | 1217 | 2709 |
| 12.15 CFS | 3523 | 2295 | 843 | 537 | 419 | 347 | 308 | 278 |
| 13.35 CFS | 252 | 233 | 216 | 200 | 186 | 174 | 163 | 155 |
| 14.55 CFS | 150 | 146 | 142 | 138 | 133 | 128 | 124 | 119 |
| 15.75 CFS | 115 | 111 | 107 | 102 | 98 | 97 | 96 | 94 |
| 16.95 CFS | 92.08 | 90.71 | 89.18 | 87.03 | 85.44 | 84.37 | 82.85 | 80.87 |
| 18.15 CFS | 79.61 | 77.82 | 76.20 | 74.91 | 72.91 | 71.54 | 69.96 | 67.97 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19.35 CFS | 66.86 | 65.61 | 63.51 | 61.36 | 59.72 | 58.59 | 57.57 | 56.67 |
| 20.55 CFS | 56.14 | 55.30 | 55.20 | 55.06 | 54.45 | 54.50 | 54.48 | 53.93 |
| 21.75 CFS | 53.82 | 53.63 | 52.67 | 52.41 | 52.42 | 52.19 | 51.26 | 50.94 |
| 22.95 CFS | 50.96 | 50.37 | 50.29 | 50.22 | 49.84 | 49.62 | 49.49 | 48.49 |
| 24.15 CFS | 41.51 | 20.88 | 2.99 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.52 WATERSHED INCHES; 3336 CFS-HRS; 275.7 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 2337.7 | 5.65 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.52 WATERSHED INCHES; 3339 CFS-HRS; 275.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.69 | 1716.1 | 4.72 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.52 WATERSHED INCHES; 3339 CFS-HRS; 275.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.60 | 8202.1 | (NULL) |
| 13.71 | 5388.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.40 CFS | .23 | .60 | 1.16 | 1.90 | 2.82 | 3.95 | 5.32 | 7.04 |
| 6.60 CFS | 9.18 | 11.77 | 14.85 | 18.41 | 22.41 | 26.86 | 31.74 | 37.03 |
| 7.80 CFS | 43 | 49 | 57 | 65 | 73 | 83 | 93 | 105 |
| 9.00 CFS | 119 | 134 | 150 | 168 | 187 | 206 | 225 | 246 |
| 10.20 CFS | 269 | 295 | 325 | 359 | 398 | 441 | 491 | 549 |
| 11.40 CFS | 619 | 704 | 814 | 992 | 1442 | 2591 | 4797 | 7222 |
| 12.60 CFS | 8201 | 7330 | 5580 | 4576 | 4589 | 4910 | 5219 | 5374 |
| 13.80 CFS | 5360 | 5216 | 4983 | 4696 | 4380 | 4056 | 3739 | 3437 |
| 15.00 CFS | 3157 | 2898 | 2661 | 2444 | 2247 | 2068 | 1908 | 1765 |
| 16.20 CFS | 1639 | 1526 | 1424 | 1333 | 1254 | 1186 | 1127 | 1073 |
| 17.40 CFS | 1024 | 980 | 940 | 904 | 871 | 842 | 815 | 790 |
| 18.60 CFS | 767 | 746 | 726 | 707 | 690 | 673 | 657 | 642 |
| 19.80 CFS | 627 | 612 | 597 | 583 | 569 | 556 | 545 | 534 |
| 21.00 CFS | 524 | 514 | 505 | 497 | 490 | 483 | 476 | 470 |
| 22.20 CFS | 464 | 458 | 453 | 448 | 444 | 440 | 436 | 432 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23.40 CFS | 428 | 425 | 422 | 420 | 417 | 414 | 408 | 393 |
| 24.60 CFS | 359 | 314 | 269 | 243 | 230 | 218 | 204 | 187 |
| 25.80 CFS | 168 | 149 | 131 | 114 | 99 | 85 | 73 | 62 |
| 27.00 CFS | 52.45 | 44.29 | 37.27 | 31.28 | 26.18 | 21.86 | 18.22 | 15.15 |
| 28.20 CFS | 12.58 | 10.43 | 8.63 | 7.14 | 5.89 | 4.86 | 4.00 | 3.29 |
| 29.40 CFS | 2.70 | 2.22 | 1.82 | 1.49 | 1.22 | 1.00 | .82 | .67 |
| 30.60 CFS | .54 | .44 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.16 WATERSHED INCHES; 25103 CFS-HRS; 2074.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.33 | 6605.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.80 CFS | .18 | .92 | 2.59 | 5.38 | 9.19 | 13.72 | 19.00 | 24.98 |
| 9.00 CFS | 31.77 | 39.17 | 47.06 | 54.97 | 62.61 | 70.09 | 78.34 | 88.71 |
| 10.20 CFS | 101 | 117 | 136 | 157 | 183 | 214 | 252 | 298 |
| 11.40 CFS | 360 | 447 | 681 | 1369 | 3042 | 5278 | 6575 | 5959 |
| 12.60 CFS | 4010 | 2089 | 1286 | 1049 | 897 | 801 | 730 | 670 |
| 13.80 CFS | 621 | 576 | 537 | 501 | 473 | 449 | 431 | 418 |
| 15.00 CFS | 407 | 396 | 383 | 370 | 357 | 344 | 332 | 321 |
| 16.20 CFS | 309 | 297 | 287 | 280 | 276 | 272 | 267 | 262 |
| 17.40 CFS | 258 | 253 | 248 | 244 | 240 | 236 | 231 | 227 |
| 18.60 CFS | 222 | 217 | 213 | 208 | 204 | 199 | 195 | 191 |
| 19.80 CFS | 186 | 180 | 175 | 171 | 168 | 166 | 164 | 162 |
| 21.00 CFS | 161 | 160 | 160 | 159 | 159 | 158 | 157 | 156 |
| 22.20 CFS | 155 | 154 | 153 | 152 | 151 | 150 | 149 | 148 |
| 23.40 CFS | 147 | 147 | 146 | 146 | 144 | 136 | 112 | 74 |
| 24.60 CFS | 35.28 | 7.94 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.67 WATERSHED INCHES; 8243 CFS-HRS; 681.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 4569.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.05 CFS | .40 | 1.20 | 2.57 | 4.63 | 7.18 | 10.00 | 12.89 | 15.82 |
| 8.25 CFS | 18.90 | 22.23 | 26.02 | 30.48 | 35.60 | 41.41 | 47.76 | 54.47 |
| 9.45 CFS | 61 | 68 | 74 | 81 | 88 | 97 | 109 | 123 |
| 10.65 CFS | 139 | 158 | 181 | 208 | 241 | 284 | 343 | 464 |
| 11.85 CFS | 800 | 1583 | 2830 | 4050 | 4565 | 4219 | 3139 | 1790 |
| 13.05 CFS | 990 | 803 | 686 | 608 | 553 | 508 | 469 | 435 |
| 14.25 CFS | 405 | 379 | 357 | 340 | 326 | 316 | 307 | 298 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.45 CFS | 288 | 278 | 268 | 259 | 250 | 241 | 232 | 224 |
| 16.65 CFS | 217 | 212 | 208 | 204 | 201 | 197 | 194 | 190 |
| 17.85 CFS | 187 | 183 | 180 | 177 | 173 | 170 | 167 | 163 |
| 19.05 CFS | 160 | 156 | 153 | 149 | 146 | 143 | 139 | 135 |
| 20.25 CFS | 132 | 129 | 126 | 124 | 123 | 122 | 121 | 120 |
| 21.45 CFS | 120 | 119 | 119 | 118 | 118 | 117 | 116 | 115 |
| 22.65 CFS | 114 | 114 | 113 | 112 | 111 | 111 | 110 | 110 |
| 23.85 CFS | 110 | 109 | 105 | 96 | 77 | 52 | 28 | 10 |
| 25.05 CFS | .64 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 6521 CFS-HRS; 538.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 10903.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.05 CFS | .40 | 1.20 | 2.57 | 4.63 | 7.20 | 10.18 | 13.81 | 18.41 |
| 8.25 CFS | 24 | 31 | 40 | 49 | 61 | 73 | 87 | 102 |
| 9.45 CFS | 116 | 130 | 144 | 159 | 177 | 199 | 226 | 258 |
| 10.65 CFS | 296 | 341 | 395 | 460 | 539 | 644 | 790 | 1145 |
| 11.85 CFS | 2169 | 4626 | 8109 | 10625 | 10524 | 8229 | 5227 | 3076 |
| 13.05 CFS | 2039 | 1700 | 1487 | 1337 | 1224 | 1128 | 1045 | 972 |
| 14.25 CFS | 906 | 851 | 806 | 771 | 744 | 723 | 702 | 681 |
| 15.45 CFS | 658 | 635 | 612 | 591 | 570 | 549 | 529 | 511 |
| 16.65 CFS | 497 | 488 | 480 | 472 | 463 | 455 | 447 | 439 |
| 17.85 CFS | 431 | 423 | 416 | 408 | 400 | 392 | 384 | 376 |
| 19.05 CFS | 368 | 360 | 352 | 344 | 337 | 328 | 319 | 310 |
| 20.25 CFS | 303 | 297 | 292 | 288 | 285 | 283 | 281 | 280 |
| 21.45 CFS | 279 | 278 | 277 | 276 | 274 | 272 | 270 | 268 |
| 22.65 CFS | 267 | 265 | 263 | 261 | 259 | 258 | 257 | 256 |
| 23.85 CFS | 255 | 253 | 241 | 208 | 151 | 88 | 36 | 10 |
| 25.05 CFS | .64 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.77 WATERSHED INCHES; 14763 CFS-HRS; 1220.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 17781.2 | (NULL) |
| 13.62 | 6601.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.40 CFS | .23 | .60 | 1.16 | 1.90 | 2.82 | 3.95 | 5.32 | 7.04 |
| 6.60 CFS | 9.18 | 11.78 | 14.94 | 18.81 | 23.61 | 29.43 | 36.37 | 44.23 |
| 7.80 CFS | 53 | 63 | 75 | 89 | 105 | 123 | 143 | 166 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | 192 | 221 | 252 | 284 | 317 | 350 | 384 | 423 |
| 10.20 CFS | 467 | 521 | 583 | 656 | 739 | 836 | 950 | 1089 |
| 11.40 CFS | 1263 | 1494 | 1959 | 3161 | 6068 | 10700 | 15422 | 17746 |
| 12.60 CFS | 16430 | 12557 | 8655 | 6616 | 6289 | 6397 | 6556 | 6597 |
| 13.80 CFS | 6488 | 6261 | 5955 | 5602 | 5231 | 4862 | 4510 | 4182 |
| 15.00 CFS | 3879 | 3600 | 3342 | 3103 | 2882 | 2680 | 2499 | 2336 |
| 16.20 CFS | 2188 | 2054 | 1935 | 1830 | 1742 | 1666 | 1598 | 1536 |
| 17.40 CFS | 1479 | 1426 | 1378 | 1335 | 1294 | 1258 | 1223 | 1190 |
| 18.60 CFS | 1159 | 1130 | 1102 | 1076 | 1050 | 1025 | 1001 | 978 |
| 19.80 CFS | 955 | 931 | 908 | 886 | 866 | 849 | 833 | 819 |
| 21.00 CFS | 806 | 795 | 785 | 776 | 768 | 759 | 752 | 744 |
| 22.20 CFS | 736 | 728 | 721 | 715 | 709 | 702 | 696 | 691 |
| 23.40 CFS | 687 | 683 | 678 | 675 | 669 | 655 | 616 | 543 |
| 24.60 CFS | 447 | 350 | 278 | 243 | 230 | 218 | 204 | 187 |
| 25.80 CFS | 168 | 149 | 131 | 114 | 99 | 85 | 73 | 62 |
| 27.00 CFS | 52.45 | 44.29 | 37.27 | 31.28 | 26.18 | 21.86 | 18.22 | 15.15 |
| 28.20 CFS | 12.58 | 10.43 | 8.63 | 7.14 | 5.89 | 4.86 | 4.00 | 3.29 |
| 29.40 CFS | 2.70 | 2.22 | 1.82 | 1.49 | 1.22 | 1.00 | .82 | .67 |
| 30.60 CFS | .54 | .44 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.00 WATERSHED INCHES; 39860 CFS-HRS; 3294.1 ACRE-FEET.

--- XSECTION 76, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1197.0 FEET) CAN ADD .336 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 2971.91 AC-FT ( .22 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1211.21. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 22.72 | 711.9 | 1212.24 |

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 82 CFS
RESVOR ( 12. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 20.57 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 4.50 CFS | 19.84 | 19.83 | 19.82 | 19.81 | 19.79 | 19.78 | 19.77 | 19.76 |
| 5.70 CFS | 19.74 | 19.73 | 19.72 | 19.71 | 19.70 | 19.69 | 19.68 | 19.68 |
| 6.90 CFS | 19.67 | 19.67 | 19.67 | 19.68 | 19.69 | 19.70 | 19.72 | 19.74 |
| 8.10 CFS | 19.77 | 19.81 | 19.87 | 19.93 | 20.00 | 20.09 | 20.19 | 20.31 |
| 9.30 CFS | 20.45 | 20.61 | 20.79 | 21.00 | 21.22 | 21.47 | 21.75 | 22.05 |
| 10.50 CFS | 22.40 | 22.79 | 23.22 | 23.72 | 24.29 | 24.93 | 25.68 | 26.56 |
| 11.70 CFS | 27.35 | 28.44 | 30.40 | 33.97 | 39.39 | 45.17 | 50.44 | 54.39 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12.90 CFS | 57.24 | 59.16 | 60.78 | 62.37 | 64.00 | 65.65 | 67.25 | 68.77 |
| 14.10 CFS | 70.23 | 71.61 | 72.91 | 74.11 | 75.22 | 76.26 | 77.18 | 77.82 |
| 15.30 CFS | 78.42 | 78.97 | 79.48 | 79.96 | 80.40 | 80.81 | 81.19 | 81.55 |
| 16.50 CFS | 81.89 | 82.20 | 82.50 | 82.79 | 83.06 | 83.32 | 83.57 | 83.81 |
| 17.70 CFS | 84.04 | 84.27 | 84.48 | 84.69 | 84.89 | 85.09 | 85.28 | 85.47 |
| 18.90 CFS | 86 | 86 | 111 | 195 | 269 | 335 | 392 | 442 |
| 20.10 CFS | 486 | 523 | 555 | 582 | 606 | 626 | 643 | 657 |
| 21.30 CFS | 669 | 679 | 688 | 695 | 700 | 704 | 708 | 710 |
| 22.50 CFS | 711 | 712 | 712 | 711 | 710 | 709 | 707 | 705 |
| 23.70 CFS | 703 | 700 | 698 | 694 | 689 | 679 | 662 | 638 |
| 24.90 CFS | 609 | 577 | 546 | 517 | 489 | 463 | 437 | 412 |
| 26.10 CFS | 387 | 363 | 340 | 317 | 296 | 275 | 255 | 236 |
| 27.30 CFS | 219 | 202 | 186 | 171 | 158 | 145 | 133 | 122 |
| 28.50 CFS | 112 | 102 | 94 | 86 | 86 | 86 | 86 | 86 |
| 29.70 CFS | 85.88 | 85.86 | 85.85 | 85.83 | 85.82 | 85.80 | 85.79 | 85.77 |
| 30.90 CFS | 85.76 | 85.74 | 85.73 | 85.71 | 85.70 | 85.68 | 85.67 | 85.65 |
| 32.10 CFS | 85.64 | 85.62 | 85.61 | 85.59 | 85.58 | 85.56 | 85.55 | 85.53 |
| 33.30 CFS | 85.52 | 85.50 | 85.49 | 85.47 | 85.46 | 85.44 | 85.43 | 85.41 |
| 34.50 CFS | 85.40 | 85.38 | 85.37 | 85.35 | 85.34 | 85.32 | 85.31 | 85.29 |
| 35.70 CFS | 85.28 | 85.26 | 85.25 | 85.23 | 85.22 | 85.20 | 85.19 | 85.17 |
| 36.90 CFS | 85.16 | 85.14 | 85.13 | 85.11 | 85.10 | 85.08 | 85.07 | 85.05 |
| 38.10 CFS | 85.04 | 85.02 | 85.01 | 84.99 | 84.98 | 84.96 | 84.95 | 84.93 |
| 39.30 CFS | 84.92 | 84.90 | 84.89 | 84.87 | 84.86 | 84.84 | 84.83 | 84.81 |
| 40.50 CFS | 84.80 | 84.78 | 84.77 | 84.75 | 84.74 | 84.72 | 84.71 | 84.69 |
| 41.70 CFS | 84.68 | 84.66 | 84.65 | 84.64 | 84.62 | 84.61 | 84.59 | 84.58 |
| 42.90 CFS | 84.56 | 84.55 | 84.53 | 84.52 | 84.50 | 84.49 | 84.47 | 84.46 |
| 44.10 CFS | 84.44 | 84.43 | 84.41 | 84.40 | 84.38 | 84.37 | 84.35 | 84.34 |
| 45.30 CFS | 84.32 | 84.31 | 84.29 | 84.28 | 84.26 | 84.25 | 84.23 | 84.22 |
| 46.50 CFS | 84.21 | 84.19 | 84.18 | 84.16 | 84.15 | 84.13 | 84.12 | 84.10 |
| 47.70 CFS | 84.09 | 84.07 | 84.06 | 84.04 | 84.03 | 84.01 | 84.00 | 83.98 |
| 48.90 CFS | 83.97 | 83.95 | 83.94 | 83.92 | 83.91 | 83.90 | 83.88 | 83.87 |
| 50.10 CFS | 83.85 | 83.84 | 83.82 | 83.81 | 83.79 | 83.78 | 83.76 | 83.75 |
| 51.30 CFS | 83.73 | 83.72 | 83.70 | 83.69 | 83.67 | 83.66 | 83.64 | 83.63 |
| 52.50 CFS | 83.62 | 83.60 | 83.59 | 83.57 | 83.56 | 83.54 | 83.53 | 83.51 |
| 53.70 CFS | 83.50 | 83.48 | 83.47 | 83.45 | 83.44 | 83.42 | 83.41 | 83.40 |
| 54.90 CFS | 83.38 | 83.37 | 83.35 | 83.34 | 83.32 | 83.31 | 83.29 | 83.28 |
| 56.10 CFS | 83.26 | 83.25 | 83.23 | 83.22 | 83.21 | 83.19 | 83.18 | 83.16 |
| 57.30 CFS | 83.15 | 83.13 | 83.12 | 83.10 | 83.09 | 83.07 | 83.06 | 83.04 |
| 58.50 CFS | 83.03 | 83.02 | 83.00 | 82.99 | 82.97 | 82.96 | 82.94 | 82.93 |
| 59.70 CFS | 82.91 | 82.90 | 82.88 | 82.87 | 82.86 | 82.84 | 82.83 | 82.81 |
| 60.90 CFS | 82.80 | 82.78 | 82.77 | 82.75 | 82.74 | 82.72 | 82.71 | 82.70 |
| 62.10 CFS | 82.68 | 82.67 | 82.65 | 82.64 | 82.62 | 82.61 | 82.59 | 82.58 |
| 63.30 CFS | 82.56 | 82.55 | 82.54 | 82.52 | 82.51 | 82.49 | 82.48 | 82.46 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.63 WATERSHED INCHES; 8361 CFS-HRS; 691.0 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 2

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

RAINFALL OF 4.84 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.
RAINTABLE NUMBER 2, ARC 1
MAIN TIME INCREMENT .150 HOURS

ALTERNATE 1 STORM 1

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|---|
| XSECTION | 1 | RUNOFF | 2.46 | 2.18 | --- | 12.39 | 2652 | 1078.0 |
| XSECTION | 5 | REACH | 2.46 | 2.18 | 4.61 | 13.05 | 1590 | 646.3 |
| XSECTION | 10 | REACH | 2.46 | 2.18 | 5.66 | 13.72 | 1123 | 456.5 |
| XSECTION | 2 | RUNOFF | 2.38 | 1.41 | --- | 12.34 | 1660 | 697.5 |
| XSECTION | 12 | ADDHYD | 4.84 | 1.80 | --- | 12.34 | 1709 | 353.1 |
| XSECTION | 12 | DIVERT | 4.84 | 1.80 | --- | 12.34 | 1709 | 353.1 |
| XSECTION | 200 | DIVERT | .00 | 1.80 | --- | .00 | 0 | ******** |
| XSECTION | 20 | REACH | 4.84 | 1.80 | 4.80 | 12.52 | 1653 | 341.5 |
| XSECTION | 25 | REACH | 4.84 | 1.80 | 3.00 | 12.67 | 1650 | 340.9 |
| XSECTION | 3 | RUNOFF | 3.94 | 2.18 | --- | 12.41 | 4180 | 1060.9 |
| XSECTION | 30 | REACH | 3.94 | 2.18 | 3.91 | 13.25 | 2215 | 562.2 |
| XSECTION | 5 | REACH | 3.94 | 2.18 | 4.63 | 13.84 | 1613 | 409.4 |
| XSECTION | 25 | REACH | 3.94 | 2.18 | 2.96 | 13.99 | 1613 | 409.4 |
| XSECTION | 4 | RUNOFF | 2.06 | 1.17 | --- | 12.40 | 1081 | 524.8 |
| XSECTION | 34 | ADDHYD | 6.00 | 1.83 | --- | 13.97 | 1754 | 292.3 |
| XSECTION | 35 | ADDHYD | 10.84 | 1.82 | --- | 13.99 | 3080 | 284.1 |
| XSECTION | 35 | DIVERT | 10.84 | 1.82 | --- | 13.99 | 3080 | 284.1 |
| XSECTION | 199 | DIVERT | .00 | 1.82 | --- | .00 | 0 | ******** |
| XSECTION | 45 | REACH | 10.84 | 1.82 | 4.12 | 14.21 | 3043 | 280.7 |
| XSECTION | 6 | RUNOFF | 1.47 | 2.29 | --- | 12.15 | 2337 | 1589.8 |
| XSECTION | 60 | REACH | 1.47 | 2.29 | 4.85 | 12.56 | 1443 | 981.6 |
| XSECTION | 67 | REACH | 1.47 | 2.29 | 3.86 | 12.90 | 1052 | 715.6 |
| XSECTION | 64 | ADDHYD | 12.31 | 1.88 | --- | 12.81 | 3398 | 276.0 |
| XSECTION | 5 | RUNOFF | 4.78 | 1.33 | --- | 12.38 | 2949 | 616.9 |
| XSECTION | 7 | RUNOFF | 3.48 | 1.57 | --- | 12.51 | 2317 | 665.8 |
| XSECTION | 75 | ADDHYD | 8.26 | 1.43 | --- | 12.43 | 5168 | 625.7 |
| XSECTION | 76 | ADDHYD | 20.57 | 1.70 | --- | 12.55 | 7135 | 346.9 |
| STRUCTURE | 1 | RESVOR | 20.57 | .28 | 1208.38 | 26.85T | 68T | 3.3 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINTABLE NUMBER 2, ARC 2 | | | | | | | |
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 3.42 | --- | 12.35 | 4185 | 1701.2 |
| XSECTION 5 | REACH | 2.46 | 3.42 | 5.39 | 12.88 | 2472 | 1004.9 |
| XSECTION 10 | REACH | 2.46 | 3.42 | 6.47 | 13.57 | 1695 | 689.0 |
| XSECTION 2 | RUNOFF | 2.38 | 2.77 | --- | 12.30 | 3544 | 1489.1 |
| XSECTION 12 | ADDHYD | 4.84 | 3.10 | --- | 12.30 | 3754 | 775.6 |
| XSECTION 12 | DIVERT | 4.84 | 3.10 | --- | 12.30 | 3754 | 775.6 |
| XSECTION 200 | DIVERT | .00 | 3.10 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 3.10 | 7.54 | 12.46 | 3746 | 774.0 |
| XSECTION 25 | REACH | 4.84 | 3.10 | 4.77 | 12.46 | 3746 | 774.0 |
| XSECTION 3 | RUNOFF | 3.94 | 3.42 | --- | 12.37 | 6596 | 1674.1 |
| XSECTION 30 | REACH | 3.94 | 3.42 | 4.47 | 13.07 | 3654 | 927.4 |
| XSECTION 5 | REACH | 3.94 | 3.42 | 5.46 | 13.65 | 2550 | 647.2 |
| XSECTION 25 | REACH | 3.94 | 3.42 | 3.82 | 13.65 | 2550 | 647.2 |
| XSECTION 4 | RUNOFF | 2.06 | 2.54 | --- | 12.34 | 2707 | 1314.1 |
| XSECTION 34 | ADDHYD | 6.00 | 3.12 | --- | 12.35 | 3038 | 506.3 |
| XSECTION 35 | ADDHYD | 10.84 | 3.11 | --- | 12.42 | 6655 | 613.9 |
| XSECTION 35 | DIVERT | 10.84 | 3.11 | --- | 12.42 | 6655 | 613.9 |
| XSECTION 199 | DIVERT | .00 | 3.11 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 3.11 | 6.36 | 12.59 | 6519 | 601.4 |
| XSECTION 6 | RUNOFF | 1.47 | 3.52 | --- | 12.13 | 3533 | 2403.4 |
| XSECTION 60 | REACH | 1.47 | 3.52 | 5.65 | 12.38 | 2338 | 1590.5 |
| XSECTION 67 | REACH | 1.47 | 3.52 | 4.72 | 12.69 | 1716 | 1167.3 |
| XSECTION 64 | ADDHYD | 12.31 | 3.16 | --- | 12.60 | 8202 | 666.3 |
| XSECTION 5 | RUNOFF | 4.78 | 2.67 | --- | 12.33 | 6605 | 1381.8 |
| XSECTION 7 | RUNOFF | 3.48 | 2.90 | --- | 12.46 | 4569 | 1312.9 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 75 | ADDHYD | 8.26 | 2.77 | --- | 12.37 | 10904 | 1320.1 |
| XSECTION 76 | ADDHYD | 20.57 | 3.00 | --- | 12.47 | 17781 | 864.4 |
| STRUCTURE 1 | RESVOR | 20.57 | .63 | 1212.24 | 22.72T | 712T | 34.6 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| | | | HYDROGRAPH INFORMATION | | | | ROUTING PARAMETERS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | INFLOW | | OUTFLOW | | Q-A EQ. | | | PEAK | ATT- |
| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | PEAK (CFS) | TIME (HR) | PEAK (CFS) | TIME (HR) | COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | RATIO Q/I (Q*) | KIN COEFF (C) |
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 2593 | 12.4 | 1590 | 13.1 | .94 | 1.21 | .454 | .613 | .23 |
| 10 | 9100 | | 1590 | 13.1 | 1118 | 13.6 | 1.08 | 1.21 | .239 | .703 | .24 |
| 20 | 3332 | | 1689 | 12.3 | 1609 | 12.4 | .12 | 1.66 | .007 | .952 | .84? |
| 25 | 1950 | | 1609 | 12.4 | 1605 | 12.6 | .046 | 1.75 | .003 | .998 | .99? |
| 30 | 8865 | | 4137 | 12.4 | 2197 | 13.2 | 1.19 | 1.13 | .587 | .531 | .18 |
| 5 | 8865 | | 2197 | 13.2 | 1611 | 13.8 | .87 | 1.22 | .204 | .733 | .24 |
| 25 | 1950 | | 1611 | 13.8 | 1610 | 13.9 | .046 | 1.75 | .003 | 1.000 | .99? |
| 45 | 4200 | | 3077 | 13.9 | 3040 | 14.3 | .045 | 1.73 | .007 | .988 | .71? |
| 60 | 7540 | | 2337 | 12.1 | 1433 | 12.6 | .49 | 1.35 | .402 | .613 | .35 |
| 67 | 5140 | | 1433 | 12.6 | 1052 | 12.9 | .72 | 1.26 | .198 | .734 | .37 |
| ALTERNATE 2 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 4117 | 12.3 | 2470 | 12.9 | 1.36 | 1.14 | .486 | .600 | .22 |
| 10 | 9100 | | 2470 | 12.9 | 1687 | 13.5 | 1.79 | 1.11 | .283 | .683 | .21 |
| 20 | 3332 | | 3754 | 12.3 | 3745 | 12.4 | .14 | 1.63 | .007 | .998 | .98? |
| 25 | 1950 | | 3745 | 12.4 | 3745 | 12.4 | .051 | 1.73 | .003 | 1.000 | 1.00? |
| 30 | 8865 | | 6417 | 12.3 | 3650 | 13.1 | 1.26 | 1.12 | .557 | .569 | .19 |
| 5 | 8865 | | 3650 | 13.1 | 2550 | 13.6 | 1.60 | 1.11 | .261 | .699 | .21 |
| 25 | 1950 | | 2550 | 13.6 | 2550 | 13.6 | .048 | 1.74 | .003 | 1.000 | 1.00? |
| 45 | 4200 | | 6616 | 12.4 | 6514 | 12.6 | .048 | 1.72 | .006 | .984 | .86? |
| 60 | 7540 | | 3523 | 12.1 | 2274 | 12.4 | .48 | 1.35 | .337 | .645 | .39 |
| 67 | 5140 | | 2274 | 12.4 | 1700 | 12.8 | .90 | 1.21 | .206 | .748 | .37 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE 1 | | 20.57 | |
| ALTERNATE | 1 | | 68 |
| ALTERNATE | 2 | | 712 |
| XSECTION 1 | | 2.46 | |
| ALTERNATE | 1 | | 2652 |
| ALTERNATE | 2 | | 4185 |
| XSECTION 2 | | 2.38 | |
| ALTERNATE | 1 | | 1660 |
| ALTERNATE | 2 | | 3544 |
| XSECTION 3 | | 3.94 | |
| ALTERNATE | 1 | | 4180 |
| ALTERNATE | 2 | | 6596 |
| XSECTION 4 | | 2.06 | |
| ALTERNATE | 1 | | 1081 |
| ALTERNATE | 2 | | 2707 |
| XSECTION 5 | | 4.78 | |
| ALTERNATE | 1 | | 2949 |
| ALTERNATE | 2 | | 6605 |
| XSECTION 6 | | 1.47 | |
| ALTERNATE | 1 | | 2337 |
| ALTERNATE | 2 | | 3533 |
| XSECTION 7 | | 3.48 | |
| ALTERNATE | 1 | | 2317 |
| ALTERNATE | 2 | | 4569 |
| XSECTION 10 | | 2.46 | |
| ALTERNATE | 1 | | 1123 |
| ALTERNATE | 2 | | 1695 |
| XSECTION 12 | | 4.84 | |
| ALTERNATE | 1 | | 1709 |
| ALTERNATE | 2 | | 3754 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 20 | | 4.84 | |
| ALTERNATE | 1 | | 1653 |
| ALTERNATE | 2 | | 3746 |
| XSECTION 25 | | 3.94 | |
| ALTERNATE | 1 | | 1613 |
| ALTERNATE | 2 | | 2550 |
| XSECTION 30 | | 3.94 | |
| ALTERNATE | 1 | | 2215 |
| ALTERNATE | 2 | | 3654 |
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 1754 |
| ALTERNATE | 2 | | 3038 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 3080 |
| ALTERNATE | 2 | | 6655 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 3043 |
| ALTERNATE | 2 | | 6519 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 1443 |
| ALTERNATE | 2 | | 2338 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 3398 |
| ALTERNATE | 2 | | 8202 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 1052 |
| ALTERNATE | 2 | | 1716 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 5168 |
| ALTERNATE | 2 | | 10904 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 7135 |
| ALTERNATE | 2 | | 17781 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

```
TR20 ------------------------------------------------------------------- SCS -
WT100YR   WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
01/21/**  500-yr, 24-hr, Type II Dist, 100-yr Sediment Storage, 1200'Spi2.04TEST


END OF  1 JOBS IN THIS RUN
```

SCS TR-20, VERSION 2.04TEST
WT100YR FILES

| | | |
|---|---|---|
| INPUT = 500IN.DAT | , GIVEN DATA FILE |
| OUTPUT = 500OUT.OUT | , DATED 01/21/**,15:17:46 |

FILES GENERATED - DATED 01/21/**,15:17:46

FILE 500OUT.TRD CONTAINS READHD INFORMATION

TOTAL NUMBER OF WARNINGS = 4, MESSAGES = 8

JOB ENDED AT 15:17:46
*** TR-20 RUN COMPLETED ***

(1)

URS

# CALCULATION PACKAGE NO. C-8

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **RESERVOIR ROUTING OF 100-YEAR, 200-YEAR & 500-YEAR 24-HOUR HYDROGRAPHS FOR FUTURE CONDITON (PRINCIPAL SPILLWAY CLOSED)**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 07/23/04

Checked by: _____ Date: _____

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 3.

Calculation Approved by: Jeff Tam 8/1/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# RESERVOIR ROUTING OF 100-YEAR, 200-YEAR & 500-YEAR 24-HOUR HYDROGRAPHS FOR FUTURE CONDITON (PRINCIPAL SPILLWAY CLOSED)

(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
23443748

## PROBLEM STATEMENT

This particular calculation package addresses the reservoir routing results for 100-year, 200-year and 500-year 24-hour hydrographs for the **Future Condition (Principal Spillway Closed).**

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

### FUTRE CONDITION (Principal Spillway Closed)

The Future Condition (Principal Spillway Closed) represents the condition where construction of the downstream conveyance channel does not occur and the principal spillway remains closed. It is assumed that the 100-year sediment volume (500 ac-ft) has accumulated in the reservoir. Under this condition outflow from the reservoir occurs through infiltration, and flow through the emergency spillway.

Given the assumption that the during the Future Condition (Principal Spillway Closed), the 100-year sediment volume (500 ac-ft) has accumulated in the reservoir, the Antecedent Reservoir Condition (ARC) for the routing of 100-year, 200-year and 500-year 24-hour hydrographs was set at the 100-year sediment pool level or at elevation 1199.2 ft (NAVD 88).

100-year 24-hour hydrograph was developed by NRCS in its 1998 study report. URS updated TR-20 model for 100-year 24-hour hydrograph with an anticipation of future conditions at the request of Flood District.

## SPECIAL NOTE ABOUT 200-YR AND 500-YR 24-HR HYDROGRAPHS

NRCS did not develop 200-year and 500-year 24-hour models in its 1998 hydrologic/hydraulic study of the White Tank FRS No. 3 Watershed. URS developed TR-20 models for 200-year and 500-year 24-hour storms with an anticipation of future conditions at the request of Flood District. The methodology involved in developing 200-year and 500-year 24-hour rainfall and all relevant computations are provided in a separate calculation package. It should be noted that the 200-year and 500-year 24-hour rainfall depths were found to be equal to 4.65 and 5.26 inches. However, given the fact that NRCS reduced the 100-year 24-hour rainfall amount for the aerial reduction purposes from 4.12 inches to 3.85 inches in its

August 1998 report "*Hydrologic Analysis of the White Tank Mountains on FRS No. 3*", URS also decided to reduce the actual 200-year and 500-year 24-hour rainfall amounts (4.65 & 5.26 inches respectively) by the same factor. Therefore, instead of using the actual amount of 200-year and 500-year rainfall amount, a reduced rainfall amount of 4.28 and 4.84 inches was used for the routing purposes of 200-year and 500-year 24-hour storms.

A new elevation-storage curve for the White Tank FRS No. 3 was developed using the 2003 topographic map in combination with the modified 1998 topographic map, both of which were provided by the District. The new elevation-storage curve was based on 500 ac-ft of sediment storage for the 100-year sediment pool level. The infiltration rates were also estimated for the Future Condition by taking accumulated sediment into consideration. An elevation-spillway rating curve for the White Tank FRS No. 3 emergency spillway was also developed. The procedure and calculations involved in establishing new curve numbers, new elevation-spillway discharge rating curve, new infiltration numbers and new elevation-storage curve are provided in separate calculation packages.

Please also note that the URS used the same lag times (times of concentrations) as well as antecedent moisture condition (AMC) in developing 200-year and 500- year 24-hour models as used by NRCS for 100-year 24-hour model.

## DIVERSIONS

The TR-20 models developed by NRCS in its 1998 report included two diversions from the watershed. The diversions occur along the eastern edge of the watershed at Olive Avenue and Northern Avenue where a stormwater channel is restricted by culverts at the road crossings. The effect of the diversions is to reduce the peak flow and volume reaching the reservoir from the northern half of the watershed.

At Olive Avenue, flows greater than 4,100 cfs are diverted out of the watershed. At Northern Avenue, flows greater than 11,000 cfs are diverted out of the watershed. The base hydraulic calculations for these diversion estimates were not presented in the NRCS hydrologic report (NRCS 1998), nor were the flows out of the reservoir watershed quantified. However, in order to be consistent with 100-year 24-hour model, URS provided the same diversions for 200-year and 500-year 24-hour models also.

## ROUTING RESULTS

The ARC for the routing of 100-year, 200-year and 500-year 24-hour hydrographs was set at the 100-year sediment pool level or at elevation 1199.2 ft (NAVD 88).

The reservoir routing results i.e. ARC, peak inflows, peak outflows, and the maximum reservoir elevation for 100-year, 200-year and 500-year 24-hour hydrographs under Future Condition (Principal Spillway Closed) are provided in Table 1 (Please See Page 5). The results indicated that 100-year and 200-yr 24-hr hydrograph would be contained within the reservoir with no spillage. 500-year 24-hour hydrograph would result in some spillage. (See Table 1 on Page 5).

The input file and the detailed output results of TR-20 modeling for reservoir routing of 100-year, 200-year and 500-year 24-hour hydrographs for Future Condition (Principal Spillway Closed) are attached at the end of this calculation package.

# TABLE 1
# RESERVOIR ROUTING RESULTS FOR 100-YEAR, 200-YEAR & 500-YEAR 24-HR HYDROGRAPHS

## FUTURE CONDITON – PRINCIPAL SPILLWAY CLOSED

| Storm Event | Inflow to White Tank FRS No.3 | | Outflow from White Tank FRS No.3 | | |
|---|---|---|---|---|---|
| | Precipitation (inches) | Peak Inflow (cfs) | Antecedent Reservoir Condition (ARC) | Peak Outflow (cfs) | Maximum Reservoir Elevation (NAVD 88) (ft) |
| 100-yr 24-hr | 3.85 | 11,750 | 1199.2 | 65.8[1] | 1210.6 |
| 200-yr 24-hr | 4.28 | 14,530 | 1199.2 | 72.2[1] | 1211.9 |
| 500-yr 24-hr | 4.84 | 17,782 | 1199.2 | 872.6 | 1212.3 |

Notes:

1) It should be noted that the peak out flow reflects the infiltration amount only.

Future Condition

(Principal spillway closed)

(100-yr 24-hr)

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20 WT100YR                          PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROUTING
TITLE     100-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spillway
 4 DIMHYD                .0556                                          WT3
 8          0.0          .03          .10          .19          .31
 8          .47          .66          .82          .93          .99
 8          1.0          .99          .93          .82          .66
 8          .47          .31          .03          .00          .00
 9 ENDTBL
 5 RAINFL 2              .1000                                      TYPE II
 8          .0000        .0010        .0020        .0030        .0041
 8          .0051        .0062        .0072        .0083        .0094
 8          .0105        .0116        .0127        .0138        .0150
 8          .0161        .0173        .0184        .0196        .0208
 8          .0220        .0232        .0244        .0257        .0269
 8          .0281        .0294        .0306        .0319        .0332
 8          .0345        .0358        .0371        .0384        .0398
 8          .0411        .0425        .0439        .0452        .0466
 8          .0480        .0494        .0508        .0523        .0538
 8          .0553        .0568        .0583        .0598        .0614
 8          .0630        .0646        .0662        .0679        .0696
 8          .0712        .0730        .0747        .0764        .0782
 8          .0800        .0818        .0836        .0855        .0874
 8          .0892        .0912        .0931        .0950        .0970
 8          .0990        .1010        .1030        .1051        .1072
 8          .1093        .1114        .1135        .1156        .1178
 8          .1200        .1222        .1246        .1270        .1296
 8          .1322        .1350        .1379        .1408        .1438
 8          .1470        .1502        .1534        .1566        .1598
 8          .1630        .1663        .1697        .1733        .1771
 8          .1810        .1851        .1895        .1941        .1989
 8          .2040        .2094        .2152        .2214        .2280
 8          .2350        .2427        .2513        .2609        .2715
 8          .2830        .3068        .3544        .4308        .5679
 8          .6630        .6820        .6986        .7130        .7252
 8          .7350        .7434        .7514        .7588        .7656
 8          .7720        .7780        .7836        .7890        .7942
 8          .7990        .8036        .8080        .8122        .8162
 8          .8200        .8237        .8273        .8308        .8342
 8          .8376        .8409        .8442        .8474        .8505
 8          .8535        .8565        .8594        .8622        .8649
 8          .8676        .8702        .8728        .8753        .8777
 8          .8800        .8823        .8845        .8868        .8890
 8          .8912        .8934        .8955        .8976        .8997
 8          .9018        .9038        .9058        .9078        .9097
 8          .9117        .9136        .9155        .9173        .9192
 8          .9210        .9228        .9245        .9263        .9280
 8          .9297        .9313        .9330        .9346        .9362
 8          .9377        .9393        .9408        .9423        .9438
 8          .9452        .9466        .9480        .9493        .9507
 8          .9520        .9533        .9546        .9559        .9572
 8          .9584        .9597        .9610        .9622        .9635
 8          .9647        .9660        .9672        .9685        .9697
 8          .9709        .9722        .9734        .9746        .9758
 8          .9770        .9782        .9794        .9806        .9818
 8          .9829        .9841        .9853        .9864        .9876
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8          .9887       .9899       .9910       .9922       .9933
 8          .9944       .9956       .9967       .9978       .9989
 8          1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         10.41                             BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.86        5.          4.39
 8                      2.01        50.         24.22
 8                      2.58        100.        40.12
 8                      3.46        200.        80.99
 8                      4.14        400.        129.44
 8                      5.16        800.        214.74
 8                      6.39        1600.       441.84
 8                      7.80        3200.       980.75
 8                      9.16        6400.       1891.44
 8                      10.41       12800.      3516.14
 8                      11.75       25600.      6548.98
 8                      13.26       51200.      11081.19
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
```

```
 8                       1.56        500.        203.28
 8                       2.30        1000.       302.00
 8                       3.38        2000.       449.24
 8                       4.97        4000.       673.73
 8                       6.23        6000.       855.96
 8                       7.31        8000.       1016.35
 8                       8.24        10000.      1158.51
 8                       9.09        12000.      1293.31
 8                       9.90        14000.      1425.57
 8                       10.64       16000.      1549.17
 8                       11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030         1.0         9.45                            BOSSCS#6
 8                       0.          0.0         0.0
 8                       0.77        5.          4.67
 8                       1.54        50.         32.06
 8                       1.78        100.        56.64
 8                       2.10        200.        100.59
 8                       2.50        400.        179.97
 8                       3.01        800.        320.25
 8                       3.63        1600.       589.66
 8                       4.35        3200.       1110.72
 8                       5.21        6400.       2084.48
 8                       6.03        12800.      4119.83
 8                       6.99        25600.      6856.75
 8                       8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045         1.0         4.87                            REACHA
 8                       0.          0.0         0.0
 8                       0.60        100.        85.69
 8                       0.90        200.        127.94
 8                       1.13        300.        161.93
 8                       1.52        500.        217.27
 8                       2.25        1000.       324.03
 8                       3.31        2000.       483.02
 8                       4.87        4000.       722.17
 8                       6.09        6000.       914.99
 8                       7.15        8000.       1084.61
 8                       8.05        10000.      1234.17
 8                       8.87        12000.      1373.80
 8                       9.64        14000.      1507.84
 8                       10.34       16000.      1633.45
 8                       11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060         1.0         4.7                             2CP6CP7
 8                       0.          0.0         0.0
 8                       2.36        100.        45.12
 8                       2.88        200.        83.75
 8                       3.18        300.        114.33
 8                       3.64        500.        172.72
 8                       4.42        1000.       289.04
 8                       5.40        2000.       470.72
 8                       6.87        4000.       782.74
 8                       7.91        6000.       1020.12
 8                       8.79        8000.       1231.25
 8                       9.60        10000.      1435.05
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8                       10.26       12000.      1618.34
 8                       10.94       14000.      1812.58
 8                       11.47       16000.      1983.46
 8                       11.96       18000.      2150.12
 9 ENDTBL
 2 XSECTN    067         1.0         8.77                                BOSSCS#5
 8                       0.          0.0         0.0
 8                       0.35        5.          5.56
 8                       1.03        50.         30.95
 8                       1.39        100.        52.16
 8                       1.94        200.        88.72
 8                       2.63        400.        148.61
 8                       3.51        800.        260.63
 8                       4.62        1600.       459.66
 8                       6.04        3200.       929.36
 8                       7.38        6400.       1811.51
 8                       8.77        12800.      3374.20
 8                       10.17       25600.      6398.87
 8                       11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT       01                                                       95/11/6
 8                       1178.0      0.0         0.
 8                       1188.0      0.02        44.8
 8                       1196.8      0.13        300.
 8                       1199.2      0.21        500.
 8                       1202.0      16.00       845.55
 8                       1204.0      28.000      1176.28
 8                       1206.0      39.00       1575.25
 8                       1208.0      50.00       2044.97
 8                       1210.0      63.00       2593.40
 8                       1212.0      73.000      3218.00
 8                       1213.0      2672.00     3556.67
 8                       1214.0      8218.00     3916.02
 8                       1215.0      15533.0     4294.13
 8                       1216.0      24261.0     4692.68
 8                       1217.0      34202.0     5113.19
 8                       1218.0      45221.0     5556.01
 8                       1219.0      57222.0     6021.50
 8                       1220.0      70131.0     6509.75
 9 ENDTBL
 6 RUNOFF 1 001          1 2.46      87.2        0.85        1 1
 6 REACH  3 005    1     7 9100.                             1           BOSS#6
 6 REACH  3 010    7     2 9100.                             1           BOSS#4
 6 RUNOFF 1 002          3 2.38      79.9        0.73        1 1
 6 ADDHYD 4 012    2 3 1                                     1 1
 6 DIVERT 6 012    1 4 7 4100.       1.00        200.        1 1         OLIVE
 6 REACH  3 020    4     7 3332.                             1           REACH C
 6 REACH  3 025    7     5 1950.                             1           REACH B
 6 RUNOFF 1 003          6 3.94      87.2        0.88        1 1
 6 REACH  3 030    6     7 8865.                             1           BOSS#6
 6 REACH  3 005    7     1 8865.                             1           BOSS#5
 6 REACH  3 025    1     7 1950.                             1           REACH B
 6 RUNOFF 1 004          1 2.06      77.3        0.79        1 1
 6 ADDHYD 4 034    7 1 2                                     1 1
 6 ADDHYD 4 035    5 2 3                                     1 1
 6 DIVERT 6 035    3 4 7 11000.      1.00        199.        1 1         NORTHERN
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 REACH   3 045    4    5 4200.                              1            REACH A
 6 RUNOFF  1 006         2 1.47          87.7         0.47    1 1
 6 REACH   3 060    2    3 7540.                              1            CP6CP7
 6 REACH   3 067    3    4 5140.                              1            BOSS#5
 6 ADDHYD  4 064    5 4  3                                    1 1
 6 RUNOFF  1 005         6 4.78          78.8         0.78    1 1
 6 RUNOFF  1 007         7 3.48          81.7         1.01    1 1
 6 ADDHYD  4 075    6 7  1                                    1 1
 6 ADDHYD  4 076    1 3  2                                    1 1      1
 6 RESVOR  2     01 2    1 1199.2                             1 1      1
 ENDATA
 7 LIST                   1.0                        1.
 7 INCREM  6              0.15
 7 COMPUT  7 001       01 0.           3.85         1.0       2 1  01  01
   ENDCMP  1
 7 COMPUT  7 001       01 0.           3.85         1.0       2 2  02  01
   ENDCMP  1
   ENDJOB  2

**********END OF 80-80 LIST**********
```

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST 1. 0. 1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT
DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0017 | .0035 | .0052 | .0070 |
| .0087 | .0105 | .0122 | .0139 | .0157 |
| .0174 | .0192 | .0210 | .0227 | .0245 |
| .0262 | .0280 | .0297 | .0315 | .0332 |
| .0350 | .0368 | .0386 | .0404 | .0423 |
| .0442 | .0461 | .0480 | .0500 | .0520 |
| .0540 | .0561 | .0582 | .0603 | .0625 |
| .0647 | .0669 | .0691 | .0714 | .0737 |
| .0760 | .0784 | .0807 | .0831 | .0855 |
| .0878 | .0902 | .0926 | .0951 | .0975 |
| .1000 | .1024 | .1049 | .1073 | .1098 |
| .1123 | .1148 | .1174 | .1199 | .1225 |
| .1250 | .1276 | .1303 | .1332 | .1361 |
| .1391 | .1423 | .1456 | .1489 | .1524 |
| .1560 | .1597 | .1633 | .1671 | .1708 |
| .1746 | .1784 | .1823 | .1861 | .1901 |
| .1940 | .1982 | .2027 | .2077 | .2132 |
| .2190 | .2252 | .2318 | .2388 | .2462 |
| .2540 | .2623 | .2714 | .2812 | .2917 |
| .3030 | .3194 | .3454 | .3878 | .4632 |
| .5150 | .5322 | .5476 | .5612 | .5730 |
| .5830 | .5919 | .6003 | .6083 | .6159 |
| .6230 | .6298 | .6365 | .6430 | .6493 |
| .6555 | .6615 | .6674 | .6731 | .6786 |
| .6840 | .6892 | .6944 | .6995 | .7044 |
| .7092 | .7140 | .7186 | .7232 | .7276 |
| .7320 | .7362 | .7404 | .7444 | .7484 |
| .7523 | .7560 | .7596 | .7632 | .7667 |
| .7700 | .7733 | .7766 | .7798 | .7830 |
| .7862 | .7894 | .7926 | .7958 | .7989 |
| .8020 | .8051 | .8082 | .8112 | .8142 |
| .8173 | .8202 | .8232 | .8262 | .8291 |
| .8320 | .8349 | .8378 | .8406 | .8434 |
| .8462 | .8490 | .8518 | .8546 | .8573 |
| .8600 | .8627 | .8654 | .8680 | .8706 |
| .8733 | .8758 | .8784 | .8810 | .8835 |
| .8860 | .8885 | .8910 | .8934 | .8958 |
| .8982 | .9006 | .9030 | .9054 | .9077 |
| .9100 | .9123 | .9146 | .9168 | .9190 |
| .9212 | .9234 | .9256 | .9278 | .9299 |
| .9320 | .9341 | .9362 | .9382 | .9402 |
| .9423 | .9442 | .9462 | .9482 | .9501 |
| .9520 | .9539 | .9558 | .9576 | .9594 |
| .9613 | .9630 | .9648 | .9666 | .9683 |
| .9700 | .9717 | .9734 | .9750 | .9766 |
| .9783 | .9798 | .9814 | .9830 | .9845 |
| .9860 | .9875 | .9890 | .9904 | .9918 |
| .9933 | .9946 | .9960 | .9974 | .9987 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RUNOFF | 1 | | | 1 | 2.4600 | 87.2000 | .85001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 5 | 1 | | 7 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 10 | 7 | | 2 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 2 | | | 3 | 2.3800 | 79.9000 | .73001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 12 | 2 | 3 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 12 | 1 | 4 | 7 | 4100.0000 | 1.0000 | 200.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 20 | 4 | | 7 | 3332.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 7 | | 5 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 3 | | | 6 | 3.9400 | 87.2000 | .88001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 30 | 6 | | 7 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 5 | 7 | | 1 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 1 | | 7 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 4 | | | 1 | 2.0600 | 77.3000 | .79001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 34 | 7 | 1 | 2 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 35 | 5 | 2 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 35 | 3 | 4 | 7 | 11000.0000 | 1.0000 | 199.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 45 | 4 | | 5 | 4200.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 6 | | | 2 | 1.4700 | 87.7000 | .47001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 60 | 2 | | 3 | 7540.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 67 | 3 | | 4 | 5140.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| ADDHYD | 64 | 5 | 4 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 5 | | | 6 | 4.7800 | 78.8000 | .78001 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 7 | | | 7 | 3.4800 | 81.7000 | 1.01001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 75 | 6 | 7 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 76 | 1 | 3 | 2 | | | 1 | 1 | 0 | 0 | 1 | 1 |
| RESVOR | | 1 | 2 | 1 | 1199.2000 | | 1 | 1 | 0 | 0 | 1 | 1 |
| ENDATA | | | | | | | | | | | | |

END OF LISTING

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .150 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 3.85 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 1 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 1 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.40 | 1705.4 | |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .11 | .66 | 2.14 | 5.21 | 9.95 | 16.55 | 25.17 | 36.44 |
| 11.55 CFS | 53 | 93 | 223 | 594 | 1159 | 1622 | 1678 | 1323 |
| 12.75 CFS | 765 | 438 | 344 | 292 | 259 | 236 | 217 | 201 |
| 13.95 CFS | 187 | 175 | 164 | 154 | 146 | 140 | 136 | 132 |
| 15.15 CFS | 129 | 125 | 121 | 117 | 113 | 109 | 105 | 102 |
| 16.35 CFS | 98.10 | 94.78 | 92.50 | 90.97 | 89.66 | 88.22 | 86.72 | 85.20 |
| 17.55 CFS | 83.77 | 82.32 | 80.94 | 79.63 | 78.29 | 76.83 | 75.34 | 73.97 |
| 18.75 CFS | 72.45 | 71.01 | 69.58 | 68.03 | 66.64 | 65.23 | 63.78 | 62.23 |
| 19.95 CFS | 60.50 | 58.85 | 57.48 | 56.44 | 55.60 | 54.88 | 54.31 | 53.94 |
| 21.15 CFS | 53.61 | 53.49 | 53.30 | 53.14 | 52.97 | 52.77 | 52.42 | 52.05 |
| 22.35 CFS | 51.72 | 51.38 | 51.16 | 50.80 | 50.43 | 50.06 | 49.85 | 49.69 |
| 23.55 CFS | 49.47 | 49.33 | 49.13 | 48.76 | 46.52 | 40.20 | 28.38 | 15.34 |
| 24.75 CFS | 4.55 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 2289 CFS-HRS; 189.1 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.07 | 1008.9 | 3.80 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 2289 CFS-HRS; 189.1 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.72 | 733.5 | 4.99 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 2289 CFS-HRS; 189.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 899.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 2 | 49 | 246 | 612 | 875 | 850 | 576 |
| 12.75 CFS | 315 | 238 | 200 | 177 | 161 | 148 | 138 | 128 |
| 13.95 CFS | 120 | 113 | 106 | 100 | 96 | 93 | 91 | 89 |
| 15.15 CFS | 86.57 | 84.12 | 81.45 | 78.76 | 76.21 | 73.81 | 71.53 | 69.00 |
| 16.35 CFS | 66.47 | 64.57 | 63.46 | 62.71 | 61.85 | 60.87 | 59.94 | 58.99 |
| 17.55 CFS | 58.03 | 57.09 | 56.27 | 55.40 | 54.51 | 53.51 | 52.58 | 51.64 |
| 18.75 CFS | 50.61 | 49.68 | 48.65 | 47.65 | 46.71 | 45.73 | 44.80 | 43.64 |
| 19.95 CFS | 42.39 | 41.32 | 40.50 | 39.88 | 39.37 | 38.90 | 38.62 | 38.39 |
| 21.15 CFS | 38.27 | 38.18 | 38.08 | 38.02 | 37.90 | 37.75 | 37.51 | 37.26 |
| 22.35 CFS | 37.02 | 36.93 | 36.72 | 36.43 | 36.18 | 36.00 | 35.92 | 35.77 |
| 23.55 CFS | 35.73 | 35.58 | 35.44 | 35.04 | 33.04 | 26.18 | 16.04 | 6.40 |
| 24.75 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.84 WATERSHED INCHES; 1290 CFS-HRS; 106.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 914.7 | (NULL) |
| 13.68 | 867.8 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.40 CFS | 0 | 1 | 4 | 52 | 250 | 620 | 887 | 870 |
| 12.60 CFS | 612 | 393 | 404 | 501 | 637 | 762 | 840 | 867 |
| 13.80 CFS | 856 | 822 | 773 | 718 | 661 | 607 | 556 | 509 |
| 15.00 CFS | 467 | 428 | 393 | 362 | 335 | 311 | 290 | 272 |
| 16.20 CFS | 255 | 241 | 229 | 218 | 209 | 201 | 194 | 187 |
| 17.40 CFS | 180 | 174 | 169 | 164 | 160 | 156 | 152 | 149 |
| 18.60 CFS | 145 | 142 | 139 | 136 | 133 | 131 | 128 | 126 |
| 19.80 CFS | 123 | 120 | 117 | 115 | 113 | 111 | 109 | 107 |
| 21.00 CFS | 105 | 104 | 102 | 101 | 99 | 98 | 97 | 96 |
| 22.20 CFS | 94.68 | 93.70 | 92.98 | 92.22 | 91.43 | 90.72 | 90.11 | 89.62 |
| 23.40 CFS | 89.09 | 88.68 | 88.17 | 87.68 | 86.93 | 84.61 | 77.44 | 67.01 |
| 24.60 CFS | 57.09 | 50.42 | 50.03 | 49.24 | 47.55 | 44.69 | 40.69 | 36.01 |
| 25.80 CFS | 31.21 | 26.63 | 22.43 | 18.72 | 15.48 | 12.72 | 10.39 | 8.44 |
| 27.00 CFS | 6.83 | 5.51 | 4.43 | 3.54 | 2.83 | 2.26 | 1.79 | 1.42 |
| 28.20 CFS | 1.13 | .89 | .70 | .55 | .44 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 914.7 | (DIVERT) |
| 13.68 | 867.8 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.40 CFS | 0 | 1 | 4 | 52 | 250 | 620 | 887 | 870 |
| 12.60 CFS | 612 | 393 | 404 | 501 | 637 | 762 | 840 | 867 |
| 13.80 CFS | 856 | 822 | 773 | 718 | 661 | 607 | 556 | 509 |
| 15.00 CFS | 467 | 428 | 393 | 362 | 335 | 311 | 290 | 272 |
| 16.20 CFS | 255 | 241 | 229 | 218 | 209 | 201 | 194 | 187 |
| 17.40 CFS | 180 | 174 | 169 | 164 | 160 | 156 | 152 | 149 |
| 18.60 CFS | 145 | 142 | 139 | 136 | 133 | 131 | 128 | 126 |
| 19.80 CFS | 123 | 120 | 117 | 115 | 113 | 111 | 109 | 107 |
| 21.00 CFS | 105 | 104 | 102 | 101 | 99 | 98 | 97 | 96 |
| 22.20 CFS | 94.68 | 93.70 | 92.98 | 92.22 | 91.43 | 90.72 | 90.11 | 89.62 |
| 23.40 CFS | 89.09 | 88.68 | 88.17 | 87.68 | 86.93 | 84.61 | 77.44 | 67.01 |
| 24.60 CFS | 57.09 | 50.42 | 50.03 | 49.24 | 47.55 | 44.69 | 40.69 | 36.01 |
| 25.80 CFS | 31.21 | 26.63 | 22.43 | 18.72 | 15.48 | 12.72 | 10.39 | 8.44 |
| 27.00 CFS | 6.83 | 5.51 | 4.43 | 3.54 | 2.83 | 2.26 | 1.79 | 1.42 |
| 28.20 CFS | 1.13 | .89 | .70 | .55 | .44 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
138 CFS-HRS; 295.7 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.57 | 852.8 | 3.33 |
| 13.90 | 856.6 | 3.34 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.74 | 831.7 | 2.05 |
| 14.08 | 853.3 | 2.08 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 2671.2 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .17 | .94 | 3.21 | 7.75 | 15.01 | 25.35 | 38.68 | 56.91 |
| 11.55 CFS | 83 | 146 | 350 | 890 | 1742 | 2507 | 2652 | 2209 |
| 12.75 CFS | 1349 | 739 | 565 | 477 | 420 | 382 | 351 | 325 |
| 13.95 CFS | 303 | 282 | 264 | 248 | 236 | 226 | 219 | 213 |
| 15.15 CFS | 207 | 201 | 195 | 188 | 182 | 176 | 170 | 164 |
| 16.35 CFS | 158 | 153 | 149 | 146 | 144 | 142 | 139 | 137 |
| 17.55 CFS | 134 | 132 | 130 | 128 | 126 | 123 | 121 | 119 |
| 18.75 CFS | 116 | 114 | 112 | 109 | 107 | 105 | 102 | 100 |
| 19.95 CFS | 97.28 | 94.58 | 92.30 | 90.56 | 89.15 | 88.02 | 87.06 | 86.48 |
| 21.15 CFS | 85.94 | 85.68 | 85.41 | 85.12 | 84.87 | 84.56 | 84.01 | 83.41 |
| 22.35 CFS | 82.92 | 82.35 | 81.98 | 81.43 | 80.86 | 80.25 | 79.84 | 79.64 |
| 23.55 CFS | 79.27 | 79.04 | 78.72 | 78.08 | 74.68 | 65.35 | 47.59 | 27.26 |
| 24.75 CFS | 10.18 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.42 | 1395.2 | 3.47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 14.04 | 1007.9 | 3.80 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 14.22 | 1005.7 | 2.31 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 527.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 16 | 100 | 286 | 466 | 526 | 431 | 262 |
| 12.90 CFS | 177 | 149 | 130 | 118 | 109 | 101 | 94 | 89 |
| 14.10 CFS | 83.10 | 78.21 | 74.15 | 70.86 | 68.51 | 66.79 | 65.35 | 63.88 |
| 15.30 CFS | 62.22 | 60.38 | 58.46 | 56.65 | 54.91 | 53.22 | 51.44 | 49.63 |
| 16.50 CFS | 48.15 | 47.18 | 46.60 | 46.03 | 45.38 | 44.70 | 44.01 | 43.34 |
| 17.70 CFS | 42.67 | 42.05 | 41.44 | 40.79 | 40.08 | 39.40 | 38.72 | 37.97 |
| 18.90 CFS | 37.29 | 36.58 | 35.81 | 35.14 | 34.44 | 33.73 | 32.92 | 32.02 |
| 20.10 CFS | 31.19 | 30.53 | 30.04 | 29.64 | 29.31 | 29.07 | 28.91 | 28.79 |
| 21.30 CFS | 28.74 | 28.67 | 28.63 | 28.55 | 28.46 | 28.30 | 28.13 | 27.96 |
| 22.50 CFS | 27.83 | 27.73 | 27.55 | 27.37 | 27.21 | 27.13 | 27.07 | 26.99 |
| 23.70 CFS | 26.91 | 26.83 | 26.57 | 25.15 | 20.92 | 14.00 | 6.83 | 1.61 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.66 WATERSHED INCHES; 881 CFS-HRS; 72.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.44 | 535.4 | (NULL) |
| 14.19 | 1085.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 17 | 101 | 289 | 471 | 535 | 445 | 284 |
| 12.90 CFS | 217 | 233 | 306 | 444 | 625 | 809 | 954 | 1042 |
| 14.10 CFS | 1081 | 1083 | 1060 | 1020 | 970 | 914 | 856 | 798 |
| 15.30 CFS | 742 | 687 | 636 | 589 | 546 | 506 | 470 | 438 |
| 16.50 CFS | 409 | 384 | 362 | 342 | 324 | 307 | 292 | 279 |
| 17.70 CFS | 266 | 255 | 245 | 236 | 227 | 220 | 213 | 206 |
| 18.90 CFS | 201 | 195 | 190 | 185 | 181 | 177 | 173 | 169 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 20.10 CFS | 165 | 161 | 158 | 155 | 152 | 149 | 146 | 144 |
| 21.30 CFS | 141 | 139 | 136 | 134 | 131 | 129 | 127 | 125 |
| 22.50 CFS | 123 | 122 | 120 | 119 | 118 | 117 | 116 | 115 |
| 23.70 CFS | 114 | 113 | 112 | 110 | 105 | 98 | 90 | 84 |
| 24.90 CFS | 82.31 | 81.82 | 81.23 | 80.24 | 78.36 | 75.16 | 70.55 | 64.78 |
| 26.10 CFS | 58.47 | 52.07 | 45.88 | 40.08 | 34.76 | 29.96 | 25.69 | 21.94 |
| 27.30 CFS | 18.66 | 15.82 | 13.37 | 11.27 | 9.48 | 7.95 | 6.66 | 5.57 |
| 28.50 CFS | 4.65 | 3.88 | 3.23 | 2.69 | 2.23 | 1.85 | 1.54 | 1.27 |
| 29.70 CFS | 1.05 | .87 | .72 | .60 | .49 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.17 WATERSHED INCHES; 4547 CFS-HRS; 375.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.64 | 1189.0 | (NULL) |
| 14.14 | 1936.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 17 | 104 | 322 | 641 | 991 | 1182 | 1115 |
| 12.90 CFS | 915 | 735 | 739 | 917 | 1202 | 1506 | 1745 | 1884 |
| 14.10 CFS | 1934 | 1917 | 1855 | 1765 | 1660 | 1550 | 1440 | 1333 |
| 15.30 CFS | 1232 | 1137 | 1049 | 969 | 896 | 831 | 772 | 720 |
| 16.50 CFS | 674 | 633 | 598 | 566 | 538 | 513 | 490 | 469 |
| 17.70 CFS | 450 | 433 | 417 | 403 | 390 | 378 | 367 | 357 |
| 18.90 CFS | 348 | 339 | 331 | 323 | 316 | 309 | 302 | 295 |
| 20.10 CFS | 289 | 283 | 277 | 271 | 266 | 261 | 256 | 252 |
| 21.30 CFS | 247 | 243 | 239 | 235 | 232 | 228 | 225 | 222 |
| 22.50 CFS | 219 | 216 | 214 | 212 | 210 | 208 | 206 | 205 |
| 23.70 CFS | 204 | 202 | 201 | 198 | 193 | 184 | 171 | 156 |
| 24.90 CFS | 145 | 136 | 133 | 130 | 127 | 121 | 113 | 103 |
| 26.10 CFS | 92.19 | 81.18 | 70.64 | 60.89 | 52.08 | 44.27 | 37.43 | 31.52 |
| 27.30 CFS | 26.44 | 22.10 | 18.43 | 15.34 | 12.73 | 10.55 | 8.73 | 7.22 |
| 28.50 CFS | 5.96 | 4.91 | 4.05 | 3.33 | 2.74 | 2.25 | 1.85 | 1.52 |
| 29.70 CFS | 1.24 | 1.02 | .84 | .68 | .56 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.16 WATERSHED INCHES; 8125 CFS-HRS; 671.5 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.64 | 1189.0 | (DIVERT) |
| 14.14 | 1936.0 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 17 | 104 | 322 | 641 | 991 | 1182 | 1115 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12.90 CFS | 915 | 735 | 739 | 917 | 1202 | 1506 | 1745 | 1884 |
| 14.10 CFS | 1934 | 1917 | 1855 | 1765 | 1660 | 1550 | 1440 | 1333 |
| 15.30 CFS | 1232 | 1137 | 1049 | 969 | 896 | 831 | 772 | 720 |
| 16.50 CFS | 674 | 633 | 598 | 566 | 538 | 513 | 490 | 469 |
| 17.70 CFS | 450 | 433 | 417 | 403 | 390 | 378 | 367 | 357 |
| 18.90 CFS | 348 | 339 | 331 | 323 | 316 | 309 | 302 | 295 |
| 20.10 CFS | 289 | 283 | 277 | 271 | 266 | 261 | 256 | 252 |
| 21.30 CFS | 247 | 243 | 239 | 235 | 232 | 228 | 225 | 222 |
| 22.50 CFS | 219 | 216 | 214 | 212 | 210 | 208 | 206 | 205 |
| 23.70 CFS | 204 | 202 | 201 | 198 | 193 | 184 | 171 | 156 |
| 24.90 CFS | 145 | 136 | 133 | 130 | 127 | 121 | 113 | 103 |
| 26.10 CFS | 92.19 | 81.18 | 70.64 | 60.89 | 52.08 | 44.27 | 37.43 | 31.52 |
| 27.30 CFS | 26.44 | 22.10 | 18.43 | 15.34 | 12.73 | 10.55 | 8.73 | 7.22 |
| 28.50 CFS | 5.96 | 4.91 | 4.05 | 3.33 | 2.74 | 2.25 | 1.85 | 1.52 |
| 29.70 CFS | 1.24 | 1.02 | .84 | .68 | .56 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.16 WATERSHED INCHES; 8125 CFS-HRS; 671.5 ACRE-FEET.

*OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)*

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
152 CFS-HRS; 671.5 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.87 | 1089.5 | 2.34 |
| 14.40 | 1901.2 | 3.21 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.16 WATERSHED INCHES; 8126 CFS-HRS; 671.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.15 | 1541.1 | (RUNOFF) |
| 21.35 | 33.1 | (RUNOFF) |
| 22.30 | 31.9 | (RUNOFF) |
| 23.30 | 30.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 1.47 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.05 CFS | .06 | .54 | 2.04 | 4.48 | 7.57 | 11.47 | 16.34 | 22.43 |
| 11.25 CFS | 31 | 42 | 60 | 120 | 370 | 1034 | 1541 | 1088 |
| 12.45 CFS | 447 | 286 | 227 | 189 | 169 | 153 | 140 | 130 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 13.65 CFS | 121 | 113 | 105 | 98 | 93 | 89 | 86 | 83 |
| 14.85 CFS | 81.76 | 79.54 | 76.76 | 74.30 | 71.72 | 68.90 | 66.82 | 64.95 |
| 16.05 CFS | 62.34 | 59.47 | 57.64 | 56.95 | 56.39 | 55.37 | 54.26 | 53.51 |
| 17.25 CFS | 52.69 | 51.51 | 50.61 | 50.01 | 49.17 | 48.07 | 47.41 | 46.42 |
| 18.45 CFS | 45.46 | 44.69 | 43.53 | 42.77 | 41.93 | 40.79 | 40.12 | 39.38 |
| 19.65 CFS | 38.16 | 36.89 | 35.92 | 35.31 | 34.74 | 34.20 | 33.88 | 33.42 |
| 20.85 CFS | 33.37 | 33.29 | 32.99 | 33.07 | 33.05 | 32.69 | 32.65 | 32.58 |
| 22.05 CFS | 32.00 | 31.88 | 31.90 | 31.77 | 31.24 | 31.08 | 31.08 | 30.72 |
| 23.25 CFS | 30.75 | 30.75 | 30.48 | 30.33 | 30.31 | 29.88 | 25.48 | 12.73 |
| 24.45 CFS | 1.53 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.53 WATERSHED INCHES; 1451 CFS-HRS; 119.9 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.59 | 858.3 | 4.20 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.53 WATERSHED INCHES; 1451 CFS-HRS; 119.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.11 | 620.8 | 3.12 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.53 WATERSHED INCHES; 1451 CFS-HRS; 119.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.95 | 1651.8 | (NULL) |
| 14.31 | 2131.2 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | .29 | .84 | 1.79 | 3.23 | 5.26 | 8.02 | 11.79 | 27.36 |
| 12.15 CFS | 92 | 264 | 563 | 998 | 1430 | 1638 | 1594 | 1436 |
| 13.35 CFS | 1339 | 1371 | 1521 | 1731 | 1929 | 2065 | 2125 | 2120 |
| 14.55 CFS | 2065 | 1976 | 1867 | 1749 | 1630 | 1513 | 1401 | 1297 |
| 15.75 CFS | 1199 | 1110 | 1029 | 955 | 889 | 830 | 777 | 730 |
| 16.95 CFS | 689 | 652 | 620 | 591 | 565 | 541 | 520 | 500 |
| 18.15 CFS | 482 | 466 | 451 | 438 | 425 | 414 | 403 | 393 |
| 19.35 CFS | 383 | 374 | 366 | 358 | 350 | 342 | 335 | 328 |
| 20.55 CFS | 321 | 314 | 307 | 302 | 296 | 291 | 286 | 281 |
| 21.75 CFS | 276 | 272 | 268 | 264 | 260 | 257 | 253 | 251 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22.95 CFS | 248 | 245 | 243 | 241 | 239 | 237 | 236 | 234 |
| 24.15 CFS | 233 | 230 | 226 | 219 | 207 | 192 | 176 | 162 |
| 25.35 CFS | 152 | 145 | 138 | 131 | 123 | 112 | 101 | 90 |
| 26.55 CFS | 78.57 | 68.07 | 58.47 | 49.87 | 42.30 | 35.70 | 30.01 | 25.14 |
| 27.75 CFS | 21.00 | 17.49 | 14.54 | 12.06 | 9.99 | 8.26 | 6.82 | 5.62 |
| 28.95 CFS | 4.64 | 3.82 | 3.14 | 2.58 | 2.12 | 1.74 | 1.43 | 1.17 |
| 30.15 CFS | .96 | .79 | .64 | .53 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.21 WATERSHED INCHES; 9577 CFS-HRS; 791.4 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 1543.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 2 | 68 | 351 | 919 | 1422 | 1528 | 1183 |
| 12.75 CFS | 683 | 467 | 391 | 341 | 308 | 284 | 264 | 246 |
| 13.95 CFS | 230 | 216 | 203 | 192 | 184 | 177 | 173 | 169 |
| 15.15 CFS | 165 | 161 | 156 | 151 | 146 | 141 | 137 | 132 |
| 16.35 CFS | 128 | 124 | 121 | 120 | 118 | 116 | 115 | 113 |
| 17.55 CFS | 111 | 109 | 108 | 106 | 104 | 102 | 101 | 99 |
| 18.75 CFS | 96.99 | 95.21 | 93.32 | 91.36 | 89.62 | 87.79 | 85.98 | 83.87 |
| 19.95 CFS | 81.51 | 79.39 | 77.72 | 76.49 | 75.45 | 74.58 | 73.99 | 73.55 |
| 21.15 CFS | 73.24 | 73.12 | 72.91 | 72.79 | 72.60 | 72.34 | 71.89 | 71.44 |
| 22.35 CFS | 71.00 | 70.72 | 70.42 | 69.92 | 69.45 | 69.03 | 68.84 | 68.65 |
| 23.55 CFS | 68.44 | 68.27 | 68.02 | 67.33 | 63.66 | 52.85 | 34.70 | 16.00 |
| 24.75 CFS | 3.91 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.77 WATERSHED INCHES; 2385 CFS-HRS; 197.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.54 | 1321.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 7 | 56 | 243 | 590 | 1005 | 1271 | 1301 |
| 12.75 CFS | 1066 | 684 | 427 | 341 | 295 | 264 | 242 | 224 |
| 13.95 CFS | 209 | 195 | 183 | 172 | 163 | 156 | 150 | 146 |
| 15.15 CFS | 142 | 138 | 135 | 130 | 126 | 122 | 118 | 114 |
| 16.35 CFS | 110 | 107 | 104 | 101 | 100 | 98 | 97 | 95 |
| 17.55 CFS | 93.73 | 92.24 | 90.76 | 89.27 | 87.90 | 86.46 | 84.94 | 83.37 |
| 18.75 CFS | 81.87 | 80.25 | 78.67 | 77.11 | 75.46 | 73.98 | 72.45 | 70.77 |
| 19.95 CFS | 69.06 | 67.26 | 65.57 | 64.16 | 63.09 | 62.22 | 61.55 | 61.02 |
| 21.15 CFS | 60.65 | 60.37 | 60.23 | 60.07 | 59.87 | 59.71 | 59.47 | 59.09 |
| 22.35 CFS | 58.73 | 58.44 | 58.06 | 57.76 | 57.42 | 57.04 | 56.69 | 56.48 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23.55 CFS | 56.36 | 56.10 | 55.95 | 55.66 | 53.94 | 48.95 | 39.51 | 26.85 |
| 24.75 CFS | 14.39 | 4.78 | .38 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.96 WATERSHED INCHES; 2161 CFS-HRS; 178.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 2799.7 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 9 | 124 | 593 | 1509 | 2427 | 2799 | 2485 |
| 12.75 CFS | 1749 | 1150 | 817 | 682 | 603 | 548 | 506 | 470 |
| 13.95 CFS | 439 | 411 | 386 | 364 | 347 | 333 | 323 | 315 |
| 15.15 CFS | 307 | 299 | 290 | 281 | 272 | 263 | 255 | 246 |
| 16.35 CFS | 238 | 230 | 225 | 221 | 218 | 215 | 211 | 208 |
| 17.55 CFS | 205 | 201 | 198 | 195 | 192 | 189 | 186 | 182 |
| 18.75 CFS | 179 | 175 | 172 | 168 | 165 | 162 | 158 | 155 |
| 19.95 CFS | 151 | 147 | 143 | 141 | 139 | 137 | 136 | 135 |
| 21.15 CFS | 134 | 133 | 133 | 133 | 132 | 132 | 131 | 131 |
| 22.35 CFS | 130 | 129 | 128 | 128 | 127 | 126 | 126 | 125 |
| 23.55 CFS | 125 | 124 | 124 | 123 | 118 | 102 | 74 | 43 |
| 24.75 CFS | 18.30 | 4.78 | .38 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.85 WATERSHED INCHES; 4546 CFS-HRS; 375.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.57 | 3492.5 | (NULL) |
| 14.26 | 2511.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 1 | 2 | 3 | 6 | 17 | 136 | 621 |
| 12.15 CFS | 1601 | 2691 | 3362 | 3483 | 3179 | 2789 | 2411 | 2118 |
| 13.35 CFS | 1942 | 1919 | 2026 | 2201 | 2368 | 2476 | 2511 | 2484 |
| 14.55 CFS | 2411 | 2309 | 2190 | 2064 | 1937 | 1812 | 1692 | 1578 |
| 15.75 CFS | 1471 | 1373 | 1284 | 1201 | 1127 | 1060 | 1002 | 951 |
| 16.95 CFS | 907 | 867 | 831 | 799 | 770 | 743 | 718 | 695 |
| 18.15 CFS | 674 | 655 | 637 | 620 | 604 | 589 | 575 | 561 |
| 19.35 CFS | 548 | 536 | 524 | 513 | 501 | 489 | 478 | 468 |
| 20.55 CFS | 459 | 451 | 443 | 436 | 430 | 424 | 419 | 414 |
| 21.75 CFS | 409 | 404 | 399 | 394 | 390 | 386 | 382 | 378 |
| 22.95 CFS | 375 | 372 | 369 | 366 | 364 | 362 | 360 | 357 |
| 24.15 CFS | 350 | 332 | 300 | 261 | 225 | 197 | 177 | 162 |
| 25.35 CFS | 152 | 145 | 138 | 131 | 123 | 112 | 101 | 90 |
| 26.55 CFS | 78.57 | 68.07 | 58.47 | 49.87 | 42.30 | 35.70 | 30.01 | 25.14 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27.75 CFS | 21.00 | 17.49 | 14.54 | 12.06 | 9.99 | 8.26 | 6.82 | 5.62 |
| 28.95 CFS | 4.64 | 3.82 | 3.14 | 2.58 | 2.12 | 1.74 | 1.43 | 1.17 |
| 30.15 CFS | .96 | .79 | .64 | .53 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.06 WATERSHED INCHES; 14124 CFS-HRS; 1167.2 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1199.2 FEET) CAN ADD .456 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 1488.92 AC-FT ( .11 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1205.58. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.15 | 40.2 * | 1206.21 |

* FIRST POINT OF FLAT PEAK

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 37 CFS
RESVOR ( 91. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.20 CFS | .21 | .21 | .21 | .21 | .21 | .21 | .21 | .21 |
| 11.40 CFS | .21 | .21 | .22 | .26 | .48 | 1.11 | 2.32 | 4.03 |
| 12.60 CFS | 5.97 | 7.85 | 9.54 | 11.00 | 12.28 | 13.42 | 14.51 | 15.62 |
| 13.80 CFS | 16.64 | 17.66 | 18.74 | 19.85 | 20.97 | 22.06 | 23.11 | 24.11 |
| 15.00 CFS | 25.06 | 25.95 | 26.78 | 27.55 | 28.21 | 28.72 | 29.20 | 29.64 |
| 16.20 CFS | 30.06 | 30.44 | 30.81 | 31.15 | 31.47 | 31.78 | 32.07 | 32.35 |
| 17.40 CFS | 32.62 | 32.87 | 33.12 | 33.36 | 33.59 | 33.81 | 34.03 | 34.24 |
| 18.60 CFS | 34.44 | 34.64 | 34.83 | 35.02 | 35.20 | 35.38 | 35.55 | 35.72 |
| 19.80 CFS | 35.88 | 36.04 | 36.20 | 36.35 | 36.50 | 36.65 | 36.79 | 36.93 |
| 21.00 CFS | 37.07 | 37.20 | 37.34 | 37.47 | 37.60 | 37.73 | 37.85 | 37.98 |
| 22.20 CFS | 38.10 | 38.22 | 38.34 | 38.46 | 38.57 | 38.69 | 38.80 | 38.92 |
| 23.40 CFS | 39.03 | 39.12 | 39.21 | 39.31 | 39.40 | 39.49 | 39.58 | 39.66 |
| 24.60 CFS | 39.73 | 39.79 | 39.84 | 39.88 | 39.92 | 39.95 | 39.98 | 40.01 |
| 25.80 CFS | 40.04 | 40.07 | 40.09 | 40.11 | 40.12 | 40.14 | 40.15 | 40.15 |
| 27.00 CFS | 40.16 | 40.16 | 40.16 | 40.16 | 40.15 | 40.15 | 40.14 | 40.13 |
| 28.20 CFS | 40.13 | 40.12 | 40.11 | 40.10 | 40.09 | 40.08 | 40.07 | 40.06 |
| 29.40 CFS | 40.05 | 40.04 | 40.03 | 40.02 | 40.00 | 39.99 | 39.98 | 39.97 |
| 30.60 CFS | 39.96 | 39.95 | 39.94 | 39.92 | 39.91 | 39.90 | 39.89 | 39.88 |
| 31.80 CFS | 39.87 | 39.85 | 39.84 | 39.83 | 39.82 | 39.81 | 39.80 | 39.79 |
| 33.00 CFS | 39.77 | 39.76 | 39.75 | 39.74 | 39.73 | 39.72 | 39.70 | 39.69 |
| 34.20 CFS | 39.68 | 39.67 | 39.66 | 39.65 | 39.64 | 39.62 | 39.61 | 39.60 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 35.40 CFS | 39.59 | 39.58 | 39.57 | 39.56 | 39.54 | 39.53 | 39.52 | 39.51 |
| 36.60 CFS | 39.50 | 39.49 | 39.47 | 39.46 | 39.45 | 39.44 | 39.43 | 39.42 |
| 37.80 CFS | 39.41 | 39.39 | 39.38 | 39.37 | 39.36 | 39.35 | 39.34 | 39.33 |
| 39.00 CFS | 39.31 | 39.30 | 39.29 | 39.28 | 39.27 | 39.26 | 39.25 | 39.23 |
| 40.20 CFS | 39.22 | 39.21 | 39.20 | 39.19 | 39.18 | 39.17 | 39.16 | 39.14 |
| 41.40 CFS | 39.13 | 39.12 | 39.11 | 39.10 | 39.09 | 39.08 | 39.06 | 39.05 |
| 42.60 CFS | 39.04 | 39.03 | 39.02 | 39.01 | 39.00 | 38.98 | 38.97 | 38.96 |
| 43.80 CFS | 38.94 | 38.93 | 38.92 | 38.90 | 38.89 | 38.88 | 38.86 | 38.85 |
| 45.00 CFS | 38.84 | 38.82 | 38.81 | 38.80 | 38.78 | 38.77 | 38.76 | 38.74 |
| 46.20 CFS | 38.73 | 38.72 | 38.70 | 38.69 | 38.68 | 38.66 | 38.65 | 38.64 |
| 47.40 CFS | 38.62 | 38.61 | 38.60 | 38.58 | 38.57 | 38.56 | 38.55 | 38.53 |
| 48.60 CFS | 38.52 | 38.51 | 38.49 | 38.48 | 38.47 | 38.45 | 38.44 | 38.43 |
| 49.80 CFS | 38.41 | 38.40 | 38.39 | 38.37 | 38.36 | 38.35 | 38.33 | 38.32 |
| 51.00 CFS | 38.31 | 38.30 | 38.28 | 38.27 | 38.26 | 38.24 | 38.23 | 38.22 |
| 52.20 CFS | 38.20 | 38.19 | 38.18 | 38.17 | 38.15 | 38.14 | 38.13 | 38.11 |
| 53.40 CFS | 38.10 | 38.09 | 38.07 | 38.06 | 38.05 | 38.03 | 38.02 | 38.01 |
| 54.60 CFS | 38.00 | 37.98 | 37.97 | 37.96 | 37.94 | 37.93 | 37.92 | 37.91 |
| 55.80 CFS | 37.89 | 37.88 | 37.87 | 37.85 | 37.84 | 37.83 | 37.81 | 37.80 |
| 57.00 CFS | 37.79 | 37.78 | 37.76 | 37.75 | 37.74 | 37.72 | 37.71 | 37.70 |
| 58.20 CFS | 37.69 | 37.67 | 37.66 | 37.65 | 37.63 | 37.62 | 37.61 | 37.60 |
| 59.40 CFS | 37.58 | 37.57 | 37.56 | 37.54 | 37.53 | 37.52 | 37.51 | 37.49 |
| 60.60 CFS | 37.48 | 37.47 | 37.45 | 37.44 | 37.43 | 37.42 | 37.40 | 37.39 |
| 61.80 CFS | 37.38 | 37.36 | 37.35 | 37.34 | 37.33 | 37.31 | 37.30 | 37.29 |
| 63.00 CFS | 37.28 | 37.26 | 37.25 | 37.24 | 37.22 | 37.21 | 37.20 | 37.19 |
| 64.20 CFS | 37.17 | 37.16 | 37.15 | 37.14 | 37.12 | 37.11 | 37.10 | 37.08 |
| 65.40 CFS | 37.07 | 37.06 | 37.05 | 37.03 | 37.02 | 37.01 | 37.00 | 36.98 |
| 66.60 CFS | 36.97 | 36.96 | 36.95 | 36.93 | 36.92 | 36.91 | 36.90 | 36.88 |
| 67.80 CFS | 36.87 | 36.86 | 36.84 | 36.83 | 36.82 | 36.81 | 36.79 | 36.78 |
| 69.00 CFS | 36.77 | 36.76 | 36.74 | 36.73 | 36.72 | 36.71 | 36.69 | 36.68 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.16 WATERSHED INCHES; 2131 CFS-HRS; 176.1 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 3.85 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 2 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 3097.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .30 | .90 | 1.89 | 3.27 | 4.83 | 6.45 | 8.11 | 9.81 |
| 7.35 CFS | 11.57 | 13.40 | 15.30 | 17.17 | 19.02 | 20.87 | 22.87 | 25.19 |
| 8.55 CFS | 28.06 | 31.50 | 35.48 | 39.89 | 44.47 | 49.13 | 53.53 | 57.54 |
| 9.75 CFS | 61 | 65 | 70 | 77 | 86 | 96 | 108 | 121 |
| 10.95 CFS | 138 | 157 | 181 | 212 | 256 | 357 | 655 | 1341 |
| 12.15 CFS | 2330 | 3036 | 2952 | 2164 | 1134 | 635 | 496 | 418 |
| 13.35 CFS | 370 | 334 | 306 | 282 | 261 | 243 | 226 | 213 |
| 14.55 CFS | 202 | 193 | 186 | 181 | 176 | 171 | 165 | 159 |
| 15.75 CFS | 153 | 148 | 142 | 137 | 132 | 127 | 124 | 122 |
| 16.95 CFS | 120 | 118 | 116 | 114 | 111 | 109 | 107 | 106 |
| 18.15 CFS | 104 | 102 | 100 | 98 | 96 | 94 | 92 | 89 |
| 19.35 CFS | 87.52 | 85.62 | 83.66 | 81.59 | 79.27 | 77.02 | 75.14 | 73.73 |
| 20.55 CFS | 72.56 | 71.58 | 70.82 | 70.29 | 69.83 | 69.59 | 69.30 | 69.06 |
| 21.75 CFS | 68.80 | 68.48 | 67.99 | 67.48 | 67.01 | 66.55 | 66.22 | 65.70 |
| 22.95 CFS | 65.19 | 64.66 | 64.35 | 64.13 | 63.82 | 63.58 | 63.30 | 62.67 |
| 24.15 CFS | 59.98 | 51.28 | 36.44 | 19.69 | 6.44 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.50 WATERSHED INCHES; 3976 CFS-HRS; 328.6 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.88 | 1859.8 | 4.85 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 3979 CFS-HRS; 328.8 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.54 | 1302.8 | 5.93 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 3979 CFS-HRS; 328.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 2510.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.70 CFS | .21 | .88 | 2.23 | 4.30 | 6.80 | 9.44 | 12.09 | 14.76 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.90 CFS | 17.74 | 21.27 | 25.63 | 30.77 | 36.93 | 44.11 | 52.80 | 63.27 |
| 11.10 CFS | 76 | 92 | 114 | 146 | 221 | 497 | 1150 | 2058 |
| 12.30 CFS | 2511 | 2106 | 1248 | 615 | 451 | 373 | 325 | 293 |
| 13.50 CFS | 267 | 246 | 229 | 212 | 198 | 185 | 175 | 167 |
| 14.70 CFS | 160 | 156 | 152 | 148 | 143 | 138 | 133 | 128 |
| 15.90 CFS | 124 | 120 | 115 | 111 | 107 | 105 | 104 | 102 |
| 17.10 CFS | 100 | 99 | 97 | 95 | 93 | 92 | 90 | 89 |
| 18.30 CFS | 86.85 | 85.20 | 83.52 | 81.75 | 80.12 | 78.36 | 76.62 | 75.02 |
| 19.50 CFS | 73.35 | 71.77 | 69.81 | 67.70 | 65.90 | 64.54 | 63.47 | 62.59 |
| 20.70 CFS | 61.76 | 61.28 | 60.84 | 60.58 | 60.38 | 60.15 | 59.99 | 59.75 |
| 21.90 CFS | 59.45 | 59.01 | 58.56 | 58.13 | 57.92 | 57.56 | 57.05 | 56.61 |
| 23.10 CFS | 56.27 | 56.07 | 55.81 | 55.68 | 55.39 | 55.14 | 54.52 | 51.23 |
| 24.30 CFS | 40.74 | 24.86 | 9.87 | 1.02 | .00 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.93 WATERSHED INCHES; 2962 CFS-HRS; 244.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 2655.3 | (NULL) |
| 13.48 | 1568.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .80 | 1.32 | 1.97 | 2.77 | 3.70 | 4.76 | 5.94 |
| 8.40 CFS | 7.22 | 8.63 | 10.26 | 12.47 | 15.44 | 19.24 | 23.63 | 28.37 |
| 9.60 CFS | 33.35 | 38.62 | 44.47 | 51.09 | 58.73 | 67.28 | 76.97 | 87.82 |
| 10.80 CFS | 100 | 115 | 133 | 155 | 183 | 223 | 306 | 592 |
| 12.00 CFS | 1257 | 2180 | 2654 | 2288 | 1514 | 1037 | 1102 | 1280 |
| 13.20 CFS | 1449 | 1548 | 1568 | 1533 | 1461 | 1368 | 1266 | 1161 |
| 14.40 CFS | 1059 | 965 | 878 | 800 | 730 | 667 | 610 | 559 |
| 15.60 CFS | 515 | 476 | 442 | 412 | 385 | 361 | 341 | 324 |
| 16.80 CFS | 310 | 296 | 284 | 273 | 263 | 254 | 246 | 238 |
| 18.00 CFS | 232 | 225 | 219 | 214 | 209 | 204 | 199 | 195 |
| 19.20 CFS | 190 | 186 | 182 | 178 | 174 | 170 | 166 | 162 |
| 20.40 CFS | 159 | 156 | 153 | 151 | 148 | 146 | 144 | 142 |
| 21.60 CFS | 140 | 138 | 137 | 135 | 133 | 132 | 131 | 130 |
| 22.80 CFS | 129 | 127 | 127 | 126 | 125 | 124 | 123 | 123 |
| 24.00 CFS | 122 | 118 | 107 | 91 | 75 | 66 | 64 | 62 |
| 25.20 CFS | 58.43 | 53.71 | 48.12 | 42.28 | 36.61 | 31.33 | 26.56 | 22.33 |
| 26.40 CFS | 18.65 | 15.49 | 12.81 | 10.54 | 8.64 | 7.06 | 5.75 | 4.67 |
| 27.60 CFS | 3.78 | 3.06 | 2.47 | 1.99 | 1.60 | 1.28 | 1.03 | .82 |
| 28.80 CFS | .66 | .52 | .42 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6941 CFS-HRS; 573.6 ACRE-FEET.

OPERATION DIVERT XSECTION 12

OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 2655.3 | (DIVERT) |
| 13.48 | 1568.6 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 | CFS | .44 | .80 | 1.32 | 1.97 | 2.77 | 3.70 | 4.76 | 5.94 |
| 8.40 | CFS | 7.22 | 8.63 | 10.26 | 12.47 | 15.44 | 19.24 | 23.63 | 28.37 |
| 9.60 | CFS | 33.35 | 38.62 | 44.47 | 51.09 | 58.73 | 67.28 | 76.97 | 87.82 |
| 10.80 | CFS | 100 | 115 | 133 | 155 | 183 | 223 | 306 | 592 |
| 12.00 | CFS | 1257 | 2180 | 2654 | 2288 | 1514 | 1037 | 1102 | 1280 |
| 13.20 | CFS | 1449 | 1548 | 1568 | 1533 | 1461 | 1368 | 1266 | 1161 |
| 14.40 | CFS | 1059 | 965 | 878 | 800 | 730 | 667 | 610 | 559 |
| 15.60 | CFS | 515 | 476 | 442 | 412 | 385 | 361 | 341 | 324 |
| 16.80 | CFS | 310 | 296 | 284 | 273 | 263 | 254 | 246 | 238 |
| 18.00 | CFS | 232 | 225 | 219 | 214 | 209 | 204 | 199 | 195 |
| 19.20 | CFS | 190 | 186 | 182 | 178 | 174 | 170 | 166 | 162 |
| 20.40 | CFS | 159 | 156 | 153 | 151 | 148 | 146 | 144 | 142 |
| 21.60 | CFS | 140 | 138 | 137 | 135 | 133 | 132 | 131 | 130 |
| 22.80 | CFS | 129 | 127 | 127 | 126 | 125 | 124 | 123 | 123 |
| 24.00 | CFS | 122 | 118 | 107 | 91 | 75 | 66 | 64 | 62 |
| 25.20 | CFS | 58.43 | 53.71 | 48.12 | 42.28 | 36.61 | 31.33 | 26.56 | 22.33 |
| 26.40 | CFS | 18.65 | 15.49 | 12.81 | 10.54 | 8.64 | 7.06 | 5.75 | 4.67 |
| 27.60 | CFS | 3.78 | 3.06 | 2.47 | 1.99 | 1.60 | 1.28 | 1.03 | .82 |
| 28.80 | CFS | .66 | .52 | .42 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6941 CFS-HRS; 573.6 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
171 CFS-HRS; 573.6 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 2617.9 | 6.16 |
| 13.64 | 1565.9 | 4.65 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6942 CFS-HRS; 573.7 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 2617.9 | 3.87 |
| 13.64 | 1565.9 | 2.91 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6942 CFS-HRS; 573.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.38 | 4801.3 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .45 | 1.32 | 2.85 | 4.98 | 7.45 | 10.06 | 12.71 | 15.43 |
| 7.35 CFS | 18.23 | 21.12 | 24.12 | 27.10 | 30.07 | 33.05 | 36.25 | 39.92 |
| 8.55 CFS | 44.44 | 49.84 | 56.11 | 63.06 | 70.34 | 77.81 | 84.96 | 91.43 |
| 9.75 CFS | 97 | 104 | 112 | 122 | 136 | 152 | 170 | 192 |
| 10.95 CFS | 218 | 248 | 286 | 335 | 401 | 560 | 990 | 2050 |
| 12.15 CFS | 3517 | 4649 | 4686 | 3657 | 2120 | 1084 | 820 | 685 |
| 13.35 CFS | 600 | 542 | 495 | 456 | 422 | 393 | 366 | 343 |
| 14.55 CFS | 325 | 311 | 300 | 291 | 283 | 274 | 265 | 255 |
| 15.75 CFS | 246 | 237 | 229 | 221 | 212 | 205 | 199 | 195 |
| 16.95 CFS | 192 | 189 | 186 | 182 | 179 | 176 | 172 | 169 |
| 18.15 CFS | 166 | 163 | 160 | 157 | 153 | 150 | 147 | 144 |
| 19.35 CFS | 141 | 138 | 134 | 131 | 127 | 124 | 121 | 118 |
| 20.55 CFS | 116 | 115 | 114 | 113 | 112 | 112 | 111 | 111 |
| 21.75 CFS | 110 | 110 | 109 | 108 | 107 | 107 | 106 | 105 |
| 22.95 CFS | 105 | 104 | 103 | 103 | 102 | 102 | 101 | 100 |
| 24.15 CFS | 96.11 | 83.61 | 61.19 | 35.11 | 13.28 | 1.30 | .00 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.23 | 2639.1 | 4.10 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.79 | 1910.5 | 4.90 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.79 | 1910.5 | 3.28 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1790.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.45 CFS | .23 | .84 | 2.02 | 3.86 | 6.19 | 9.02 | 12.33 | 16.32 |
| 10.65 CFS | 21 | 27 | 34 | 42 | 53 | 68 | 90 | 144 |
| 11.85 CFS | 317 | 764 | 1384 | 1766 | 1685 | 1187 | 640 | 384 |
| 13.05 CFS | 317 | 271 | 243 | 221 | 203 | 188 | 175 | 163 |
| 14.25 CFS | 153 | 144 | 137 | 131 | 128 | 124 | 121 | 117 |
| 15.45 CFS | 113 | 109 | 105 | 102 | 98 | 95 | 91 | 88 |
| 16.65 CFS | 86.31 | 84.98 | 83.69 | 82.29 | 80.88 | 79.42 | 78.03 | 76.61 |
| 17.85 CFS | 75.31 | 74.10 | 72.80 | 71.41 | 70.03 | 68.70 | 67.26 | 65.92 |
| 19.05 CFS | 64.53 | 63.08 | 61.77 | 60.42 | 59.10 | 57.59 | 55.90 | 54.42 |
| 20.25 CFS | 53.19 | 52.28 | 51.51 | 50.84 | 50.38 | 50.01 | 49.76 | 49.62 |
| 21.45 CFS | 49.42 | 49.30 | 49.09 | 48.88 | 48.55 | 48.18 | 47.87 | 47.59 |
| 22.65 CFS | 47.35 | 46.99 | 46.64 | 46.32 | 46.13 | 45.95 | 45.77 | 45.61 |
| 23.85 CFS | 45.45 | 44.86 | 42.52 | 35.27 | 23.59 | 11.46 | 3.06 | .00 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.73 WATERSHED INCHES; 2305 CFS-HRS; 190.5 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 1978.7 | (NULL) |
| 13.75 | 2101.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 6.00 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .25 | .55 | 1.03 | 1.72 | 2.61 | 3.72 | 5.03 | 6.53 |
| 8.40 CFS | 8.22 | 10.08 | 12.10 | 14.25 | 16.54 | 18.97 | 21.60 | 24.64 |
| 9.60 CFS | 28.37 | 33.02 | 38.70 | 45.27 | 52.71 | 60.94 | 70.08 | 80.18 |
| 10.80 CFS | 91 | 104 | 119 | 138 | 160 | 192 | 257 | 442 |
| 12.00 CFS | 904 | 1541 | 1945 | 1893 | 1447 | 1008 | 954 | 1187 |
| 13.20 CFS | 1490 | 1785 | 1991 | 2087 | 2098 | 2050 | 1962 | 1850 |
| 14.40 CFS | 1727 | 1600 | 1476 | 1356 | 1244 | 1139 | 1042 | 954 |
| 15.60 CFS | 874 | 802 | 738 | 682 | 631 | 586 | 547 | 513 |
| 16.80 CFS | 483 | 456 | 432 | 410 | 390 | 372 | 356 | 342 |
| 18.00 CFS | 329 | 317 | 307 | 297 | 288 | 280 | 272 | 265 |
| 19.20 CFS | 258 | 252 | 246 | 240 | 234 | 229 | 223 | 218 |
| 20.40 CFS | 214 | 209 | 205 | 201 | 197 | 194 | 190 | 187 |
| 21.60 CFS | 184 | 181 | 178 | 175 | 173 | 170 | 168 | 167 |
| 22.80 CFS | 165 | 163 | 162 | 160 | 159 | 158 | 157 | 156 |
| 24.00 CFS | 154 | 151 | 143 | 131 | 118 | 109 | 105 | 103 |
| 25.20 CFS | 101 | 96 | 90 | 82 | 74 | 65 | 57 | 50 |
| 26.40 CFS | 43.14 | 37.03 | 31.62 | 26.88 | 22.76 | 19.21 | 16.16 | 13.56 |
| 27.60 CFS | 11.35 | 9.49 | 7.91 | 6.58 | 5.47 | 4.54 | 3.76 | 3.12 |
| 28.80 CFS | 2.58 | 2.13 | 1.75 | 1.45 | 1.19 | .98 | .81 | .66 |
| 30.00 CFS | .54 | .44 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.24 WATERSHED INCHES; 8676 CFS-HRS; 717.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 4512.7 | (NULL) |
| 13.70 | 3662.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .97 | 1.80 | 2.99 | 4.53 | 6.42 | 8.65 | 11.20 |
| 8.40 CFS | 14.06 | 17.20 | 20.61 | 24.38 | 28.83 | 34.16 | 40.52 | 47.91 |
| 9.60 CFS | 56 | 66 | 77 | 89 | 103 | 119 | 137 | 156 |
| 10.80 CFS | 178 | 204 | 233 | 269 | 313 | 373 | 476 | 742 |
| 12.00 CFS | 1473 | 2745 | 4050 | 4504 | 3759 | 2584 | 2032 | 2287 |
| 13.20 CFS | 2756 | 3220 | 3530 | 3653 | 3634 | 3517 | 3338 | 3124 |
| 14.40 CFS | 2897 | 2668 | 2448 | 2242 | 2051 | 1875 | 1715 | 1569 |
| 15.60 CFS | 1438 | 1321 | 1218 | 1126 | 1046 | 974 | 910 | 855 |
| 16.80 CFS | 808 | 767 | 729 | 695 | 664 | 636 | 611 | 588 |
| 18.00 CFS | 568 | 549 | 533 | 517 | 502 | 489 | 476 | 465 |
| 19.20 CFS | 453 | 443 | 432 | 423 | 413 | 403 | 393 | 384 |
| 20.40 CFS | 376 | 369 | 361 | 354 | 348 | 342 | 336 | 331 |
| 21.60 CFS | 326 | 321 | 316 | 312 | 308 | 304 | 300 | 298 |
| 22.80 CFS | 295 | 292 | 289 | 287 | 285 | 283 | 281 | 279 |
| 24.00 CFS | 277 | 273 | 261 | 238 | 210 | 185 | 172 | 167 |
| 25.20 CFS | 163 | 155 | 144 | 131 | 117 | 103 | 89 | 77 |
| 26.40 CFS | 65.83 | 55.99 | 47.38 | 39.91 | 33.49 | 28.01 | 23.35 | 19.42 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27.60 CFS | 16.11 | 13.34 | 11.03 | 9.10 | 7.50 | 6.17 | 5.07 | 4.16 |
| 28.80 CFS | 3.41 | 2.80 | 2.29 | 1.87 | 1.53 | 1.25 | 1.02 | .83 |
| 30.00 CFS | .67 | .55 | .44 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.23 WATERSHED INCHES; 15618 CFS-HRS; 1290.7 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 4512.7 | (DIVERT) |
| 13.70 | 3662.3 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .97 | 1.80 | 2.99 | 4.53 | 6.42 | 8.65 | 11.20 |
| 8.40 CFS | 14.06 | 17.20 | 20.61 | 24.38 | 28.83 | 34.16 | 40.52 | 47.91 |
| 9.60 CFS | 56 | 66 | 77 | 89 | 103 | 119 | 137 | 156 |
| 10.80 CFS | 178 | 204 | 233 | 269 | 313 | 373 | 476 | 742 |
| 12.00 CFS | 1473 | 2745 | 4050 | 4504 | 3759 | 2584 | 2032 | 2287 |
| 13.20 CFS | 2756 | 3220 | 3530 | 3653 | 3634 | 3517 | 3338 | 3124 |
| 14.40 CFS | 2897 | 2668 | 2448 | 2242 | 2051 | 1875 | 1715 | 1569 |
| 15.60 CFS | 1438 | 1321 | 1218 | 1126 | 1046 | 974 | 910 | 855 |
| 16.80 CFS | 808 | 767 | 729 | 695 | 664 | 636 | 611 | 588 |
| 18.00 CFS | 568 | 549 | 533 | 517 | 502 | 489 | 476 | 465 |
| 19.20 CFS | 453 | 443 | 432 | 423 | 413 | 403 | 393 | 384 |
| 20.40 CFS | 376 | 369 | 361 | 354 | 348 | 342 | 336 | 331 |
| 21.60 CFS | 326 | 321 | 316 | 312 | 308 | 304 | 300 | 298 |
| 22.80 CFS | 295 | 292 | 289 | 287 | 285 | 283 | 281 | 279 |
| 24.00 CFS | 277 | 273 | 261 | 238 | 210 | 185 | 172 | 167 |
| 25.20 CFS | 163 | 155 | 144 | 131 | 117 | 103 | 89 | 77 |
| 26.40 CFS | 65.83 | 55.99 | 47.38 | 39.91 | 33.49 | 28.01 | 23.35 | 19.42 |
| 27.60 CFS | 16.11 | 13.34 | 11.03 | 9.10 | 7.50 | 6.17 | 5.07 | 4.16 |
| 28.80 CFS | 3.41 | 2.80 | 2.29 | 1.87 | 1.53 | 1.25 | 1.02 | .83 |
| 30.00 CFS | .67 | .55 | .44 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.23 WATERSHED INCHES; 15618 CFS-HRS; 1290.7 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
180 CFS-HRS; 1290.7 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.61 | 4335.5 | 5.07 |
| 13.90 | 3632.8 | 4.58 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.23 WATERSHED INCHES; 15617 CFS-HRS; 1290.6 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.14 | 2639.3 | (RUNOFF) |
| 21.28 | 42.2 | (RUNOFF) |
| 22.28 | 40.6 | (RUNOFF) |
| 23.21 | 39.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 1.47 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.85 CFS | .24 | .83 | 1.72 | 2.68 | 3.68 | 4.69 | 5.72 | 6.77 |
| 7.05 CFS | 7.84 | 8.97 | 10.10 | 11.33 | 12.54 | 13.59 | 14.69 | 16.01 |
| 8.25 CFS | 17.53 | 19.47 | 21.91 | 24.61 | 27.56 | 30.43 | 33.48 | 36.44 |
| 9.45 CFS | 38.52 | 40.31 | 42.66 | 46.38 | 51.48 | 57.22 | 63.96 | 71.87 |
| 10.65 CFS | 81 | 91 | 105 | 120 | 140 | 168 | 210 | 346 |
| 11.85 CFS | 871 | 1989 | 2633 | 1712 | 643 | 410 | 320 | 265 |
| 13.05 CFS | 236 | 212 | 193 | 179 | 166 | 153 | 143 | 133 |
| 14.25 CFS | 125 | 119 | 115 | 112 | 109 | 106 | 102 | 99 |
| 15.45 CFS | 95.26 | 91.36 | 88.46 | 85.86 | 82.27 | 78.35 | 75.81 | 74.83 |
| 16.65 CFS | 74.05 | 72.59 | 71.03 | 69.96 | 68.82 | 67.19 | 65.93 | 65.11 |
| 17.85 CFS | 63.99 | 62.49 | 61.53 | 60.16 | 58.86 | 57.83 | 56.30 | 55.28 |
| 19.05 CFS | 54.14 | 52.62 | 51.68 | 50.69 | 49.11 | 47.43 | 46.17 | 45.34 |
| 20.25 CFS | 44.55 | 43.84 | 43.43 | 42.80 | 42.69 | 42.58 | 42.19 | 42.25 |
| 21.45 CFS | 42.16 | 41.70 | 41.66 | 41.51 | 40.75 | 40.58 | 40.59 | 40.40 |
| 22.65 CFS | 39.71 | 39.46 | 39.42 | 39.00 | 39.02 | 38.97 | 38.58 | 38.41 |
| 23.85 CFS | 38.36 | 37.64 | 31.99 | 16.10 | 2.28 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.59 WATERSHED INCHES; 2454 CFS-HRS; 202.8 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.54 | 1673.3 | 5.08 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.59 WATERSHED INCHES; 2455 CFS-HRS; 202.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.86 | 1234.3 | 4.11 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.59 WATERSHED INCHES; 2455 CFS-HRS; 202.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.65 | 5342.9 | (NULL) |
| 13.81 | 4072.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .41 | .82 | 1.37 | 2.06 | 2.93 | 4.01 | 5.38 | 7.09 |
| 7.80 CFS | 9.19 | 11.68 | 14.57 | 17.81 | 21.38 | 25.29 | 29.55 | 34.21 |
| 9.00 CFS | 39 | 45 | 53 | 61 | 70 | 81 | 93 | 106 |
| 10.20 CFS | 120 | 137 | 155 | 176 | 199 | 225 | 255 | 291 |
| 11.40 CFS | 333 | 385 | 452 | 560 | 807 | 1468 | 2710 | 4252 |
| 12.60 CFS | 5272 | 5083 | 4092 | 3342 | 3253 | 3479 | 3783 | 4001 |
| 13.80 CFS | 4072 | 4016 | 3868 | 3661 | 3421 | 3169 | 2919 | 2678 |
| 15.00 CFS | 2454 | 2247 | 2058 | 1886 | 1730 | 1589 | 1464 | 1352 |
| 16.20 CFS | 1254 | 1167 | 1088 | 1019 | 958 | 906 | 860 | 819 |
| 17.40 CFS | 782 | 748 | 718 | 690 | 665 | 643 | 623 | 604 |
| 18.60 CFS | 587 | 571 | 556 | 542 | 529 | 516 | 504 | 492 |
| 19.80 CFS | 481 | 470 | 459 | 448 | 438 | 428 | 419 | 411 |
| 21.00 CFS | 403 | 395 | 388 | 382 | 376 | 370 | 365 | 360 |
| 22.20 CFS | 355 | 351 | 347 | 343 | 340 | 337 | 333 | 330 |
| 23.40 CFS | 328 | 325 | 323 | 321 | 319 | 317 | 313 | 303 |
| 24.60 CFS | 282 | 251 | 221 | 199 | 186 | 177 | 166 | 153 |
| 25.80 CFS | 139 | 124 | 109 | 94 | 81 | 70 | 59 | 50 |
| 27.00 CFS | 42.25 | 35.47 | 29.67 | 24.75 | 20.59 | 17.09 | 14.16 | 11.71 |
| 28.20 CFS | 9.66 | 7.96 | 6.56 | 5.39 | 4.43 | 3.63 | 2.98 | 2.44 |
| 29.40 CFS | 1.99 | 1.63 | 1.33 | 1.09 | .88 | .72 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.27 WATERSHED INCHES; 18073 CFS-HRS; 1493.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 4518.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | .32 | 1.49 | 3.96 | 7.80 | 12.57 | 17.70 | 23.26 | 29.57 |
| 10.20 CFS | 37 | 46 | 57 | 70 | 85 | 104 | 126 | 155 |
| 11.40 CFS | 193 | 251 | 382 | 846 | 1965 | 3523 | 4470 | 4209 |
| 12.60 CFS | 2843 | 1440 | 924 | 760 | 653 | 584 | 532 | 490 |
| 13.80 CFS | 453 | 422 | 393 | 367 | 346 | 329 | 316 | 307 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.00 CFS | 299 | 291 | 282 | 272 | 262 | 253 | 245 | 236 |
| 16.20 CFS | 228 | 219 | 212 | 207 | 204 | 201 | 197 | 194 |
| 17.40 CFS | 190 | 187 | 184 | 181 | 178 | 175 | 171 | 168 |
| 18.60 CFS | 165 | 161 | 158 | 155 | 151 | 148 | 145 | 141 |
| 19.80 CFS | 138 | 134 | 130 | 127 | 125 | 123 | 122 | 121 |
| 21.00 CFS | 120 | 119 | 119 | 118 | 118 | 118 | 117 | 116 |
| 22.20 CFS | 115 | 114 | 114 | 113 | 112 | 112 | 111 | 110 |
| 23.40 CFS | 110 | 109 | 109 | 109 | 108 | 102 | 85 | 55 |
| 24.60 CFS | 25.49 | 5.84 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.84 WATERSHED INCHES; 5687 CFS-HRS; 470.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 3227.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 3.48 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 8.25 CFS | .45 | 1.25 | 2.62 | 4.72 | 7.41 | 10.60 | 14.21 | 18.16 |
| 9.45 CFS | 22.35 | 26.61 | 30.89 | 35.37 | 40.30 | 46.22 | 53.40 | 62.01 |
| 10.65 CFS | 72 | 84 | 99 | 117 | 138 | 166 | 205 | 282 |
| 11.85 CFS | 510 | 1047 | 1935 | 2809 | 3220 | 2998 | 2258 | 1294 |
| 13.05 CFS | 737 | 593 | 508 | 450 | 410 | 377 | 348 | 323 |
| 14.25 CFS | 301 | 282 | 266 | 253 | 243 | 236 | 229 | 222 |
| 15.45 CFS | 215 | 208 | 201 | 194 | 187 | 180 | 174 | 168 |
| 16.65 CFS | 162 | 159 | 156 | 153 | 151 | 148 | 145 | 143 |
| 17.85 CFS | 140 | 138 | 135 | 133 | 130 | 128 | 125 | 123 |
| 19.05 CFS | 120 | 118 | 115 | 113 | 110 | 107 | 105 | 102 |
| 20.25 CFS | 99.17 | 96.93 | 95.23 | 93.83 | 92.68 | 91.80 | 91.16 | 90.65 |
| 21.45 CFS | 90.35 | 90.04 | 89.67 | 89.35 | 88.88 | 88.23 | 87.61 | 87.10 |
| 22.65 CFS | 86.42 | 85.95 | 85.38 | 84.75 | 84.17 | 83.79 | 83.52 | 83.08 |
| 23.85 CFS | 82.81 | 82.25 | 79.54 | 72.48 | 58.11 | 39.66 | 21.26 | 7.26 |
| 25.05 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.05 WATERSHED INCHES; 4597 CFS-HRS; 379.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.39 | 7577.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 8.26 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 8.25 CFS | .45 | 1.25 | 2.62 | 4.72 | 7.45 | 10.92 | 15.71 | 22.12 |
| 9.45 CFS | 30 | 39 | 49 | 59 | 70 | 83 | 100 | 119 |
| 10.65 CFS | 142 | 169 | 203 | 243 | 294 | 359 | 456 | 663 |
| 11.85 CFS | 1356 | 3013 | 5458 | 7279 | 7429 | 5841 | 3698 | 2217 |
| 13.05 CFS | 1497 | 1246 | 1092 | 982 | 900 | 830 | 770 | 716 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 14.25 CFS | 668 | 628 | 595 | 569 | 550 | 534 | 520 | 504 |
| 15.45 CFS | 488 | 470 | 454 | 438 | 423 | 408 | 393 | 379 |
| 16.65 CFS | 370 | 363 | 357 | 351 | 345 | 339 | 333 | 327 |
| 17.85 CFS | 321 | 315 | 310 | 304 | 298 | 292 | 286 | 281 |
| 19.05 CFS | 275 | 269 | 263 | 257 | 252 | 245 | 238 | 232 |
| 20.25 CFS | 226 | 222 | 218 | 216 | 213 | 212 | 210 | 209 |
| 21.45 CFS | 209 | 208 | 207 | 206 | 205 | 204 | 202 | 201 |
| 22.65 CFS | 200 | 198 | 197 | 195 | 194 | 194 | 193 | 192 |
| 23.85 CFS | 191 | 190 | 181 | 157 | 113 | 65 | 27 | 7 |
| 25.05 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.93 WATERSHED INCHES; 10285 CFS-HRS; 850.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.49 | 11750.6 | (NULL) |
| 13.73 | 4916.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .41 | .82 | 1.37 | 2.06 | 2.93 | 4.01 | 5.38 | 7.09 |
| 7.80 CFS | 9.19 | 11.70 | 14.68 | 18.26 | 22.63 | 27.91 | 34.27 | 41.66 |
| 9.00 CFS | 50 | 61 | 75 | 91 | 110 | 130 | 152 | 176 |
| 10.20 CFS | 204 | 236 | 274 | 318 | 368 | 428 | 498 | 584 |
| 11.40 CFS | 692 | 840 | 1115 | 1915 | 3820 | 6925 | 9989 | 11681 |
| 12.60 CFS | 11112 | 8780 | 6310 | 4839 | 4499 | 4570 | 4765 | 4901 |
| 13.80 CFS | 4902 | 4785 | 4584 | 4329 | 4049 | 3764 | 3488 | 3229 |
| 15.00 CFS | 2988 | 2767 | 2562 | 2374 | 2201 | 2043 | 1902 | 1776 |
| 16.20 CFS | 1662 | 1559 | 1468 | 1389 | 1321 | 1263 | 1211 | 1164 |
| 17.40 CFS | 1120 | 1081 | 1044 | 1011 | 981 | 953 | 927 | 902 |
| 18.60 CFS | 879 | 857 | 836 | 817 | 797 | 779 | 761 | 744 |
| 19.80 CFS | 726 | 709 | 691 | 674 | 660 | 646 | 635 | 624 |
| 21.00 CFS | 614 | 606 | 598 | 591 | 584 | 577 | 571 | 565 |
| 22.20 CFS | 559 | 553 | 548 | 543 | 538 | 533 | 529 | 525 |
| 23.40 CFS | 522 | 518 | 515 | 513 | 509 | 498 | 470 | 416 |
| 24.60 CFS | 347 | 279 | 228 | 199 | 186 | 177 | 166 | 153 |
| 25.80 CFS | 139 | 124 | 109 | 94 | 81 | 70 | 59 | 50 |
| 27.00 CFS | 42.25 | 35.47 | 29.67 | 24.75 | 20.59 | 17.09 | 14.16 | 11.71 |
| 28.20 CFS | 9.66 | 7.96 | 6.56 | 5.39 | 4.43 | 3.63 | 2.98 | 2.44 |
| 29.40 CFS | 1.99 | 1.63 | 1.33 | 1.09 | .88 | .72 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.14 WATERSHED INCHES; 28358 CFS-HRS; 2343.5 ACRE-FEET.

--- XSECTION 76, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1199.2 FEET) CAN ADD .456 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS
WITH 2567.16 AC-FT ( .19 WATERSHED INCHES) FLOOD STORAGE
REMAINING IN RESERVOIR AT ELEV. 1209.91. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.55 | 65.8 * | 1210.57 |

* FIRST POINT OF FLAT PEAK

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 62 CFS
RESVOR ( 95. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
HRS MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.55 CFS | .21 | .21 | .21 | .21 | .21 | .21 | .21 | .21 |
| 6.75 CFS | .21 | .21 | .21 | .21 | .21 | .22 | .22 | .22 |
| 7.95 CFS | .23 | .24 | .25 | .26 | .27 | .29 | .31 | .34 |
| 9.15 CFS | .37 | .41 | .45 | .51 | .58 | .66 | .75 | .86 |
| 10.35 CFS | .98 | 1.12 | 1.29 | 1.48 | 1.71 | 1.97 | 2.28 | 2.64 |
| 11.55 CFS | 3.07 | 3.62 | 4.48 | 6.10 | 9.14 | 13.92 | 19.22 | 24.33 |
| 12.75 CFS | 28.60 | 31.17 | 33.07 | 34.65 | 36.19 | 37.77 | 39.35 | 40.76 |
| 13.95 CFS | 42.15 | 43.50 | 44.78 | 45.98 | 47.11 | 48.14 | 49.10 | 49.99 |
| 15.15 CFS | 50.82 | 51.59 | 52.30 | 52.96 | 53.57 | 54.13 | 54.65 | 55.14 |
| 16.35 CFS | 55.60 | 56.03 | 56.43 | 56.81 | 57.18 | 57.52 | 57.85 | 58.17 |
| 17.55 CFS | 58.48 | 58.77 | 59.06 | 59.33 | 59.60 | 59.86 | 60.11 | 60.35 |
| 18.75 CFS | 60.59 | 60.82 | 61.05 | 61.27 | 61.48 | 61.69 | 61.89 | 62.09 |
| 19.95 CFS | 62.28 | 62.47 | 62.65 | 62.83 | 63.00 | 63.12 | 63.23 | 63.34 |
| 21.15 CFS | 63.45 | 63.55 | 63.66 | 63.76 | 63.87 | 63.97 | 64.07 | 64.17 |
| 22.35 CFS | 64.26 | 64.36 | 64.46 | 64.55 | 64.64 | 64.74 | 64.83 | 64.92 |
| 23.55 CFS | 65.01 | 65.10 | 65.19 | 65.28 | 65.36 | 65.45 | 65.52 | 65.58 |
| 24.75 CFS | 65.63 | 65.67 | 65.70 | 65.73 | 65.75 | 65.77 | 65.79 | 65.80 |
| 25.95 CFS | 65.82 | 65.83 | 65.83 | 65.84 | 65.84 | 65.84 | 65.84 | 65.83 |
| 27.15 CFS | 65.83 | 65.82 | 65.81 | 65.81 | 65.80 | 65.79 | 65.78 | 65.76 |
| 28.35 CFS | 65.75 | 65.74 | 65.73 | 65.72 | 65.71 | 65.69 | 65.68 | 65.67 |
| 29.55 CFS | 65.66 | 65.64 | 65.63 | 65.62 | 65.60 | 65.59 | 65.58 | 65.57 |
| 30.75 CFS | 65.55 | 65.54 | 65.53 | 65.51 | 65.50 | 65.49 | 65.47 | 65.46 |
| 31.95 CFS | 65.45 | 65.44 | 65.42 | 65.41 | 65.40 | 65.38 | 65.37 | 65.36 |
| 33.15 CFS | 65.34 | 65.33 | 65.32 | 65.31 | 65.29 | 65.28 | 65.27 | 65.25 |
| 34.35 CFS | 65.24 | 65.23 | 65.22 | 65.20 | 65.19 | 65.18 | 65.16 | 65.15 |
| 35.55 CFS | 65.14 | 65.12 | 65.11 | 65.10 | 65.09 | 65.07 | 65.06 | 65.05 |
| 36.75 CFS | 65.03 | 65.02 | 65.01 | 65.00 | 64.98 | 64.97 | 64.96 | 64.94 |
| 37.95 CFS | 64.93 | 64.92 | 64.91 | 64.89 | 64.88 | 64.87 | 64.85 | 64.84 |
| 39.15 CFS | 64.83 | 64.82 | 64.80 | 64.79 | 64.78 | 64.76 | 64.75 | 64.74 |
| 40.35 CFS | 64.73 | 64.71 | 64.70 | 64.69 | 64.67 | 64.66 | 64.65 | 64.64 |
| 41.55 CFS | 64.62 | 64.61 | 64.60 | 64.58 | 64.57 | 64.56 | 64.55 | 64.53 |
| 42.75 CFS | 64.52 | 64.51 | 64.49 | 64.48 | 64.47 | 64.46 | 64.44 | 64.43 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 43.95 CFS | 64.42 | 64.40 | 64.39 | 64.38 | 64.37 | 64.35 | 64.34 | 64.33 |
| 45.15 CFS | 64.32 | 64.30 | 64.29 | 64.28 | 64.26 | 64.25 | 64.24 | 64.23 |
| 46.35 CFS | 64.21 | 64.20 | 64.19 | 64.18 | 64.16 | 64.15 | 64.14 | 64.12 |
| 47.55 CFS | 64.11 | 64.10 | 64.09 | 64.07 | 64.06 | 64.05 | 64.04 | 64.02 |
| 48.75 CFS | 64.01 | 64.00 | 63.98 | 63.97 | 63.96 | 63.95 | 63.93 | 63.92 |
| 49.95 CFS | 63.91 | 63.90 | 63.88 | 63.87 | 63.86 | 63.84 | 63.83 | 63.82 |
| 51.15 CFS | 63.81 | 63.79 | 63.78 | 63.77 | 63.76 | 63.74 | 63.73 | 63.72 |
| 52.35 CFS | 63.71 | 63.69 | 63.68 | 63.67 | 63.66 | 63.64 | 63.63 | 63.62 |
| 53.55 CFS | 63.60 | 63.59 | 63.58 | 63.57 | 63.55 | 63.54 | 63.53 | 63.52 |
| 54.75 CFS | 63.50 | 63.49 | 63.48 | 63.47 | 63.45 | 63.44 | 63.43 | 63.42 |
| 55.95 CFS | 63.40 | 63.39 | 63.38 | 63.37 | 63.35 | 63.34 | 63.33 | 63.31 |
| 57.15 CFS | 63.30 | 63.29 | 63.28 | 63.26 | 63.25 | 63.24 | 63.23 | 63.21 |
| 58.35 CFS | 63.20 | 63.19 | 63.18 | 63.16 | 63.15 | 63.14 | 63.13 | 63.11 |
| 59.55 CFS | 63.10 | 63.09 | 63.08 | 63.06 | 63.05 | 63.04 | 63.03 | 63.01 |
| 60.75 CFS | 63.00 | 62.98 | 62.97 | 62.95 | 62.93 | 62.91 | 62.89 | 62.87 |
| 61.95 CFS | 62.85 | 62.84 | 62.82 | 62.80 | 62.78 | 62.76 | 62.74 | 62.73 |
| 63.15 CFS | 62.71 | 62.69 | 62.67 | 62.65 | 62.63 | 62.61 | 62.60 | 62.58 |
| 64.35 CFS | 62.56 | 62.54 | 62.52 | 62.50 | 62.49 | 62.47 | 62.45 | 62.43 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.25 WATERSHED INCHES; 3318 CFS-HRS; 274.2 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 2

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINFALL OF 3.85 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs. | | | | | | | |
| RAINTABLE NUMBER 2, ARC 1 | | | | | | | |
| MAIN TIME INCREMENT .150 HOURS | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 1.44 | --- | 12.40 | 1705 | 693.1 |
| XSECTION 5 | REACH | 2.46 | 1.44 | 3.80 | 13.07 | 1009 | 410.2 |
| XSECTION 10 | REACH | 2.46 | 1.44 | 4.99 | 13.72 | 733 | 298.0 |
| XSECTION 2 | RUNOFF | 2.38 | .84 | --- | 12.36 | 900 | 378.2 |
| XSECTION 12 | ADDHYD | 4.84 | 1.15 | --- | 12.37 | 915 | 189.0 |
| XSECTION 12 | DIVERT | 4.84 | 1.15 | --- | 12.37 | 915 | 189.0 |
| XSECTION 200 | DIVERT | .00 | 1.15 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 1.15 | 3.34 | 13.90 | 857 | 177.1 |
| XSECTION 25 | REACH | 4.84 | 1.15 | 2.08 | 14.08 | 853 | 176.2 |
| XSECTION 3 | RUNOFF | 3.94 | 1.44 | --- | 12.41 | 2671 | 677.9 |
| XSECTION 30 | REACH | 3.94 | 1.44 | 3.47 | 13.42 | 1395 | 354.1 |
| XSECTION 5 | REACH | 3.94 | 1.44 | 3.80 | 14.04 | 1008 | 255.8 |
| XSECTION 25 | REACH | 3.94 | 1.44 | 2.31 | 14.22 | 1006 | 255.3 |
| XSECTION 4 | RUNOFF | 2.06 | .66 | --- | 12.43 | 527 | 255.8 |
| XSECTION 34 | ADDHYD | 6.00 | 1.17 | --- | 14.19 | 1085 | 180.8 |
| XSECTION 35 | ADDHYD | 10.84 | 1.16 | --- | 14.14 | 1936 | 178.6 |
| XSECTION 35 | DIVERT | 10.84 | 1.16 | --- | 14.14 | 1936 | 178.6 |
| XSECTION 199 | DIVERT | .00 | 1.16 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 1.16 | 3.21 | 14.40 | 1901 | 175.4 |
| XSECTION 6 | RUNOFF | 1.47 | 1.53 | --- | 12.15 | 1541 | 1048.3 |
| XSECTION 60 | REACH | 1.47 | 1.53 | 4.20 | 12.59 | 858 | 583.7 |
| XSECTION 67 | REACH | 1.47 | 1.53 | 3.12 | 13.11 | 621 | 422.4 |
| XSECTION 64 | ADDHYD | 12.31 | 1.21 | --- | 14.31 | 2131 | 173.1 |
| XSECTION 5 | RUNOFF | 4.78 | .77 | --- | 12.41 | 1544 | 323.0 |
| XSECTION 7 | RUNOFF | 3.48 | .96 | --- | 12.54 | 1321 | 379.6 |
| XSECTION 75 | ADDHYD | 8.26 | .85 | --- | 12.46 | 2800 | 339.0 |
| XSECTION 76 | ADDHYD | 20.57 | 1.06 | --- | 12.57 | 3492 | 169.8 |
| STRUCTURE 1 | RESVOR | 20.57 | .16 | 1206.21 | 27.15F | 40F | 1.9 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINTABLE NUMBER 2, ARC 2 | | | | | | | |
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 2.50 | --- | 12.36 | 3097 | 1258.9 |
| XSECTION 5 | REACH | 2.46 | 2.51 | 4.85 | 12.88 | 1860 | 756.1 |
| XSECTION 10 | REACH | 2.46 | 2.51 | 5.93 | 13.54 | 1303 | 529.7 |
| XSECTION 2 | RUNOFF | 2.38 | 1.93 | --- | 12.30 | 2511 | 1055.0 |
| XSECTION 12 | ADDHYD | 4.84 | 2.22 | --- | 12.31 | 2655 | 548.6 |
| XSECTION 12 | DIVERT | 4.84 | 2.22 | --- | 12.31 | 2655 | 548.6 |
| XSECTION 200 | DIVERT | .00 | 2.22 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 2.22 | 6.16 | 12.47 | 2618 | 540.9 |
| XSECTION 25 | REACH | 4.84 | 2.22 | 3.87 | 12.47 | 2618 | 540.9 |
| XSECTION 3 | RUNOFF | 3.94 | 2.51 | --- | 12.38 | 4801 | 1218.5 |
| XSECTION 30 | REACH | 3.94 | 2.51 | 4.10 | 13.23 | 2639 | 669.8 |
| XSECTION 5 | REACH | 3.94 | 2.51 | 4.90 | 13.79 | 1910 | 484.8 |
| XSECTION 25 | REACH | 3.94 | 2.51 | 3.28 | 13.79 | 1910 | 484.8 |
| XSECTION 4 | RUNOFF | 2.06 | 1.73 | --- | 12.35 | 1790 | 868.9 |
| XSECTION 34 | ADDHYD | 6.00 | 2.24 | --- | 13.75 | 2101 | 350.2 |
| XSECTION 35 | ADDHYD | 10.84 | 2.23 | --- | 12.43 | 4513 | 416.3 |
| XSECTION 35 | DIVERT | 10.84 | 2.23 | --- | 12.43 | 4513 | 416.3 |
| XSECTION 199 | DIVERT | .00 | 2.23 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 2.23 | 5.07 | 12.61 | 4335 | 399.9 |
| XSECTION 6 | RUNOFF | 1.47 | 2.59 | --- | 12.14 | 2639 | 1795.2 |
| XSECTION 60 | REACH | 1.47 | 2.59 | 5.08 | 12.54 | 1673 | 1138.1 |
| XSECTION 67 | REACH | 1.47 | 2.59 | 4.11 | 12.86 | 1234 | 839.5 |
| XSECTION 64 | ADDHYD | 12.31 | 2.27 | --- | 12.65 | 5343 | 434.0 |
| XSECTION 5 | RUNOFF | 4.78 | 1.84 | --- | 12.34 | 4519 | 945.4 |
| XSECTION 7 | RUNOFF | 3.48 | 2.05 | --- | 12.47 | 3227 | 927.3 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 75 | ADDHYD | 8.26 | 1.93 | --- | 12.39 | 7577 | 917.3 |
| XSECTION 76 | ADDHYD | 20.57 | 2.14 | --- | 12.49 | 11751 | 571.3 |
| STRUCTURE 1 | RESVOR | 20.57 | .25 | 1210.57 | 26.55F | 66F | 3.2 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | HYDROGRAPH INFLOW PEAK (CFS) | HYDROGRAPH INFLOW TIME (HR) | HYDROGRAPH OUTFLOW PEAK (CFS) | HYDROGRAPH OUTFLOW TIME (HR) | ROUTING PARAMETERS Q-A EQ. COEFF (X) | Q-A EQ. POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 1678 | 12.4 | 1008 | 13.1 | .78 | 1.24 | .457 | .600 | .23 |
| 10 | 9100 | | 1008 | 13.1 | 729 | 13.6 | .67 | 1.31 | .199 | .724 | .26 |
| 20 | 3332 | | 887 | 12.3 | 855 | 13.9 | .11 | 1.68 | .007 | .963 | .73? |
| 25 | 1950 | | 855 | 13.9 | 853 | 14.1 | .046 | 1.75 | .004 | .998 | .86? |
| 30 | 8865 | | 2652 | 12.4 | 1374 | 13.4 | 1.08 | 1.14 | .588 | .518 | .18 |
| 5 | 8865 | | 1374 | 13.4 | 1006 | 14.1 | .71 | 1.26 | .195 | .732 | .23 |
| 25 | 1950 | | 1006 | 14.1 | 1005 | 14.3 | .046 | 1.75 | .004 | .999 | .89? |
| 45 | 4200 | | 1934 | 14.1 | 1901 | 14.4 | .044 | 1.73 | .009 | .983 | .63 |
| 60 | 7540 | | 1541 | 12.1 | 858 | 12.6 | .67 | 1.29 | .493 | .557 | .30 |
| 67 | 5140 | | 858 | 12.6 | 615 | 13.1 | .65 | 1.28 | .189 | .717 | .35 |
| ALTERNATE 2 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 3036 | 12.3 | 1857 | 12.9 | 1.09 | 1.18 | .473 | .612 | .23 |
| 10 | 9100 | | 1857 | 12.9 | 1301 | 13.5 | 1.29 | 1.17 | .260 | .700 | .23 |
| 20 | 3332 | | 2654 | 12.3 | 2611 | 12.4 | .13 | 1.65 | .008 | .984 | .92? |
| 25 | 1950 | | 2611 | 12.4 | 2611 | 12.4 | .048 | 1.74 | .004 | 1.000 | 1.00? |
| 30 | 8865 | | 4686 | 12.4 | 2632 | 13.2 | 1.21 | 1.12 | .571 | .562 | .19 |
| 5 | 8865 | | 2632 | 13.2 | 1910 | 13.8 | 1.03 | 1.19 | .225 | .726 | .23 |
| 25 | 1950 | | 1910 | 13.8 | 1910 | 13.8 | .046 | 1.75 | .003 | 1.000 | 1.00? |
| 45 | 4200 | | 4504 | 12.4 | 4332 | 12.6 | .046 | 1.73 | .007 | .962 | .79? |
| 60 | 7540 | | 2633 | 12.1 | 1641 | 12.6 | .49 | 1.35 | .383 | .623 | .36 |
| 67 | 5140 | | 1641 | 12.6 | 1230 | 12.9 | .76 | 1.25 | .199 | .749 | .37 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE 1 | | 20.57 | |
| ALTERNATE | 1 | | 40 |
| ALTERNATE | 2 | | 66 |
| XSECTION 1 | | 2.46 | |
| ALTERNATE | 1 | | 1705 |
| ALTERNATE | 2 | | 3097 |
| XSECTION 2 | | 2.38 | |
| ALTERNATE | 1 | | 900 |
| ALTERNATE | 2 | | 2511 |
| XSECTION 3 | | 3.94 | |
| ALTERNATE | 1 | | 2671 |
| ALTERNATE | 2 | | 4801 |
| XSECTION 4 | | 2.06 | |
| ALTERNATE | 1 | | 527 |
| ALTERNATE | 2 | | 1790 |
| XSECTION 5 | | 4.78 | |
| ALTERNATE | 1 | | 1544 |
| ALTERNATE | 2 | | 4519 |
| XSECTION 6 | | 1.47 | |
| ALTERNATE | 1 | | 1541 |
| ALTERNATE | 2 | | 2639 |
| XSECTION 7 | | 3.48 | |
| ALTERNATE | 1 | | 1321 |
| ALTERNATE | 2 | | 3227 |
| XSECTION 10 | | 2.46 | |
| ALTERNATE | 1 | | 733 |
| ALTERNATE | 2 | | 1303 |
| XSECTION 12 | | 4.84 | |
| ALTERNATE | 1 | | 915 |
| ALTERNATE | 2 | | 2655 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 20 | | 4.84 | |
| ALTERNATE | 1 | | 857 |
| ALTERNATE | 2 | | 2618 |
| XSECTION 25 | | 3.94 | |
| ALTERNATE | 1 | | 1006 |
| ALTERNATE | 2 | | 1910 |
| XSECTION 30 | | 3.94 | |
| ALTERNATE | 1 | | 1395 |
| ALTERNATE | 2 | | 2639 |
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 1085 |
| ALTERNATE | 2 | | 2101 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 1936 |
| ALTERNATE | 2 | | 4513 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 1901 |
| ALTERNATE | 2 | | 4335 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 858 |
| ALTERNATE | 2 | | 1673 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 2131 |
| ALTERNATE | 2 | | 5343 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 621 |
| ALTERNATE | 2 | | 1234 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 2800 |
| ALTERNATE | 2 | | 7577 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 3492 |
| ALTERNATE | 2 | | 11751 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

```
TR20 ------------------------------------------------------------------------ SCS -
WT100YR   WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
08/05/**  100-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spil2.04TEST


END OF  1 JOBS IN THIS RUN




                    SCS  TR-20,  VERSION 2.04TEST
                         WT100YR   FILES

     INPUT  = 100INN.DAT                                , GIVEN DATA FILE
     OUTPUT = 100OUT.OUT                                , DATED 08/05/**,17:13:44

              FILES GENERATED - DATED 08/05/**,17:13:44

    FILE 111.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   4,  MESSAGES =   8

                       JOB ENDED AT 17:13:44
                   *** TR-20 RUN COMPLETED ***
```

Future Condition

(Principal spillway open)

(500-yr 24-hr)

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20 WT100YR                          PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROUTING
TITLE     500-yr, 24-hr, Type II Dist, 100-yr Sediment Storage, 1200'Spillway
 4 DIMHYD                .0556                                          WT3
 8          0.0          .03          .10          .19          .31
 8          .47          .66          .82          .93          .99
 8          1.0          .99          .93          .82          .66
 8          .47          .31          .03          .00          .00
 9 ENDTBL
 5 RAINFL 2              .1000                                          TYPE II
 8          .0000        .0010        .0020        .0030        .0041
 8          .0051        .0062        .0072        .0083        .0094
 8          .0105        .0116        .0127        .0138        .0150
 8          .0161        .0173        .0184        .0196        .0208
 8          .0220        .0232        .0244        .0257        .0269
 8          .0281        .0294        .0306        .0319        .0332
 8          .0345        .0358        .0371        .0384        .0398
 8          .0411        .0425        .0439        .0452        .0466
 8          .0480        .0494        .0508        .0523        .0538
 8          .0553        .0568        .0583        .0598        .0614
 8          .0630        .0646        .0662        .0679        .0696
 8          .0712        .0730        .0747        .0764        .0782
 8          .0800        .0818        .0836        .0855        .0874
 8          .0892        .0912        .0931        .0950        .0970
 8          .0990        .1010        .1030        .1051        .1072
 8          .1093        .1114        .1135        .1156        .1178
 8          .1200        .1222        .1246        .1270        .1296
 8          .1322        .1350        .1379        .1408        .1438
 8          .1470        .1502        .1534        .1566        .1598
 8          .1630        .1663        .1697        .1733        .1771
 8          .1810        .1851        .1895        .1941        .1989
 8          .2040        .2094        .2152        .2214        .2280
 8          .2350        .2427        .2513        .2609        .2715
 8          .2830        .3068        .3544        .4308        .5679
 8          .6630        .6820        .6986        .7130        .7252
 8          .7350        .7434        .7514        .7588        .7656
 8          .7720        .7780        .7836        .7890        .7942
 8          .7990        .8036        .8080        .8122        .8162
 8          .8200        .8237        .8273        .8308        .8342
 8          .8376        .8409        .8442        .8474        .8505
 8          .8535        .8565        .8594        .8622        .8649
 8          .8676        .8702        .8728        .8753        .8777
 8          .8800        .8823        .8845        .8868        .8890
 8          .8912        .8934        .8955        .8976        .8997
 8          .9018        .9038        .9058        .9078        .9097
 8          .9117        .9136        .9155        .9173        .9192
 8          .9210        .9228        .9245        .9263        .9280
 8          .9297        .9313        .9330        .9346        .9362
 8          .9377        .9393        .9408        .9423        .9438
 8          .9452        .9466        .9480        .9493        .9507
 8          .9520        .9533        .9546        .9559        .9572
 8          .9584        .9597        .9610        .9622        .9635
 8          .9647        .9660        .9672        .9685        .9697
 8          .9709        .9722        .9734        .9746        .9758
 8          .9770        .9782        .9794        .9806        .9818
 8          .9829        .9841        .9853        .9864        .9876
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8          .9887       .9899       .9910       .9922       .9933
 8          .9944       .9956       .9967       .9978       .9989
 8          1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         10.41                             BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.86        5.          4.39
 8                      2.01        50.         24.22
 8                      2.58        100.        40.12
 8                      3.46        200.        80.99
 8                      4.14        400.        129.44
 8                      5.16        800.        214.74
 8                      6.39        1600.       441.84
 8                      7.80        3200.       980.75
 8                      9.16        6400.       1891.44
 8                      10.41       12800.      3516.14
 8                      11.75       25600.      6548.98
 8                      13.26       51200.      11081.19
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
```

```
 8                      1.56        500.        203.28
 8                      2.30        1000.       302.00
 8                      3.38        2000.       449.24
 8                      4.97        4000.       673.73
 8                      6.23        6000.       855.96
 8                      7.31        8000.       1016.35
 8                      8.24        10000.      1158.51
 8                      9.09        12000.      1293.31
 8                      9.90        14000.      1425.57
 8                      10.64       16000.      1549.17
 8                      11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030        1.0         9.45                                BOSSCS#6
 8                      0.          0.0         0.0
 8                      0.77        5.          4.67
 8                      1.54        50.         32.06
 8                      1.78        100.        56.64
 8                      2.10        200.        100.59
 8                      2.50        400.        179.97
 8                      3.01        800.        320.25
 8                      3.63        1600.       589.66
 8                      4.35        3200.       1110.72
 8                      5.21        6400.       2084.48
 8                      6.03        12800.      4119.83
 8                      6.99        25600.      6856.75
 8                      8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045        1.0         4.87                                REACHA
 8                      0.          0.0         0.0
 8                      0.60        100.        85.69
 8                      0.90        200.        127.94
 8                      1.13        300.        161.93
 8                      1.52        500.        217.27
 8                      2.25        1000.       324.03
 8                      3.31        2000.       483.02
 8                      4.87        4000.       722.17
 8                      6.09        6000.       914.99
 8                      7.15        8000.       1084.61
 8                      8.05        10000.      1234.17
 8                      8.87        12000.      1373.80
 8                      9.64        14000.      1507.84
 8                      10.34       16000.      1633.45
 8                      11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060        1.0         4.7                                 2CP6CP7
 8                      0.          0.0         0.0
 8                      2.36        100.        45.12
 8                      2.88        200.        83.75
 8                      3.18        300.        114.33
 8                      3.64        500.        172.72
 8                      4.42        1000.       289.04
 8                      5.40        2000.       470.72
 8                      6.87        4000.       782.74
 8                      7.91        6000.       1020.12
 8                      8.79        8000.       1231.25
 8                      9.60        10000.      1435.05
```

```
 8                        10.26       12000.      1618.34
 8                        10.94       14000.      1812.58
 8                        11.47       16000.      1983.46
 8                        11.96       18000.      2150.12
 9 ENDTBL
 2 XSECTN    067          1.0         8.77                                BOSSCS#5
 8                        0.          0.0         0.0
 8                        0.35        5.          5.56
 8                        1.03        50.         30.95
 8                        1.39        100.        52.16
 8                        1.94        200.        88.72
 8                        2.63        400.        148.61
 8                        3.51        800.        260.63
 8                        4.62        1600.       459.66
 8                        6.04        3200.       929.36
 8                        7.38        6400.       1811.51
 8                        8.77        12800.      3374.20
 8                        10.17       25600.      6398.87
 8                        11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT       01                                                        95/11/6
 8                        1178.0      0.0         0.
 8                        1188.0      0.02        44.8
 8                        1196.8      0.13        300.
 8                        1199.2      0.21        500.
 8                        1202.0      159.0       845.55
 8                        1204.0      187.75      1176.28
 8                        1206.0      214.9       1575.25
 8                        1208.0      240.3       2044.97
 8                        1210.0      265.4       2593.40
 8                        1212.0      330.00      3218.00
 8                        1213.0      2936.00     3556.67
 8                        1214.0      8488.00     3916.02
 8                        1215.0      15810.0     4294.13
 8                        1216.0      24545.0     4692.68
 8                        1217.0      34492.0     5113.19
 8                        1218.0      45517.0     5556.01
 8                        1219.0      57524.0     6021.50
 8                        1220.0      70439.0     6509.75
 9 ENDTBL
 6 RUNOFF 1 001         1 2.46        87.2        0.85        1 1
 6 REACH  3 005    1    7 9100.                               1           BOSS#6
 6 REACH  3 010    7    2 9100.                               1           BOSS#4
 6 RUNOFF 1 002         3 2.38        79.9        0.73        1 1
 6 ADDHYD 4 012    2 3 1                                     1 1
 6 DIVERT 6 012    1 4 7 4100.       1.00        200.        1 1         OLIVE
 6 REACH  3 020    4    7 3332.                               1           REACH C
 6 REACH  3 025    7    5 1950.                               1           REACH B
 6 RUNOFF 1 003         6 3.94        87.2        0.88        1 1
 6 REACH  3 030    6    7 8865.                               1           BOSS#6
 6 REACH  3 005    7    1 8865.                               1           BOSS#5
 6 REACH  3 025    1    7 1950.                               1           REACH B
 6 RUNOFF 1 004         1 2.06        77.3        0.79        1 1
 6 ADDHYD 4 034    7 1 2                                     1 1
 6 ADDHYD 4 035    5 2 3                                     1 1
 6 DIVERT 6 035    3 4 7 11000.      1.00        199.        1 1         NORTHERN
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 REACH   3 045    4    5 4200.                                  1            REACH A
 6 RUNOFF  1 006         2 1.47          87.7          0.47      1 1
 6 REACH   3 060    2    3 7540.                                  1            CP6CP7
 6 REACH   3 067    3    4 5140.                                  1            BOSS#5
 6 ADDHYD  4 064    5 4  3                                        1 1
 6 RUNOFF  1 005         6 4.78          78.8          0.78      1 1
 6 RUNOFF  1 007         7 3.48          81.7          1.01      1 1
 6 ADDHYD  4 075    6 7  1                                        1 1
 6 ADDHYD  4 076    1 3  2                                        1 1      1
 6 RESVOR  2     01 2    1 1200.0                                 1 1      1
ENDATA
 7 LIST                    1.0                        1.
 7 INCREM  6               0.15
 7 COMPUT  7 001       01  0.          4.84          1.0         2 1  01  01
   ENDCMP  1
 7 COMPUT  7 001       01  0.          4.84          1.0         2 2  02  01
   ENDCMP  1
   ENDJOB  2

**********END OF 80-80 LIST**********
```

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST 1. 0. 1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT
DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0017 | .0035 | .0052 | .0070 |
| .0087 | .0105 | .0122 | .0139 | .0157 |
| .0174 | .0192 | .0210 | .0227 | .0245 |
| .0262 | .0280 | .0297 | .0315 | .0332 |
| .0350 | .0368 | .0386 | .0404 | .0423 |
| .0442 | .0461 | .0480 | .0500 | .0520 |
| .0540 | .0561 | .0582 | .0603 | .0625 |
| .0647 | .0669 | .0691 | .0714 | .0737 |
| .0760 | .0784 | .0807 | .0831 | .0855 |
| .0878 | .0902 | .0926 | .0951 | .0975 |
| .1000 | .1024 | .1049 | .1073 | .1098 |
| .1123 | .1148 | .1174 | .1199 | .1225 |
| .1250 | .1276 | .1303 | .1332 | .1361 |
| .1391 | .1423 | .1456 | .1489 | .1524 |
| .1560 | .1597 | .1633 | .1671 | .1708 |
| .1746 | .1784 | .1823 | .1861 | .1901 |
| .1940 | .1982 | .2027 | .2077 | .2132 |
| .2190 | .2252 | .2318 | .2388 | .2462 |
| .2540 | .2623 | .2714 | .2812 | .2917 |
| .3030 | .3194 | .3454 | .3878 | .4632 |
| .5150 | .5322 | .5476 | .5612 | .5730 |
| .5830 | .5919 | .6003 | .6083 | .6159 |
| .6230 | .6298 | .6365 | .6430 | .6493 |
| .6555 | .6615 | .6674 | .6731 | .6786 |
| .6840 | .6892 | .6944 | .6995 | .7044 |
| .7092 | .7140 | .7186 | .7232 | .7276 |
| .7320 | .7362 | .7404 | .7444 | .7484 |
| .7523 | .7560 | .7596 | .7632 | .7667 |
| .7700 | .7733 | .7766 | .7798 | .7830 |
| .7862 | .7894 | .7926 | .7958 | .7989 |
| .8020 | .8051 | .8082 | .8112 | .8142 |
| .8173 | .8202 | .8232 | .8262 | .8291 |
| .8320 | .8349 | .8378 | .8406 | .8434 |
| .8462 | .8490 | .8518 | .8546 | .8573 |
| .8600 | .8627 | .8654 | .8680 | .8706 |
| .8733 | .8758 | .8784 | .8810 | .8835 |
| .8860 | .8885 | .8910 | .8934 | .8958 |
| .8982 | .9006 | .9030 | .9054 | .9077 |
| .9100 | .9123 | .9146 | .9168 | .9190 |
| .9212 | .9234 | .9256 | .9278 | .9299 |
| .9320 | .9341 | .9362 | .9382 | .9402 |
| .9423 | .9442 | .9462 | .9482 | .9501 |
| .9520 | .9539 | .9558 | .9576 | .9594 |
| .9613 | .9630 | .9648 | .9666 | .9683 |
| .9700 | .9717 | .9734 | .9750 | .9766 |
| .9783 | .9798 | .9814 | .9830 | .9845 |
| .9860 | .9875 | .9890 | .9904 | .9918 |
| .9933 | .9946 | .9960 | .9974 | .9987 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RUNOFF | 1 | | | 1 | 2.4600 | 87.2000 | .85001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 5 | 1 | | 7 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 10 | 7 | | 2 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 2 | | | 3 | 2.3800 | 79.9000 | .73001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 12 | 2 | 3 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 12 | 1 | 4 | 7 | 4100.0000 | 1.0000 | 200.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 20 | 4 | | 7 | 3332.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 7 | | 5 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 3 | | | 6 | 3.9400 | 87.2000 | .88001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 30 | 6 | | 7 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 5 | 7 | | 1 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 1 | | 7 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 4 | | | 1 | 2.0600 | 77.3000 | .79001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 34 | 7 | 1 | 2 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 35 | 5 | 2 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 35 | 3 | 4 | 7 | 11000.0000 | 1.0000 | 199.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 45 | 4 | | 5 | 4200.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 6 | | | 2 | 1.4700 | 87.7000 | .47001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 60 | 2 | | 3 | 7540.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 67 | 3 | | 4 | 5140.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| ADDHYD | 64 | 5 | 4 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 5 | | | 6 | 4.7800 | 78.8000 | .78001 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 7 | | | 7 | 3.4800 | 81.7000 | 1.01001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 75 | 6 | 7 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 76 | 1 | 3 | 2 | | | 1 | 1 | 0 | 0 | 1 | 1 |
| RESVOR | | 1 | 2 | 1 | 1200.0000 | | 1 | 1 | 0 | 0 | 1 | 1 |
| ENDATA | | | | | | | | | | | | |

END OF LISTING

EXECUTIVE CONTROL INCREM' MAIN TIME INCREMENT = .150 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.84 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 1 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 1 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.39 | 2652.3 | |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.30 CFS | .14 | .64 | 1.88 | 3.93 | 6.85 | 10.39 | 14.51 | 19.43 |
| 10.50 CFS | 25 | 32 | 41 | 51 | 64 | 80 | 101 | 131 |
| 11.70 CFS | 196 | 419 | 998 | 1876 | 2542 | 2593 | 1984 | 1122 |
| 12.90 CFS | 627 | 495 | 419 | 370 | 337 | 309 | 286 | 266 |
| 14.10 CFS | 248 | 232 | 218 | 207 | 198 | 192 | 186 | 182 |
| 15.30 CFS | 176 | 171 | 164 | 159 | 153 | 148 | 143 | 137 |
| 16.50 CFS | 133 | 129 | 127 | 125 | 123 | 121 | 119 | 117 |
| 17.70 CFS | 115 | 113 | 111 | 109 | 107 | 105 | 103 | 101 |
| 18.90 CFS | 98.76 | 96.75 | 94.57 | 92.62 | 90.65 | 88.60 | 86.41 | 83.97 |
| 20.10 CFS | 81.66 | 79.74 | 78.28 | 77.10 | 76.07 | 75.28 | 74.75 | 74.28 |
| 21.30 CFS | 74.09 | 73.81 | 73.57 | 73.32 | 73.03 | 72.52 | 72.00 | 71.52 |
| 22.50 CFS | 71.05 | 70.72 | 70.21 | 69.69 | 69.16 | 68.86 | 68.63 | 68.32 |
| 23.70 CFS | 68.10 | 67.82 | 67.20 | 64.08 | 55.49 | 39.11 | 21.20 | 6.63 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 3461 CFS-HRS; 286.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.05 | 1590.2 | 4.61 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 3461 CFS-HRS; 286.0 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.72 | 1122.9 | 5.66 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 3461 CFS-HRS; 286.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 1660.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 2 | 10 | 40 | 181 | 604 | 1257 | 1644 |
| 12.45 CFS | 1515 | 972 | 508 | 381 | 317 | 279 | 253 | 232 |
| 13.65 CFS | 215 | 200 | 187 | 175 | 164 | 155 | 148 | 143 |
| 14.85 CFS | 139 | 136 | 133 | 129 | 124 | 120 | 116 | 112 |
| 16.05 CFS | 109 | 105 | 101 | 98 | 96 | 95 | 94 | 92 |
| 17.25 CFS | 90.62 | 89.11 | 87.59 | 86.11 | 84.82 | 83.46 | 82.06 | 80.49 |
| 18.45 CFS | 79.06 | 77.60 | 76.00 | 74.55 | 72.96 | 71.43 | 70.01 | 68.50 |
| 19.65 CFS | 67.07 | 65.29 | 63.40 | 61.78 | 60.53 | 59.57 | 58.78 | 58.06 |
| 20.85 CFS | 57.62 | 57.25 | 57.05 | 56.90 | 56.72 | 56.62 | 56.41 | 56.17 |
| 22.05 CFS | 55.79 | 55.41 | 55.01 | 54.86 | 54.55 | 54.10 | 53.70 | 53.42 |
| 23.25 CFS | 53.28 | 53.05 | 52.96 | 52.73 | 52.50 | 51.88 | 48.81 | 38.76 |
| 24.45 CFS | 23.78 | 9.43 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.41 WATERSHED INCHES; 2172 CFS-HRS; 179.5 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 1708.7 | (NULL) |
| 13.67 | 1333.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .45 | .97 | 1.79 | 2.97 | 4.58 | 6.97 | 11.49 | 22.39 |
| 11.70 CFS | 57 | 203 | 632 | 1293 | 1689 | 1574 | 1059 | 662 |
| 12.90 CFS | 669 | 809 | 1005 | 1186 | 1297 | 1332 | 1314 | 1260 |
| 14.10 CFS | 1185 | 1101 | 1014 | 930 | 851 | 779 | 713 | 653 |
| 15.30 CFS | 599 | 550 | 507 | 469 | 436 | 407 | 381 | 358 |
| 16.50 CFS | 339 | 323 | 309 | 296 | 284 | 273 | 263 | 254 |
| 17.70 CFS | 246 | 239 | 232 | 226 | 220 | 215 | 210 | 205 |
| 18.90 CFS | 201 | 196 | 192 | 188 | 184 | 180 | 176 | 172 |
| 20.10 CFS | 168 | 165 | 162 | 159 | 156 | 153 | 151 | 149 |
| 21.30 CFS | 146 | 144 | 142 | 141 | 139 | 137 | 135 | 134 |
| 22.50 CFS | 133 | 132 | 131 | 129 | 129 | 128 | 127 | 126 |
| 23.70 CFS | 126 | 125 | 124 | 120 | 110 | 94 | 80 | 70 |
| 24.90 CFS | 69.23 | 68.15 | 65.91 | 62.13 | 56.85 | 50.62 | 44.17 | 37.96 |
| 26.10 CFS | 32.23 | 27.09 | 22.59 | 18.71 | 15.40 | 12.62 | 10.29 | 8.36 |
| 27.30 CFS | 6.77 | 5.46 | 4.40 | 3.53 | 2.83 | 2.26 | 1.80 | 1.44 |
| 28.50 CFS | 1.14 | .91 | .72 | .57 | .45 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5633 CFS-HRS; 465.5 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 1708.7 | (DIVERT) |
| 13.67 | 1333.0 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .45 | .97 | 1.79 | 2.97 | 4.58 | 6.97 | 11.49 | 22.39 |
| 11.70 CFS | 57 | 203 | 632 | 1293 | 1689 | 1574 | 1059 | 662 |
| 12.90 CFS | 669 | 809 | 1005 | 1186 | 1297 | 1332 | 1314 | 1260 |
| 14.10 CFS | 1185 | 1101 | 1014 | 930 | 851 | 779 | 713 | 653 |
| 15.30 CFS | 599 | 550 | 507 | 469 | 436 | 407 | 381 | 358 |
| 16.50 CFS | 339 | 323 | 309 | 296 | 284 | 273 | 263 | 254 |
| 17.70 CFS | 246 | 239 | 232 | 226 | 220 | 215 | 210 | 205 |
| 18.90 CFS | 201 | 196 | 192 | 188 | 184 | 180 | 176 | 172 |
| 20.10 CFS | 168 | 165 | 162 | 159 | 156 | 153 | 151 | 149 |
| 21.30 CFS | 146 | 144 | 142 | 141 | 139 | 137 | 135 | 134 |
| 22.50 CFS | 133 | 132 | 131 | 129 | 129 | 128 | 127 | 126 |
| 23.70 CFS | 126 | 125 | 124 | 120 | 110 | 94 | 80 | 70 |
| 24.90 CFS | 69.23 | 68.15 | 65.91 | 62.13 | 56.85 | 50.62 | 44.17 | 37.96 |
| 26.10 CFS | 32.23 | 27.09 | 22.59 | 18.71 | 15.40 | 12.62 | 10.29 | 8.36 |
| 27.30 CFS | 6.77 | 5.46 | 4.40 | 3.53 | 2.83 | 2.26 | 1.80 | 1.44 |
| 28.50 CFS | 1.14 | .91 | .72 | .57 | .45 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5633 CFS-HRS; 465.5 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
149 CFS-HRS; 465.5 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.52 | 1652.9 | 4.80 |
| 13.85 | 1326.9 | 4.24 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5633 CFS-HRS; 465.5 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.67 | 1650.4 | 3.00 |
| 14.01 | 1326.7 | 2.65 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5632 CFS-HRS; 465.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 4180.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.30 CFS | .19 | .96 | 2.77 | 5.91 | 10.42 | 15.98 | 22.58 | 30.28 |
| 10.50 CFS | 40 | 51 | 64 | 80 | 100 | 125 | 157 | 204 |
| 11.70 CFS | 304 | 643 | 1501 | 2830 | 3913 | 4137 | 3309 | 1968 |
| 12.90 CFS | 1099 | 812 | 685 | 603 | 546 | 501 | 463 | 430 |
| 14.10 CFS | 400 | 374 | 351 | 333 | 319 | 308 | 300 | 292 |
| 15.30 CFS | 283 | 274 | 265 | 255 | 247 | 238 | 230 | 221 |
| 16.50 CFS | 214 | 208 | 204 | 201 | 198 | 194 | 191 | 188 |
| 17.70 CFS | 184 | 181 | 178 | 175 | 172 | 168 | 165 | 162 |
| 18.90 CFS | 159 | 155 | 152 | 149 | 146 | 142 | 139 | 135 |
| 20.10 CFS | 131 | 128 | 126 | 124 | 122 | 121 | 120 | 119 |
| 21.30 CFS | 119 | 118 | 118 | 117 | 117 | 116 | 115 | 115 |
| 22.50 CFS | 114 | 113 | 113 | 112 | 111 | 110 | 110 | 109 |
| 23.70 CFS | 109 | 109 | 108 | 103 | 90 | 66 | 38 | 14 |
| 24.90 CFS | 1.99 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.0 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.25 | 2215.5 | 3.91 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.1 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.84 | 1612.8 | 4.63 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.1 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.99 | 1612.6 | 2.96 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.40 | 1081.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 6 | 71 | 295 | 685 | 1006 | 1065 | 806 |
| 12.75 CFS | 462 | 299 | 249 | 216 | 195 | 178 | 165 | 154 |
| 13.95 CFS | 144 | 134 | 126 | 119 | 114 | 110 | 107 | 104 |
| 15.15 CFS | 102 | 99 | 96 | 93 | 90 | 87 | 84 | 81 |
| 16.35 CFS | 78.26 | 75.89 | 74.28 | 73.27 | 72.29 | 71.20 | 70.08 | 68.92 |
| 17.55 CFS | 67.81 | 66.69 | 65.67 | 64.67 | 63.62 | 62.46 | 61.35 | 60.25 |
| 18.75 CFS | 59.05 | 57.94 | 56.79 | 55.57 | 54.49 | 53.37 | 52.24 | 50.95 |
| 19.95 CFS | 49.52 | 48.21 | 47.16 | 46.41 | 45.76 | 45.22 | 44.84 | 44.55 |
| 21.15 CFS | 44.36 | 44.27 | 44.14 | 44.05 | 43.90 | 43.74 | 43.47 | 43.19 |
| 22.35 CFS | 42.93 | 42.71 | 42.53 | 42.23 | 41.94 | 41.68 | 41.55 | 41.43 |
| 23.55 CFS | 41.30 | 41.15 | 41.02 | 40.57 | 38.45 | 31.89 | 21.36 | 10.46 |
| 24.75 CFS | 2.62 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.17 WATERSHED INCHES; 1562 CFS-HRS; 129.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 1137.5 | (NULL) |
| 13.97 | 1754.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .20 | .53 | 1.17 | 2.20 | 3.73 | 5.82 | 8.59 | 12.44 |
| 11.70 CFS | 23 | 94 | 324 | 722 | 1054 | 1126 | 886 | 577 |
| 12.90 CFS | 496 | 611 | 833 | 1124 | 1405 | 1611 | 1721 | 1754 |
| 14.10 CFS | 1732 | 1673 | 1591 | 1497 | 1398 | 1298 | 1201 | 1109 |
| 15.30 CFS | 1021 | 940 | 865 | 797 | 736 | 682 | 633 | 590 |
| 16.50 CFS | 551 | 518 | 488 | 462 | 438 | 416 | 397 | 379 |
| 17.70 CFS | 363 | 348 | 335 | 323 | 312 | 302 | 293 | 285 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.90 CFS | 277 | 270 | 263 | 257 | 251 | 246 | 240 | 234 |
| 20.10 CFS | 229 | 224 | 219 | 215 | 211 | 207 | 203 | 199 |
| 21.30 CFS | 196 | 192 | 189 | 186 | 183 | 180 | 177 | 175 |
| 22.50 CFS | 172 | 171 | 169 | 167 | 165 | 164 | 163 | 162 |
| 23.70 CFS | 160 | 159 | 158 | 155 | 148 | 136 | 125 | 116 |
| 24.90 CFS | 113 | 112 | 110 | 108 | 103 | 96 | 88 | 79 |
| 26.10 CFS | 69.67 | 61.03 | 53.00 | 45.70 | 39.17 | 33.39 | 28.35 | 23.97 |
| 27.30 CFS | 20.20 | 16.98 | 14.23 | 11.90 | 9.93 | 8.27 | 6.88 | 5.71 |
| 28.50 CFS | 4.74 | 3.92 | 3.24 | 2.68 | 2.21 | 1.82 | 1.50 | 1.24 |
| 29.70 CFS | 1.02 | .84 | .69 | .56 | .46 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.83 WATERSHED INCHES; 7105 CFS-HRS; 587.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.58 | 2495.4 | (NULL) |
| 13.99 | 3080.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .23 | .68 | 1.57 | 3.07 | 5.37 | 8.58 | 12.86 | 18.96 |
| 11.70 CFS | 34 | 114 | 374 | 900 | 1611 | 2298 | 2491 | 2157 |
| 12.90 CFS | 1641 | 1352 | 1513 | 1911 | 2375 | 2761 | 2994 | 3077 |
| 14.10 CFS | 3048 | 2942 | 2790 | 2614 | 2429 | 2245 | 2068 | 1902 |
| 15.30 CFS | 1747 | 1605 | 1474 | 1357 | 1252 | 1158 | 1076 | 1002 |
| 16.50 CFS | 938 | 880 | 831 | 788 | 749 | 714 | 683 | 654 |
| 17.70 CFS | 628 | 604 | 583 | 563 | 546 | 530 | 515 | 501 |
| 18.90 CFS | 488 | 476 | 465 | 454 | 444 | 434 | 425 | 415 |
| 20.10 CFS | 406 | 397 | 389 | 381 | 373 | 366 | 360 | 353 |
| 21.30 CFS | 347 | 341 | 336 | 330 | 326 | 321 | 316 | 312 |
| 22.50 CFS | 308 | 305 | 302 | 299 | 296 | 294 | 292 | 290 |
| 23.70 CFS | 288 | 286 | 284 | 280 | 272 | 257 | 236 | 213 |
| 24.90 CFS | 195 | 184 | 180 | 176 | 169 | 159 | 145 | 130 |
| 26.10 CFS | 115 | 100 | 86 | 74 | 63 | 53 | 44 | 37 |
| 27.30 CFS | 30.97 | 25.73 | 21.32 | 17.63 | 14.55 | 11.98 | 9.85 | 8.09 |
| 28.50 CFS | 6.63 | 5.43 | 4.45 | 3.63 | 2.97 | 2.42 | 1.98 | 1.61 |
| 29.70 CFS | 1.31 | 1.07 | .87 | .71 | .57 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.82 WATERSHED INCHES; 12737 CFS-HRS; 1052.6 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.58 | 2495.4 | (DIVERT) |
| 13.99 | 3080.1 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .23 | .68 | 1.57 | 3.07 | 5.37 | 8.58 | 12.86 | 18.96 |
| 11.70 CFS | 34 | 114 | 374 | 900 | 1611 | 2298 | 2491 | 2157 |
| 12.90 CFS | 1641 | 1352 | 1513 | 1911 | 2375 | 2761 | 2994 | 3077 |
| 14.10 CFS | 3048 | 2942 | 2790 | 2614 | 2429 | 2245 | 2068 | 1902 |
| 15.30 CFS | 1747 | 1605 | 1474 | 1357 | 1252 | 1158 | 1076 | 1002 |
| 16.50 CFS | 938 | 880 | 831 | 788 | 749 | 714 | 683 | 654 |
| 17.70 CFS | 628 | 604 | 583 | 563 | 546 | 530 | 515 | 501 |
| 18.90 CFS | 488 | 476 | 465 | 454 | 444 | 434 | 425 | 415 |
| 20.10 CFS | 406 | 397 | 389 | 381 | 373 | 366 | 360 | 353 |
| 21.30 CFS | 347 | 341 | 336 | 330 | 326 | 321 | 316 | 312 |
| 22.50 CFS | 308 | 305 | 302 | 299 | 296 | 294 | 292 | 290 |
| 23.70 CFS | 288 | 286 | 284 | 280 | 272 | 257 | 236 | 213 |
| 24.90 CFS | 195 | 184 | 180 | 176 | 169 | 159 | 145 | 130 |
| 26.10 CFS | 115 | 100 | 86 | 74 | 63 | 53 | 44 | 37 |
| 27.30 CFS | 30.97 | 25.73 | 21.32 | 17.63 | 14.55 | 11.98 | 9.85 | 8.09 |
| 28.50 CFS | 6.63 | 5.43 | 4.45 | 3.63 | 2.97 | 2.42 | 1.98 | 1.61 |
| 29.70 CFS | 1.31 | 1.07 | .87 | .71 | .57 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.82 WATERSHED INCHES; 12737 CFS-HRS; 1052.6 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
159 CFS-HRS; 1052.6 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.78 | 2366.0 | 3.60 |
| 14.21 | 3043.2 | 4.12 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.82 WATERSHED INCHES; 12737 CFS-HRS; 1052.6 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.15 | 2337.1 | (RUNOFF) |
| 21.38 | 45.5 | (RUNOFF) |
| 22.30 | 43.9 | (RUNOFF) |
| 22.89 | 42.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | | 1.47 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | .12 | .81 | 2.31 | 4.21 | 6.13 | 8.18 | 10.60 | 13.56 |
| 10.20 CFS | 17.04 | 21.18 | 26.13 | 31.94 | 39.10 | 48.05 | 58.88 | 73.09 |
| 11.40 CFS | 93 | 123 | 229 | 641 | 1641 | 2337 | 1620 | 629 |
| 12.60 CFS | 410 | 323 | 269 | 240 | 217 | 198 | 184 | 171 |
| 13.80 CFS | 158 | 148 | 138 | 130 | 124 | 120 | 117 | 114 |
| 15.00 CFS | 111 | 107 | 104 | 100 | 96 | 93 | 90 | 87 |
| 16.20 CFS | 82.70 | 80.16 | 79.19 | 78.39 | 76.91 | 75.34 | 74.29 | 73.10 |
| 17.40 CFS | 71.40 | 70.15 | 69.34 | 68.15 | 66.58 | 65.58 | 64.15 | 62.87 |
| 18.60 CFS | 61.85 | 60.24 | 59.15 | 57.89 | 56.28 | 55.38 | 54.38 | 52.67 |
| 19.80 CFS | 50.92 | 49.59 | 48.68 | 47.85 | 47.12 | 46.71 | 46.04 | 45.97 |
| 21.00 CFS | 45.88 | 45.40 | 45.46 | 45.46 | 45.02 | 44.95 | 44.81 | 44.03 |
| 22.20 CFS | 43.83 | 43.86 | 43.69 | 42.93 | 42.68 | 42.71 | 42.24 | 42.19 |
| 23.40 CFS | 42.14 | 41.84 | 41.67 | 41.59 | 40.75 | 34.87 | 17.56 | 2.53 |
| 24.60 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 2172 CFS-HRS; 179.5 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.56 | 1443.4 | 4.85 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 2174 CFS-HRS; 179.6 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.90 | 1051.8 | 3.86 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 2174 CFS-HRS; 179.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.81 | 3398.3 | (NULL) |
| 14.14 | 3348.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | | 12.31 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 9.75 CFS | .45 | 1.07 | 1.98 | 3.16 | 4.61 | 6.39 | 8.64 | 11.51 |
| 10.95 CFS | 15 | 20 | 26 | 34 | 44 | 58 | 80 | 154 |
| 12.15 CFS | 383 | 898 | 1753 | 2767 | 3352 | 3266 | 2798 | 2364 |
| 13.35 CFS | 2260 | 2432 | 2742 | 3050 | 3260 | 3344 | 3320 | 3215 |
| 14.55 CFS | 3059 | 2873 | 2676 | 2479 | 2289 | 2110 | 1944 | 1790 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.75 CFS | 1650 | 1522 | 1407 | 1305 | 1214 | 1133 | 1061 | 997 |
| 16.95 CFS | 941 | 893 | 850 | 811 | 776 | 745 | 716 | 689 |
| 18.15 CFS | 666 | 644 | 625 | 607 | 590 | 574 | 560 | 546 |
| 19.35 CFS | 533 | 521 | 509 | 498 | 487 | 477 | 466 | 455 |
| 20.55 CFS | 445 | 436 | 427 | 419 | 411 | 404 | 397 | 391 |
| 21.75 CFS | 385 | 379 | 374 | 368 | 364 | 359 | 355 | 351 |
| 22.95 CFS | 348 | 344 | 341 | 338 | 336 | 333 | 331 | 329 |
| 24.15 CFS | 327 | 324 | 316 | 303 | 281 | 254 | 228 | 208 |
| 25.35 CFS | 197 | 188 | 179 | 168 | 154 | 139 | 123 | 107 |
| 26.55 CFS | 92.95 | 79.67 | 67.79 | 57.34 | 48.25 | 40.42 | 33.74 | 28.07 |
| 27.75 CFS | 23.29 | 19.27 | 15.91 | 13.12 | 10.79 | 8.87 | 7.28 | 5.96 |
| 28.95 CFS | 4.88 | 3.99 | 3.26 | 2.66 | 2.17 | 1.77 | 1.44 | 1.17 |
| 30.15 CFS | .96 | .78 | .63 | .51 | .41 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.88 WATERSHED INCHES; 14911 CFS-HRS; 1232.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 2948.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 1 | 7 | 45 | 264 | 936 | 2010 | 2815 |
| 12.45 CFS | 2869 | 2084 | 1153 | 759 | 632 | 547 | 493 | 452 |
| 13.65 CFS | 418 | 389 | 363 | 340 | 319 | 301 | 287 | 277 |
| 14.85 CFS | 269 | 263 | 256 | 249 | 241 | 233 | 225 | 218 |
| 16.05 CFS | 211 | 204 | 196 | 190 | 186 | 184 | 181 | 178 |
| 17.25 CFS | 175 | 172 | 170 | 167 | 164 | 162 | 159 | 156 |
| 18.45 CFS | 153 | 150 | 147 | 145 | 142 | 139 | 136 | 133 |
| 19.65 CFS | 130 | 127 | 123 | 120 | 117 | 116 | 114 | 113 |
| 20.85 CFS | 112 | 111 | 110 | 110 | 110 | 110 | 109 | 109 |
| 22.05 CFS | 108 | 107 | 107 | 106 | 106 | 105 | 104 | 104 |
| 23.25 CFS | 103 | 103 | 103 | 102 | 102 | 101 | 95 | 80 |
| 24.45 CFS | 51.97 | 23.95 | 5.33 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.33 WATERSHED INCHES; 4091 CFS-HRS; 338.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.51 | 2316.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 2 | 5 | 14 | 29 | 68 | 200 | 557 |
| 12.15 CFS | 1200 | 1896 | 2284 | 2235 | 1778 | 1088 | 639 | 525 |
| 13.35 CFS | 453 | 404 | 370 | 342 | 317 | 295 | 276 | 259 |
| 14.55 CFS | 245 | 234 | 225 | 219 | 213 | 207 | 201 | 195 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.75 CFS | 188 | 182 | 176 | 170 | 164 | 158 | 154 | 150 |
| 16.95 CFS | 148 | 146 | 143 | 141 | 139 | 136 | 134 | 132 |
| 18.15 CFS | 130 | 127 | 125 | 123 | 120 | 118 | 116 | 113 |
| 19.35 CFS | 111 | 109 | 106 | 104 | 101 | 99 | 96 | 94 |
| 20.55 CFS | 92.39 | 91.09 | 90.02 | 89.23 | 88.66 | 88.22 | 87.97 | 87.72 |
| 21.75 CFS | 87.42 | 87.16 | 86.74 | 86.16 | 85.61 | 85.16 | 84.55 | 84.12 |
| 22.95 CFS | 83.62 | 83.05 | 82.52 | 82.19 | 81.96 | 81.59 | 81.36 | 80.80 |
| 24.15 CFS | 78.20 | 71.11 | 57.14 | 39.02 | 21.01 | 7.17 | .42 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.57 WATERSHED INCHES; 3534 CFS-HRS; 292.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 5168.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 2 | 5 | 14 | 36 | 113 | 464 | 1492 |
| 12.15 CFS | 3209 | 4711 | 5153 | 4318 | 2931 | 1847 | 1271 | 1072 |
| 13.35 CFS | 946 | 856 | 788 | 730 | 680 | 635 | 595 | 560 |
| 14.55 CFS | 532 | 511 | 495 | 482 | 469 | 456 | 443 | 428 |
| 15.75 CFS | 414 | 400 | 387 | 373 | 360 | 348 | 340 | 334 |
| 16.95 CFS | 329 | 324 | 319 | 313 | 308 | 303 | 298 | 293 |
| 18.15 CFS | 289 | 284 | 278 | 273 | 268 | 263 | 257 | 252 |
| 19.35 CFS | 247 | 242 | 237 | 231 | 224 | 219 | 214 | 210 |
| 20.55 CFS | 206 | 204 | 202 | 200 | 199 | 198 | 198 | 197 |
| 21.75 CFS | 197 | 196 | 195 | 194 | 192 | 191 | 190 | 189 |
| 22.95 CFS | 188 | 187 | 186 | 185 | 185 | 184 | 183 | 182 |
| 24.15 CFS | 174 | 151 | 109 | 63 | 26 | 7 | 0 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.43 WATERSHED INCHES; 7625 CFS-HRS; 630.2 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.55 | 7134.6 | (NULL) |
| 14.08 | 3980.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.75 CFS | .45 | 1.07 | 1.98 | 3.16 | 4.61 | 6.39 | 8.64 | 11.52 |
| 10.95 CFS | 16 | 22 | 32 | 48 | 80 | 171 | 544 | .1646 |
| 12.15 CFS | 3592 | 5609 | 6906 | 7085 | 6283 | 5114 | 4069 | 3436 |
| 13.35 CFS | 3206 | 3288 | 3530 | 3781 | 3940 | 3979 | 3914 | 3775 |
| 14.55 CFS | 3591 | 3384 | 3171 | 2961 | 2759 | 2567 | 2386 | 2218 |
| 15.75 CFS | 2063 | 1922 | 1794 | 1679 | 1574 | 1481 | 1401 | 1331 |
| 16.95 CFS | 1270 | 1216 | 1169 | 1125 | 1085 | 1048 | 1014 | 983 |
| 18.15 CFS | 954 | 928 | 903 | 880 | 858 | 837 | 817 | 798 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19.35 CFS | 780 | 763 | 746 | 729 | 712 | 695 | 679 | 665 |
| 20.55 CFS | 652 | 640 | 629 | 619 | 611 | 603 | 595 | 588 |
| 21.75 CFS | 581 | 575 | 568 | 562 | 556 | 550 | 545 | 540 |
| 22.95 CFS | 535 | 531 | 527 | 523 | 520 | 517 | 514 | 511 |
| 24.15 CFS | 501 | 474 | 426 | 366 | 308 | 261 | 228 | 208 |
| 25.35 CFS | 197 | 188 | 179 | 168 | 154 | 139 | 123 | 107 |
| 26.55 CFS | 92.95 | 79.67 | 67.79 | 57.34 | 48.25 | 40.42 | 33.74 | 28.07 |
| 27.75 CFS | 23.29 | 19.27 | 15.91 | 13.12 | 10.79 | 8.87 | 7.28 | 5.96 |
| 28.95 CFS | 4.88 | 3.99 | 3.26 | 2.66 | 2.17 | 1.77 | 1.44 | 1.17 |
| 30.15 CFS | .96 | .78 | .63 | .51 | .41 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.70 WATERSHED INCHES; 22536 CFS-HRS; 1862.4 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1200.0 FEET) CAN ADD .546 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS
WITH 1391.54 AC-FT ( .10 WATERSHED INCHES) FLOOD STORAGE
REMAINING IN RESERVOIR AT ELEV. 1205.09. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 8.85 | 45.6 | 1200.00 |
| 24.97 | 246.6 | 1208.50 |

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 203 CFS
RESVOR ( 82. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 20.57 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 8.85 CFS | 45.58 | 45.32 | 45.06 | 44.81 | 44.55 | 44.30 | 44.05 | 43.81 |
| 10.05 CFS | 43.56 | 43.33 | 43.11 | 42.89 | 42.69 | 42.51 | 42.34 | 42.21 |
| 11.25 CFS | 42.12 | 42.11 | 42.23 | 42.71 | 44.49 | 50.46 | 65.05 | 90.82 |
| 12.45 CFS | 126 | 160 | 167 | 173 | 178 | 182 | 185 | 188 |
| 13.65 CFS | 191 | 194 | 197 | 200 | 203 | 206 | 209 | 212 |
| 14.85 CFS | 215 | 217 | 218 | 220 | 222 | 223 | 224 | 225 |
| 16.05 CFS | 227 | 228 | 228 | 229 | 230 | 231 | 232 | 232 |
| 17.25 CFS | 233 | 234 | 234 | 235 | 235 | 236 | 236 | 237 |
| 18.45 CFS | 237 | 238 | 238 | 238 | 239 | 239 | 240 | 240 |
| 19.65 CFS | 240 | 241 | 241 | 241 | 241 | 242 | 242 | 242 |
| 20.85 CFS | 242 | 242 | 243 | 243 | 243 | 243 | 243 | 244 |
| 22.05 CFS | 244 | 244 | 244 | 244 | 245 | 245 | 245 | 245 |
| 23.25 CFS | 245 | 245 | 246 | 246 | 246 | 246 | 246 | 246 |
| 24.45 CFS | 246 | 247 | 247 | 247 | 247 | 247 | 247 | 247 |
| 25.65 CFS | 246 | 246 | 246 | 246 | 246 | 246 | 246 | 246 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 26.85 CFS | 246 | 246 | 246 | 246 | 245 | 245 | 245 | 245 |
| 28.05 CFS | 245 | 245 | 245 | 245 | 244 | 244 | 244 | 244 |
| 29.25 CFS | 244 | 244 | 244 | 243 | 243 | 243 | 243 | 243 |
| 30.45 CFS | 243 | 243 | 243 | 242 | 242 | 242 | 242 | 242 |
| 31.65 CFS | 242 | 242 | 241 | 241 | 241 | 241 | 241 | 241 |
| 32.85 CFS | 241 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| 34.05 CFS | 239 | 239 | 239 | 239 | 239 | 239 | 238 | 238 |
| 35.25 CFS | 238 | 238 | 238 | 238 | 237 | 237 | 237 | 237 |
| 36.45 CFS | 237 | 237 | 236 | 236 | 236 | 236 | 236 | 236 |
| 37.65 CFS | 236 | 235 | 235 | 235 | 235 | 235 | 235 | 234 |
| 38.85 CFS | 234 | 234 | 234 | 234 | 234 | 234 | 233 | 233 |
| 40.05 CFS | 233 | 233 | 233 | 233 | 232 | 232 | 232 | 232 |
| 41.25 CFS | 232 | 232 | 231 | 231 | 231 | 231 | 231 | 231 |
| 42.45 CFS | 231 | 230 | 230 | 230 | 230 | 230 | 230 | 229 |
| 43.65 CFS | 229 | 229 | 229 | 229 | 229 | 229 | 228 | 228 |
| 44.85 CFS | 228 | 228 | 228 | 228 | 227 | 227 | 227 | 227 |
| 46.05 CFS | 227 | 227 | 227 | 226 | 226 | 226 | 226 | 226 |
| 47.25 CFS | 226 | 226 | 225 | 225 | 225 | 225 | 225 | 225 |
| 48.45 CFS | 224 | 224 | 224 | 224 | 224 | 224 | 224 | 223 |
| 49.65 CFS | 223 | 223 | 223 | 223 | 223 | 222 | 222 | 222 |
| 50.85 CFS | 222 | 222 | 222 | 222 | 221 | 221 | 221 | 221 |
| 52.05 CFS | 221 | 221 | 221 | 220 | 220 | 220 | 220 | 220 |
| 53.25 CFS | 220 | 220 | 219 | 219 | 219 | 219 | 219 | 219 |
| 54.45 CFS | 219 | 218 | 218 | 218 | 218 | 218 | 218 | 217 |
| 55.65 CFS | 217 | 217 | 217 | 217 | 217 | 217 | 216 | 216 |
| 56.85 CFS | 216 | 216 | 216 | 216 | 216 | 215 | 215 | 215 |
| 58.05 CFS | 215 | 215 | 215 | 215 | 214 | 214 | 214 | 214 |
| 59.25 CFS | 214 | 213 | 213 | 213 | 213 | 213 | 213 | 212 |
| 60.45 CFS | 212 | 212 | 212 | 212 | 211 | 211 | 211 | 211 |
| 61.65 CFS | 211 | 211 | 210 | 210 | 210 | 210 | 210 | 210 |
| 62.85 CFS | 209 | 209 | 209 | 209 | 209 | 208 | 208 | 208 |
| 64.05 CFS | 208 | 208 | 208 | 207 | 207 | 207 | 207 | 207 |
| 65.25 CFS | 207 | 206 | 206 | 206 | 206 | 206 | 205 | 205 |
| 66.45 CFS | 205 | 205 | 205 | 205 | 204 | 204 | 204 | 204 |
| 67.65 CFS | 204 | 204 | 203 | 203 | 203 | 203 | 203 | 203 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.97 WATERSHED INCHES; 12917 CFS-HRS; 1067.4 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.84 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 2 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.35 | 4184.8 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.10 CFS | .13 | .52 | 1.40 | 2.79 | 4.63 | 6.64 | 8.71 | 10.84 |
| 6.30 CFS | 13.04 | 15.32 | 17.69 | 20.07 | 22.48 | 24.89 | 27.34 | 29.88 |
| 7.50 CFS | 32.51 | 35.26 | 37.94 | 40.58 | 43.19 | 46.02 | 49.47 | 53.81 |
| 8.70 CFS | 59 | 65 | 72 | 79 | 86 | 92 | 98 | 103 |
| 9.90 CFS | 108 | 115 | 125 | 138 | 153 | 170 | 190 | 213 |
| 11.10 CFS | 240 | 274 | 317 | 379 | 522 | 915 | 1887 | 3187 |
| 12.30 CFS | 4117 | 3956 | 2908 | 1555 | 847 | 650 | 548 | 483 |
| 13.50 CFS | 437 | 400 | 369 | 342 | 318 | 296 | 278 | 263 |
| 14.70 CFS | 251 | 243 | 236 | 229 | 222 | 215 | 207 | 199 |
| 15.90 CFS | 192 | 185 | 178 | 172 | 165 | 161 | 158 | 156 |
| 17.10 CFS | 153 | 150 | 147 | 145 | 142 | 139 | 137 | 135 |
| 18.30 CFS | 132 | 129 | 127 | 124 | 121 | 119 | 116 | 113 |
| 19.50 CFS | 111 | 108 | 106 | 103 | 100 | 97 | 96 | 94 |
| 20.70 CFS | 92.72 | 91.70 | 91.01 | 90.41 | 90.12 | 89.73 | 89.41 | 89.04 |
| 21.90 CFS | 88.64 | 87.99 | 87.32 | 86.72 | 86.09 | 85.65 | 84.99 | 84.34 |
| 23.10 CFS | 83.65 | 83.23 | 82.92 | 82.49 | 82.21 | 81.83 | 81.21 | 77.53 |
| 24.30 CFS | 66.71 | 47.19 | 25.43 | 7.73 | .56 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 5435 CFS-HRS; 449.1 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.88 | 2472.1 | 5.39 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 5435 CFS-HRS; 449.2 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.57 | 1695.1 | 6.47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 5435 CFS-HRS; 449.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 3544.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.50 CFS | .18 | .76 | 1.87 | 3.49 | 5.37 | 7.39 | 9.65 | 12.23 |
| 8.70 CFS | 15.26 | 18.71 | 22.53 | 26.64 | 30.95 | 35.15 | 39.09 | 42.91 |
| 9.90 CFS | 47 | 53 | 60 | 69 | 79 | 91 | 105 | 122 |
| 11.10 CFS | 142 | 168 | 202 | 251 | 377 | 784 | 1764 | 3027 |
| 12.30 CFS | 3544 | 3002 | 1767 | 849 | 621 | 512 | 445 | 400 |
| 13.50 CFS | 365 | 336 | 311 | 289 | 269 | 252 | 237 | 226 |
| 14.70 CFS | 217 | 211 | 205 | 200 | 193 | 186 | 180 | 173 |
| 15.90 CFS | 167 | 162 | 155 | 149 | 145 | 142 | 140 | 137 |
| 17.10 CFS | 135 | 133 | 130 | 128 | 125 | 123 | 121 | 119 |
| 18.30 CFS | 117 | 114 | 112 | 110 | 107 | 105 | 103 | 101 |
| 19.50 CFS | 98.28 | 96.12 | 93.47 | 90.67 | 88.28 | 86.41 | 84.96 | 83.75 |
| 20.70 CFS | 82.66 | 81.96 | 81.37 | 81.02 | 80.75 | 80.42 | 80.23 | 79.86 |
| 21.90 CFS | 79.45 | 78.84 | 78.25 | 77.61 | 77.35 | 76.85 | 76.17 | 75.55 |
| 23.10 CFS | 75.10 | 74.86 | 74.48 | 74.29 | 73.93 | 73.56 | 72.64 | 68.18 |
| 24.30 CFS | 54.27 | 33.26 | 13.11 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.77 WATERSHED INCHES; 4254 CFS-HRS; 351.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 3754.5 | (NULL) |
| 13.51 | 2051.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .28 | .59 | 1.05 | 1.69 | 2.51 | 3.49 | 4.64 | 5.95 |
| 7.35 CFS | 7.43 | 9.18 | 11.47 | 14.39 | 17.93 | 21.83 | 25.96 | 30.40 |
| 8.55 CFS | 35.24 | 40.60 | 46.43 | 52.71 | 59.43 | 66.56 | 73.86 | 81.23 |
| 9.75 CFS | 89 | 97 | 108 | 120 | 133 | 149 | 166 | 185 |
| 10.95 CFS | 208 | 235 | 269 | 311 | 371 | 508 | 930 | 1926 |
| 12.15 CFS | 3209 | 3754 | 3262 | 2132 | 1409 | 1464 | 1673 | 1882 |
| 13.35 CFS | 2013 | 2051 | 2020 | 1942 | 1834 | 1710 | 1581 | 1454 |
| 14.55 CFS | 1332 | 1220 | 1117 | 1023 | 937 | 859 | 788 | 725 |
| 15.75 CFS | 670 | 621 | 578 | 539 | 504 | 474 | 449 | 427 |
| 16.95 CFS | 408 | 390 | 373 | 359 | 345 | 333 | 322 | 313 |
| 18.15 CFS | 303 | 295 | 287 | 280 | 272 | 266 | 260 | 253 |
| 19.35 CFS | 248 | 242 | 237 | 231 | 225 | 220 | 215 | 211 |
| 20.55 CFS | 207 | 203 | 199 | 196 | 193 | 190 | 188 | 185 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21.75 CFS | 183 | 181 | 178 | 176 | 174 | 173 | 171 | 170 |
| 22.95 CFS | 168 | 167 | 166 | 165 | 164 | 163 | 161 | 160 |
| 24.15 CFS | 155 | 140 | 119 | 98 | 84 | 83 | 81 | 77 |
| 25.35 CFS | 71.00 | 64.28 | 57.19 | 50.18 | 43.55 | 37.46 | 31.98 | 27.13 |
| 26.55 CFS | 22.89 | 19.22 | 16.07 | 13.39 | 11.12 | 9.21 | 7.61 | 6.27 |
| 27.75 CFS | 5.15 | 4.23 | 3.46 | 2.83 | 2.31 | 1.88 | 1.53 | 1.25 |
| 28.95 CFS | 1.01 | .82 | .66 | .54 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9689 CFS-HRS; 800.7 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 3754.5 | (DIVERT) |
| 13.51 | 2051.4 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .28 | .59 | 1.05 | 1.69 | 2.51 | 3.49 | 4.64 | 5.95 |
| 7.35 CFS | 7.43 | 9.18 | 11.47 | 14.39 | 17.93 | 21.83 | 25.96 | 30.40 |
| 8.55 CFS | 35.24 | 40.60 | 46.43 | 52.71 | 59.43 | 66.56 | 73.86 | 81.23 |
| 9.75 CFS | 89 | 97 | 108 | 120 | 133 | 149 | 166 | 185 |
| 10.95 CFS | 208 | 235 | 269 | 311 | 371 | 508 | 930 | 1926 |
| 12.15 CFS | 3209 | 3754 | 3262 | 2132 | 1409 | 1464 | 1673 | 1882 |
| 13.35 CFS | 2013 | 2051 | 2020 | 1942 | 1834 | 1710 | 1581 | 1454 |
| 14.55 CFS | 1332 | 1220 | 1117 | 1023 | 937 | 859 | 788 | 725 |
| 15.75 CFS | 670 | 621 | 578 | 539 | 504 | 474 | 449 | 427 |
| 16.95 CFS | 408 | 390 | 373 | 359 | 345 | 333 | 322 | 313 |
| 18.15 CFS | 303 | 295 | 287 | 280 | 272 | 266 | 260 | 253 |
| 19.35 CFS | 248 | 242 | 237 | 231 | 225 | 220 | 215 | 211 |
| 20.55 CFS | 207 | 203 | 199 | 196 | 193 | 190 | 188 | 185 |
| 21.75 CFS | 183 | 181 | 178 | 176 | 174 | 173 | 171 | 170 |
| 22.95 CFS | 168 | 167 | 166 | 165 | 164 | 163 | 161 | 160 |
| 24.15 CFS | 155 | 140 | 119 | 98 | 84 | 83 | 81 | 77 |
| 25.35 CFS | 71.00 | 64.28 | 57.19 | 50.18 | 43.55 | 37.46 | 31.98 | 27.13 |
| 26.55 CFS | 22.89 | 19.22 | 16.07 | 13.39 | 11.12 | 9.21 | 7.61 | 6.27 |
| 27.75 CFS | 5.15 | 4.23 | 3.46 | 2.83 | 2.31 | 1.88 | 1.53 | 1.25 |
| 28.95 CFS | 1.01 | .82 | .66 | .54 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9689 CFS-HRS; 800.7 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
181 CFS-HRS; 800.7 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3745.9 | 7.54 |
| 13.66 | 2050.8 | 5.46 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9688 CFS-HRS; 800.7 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3745.9 | 4.77 |
| 13.66 | 2050.8 | 3.42 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9688 CFS-HRS; 800.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.37 | 6595.8 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.10 CFS | .18 | .77 | 2.08 | 4.21 | 7.06 | 10.26 | 13.60 | 17.00 |
| 6.30 CFS | 20.52 | 24.14 | 27.88 | 31.66 | 35.49 | 39.36 | 43.29 | 47.37 |
| 7.50 CFS | 51.57 | 55.98 | 60.28 | 64.50 | 68.70 | 73.17 | 78.64 | 85.39 |
| 8.70 CFS | 94 | 103 | 114 | 125 | 136 | 147 | 156 | 164 |
| 9.90 CFS | 172 | 184 | 199 | 219 | 242 | 269 | 300 | 337 |
| 11.10 CFS | 381 | 434 | 502 | 599 | 801 | 1425 | 2812 | 4862 |
| 12.30 CFS | 6417 | 6374 | 4913 | 2732 | 1425 | 1070 | 899 | 785 |
| 13.50 CFS | 710 | 648 | 597 | 553 | 513 | 478 | 448 | 424 |
| 14.70 CFS | 405 | 391 | 379 | 368 | 357 | 345 | 332 | 320 |
| 15.90 CFS | 309 | 298 | 287 | 276 | 266 | 259 | 254 | 250 |
| 17.10 CFS | 246 | 241 | 237 | 232 | 228 | 224 | 220 | 216 |
| 18.30 CFS | 212 | 207 | 203 | 199 | 195 | 191 | 186 | 182 |
| 19.50 CFS | 178 | 174 | 170 | 165 | 160 | 156 | 153 | 151 |
| 20.70 CFS | 149 | 147 | 146 | 145 | 144 | 144 | 143 | 143 |
| 21.90 CFS | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 135 |
| 23.10 CFS | 134 | 133 | 133 | 132 | 132 | 131 | 130 | 125 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 24.30 CFS | 109 | 79 | 45 | 16 | 2 | 0 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.07 | 3654.0 | 4.47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.65 | 2549.9 | 5.46 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.65 | 2549.9 | 3.82 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 2706.6 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.40 CFS | .37 | 1.15 | 2.56 | 4.55 | 7.03 | 9.79 | 12.80 | 15.90 |
| 9.60 CFS | 18.97 | 22.03 | 25.35 | 29.41 | 34.33 | 40.38 | 47.54 | 55.92 |
| 10.80 CFS | 66 | 78 | 93 | 111 | 135 | 170 | 252 | 530 |
| 12.00 CFS | 1174 | 2106 | 2683 | 2487 | 1692 | 848 | 537 | 440 |
| 13.20 CFS | 377 | 337 | 306 | 282 | 261 | 242 | 225 | 211 |
| 14.40 CFS | 198 | 188 | 181 | 175 | 171 | 166 | 161 | 155 |
| 15.60 CFS | 150 | 145 | 140 | 135 | 130 | 125 | 121 | 118 |
| 16.80 CFS | 116 | 114 | 112 | 110 | 108 | 106 | 104 | 103 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.00 CFS | 101 | 99 | 97 | 95 | 93 | 91 | 90 | 88 |
| 19.20 CFS | 85.71 | 83.93 | 82.12 | 80.26 | 78.21 | 75.94 | 73.86 | 72.20 |
| 20.40 CFS | 70.92 | 69.85 | 68.93 | 68.30 | 67.81 | 67.43 | 67.23 | 66.97 |
| 21.60 CFS | 66.76 | 66.52 | 66.22 | 65.72 | 65.24 | 64.77 | 64.41 | 64.08 |
| 22.80 CFS | 63.57 | 63.07 | 62.63 | 62.37 | 62.15 | 61.89 | 61.64 | 61.38 |
| 24.00 CFS | 60.82 | 57.46 | 47.91 | 31.95 | 15.41 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.54 WATERSHED INCHES; 3372 CFS-HRS; 278.7 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 3037.8 | (NULL) |
| 13.61 | 2834.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | 6.00 SQ.MI. | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .37 | .78 | 1.42 | 2.31 | 3.46 | 4.88 | 6.55 | 8.46 |
| 7.35 CFS | 10.61 | 12.97 | 15.53 | 18.27 | 21.18 | 24.25 | 27.54 | 31.20 |
| 8.55 CFS | 35.47 | 40.49 | 46.18 | 52.50 | 59.30 | 66.66 | 74.50 | 82.81 |
| 9.75 CFS | 92 | 101 | 112 | 124 | 138 | 153 | 170 | 188 |
| 10.95 CFS | 209 | 234 | 264 | 302 | 352 | 452 | 750 | 1419 |
| 12.15 CFS | 2380 | 2997 | 2871 | 2217 | 1634 | 1714 | 2074 | 2434 |
| 13.35 CFS | 2691 | 2815 | 2832 | 2772 | 2660 | 2516 | 2355 | 2187 |
| 14.55 CFS | 2020 | 1860 | 1709 | 1569 | 1438 | 1318 | 1208 | 1109 |
| 15.75 CFS | 1021 | 942 | 871 | 808 | 752 | 702 | 659 | 621 |
| 16.95 CFS | 587 | 557 | 529 | 504 | 481 | 461 | 443 | 427 |
| 18.15 CFS | 412 | 398 | 386 | 374 | 364 | 354 | 345 | 336 |
| 19.35 CFS | 327 | 320 | 312 | 305 | 297 | 290 | 283 | 277 |
| 20.55 CFS | 271 | 266 | 261 | 256 | 251 | 247 | 242 | 238 |
| 21.75 CFS | 235 | 231 | 228 | 225 | 222 | 220 | 217 | 215 |
| 22.95 CFS | 213 | 211 | 209 | 208 | 206 | 205 | 203 | 202 |
| 24.15 CFS | 197 | 187 | 170 | 152 | 136 | 134 | 131 | 125 |
| 25.35 CFS | 118 | 108 | 97 | 87 | 77 | 67 | 58 | 50 |
| 26.55 CFS | 43.26 | 37.00 | 31.52 | 26.76 | 22.65 | 19.11 | 16.09 | 13.52 |
| 27.75 CFS | 11.33 | 9.48 | 7.92 | 6.61 | 5.50 | 4.57 | 3.80 | 3.15 |
| 28.95 CFS | 2.61 | 2.16 | 1.79 | 1.48 | 1.22 | 1.00 | .83 | .68 |
| 30.15 CFS | .56 | .46 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.12 WATERSHED INCHES; 12073 CFS-HRS; 997.7 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 6655.4 | (NULL) |
| 13.63 | 4883.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .47 | 1.06 | 2.00 | 3.35 | 5.14 | 7.37 | 10.02 | 13.09 |
| 7.35 CFS | 16.54 | 20.38 | 24.68 | 29.70 | 35.53 | 42.12 | 49.31 | 57.09 |
| 8.55 CFS | 66 | 76 | 87 | 99 | 112 | 126 | 141 | 157 |
| 9.75 CFS | 173 | 190 | 210 | 232 | 258 | 286 | 318 | 353 |
| 10.95 CFS | 394 | 442 | 499 | 570 | 663 | 822 | 1257 | 2342 |
| 12.15 CFS | 4290 | 6186 | 6616 | 5486 | 3784 | 3135 | 3537 | 4103 |
| 13.35 CFS | 4569 | 4825 | 4882 | 4792 | 4603 | 4352 | 4067 | 3770 |
| 14.55 CFS | 3476 | 3195 | 2931 | 2687 | 2462 | 2256 | 2068 | 1898 |
| 15.75 CFS | 1747 | 1612 | 1493 | 1387 | 1291 | 1207 | 1134 | 1071 |
| 16.95 CFS | 1015 | 965 | 919 | 877 | 840 | 806 | 776 | 749 |
| 18.15 CFS | 725 | 702 | 681 | 661 | 643 | 626 | 611 | 595 |
| 19.35 CFS | 581 | 568 | 554 | 541 | 528 | 515 | 503 | 492 |
| 20.55 CFS | 482 | 473 | 464 | 455 | 447 | 440 | 433 | 426 |
| 21.75 CFS | 420 | 414 | 409 | 403 | 398 | 394 | 390 | 386 |
| 22.95 CFS | 383 | 379 | 376 | 374 | 371 | 368 | 366 | 363 |
| 24.15 CFS | 357 | 342 | 310 | 272 | 234 | 219 | 214 | 206 |
| 25.35 CFS | 194 | 179 | 162 | 144 | 127 | 111 | 96 | 82 |
| 26.55 CFS | 70.47 | 59.96 | 50.80 | 42.89 | 36.08 | 30.27 | 25.33 | 21.15 |
| 27.75 CFS | 17.62 | 14.65 | 12.16 | 10.08 | 8.34 | 6.89 | 5.69 | 4.69 |
| 28.95 CFS | 3.86 | 3.18 | 2.61 | 2.14 | 1.76 | 1.44 | 1.18 | .96 |
| 30.15 CFS | .79 | .64 | .52 | .43 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.11 WATERSHED INCHES; 21762 CFS-HRS; 1798.4 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 6655.4 | (DIVERT) |
| 13.63 | 4883.1 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .47 | 1.06 | 2.00 | 3.35 | 5.14 | 7.37 | 10.02 | 13.09 |
| 7.35 CFS | 16.54 | 20.38 | 24.68 | 29.70 | 35.53 | 42.12 | 49.31 | 57.09 |
| 8.55 CFS | 66 | 76 | 87 | 99 | 112 | 126 | 141 | 157 |
| 9.75 CFS | 173 | 190 | 210 | 232 | 258 | 286 | 318 | 353 |
| 10.95 CFS | 394 | 442 | 499 | 570 | 663 | 822 | 1257 | 2342 |
| 12.15 CFS | 4290 | 6186 | 6616 | 5486 | 3784 | 3135 | 3537 | 4103 |
| 13.35 CFS | 4569 | 4825 | 4882 | 4792 | 4603 | 4352 | 4067 | 3770 |
| 14.55 CFS | 3476 | 3195 | 2931 | 2687 | 2462 | 2256 | 2068 | 1898 |
| 15.75 CFS | 1747 | 1612 | 1493 | 1387 | 1291 | 1207 | 1134 | 1071 |
| 16.95 CFS | 1015 | 965 | 919 | 877 | 840 | 806 | 776 | 749 |
| 18.15 CFS | 725 | 702 | 681 | 661 | 643 | 626 | 611 | 595 |
| 19.35 CFS | 581 | 568 | 554 | 541 | 528 | 515 | 503 | 492 |
| 20.55 CFS | 482 | 473 | 464 | 455 | 447 | 440 | 433 | 426 |
| 21.75 CFS | 420 | 414 | 409 | 403 | 398 | 394 | 390 | 386 |
| 22.95 CFS | 383 | 379 | 376 | 374 | 371 | 368 | 366 | 363 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 24.15 CFS | 357 | 342 | 310 | 272 | 234 | 219 | 214 | 206 |
| 25.35 CFS | 194 | 179 | 162 | 144 | 127 | 111 | 96 | 82 |
| 26.55 CFS | 70.47 | 59.96 | 50.80 | 42.89 | 36.08 | 30.27 | 25.33 | 21.15 |
| 27.75 CFS | 17.62 | 14.65 | 12.16 | 10.08 | 8.34 | 6.89 | 5.69 | 4.69 |
| 28.95 CFS | 3.86 | 3.18 | 2.61 | 2.14 | 1.76 | 1.44 | 1.18 | .96 |
| 30.15 CFS | .79 | .64 | .52 | .43 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.11 WATERSHED INCHES; 21762 CFS-HRS; 1798.4 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
187 CFS-HRS; 1798.4 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.59 | 6518.7 | 6.36 |
| 13.81 | 4868.2 | 5.40 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.11 WATERSHED INCHES; 21764 CFS-HRS; 1798.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.13 | 3533.0 | (RUNOFF) |
| 21.34 | 54.5 | (RUNOFF) |
| 22.28 | 52.4 | (RUNOFF) |
| 22.88 | 51.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | 1.47 SQ.MI. | |
|---|---|---|---|---|---|---|---|---|
| 4.95 CFS | .35 | 1.16 | 2.30 | 3.54 | 4.82 | 6.10 | 7.41 | 8.75 |
| 6.15 CFS | 10.17 | 11.60 | 13.10 | 14.60 | 16.08 | 17.56 | 19.08 | 20.76 |
| 7.35 CFS | 22.35 | 24.15 | 25.90 | 27.28 | 28.75 | 30.65 | 32.91 | 35.85 |
| 8.55 CFS | 39.68 | 43.85 | 48.29 | 52.55 | 57.02 | 61.30 | 63.97 | 66.18 |
| 9.75 CFS | 69 | 75 | 82 | 90 | 100 | 111 | 124 | 139 |
| 10.95 CFS | 158 | 180 | 207 | 247 | 303 | 504 | 1217 | 2709 |
| 12.15 CFS | 3523 | 2295 | 843 | 537 | 419 | 347 | 308 | 278 |
| 13.35 CFS | 252 | 233 | 216 | 200 | 186 | 174 | 163 | 155 |
| 14.55 CFS | 150 | 146 | 142 | 138 | 133 | 128 | 124 | 119 |
| 15.75 CFS | 115 | 111 | 107 | 102 | 98 | 97 | 96 | 94 |
| 16.95 CFS | 92.08 | 90.71 | 89.18 | 87.03 | 85.44 | 84.37 | 82.85 | 80.87 |
| 18.15 CFS | 79.61 | 77.82 | 76.20 | 74.91 | 72.91 | 71.54 | 69.96 | 67.97 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19.35 CFS | 66.86 | 65.61 | 63.51 | 61.36 | 59.72 | 58.59 | 57.57 | 56.67 |
| 20.55 CFS | 56.14 | 55.30 | 55.20 | 55.06 | 54.45 | 54.50 | 54.48 | 53.93 |
| 21.75 CFS | 53.82 | 53.63 | 52.67 | 52.41 | 52.42 | 52.19 | 51.26 | 50.94 |
| 22.95 CFS | 50.96 | 50.37 | 50.29 | 50.22 | 49.84 | 49.62 | 49.49 | 48.49 |
| 24.15 CFS | 41.51 | 20.88 | 2.99 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.52 WATERSHED INCHES; 3336 CFS-HRS; 275.7 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 2337.7 | 5.65 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.52 WATERSHED INCHES; 3339 CFS-HRS; 275.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.69 | 1716.1 | 4.72 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.52 WATERSHED INCHES; 3339 CFS-HRS; 275.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.60 | 8202.1 | (NULL) |
| 13.71 | 5388.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.40 CFS | .23 | .60 | 1.16 | 1.90 | 2.82 | 3.95 | 5.32 | 7.04 |
| 6.60 CFS | 9.18 | 11.77 | 14.85 | 18.41 | 22.41 | 26.86 | 31.74 | 37.03 |
| 7.80 CFS | 43 | 49 | 57 | 65 | 73 | 83 | 93 | 105 |
| 9.00 CFS | 119 | 134 | 150 | 168 | 187 | 206 | 225 | 246 |
| 10.20 CFS | 269 | 295 | 325 | 359 | 398 | 441 | 491 | 549 |
| 11.40 CFS | 619 | 704 | 814 | 992 | 1442 | 2591 | 4797 | 7222 |
| 12.60 CFS | 8201 | 7330 | 5580 | 4576 | 4589 | 4910 | 5219 | 5374 |
| 13.80 CFS | 5360 | 5216 | 4983 | 4696 | 4380 | 4056 | 3739 | 3437 |
| 15.00 CFS | 3157 | 2898 | 2661 | 2444 | 2247 | 2068 | 1908 | 1765 |
| 16.20 CFS | 1639 | 1526 | 1424 | 1333 | 1254 | 1186 | 1127 | 1073 |
| 17.40 CFS | 1024 | 980 | 940 | 904 | 871 | 842 | 815 | 790 |
| 18.60 CFS | 767 | 746 | 726 | 707 | 690 | 673 | 657 | 642 |
| 19.80 CFS | 627 | 612 | 597 | 583 | 569 | 556 | 545 | 534 |
| 21.00 CFS | 524 | 514 | 505 | 497 | 490 | 483 | 476 | 470 |
| 22.20 CFS | 464 | 458 | 453 | 448 | 444 | 440 | 436 | 432 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23.40 CFS | 428 | 425 | 422 | 420 | 417 | 414 | 408 | 393 |
| 24.60 CFS | 359 | 314 | 269 | 243 | 230 | 218 | 204 | 187 |
| 25.80 CFS | 168 | 149 | 131 | 114 | 99 | 85 | 73 | 62 |
| 27.00 CFS | 52.45 | 44.29 | 37.27 | 31.28 | 26.18 | 21.86 | 18.22 | 15.15 |
| 28.20 CFS | 12.58 | 10.43 | 8.63 | 7.14 | 5.89 | 4.86 | 4.00 | 3.29 |
| 29.40 CFS | 2.70 | 2.22 | 1.82 | 1.49 | 1.22 | 1.00 | .82 | .67 |
| 30.60 CFS | .54 | .44 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.16 WATERSHED INCHES; 25103 CFS-HRS; 2074.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.33 | 6605.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.80 CFS | .18 | .92 | 2.59 | 5.38 | 9.19 | 13.72 | 19.00 | 24.98 |
| 9.00 CFS | 31.77 | 39.17 | 47.06 | 54.97 | 62.61 | 70.09 | 78.34 | 88.71 |
| 10.20 CFS | 101 | 117 | 136 | 157 | 183 | 214 | 252 | 298 |
| 11.40 CFS | 360 | 447 | 681 | 1369 | 3042 | 5278 | 6575 | 5959 |
| 12.60 CFS | 4010 | 2089 | 1286 | 1049 | 897 | 801 | 730 | 670 |
| 13.80 CFS | 621 | 576 | 537 | 501 | 473 | 449 | 431 | 418 |
| 15.00 CFS | 407 | 396 | 383 | 370 | 357 | 344 | 332 | 321 |
| 16.20 CFS | 309 | 297 | 287 | 280 | 276 | 272 | 267 | 262 |
| 17.40 CFS | 258 | 253 | 248 | 244 | 240 | 236 | 231 | 227 |
| 18.60 CFS | 222 | 217 | 213 | 208 | 204 | 199 | 195 | 191 |
| 19.80 CFS | 186 | 180 | 175 | 171 | 168 | 166 | 164 | 162 |
| 21.00 CFS | 161 | 160 | 160 | 159 | 159 | 158 | 157 | 156 |
| 22.20 CFS | 155 | 154 | 153 | 152 | 151 | 150 | 149 | 148 |
| 23.40 CFS | 147 | 147 | 146 | 146 | 144 | 136 | 112 | 74 |
| 24.60 CFS | 35.28 | 7.94 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.67 WATERSHED INCHES; 8243 CFS-HRS; 681.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 4569.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.05 CFS | .40 | 1.20 | 2.57 | 4.63 | 7.18 | 10.00 | 12.89 | 15.82 |
| 8.25 CFS | 18.90 | 22.23 | 26.02 | 30.48 | 35.60 | 41.41 | 47.76 | 54.47 |
| 9.45 CFS | 61 | 68 | 74 | 81 | 88 | 97 | 109 | 123 |
| 10.65 CFS | 139 | 158 | 181 | 208 | 241 | 284 | 343 | 464 |
| 11.85 CFS | 800 | 1583 | 2830 | 4050 | 4565 | 4219 | 3139 | 1790 |
| 13.05 CFS | 990 | 803 | 686 | 608 | 553 | 508 | 469 | 435 |
| 14.25 CFS | 405 | 379 | 357 | 340 | 326 | 316 | 307 | 298 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.45 CFS | 288 | 278 | 268 | 259 | 250 | 241 | 232 | 224 |
| 16.65 CFS | 217 | 212 | 208 | 204 | 201 | 197 | 194 | 190 |
| 17.85 CFS | 187 | 183 | 180 | 177 | 173 | 170 | 167 | 163 |
| 19.05 CFS | 160 | 156 | 153 | 149 | 146 | 143 | 139 | 135 |
| 20.25 CFS | 132 | 129 | 126 | 124 | 123 | 122 | 121 | 120 |
| 21.45 CFS | 120 | 119 | 119 | 118 | 118 | 117 | 116 | 115 |
| 22.65 CFS | 114 | 114 | 113 | 112 | 111 | 111 | 110 | 110 |
| 23.85 CFS | 110 | 109 | 105 | 96 | 77 | 52 | 28 | 10 |
| 25.05 CFS | .64 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 6521 CFS-HRS; 538.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 10903.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.05 CFS | .40 | 1.20 | 2.57 | 4.63 | 7.20 | 10.18 | 13.81 | 18.41 |
| 8.25 CFS | 24 | 31 | 40 | 49 | 61 | 73 | 87 | 102 |
| 9.45 CFS | 116 | 130 | 144 | 159 | 177 | 199 | 226 | 258 |
| 10.65 CFS | 296 | 341 | 395 | 460 | 539 | 644 | 790 | 1145 |
| 11.85 CFS | 2169 | 4626 | 8109 | 10625 | 10524 | 8229 | 5227 | 3076 |
| 13.05 CFS | 2039 | 1700 | 1487 | 1337 | 1224 | 1128 | 1045 | 972 |
| 14.25 CFS | 906 | 851 | 806 | 771 | 744 | 723 | 702 | 681 |
| 15.45 CFS | 658 | 635 | 612 | 591 | 570 | 549 | 529 | 511 |
| 16.65 CFS | 497 | 488 | 480 | 472 | 463 | 455 | 447 | 439 |
| 17.85 CFS | 431 | 423 | 416 | 408 | 400 | 392 | 384 | 376 |
| 19.05 CFS | 368 | 360 | 352 | 344 | 337 | 328 | 319 | 310 |
| 20.25 CFS | 303 | 297 | 292 | 288 | 285 | 283 | 281 | 280 |
| 21.45 CFS | 279 | 278 | 277 | 276 | 274 | 272 | 270 | 268 |
| 22.65 CFS | 267 | 265 | 263 | 261 | 259 | 258 | 257 | 256 |
| 23.85 CFS | 255 | 253 | 241 | 208 | 151 | 88 | 36 | 10 |
| 25.05 CFS | .64 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.77 WATERSHED INCHES; 14763 CFS-HRS; 1220.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 17781.2 | (NULL) |
| 13.62 | 6601.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.40 CFS | .23 | .60 | 1.16 | 1.90 | 2.82 | 3.95 | 5.32 | 7.04 |
| 6.60 CFS | 9.18 | 11.78 | 14.94 | 18.81 | 23.61 | 29.43 | 36.37 | 44.23 |
| 7.80 CFS | 53 | 63 | 75 | 89 | 105 | 123 | 143 | 166 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | 192 | 221 | 252 | 284 | 317 | 350 | 384 | 423 |
| 10.20 CFS | 467 | 521 | 583 | 656 | 739 | 836 | 950 | 1089 |
| 11.40 CFS | 1263 | 1494 | 1959 | 3161 | 6068 | 10700 | 15422 | 17746 |
| 12.60 CFS | 16430 | 12557 | 8655 | 6616 | 6289 | 6397 | 6556 | 6597 |
| 13.80 CFS | 6488 | 6261 | 5955 | 5602 | 5231 | 4862 | 4510 | 4182 |
| 15.00 CFS | 3879 | 3600 | 3342 | 3103 | 2882 | 2680 | 2499 | 2336 |
| 16.20 CFS | 2188 | 2054 | 1935 | 1830 | 1742 | 1666 | 1598 | 1536 |
| 17.40 CFS | 1479 | 1426 | 1378 | 1335 | 1294 | 1258 | 1223 | 1190 |
| 18.60 CFS | 1159 | 1130 | 1102 | 1076 | 1050 | 1025 | 1001 | 978 |
| 19.80 CFS | 955 | 931 | 908 | 886 | 866 | 849 | 833 | 819 |
| 21.00 CFS | 806 | 795 | 785 | 776 | 768 | 759 | 752 | 744 |
| 22.20 CFS | 736 | 728 | 721 | 715 | 709 | 702 | 696 | 691 |
| 23.40 CFS | 687 | 683 | 678 | 675 | 669 | 655 | 616 | 543 |
| 24.60 CFS | 447 | 350 | 278 | 243 | 230 | 218 | 204 | 187 |
| 25.80 CFS | 168 | 149 | 131 | 114 | 99 | 85 | 73 | 62 |
| 27.00 CFS | 52.45 | 44.29 | 37.27 | 31.28 | 26.18 | 21.86 | 18.22 | 15.15 |
| 28.20 CFS | 12.58 | 10.43 | 8.63 | 7.14 | 5.89 | 4.86 | 4.00 | 3.29 |
| 29.40 CFS | 2.70 | 2.22 | 1.82 | 1.49 | 1.22 | 1.00 | .82 | .67 |
| 30.60 CFS | .54 | .44 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.00 WATERSHED INCHES; 39860 CFS-HRS; 3294.1 ACRE-FEET.

--- XSECTION 76, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1200.0 FEET) CAN ADD .546 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 2331.29 AC-FT ( .18 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1209.05. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 4.50 | 45.6 | 1200.00 |
| 20.36 | 871.4 | 1212.21 |

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 254 CFS
RESVOR ( 29. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4.50 CFS | 45.58 | 45.32 | 45.06 | 44.81 | 44.55 | 44.30 | 44.05 | 43.80 |
| 5.70 CFS | 43.56 | 43.32 | 43.09 | 42.86 | 42.64 | 42.44 | 42.24 | 42.06 |
| 6.90 CFS | 41.90 | 41.76 | 41.64 | 41.55 | 41.50 | 41.50 | 41.54 | 41.63 |
| 8.10 CFS | 41.79 | 42.02 | 42.33 | 42.73 | 43.25 | 43.88 | 44.64 | 45.56 |
| 9.30 CFS | 46.65 | 47.90 | 49.34 | 50.95 | 52.75 | 54.74 | 56.96 | 59.44 |
| 10.50 CFS | 62.24 | 65.40 | 68.99 | 73.07 | 77.73 | 83.08 | 89.29 | 96.61 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 106 | 120 | 145 | 165 | 179 | 195 | 209 | 220 |
| 12.90 CFS | 227 | 232 | 236 | 240 | 244 | 247 | 251 | 254 |
| 14.10 CFS | 258 | 261 | 264 | 268 | 273 | 278 | 283 | 288 |
| 15.30 CFS | 292 | 296 | 299 | 302 | 305 | 308 | 310 | 313 |
| 16.50 CFS | 315 | 317 | 319 | 320 | 322 | 324 | 325 | 327 |
| 17.70 CFS | 328 | 329 | 375 | 457 | 528 | 590 | 643 | 689 |
| 18.90 CFS | 728 | 761 | 788 | 811 | 829 | 844 | 855 | 863 |
| 20.10 CFS | 868 | 871 | 871 | 870 | 867 | 864 | 859 | 854 |
| 21.30 CFS | 848 | 842 | 835 | 829 | 822 | 815 | 809 | 802 |
| 22.50 CFS | 795 | 788 | 781 | 774 | 767 | 760 | 754 | 748 |
| 23.70 CFS | 741 | 736 | 730 | 724 | 716 | 703 | 684 | 658 |
| 24.90 CFS | 627 | 594 | 561 | 530 | 501 | 473 | 446 | 420 |
| 26.10 CFS | 395 | 370 | 346 | 330 | 330 | 329 | 329 | 329 |
| 27.30 CFS | 328 | 328 | 327 | 327 | 327 | 326 | 326 | 325 |
| 28.50 CFS | 325 | 325 | 324 | 324 | 323 | 323 | 323 | 322 |
| 29.70 CFS | 322 | 321 | 321 | 321 | 320 | 320 | 319 | 319 |
| 30.90 CFS | 318 | 318 | 318 | 317 | 317 | 316 | 316 | 316 |
| 32.10 CFS | 315 | 315 | 314 | 314 | 314 | 313 | 313 | 312 |
| 33.30 CFS | 312 | 312 | 311 | 311 | 310 | 310 | 310 | 309 |
| 34.50 CFS | 309 | 308 | 308 | 308 | 307 | 307 | 306 | 306 |
| 35.70 CFS | 306 | 305 | 305 | 305 | 304 | 304 | 303 | 303 |
| 36.90 CFS | 303 | 302 | 302 | 301 | 301 | 301 | 300 | 300 |
| 38.10 CFS | 299 | 299 | 299 | 298 | 298 | 298 | 297 | 297 |
| 39.30 CFS | 296 | 296 | 296 | 295 | 295 | 295 | 294 | 294 |
| 40.50 CFS | 293 | 293 | 293 | 292 | 292 | 292 | 291 | 291 |
| 41.70 CFS | 290 | 290 | 290 | 289 | 289 | 289 | 288 | 288 |
| 42.90 CFS | 287 | 287 | 287 | 286 | 286 | 286 | 285 | 285 |
| 44.10 CFS | 284 | 284 | 284 | 283 | 283 | 283 | 282 | 282 |
| 45.30 CFS | 282 | 281 | 281 | 281 | 280 | 280 | 279 | 279 |
| 46.50 CFS | 279 | 278 | 278 | 278 | 277 | 277 | 277 | 276 |
| 47.70 CFS | 276 | 276 | 275 | 275 | 274 | 274 | 274 | 273 |
| 48.90 CFS | 273 | 273 | 272 | 272 | 272 | 271 | 271 | 271 |
| 50.10 CFS | 270 | 270 | 270 | 269 | 269 | 269 | 268 | 268 |
| 51.30 CFS | 268 | 267 | 267 | 266 | 266 | 266 | 265 | 265 |
| 52.50 CFS | 265 | 265 | 265 | 265 | 265 | 264 | 264 | 264 |
| 53.70 CFS | 264 | 264 | 264 | 263 | 263 | 263 | 263 | 263 |
| 54.90 CFS | 263 | 263 | 262 | 262 | 262 | 262 | 262 | 262 |
| 56.10 CFS | 262 | 261 | 261 | 261 | 261 | 261 | 261 | 261 |
| 57.30 CFS | 260 | 260 | 260 | 260 | 260 | 260 | 259 | 259 |
| 58.50 CFS | 259 | 259 | 259 | 259 | 259 | 258 | 258 | 258 |
| 59.70 CFS | 258 | 258 | 258 | 258 | 257 | 257 | 257 | 257 |
| 60.90 CFS | 257 | 257 | 257 | 256 | 256 | 256 | 256 | 256 |
| 62.10 CFS | 256 | 256 | 255 | 255 | 255 | 255 | 255 | 255 |
| 63.30 CFS | 255 | 254 | 254 | 254 | 254 | 254 | 254 | 254 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 18873 CFS-HRS; 1559.7 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP` COMPUTATIONS COMPLETED FOR PASS 2

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINFALL OF 4.84 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs. | | | | | | | |
| RAINTABLE NUMBER 2, ARC 1 | | | | | | | |
| MAIN TIME INCREMENT .150 HOURS | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 2.18 | --- | 12.39 | 2652 | 1078.0 |
| XSECTION 5 | REACH | 2.46 | 2.18 | 4.61 | 13.05 | 1590 | 646.3 |
| XSECTION 10 | REACH | 2.46 | 2.18 | 5.66 | 13.72 | 1123 | 456.5 |
| XSECTION 2 | RUNOFF | 2.38 | 1.41 | --- | 12.34 | 1660 | 697.5 |
| XSECTION 12 | ADDHYD | 4.84 | 1.80 | --- | 12.34 | 1709 | 353.1 |
| XSECTION 12 | DIVERT | 4.84 | 1.80 | --- | 12.34 | 1709 | 353.1 |
| XSECTION 200 | DIVERT | .00 | 1.80 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 1.80 | 4.80 | 12.52 | 1653 | 341.5 |
| XSECTION 25 | REACH | 4.84 | 1.80 | 3.00 | 12.67 | 1650 | 340.9 |
| XSECTION 3 | RUNOFF | 3.94 | 2.18 | --- | 12.41 | 4180 | 1060.9 |
| XSECTION 30 | REACH | 3.94 | 2.18 | 3.91 | 13.25 | 2215 | 562.2 |
| XSECTION 5 | REACH | 3.94 | 2.18 | 4.63 | 13.84 | 1613 | 409.4 |
| XSECTION 25 | REACH | 3.94 | 2.18 | 2.96 | 13.99 | 1613 | 409.4 |
| XSECTION 4 | RUNOFF | 2.06 | 1.17 | --- | 12.40 | 1081 | 524.8 |
| XSECTION 34 | ADDHYD | 6.00 | 1.83 | --- | 13.97 | 1754 | 292.3 |
| XSECTION 35 | ADDHYD | 10.84 | 1.82 | --- | 13.99 | 3080 | 284.1 |
| XSECTION 35 | DIVERT | 10.84 | 1.82 | --- | 13.99 | 3080 | 284.1 |
| XSECTION 199 | DIVERT | .00 | 1.82 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 1.82 | 4.12 | 14.21 | 3043 | 280.7 |
| XSECTION 6 | RUNOFF | 1.47 | 2.29 | --- | 12.15 | 2337 | 1589.8 |
| XSECTION 60 | REACH | 1.47 | 2.29 | 4.85 | 12.56 | 1443 | 981.6 |
| XSECTION 67 | REACH | 1.47 | 2.29 | 3.86 | 12.90 | 1052 | 715.6 |
| XSECTION 64 | ADDHYD | 12.31 | 1.88 | --- | 12.81 | 3398 | 276.0 |
| XSECTION 5 | RUNOFF | 4.78 | 1.33 | --- | 12.38 | 2949 | 616.9 |
| XSECTION 7 | RUNOFF | 3.48 | 1.57 | --- | 12.51 | 2317 | 665.8 |
| XSECTION 75 | ADDHYD | 8.26 | 1.43 | --- | 12.43 | 5168 | 625.7 |
| XSECTION 76 | ADDHYD | 20.57 | 1.70 | --- | 12.55 | 7135 | 346.9 |
| STRUCTURE 1 | RESVOR | 20.57 | .97 | 1208.50 | 24.97T | 247T | 12.0 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINTABLE NUMBER 2, ARC 2 | | | | | | | |
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 3.42 | --- | 12.35 | 4185 | 1701.2 |
| XSECTION 5 | REACH | 2.46 | 3.42 | 5.39 | 12.88 | 2472 | 1004.9 |
| XSECTION 10 | REACH | 2.46 | 3.42 | 6.47 | 13.57 | 1695 | 689.0 |
| XSECTION 2 | RUNOFF | 2.38 | 2.77 | --- | 12.30 | 3544 | 1489.1 |
| XSECTION 12 | ADDHYD | 4.84 | 3.10 | --- | 12.30 | 3754 | 775.6 |
| XSECTION 12 | DIVERT | 4.84 | 3.10 | --- | 12.30 | 3754 | 775.6 |
| XSECTION 200 | DIVERT | .00 | 3.10 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 3.10 | 7.54 | 12.46 | 3746 | 774.0 |
| XSECTION 25 | REACH | 4.84 | 3.10 | 4.77 | 12.46 | 3746 | 774.0 |
| XSECTION 3 | RUNOFF | 3.94 | 3.42 | --- | 12.37 | 6596 | 1674.1 |
| XSECTION 30 | REACH | 3.94 | 3.42 | 4.47 | 13.07 | 3654 | 927.4 |
| XSECTION 5 | REACH | 3.94 | 3.42 | 5.46 | 13.65 | 2550 | 647.2 |
| XSECTION 25 | REACH | 3.94 | 3.42 | 3.82 | 13.65 | 2550 | 647.2 |
| XSECTION 4 | RUNOFF | 2.06 | 2.54 | --- | 12.34 | 2707 | 1314.1 |
| XSECTION 34 | ADDHYD | 6.00 | 3.12 | --- | 12.35 | 3038 | 506.3 |
| XSECTION 35 | ADDHYD | 10.84 | 3.11 | --- | 12.42 | 6655 | 613.9 |
| XSECTION 35 | DIVERT | 10.84 | 3.11 | --- | 12.42 | 6655 | 613.9 |
| XSECTION 199 | DIVERT | .00 | 3.11 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 3.11 | 6.36 | 12.59 | 6519 | 601.4 |
| XSECTION 6 | RUNOFF | 1.47 | 3.52 | --- | 12.13 | 3533 | 2403.4 |
| XSECTION 60 | REACH | 1.47 | 3.52 | 5.65 | 12.38 | 2338 | 1590.5 |
| XSECTION 67 | REACH | 1.47 | 3.52 | 4.72 | 12.69 | 1716 | 1167.3 |
| XSECTION 64 | ADDHYD | 12.31 | 3.16 | --- | 12.60 | 8202 | 666.3 |
| XSECTION 5 | RUNOFF | 4.78 | 2.67 | --- | 12.33 | 6605 | 1381.8 |
| XSECTION 7 | RUNOFF | 3.48 | 2.90 | --- | 12.46 | 4569 | 1312.9 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 75 | ADDHYD | 8.26 | 2.77 | --- | 12.37 | 10904 | 1320.1 |
| XSECTION 76 | ADDHYD | 20.57 | 3.00 | --- | 12.47 | 17781 | 864.4 |
| STRUCTURE 1 | RESVOR | 20.57 | 1.42 | 1212.21 | 20.36T | 871T | 42.3 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| | | | HYDROGRAPH INFORMATION | | | | ROUTING PARAMETERS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | INFLOW | | OUTFLOW | | Q-A EQ. | | | | |
| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | PEAK (CFS) | TIME (HR) | PEAK (CFS) | TIME (HR) | COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 2593 | 12.4 | 1590 | 13.1 | .94 | 1.21 | .454 | .613 | .23 |
| 10 | 9100 | | 1590 | 13.1 | 1118 | 13.6 | 1.08 | 1.21 | .239 | .703 | .24 |
| 20 | 3332 | | 1689 | 12.3 | 1609 | 12.4 | .12 | 1.66 | .007 | .952 | .84? |
| 25 | 1950 | | 1609 | 12.4 | 1605 | 12.6 | .046 | 1.75 | .003 | .998 | .99? |
| 30 | 8865 | | 4137 | 12.4 | 2197 | 13.2 | 1.19 | 1.13 | .587 | .531 | .18 |
| 5 | 8865 | | 2197 | 13.2 | 1611 | 13.8 | .87 | 1.22 | .204 | .733 | .24 |
| 25 | 1950 | | 1611 | 13.8 | 1610 | 13.9 | .046 | 1.75 | .003 | 1.000 | .99? |
| 45 | 4200 | | 3077 | 13.9 | 3040 | 14.3 | .045 | 1.73 | .007 | .988 | .71? |
| 60 | 7540 | | 2337 | 12.1 | 1433 | 12.6 | .49 | 1.35 | .402 | .613 | .35 |
| 67 | 5140 | | 1433 | 12.6 | 1052 | 12.9 | .72 | 1.26 | .198 | .734 | .37 |
| ALTERNATE 2 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 4117 | 12.3 | 2470 | 12.9 | 1.36 | 1.14 | .486 | .600 | .22 |
| 10 | 9100 | | 2470 | 12.9 | 1687 | 13.5 | 1.79 | 1.11 | .283 | .683 | .21 |
| 20 | 3332 | | 3754 | 12.3 | 3745 | 12.4 | .14 | 1.63 | .007 | .998 | .98? |
| 25 | 1950 | | 3745 | 12.4 | 3745 | 12.4 | .051 | 1.73 | .003 | 1.000 | 1.00? |
| 30 | 8865 | | 6417 | 12.3 | 3650 | 13.1 | 1.26 | 1.12 | .557 | .569 | .19 |
| 5 | 8865 | | 3650 | 13.1 | 2550 | 13.6 | 1.60 | 1.11 | .261 | .699 | .21 |
| 25 | 1950 | | 2550 | 13.6 | 2550 | 13.6 | .048 | 1.74 | .003 | 1.000 | 1.00? |
| 45 | 4200 | | 6616 | 12.4 | 6514 | 12.6 | .048 | 1.72 | .006 | .984 | .86? |
| 60 | 7540 | | 3523 | 12.1 | 2274 | 12.4 | .48 | 1.35 | .337 | .645 | .39 |
| 67 | 5140 | | 2274 | 12.4 | 1700 | 12.8 | .90 | 1.21 | .206 | .748 | .37 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE 1 | | 20.57 | |
| ALTERNATE | 1 | | 247 |
| ALTERNATE | 2 | | 871 |
| XSECTION 1 | | 2.46 | |
| ALTERNATE | 1 | | 2652 |
| ALTERNATE | 2 | | 4185 |
| XSECTION 2 | | 2.38 | |
| ALTERNATE | 1 | | 1660 |
| ALTERNATE | 2 | | 3544 |
| XSECTION 3 | | 3.94 | |
| ALTERNATE | 1 | | 4180 |
| ALTERNATE | 2 | | 6596 |
| XSECTION 4 | | 2.06 | |
| ALTERNATE | 1 | | 1081 |
| ALTERNATE | 2 | | 2707 |
| XSECTION 5 | | 4.78 | |
| ALTERNATE | 1 | | 2949 |
| ALTERNATE | 2 | | 6605 |
| XSECTION 6 | | 1.47 | |
| ALTERNATE | 1 | | 2337 |
| ALTERNATE | 2 | | 3533 |
| XSECTION 7 | | 3.48 | |
| ALTERNATE | 1 | | 2317 |
| ALTERNATE | 2 | | 4569 |
| XSECTION 10 | | 2.46 | |
| ALTERNATE | 1 | | 1123 |
| ALTERNATE | 2 | | 1695 |
| XSECTION 12 | | 4.84 | |
| ALTERNATE | 1 | | 1709 |
| ALTERNATE | 2 | | 3754 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 20 | | 4.84 | |
| ALTERNATE | 1 | | 1653 |
| ALTERNATE | 2 | | 3746 |
| XSECTION 25 | | 3.94 | |
| ALTERNATE | 1 | | 1613 |
| ALTERNATE | 2 | | 2550 |
| XSECTION 30 | | 3.94 | |
| ALTERNATE | 1 | | 2215 |
| ALTERNATE | 2 | | 3654 |
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 1754 |
| ALTERNATE | 2 | | 3038 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 3080 |
| ALTERNATE | 2 | | 6655 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 3043 |
| ALTERNATE | 2 | | 6519 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 1443 |
| ALTERNATE | 2 | | 2338 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 3398 |
| ALTERNATE | 2 | | 8202 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 1052 |
| ALTERNATE | 2 | | 1716 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 5168 |
| ALTERNATE | 2 | | 10904 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 7135 |
| ALTERNATE | 2 | | 17781 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

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TR20 ------------------------------------------------------------------- SCS -
WT100YR   WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
08/12/**  500-yr, 24-hr, Type II Dist, 100-yr Sediment Storage, 1200'Spi2.04TEST


END OF  1 JOBS IN THIS RUN
```

SCS TR-20, VERSION 2.04TEST
WT100YR FILES

INPUT = 500IN.DAT , GIVEN DATA FILE
OUTPUT = 500OUT.OUT , DATED 08/12/**,11:11:04

FILES GENERATED - DATED 08/12/**,11:11:04

FILE 111.TRD CONTAINS READHD INFORMATION

TOTAL NUMBER OF WARNINGS = 4, MESSAGES = 8

JOB ENDED AT 11:11:04
*** TR-20 RUN COMPLETED ***

Future Condition

(Principal spillway open)

(200-Yr 24-hr)

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******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20 WT100YR                          PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROUTING
TITLE     200-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spillway
 4 DIMHYD                .0556                                          WT3
 8          0.0          .03          .10          .19          .31
 8          .47          .66          .82          .93          .99
 8          1.0          .99          .93          .82          .66
 8          .47          .31          .03          .00          .00
 9 ENDTBL
 5 RAINFL 2              .1000                                          TYPE II
 8          .0000        .0010        .0020        .0030        .0041
 8          .0051        .0062        .0072        .0083        .0094
 8          .0105        .0116        .0127        .0138        .0150
 8          .0161        .0173        .0184        .0196        .0208
 8          .0220        .0232        .0244        .0257        .0269
 8          .0281        .0294        .0306        .0319        .0332
 8          .0345        .0358        .0371        .0384        .0398
 8          .0411        .0425        .0439        .0452        .0466
 8          .0480        .0494        .0508        .0523        .0538
 8          .0553        .0568        .0583        .0598        .0614
 8          .0630        .0646        .0662        .0679        .0696
 8          .0712        .0730        .0747        .0764        .0782
 8          .0800        .0818        .0836        .0855        .0874
 8          .0892        .0912        .0931        .0950        .0970
 8          .0990        .1010        .1030        .1051        .1072
 8          .1093        .1114        .1135        .1156        .1178
 8          .1200        .1222        .1246        .1270        .1296
 8          .1322        .1350        .1379        .1408        .1438
 8          .1470        .1502        .1534        .1566        .1598
 8          .1630        .1663        .1697        .1733        .1771
 8          .1810        .1851        .1895        .1941        .1989
 8          .2040        .2094        .2152        .2214        .2280
 8          .2350        .2427        .2513        .2609        .2715
 8          .2830        .3068        .3544        .4308        .5679
 8          .6630        .6820        .6986        .7130        .7252
 8          .7350        .7434        .7514        .7588        .7656
 8          .7720        .7780        .7836        .7890        .7942
 8          .7990        .8036        .8080        .8122        .8162
 8          .8200        .8237        .8273        .8308        .8342
 8          .8376        .8409        .8442        .8474        .8505
 8          .8535        .8565        .8594        .8622        .8649
 8          .8676        .8702        .8728        .8753        .8777
 8          .8800        .8823        .8845        .8868        .8890
 8          .8912        .8934        .8955        .8976        .8997
 8          .9018        .9038        .9058        .9078        .9097
 8          .9117        .9136        .9155        .9173        .9192
 8          .9210        .9228        .9245        .9263        .9280
 8          .9297        .9313        .9330        .9346        .9362
 8          .9377        .9393        .9408        .9423        .9438
 8          .9452        .9466        .9480        .9493        .9507
 8          .9520        .9533        .9546        .9559        .9572
 8          .9584        .9597        .9610        .9622        .9635
 8          .9647        .9660        .9672        .9685        .9697
 8          .9709        .9722        .9734        .9746        .9758
 8          .9770        .9782        .9794        .9806        .9818
 8          .9829        .9841        .9853        .9864        .9876
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 8          .9887       .9899       .9910       .9922       .9933
 8          .9944       .9956       .9967       .9978       .9989
 8          1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         10.41                             BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.86        5.          4.39
 8                      2.01        50.         24.22
 8                      2.58        100.        40.12
 8                      3.46        200.        80.99
 8                      4.14        400.        129.44
 8                      5.16        800.        214.74
 8                      6.39        1600.       441.84
 8                      7.80        3200.       980.75
 8                      9.16        6400.       1891.44
 8                      10.41       12800.      3516.14
 8                      11.75       25600.      6548.98
 8                      13.26       51200.      11081.19
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
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```
 8                       1.56        500.        203.28
 8                       2.30        1000.       302.00
 8                       3.38        2000.       449.24
 8                       4.97        4000.       673.73
 8                       6.23        6000.       855.96
 8                       7.31        8000.       1016.35
 8                       8.24        10000.      1158.51
 8                       9.09        12000.      1293.31
 8                       9.90        14000.      1425.57
 8                       10.64       16000.      1549.17
 8                       11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030         1.0         9.45                            BOSSCS#6
 8                       0.          0.0         0.0
 8                       0.77        5.          4.67
 8                       1.54        50.         32.06
 8                       1.78        100.        56.64
 8                       2.10        200.        100.59
 8                       2.50        400.        179.97
 8                       3.01        800.        320.25
 8                       3.63        1600.       589.66
 8                       4.35        3200.       1110.72
 8                       5.21        6400.       2084.48
 8                       6.03        12800.      4119.83
 8                       6.99        25600.      6856.75
 8                       8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045         1.0         4.87                            REACHA
 8                       0.          0.0         0.0
 8                       0.60        100.        85.69
 8                       0.90        200.        127.94
 8                       1.13        300.        161.93
 8                       1.52        500.        217.27
 8                       2.25        1000.       324.03
 8                       3.31        2000.       483.02
 8                       4.87        4000.       722.17
 8                       6.09        6000.       914.99
 8                       7.15        8000.       1084.61
 8                       8.05        10000.      1234.17
 8                       8.87        12000.      1373.80
 8                       9.64        14000.      1507.84
 8                       10.34       16000.      1633.45
 8                       11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060         1.0         4.7                             2CP6CP7
 8                       0.          0.0         0.0
 8                       2.36        100.        45.12
 8                       2.88        200.        83.75
 8                       3.18        300.        114.33
 8                       3.64        500.        172.72
 8                       4.42        1000.       289.04
 8                       5.40        2000.       470.72
 8                       6.87        4000.       782.74
 8                       7.91        6000.       1020.12
 8                       8.79        8000.       1231.25
 8                       9.60        10000.      1435.05
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**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8                       10.26       12000.      1618.34
 8                       10.94       14000.      1812.58
 8                       11.47       16000.      1983.46
 8                       11.96       18000.      2150.12
 9 ENDTBL
 2 XSECTN   067          1.0         8.77                                BOSSCS#5
 8                       0.          0.0         0.0
 8                       0.35        5.          5.56
 8                       1.03        50.         30.95
 8                       1.39        100.        52.16
 8                       1.94        200.        88.72
 8                       2.63        400.        148.61
 8                       3.51        800.        260.63
 8                       4.62        1600.       459.66
 8                       6.04        3200.       929.36
 8                       7.38        6400.       1811.51
 8                       8.77        12800.      3374.20
 8                       10.17       25600.      6398.87
 8                       11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT      01                                                        95/11/6
 8                       1178.0      0.0         0.
 8                       1188.0      0.02        44.8
 8                       1196.8      0.13        300.
 8                       1199.2      0.21        500.
 8                       1202.0      159.0       845.55
 8                       1204.0      187.75      1176.28
 8                       1206.0      214.9       1575.25
 8                       1208.0      240.3       2044.97
 8                       1210.0      265.4       2593.40
 8                       1212.0      330.00      3218.00
 8                       1213.0      2936.00     3556.67
 8                       1214.0      8488.00     3916.02
 8                       1215.0      15810.0     4294.13
 8                       1216.0      24545.0     4692.68
 8                       1217.0      34492.0     5113.19
 8                       1218.0      45517.0     5556.01
 8                       1219.0      57524.0     6021.50
 8                       1220.0      70439.0     6509.75
 9 ENDTBL
 6 RUNOFF 1 001       1 2.46         87.2        0.85        1 1
 6 REACH  3 005   1   7 9100.                                 1           BOSS#6
 6 REACH  3 010   7   2 9100.                                 1           BOSS#4
 6 RUNOFF 1 002       3 2.38         79.9        0.73        1 1
 6 ADDHYD 4 012   2 3 1                                       1 1
 6 DIVERT 6 012   1 4 7 4100.       1.00        200.        1 1         OLIVE
 6 REACH  3 020   4   7 3332.                                 1           REACH C
 6 REACH  3 025   7   5 1950.                                 1           REACH B
 6 RUNOFF 1 003       6 3.94         87.2        0.88        1 1
 6 REACH  3 030   6   7 8865.                                 1           BOSS#6
 6 REACH  3 005   7   1 8865.                                 1           BOSS#5
 6 REACH  3 025   1   7 1950.                                 1           REACH B
 6 RUNOFF 1 004       1 2.06         77.3        0.79        1 1
 6 ADDHYD 4 034   7 1 2                                       1 1
 6 ADDHYD 4 035   5 2 3                                       1 1
 6 DIVERT 6 035   3 4 7 11000.      1.00        199.        1 1         NORTHERN
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**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 REACH  3 045   4   5 4200.                              1           REACH A
 6 RUNOFF 1 006       2 1.47        87.7        0.47      1 1
 6 REACH  3 060   2   3 7540.                              1           CP6CP7
 6 REACH  3 067   3   4 5140.                              1           BOSS#5
 6 ADDHYD 4 064   5 4 3                                   1 1
 6 RUNOFF 1 005       6 4.78        78.8        0.78      1 1
 6 RUNOFF 1 007       7 3.48        81.7        1.01      1 1
 6 ADDHYD 4 075   6 7 1                                   1 1
 6 ADDHYD 4 076   1 3 2                                   1 1     1
 6 RESVOR 2    01 2   1 1200.0                            1 1     1
 ENDATA
 7 LIST               1.0                      1.
 7 INCREM 6           0.15
 7 COMPUT 7 001     01 0.          4.28        1.0       2 1  01  01
   ENDCMP 1
 7 COMPUT 7 001     01 0.          4.28        1.0       2 2  02  01
   ENDCMP 1
   ENDJOB 2

**********END OF 80-80 LIST**********
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COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST 1. 0. 1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT
DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0017 | .0035 | .0052 | .0070 |
| .0087 | .0105 | .0122 | .0139 | .0157 |
| .0174 | .0192 | .0210 | .0227 | .0245 |
| .0262 | .0280 | .0297 | .0315 | .0332 |
| .0350 | .0368 | .0386 | .0404 | .0423 |
| .0442 | .0461 | .0480 | .0500 | .0520 |
| .0540 | .0561 | .0582 | .0603 | .0625 |
| .0647 | .0669 | .0691 | .0714 | .0737 |
| .0760 | .0784 | .0807 | .0831 | .0855 |
| .0878 | .0902 | .0926 | .0951 | .0975 |
| .1000 | .1024 | .1049 | .1073 | .1098 |
| .1123 | .1148 | .1174 | .1199 | .1225 |
| .1250 | .1276 | .1303 | .1332 | .1361 |
| .1391 | .1423 | .1456 | .1489 | .1524 |
| .1560 | .1597 | .1633 | .1671 | .1708 |
| .1746 | .1784 | .1823 | .1861 | .1901 |
| .1940 | .1982 | .2027 | .2077 | .2132 |
| .2190 | .2252 | .2318 | .2388 | .2462 |
| .2540 | .2623 | .2714 | .2812 | .2917 |
| .3030 | .3194 | .3454 | .3878 | .4632 |
| .5150 | .5322 | .5476 | .5612 | .5730 |
| .5830 | .5919 | .6003 | .6083 | .6159 |
| .6230 | .6298 | .6365 | .6430 | .6493 |
| .6555 | .6615 | .6674 | .6731 | .6786 |
| .6840 | .6892 | .6944 | .6995 | .7044 |
| .7092 | .7140 | .7186 | .7232 | .7276 |
| .7320 | .7362 | .7404 | .7444 | .7484 |
| .7523 | .7560 | .7596 | .7632 | .7667 |
| .7700 | .7733 | .7766 | .7798 | .7830 |
| .7862 | .7894 | .7926 | .7958 | .7989 |
| .8020 | .8051 | .8082 | .8112 | .8142 |
| .8173 | .8202 | .8232 | .8262 | .8291 |
| .8320 | .8349 | .8378 | .8406 | .8434 |
| .8462 | .8490 | .8518 | .8546 | .8573 |
| .8600 | .8627 | .8654 | .8680 | .8706 |
| .8733 | .8758 | .8784 | .8810 | .8835 |
| .8860 | .8885 | .8910 | .8934 | .8958 |
| .8982 | .9006 | .9030 | .9054 | .9077 |
| .9100 | .9123 | .9146 | .9168 | .9190 |
| .9212 | .9234 | .9256 | .9278 | .9299 |
| .9320 | .9341 | .9362 | .9382 | .9402 |
| .9423 | .9442 | .9462 | .9482 | .9501 |
| .9520 | .9539 | .9558 | .9576 | .9594 |
| .9613 | .9630 | .9648 | .9666 | .9683 |
| .9700 | .9717 | .9734 | .9750 | .9766 |
| .9783 | .9798 | .9814 | .9830 | .9845 |
| .9860 | .9875 | .9890 | .9904 | .9918 |
| .9933 | .9946 | .9960 | .9974 | .9987 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

```
RUNOFF      1       1      2.4600     87.2000      .85001 1 0 0 0 1
REACH       5   1   7   9100.0000       .0000      .00001 0 0 0 0 1
REACH      10   7   2   9100.0000       .0000      .00001 0 0 0 0 1
RUNOFF      2       3      2.3800     79.9000      .73001 1 0 0 0 1
ADDHYD     12   2 3 1                                   1 1 0 0 0 1
DIVERT     12   1 4 7   4100.0000      1.0000   200.00001 1 0 0 0 1
REACH      20   4   7   3332.0000       .0000      .00001 0 0 0 0 1
REACH      25   7   5   1950.0000       .0000      .00001 0 0 0 0 1
RUNOFF      3       6      3.9400     87.2000      .88001 1 0 0 0 1
REACH      30   6   7   8865.0000       .0000      .00001 0 0 0 0 1
REACH       5   7   1   8865.0000       .0000      .00001 0 0 0 0 1
REACH      25   1   7   1950.0000       .0000      .00001 0 0 0 0 1
RUNOFF      4       1      2.0600     77.3000      .79001 1 0 0 0 1
ADDHYD     34   7 1 2                                   1 1 0 0 0 1
ADDHYD     35   5 2 3                                   1 1 0 0 0 1
DIVERT     35   3 4 7  11000.0000      1.0000   199.00001 1 0 0 0 1
REACH      45   4   5   4200.0000       .0000      .00001 0 0 0 0 1
RUNOFF      6       2      1.4700     87.7000      .47001 1 0 0 0 1
REACH      60   2   3   7540.0000       .0000      .00001 0 0 0 0 1
REACH      67   3   4   5140.0000       .0000      .00001 0 0 0 0 1
ADDHYD     64   5 4 3                                   1 1 0 0 0 1
RUNOFF      5       6      4.7800     78.8000      .78001 1 0 0 0 1
RUNOFF      7       7      3.4800     81.7000     1.01001 1 0 0 0 1
ADDHYD     75   6 7 1                                   1 1 0 0 0 1
ADDHYD     76   1 3 2                                   1 1 0 0 1 1
RESVOR        1 2   1   1200.0000                       1 1 0 0 1 1
ENDATA
```

END OF LISTING

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .150 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.28 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 1 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 1 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.39 | 2110.8 | |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.90 CFS | .14 | .66 | 2.05 | 4.52 | 8.28 | 13.13 | 19.03 | 26.41 |
| 11.10 CFS | 35 | 47 | 63 | 85 | 140 | 314 | 763 | 1461 |
| 12.30 CFS | 2030 | 2064 | 1596 | 891 | 518 | 407 | 346 | 308 |
| 13.50 CFS | 280 | 257 | 238 | 221 | 206 | 193 | 181 | 172 |
| 14.70 CFS | 165 | 160 | 156 | 152 | 147 | 142 | 137 | 133 |
| 15.90 CFS | 128 | 124 | 120 | 115 | 111 | 108 | 107 | 105 |
| 17.10 CFS | 103 | 102 | 100 | 98 | 96 | 95 | 93 | 92 |
| 18.30 CFS | 89.87 | 88.14 | 86.52 | 84.73 | 83.01 | 81.32 | 79.48 | 77.83 |
| 19.50 CFS | 76.19 | 74.49 | 72.71 | 70.67 | 68.72 | 67.10 | 65.87 | 64.87 |
| 20.70 CFS | 64.02 | 63.38 | 62.94 | 62.57 | 62.39 | 62.16 | 61.97 | 61.76 |
| 21.90 CFS | 61.51 | 61.11 | 60.68 | 60.29 | 59.90 | 59.63 | 59.20 | 58.76 |
| 23.10 CFS | 58.31 | 58.06 | 57.89 | 57.63 | 57.45 | 57.22 | 56.69 | 54.24 |
| 24.30 CFS | 46.42 | 32.99 | 17.83 | 5.79 | .35 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 2783 CFS-HRS; 230.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.06 | 1263.0 | 4.15 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 2783 CFS-HRS; 230.0 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.71 | 908.0 | 5.33 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 2783 CFS-HRS; 230.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1217.2 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.40 CFS | 0 | 1 | 10 | 93 | 383 | 875 | 1197 | 1128 |
| 12.60 CFS | 742 | 397 | 298 | 250 | 220 | 200 | 184 | 170 |
| 13.80 CFS | 159 | 148 | 139 | 131 | 124 | 118 | 114 | 111 |
| 15.00 CFS | 109 | 106 | 103 | 100 | 96 | 93 | 90 | 87 |
| 16.20 CFS | 84.29 | 81.16 | 78.81 | 77.42 | 76.48 | 75.40 | 74.18 | 73.02 |
| 17.40 CFS | 71.83 | 70.63 | 69.46 | 68.44 | 67.37 | 66.26 | 65.02 | 63.88 |
| 18.60 CFS | 62.71 | 61.45 | 60.30 | 59.03 | 57.80 | 56.65 | 55.44 | 54.30 |
| 19.80 CFS | 52.89 | 51.36 | 50.05 | 49.05 | 48.29 | 47.66 | 47.08 | 46.73 |
| 21.00 CFS | 46.45 | 46.29 | 46.18 | 46.04 | 45.96 | 45.81 | 45.62 | 45.32 |
| 22.20 CFS | 45.02 | 44.71 | 44.59 | 44.34 | 43.98 | 43.67 | 43.44 | 43.34 |
| 23.40 CFS | 43.16 | 43.10 | 42.91 | 42.74 | 42.24 | 39.85 | 31.55 | 19.34 |
| 24.60 CFS | 7.71 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.08 WATERSHED INCHES; 1655 CFS-HRS; 136.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1245.6 | (NULL) |
| 13.67 | 1075.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 1 | 1 | 2 | 4 | 16 | 103 | 396 |
| 12.15 CFS | 893 | 1222 | 1163 | 801 | 510 | 521 | 642 | 807 |
| 13.35 CFS | 958 | 1048 | 1075 | 1058 | 1011 | 949 | 879 | 808 |
| 14.55 CFS | 739 | 676 | 618 | 565 | 518 | 475 | 437 | 403 |
| 15.75 CFS | 373 | 348 | 326 | 306 | 288 | 273 | 260 | 250 |
| 16.95 CFS | 240 | 231 | 222 | 214 | 207 | 201 | 195 | 190 |
| 18.15 CFS | 185 | 181 | 176 | 172 | 169 | 165 | 162 | 158 |
| 19.35 CFS | 155 | 152 | 149 | 145 | 142 | 139 | 136 | 134 |
| 20.55 CFS | 131 | 129 | 127 | 125 | 123 | 121 | 119 | 118 |
| 21.75 CFS | 116 | 115 | 113 | 112 | 111 | 110 | 109 | 108 |
| 22.95 CFS | 107 | 107 | 106 | 105 | 105 | 104 | 104 | 103 |
| 24.15 CFS | 99.95 | 91.29 | 78.74 | 66.78 | 58.74 | 58.29 | 57.33 | 55.36 |
| 25.35 CFS | 52.02 | 47.40 | 41.98 | 36.41 | 31.08 | 26.20 | 21.86 | 18.09 |
| 26.55 CFS | 14.86 | 12.14 | 9.86 | 7.98 | 6.43 | 5.16 | 4.14 | 3.30 |
| 27.75 CFS | 2.63 | 2.09 | 1.66 | 1.31 | 1.03 | .82 | .64 | .50 |
| 28.95 CFS | .40 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1245.6 | (DIVERT) |
| 13.67 | 1075.3 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 1 | 1 | 2 | 4 | 16 | 103 | 396 |
| 12.15 CFS | 893 | 1222 | 1163 | 801 | 510 | 521 | 642 | 807 |
| 13.35 CFS | 958 | 1048 | 1075 | 1058 | 1011 | 949 | 879 | 808 |
| 14.55 CFS | 739 | 676 | 618 | 565 | 518 | 475 | 437 | 403 |
| 15.75 CFS | 373 | 348 | 326 | 306 | 288 | 273 | 260 | 250 |
| 16.95 CFS | 240 | 231 | 222 | 214 | 207 | 201 | 195 | 190 |
| 18.15 CFS | 185 | 181 | 176 | 172 | 169 | 165 | 162 | 158 |
| 19.35 CFS | 155 | 152 | 149 | 145 | 142 | 139 | 136 | 134 |
| 20.55 CFS | 131 | 129 | 127 | 125 | 123 | 121 | 119 | 118 |
| 21.75 CFS | 116 | 115 | 113 | 112 | 111 | 110 | 109 | 108 |
| 22.95 CFS | 107 | 107 | 106 | 105 | 105 | 104 | 104 | 103 |
| 24.15 CFS | 99.95 | 91.29 | 78.74 | 66.78 | 58.74 | 58.29 | 57.33 | 55.36 |
| 25.35 CFS | 52.02 | 47.40 | 41.98 | 36.41 | 31.08 | 26.20 | 21.86 | 18.09 |
| 26.55 CFS | 14.86 | 12.14 | 9.86 | 7.98 | 6.43 | 5.16 | 4.14 | 3.30 |
| 27.75 CFS | 2.63 | 2.09 | 1.66 | 1.31 | 1.03 | .82 | .64 | .50 |
| 28.95 CFS | .40 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
141 CFS-HRS; 366.8 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.54 | 1180.6 | 3.99 |
| 13.86 | 1067.3 | 3.80 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.70 | 1166.3 | 2.48 |
| 14.02 | 1065.1 | 2.37 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 3318.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.90 CFS | .19 | .99 | 3.02 | 6.78 | 12.56 | 20.09 | 29.57 | 41.05 |
| 11.10 CFS | 56 | 74 | 98 | 133 | 209 | 472 | 1128 | 2207 |
| 12.30 CFS | 3132 | 3285 | 2681 | 1592 | 876 | 669 | 566 | 498 |
| 13.50 CFS | 453 | 416 | 384 | 357 | 333 | 311 | 293 | 278 |
| 14.70 CFS | 266 | 257 | 250 | 244 | 237 | 229 | 221 | 213 |
| 15.90 CFS | 206 | 199 | 192 | 185 | 179 | 174 | 171 | 169 |
| 17.10 CFS | 166 | 163 | 160 | 157 | 155 | 152 | 149 | 147 |
| 18.30 CFS | 144 | 141 | 139 | 136 | 133 | 131 | 128 | 125 |
| 19.50 CFS | 122 | 120 | 117 | 114 | 110 | 108 | 106 | 104 |
| 20.70 CFS | 103 | 102 | 101 | 100 | 100 | 100 | 99 | 99 |
| 21.90 CFS | 98.62 | 97.95 | 97.24 | 96.66 | 95.97 | 95.54 | 94.89 | 94.21 |
| 23.10 CFS | 93.50 | 93.03 | 92.76 | 92.34 | 92.05 | 91.68 | 91.11 | 87.22 |
| 24.30 CFS | 76.37 | 55.46 | 31.71 | 11.28 | 1.18 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.26 | 1740.0 | 3.69 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.86 | 1258.8 | 4.15 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 14.02 | 1257.3 | 2.58 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 751.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 1 | 34 | 171 | 440 | 682 | 747 | 587 |
| 12.75 CFS | 345 | 228 | 191 | 166 | 150 | 138 | 128 | 119 |
| 13.95 CFS | 112 | 105 | 98 | 93 | 89 | 86 | 84 | 82 |
| 15.15 CFS | 79.95 | 77.82 | 75.45 | 72.99 | 70.68 | 68.45 | 66.30 | 64.04 |
| 16.35 CFS | 61.75 | 59.90 | 58.66 | 57.90 | 57.15 | 56.32 | 55.45 | 54.57 |
| 17.55 CFS | 53.71 | 52.86 | 52.07 | 51.29 | 50.47 | 49.57 | 48.71 | 47.86 |
| 18.75 CFS | 46.91 | 46.05 | 45.16 | 44.20 | 43.36 | 42.48 | 41.59 | 40.58 |
| 19.95 CFS | 39.45 | 38.42 | 37.60 | 36.99 | 36.48 | 36.07 | 35.77 | 35.56 |
| 21.15 CFS | 35.40 | 35.34 | 35.24 | 35.18 | 35.07 | 34.96 | 34.75 | 34.53 |
| 22.35 CFS | 34.33 | 34.16 | 34.03 | 33.79 | 33.56 | 33.37 | 33.26 | 33.18 |
| 23.55 CFS | 33.07 | 32.96 | 32.87 | 32.53 | 30.81 | 25.59 | 17.14 | 8.38 |
| 24.75 CFS | 2.04 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.87 WATERSHED INCHES; 1160 CFS-HRS; 95.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 780.6 | (NULL) |
| 14.00 | 1366.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.10 CFS | 0 | 1 | 1 | 2 | 5 | 41 | 182 | 456 |
| 12.30 CFS | 704 | 777 | 630 | 414 | 356 | 440 | 609 | 834 |
| 13.50 CFS | 1059 | 1229 | 1326 | 1364 | 1356 | 1318 | 1261 | 1193 |
| 14.70 CFS | 1120 | 1045 | 971 | 900 | 832 | 768 | 709 | 656 |
| 15.90 CFS | 607 | 563 | 524 | 489 | 458 | 430 | 406 | 384 |
| 17.10 CFS | 365 | 347 | 331 | 316 | 302 | 290 | 279 | 269 |
| 18.30 CFS | 260 | 252 | 245 | 238 | 231 | 225 | 220 | 214 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19.50 CFS | 209 | 205 | 200 | 195 | 191 | 187 | 183 | 179 |
| 20.70 CFS | 176 | 173 | 169 | 166 | 163 | 160 | 158 | 155 |
| 21.90 CFS | 152 | 150 | 148 | 146 | 144 | 142 | 141 | 139 |
| 23.10 CFS | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 129 |
| 24.30 CFS | 123 | 114 | 105 | 98 | 95 | 95 | 93 | 91 |
| 25.50 CFS | 87.29 | 81.73 | 74.89 | 67.45 | 59.94 | 52.70 | 45.93 | 39.75 |
| 26.70 CFS | 34.19 | 29.26 | 24.93 | 21.16 | 17.90 | 15.10 | 12.70 | 10.66 |
| 27.90 CFS | 8.93 | 7.47 | 6.23 | 5.19 | 4.32 | 3.59 | 2.98 | 2.47 |
| 29.10 CFS | 2.05 | 1.70 | 1.40 | 1.16 | .96 | .79 | .65 | .54 |
| 30.30 CFS | .44 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.45 WATERSHED INCHES; 5618 CFS-HRS; 464.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.61 | 1725.8 | (NULL) |
| 14.01 | 2430.9 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | 10.84 | SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 11.10 CFS | 0 | 1 | 2 | 3 | 7 | 45 | 194 | 534 |
| 12.30 CFS | 1014 | 1513 | 1725 | 1564 | 1254 | 1053 | 1151 | 1447 |
| 13.50 CFS | 1814 | 2133 | 2337 | 2423 | 2415 | 2343 | 2231 | 2096 |
| 14.70 CFS | 1953 | 1809 | 1670 | 1539 | 1417 | 1304 | 1200 | 1106 |
| 15.90 CFS | 1023 | 948 | 882 | 823 | 771 | 725 | 685 | 650 |
| 17.10 CFS | 618 | 590 | 564 | 541 | 520 | 500 | 483 | 467 |
| 18.30 CFS | 452 | 439 | 427 | 416 | 405 | 395 | 386 | 377 |
| 19.50 CFS | 369 | 361 | 353 | 345 | 338 | 330 | 323 | 317 |
| 20.70 CFS | 311 | 305 | 299 | 294 | 289 | 284 | 279 | 275 |
| 21.90 CFS | 271 | 267 | 263 | 259 | 256 | 253 | 251 | 249 |
| 23.10 CFS | 246 | 244 | 242 | 241 | 239 | 238 | 236 | 233 |
| 24.30 CFS | 226 | 215 | 199 | 181 | 166 | 157 | 153 | 149 |
| 25.50 CFS | 143 | 135 | 124 | 111 | 98 | 86 | 74 | 63 |
| 26.70 CFS | 53.69 | 45.34 | 38.10 | 31.89 | 26.60 | 22.12 | 18.35 | 15.19 |
| 27.90 CFS | 12.55 | 10.35 | 8.53 | 7.01 | 5.76 | 4.73 | 3.88 | 3.18 |
| 29.10 CFS | 2.61 | 2.13 | 1.74 | 1.43 | 1.17 | .95 | .78 | .63 |
| 30.30 CFS | .51 | .42 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 10056 CFS-HRS; 831.1 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.61 | 1725.8 | (DIVERT) |
| 14.01 | 2430.9 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | 10.84 | SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 11.10 CFS | 0 | 1 | 2 | 3 | 7 | 45 | 194 | 534 |
| 12.30 CFS | 1014 | 1513 | 1725 | 1564 | 1254 | 1053 | 1151 | 1447 |
| 13.50 CFS | 1814 | 2133 | 2337 | 2423 | 2415 | 2343 | 2231 | 2096 |
| 14.70 CFS | 1953 | 1809 | 1670 | 1539 | 1417 | 1304 | 1200 | 1106 |
| 15.90 CFS | 1023 | 948 | 882 | 823 | 771 | 725 | 685 | 650 |
| 17.10 CFS | 618 | 590 | 564 | 541 | 520 | 500 | 483 | 467 |
| 18.30 CFS | 452 | 439 | 427 | 416 | 405 | 395 | 386 | 377 |
| 19.50 CFS | 369 | 361 | 353 | 345 | 338 | 330 | 323 | 317 |
| 20.70 CFS | 311 | 305 | 299 | 294 | 289 | 284 | 279 | 275 |
| 21.90 CFS | 271 | 267 | 263 | 259 | 256 | 253 | 251 | 249 |
| 23.10 CFS | 246 | 244 | 242 | 241 | 239 | 238 | 236 | 233 |
| 24.30 CFS | 226 | 215 | 199 | 181 | 166 | 157 | 153 | 149 |
| 25.50 CFS | 143 | 135 | 124 | 111 | 98 | 86 | 74 | 63 |
| 26.70 CFS | 53.69 | 45.34 | 38.10 | 31.89 | 26.60 | 22.12 | 18.35 | 15.19 |
| 27.90 CFS | 12.55 | 10.35 | 8.53 | 7.01 | 5.76 | 4.73 | 3.88 | 3.18 |
| 29.10 CFS | 2.61 | 2.13 | 1.74 | 1.43 | 1.17 | .95 | .78 | .63 |
| 30.30 CFS | .51 | .42 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 10056 CFS-HRS; 831.1 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
154 CFS-HRS; 831.1 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.82 | 1610.4 | 2.90 |
| 14.26 | 2394.9 | 3.62 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 10056 CFS-HRS; 831.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.15 | 1881.8 | (RUNOFF) |
| 21.35 | 38.5 | (RUNOFF) |
| 22.30 | 37.1 | (RUNOFF) |
| 23.29 | 35.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 1.47 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 9.60 CFS | .13 | .80 | 2.25 | 4.30 | 6.73 | 9.68 | 13.21 | 17.42 |
| 10.80 CFS | 23 | 29 | 37 | 48 | 63 | 87 | 165 | 480 |
| 12.00 CFS | 1292 | 1882 | 1313 | 533 | 339 | 268 | 223 | 200 |
| 13.20 CFS | 181 | 165 | 153 | 143 | 132 | 124 | 116 | 109 |
| 14.40 CFS | 104 | 100 | 98 | 96 | 93 | 90 | 87 | 84 |
| 15.60 CFS | 80.64 | 78.18 | 75.98 | 72.91 | 69.53 | 67.38 | 66.55 | 65.89 |
| 16.80 CFS | 64.68 | 63.37 | 62.48 | 61.51 | 60.12 | 59.06 | 58.34 | 57.36 |
| 18.00 CFS | 56.06 | 55.29 | 54.13 | 53.00 | 52.10 | 50.73 | 49.84 | 48.84 |
| 19.20 CFS | 47.51 | 46.73 | 45.87 | 44.44 | 42.95 | 41.82 | 41.10 | 40.43 |
| 20.40 CFS | 39.80 | 39.42 | 38.88 | 38.83 | 38.73 | 38.37 | 38.45 | 38.43 |
| 21.60 CFS | 38.02 | 37.96 | 37.87 | 37.20 | 37.05 | 37.08 | 36.92 | 36.29 |
| 22.80 CFS | 36.11 | 36.11 | 35.69 | 35.72 | 35.71 | 35.39 | 35.22 | 35.20 |
| 24.00 CFS | 34.68 | 29.57 | 14.80 | 1.79 | .00 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.85 WATERSHED INCHES; 1757 CFS-HRS; 145.2 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.58 | 1096.7 | 4.51 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.85 WATERSHED INCHES; 1758 CFS-HRS; 145.3 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.93 | 797.6 | 3.50 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.85 WATERSHED INCHES; 1758 CFS-HRS; 145.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.85 | 2376.9 | (NULL) |
| 14.18 | 2649.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 12.31 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .40 | .97 | 1.89 | 3.18 | 4.90 | 7.12 | 10.00 | 13.78 |
| 11.55 CFS | 19 | 26 | 36 | 71 | 198 | 517 | 1085 | 1808 |
| 12.75 CFS | 2306 | 2363 | 2130 | 1858 | 1770 | 1882 | 2114 | 2363 |
| 13.95 CFS | 2548 | 2639 | 2642 | 2577 | 2466 | 2327 | 2175 | 2021 |
| 15.15 CFS | 1870 | 1728 | 1594 | 1471 | 1358 | 1255 | 1162 | 1079 |
| 16.35 CFS | 1005 | 939 | 880 | 828 | 782 | 742 | 707 | 675 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 17.55 CFS | 646 | 620 | 596 | 574 | 555 | 537 | 520 | 505 |
| 18.75 CFS | 492 | 479 | 467 | 455 | 445 | 435 | 425 | 416 |
| 19.95 CFS | 407 | 398 | 389 | 380 | 372 | 364 | 357 | 350 |
| 21.15 CFS | 344 | 338 | 332 | 326 | 321 | 316 | 312 | 307 |
| 22.35 CFS | 303 | 300 | 296 | 293 | 290 | 287 | 285 | 282 |
| 23.55 CFS | 280 | 278 | 276 | 275 | 273 | 270 | 265 | 254 |
| 24.75 CFS | 238 | 217 | 196 | 180 | 169 | 161 | 153 | 144 |
| 25.95 CFS | 133 | 120 | 107 | 93 | 81 | 70 | 59 | 50 |
| 27.15 CFS | 42.25 | 35.43 | 29.61 | 24.66 | 20.48 | 16.97 | 14.04 | 11.59 |
| 28.35 CFS | 9.55 | 7.86 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.40 |
| 29.55 CFS | 1.96 | 1.60 | 1.31 | 1.07 | .88 | .71 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.49 WATERSHED INCHES; 11814 CFS-HRS; 976.3 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.40 | 2122.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 10 | 131 | 567 | 1352 | 1997 | 2083 | 1560 |
| 12.75 CFS | 871 | 590 | 492 | 428 | 386 | 355 | 329 | 306 |
| 13.95 CFS | 287 | 268 | 252 | 238 | 228 | 220 | 214 | 209 |
| 15.15 CFS | 204 | 198 | 192 | 186 | 180 | 174 | 168 | 163 |
| 16.35 CFS | 157 | 152 | 149 | 147 | 145 | 143 | 140 | 138 |
| 17.55 CFS | 136 | 134 | 132 | 130 | 128 | 125 | 123 | 121 |
| 18.75 CFS | 118 | 116 | 114 | 111 | 109 | 107 | 105 | 102 |
| 19.95 CFS | 99.32 | 96.74 | 94.67 | 93.16 | 91.86 | 90.79 | 90.05 | 89.49 |
| 21.15 CFS | 89.10 | 88.93 | 88.66 | 88.50 | 88.25 | 87.91 | 87.34 | 86.78 |
| 22.35 CFS | 86.23 | 85.87 | 85.49 | 84.87 | 84.29 | 83.77 | 83.52 | 83.27 |
| 23.55 CFS | 83.01 | 82.78 | 82.46 | 81.65 | 77.17 | 64.16 | 42.06 | 19.40 |
| 24.75 CFS | 4.66 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.00 WATERSHED INCHES; 3087 CFS-HRS; 255.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.53 | 1733.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 1 | 5 | 24 | 103 | 371 | 839 | 1375 |
| 12.45 CFS | 1686 | 1695 | 1361 | 863 | 516 | 419 | 361 | 324 |
| 13.65 CFS | 297 | 274 | 255 | 238 | 223 | 209 | 198 | 189 |
| 14.85 CFS | 182 | 177 | 172 | 168 | 163 | 158 | 153 | 148 |
| 16.05 CFS | 143 | 138 | 133 | 129 | 125 | 122 | 120 | 119 |
| 17.25 CFS | 117 | 115 | 113 | 111 | 109 | 107 | 106 | 104 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.45 CFS | 102 | 100 | 98 | 96 | 95 | 93 | 91 | 89 |
| 19.65 CFS | 86.96 | 84.91 | 82.83 | 80.65 | 78.62 | 76.91 | 75.64 | 74.58 |
| 20.85 CFS | 73.75 | 73.12 | 72.66 | 72.31 | 72.11 | 71.92 | 71.67 | 71.46 |
| 22.05 CFS | 71.15 | 70.70 | 70.27 | 69.89 | 69.42 | 69.06 | 68.66 | 68.19 |
| 23.25 CFS | 67.77 | 67.50 | 67.33 | 67.03 | 66.83 | 66.40 | 64.43 | 58.31 |
| 24.45 CFS | 47.04 | 32.03 | 17.30 | 5.67 | .61 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.22 WATERSHED INCHES; 2734 CFS-HRS; 225.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.44 | 3771.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 1 | 5 | 33 | 234 | 938 | 2191 | 3372 |
| 12.45 CFS | 3769 | 3255 | 2233 | 1452 | 1008 | 848 | 747 | 679 |
| 13.65 CFS | 626 | 581 | 542 | 506 | 475 | 448 | 425 | 408 |
| 14.85 CFS | 396 | 386 | 376 | 366 | 355 | 344 | 332 | 322 |
| 16.05 CFS | 311 | 300 | 290 | 281 | 274 | 269 | 265 | 261 |
| 17.25 CFS | 257 | 253 | 249 | 245 | 241 | 237 | 233 | 229 |
| 18.45 CFS | 225 | 221 | 217 | 213 | 208 | 204 | 200 | 196 |
| 19.65 CFS | 192 | 187 | 182 | 177 | 173 | 170 | 168 | 165 |
| 20.85 CFS | 164 | 163 | 162 | 161 | 161 | 160 | 160 | 159 |
| 22.05 CFS | 158 | 157 | 156 | 156 | 155 | 154 | 153 | 152 |
| 23.25 CFS | 151 | 151 | 150 | 150 | 149 | 148 | 142 | 122 |
| 24.45 CFS | 89.10 | 51.43 | 21.95 | 5.67 | .61 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.09 WATERSHED INCHES; 5822 CFS-HRS; 481.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.57 | 5080.1 | (NULL) |
| 14.12 | 3146.8 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .40 | .97 | 1.89 | 3.18 | 4.90 | 7.12 | 10.09 | 14.70 |
| 11.55 CFS | 24 | 59 | 270 | 1009 | 2389 | 3889 | 4854 | 5063 |
| 12.75 CFS | 4539 | 3816 | 3138 | 2705 | 2517 | 2560 | 2739 | 2944 |
| 13.95 CFS | 3090 | 3146 | 3117 | 3025 | 2891 | 2735 | 2571 | 2406 |
| 15.15 CFS | 2246 | 2094 | 1949 | 1815 | 1690 | 1576 | 1473 | 1379 |
| 16.35 CFS | 1295 | 1219 | 1154 | 1097 | 1047 | 1003 | 964 | 928 |
| 17.55 CFS | 895 | 865 | 837 | 812 | 788 | 766 | 746 | 727 |
| 18.75 CFS | 708 | 691 | 675 | 660 | 645 | 631 | 617 | 603 |
| 19.95 CFS | 589 | 575 | 562 | 550 | 540 | 530 | 521 | 513 |
| 21.15 CFS | 505 | 499 | 493 | 487 | 481 | 476 | 470 | 465 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22.35 CFS | 460 | 455 | 451 | 447 | 443 | 439 | 436 | 433 |
| 23.55 CFS | 430 | 428 | 426 | 423 | 414 | 393 | 354 | 306 |
| 24.75 CFS | 260 | 222 | 197 | 180 | 169 | 161 | 153 | 144 |
| 25.95 CFS | 133 | 120 | 107 | 93 | 81 | 70 | 59 | 50 |
| 27.15 CFS | 42.25 | 35.43 | 29.61 | 24.66 | 20.48 | 16.97 | 14.04 | 11.59 |
| 28.35 CFS | 9.55 | 7.86 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.40 |
| 29.55 CFS | 1.96 | 1.60 | 1.31 | 1.07 | .88 | .71 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.33 WATERSHED INCHES; 17636 CFS-HRS; 1457.4 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1200.0 FEET) CAN ADD .546 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS
WITH 1074.30 AC-FT ( .08 WATERSHED INCHES) FLOOD STORAGE
REMAINING IN RESERVOIR AT ELEV. 1203.40. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 9.45 | 45.6 | 1200.00 |
| 24.89 | 227.2 | 1206.97 |

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 179 CFS
RESVOR ( 79. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.45 CFS | 45.58 | 45.32 | 45.06 | 44.81 | 44.55 | 44.30 | 44.05 | 43.80 |
| 10.65 CFS | 43.56 | 43.33 | 43.11 | 42.90 | 42.70 | 42.53 | 42.40 | 42.39 |
| 11.85 CFS | 43 | 46 | 56 | 73 | 98 | 125 | 152 | 162 |
| 13.05 CFS | 166 | 169 | 171 | 174 | 176 | 179 | 182 | 185 |
| 14.25 CFS | 188 | 191 | 193 | 195 | 197 | 199 | 201 | 203 |
| 15.45 CFS | 204 | 206 | 207 | 208 | 209 | 210 | 211 | 212 |
| 16.65 CFS | 213 | 214 | 215 | 215 | 216 | 216 | 217 | 217 |
| 17.85 CFS | 218 | 218 | 218 | 219 | 219 | 219 | 220 | 220 |
| 19.05 CFS | 220 | 221 | 221 | 221 | 222 | 222 | 222 | 222 |
| 20.25 CFS | 223 | 223 | 223 | 223 | 223 | 224 | 224 | 224 |
| 21.45 CFS | 224 | 224 | 224 | 225 | 225 | 225 | 225 | 225 |
| 22.65 CFS | 225 | 226 | 226 | 226 | 226 | 226 | 226 | 226 |
| 23.85 CFS | 227 | 227 | 227 | 227 | 227 | 227 | 227 | 227 |
| 25.05 CFS | 227 | 227 | 227 | 227 | 227 | 227 | 227 | 227 |
| 26.25 CFS | 227 | 227 | 227 | 226 | 226 | 226 | 226 | 226 |
| 27.45 CFS | 226 | 226 | 226 | 225 | 225 | 225 | 225 | 225 |
| 28.65 CFS | 225 | 225 | 224 | 224 | 224 | 224 | 224 | 224 |
| 29.85 CFS | 224 | 223 | 223 | 223 | 223 | 223 | 223 | 223 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 31.05 CFS | 222 | 222 | 222 | 222 | 222 | 222 | 221 | 221 |
| 32.25 CFS | 221 | 221 | 221 | 221 | 221 | 220 | 220 | 220 |
| 33.45 CFS | 220 | 220 | 220 | 220 | 219 | 219 | 219 | 219 |
| 34.65 CFS | 219 | 219 | 219 | 218 | 218 | 218 | 218 | 218 |
| 35.85 CFS | 218 | 218 | 217 | 217 | 217 | 217 | 217 | 217 |
| 37.05 CFS | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 215 |
| 38.25 CFS | 215 | 215 | 215 | 215 | 215 | 215 | 214 | 214 |
| 39.45 CFS | 214 | 214 | 214 | 213 | 213 | 213 | 213 | 213 |
| 40.65 CFS | 213 | 212 | 212 | 212 | 212 | 212 | 211 | 211 |
| 41.85 CFS | 211 | 211 | 211 | 211 | 210 | 210 | 210 | 210 |
| 43.05 CFS | 210 | 210 | 209 | 209 | 209 | 209 | 209 | 208 |
| 44.25 CFS | 208 | 208 | 208 | 208 | 208 | 207 | 207 | 207 |
| 45.45 CFS | 207 | 207 | 207 | 206 | 206 | 206 | 206 | 206 |
| 46.65 CFS | 206 | 205 | 205 | 205 | 205 | 205 | 204 | 204 |
| 47.85 CFS | 204 | 204 | 204 | 204 | 203 | 203 | 203 | 203 |
| 49.05 CFS | 203 | 203 | 202 | 202 | 202 | 202 | 202 | 202 |
| 50.25 CFS | 201 | 201 | 201 | 201 | 201 | 201 | 200 | 200 |
| 51.45 CFS | 200 | 200 | 200 | 200 | 199 | 199 | 199 | 199 |
| 52.65 CFS | 199 | 199 | 198 | 198 | 198 | 198 | 198 | 198 |
| 53.85 CFS | 197 | 197 | 197 | 197 | 197 | 197 | 196 | 196 |
| 55.05 CFS | 196 | 196 | 196 | 196 | 195 | 195 | 195 | 195 |
| 56.25 CFS | 195 | 195 | 194 | 194 | 194 | 194 | 194 | 194 |
| 57.45 CFS | 193 | 193 | 193 | 193 | 193 | 193 | 192 | 192 |
| 58.65 CFS | 192 | 192 | 192 | 192 | 191 | 191 | 191 | 191 |
| 59.85 CFS | 191 | 191 | 190 | 190 | 190 | 190 | 190 | 190 |
| 61.05 CFS | 190 | 189 | 189 | 189 | 189 | 189 | 189 | 188 |
| 62.25 CFS | 188 | 188 | 188 | 188 | 188 | 187 | 187 | 187 |
| 63.45 CFS | 187 | 187 | 186 | 186 | 186 | 186 | 186 | 185 |
| 64.65 CFS | 185 | 185 | 185 | 185 | 184 | 184 | 184 | 184 |
| 65.85 CFS | 184 | 183 | 183 | 183 | 183 | 183 | 182 | 182 |
| 67.05 CFS | 182 | 182 | 182 | 181 | 181 | 181 | 181 | 181 |
| 68.25 CFS | 180 | 180 | 180 | 180 | 180 | 179 | 179 | 179 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.89 WATERSHED INCHES; 11854 CFS-HRS; 979.7 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.28 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 2 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.36 | 3560.9 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
HRS MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.70 CFS | .34 | .97 | 2.10 | 3.60 | 5.35 | 7.17 | 9.05 | 10.97 |
| 6.90 CFS | 12.93 | 14.93 | 16.98 | 19.09 | 21.26 | 23.50 | 25.69 | 27.86 |
| 8.10 CFS | 30.04 | 32.42 | 35.28 | 38.77 | 43.02 | 47.91 | 53.24 | 58.80 |
| 9.30 CFS | 64 | 70 | 74 | 79 | 83 | 89 | 98 | 108 |
| 10.50 CFS | 120 | 134 | 150 | 170 | 193 | 221 | 258 | 309 |
| 11.70 CFS | 414 | 759 | 1558 | 2705 | 3483 | 3425 | 2495 | 1338 |
| 12.90 CFS | 723 | 566 | 476 | 419 | 379 | 346 | 320 | 296 |
| 14.10 CFS | 275 | 257 | 241 | 228 | 218 | 211 | 205 | 199 |
| 15.30 CFS | 193 | 186 | 180 | 173 | 167 | 161 | 155 | 149 |
| 16.50 CFS | 144 | 140 | 138 | 136 | 133 | 131 | 128 | 126 |
| 17.70 CFS | 124 | 121 | 119 | 117 | 115 | 112 | 110 | 108 |
| 18.90 CFS | 106 | 103 | 101 | 99 | 97 | 94 | 92 | 89 |
| 20.10 CFS | 86.91 | 84.80 | 83.23 | 81.92 | 80.80 | 79.93 | 79.33 | 78.79 |
| 21.30 CFS | 78.54 | 78.20 | 77.92 | 77.62 | 77.28 | 76.70 | 76.12 | 75.58 |
| 22.50 CFS | 75.05 | 74.68 | 74.10 | 73.52 | 72.93 | 72.59 | 72.32 | 71.97 |
| 23.70 CFS | 71.70 | 71.38 | 70.66 | 67.37 | 58.11 | 41.09 | 22.26 | 7.14 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 4608 CFS-HRS; 380.8 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.88 | 2127.1 | 5.09 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 4608 CFS-HRS; 380.8 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.56 | 1475.8 | 6.20 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 4608 CFS-HRS; 380.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 2955.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.25 CFS | .49 | 1.39 | 2.94 | 5.01 | 7.46 | 10.23 | 13.28 | 16.56 |
| 9.45 CFS | 19.86 | 23.05 | 26.21 | 29.84 | 34.28 | 39.84 | 46.48 | 54.31 |
| 10.65 CFS | 63 | 74 | 88 | 104 | 124 | 150 | 189 | 279 |
| 11.85 CFS | 613 | 1406 | 2474 | 2956 | 2493 | 1476 | 720 | 525 |
| 13.05 CFS | 433 | 377 | 339 | 310 | 285 | 264 | 246 | 229 |
| 14.25 CFS | 214 | 202 | 192 | 185 | 180 | 175 | 170 | 165 |
| 15.45 CFS | 159 | 153 | 148 | 143 | 138 | 133 | 127 | 123 |
| 16.65 CFS | 121 | 119 | 117 | 115 | 113 | 111 | 109 | 107 |
| 17.85 CFS | 105 | 104 | 102 | 100 | 98 | 96 | 94 | 92 |
| 19.05 CFS | 89.94 | 87.94 | 86.09 | 84.15 | 82.33 | 80.09 | 77.68 | 75.63 |
| 20.25 CFS | 74.04 | 72.81 | 71.79 | 70.85 | 70.26 | 69.77 | 69.46 | 69.23 |
| 21.45 CFS | 68.96 | 68.78 | 68.48 | 68.14 | 67.63 | 67.12 | 66.61 | 66.38 |
| 22.65 CFS | 65.95 | 65.35 | 64.83 | 64.44 | 64.25 | 63.92 | 63.77 | 63.45 |
| 23.85 CFS | 63.14 | 62.36 | 58.77 | 46.53 | 28.51 | 11.37 | .00 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 3513 CFS-HRS; 290.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 3128.1 | (NULL) |
| 13.50 | 1780.7 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.75 CFS | .46 | .84 | 1.39 | 2.09 | 2.95 | 3.96 | 5.11 | 6.39 |
| 7.95 CFS | 7.79 | 9.38 | 11.38 | 13.99 | 17.31 | 21.22 | 25.58 | 30.35 |
| 9.15 CFS | 35.52 | 41.10 | 46.94 | 52.96 | 59.24 | 66.30 | 74.45 | 83.93 |
| 10.35 CFS | 95 | 107 | 120 | 136 | 154 | 176 | 202 | 236 |
| 11.55 CFS | 284 | 384 | 730 | 1537 | 2621 | 3127 | 2707 | 1781 |
| 12.75 CFS | 1199 | 1255 | 1448 | 1637 | 1751 | 1781 | 1748 | 1673 |
| 13.95 CFS | 1574 | 1462 | 1346 | 1233 | 1126 | 1027 | 938 | 857 |
| 15.15 CFS | 784 | 718 | 658 | 606 | 559 | 519 | 483 | 451 |
| 16.35 CFS | 423 | 398 | 378 | 360 | 344 | 330 | 316 | 304 |
| 17.55 CFS | 293 | 283 | 275 | 267 | 259 | 252 | 246 | 239 |
| 18.75 CFS | 234 | 228 | 223 | 218 | 213 | 208 | 204 | 199 |
| 19.95 CFS | 194 | 189 | 185 | 181 | 178 | 175 | 172 | 169 |
| 21.15 CFS | 166 | 164 | 162 | 160 | 158 | 156 | 154 | 152 |
| 22.35 CFS | 150 | 149 | 148 | 146 | 145 | 144 | 143 | 142 |
| 23.55 CFS | 141 | 140 | 140 | 138 | 134 | 121 | 103 | 85 |
| 24.75 CFS | 73.30 | 72.19 | 70.00 | 66.33 | 61.22 | 55.12 | 48.73 | 42.47 |
| 25.95 CFS | 36.60 | 31.25 | 26.47 | 22.28 | 18.65 | 15.53 | 12.88 | 10.65 |
| 27.15 CFS | 8.77 | 7.20 | 5.90 | 4.82 | 3.93 | 3.19 | 2.59 | 2.10 |
| 28.35 CFS | 1.70 | 1.37 | 1.11 | .89 | .72 | .58 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 3128.1 | (DIVERT) |
| 13.50 | 1780.7 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | | 4.84 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 6.75 CFS | .46 | .84 | 1.39 | 2.09 | 2.95 | 3.96 | 5.11 | 6.39 |
| 7.95 CFS | 7.79 | 9.38 | 11.38 | 13.99 | 17.31 | 21.22 | 25.58 | 30.35 |
| 9.15 CFS | 35.52 | 41.10 | 46.94 | 52.96 | 59.24 | 66.30 | 74.45 | 83.93 |
| 10.35 CFS | 95 | 107 | 120 | 136 | 154 | 176 | 202 | 236 |
| 11.55 CFS | 284 | 384 | 730 | 1537 | 2621 | 3127 | 2707 | 1781 |
| 12.75 CFS | 1199 | 1255 | 1448 | 1637 | 1751 | 1781 | 1748 | 1673 |
| 13.95 CFS | 1574 | 1462 | 1346 | 1233 | 1126 | 1027 | 938 | 857 |
| 15.15 CFS | 784 | 718 | 658 | 606 | 559 | 519 | 483 | 451 |
| 16.35 CFS | 423 | 398 | 378 | 360 | 344 | 330 | 316 | 304 |
| 17.55 CFS | 293 | 283 | 275 | 267 | 259 | 252 | 246 | 239 |
| 18.75 CFS | 234 | 228 | 223 | 218 | 213 | 208 | 204 | 199 |
| 19.95 CFS | 194 | 189 | 185 | 181 | 178 | 175 | 172 | 169 |
| 21.15 CFS | 166 | 164 | 162 | 160 | 158 | 156 | 154 | 152 |
| 22.35 CFS | 150 | 149 | 148 | 146 | 145 | 144 | 143 | 142 |
| 23.55 CFS | 141 | 140 | 140 | 138 | 134 | 121 | 103 | 85 |
| 24.75 CFS | 73.30 | 72.19 | 70.00 | 66.33 | 61.22 | 55.12 | 48.73 | 42.47 |
| 25.95 CFS | 36.60 | 31.25 | 26.47 | 22.28 | 18.65 | 15.53 | 12.88 | 10.65 |
| 27.15 CFS | 8.77 | 7.20 | 5.90 | 4.82 | 3.93 | 3.19 | 2.59 | 2.10 |
| 28.35 CFS | 1.70 | 1.37 | 1.11 | .89 | .72 | .58 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
176 CFS-HRS; 671.1 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3103.5 | 6.75 |
| 13.65 | 1779.0 | 5.02 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3103.5 | 4.26 |
| 13.65 | 1779.0 | 3.14 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 5581.6 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.70 CFS | .48 | 1.45 | 3.14 | 5.48 | 8.24 | 11.15 | 14.17 | 17.24 |
| 6.90 CFS | 20.37 | 23.55 | 26.79 | 30.14 | 33.59 | 37.17 | 40.72 | 44.22 |
| 8.10 CFS | 47.74 | 51.52 | 55.99 | 61.46 | 68.12 | 75.78 | 84.32 | 93.21 |
| 9.30 CFS | 102 | 111 | 118 | 125 | 133 | 142 | 154 | 171 |
| 10.50 CFS | 190 | 212 | 238 | 269 | 305 | 349 | 406 | 486 |
| 11.70 CFS | 668 | 1188 | 2390 | 4087 | 5423 | 5399 | 4218 | 2407 |
| 12.90 CFS | 1238 | 928 | 776 | 679 | 614 | 561 | 517 | 479 |
| 14.10 CFS | 445 | 415 | 389 | 368 | 352 | 339 | 329 | 320 |
| 15.30 CFS | 310 | 300 | 289 | 278 | 269 | 259 | 249 | 240 |
| 16.50 CFS | 232 | 225 | 221 | 217 | 214 | 210 | 206 | 202 |
| 17.70 CFS | 198 | 195 | 191 | 188 | 184 | 181 | 177 | 173 |
| 18.90 CFS | 170 | 166 | 162 | 159 | 155 | 152 | 148 | 144 |
| 20.10 CFS | 140 | 136 | 134 | 131 | 130 | 128 | 127 | 126 |
| 21.30 CFS | 126 | 125 | 125 | 124 | 124 | 123 | 122 | 121 |
| 22.50 CFS | 120 | 120 | 119 | 118 | 117 | 116 | 116 | 115 |
| 23.70 CFS | 115 | 114 | 113 | 108 | 95 | 69 | 40 | 15 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.1 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.08 | 3079.4 | 4.30 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.64 | 2205.4 | 5.16 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.1 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.64 | 2205.4 | 3.54 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 2177.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | .39 | 1.25 | 2.80 | 4.89 | 7.30 | 9.79 | 12.49 | 15.58 |
| 10.20 CFS | 19.28 | 23.72 | 28.94 | 35.21 | 42.64 | 51.83 | 63.05 | 77.19 |
| 11.40 CFS | 96 | 122 | 195 | 408 | 948 | 1688 | 2157 | 2007 |
| 12.60 CFS | 1402 | 751 | 458 | 370 | 316 | 282 | 258 | 237 |
| 13.80 CFS | 219 | 204 | 190 | 178 | 167 | 159 | 153 | 148 |
| 15.00 CFS | 144 | 140 | 136 | 131 | 127 | 122 | 118 | 114 |
| 16.20 CFS | 110 | 106 | 102 | 100 | 98 | 97 | 95 | 94 |
| 17.40 CFS | 91.92 | 90.32 | 88.68 | 87.17 | 85.73 | 84.23 | 82.61 | 81.00 |
| 18.60 CFS | 79.47 | 77.77 | 76.19 | 74.58 | 72.88 | 71.36 | 69.83 | 68.27 |
| 19.80 CFS | 66.52 | 64.60 | 62.86 | 61.44 | 60.37 | 59.48 | 58.68 | 58.14 |
| 21.00 CFS | 57.72 | 57.42 | 57.27 | 57.02 | 56.86 | 56.65 | 56.41 | 55.99 |
| 22.20 CFS | 55.58 | 55.21 | 54.90 | 54.62 | 54.17 | 53.77 | 53.38 | 53.17 |
| 23.40 CFS | 52.98 | 52.75 | 52.59 | 52.35 | 51.79 | 48.97 | 40.98 | 27.20 |
| 24.60 CFS | 12.99 | 3.32 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.08 WATERSHED INCHES; 2761 CFS-HRS; 228.2 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 2448.8 | (NULL) |
| 13.60 | 2446.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 | CFS | .27 | .60 | 1.12 | 1.87 | 2.86 | 4.08 | 5.53 | 7.20 |
| 7.80 | CFS | 9.07 | 11.13 | 13.37 | 15.77 | 18.33 | 21.03 | 23.84 | 26.85 |
| 9.00 | CFS | 30.23 | 34.35 | 39.42 | 45.37 | 52.04 | 59.24 | 67.12 | 75.82 |
| 10.20 | CFS | 85 | 96 | 108 | 121 | 135 | 152 | 172 | 196 |
| 11.40 | CFS | 226 | 265 | 352 | 583 | 1143 | 1909 | 2413 | 2323 |
| 12.60 | CFS | 1842 | 1423 | 1474 | 1786 | 2102 | 2327 | 2433 | 2442 |
| 13.80 | CFS | 2384 | 2281 | 2151 | 2007 | 1859 | 1713 | 1573 | 1443 |
| 15.00 | CFS | 1321 | 1209 | 1107 | 1014 | 931 | 856 | 790 | 732 |
| 16.20 | CFS | 679 | 632 | 591 | 556 | 524 | 496 | 471 | 448 |
| 17.40 | CFS | 427 | 409 | 392 | 377 | 364 | 352 | 340 | 330 |
| 18.60 | CFS | 320 | 312 | 303 | 296 | 288 | 281 | 275 | 268 |
| 19.80 | CFS | 262 | 256 | 250 | 244 | 239 | 234 | 229 | 225 |
| 21.00 | CFS | 220 | 216 | 213 | 209 | 206 | 202 | 199 | 197 |
| 22.20 | CFS | 194 | 192 | 190 | 188 | 186 | 184 | 182 | 181 |
| 23.40 | CFS | 180 | 178 | 177 | 176 | 174 | 171 | 162 | 147 |
| 24.60 | CFS | 132 | 122 | 117 | 114 | 109 | 102 | 93 | 84 |
| 25.80 | CFS | 74.17 | 65.14 | 56.71 | 49.03 | 42.13 | 36.01 | 30.65 | 25.98 |
| 27.00 | CFS | 21.95 | 18.49 | 15.53 | 13.01 | 10.88 | 9.08 | 7.56 | 6.29 |
| 28.20 | CFS | 5.22 | 4.33 | 3.59 | 2.96 | 2.45 | 2.02 | 1.67 | 1.37 |
| 29.40 | CFS | 1.13 | .93 | .76 | .63 | .51 | .42 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.62 WATERSHED INCHES; 10145 CFS-HRS; 838.4 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 5438.9 | (NULL) |
| 13.62 | 4222.9 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 | CFS | .34 | .80 | 1.56 | 2.70 | 4.22 | 6.14 | 8.44 | 11.11 |
| 7.80 | CFS | 14.12 | 17.45 | 21.08 | 25.07 | 29.61 | 34.88 | 40.99 | 47.87 |
| 9.00 | CFS | 56 | 64 | 75 | 86 | 99 | 112 | 126 | 142 |
| 10.20 | CFS | 160 | 180 | 202 | 227 | 255 | 287 | 325 | 371 |
| 11.40 | CFS | 427 | 500 | 634 | 962 | 1856 | 3405 | 4980 | 5423 |
| 12.60 | CFS | 4568 | 3250 | 2703 | 3040 | 3540 | 3954 | 4178 | 4221 |
| 13.80 | CFS | 4133 | 3958 | 3730 | 3474 | 3210 | 2951 | 2704 | 2475 |
| 15.00 | CFS | 2264 | 2071 | 1895 | 1735 | 1592 | 1465 | 1352 | 1252 |
| 16.20 | CFS | 1164 | 1085 | 1015 | 955 | 903 | 858 | 816 | 778 |
| 17.40 | CFS | 744 | 714 | 686 | 661 | 639 | 618 | 600 | 582 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.60 CFS | 566 | 551 | 537 | 524 | 511 | 499 | 488 | 477 |
| 19.80 CFS | 466 | 455 | 444 | 433 | 424 | 416 | 407 | 400 |
| 21.00 CFS | 392 | 385 | 379 | 373 | 367 | 362 | 357 | 352 |
| 22.20 CFS | 348 | 344 | 340 | 337 | 334 | 330 | 327 | 325 |
| 23.40 CFS | 323 | 320 | 319 | 316 | 314 | 309 | 296 | 269 |
| 24.60 CFS | 236 | 208 | 191 | 186 | 179 | 168 | 154 | 139 |
| 25.80 CFS | 123 | 108 | 94 | 81 | 69 | 59 | 49 | 42 |
| 27.00 CFS | 34.97 | 29.25 | 24.39 | 20.29 | 16.84 | 13.95 | 11.53 | 9.52 |
| 28.20 CFS | 7.84 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.39 | 1.96 |
| 29.40 CFS | 1.60 | 1.30 | 1.06 | .87 | .70 | .57 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.61 WATERSHED INCHES; 18266 CFS-HRS; 1509.5 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 5438.9 | (DIVERT) |
| 13.62 | 4222.9 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .34 | .80 | 1.56 | 2.70 | 4.22 | 6.14 | 8.44 | 11.11 |
| 7.80 CFS | 14.12 | 17.45 | 21.08 | 25.07 | 29.61 | 34.88 | 40.99 | 47.87 |
| 9.00 CFS | 56 | 64 | 75 | 86 | 99 | 112 | 126 | 142 |
| 10.20 CFS | 160 | 180 | 202 | 227 | 255 | 287 | 325 | 371 |
| 11.40 CFS | 427 | 500 | 634 | 962 | 1856 | 3405 | 4980 | 5423 |
| 12.60 CFS | 4568 | 3250 | 2703 | 3040 | 3540 | 3954 | 4178 | 4221 |
| 13.80 CFS | 4133 | 3958 | 3730 | 3474 | 3210 | 2951 | 2704 | 2475 |
| 15.00 CFS | 2264 | 2071 | 1895 | 1735 | 1592 | 1465 | 1352 | 1252 |
| 16.20 CFS | 1164 | 1085 | 1015 | 955 | 903 | 858 | 816 | 778 |
| 17.40 CFS | 744 | 714 | 686 | 661 | 639 | 618 | 600 | 582 |
| 18.60 CFS | 566 | 551 | 537 | 524 | 511 | 499 | 488 | 477 |
| 19.80 CFS | 466 | 455 | 444 | 433 | 424 | 416 | 407 | 400 |
| 21.00 CFS | 392 | 385 | 379 | 373 | 367 | 362 | 357 | 352 |
| 22.20 CFS | 348 | 344 | 340 | 337 | 334 | 330 | 327 | 325 |
| 23.40 CFS | 323 | 320 | 319 | 316 | 314 | 309 | 296 | 269 |
| 24.60 CFS | 236 | 208 | 191 | 186 | 179 | 168 | 154 | 139 |
| 25.80 CFS | 123 | 108 | 94 | 81 | 69 | 59 | 49 | 42 |
| 27.00 CFS | 34.97 | 29.25 | 24.39 | 20.29 | 16.84 | 13.95 | 11.53 | 9.52 |
| 28.20 CFS | 7.84 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.39 | 1.96 |
| 29.40 CFS | 1.60 | 1.30 | 1.06 | .87 | .70 | .57 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.61 WATERSHED INCHES; 18266 CFS-HRS; 1509.5 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
182 CFS-HRS; 1509.5 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.60 | 5284.0 | 5.65 |
| 13.81 | 4203.8 | 4.99 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.61 WATERSHED INCHES; 18264 CFS-HRS; 1509.3 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.14 | 3017.4 | (RUNOFF) |
| 21.36 | 47.5 | (RUNOFF) |
| 22.28 | 45.8 | (RUNOFF) |
| 22.88 | 44.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 1.47 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.40 CFS | .23 | .86 | 1.83 | 2.90 | 3.99 | 5.13 | 6.29 | 7.50 |
| 6.60 CFS | 8.72 | 9.95 | 11.17 | 12.44 | 13.81 | 15.13 | 16.61 | 18.05 |
| 7.80 CFS | 19.25 | 20.51 | 22.08 | 23.92 | 26.29 | 29.33 | 32.65 | 36.22 |
| 9.00 CFS | 39.69 | 43.35 | 46.89 | 49.23 | 51.20 | 53.92 | 58.31 | 64.38 |
| 10.20 CFS | 71 | 79 | 89 | 99 | 112 | 127 | 145 | 169 |
| 11.40 CFS | 202 | 249 | 418 | 1018 | 2294 | 3010 | 1975 | 731 |
| 12.60 CFS | 465 | 363 | 301 | 268 | 241 | 219 | 202 | 188 |
| 13.80 CFS | 174 | 162 | 151 | 142 | 135 | 130 | 127 | 124 |
| 15.00 CFS | 120 | 116 | 112 | 108 | 103 | 100 | 97 | 93 |
| 16.20 CFS | 88.45 | 85.66 | 84.53 | 83.59 | 81.94 | 80.20 | 79.02 | 77.69 |
| 17.40 CFS | 75.82 | 74.44 | 73.51 | 72.19 | 70.47 | 69.38 | 67.83 | 66.41 |
| 18.60 CFS | 65.29 | 63.55 | 62.36 | 60.99 | 59.26 | 58.30 | 57.21 | 55.38 |
| 19.80 CFS | 53.51 | 52.08 | 51.10 | 50.21 | 49.43 | 48.96 | 48.24 | 48.15 |
| 21.00 CFS | 48.03 | 47.50 | 47.54 | 47.54 | 47.06 | 46.95 | 46.79 | 45.96 |
| 22.20 CFS | 45.73 | 45.74 | 45.54 | 44.73 | 44.46 | 44.48 | 43.96 | 43.89 |
| 23.40 CFS | 43.83 | 43.50 | 43.31 | 43.20 | 42.33 | 36.27 | 18.23 | 2.58 |
| 24.60 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.99 WATERSHED INCHES; 2836 CFS-HRS; 234.3 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.39 | 1957.2 | 5.36 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.99 WATERSHED INCHES; 2836 CFS-HRS; 234.3 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.71 | 1427.4 | 4.38 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.99 WATERSHED INCHES; 2836 CFS-HRS; 234.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.62 | 6687.0 | (NULL) |
| 13.72 | 4667.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.00 CFS | .43 | .88 | 1.48 | 2.23 | 3.15 | 4.29 | 5.72 | 7.49 |
| 7.20 CFS | 9.66 | 12.26 | 15.29 | 18.75 | 22.62 | 26.88 | 31.46 | 36.34 |
| 8.40 CFS | 42 | 47 | 54 | 62 | 71 | 81 | 92 | 105 |
| 9.60 CFS | 119 | 135 | 151 | 167 | 186 | 207 | 230 | 257 |
| 10.80 CFS | 287 | 322 | 361 | 407 | 463 | 530 | 617 | 762 |
| 12.00 CFS | 1098 | 2014 | 3745 | 5737 | 6675 | 6117 | 4811 | 3976 |
| 13.20 CFS | 3952 | 4227 | 4507 | 4652 | 4644 | 4517 | 4308 | 4050 |
| 14.40 CFS | 3768 | 3480 | 3199 | 2933 | 2687 | 2462 | 2257 | 2070 |
| 15.60 CFS | 1900 | 1748 | 1612 | 1492 | 1385 | 1290 | 1205 | 1129 |
| 16.80 CFS | 1064 | 1007 | 957 | 913 | 872 | 835 | 802 | 772 |
| 18.00 CFS | 745 | 721 | 699 | 678 | 659 | 641 | 625 | 609 |
| 19.20 CFS | 594 | 580 | 566 | 553 | 541 | 528 | 516 | 503 |
| 20.40 CFS | 491 | 481 | 471 | 461 | 452 | 444 | 437 | 430 |
| 21.60 CFS | 423 | 417 | 411 | 406 | 401 | 396 | 392 | 387 |
| 22.80 CFS | 384 | 380 | 377 | 374 | 371 | 368 | 366 | 363 |
| 24.00 CFS | 361 | 358 | 353 | 341 | 313 | 275 | 239 | 214 |
| 25.20 CFS | 202 | 191 | 178 | 162 | 146 | 129 | 113 | 98 |
| 26.40 CFS | 84.20 | 71.96 | 61.16 | 51.73 | 43.58 | 36.58 | 30.60 | 25.53 |
| 27.60 CFS | 21.24 | 17.64 | 14.62 | 12.09 | 9.98 | 8.22 | 6.77 | 5.57 |
| 28.80 CFS | 4.57 | 3.75 | 3.07 | 2.52 | 2.06 | 1.68 | 1.37 | 1.12 |
| 30.00 CFS | .91 | .74 | .60 | .49 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.66 WATERSHED INCHES; 21100 CFS-HRS; 1743.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 5366.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 4.78 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 8.40 CFS | .08 | .63 | 2.13 | 5.05 | 9.35 | 14.65 | 20.55 | 26.65 |
| 9.60 CFS | 33 | 39 | 46 | 54 | 63 | 75 | 89 | 106 |
| 10.80 CFS | 125 | 149 | 178 | 215 | 263 | 335 | 513 | 1060 |
| 12.00 CFS | 2437 | 4291 | 5327 | 4955 | 3355 | 1745 | 1077 | 887 |
| 13.20 CFS | 758 | 679 | 618 | 568 | 526 | 489 | 455 | 425 |
| 14.40 CFS | 401 | 381 | 366 | 355 | 346 | 336 | 326 | 315 |
| 15.60 CFS | 303 | 293 | 283 | 273 | 263 | 253 | 244 | 239 |
| 16.80 CFS | 235 | 232 | 228 | 224 | 220 | 216 | 212 | 208 |
| 18.00 CFS | 205 | 201 | 197 | 193 | 190 | 186 | 182 | 178 |
| 19.20 CFS | 174 | 170 | 166 | 163 | 159 | 154 | 150 | 146 |
| 20.40 CFS | 144 | 142 | 140 | 139 | 138 | 137 | 137 | 136 |
| 21.60 CFS | 136 | 135 | 134 | 133 | 132 | 132 | 131 | 130 |
| 22.80 CFS | 129 | 128 | 127 | 127 | 126 | 126 | 125 | 125 |
| 24.00 CFS | 124 | 117 | 97 | 64 | 30 | 0 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.20 WATERSHED INCHES; 6779 CFS-HRS; 560.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 3789.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 3.48 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.65 CFS | .34 | 1.02 | 2.20 | 3.98 | 6.21 | 8.79 | 11.68 | 14.95 |
| 8.85 CFS | 18.73 | 23.03 | 27.81 | 32.98 | 38.30 | 43.54 | 48.66 | 53.93 |
| 10.05 CFS | 60 | 67 | 76 | 87 | 100 | 115 | 133 | 155 |
| 11.25 CFS | 182 | 215 | 261 | 357 | 621 | 1288 | 2308 | 3320 |
| 12.45 CFS | 3780 | 3543 | 2634 | 1521 | 877 | 686 | 583 | 518 |
| 13.65 CFS | 471 | 433 | 400 | 372 | 347 | 324 | 306 | 291 |
| 14.85 CFS | 279 | 270 | 263 | 255 | 247 | 239 | 230 | 222 |
| 16.05 CFS | 214 | 206 | 199 | 192 | 186 | 182 | 178 | 176 |
| 17.25 CFS | 173 | 169 | 166 | 163 | 160 | 158 | 155 | 152 |
| 18.45 CFS | 149 | 146 | 143 | 140 | 137 | 134 | 131 | 129 |
| 19.65 CFS | 126 | 123 | 120 | 116 | 113 | 111 | 109 | 107 |
| 20.85 CFS | 106 | 105 | 104 | 103 | 103 | 103 | 102 | 102 |
| 22.05 CFS | 101 | 101 | 100 | 99 | 99 | 98 | 97 | 97 |
| 23.25 CFS | 95.98 | 95.54 | 95.25 | 94.74 | 94.41 | 93.80 | 90.87 | 82.34 |
| 24.45 CFS | 66.46 | 45.14 | 24.24 | 8.03 | .73 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.41 WATERSHED INCHES; 5420 CFS-HRS; 447.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 8933.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 8.26 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.65 CFS | .34 | 1.02 | 2.20 | 3.98 | 6.21 | 8.88 | 12.31 | 17.07 |
| 8.85 CFS | 23.77 | 32.38 | 42.46 | 53.53 | 64.95 | 76.31 | 87.58 | 99.60 |
| 10.05 CFS | 114 | 131 | 151 | 176 | 206 | 240 | 282 | 333 |
| 11.25 CFS | 396 | 477 | 597 | 871 | 1680 | 3726 | 6600 | 8648 |
| 12.45 CFS | 8735 | 6899 | 4380 | 2598 | 1764 | 1444 | 1262 | 1136 |
| 13.65 CFS | 1040 | 959 | 889 | 827 | 772 | 725 | 686 | 657 |
| 14.85 CFS | 634 | 616 | 599 | 581 | 562 | 542 | 523 | 505 |
| 16.05 CFS | 487 | 469 | 452 | 436 | 425 | 417 | 410 | 403 |
| 17.25 CFS | 396 | 389 | 382 | 375 | 369 | 362 | 356 | 349 |
| 18.45 CFS | 342 | 336 | 329 | 322 | 315 | 308 | 302 | 295 |
| 19.65 CFS | 289 | 281 | 273 | 266 | 260 | 255 | 251 | 247 |
| 20.85 CFS | 245 | 242 | 241 | 240 | 239 | 238 | 237 | 236 |
| 22.05 CFS | 235 | 233 | 232 | 230 | 229 | 227 | 225 | 224 |
| 23.25 CFS | 223 | 222 | 221 | 220 | 219 | 217 | 207 | 179 |
| 24.45 CFS | 130 | 75 | 24 | 8 | 1 | 0 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 12200 CFS-HRS; 1008.2 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.48 | 14530.5 | (NULL) |
| 13.63 | 5693.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 20.57 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.00 CFS | .43 | .88 | 1.48 | 2.23 | 3.15 | 4.29 | 5.72 | 7.49 |
| 7.20 CFS | 9.66 | 12.27 | 15.37 | 19.09 | 23.64 | 29.08 | 35.44 | 42.55 |
| 8.40 CFS | 50 | 60 | 71 | 86 | 103 | 123 | 146 | 170 |
| 9.60 CFS | 196 | 222 | 250 | 281 | 316 | 358 | 407 | 463 |
| 10.80 CFS | 528 | 604 | 694 | 804 | 940 | 1127 | 1487 | 2442 |
| 12.00 CFS | 4824 | 8613 | 12392 | 14472 | 13574 | 10496 | 7409 | 5739 |
| 13.20 CFS | 5397 | 5490 | 5643 | 5692 | 5603 | 5405 | 5134 | 4822 |
| 14.40 CFS | 4493 | 4166 | 3856 | 3567 | 3303 | 3060 | 2837 | 2631 |
| 15.60 CFS | 2442 | 2271 | 2117 | 1979 | 1854 | 1742 | 1641 | 1554 |
| 16.80 CFS | 1481 | 1417 | 1361 | 1309 | 1261 | 1217 | 1177 | 1141 |
| 18.00 CFS | 1107 | 1077 | 1048 | 1020 | 995 | 970 | 947 | 924 |
| 19.20 CFS | 902 | 881 | 861 | 842 | 822 | 802 | 782 | 763 |
| 20.40 CFS | 746 | 731 | 718 | 706 | 695 | 685 | 677 | 669 |
| 21.60 CFS | 661 | 654 | 648 | 641 | 634 | 628 | 622 | 616 |
| 22.80 CFS | 611 | 606 | 601 | 596 | 592 | 589 | 585 | 582 |
| 24.00 CFS | 578 | 566 | 533 | 471 | 388 | 299 | 247 | 215 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 25.20 CFS | 202 | 191 | 178 | 162 | 146 | 129 | 113 | 98 |
| 26.40 CFS | 84.20 | 71.96 | 61.16 | 51.73 | 43.58 | 36.58 | 30.60 | 25.53 |
| 27.60 CFS | 21.24 | 17.64 | 14.62 | 12.09 | 9.98 | 8.22 | 6.77 | 5.57 |
| 28.80 CFS | 4.57 | 3.75 | 3.07 | 2.52 | 2.06 | 1.68 | 1.37 | 1.12 |
| 30.00 CFS | .91 | .74 | .60 | .49 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 33301 CFS-HRS; 2752.0 ACRE-FEET.

--- XSECTION 76, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1200.0 FEET) CAN ADD .546 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 2138.16 AC-FT ( .16 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1208.35. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 4.95 | 45.6 | 1200.00 |
| 24.75 | 307.9 | 1211.32 |

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 245 CFS
RESVOR ( 79. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4.95 CFS | 45.58 | 45.32 | 45.06 | 44.81 | 44.55 | 44.30 | 44.05 | 43.80 |
| 6.15 CFS | 43.56 | 43.32 | 43.08 | 42.85 | 42.63 | 42.41 | 42.21 | 42.02 |
| 7.35 CFS | 41.84 | 41.68 | 41.55 | 41.43 | 41.35 | 41.29 | 41.28 | 41.31 |
| 8.55 CFS | 41.39 | 41.53 | 41.74 | 42.03 | 42.44 | 42.96 | 43.61 | 44.41 |
| 9.75 CFS | 45.34 | 46.42 | 47.67 | 49.10 | 50.73 | 52.62 | 54.79 | 57.29 |
| 10.95 CFS | 60 | 64 | 67 | 72 | 77 | 84 | 95 | 115 |
| 12.15 CFS | 153 | 169 | 183 | 196 | 206 | 213 | 218 | 221 |
| 13.35 CFS | 225 | 229 | 232 | 236 | 239 | 242 | 245 | 248 |
| 14.55 CFS | 250 | 252 | 254 | 256 | 257 | 259 | 260 | 262 |
| 15.75 CFS | 263 | 264 | 265 | 266 | 268 | 270 | 272 | 273 |
| 16.95 CFS | 275 | 276 | 278 | 279 | 280 | 281 | 283 | 284 |
| 18.15 CFS | 285 | 286 | 287 | 288 | 288 | 289 | 290 | 291 |
| 19.35 CFS | 292 | 292 | 293 | 294 | 295 | 295 | 296 | 296 |
| 20.55 CFS | 297 | 297 | 298 | 299 | 299 | 300 | 300 | 300 |
| 21.75 CFS | 301 | 301 | 302 | 302 | 303 | 303 | 303 | 304 |
| 22.95 CFS | 304 | 305 | 305 | 305 | 306 | 306 | 306 | 307 |
| 24.15 CFS | 307 | 307 | 308 | 308 | 308 | 308 | 308 | 308 |
| 25.35 CFS | 308 | 307 | 307 | 307 | 307 | 307 | 306 | 306 |
| 26.55 CFS | 306 | 305 | 305 | 305 | 304 | 304 | 304 | 303 |
| 27.75 CFS | 303 | 303 | 302 | 302 | 302 | 301 | 301 | 300 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 28.95 CFS | 300 | 300 | 299 | 299 | 298 | 298 | 298 | 297 |
| 30.15 CFS | 297 | 297 | 296 | 296 | 295 | 295 | 295 | 294 |
| 31.35 CFS | 294 | 294 | 293 | 293 | 292 | 292 | 292 | 291 |
| 32.55 CFS | 291 | 291 | 290 | 290 | 289 | 289 | 289 | 288 |
| 33.75 CFS | 288 | 288 | 287 | 287 | 286 | 286 | 286 | 285 |
| 34.95 CFS | 285 | 285 | 284 | 284 | 284 | 283 | 283 | 282 |
| 36.15 CFS | 282 | 282 | 281 | 281 | 281 | 280 | 280 | 280 |
| 37.35 CFS | 279 | 279 | 279 | 278 | 278 | 277 | 277 | 277 |
| 38.55 CFS | 276 | 276 | 276 | 275 | 275 | 275 | 274 | 274 |
| 39.75 CFS | 274 | 273 | 273 | 273 | 272 | 272 | 271 | 271 |
| 40.95 CFS | 271 | 270 | 270 | 270 | 269 | 269 | 269 | 268 |
| 42.15 CFS | 268 | 268 | 267 | 267 | 267 | 266 | 266 | 266 |
| 43.35 CFS | 265 | 265 | 265 | 265 | 265 | 265 | 264 | 264 |
| 44.55 CFS | 264 | 264 | 264 | 264 | 264 | 263 | 263 | 263 |
| 45.75 CFS | 263 | 263 | 263 | 263 | 262 | 262 | 262 | 262 |
| 46.95 CFS | 262 | 262 | 261 | 261 | 261 | 261 | 261 | 261 |
| 48.15 CFS | 261 | 260 | 260 | 260 | 260 | 260 | 260 | 260 |
| 49.35 CFS | 259 | 259 | 259 | 259 | 259 | 259 | 259 | 258 |
| 50.55 CFS | 258 | 258 | 258 | 258 | 258 | 257 | 257 | 257 |
| 51.75 CFS | 257 | 257 | 257 | 257 | 256 | 256 | 256 | 256 |
| 52.95 CFS | 256 | 256 | 256 | 255 | 255 | 255 | 255 | 255 |
| 54.15 CFS | 255 | 255 | 254 | 254 | 254 | 254 | 254 | 254 |
| 55.35 CFS | 254 | 253 | 253 | 253 | 253 | 253 | 253 | 253 |
| 56.55 CFS | 252 | 252 | 252 | 252 | 252 | 252 | 252 | 251 |
| 57.75 CFS | 251 | 251 | 251 | 251 | 251 | 251 | 250 | 250 |
| 58.95 CFS | 250 | 250 | 250 | 250 | 250 | 249 | 249 | 249 |
| 60.15 CFS | 249 | 249 | 249 | 249 | 248 | 248 | 248 | 248 |
| 61.35 CFS | 248 | 248 | 248 | 247 | 247 | 247 | 247 | 247 |
| 62.55 CFS | 247 | 247 | 246 | 246 | 246 | 246 | 246 | 246 |
| 63.75 CFS | 246 | 246 | 245 | 245 | 245 | 245 | 245 | 245 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.10 WATERSHED INCHES; 14646 CFS-HRS; 1210.4 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 2

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINFALL OF 4.28 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs. | | | | | | | |
| RAINTABLE NUMBER 2, ARC 1 | | | | | | | |
| MAIN TIME INCREMENT .150 HOURS | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 1.75 | --- | 12.39 | 2111 | 858.1 |
| XSECTION 5 | REACH | 2.46 | 1.75 | 4.15 | 13.06 | 1263 | 513.4 |
| XSECTION 10 | REACH | 2.46 | 1.75 | 5.33 | 13.71 | 908 | 369.1 |
| XSECTION 2 | RUNOFF | 2.38 | 1.08 | --- | 12.35 | 1217 | 511.3 |
| XSECTION 12 | ADDHYD | 4.84 | 1.42 | --- | 12.35 | 1246 | 257.4 |
| XSECTION 12 | DIVERT | 4.84 | 1.42 | --- | 12.35 | 1246 | 257.4 |
| XSECTION 200 | DIVERT | .00 | 1.42 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 1.42 | 3.99 | 12.54 | 1181 | 244.0 |
| XSECTION 25 | REACH | 4.84 | 1.42 | 2.48 | 12.70 | 1166 | 240.9 |
| XSECTION 3 | RUNOFF | 3.94 | 1.75 | --- | 12.41 | 3318 | 842.1 |
| XSECTION 30 | REACH | 3.94 | 1.75 | 3.69 | 13.26 | 1740 | 441.6 |
| XSECTION 5 | REACH | 3.94 | 1.75 | 4.15 | 13.86 | 1259 | 319.5 |
| XSECTION 25 | REACH | 3.94 | 1.75 | 2.58 | 14.02 | 1257 | 319.0 |
| XSECTION 4 | RUNOFF | 2.06 | .87 | --- | 12.42 | 752 | 365.0 |
| XSECTION 34 | ADDHYD | 6.00 | 1.45 | --- | 14.00 | 1366 | 227.7 |
| XSECTION 35 | ADDHYD | 10.84 | 1.44 | --- | 14.01 | 2431 | 224.3 |
| XSECTION 35 | DIVERT | 10.84 | 1.44 | --- | 14.01 | 2431 | 224.3 |
| XSECTION 199 | DIVERT | .00 | 1.44 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 1.44 | 3.62 | 14.26 | 2395 | 220.9 |
| XSECTION 6 | RUNOFF | 1.47 | 1.85 | --- | 12.15 | 1882 | 1280.3 |
| XSECTION 60 | REACH | 1.47 | 1.85 | 4.51 | 12.58 | 1097 | 746.3 |
| XSECTION 67 | REACH | 1.47 | 1.85 | 3.50 | 12.93 | 798 | 542.9 |
| XSECTION 64 | ADDHYD | 12.31 | 1.49 | --- | 14.18 | 2650 | 215.3 |
| XSECTION 5 | RUNOFF | 4.78 | 1.00 | --- | 12.40 | 2122 | 443.9 |
| XSECTION 7 | RUNOFF | 3.48 | 1.22 | --- | 12.53 | 1734 | 498.3 |
| XSECTION 75 | ADDHYD | 8.26 | 1.09 | --- | 12.44 | 3771 | 456.5 |
| XSECTION 76 | ADDHYD | 20.57 | 1.33 | --- | 12.57 | 5080 | 247.0 |
| STRUCTURE 1 | RESVOR | 20.57 | .89 | 1206.97 | 24.89T | 227T | 11.0 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINTABLE NUMBER 2, ARC 2 | | | | | | | |
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 2.90 | --- | 12.36 | 3561 | 1447.6 |
| XSECTION 5 | REACH | 2.46 | 2.90 | 5.09 | 12.88 | 2127 | 864.6 |
| XSECTION 10 | REACH | 2.46 | 2.90 | 6.20 | 13.56 | 1476 | 600.0 |
| XSECTION 2 | RUNOFF | 2.38 | 2.29 | --- | 12.30 | 2956 | 1242.0 |
| XSECTION 12 | ADDHYD | 4.84 | 2.60 | --- | 12.31 | 3128 | 646.3 |
| XSECTION 12 | DIVERT | 4.84 | 2.60 | --- | 12.31 | 3128 | 646.3 |
| XSECTION 200 | DIVERT | .00 | 2.60 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 2.60 | 6.75 | 12.46 | 3103 | 641.1 |
| XSECTION 25 | REACH | 4.84 | 2.60 | 4.26 | 12.46 | 3103 | 641.1 |
| XSECTION 3 | RUNOFF | 3.94 | 2.90 | --- | 12.37 | 5582 | 1416.8 |
| XSECTION 30 | REACH | 3.94 | 2.90 | 4.30 | 13.08 | 3079 | 781.5 |
| XSECTION 5 | REACH | 3.94 | 2.90 | 5.16 | 13.64 | 2205 | 559.6 |
| XSECTION 25 | REACH | 3.94 | 2.90 | 3.54 | 13.64 | 2205 | 559.6 |
| XSECTION 4 | RUNOFF | 2.06 | 2.08 | --- | 12.34 | 2178 | 1057.3 |
| XSECTION 34 | ADDHYD | 6.00 | 2.62 | --- | 12.35 | 2449 | 408.2 |
| XSECTION 35 | ADDHYD | 10.84 | 2.61 | --- | 12.43 | 5439 | 501.8 |
| XSECTION 35 | DIVERT | 10.84 | 2.61 | --- | 12.43 | 5439 | 501.8 |
| XSECTION 199 | DIVERT | .00 | 2.61 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 2.61 | 5.65 | 12.60 | 5284 | 487.5 |
| XSECTION 6 | RUNOFF | 1.47 | 2.99 | --- | 12.14 | 3017 | 2052.4 |
| XSECTION 60 | REACH | 1.47 | 2.99 | 5.36 | 12.39 | 1957 | 1331.3 |
| XSECTION 67 | REACH | 1.47 | 2.99 | 4.38 | 12.71 | 1427 | 970.7 |
| XSECTION 64 | ADDHYD | 12.31 | 2.66 | --- | 12.62 | 6687 | 543.2 |
| XSECTION 5 | RUNOFF | 4.78 | 2.20 | --- | 12.34 | 5366 | 1122.6 |
| XSECTION 7 | RUNOFF | 3.48 | 2.41 | --- | 12.47 | 3789 | 1088.8 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 75 | ADDHYD | 8.26 | 2.29 | --- | 12.38 | 8934 | 1081.6 |
| XSECTION 76 | ADDHYD | 20.57 | 2.51 | --- | 12.48 | 14531 | 706.4 |
| STRUCTURE 1 | RESVOR | 20.57 | 1.10 | 1211.32 | 24.75T | 308T | 15.0 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| | | | HYDROGRAPH INFORMATION | | | | ROUTING PARAMETERS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | INFLOW | | OUTFLOW | | Q-A EQ. | | | PEAK | ATT- |
| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | PEAK (CFS) | TIME (HR) | PEAK (CFS) | TIME (HR) | COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | RATIO Q/I (Q*) | KIN COEFF (C) |
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 2064 | 12.4 | 1263 | 13.1 | .82 | 1.23 | .451 | .612 | .23 |
| 10 | 9100 | | 1263 | 13.1 | 905 | 13.6 | .81 | 1.27 | .215 | .716 | .25 |
| 20 | 3332 | | 1222 | 12.3 | 1155 | 12.6 | .11 | 1.67 | .007 | .945 | .79? |
| 25 | 1950 | | 1155 | 12.6 | 1151 | 12.8 | .046 | 1.75 | .004 | .996 | .92? |
| 30 | 8865 | | 3285 | 12.4 | 1721 | 13.2 | 1.15 | 1.13 | .591 | .524 | .18 |
| 5 | 8865 | | 1721 | 13.2 | 1255 | 13.8 | .80 | 1.24 | .201 | .729 | .23 |
| 25 | 1950 | | 1255 | 13.8 | 1252 | 13.9 | .046 | 1.75 | .004 | .998 | .94? |
| 45 | 4200 | | 2423 | 13.9 | 2395 | 14.3 | .045 | 1.73 | .008 | .988 | .67? |
| 60 | 7540 | | 1882 | 12.1 | 1094 | 12.6 | .60 | 1.31 | .454 | .581 | .32 |
| 67 | 5140 | | 1094 | 12.6 | 795 | 12.9 | .68 | 1.27 | .193 | .727 | .36 |
| ALTERNATE 2 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 3483 | 12.3 | 2125 | 12.9 | 1.22 | 1.16 | .477 | .610 | .22 |
| 10 | 9100 | | 2125 | 12.9 | 1471 | 13.5 | 1.51 | 1.14 | .271 | .692 | .22 |
| 20 | 3332 | | 3127 | 12.3 | 3100 | 12.4 | .14 | 1.64 | .008 | .991 | .95? |
| 25 | 1950 | | 3100 | 12.4 | 3100 | 12.4 | .050 | 1.74 | .004 | 1.000 | 1.00? |
| 30 | 8865 | | 5423 | 12.3 | 3073 | 13.1 | 1.23 | 1.12 | .562 | .567 | .19 |
| 5 | 8865 | | 3073 | 13.1 | 2205 | 13.6 | 1.21 | 1.16 | .237 | .718 | .22 |
| 25 | 1950 | | 2205 | 13.6 | 2205 | 13.6 | .047 | 1.74 | .003 | 1.000 | 1.00? |
| 45 | 4200 | | 5423 | 12.4 | 5284 | 12.6 | .047 | 1.73 | .007 | .974 | .82? |
| 60 | 7540 | | 3010 | 12.1 | 1914 | 12.4 | .49 | 1.35 | .359 | .636 | .37 |
| 67 | 5140 | | 1914 | 12.4 | 1421 | 12.8 | .89 | 1.22 | .211 | .742 | .36 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE 1 | | 20.57 | |
| ALTERNATE | 1 | | 227 |
| ALTERNATE | 2 | | 308 |
| XSECTION 1 | | 2.46 | |
| ALTERNATE | 1 | | 2111 |
| ALTERNATE | 2 | | 3561 |
| XSECTION 2 | | 2.38 | |
| ALTERNATE | 1 | | 1217 |
| ALTERNATE | 2 | | 2956 |
| XSECTION 3 | | 3.94 | |
| ALTERNATE | 1 | | 3318 |
| ALTERNATE | 2 | | 5582 |
| XSECTION 4 | | 2.06 | |
| ALTERNATE | 1 | | 752 |
| ALTERNATE | 2 | | 2178 |
| XSECTION 5 | | 4.78 | |
| ALTERNATE | 1 | | 2122 |
| ALTERNATE | 2 | | 5366 |
| XSECTION 6 | | 1.47 | |
| ALTERNATE | 1 | | 1882 |
| ALTERNATE | 2 | | 3017 |
| XSECTION 7 | | 3.48 | |
| ALTERNATE | 1 | | 1734 |
| ALTERNATE | 2 | | 3789 |
| XSECTION 10 | | 2.46 | |
| ALTERNATE | 1 | | 908 |
| ALTERNATE | 2 | | 1476 |
| XSECTION 12 | | 4.84 | |
| ALTERNATE | 1 | | 1246 |
| ALTERNATE | 2 | | 3128 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 20 | | 4.84 | |
| ALTERNATE | 1 | | 1181 |
| ALTERNATE | 2 | | 3103 |
| XSECTION 25 | | 3.94 | |
| ALTERNATE | 1 | | 1257 |
| ALTERNATE | 2 | | 2205 |
| XSECTION 30 | | 3.94 | |
| ALTERNATE | 1 | | 1740 |
| ALTERNATE | 2 | | 3079 |
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 1366 |
| ALTERNATE | 2 | | 2449 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 2431 |
| ALTERNATE | 2 | | 5439 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 2395 |
| ALTERNATE | 2 | | 5284 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 1097 |
| ALTERNATE | 2 | | 1957 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 2650 |
| ALTERNATE | 2 | | 6687 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 798 |
| ALTERNATE | 2 | | 1427 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 3771 |
| ALTERNATE | 2 | | 8934 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 5080 |
| ALTERNATE | 2 | | 14531 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

```
TR20 ------------------------------------------------------------------------ SCS -
WT100YR   WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
08/12/**  200-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spil2.04TEST


END OF  1 JOBS IN THIS RUN




                    SCS  TR-20,  VERSION 2.04TEST
                           WT100YR   FILES

     INPUT  = 200INN.DAT                                , GIVEN DATA FILE
     OUTPUT = 200OUT.OUT                                , DATED 08/12/**,11:06:28

              FILES GENERATED - DATED 08/12/**,11:06:28

    FILE 111.TRD CONTAINS READHD INFORMATION


          TOTAL NUMBER OF WARNINGS =   4,  MESSAGES =   8

                        JOB ENDED AT 11:06:28
                    *** TR-20 RUN COMPLETED ***
```

URS

# CALCULATION PACKAGE NO. C-9

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **RESERVOIR ROUTING OF 100-YEAR, 200-YEAR & 500-YEAR 24-HOUR HYDROGRAPHS FOR FUTURE CONDITON (PRINCIPAL SPILLWAY OPEN)**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 08/12/04

Checked by: Todd Ringsmuth Date: 8-17-04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 4.

Calculation Approved by: Todd Ringsmuth 8-17-04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# RESERVOIR ROUTING OF 100-YEAR, 200-YEAR & 500-YEAR 24-HOUR HYDROGRAPHS FOR FUTURE CONDITON (PRINCIPAL SPILLWAY OPEN)

(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
23443748

## PROBLEM STATEMENT

This particular calculation package addresses the reservoir routing results for 100-year, 200-year and 500-year 24-hour hydrographs for the **Future Condition (Principal Spillway Open).**

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

### FUTRE CONDITION (Principal Spillway Open)

The Future Condition (Principal Spillway Open) represents the time period following construction of the downstream conveyance channel and the principal spillway is opened. The inlet to the principal spillway is set at elevation 1,200 feet (NAVD 88). It is assumed that the 100-year sediment volume (500 ac-ft) has accumulated in the reservoir. Under this condition outflow from the reservoir occurs through infiltration, flow through the principal spillway, and flow through the emergency spillway.

For the Future Condition (Principal Spillway Open), the antecedent reservoir condition (ARC) for the routing of the 100-year, 200-year and 500-year 24-hour hydrographs will be based on the inlet elevation of the principal spillway or at elevation 1200.0 ft (NAVD 88).

100-year 24-hour hydrograph was developed by NRCS in its 1998 study report. URS updated TR-20 model for 100-year 24-hour hydrograph with an anticipation of future conditions at the request of Flood District.

## SPECIAL NOTE ABOUT 200-YR AND 500-YR 24-HR HYDROGRAPHS

NRCS did not develop 200-year and 500-year 24-hour models in its 1998 hydrologic/hydraulic study of the White Tank FRS No. 3 Watershed. URS developed TR-20 models for 200-year and 500-year 24-hour storms with an anticipation of future conditions at the request of Flood District. The methodology involved in developing 200-year and 500-year 24-hour rainfall and all relevant computations are provided in a separate calculation package. It should be noted that the 200-year and 500-year 24-hour rainfall depths were found to be equal to 4.65 and 5.26 inches. However, given the fact that NRCS reduced the 100-year 24-hour rainfall amount for the aerial reduction purposes from 4.12 inches to 3.85 inches in its

August 1998 report "*Hydrologic Analysis of the White Tank Mountains on FRS No. 3*", URS also decided to reduce the actual 200-year and 500-year 24-hour rainfall amounts (4.65 & 5.26 inches respectively) by the same factor. Therefore, instead of using the actual amount of 200-year and 500-year rainfall amount, a reduced rainfall amount of 4.28 and 4.84 inches was used for the routing purposes of 200-year and 500-year 24-hour storms.

A new elevation-storage curve for the White Tank FRS No. 3 was developed using the 2003 topographic map in combination with the modified 1998 topographic map, both of which were provided by the District. The new elevation-storage curve was based on 500 ac-ft of sediment storage for the 100-year sediment pool level. The infiltration rates were also estimated for the Future Condition by taking accumulated sediment into consideration. An elevation-spillway rating curve for the White Tank FRS No. 3 emergency spillway was also developed. The procedure and calculations involved in establishing new curve numbers, new elevation-spillway discharge rating curve, new infiltration numbers and new elevation-storage curve are provided in separate calculation packages.

Please also note that the URS used the same lag times (times of concentrations) as well as antecedent moisture condition (AMC) in developing 200-year and 500- year 24-hour models as used by NRCS for 100-year 24-hour model.

## DIVERSIONS

The TR-20 models developed by NRCS in its 1998 report included two diversions from the watershed. The diversions occur along the eastern edge of the watershed at Olive Avenue and Northern Avenue where a stormwater channel is restricted by culverts at the road crossings. The effect of the diversions is to reduce the peak flow and volume reaching the reservoir from the northern half of the watershed.

At Olive Avenue, flows greater than 4,100 cfs are diverted out of the watershed. At Northern Avenue, flows greater than 11,000 cfs are diverted out of the watershed. The base hydraulic calculations for these diversion estimates were not presented in the NRCS hydrologic report (NRCS 1998), nor were the flows out of the reservoir watershed quantified. However, in order to be consistent with 100-year 24-hour model, URS provided the same diversions for 200-year and 500-year 24-hour models also.

## ROUTING RESULTS

The ARC for the routing of 100-year, 200-year and 500-year 24-hour hydrographs was set at the inlet elevation of the principal spillway or at elevation 1200.0 ft (NAVD 88).

The reservoir routing results i.e. ARC, peak inflows, peak outflows, and the maximum reservoir elevation for 100-year, 200-year and 500-year 24-hour hydrographs under Future Condition (Principal Spillway Open) are provided in Table 1 (Please See Page 5). The results indicated that 100-year and 200-yr 24-hr hydrograph would be contained within the reservoir with no spillage. 500-year 24-hour hydrograph would result in some spillage. (See Table 1 on Page 5).

The input file and the detailed output results of TR-20 modeling for reservoir routing of 100-year, 200-year and 500-year 24-hour hydrographs for Future Condition (Principal Spillway Open) are attached at the end of this calculation package.

# TABLE 1
# RESERVOIR ROUTING RESULTS FOR 100-YEAR, 200-YEAR & 500-YEAR 24-HR HYDROGRAPHS

## FUTURE CONDITON – PRINCIPAL SPILLWAY OPEN

| Storm Event | Inflow to White Tank FRS No.3 | | Outflow from White Tank FRS No.3 | | |
|---|---|---|---|---|---|
| | Precipitation (inches) | Peak Inflow (cfs) | Antecedent Reservoir Condition (ARC) | Peak Outflow (cfs) | Maximum Reservoir Elevation (NAVD 88) (ft) |
| 100-yr 24-hr | 3.85 | 11,750 | 1200.0 | 269[1] | 1210.1 |
| 200-yr 24-hr | 4.28 | 14,530 | 1200.0 | 308[1] | 1211.3 |
| 500-yr 24-hr | 4.84 | 17,782 | 1200.0 | 871 | 1212.2 |

Notes:

1) It should be noted that the peak out flow reflects the infiltration amount only.

Future Condition

(Principal spillway Open)

(100-yr 24-hr)

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY*****************

JOB TR-20 WT100YR                          PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROUTING
TITLE     100-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spillway
 4 DIMHYD                .0556                                          WT3
 8          0.0          .03          .10          .19          .31
 8          .47          .66          .82          .93          .99
 8          1.0          .99          .93          .82          .66
 8          .47          .31          .03          .00          .00
 9 ENDTBL
 5 RAINFL 2              .1000                                          TYPE II
 8          .0000        .0010        .0020        .0030        .0041
 8          .0051        .0062        .0072        .0083        .0094
 8          .0105        .0116        .0127        .0138        .0150
 8          .0161        .0173        .0184        .0196        .0208
 8          .0220        .0232        .0244        .0257        .0269
 8          .0281        .0294        .0306        .0319        .0332
 8          .0345        .0358        .0371        .0384        .0398
 8          .0411        .0425        .0439        .0452        .0466
 8          .0480        .0494        .0508        .0523        .0538
 8          .0553        .0568        .0583        .0598        .0614
 8          .0630        .0646        .0662        .0679        .0696
 8          .0712        .0730        .0747        .0764        .0782
 8          .0800        .0818        .0836        .0855        .0874
 8          .0892        .0912        .0931        .0950        .0970
 8          .0990        .1010        .1030        .1051        .1072
 8          .1093        .1114        .1135        .1156        .1178
 8          .1200        .1222        .1246        .1270        .1296
 8          .1322        .1350        .1379        .1408        .1438
 8          .1470        .1502        .1534        .1566        .1598
 8          .1630        .1663        .1697        .1733        .1771
 8          .1810        .1851        .1895        .1941        .1989
 8          .2040        .2094        .2152        .2214        .2280
 8          .2350        .2427        .2513        .2609        .2715
 8          .2830        .3068        .3544        .4308        .5679
 8          .6630        .6820        .6986        .7130        .7252
 8          .7350        .7434        .7514        .7588        .7656
 8          .7720        .7780        .7836        .7890        .7942
 8          .7990        .8036        .8080        .8122        .8162
 8          .8200        .8237        .8273        .8308        .8342
 8          .8376        .8409        .8442        .8474        .8505
 8          .8535        .8565        .8594        .8622        .8649
 8          .8676        .8702        .8728        .8753        .8777
 8          .8800        .8823        .8845        .8868        .8890
 8          .8912        .8934        .8955        .8976        .8997
 8          .9018        .9038        .9058        .9078        .9097
 8          .9117        .9136        .9155        .9173        .9192
 8          .9210        .9228        .9245        .9263        .9280
 8          .9297        .9313        .9330        .9346        .9362
 8          .9377        .9393        .9408        .9423        .9438
 8          .9452        .9466        .9480        .9493        .9507
 8          .9520        .9533        .9546        .9559        .9572
 8          .9584        .9597        .9610        .9622        .9635
 8          .9647        .9660        .9672        .9685        .9697
 8          .9709        .9722        .9734        .9746        .9758
 8          .9770        .9782        .9794        .9806        .9818
 8          .9829        .9841        .9853        .9864        .9876
```

```
 8          .9887       .9899       .9910       .9922       .9933
 8          .9944       .9956       .9967       .9978       .9989
 8          1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         10.41                             BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.86        5.          4.39
 8                      2.01        50.         24.22
 8                      2.58        100.        40.12
 8                      3.46        200.        80.99
 8                      4.14        400.        129.44
 8                      5.16        800.        214.74
 8                      6.39        1600.       441.84
 8                      7.80        3200.       980.75
 8                      9.16        6400.       1891.44
 8                      10.41       12800.      3516.14
 8                      11.75       25600.      6548.98
 8                      13.26       51200.      11081.19
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
```

```
 8                       1.56        500.        203.28
 8                       2.30        1000.       302.00
 8                       3.38        2000.       449.24
 8                       4.97        4000.       673.73
 8                       6.23        6000.       855.96
 8                       7.31        8000.       1016.35
 8                       8.24        10000.      1158.51
 8                       9.09        12000.      1293.31
 8                       9.90        14000.      1425.57
 8                       10.64       16000.      1549.17
 8                       11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030         1.0         9.45                            BOSSCS#6
 8                       0.          0.0         0.0
 8                       0.77        5.          4.67
 8                       1.54        50.         32.06
 8                       1.78        100.        56.64
 8                       2.10        200.        100.59
 8                       2.50        400.        179.97
 8                       3.01        800.        320.25
 8                       3.63        1600.       589.66
 8                       4.35        3200.       1110.72
 8                       5.21        6400.       2084.48
 8                       6.03        12800.      4119.83
 8                       6.99        25600.      6856.75
 8                       8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045         1.0         4.87                            REACHA
 8                       0.          0.0         0.0
 8                       0.60        100.        85.69
 8                       0.90        200.        127.94
 8                       1.13        300.        161.93
 8                       1.52        500.        217.27
 8                       2.25        1000.       324.03
 8                       3.31        2000.       483.02
 8                       4.87        4000.       722.17
 8                       6.09        6000.       914.99
 8                       7.15        8000.       1084.61
 8                       8.05        10000.      1234.17
 8                       8.87        12000.      1373.80
 8                       9.64        14000.      1507.84
 8                       10.34       16000.      1633.45
 8                       11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060         1.0         4.7                             2CP6CP7
 8                       0.          0.0         0.0
 8                       2.36        100.        45.12
 8                       2.88        200.        83.75
 8                       3.18        300.        114.33
 8                       3.64        500.        172.72
 8                       4.42        1000.       289.04
 8                       5.40        2000.       470.72
 8                       6.87        4000.       782.74
 8                       7.91        6000.       1020.12
 8                       8.79        8000.       1231.25
 8                       9.60        10000.      1435.05
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8                      10.26       12000.      1618.34
 8                      10.94       14000.      1812.58
 8                      11.47       16000.      1983.46
 8                      11.96       18000.      2150.12
 9 ENDTBL
 2 XSECTN   067          1.0         8.77                                BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT       01                                                       95/11/6
 8                      1178.0      0.0         0.
 8                      1188.0      0.02        44.8
 8                      1196.8      0.13        300.
 8                      1199.2      0.21        500.
 8                      1202.0      159.0       845.55
 8                      1204.0      187.75      1176.28
 8                      1206.0      214.9       1575.25
 8                      1208.0      240.3       2044.97
 8                      1210.0      265.4       2593.40
 8                      1212.0      330.00      3218.00
 8                      1213.0      2936.00     3556.67
 8                      1214.0      8488.00     3916.02
 8                      1215.0      15810.0     4294.13
 8                      1216.0      24545.0     4692.68
 8                      1217.0      34492.0     5113.19
 8                      1218.0      45517.0     5556.01
 8                      1219.0      57524.0     6021.50
 8                      1220.0      70439.0     6509.75
 9 ENDTBL
 6 RUNOFF 1 001        1 2.46       87.2        0.85        1 1
 6 REACH  3 005   1    7 9100.                              1           BOSS#6
 6 REACH  3 010   7    2 9100.                              1           BOSS#4
 6 RUNOFF 1 002        3 2.38       79.9        0.73        1 1
 6 ADDHYD 4 012   2 3 1                                     1 1
 6 DIVERT 6 012   1 4 7 4100.       1.00        200.        1 1         OLIVE
 6 REACH  3 020   4    7 3332.                              1           REACH C
 6 REACH  3 025   7    5 1950.                              1           REACH B
 6 RUNOFF 1 003        6 3.94       87.2        0.88        1 1
 6 REACH  3 030   6    7 8865.                              1           BOSS#6
 6 REACH  3 005   7    1 8865.                              1           BOSS#5
 6 REACH  3 025   1    7 1950.                              1           REACH B
 6 RUNOFF 1 004        1 2.06       77.3        0.79        1 1
 6 ADDHYD 4 034   7 1 2                                     1 1
 6 ADDHYD 4 035   5 2 3                                     1 1
 6 DIVERT 6 035   3 4 7 11000.      1.00        199.        1 1         NORTHERN
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 REACH   3 045    4    5 4200.                                  1            REACH A
 6 RUNOFF  1 006         2 1.47          87.7          0.47      1 1
 6 REACH   3 060    2    3 7540.                                  1            CP6CP7
 6 REACH   3 067    3    4 5140.                                  1            BOSS#5
 6 ADDHYD  4 064    5 4  3                                       1 1
 6 RUNOFF  1 005         6 4.78          78.8          0.78      1 1
 6 RUNOFF  1 007         7 3.48          81.7          1.01      1 1
 6 ADDHYD  4 075    6 7  1                                       1 1
 6 ADDHYD  4 076    1 3  2                                       1 1       1
 6 RESVOR  2     01 2    1 1200.0                                1 1       1
 ENDATA
 7 LIST                   1.0                        1.
 7 INCREM  6              0.15
 7 COMPUT  7 001       01 0.          3.85          1.0          2 1  01   01
   ENDCMP  1
 7 COMPUT  7 001       01 0.          3.85          1.0          2 2  02   01
   ENDCMP  1
   ENDJOB  2

**********END OF 80-80 LIST**********
```

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST 1. 0. 1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT

DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0017 | .0035 | .0052 | .0070 |
| .0087 | .0105 | .0122 | .0139 | .0157 |
| .0174 | .0192 | .0210 | .0227 | .0245 |
| .0262 | .0280 | .0297 | .0315 | .0332 |
| .0350 | .0368 | .0386 | .0404 | .0423 |
| .0442 | .0461 | .0480 | .0500 | .0520 |
| .0540 | .0561 | .0582 | .0603 | .0625 |
| .0647 | .0669 | .0691 | .0714 | .0737 |
| .0760 | .0784 | .0807 | .0831 | .0855 |
| .0878 | .0902 | .0926 | .0951 | .0975 |
| .1000 | .1024 | .1049 | .1073 | .1098 |
| .1123 | .1148 | .1174 | .1199 | .1225 |
| .1250 | .1276 | .1303 | .1332 | .1361 |
| .1391 | .1423 | .1456 | .1489 | .1524 |
| .1560 | .1597 | .1633 | .1671 | .1708 |
| .1746 | .1784 | .1823 | .1861 | .1901 |
| .1940 | .1982 | .2027 | .2077 | .2132 |
| .2190 | .2252 | .2318 | .2388 | .2462 |
| .2540 | .2623 | .2714 | .2812 | .2917 |
| .3030 | .3194 | .3454 | .3878 | .4632 |
| .5150 | .5322 | .5476 | .5612 | .5730 |
| .5830 | .5919 | .6003 | .6083 | .6159 |
| .6230 | .6298 | .6365 | .6430 | .6493 |
| .6555 | .6615 | .6674 | .6731 | .6786 |
| .6840 | .6892 | .6944 | .6995 | .7044 |
| .7092 | .7140 | .7186 | .7232 | .7276 |
| .7320 | .7362 | .7404 | .7444 | .7484 |
| .7523 | .7560 | .7596 | .7632 | .7667 |
| .7700 | .7733 | .7766 | .7798 | .7830 |
| .7862 | .7894 | .7926 | .7958 | .7989 |
| .8020 | .8051 | .8082 | .8112 | .8142 |
| .8173 | .8202 | .8232 | .8262 | .8291 |
| .8320 | .8349 | .8378 | .8406 | .8434 |
| .8462 | .8490 | .8518 | .8546 | .8573 |
| .8600 | .8627 | .8654 | .8680 | .8706 |
| .8733 | .8758 | .8784 | .8810 | .8835 |
| .8860 | .8885 | .8910 | .8934 | .8958 |
| .8982 | .9006 | .9030 | .9054 | .9077 |
| .9100 | .9123 | .9146 | .9168 | .9190 |
| .9212 | .9234 | .9256 | .9278 | .9299 |
| .9320 | .9341 | .9362 | .9382 | .9402 |
| .9423 | .9442 | .9462 | .9482 | .9501 |
| .9520 | .9539 | .9558 | .9576 | .9594 |
| .9613 | .9630 | .9648 | .9666 | .9683 |
| .9700 | .9717 | .9734 | .9750 | .9766 |
| .9783 | .9798 | .9814 | .9830 | .9845 |
| .9860 | .9875 | .9890 | .9904 | .9918 |
| .9933 | .9946 | .9960 | .9974 | .9987 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RUNOFF | 1 | | | 1 | 2.4600 | 87.2000 | .85001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 5 | 1 | | 7 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 10 | 7 | | 2 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 2 | | | 3 | 2.3800 | 79.9000 | .73001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 12 | 2 | 3 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 12 | 1 | 4 | 7 | 4100.0000 | 1.0000 | 200.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 20 | 4 | | 7 | 3332.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 7 | | 5 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 3 | | | 6 | 3.9400 | 87.2000 | .88001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 30 | 6 | | 7 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 5 | 7 | | 1 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 1 | | 7 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 4 | | | 1 | 2.0600 | 77.3000 | .79001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 34 | 7 | 1 | 2 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 35 | 5 | 2 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 35 | 3 | 4 | 7 | 11000.0000 | 1.0000 | 199.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 45 | 4 | | 5 | 4200.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 6 | | | 2 | 1.4700 | 87.7000 | .47001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 60 | 2 | | 3 | 7540.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 67 | 3 | | 4 | 5140.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| ADDHYD | 64 | 5 | 4 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 5 | | | 6 | 4.7800 | 78.8000 | .78001 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 7 | | | 7 | 3.4800 | 81.7000 | 1.01001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 75 | 6 | 7 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 76 | 1 | 3 | 2 | | | 1 | 1 | 0 | 0 | 1 | 1 |
| RESVOR | | 1 | 2 | 1 | 1200.0000 | | 1 | 1 | 0 | 0 | 1 | 1 |
| ENDATA | | | | | | | | | | | | |

END OF LISTING

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .150 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 3.85 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 1 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 1 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.40 | 1705.4 | |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .11 | .66 | 2.14 | 5.21 | 9.95 | 16.55 | 25.17 | 36.44 |
| 11.55 CFS | 53 | 93 | 223 | 594 | 1159 | 1622 | 1678 | 1323 |
| 12.75 CFS | 765 | 438 | 344 | 292 | 259 | 236 | 217 | 201 |
| 13.95 CFS | 187 | 175 | 164 | 154 | 146 | 140 | 136 | 132 |
| 15.15 CFS | 129 | 125 | 121 | 117 | 113 | 109 | 105 | 102 |
| 16.35 CFS | 98.10 | 94.78 | 92.50 | 90.97 | 89.66 | 88.22 | 86.72 | 85.20 |
| 17.55 CFS | 83.77 | 82.32 | 80.94 | 79.63 | 78.29 | 76.83 | 75.34 | 73.97 |
| 18.75 CFS | 72.45 | 71.01 | 69.58 | 68.03 | 66.64 | 65.23 | 63.78 | 62.23 |
| 19.95 CFS | 60.50 | 58.85 | 57.48 | 56.44 | 55.60 | 54.88 | 54.31 | 53.94 |
| 21.15 CFS | 53.61 | 53.49 | 53.30 | 53.14 | 52.97 | 52.77 | 52.42 | 52.05 |
| 22.35 CFS | 51.72 | 51.38 | 51.16 | 50.80 | 50.43 | 50.06 | 49.85 | 49.69 |
| 23.55 CFS | 49.47 | 49.33 | 49.13 | 48.76 | 46.52 | 40.20 | 28.38 | 15.34 |
| 24.75 CFS | 4.55 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 2289 CFS-HRS; 189.1 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.07 | 1008.9 | 3.80 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 2289 CFS-HRS; 189.1 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.72 | 733.5 | 4.99 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 2289 CFS-HRS; 189.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 899.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 2 | 49 | 246 | 612 | 875 | 850 | 576 |
| 12.75 CFS | 315 | 238 | 200 | 177 | 161 | 148 | 138 | 128 |
| 13.95 CFS | 120 | 113 | 106 | 100 | 96 | 93 | 91 | 89 |
| 15.15 CFS | 86.57 | 84.12 | 81.45 | 78.76 | 76.21 | 73.81 | 71.53 | 69.00 |
| 16.35 CFS | 66.47 | 64.57 | 63.46 | 62.71 | 61.85 | 60.87 | 59.94 | 58.99 |
| 17.55 CFS | 58.03 | 57.09 | 56.27 | 55.40 | 54.51 | 53.51 | 52.58 | 51.64 |
| 18.75 CFS | 50.61 | 49.68 | 48.65 | 47.65 | 46.71 | 45.73 | 44.80 | 43.64 |
| 19.95 CFS | 42.39 | 41.32 | 40.50 | 39.88 | 39.37 | 38.90 | 38.62 | 38.39 |
| 21.15 CFS | 38.27 | 38.18 | 38.08 | 38.02 | 37.90 | 37.75 | 37.51 | 37.26 |
| 22.35 CFS | 37.02 | 36.93 | 36.72 | 36.43 | 36.18 | 36.00 | 35.92 | 35.77 |
| 23.55 CFS | 35.73 | 35.58 | 35.44 | 35.04 | 33.04 | 26.18 | 16.04 | 6.40 |
| 24.75 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.84 WATERSHED INCHES; 1290 CFS-HRS; 106.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 914.7 | (NULL) |
| 13.68 | 867.8 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.40 CFS | 0 | 1 | 4 | 52 | 250 | 620 | 887 | 870 |
| 12.60 CFS | 612 | 393 | 404 | 501 | 637 | 762 | 840 | 867 |
| 13.80 CFS | 856 | 822 | 773 | 718 | 661 | 607 | 556 | 509 |
| 15.00 CFS | 467 | 428 | 393 | 362 | 335 | 311 | 290 | 272 |
| 16.20 CFS | 255 | 241 | 229 | 218 | 209 | 201 | 194 | 187 |
| 17.40 CFS | 180 | 174 | 169 | 164 | 160 | 156 | 152 | 149 |
| 18.60 CFS | 145 | 142 | 139 | 136 | 133 | 131 | 128 | 126 |
| 19.80 CFS | 123 | 120 | 117 | 115 | 113 | 111 | 109 | 107 |
| 21.00 CFS | 105 | 104 | 102 | 101 | 99 | 98 | 97 | 96 |
| 22.20 CFS | 94.68 | 93.70 | 92.98 | 92.22 | 91.43 | 90.72 | 90.11 | 89.62 |
| 23.40 CFS | 89.09 | 88.68 | 88.17 | 87.68 | 86.93 | 84.61 | 77.44 | 67.01 |
| 24.60 CFS | 57.09 | 50.42 | 50.03 | 49.24 | 47.55 | 44.69 | 40.69 | 36.01 |
| 25.80 CFS | 31.21 | 26.63 | 22.43 | 18.72 | 15.48 | 12.72 | 10.39 | 8.44 |
| 27.00 CFS | 6.83 | 5.51 | 4.43 | 3.54 | 2.83 | 2.26 | 1.79 | 1.42 |
| 28.20 CFS | 1.13 | .89 | .70 | .55 | .44 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 914.7 | (DIVERT) |
| 13.68 | 867.8 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | | 4.84 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 11.40 CFS | 0 | 1 | 4 | 52 | 250 | 620 | 887 | 870 |
| 12.60 CFS | 612 | 393 | 404 | 501 | 637 | 762 | 840 | 867 |
| 13.80 CFS | 856 | 822 | 773 | 718 | 661 | 607 | 556 | 509 |
| 15.00 CFS | 467 | 428 | 393 | 362 | 335 | 311 | 290 | 272 |
| 16.20 CFS | 255 | 241 | 229 | 218 | 209 | 201 | 194 | 187 |
| 17.40 CFS | 180 | 174 | 169 | 164 | 160 | 156 | 152 | 149 |
| 18.60 CFS | 145 | 142 | 139 | 136 | 133 | 131 | 128 | 126 |
| 19.80 CFS | 123 | 120 | 117 | 115 | 113 | 111 | 109 | 107 |
| 21.00 CFS | 105 | 104 | 102 | 101 | 99 | 98 | 97 | 96 |
| 22.20 CFS | 94.68 | 93.70 | 92.98 | 92.22 | 91.43 | 90.72 | 90.11 | 89.62 |
| 23.40 CFS | 89.09 | 88.68 | 88.17 | 87.68 | 86.93 | 84.61 | 77.44 | 67.01 |
| 24.60 CFS | 57.09 | 50.42 | 50.03 | 49.24 | 47.55 | 44.69 | 40.69 | 36.01 |
| 25.80 CFS | 31.21 | 26.63 | 22.43 | 18.72 | 15.48 | 12.72 | 10.39 | 8.44 |
| 27.00 CFS | 6.83 | 5.51 | 4.43 | 3.54 | 2.83 | 2.26 | 1.79 | 1.42 |
| 28.20 CFS | 1.13 | .89 | .70 | .55 | .44 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
138 CFS-HRS; 295.7 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.57 | 852.8 | 3.33 |
| 13.90 | 856.6 | 3.34 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.74 | 831.7 | 2.05 |
| 14.08 | 853.3 | 2.08 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.15 WATERSHED INCHES; 3578 CFS-HRS; 295.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 2671.2 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .17 | .94 | 3.21 | 7.75 | 15.01 | 25.35 | 38.68 | 56.91 |
| 11.55 CFS | 83 | 146 | 350 | 890 | 1742 | 2507 | 2652 | 2209 |
| 12.75 CFS | 1349 | 739 | 565 | 477 | 420 | 382 | 351 | 325 |
| 13.95 CFS | 303 | 282 | 264 | 248 | 236 | 226 | 219 | 213 |
| 15.15 CFS | 207 | 201 | 195 | 188 | 182 | 176 | 170 | 164 |
| 16.35 CFS | 158 | 153 | 149 | 146 | 144 | 142 | 139 | 137 |
| 17.55 CFS | 134 | 132 | 130 | 128 | 126 | 123 | 121 | 119 |
| 18.75 CFS | 116 | 114 | 112 | 109 | 107 | 105 | 102 | 100 |
| 19.95 CFS | 97.28 | 94.58 | 92.30 | 90.56 | 89.15 | 88.02 | 87.06 | 86.48 |
| 21.15 CFS | 85.94 | 85.68 | 85.41 | 85.12 | 84.87 | 84.56 | 84.01 | 83.41 |
| 22.35 CFS | 82.92 | 82.35 | 81.98 | 81.43 | 80.86 | 80.25 | 79.84 | 79.64 |
| 23.55 CFS | 79.27 | 79.04 | 78.72 | 78.08 | 74.68 | 65.35 | 47.59 | 27.26 |
| 24.75 CFS | 10.18 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.42 | 1395.2 | 3.47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 14.04 | 1007.9 | 3.80 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 14.22 | 1005.7 | 2.31 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 3667 CFS-HRS; 303.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 527.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 16 | 100 | 286 | 466 | 526 | 431 | 262 |
| 12.90 CFS | 177 | 149 | 130 | 118 | 109 | 101 | 94 | 89 |
| 14.10 CFS | 83.10 | 78.21 | 74.15 | 70.86 | 68.51 | 66.79 | 65.35 | 63.88 |
| 15.30 CFS | 62.22 | 60.38 | 58.46 | 56.65 | 54.91 | 53.22 | 51.44 | 49.63 |
| 16.50 CFS | 48.15 | 47.18 | 46.60 | 46.03 | 45.38 | 44.70 | 44.01 | 43.34 |
| 17.70 CFS | 42.67 | 42.05 | 41.44 | 40.79 | 40.08 | 39.40 | 38.72 | 37.97 |
| 18.90 CFS | 37.29 | 36.58 | 35.81 | 35.14 | 34.44 | 33.73 | 32.92 | 32.02 |
| 20.10 CFS | 31.19 | 30.53 | 30.04 | 29.64 | 29.31 | 29.07 | 28.91 | 28.79 |
| 21.30 CFS | 28.74 | 28.67 | 28.63 | 28.55 | 28.46 | 28.30 | 28.13 | 27.96 |
| 22.50 CFS | 27.83 | 27.73 | 27.55 | 27.37 | 27.21 | 27.13 | 27.07 | 26.99 |
| 23.70 CFS | 26.91 | 26.83 | 26.57 | 25.15 | 20.92 | 14.00 | 6.83 | 1.61 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.66 WATERSHED INCHES; 881 CFS-HRS; 72.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.44 | 535.4 | (NULL) |
| 14.19 | 1085.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 17 | 101 | 289 | 471 | 535 | 445 | 284 |
| 12.90 CFS | 217 | 233 | 306 | 444 | 625 | 809 | 954 | 1042 |
| 14.10 CFS | 1081 | 1083 | 1060 | 1020 | 970 | 914 | 856 | 798 |
| 15.30 CFS | 742 | 687 | 636 | 589 | 546 | 506 | 470 | 438 |
| 16.50 CFS | 409 | 384 | 362 | 342 | 324 | 307 | 292 | 279 |
| 17.70 CFS | 266 | 255 | 245 | 236 | 227 | 220 | 213 | 206 |
| 18.90 CFS | 201 | 195 | 190 | 185 | 181 | 177 | 173 | 169 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 20.10 CFS | 165 | 161 | 158 | 155 | 152 | 149 | 146 | 144 |
| 21.30 CFS | 141 | 139 | 136 | 134 | 131 | 129 | 127 | 125 |
| 22.50 CFS | 123 | 122 | 120 | 119 | 118 | 117 | 116 | 115 |
| 23.70 CFS | 114 | 113 | 112 | 110 | 105 | 98 | 90 | 84 |
| 24.90 CFS | 82.31 | 81.82 | 81.23 | 80.24 | 78.36 | 75.16 | 70.55 | 64.78 |
| 26.10 CFS | 58.47 | 52.07 | 45.88 | 40.08 | 34.76 | 29.96 | 25.69 | 21.94 |
| 27.30 CFS | 18.66 | 15.82 | 13.37 | 11.27 | 9.48 | 7.95 | 6.66 | 5.57 |
| 28.50 CFS | 4.65 | 3.88 | 3.23 | 2.69 | 2.23 | 1.85 | 1.54 | 1.27 |
| 29.70 CFS | 1.05 | .87 | .72 | .60 | .49 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.17 WATERSHED INCHES; 4547 CFS-HRS; 375.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.64 | 1189.0 | (NULL) |
| 14.14 | 1936.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 17 | 104 | 322 | 641 | 991 | 1182 | 1115 |
| 12.90 CFS | 915 | 735 | 739 | 917 | 1202 | 1506 | 1745 | 1884 |
| 14.10 CFS | 1934 | 1917 | 1855 | 1765 | 1660 | 1550 | 1440 | 1333 |
| 15.30 CFS | 1232 | 1137 | 1049 | 969 | 896 | 831 | 772 | 720 |
| 16.50 CFS | 674 | 633 | 598 | 566 | 538 | 513 | 490 | 469 |
| 17.70 CFS | 450 | 433 | 417 | 403 | 390 | 378 | 367 | 357 |
| 18.90 CFS | 348 | 339 | 331 | 323 | 316 | 309 | 302 | 295 |
| 20.10 CFS | 289 | 283 | 277 | 271 | 266 | 261 | 256 | 252 |
| 21.30 CFS | 247 | 243 | 239 | 235 | 232 | 228 | 225 | 222 |
| 22.50 CFS | 219 | 216 | 214 | 212 | 210 | 208 | 206 | 205 |
| 23.70 CFS | 204 | 202 | 201 | 198 | 193 | 184 | 171 | 156 |
| 24.90 CFS | 145 | 136 | 133 | 130 | 127 | 121 | 113 | 103 |
| 26.10 CFS | 92.19 | 81.18 | 70.64 | 60.89 | 52.08 | 44.27 | 37.43 | 31.52 |
| 27.30 CFS | 26.44 | 22.10 | 18.43 | 15.34 | 12.73 | 10.55 | 8.73 | 7.22 |
| 28.50 CFS | 5.96 | 4.91 | 4.05 | 3.33 | 2.74 | 2.25 | 1.85 | 1.52 |
| 29.70 CFS | 1.24 | 1.02 | .84 | .68 | .56 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.16 WATERSHED INCHES; 8125 CFS-HRS; 671.5 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.64 | 1189.0 | (DIVERT) |
| 14.14 | 1936.0 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.70 CFS | 0 | 17 | 104 | 322 | 641 | 991 | 1182 | 1115 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12.90 CFS | 915 | 735 | 739 | 917 | 1202 | 1506 | 1745 | 1884 |
| 14.10 CFS | 1934 | 1917 | 1855 | 1765 | 1660 | 1550 | 1440 | 1333 |
| 15.30 CFS | 1232 | 1137 | 1049 | 969 | 896 | 831 | 772 | 720 |
| 16.50 CFS | 674 | 633 | 598 | 566 | 538 | 513 | 490 | 469 |
| 17.70 CFS | 450 | 433 | 417 | 403 | 390 | 378 | 367 | 357 |
| 18.90 CFS | 348 | 339 | 331 | 323 | 316 | 309 | 302 | 295 |
| 20.10 CFS | 289 | 283 | 277 | 271 | 266 | 261 | 256 | 252 |
| 21.30 CFS | 247 | 243 | 239 | 235 | 232 | 228 | 225 | 222 |
| 22.50 CFS | 219 | 216 | 214 | 212 | 210 | 208 | 206 | 205 |
| 23.70 CFS | 204 | 202 | 201 | 198 | 193 | 184 | 171 | 156 |
| 24.90 CFS | 145 | 136 | 133 | 130 | 127 | 121 | 113 | 103 |
| 26.10 CFS | 92.19 | 81.18 | 70.64 | 60.89 | 52.08 | 44.27 | 37.43 | 31.52 |
| 27.30 CFS | 26.44 | 22.10 | 18.43 | 15.34 | 12.73 | 10.55 | 8.73 | 7.22 |
| 28.50 CFS | 5.96 | 4.91 | 4.05 | 3.33 | 2.74 | 2.25 | 1.85 | 1.52 |
| 29.70 CFS | 1.24 | 1.02 | .84 | .68 | .56 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.16 WATERSHED INCHES; 8125 CFS-HRS; 671.5 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
152 CFS-HRS; 671.5 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.87 | 1089.5 | 2.34 |
| 14.40 | 1901.2 | 3.21 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.16 WATERSHED INCHES; 8126 CFS-HRS; 671.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.15 | 1541.1 | (RUNOFF) |
| 21.35 | 33.1 | (RUNOFF) |
| 22.30 | 31.9 | (RUNOFF) |
| 23.30 | 30.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1 .

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | | 1.47 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 10.05 CFS | .06 | .54 | 2.04 | 4.48 | 7.57 | 11.47 | 16.34 | 22.43 |
| 11.25 CFS | 31 | 42 | 60 | 120 | 370 | 1034 | 1541 | 1088 |
| 12.45 CFS | 447 | 286 | 227 | 189 | 169 | 153 | 140 | 130 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 13.65 CFS | 121 | 113 | 105 | 98 | 93 | 89 | 86 | 83 |
| 14.85 CFS | 81.76 | 79.54 | 76.76 | 74.30 | 71.72 | 68.90 | 66.82 | 64.95 |
| 16.05 CFS | 62.34 | 59.47 | 57.64 | 56.95 | 56.39 | 55.37 | 54.26 | 53.51 |
| 17.25 CFS | 52.69 | 51.51 | 50.61 | 50.01 | 49.17 | 48.07 | 47.41 | 46.42 |
| 18.45 CFS | 45.46 | 44.69 | 43.53 | 42.77 | 41.93 | 40.79 | 40.12 | 39.38 |
| 19.65 CFS | 38.16 | 36.89 | 35.92 | 35.31 | 34.74 | 34.20 | 33.88 | 33.42 |
| 20.85 CFS | 33.37 | 33.29 | 32.99 | 33.07 | 33.05 | 32.69 | 32.65 | 32.58 |
| 22.05 CFS | 32.00 | 31.88 | 31.90 | 31.77 | 31.24 | 31.08 | 31.08 | 30.72 |
| 23.25 CFS | 30.75 | 30.75 | 30.48 | 30.33 | 30.31 | 29.88 | 25.48 | 12.73 |
| 24.45 CFS | 1.53 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.53 WATERSHED INCHES; 1451 CFS-HRS; 119.9 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.59 | 858.3 | 4.20 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.53 WATERSHED INCHES; 1451 CFS-HRS; 119.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.11 | 620.8 | 3.12 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.53 WATERSHED INCHES; 1451 CFS-HRS; 119.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.95 | 1651.8 | (NULL) |
| 14.31 | 2131.2 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | .29 | .84 | 1.79 | 3.23 | 5.26 | 8.02 | 11.79 | 27.36 |
| 12.15 CFS | 92 | 264 | 563 | 998 | 1430 | 1638 | 1594 | 1436 |
| 13.35 CFS | 1339 | 1371 | 1521 | 1731 | 1929 | 2065 | 2125 | 2120 |
| 14.55 CFS | 2065 | 1976 | 1867 | 1749 | 1630 | 1513 | 1401 | 1297 |
| 15.75 CFS | 1199 | 1110 | 1029 | 955 | 889 | 830 | 777 | 730 |
| 16.95 CFS | 689 | 652 | 620 | 591 | 565 | 541 | 520 | 500 |
| 18.15 CFS | 482 | 466 | 451 | 438 | 425 | 414 | 403 | 393 |
| 19.35 CFS | 383 | 374 | 366 | 358 | 350 | 342 | 335 | 328 |
| 20.55 CFS | 321 | 314 | 307 | 302 | 296 | 291 | 286 | 281 |
| 21.75 CFS | 276 | 272 | 268 | 264 | 260 | 257 | 253 | 251 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22.95 CFS | 248 | 245 | 243 | 241 | 239 | 237 | 236 | 234 |
| 24.15 CFS | 233 | 230 | 226 | 219 | 207 | 192 | 176 | 162 |
| 25.35 CFS | 152 | 145 | 138 | 131 | 123 | 112 | 101 | 90 |
| 26.55 CFS | 78.57 | 68.07 | 58.47 | 49.87 | 42.30 | 35.70 | 30.01 | 25.14 |
| 27.75 CFS | 21.00 | 17.49 | 14.54 | 12.06 | 9.99 | 8.26 | 6.82 | 5.62 |
| 28.95 CFS | 4.64 | 3.82 | 3.14 | 2.58 | 2.12 | 1.74 | 1.43 | 1.17 |
| 30.15 CFS | .96 | .79 | .64 | .53 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.21 WATERSHED INCHES; 9577 CFS-HRS; 791.4 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 1543.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 2 | 68 | 351 | 919 | 1422 | 1528 | 1183 |
| 12.75 CFS | 683 | 467 | 391 | 341 | 308 | 284 | 264 | 246 |
| 13.95 CFS | 230 | 216 | 203 | 192 | 184 | 177 | 173 | 169 |
| 15.15 CFS | 165 | 161 | 156 | 151 | 146 | 141 | 137 | 132 |
| 16.35 CFS | 128 | 124 | 121 | 120 | 118 | 116 | 115 | 113 |
| 17.55 CFS | 111 | 109 | 108 | 106 | 104 | 102 | 101 | 99 |
| 18.75 CFS | 96.99 | 95.21 | 93.32 | 91.36 | 89.62 | 87.79 | 85.98 | 83.87 |
| 19.95 CFS | 81.51 | 79.39 | 77.72 | 76.49 | 75.45 | 74.58 | 73.99 | 73.55 |
| 21.15 CFS | 73.24 | 73.12 | 72.91 | 72.79 | 72.60 | 72.34 | 71.89 | 71.44 |
| 22.35 CFS | 71.00 | 70.72 | 70.42 | 69.92 | 69.45 | 69.03 | 68.84 | 68.65 |
| 23.55 CFS | 68.44 | 68.27 | 68.02 | 67.33 | 63.66 | 52.85 | 34.70 | 16.00 |
| 24.75 CFS | 3.91 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.77 WATERSHED INCHES; 2385 CFS-HRS; 197.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.54 | 1321.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 7 | 56 | 243 | 590 | 1005 | 1271 | 1301 |
| 12.75 CFS | 1066 | 684 | 427 | 341 | 295 | 264 | 242 | 224 |
| 13.95 CFS | 209 | 195 | 183 | 172 | 163 | 156 | 150 | 146 |
| 15.15 CFS | 142 | 138 | 135 | 130 | 126 | 122 | 118 | 114 |
| 16.35 CFS | 110 | 107 | 104 | 101 | 100 | 98 | 97 | 95 |
| 17.55 CFS | 93.73 | 92.24 | 90.76 | 89.27 | 87.90 | 86.46 | 84.94 | 83.37 |
| 18.75 CFS | 81.87 | 80.25 | 78.67 | 77.11 | 75.46 | 73.98 | 72.45 | 70.77 |
| 19.95 CFS | 69.06 | 67.26 | 65.57 | 64.16 | 63.09 | 62.22 | 61.55 | 61.02 |
| 21.15 CFS | 60.65 | 60.37 | 60.23 | 60.07 | 59.87 | 59.71 | 59.47 | 59.09 |
| 22.35 CFS | 58.73 | 58.44 | 58.06 | 57.76 | 57.42 | 57.04 | 56.69 | 56.48 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23.55 CFS | 56.36 | 56.10 | 55.95 | 55.66 | 53.94 | 48.95 | 39.51 | 26.85 |
| 24.75 CFS | 14.39 | 4.78 | .38 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.96 WATERSHED INCHES; 2161 CFS-HRS; 178.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 2799.7 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 9 | 124 | 593 | 1509 | 2427 | 2799 | 2485 |
| 12.75 CFS | 1749 | 1150 | 817 | 682 | 603 | 548 | 506 | 470 |
| 13.95 CFS | 439 | 411 | 386 | 364 | 347 | 333 | 323 | 315 |
| 15.15 CFS | 307 | 299 | 290 | 281 | 272 | 263 | 255 | 246 |
| 16.35 CFS | 238 | 230 | 225 | 221 | 218 | 215 | 211 | 208 |
| 17.55 CFS | 205 | 201 | 198 | 195 | 192 | 189 | 186 | 182 |
| 18.75 CFS | 179 | 175 | 172 | 168 | 165 | 162 | 158 | 155 |
| 19.95 CFS | 151 | 147 | 143 | 141 | 139 | 137 | 136 | 135 |
| 21.15 CFS | 134 | 133 | 133 | 133 | 132 | 132 | 131 | 131 |
| 22.35 CFS | 130 | 129 | 128 | 128 | 127 | 126 | 126 | 125 |
| 23.55 CFS | 125 | 124 | 124 | 123 | 118 | 102 | 74 | 43 |
| 24.75 CFS | 18.30 | 4.78 | .38 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.85 WATERSHED INCHES; 4546 CFS-HRS; 375.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.57 | 3492.5 | (NULL) |
| 14.26 | 2511.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 1 | 2 | 3 | 6 | 17 | 136 | 621 |
| 12.15 CFS | 1601 | 2691 | 3362 | 3483 | 3179 | 2789 | 2411 | 2118 |
| 13.35 CFS | 1942 | 1919 | 2026 | 2201 | 2368 | 2476 | 2511 | 2484 |
| 14.55 CFS | 2411 | 2309 | 2190 | 2064 | 1937 | 1812 | 1692 | 1578 |
| 15.75 CFS | 1471 | 1373 | 1284 | 1201 | 1127 | 1060 | 1002 | 951 |
| 16.95 CFS | 907 | 867 | 831 | 799 | 770 | 743 | 718 | 695 |
| 18.15 CFS | 674 | 655 | 637 | 620 | 604 | 589 | 575 | 561 |
| 19.35 CFS | 548 | 536 | 524 | 513 | 501 | 489 | 478 | 468 |
| 20.55 CFS | 459 | 451 | 443 | 436 | 430 | 424 | 419 | 414 |
| 21.75 CFS | 409 | 404 | 399 | 394 | 390 | 386 | 382 | 378 |
| 22.95 CFS | 375 | 372 | 369 | 366 | 364 | 362 | 360 | 357 |
| 24.15 CFS | 350 | 332 | 300 | 261 | 225 | 197 | 177 | 162 |
| 25.35 CFS | 152 | 145 | 138 | 131 | 123 | 112 | 101 | 90 |
| 26.55 CFS | 78.57 | 68.07 | 58.47 | 49.87 | 42.30 | 35.70 | 30.01 | 25.14 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27.75 CFS | 21.00 | 17.49 | 14.54 | 12.06 | 9.99 | 8.26 | 6.82 | 5.62 |
| 28.95 CFS | 4.64 | 3.82 | 3.14 | 2.58 | 2.12 | 1.74 | 1.43 | 1.17 |
| 30.15 CFS | .96 | .79 | .64 | .53 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.06 WATERSHED INCHES; 14124 CFS-HRS; 1167.2 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1200.0 FEET) CAN ADD .546 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 855.69 AC-FT ( .06 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1202.07. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 10.20 | 45.6 | 1200.00 |
| 24.82 | 212.0 | 1205.78 |

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 160 CFS
RESVOR ( 76. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.20 CFS | 45.58 | 45.32 | 45.06 | 44.81 | 44.55 | 44.30 | 44.05 | 43.81 |
| 11.40 CFS | 43.58 | 43.35 | 43.17 | 43.36 | 45.26 | 51.32 | 63.21 | 80.05 |
| 12.60 CFS | 99 | 117 | 134 | 148 | 159 | 161 | 163 | 165 |
| 13.80 CFS | 167 | 169 | 172 | 174 | 177 | 179 | 182 | 184 |
| 15.00 CFS | 186 | 188 | 189 | 191 | 192 | 193 | 194 | 195 |
| 16.20 CFS | 196 | 197 | 197 | 198 | 199 | 199 | 200 | 200 |
| 17.40 CFS | 201 | 201 | 202 | 202 | 203 | 203 | 204 | 204 |
| 18.60 CFS | 204 | 205 | 205 | 205 | 206 | 206 | 206 | 207 |
| 19.80 CFS | 207 | 207 | 207 | 208 | 208 | 208 | 208 | 208 |
| 21.00 CFS | 209 | 209 | 209 | 209 | 209 | 209 | 210 | 210 |
| 22.20 CFS | 210 | 210 | 210 | 210 | 211 | 211 | 211 | 211 |
| 23.40 CFS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 |
| 24.60 CFS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 |
| 25.80 CFS | 212 | 212 | 212 | 211 | 211 | 211 | 211 | 211 |
| 27.00 CFS | 211 | 211 | 211 | 210 | 210 | 210 | 210 | 210 |
| 28.20 CFS | 210 | 209 | 209 | 209 | 209 | 209 | 209 | 208 |
| 29.40 CFS | 208 | 208 | 208 | 208 | 208 | 207 | 207 | 207 |
| 30.60 CFS | 207 | 207 | 207 | 206 | 206 | 206 | 206 | 206 |
| 31.80 CFS | 205 | 205 | 205 | 205 | 205 | 205 | 204 | 204 |
| 33.00 CFS | 204 | 204 | 204 | 204 | 203 | 203 | 203 | 203 |
| 34.20 CFS | 203 | 203 | 202 | 202 | 202 | 202 | 202 | 202 |
| 35.40 CFS | 201 | 201 | 201 | 201 | 201 | 201 | 200 | 200 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 36.60 CFS | 200 | 200 | 200 | 200 | 199 | 199 | 199 | 199 |
| 37.80 CFS | 199 | 199 | 198 | 198 | 198 | 198 | 198 | 198 |
| 39.00 CFS | 197 | 197 | 197 | 197 | 197 | 197 | 196 | 196 |
| 40.20 CFS | 196 | 196 | 196 | 196 | 195 | 195 | 195 | 195 |
| 41.40 CFS | 195 | 195 | 194 | 194 | 194 | 194 | 194 | 194 |
| 42.60 CFS | 193 | 193 | 193 | 193 | 193 | 193 | 192 | 192 |
| 43.80 CFS | 192 | 192 | 192 | 192 | 191 | 191 | 191 | 191 |
| 45.00 CFS | 191 | 191 | 190 | 190 | 190 | 190 | 190 | 190 |
| 46.20 CFS | 190 | 189 | 189 | 189 | 189 | 189 | 189 | 188 |
| 47.40 CFS | 188 | 188 | 188 | 188 | 188 | 187 | 187 | 187 |
| 48.60 CFS | 187 | 187 | 186 | 186 | 186 | 186 | 186 | 185 |
| 49.80 CFS | 185 | 185 | 185 | 185 | 184 | 184 | 184 | 184 |
| 51.00 CFS | 184 | 183 | 183 | 183 | 183 | 183 | 182 | 182 |
| 52.20 CFS | 182 | 182 | 182 | 181 | 181 | 181 | 181 | 181 |
| 53.40 CFS | 180 | 180 | 180 | 180 | 180 | 179 | 179 | 179 |
| 54.60 CFS | 179 | 179 | 178 | 178 | 178 | 178 | 178 | 178 |
| 55.80 CFS | 177 | 177 | 177 | 177 | 177 | 176 | 176 | 176 |
| 57.00 CFS | 176 | 176 | 175 | 175 | 175 | 175 | 175 | 174 |
| 58.20 CFS | 174 | 174 | 174 | 174 | 174 | 173 | 173 | 173 |
| 59.40 CFS | 173 | 173 | 172 | 172 | 172 | 172 | 172 | 172 |
| 60.60 CFS | 171 | 171 | 171 | 171 | 171 | 170 | 170 | 170 |
| 61.80 CFS | 170 | 170 | 169 | 169 | 169 | 169 | 169 | 169 |
| 63.00 CFS | 168 | 168 | 168 | 168 | 168 | 167 | 167 | 167 |
| 64.20 CFS | 167 | 167 | 167 | 166 | 166 | 166 | 166 | 166 |
| 65.40 CFS | 166 | 165 | 165 | 165 | 165 | 165 | 164 | 164 |
| 66.60 CFS | 164 | 164 | 164 | 164 | 164 | 163 | 163 | 163 |
| 67.80 CFS | 163 | 163 | 162 | 162 | 162 | 162 | 162 | 161 |
| 69.00 CFS | 161 | 161 | 161 | 161 | 161 | 160 | 160 | 160 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.83 WATERSHED INCHES; 10988 CFS-HRS; 908.0 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 3.85 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 2 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 3097.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .30 | .90 | 1.89 | 3.27 | 4.83 | 6.45 | 8.11 | 9.81 |
| 7.35 CFS | 11.57 | 13.40 | 15.30 | 17.17 | 19.02 | 20.87 | 22.87 | 25.19 |
| 8.55 CFS | 28.06 | 31.50 | 35.48 | 39.89 | 44.47 | 49.13 | 53.53 | 57.54 |
| 9.75 CFS | 61 | 65 | 70 | 77 | 86 | 96 | 108 | 121 |
| 10.95 CFS | 138 | 157 | 181 | 212 | 256 | 357 | 655 | 1341 |
| 12.15 CFS | 2330 | 3036 | 2952 | 2164 | 1134 | 635 | 496 | 418 |
| 13.35 CFS | 370 | 334 | 306 | 282 | 261 | 243 | 226 | 213 |
| 14.55 CFS | 202 | 193 | 186 | 181 | 176 | 171 | 165 | 159 |
| 15.75 CFS | 153 | 148 | 142 | 137 | 132 | 127 | 124 | 122 |
| 16.95 CFS | 120 | 118 | 116 | 114 | 111 | 109 | 107 | 106 |
| 18.15 CFS | 104 | 102 | 100 | 98 | 96 | 94 | 92 | 89 |
| 19.35 CFS | 87.52 | 85.62 | 83.66 | 81.59 | 79.27 | 77.02 | 75.14 | 73.73 |
| 20.55 CFS | 72.56 | 71.58 | 70.82 | 70.29 | 69.83 | 69.59 | 69.30 | 69.06 |
| 21.75 CFS | 68.80 | 68.48 | 67.99 | 67.48 | 67.01 | 66.55 | 66.22 | 65.70 |
| 22.95 CFS | 65.19 | 64.66 | 64.35 | 64.13 | 63.82 | 63.58 | 63.30 | 62.67 |
| 24.15 CFS | 59.98 | 51.28 | 36.44 | 19.69 | 6.44 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.50 WATERSHED INCHES; 3976 CFS-HRS; 328.6 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.88 | 1859.8 | 4.85 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 3979 CFS-HRS; 328.8 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.54 | 1302.8 | 5.93 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 3979 CFS-HRS; 328.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 2510.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.70 CFS | .21 | .88 | 2.23 | 4.30 | 6.80 | 9.44 | 12.09 | 14.76 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.90 CFS | 17.74 | 21.27 | 25.63 | 30.77 | 36.93 | 44.11 | 52.80 | 63.27 |
| 11.10 CFS | 76 | 92 | 114 | 146 | 221 | 497 | 1150 | 2058 |
| 12.30 CFS | 2511 | 2106 | 1248 | 615 | 451 | 373 | 325 | 293 |
| 13.50 CFS | 267 | 246 | 229 | 212 | 198 | 185 | 175 | 167 |
| 14.70 CFS | 160 | 156 | 152 | 148 | 143 | 138 | 133 | 128 |
| 15.90 CFS | 124 | 120 | 115 | 111 | 107 | 105 | 104 | 102 |
| 17.10 CFS | 100 | 99 | 97 | 95 | 93 | 92 | 90 | 89 |
| 18.30 CFS | 86.85 | 85.20 | 83.52 | 81.75 | 80.12 | 78.36 | 76.62 | 75.02 |
| 19.50 CFS | 73.35 | 71.77 | 69.81 | 67.70 | 65.90 | 64.54 | 63.47 | 62.59 |
| 20.70 CFS | 61.76 | 61.28 | 60.84 | 60.58 | 60.38 | 60.15 | 59.99 | 59.75 |
| 21.90 CFS | 59.45 | 59.01 | 58.56 | 58.13 | 57.92 | 57.56 | 57.05 | 56.61 |
| 23.10 CFS | 56.27 | 56.07 | 55.81 | 55.68 | 55.39 | 55.14 | 54.52 | 51.23 |
| 24.30 CFS | 40.74 | 24.86 | 9.87 | 1.02 | .00 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.93 WATERSHED INCHES; 2962 CFS-HRS; 244.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 2655.3 | (NULL) |
| 13.48 | 1568.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .80 | 1.32 | 1.97 | 2.77 | 3.70 | 4.76 | 5.94 |
| 8.40 CFS | 7.22 | 8.63 | 10.26 | 12.47 | 15.44 | 19.24 | 23.63 | 28.37 |
| 9.60 CFS | 33.35 | 38.62 | 44.47 | 51.09 | 58.73 | 67.28 | 76.97 | 87.82 |
| 10.80 CFS | 100 | 115 | 133 | 155 | 183 | 223 | 306 | 592 |
| 12.00 CFS | 1257 | 2180 | 2654 | 2288 | 1514 | 1037 | 1102 | 1280 |
| 13.20 CFS | 1449 | 1548 | 1568 | 1533 | 1461 | 1368 | 1266 | 1161 |
| 14.40 CFS | 1059 | 965 | 878 | 800 | 730 | 667 | 610 | 559 |
| 15.60 CFS | 515 | 476 | 442 | 412 | 385 | 361 | 341 | 324 |
| 16.80 CFS | 310 | 296 | 284 | 273 | 263 | 254 | 246 | 238 |
| 18.00 CFS | 232 | 225 | 219 | 214 | 209 | 204 | 199 | 195 |
| 19.20 CFS | 190 | 186 | 182 | 178 | 174 | 170 | 166 | 162 |
| 20.40 CFS | 159 | 156 | 153 | 151 | 148 | 146 | 144 | 142 |
| 21.60 CFS | 140 | 138 | 137 | 135 | 133 | 132 | 131 | 130 |
| 22.80 CFS | 129 | 127 | 127 | 126 | 125 | 124 | 123 | 123 |
| 24.00 CFS | 122 | 118 | 107 | 91 | 75 | 66 | 64 | 62 |
| 25.20 CFS | 58.43 | 53.71 | 48.12 | 42.28 | 36.61 | 31.33 | 26.56 | 22.33 |
| 26.40 CFS | 18.65 | 15.49 | 12.81 | 10.54 | 8.64 | 7.06 | 5.75 | 4.67 |
| 27.60 CFS | 3.78 | 3.06 | 2.47 | 1.99 | 1.60 | 1.28 | 1.03 | .82 |
| 28.80 CFS | .66 | .52 | .42 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6941 CFS-HRS; 573.6 ACRE-FEET.

OPERATION DIVERT XSECTION 12

OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 2655.3 | (DIVERT) |
| 13.48 | 1568.6 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 | CFS | .44 | .80 | 1.32 | 1.97 | 2.77 | 3.70 | 4.76 | 5.94 |
| 8.40 | CFS | 7.22 | 8.63 | 10.26 | 12.47 | 15.44 | 19.24 | 23.63 | 28.37 |
| 9.60 | CFS | 33.35 | 38.62 | 44.47 | 51.09 | 58.73 | 67.28 | 76.97 | 87.82 |
| 10.80 | CFS | 100 | 115 | 133 | 155 | 183 | 223 | 306 | 592 |
| 12.00 | CFS | 1257 | 2180 | 2654 | 2288 | 1514 | 1037 | 1102 | 1280 |
| 13.20 | CFS | 1449 | 1548 | 1568 | 1533 | 1461 | 1368 | 1266 | 1161 |
| 14.40 | CFS | 1059 | 965 | 878 | 800 | 730 | 667 | 610 | 559 |
| 15.60 | CFS | 515 | 476 | 442 | 412 | 385 | 361 | 341 | 324 |
| 16.80 | CFS | 310 | 296 | 284 | 273 | 263 | 254 | 246 | 238 |
| 18.00 | CFS | 232 | 225 | 219 | 214 | 209 | 204 | 199 | 195 |
| 19.20 | CFS | 190 | 186 | 182 | 178 | 174 | 170 | 166 | 162 |
| 20.40 | CFS | 159 | 156 | 153 | 151 | 148 | 146 | 144 | 142 |
| 21.60 | CFS | 140 | 138 | 137 | 135 | 133 | 132 | 131 | 130 |
| 22.80 | CFS | 129 | 127 | 127 | 126 | 125 | 124 | 123 | 123 |
| 24.00 | CFS | 122 | 118 | 107 | 91 | 75 | 66 | 64 | 62 |
| 25.20 | CFS | 58.43 | 53.71 | 48.12 | 42.28 | 36.61 | 31.33 | 26.56 | 22.33 |
| 26.40 | CFS | 18.65 | 15.49 | 12.81 | 10.54 | 8.64 | 7.06 | 5.75 | 4.67 |
| 27.60 | CFS | 3.78 | 3.06 | 2.47 | 1.99 | 1.60 | 1.28 | 1.03 | .82 |
| 28.80 | CFS | .66 | .52 | .42 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6941 CFS-HRS; 573.6 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
171 CFS-HRS; 573.6 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 2617.9 | 6.16 |
| 13.64 | 1565.9 | 4.65 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6942 CFS-HRS; 573.7 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 2617.9 | 3.87 |
| 13.64 | 1565.9 | 2.91 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.22 WATERSHED INCHES; 6942 CFS-HRS; 573.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.38 | 4801.3 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .45 | 1.32 | 2.85 | 4.98 | 7.45 | 10.06 | 12.71 | 15.43 |
| 7.35 CFS | 18.23 | 21.12 | 24.12 | 27.10 | 30.07 | 33.05 | 36.25 | 39.92 |
| 8.55 CFS | 44.44 | 49.84 | 56.11 | 63.06 | 70.34 | 77.81 | 84.96 | 91.43 |
| 9.75 CFS | 97 | 104 | 112 | 122 | 136 | 152 | 170 | 192 |
| 10.95 CFS | 218 | 248 | 286 | 335 | 401 | 560 | 990 | 2050 |
| 12.15 CFS | 3517 | 4649 | 4686 | 3657 | 2120 | 1084 | 820 | 685 |
| 13.35 CFS | 600 | 542 | 495 | 456 | 422 | 393 | 366 | 343 |
| 14.55 CFS | 325 | 311 | 300 | 291 | 283 | 274 | 265 | 255 |
| 15.75 CFS | 246 | 237 | 229 | 221 | 212 | 205 | 199 | 195 |
| 16.95 CFS | 192 | 189 | 186 | 182 | 179 | 176 | 172 | 169 |
| 18.15 CFS | 166 | 163 | 160 | 157 | 153 | 150 | 147 | 144 |
| 19.35 CFS | 141 | 138 | 134 | 131 | 127 | 124 | 121 | 118 |
| 20.55 CFS | 116 | 115 | 114 | 113 | 112 | 112 | 111 | 111 |
| 21.75 CFS | 110 | 110 | 109 | 108 | 107 | 107 | 106 | 105 |
| 22.95 CFS | 105 | 104 | 103 | 103 | 102 | 102 | 101 | 100 |
| 24.15 CFS | 96.11 | 83.61 | 61.19 | 35.11 | 13.28 | 1.30 | .00 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.23 | 2639.1 | 4.10 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.79 | 1910.5 | 4.90 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.79 | 1910.5 | 3.28 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 6371 CFS-HRS; 526.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1790.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.45 CFS | .23 | .84 | 2.02 | 3.86 | 6.19 | 9.02 | 12.33 | 16.32 |
| 10.65 CFS | 21 | 27 | 34 | 42 | 53 | 68 | 90 | 144 |
| 11.85 CFS | 317 | 764 | 1384 | 1766 | 1685 | 1187 | 640 | 384 |
| 13.05 CFS | 317 | 271 | 243 | 221 | 203 | 188 | 175 | 163 |
| 14.25 CFS | 153 | 144 | 137 | 131 | 128 | 124 | 121 | 117 |
| 15.45 CFS | 113 | 109 | 105 | 102 | 98 | 95 | 91 | 88 |
| 16.65 CFS | 86.31 | 84.98 | 83.69 | 82.29 | 80.88 | 79.42 | 78.03 | 76.61 |
| 17.85 CFS | 75.31 | 74.10 | 72.80 | 71.41 | 70.03 | 68.70 | 67.26 | 65.92 |
| 19.05 CFS | 64.53 | 63.08 | 61.77 | 60.42 | 59.10 | 57.59 | 55.90 | 54.42 |
| 20.25 CFS | 53.19 | 52.28 | 51.51 | 50.84 | 50.38 | 50.01 | 49.76 | 49.62 |
| 21.45 CFS | 49.42 | 49.30 | 49.09 | 48.88 | 48.55 | 48.18 | 47.87 | 47.59 |
| 22.65 CFS | 47.35 | 46.99 | 46.64 | 46.32 | 46.13 | 45.95 | 45.77 | 45.61 |
| 23.85 CFS | 45.45 | 44.86 | 42.52 | 35.27 | 23.59 | 11.46 | 3.06 | .00 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.73 WATERSHED INCHES; 2305 CFS-HRS; 190.5 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.36 | 1978.7 | (NULL) |
| 13.75 | 2101.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 6.00 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .25 | .55 | 1.03 | 1.72 | 2.61 | 3.72 | 5.03 | 6.53 |
| 8.40 CFS | 8.22 | 10.08 | 12.10 | 14.25 | 16.54 | 18.97 | 21.60 | 24.64 |
| 9.60 CFS | 28.37 | 33.02 | 38.70 | 45.27 | 52.71 | 60.94 | 70.08 | 80.18 |
| 10.80 CFS | 91 | 104 | 119 | 138 | 160 | 192 | 257 | 442 |
| 12.00 CFS | 904 | 1541 | 1945 | 1893 | 1447 | 1008 | 954 | 1187 |
| 13.20 CFS | 1490 | 1785 | 1991 | 2087 | 2098 | 2050 | 1962 | 1850 |
| 14.40 CFS | 1727 | 1600 | 1476 | 1356 | 1244 | 1139 | 1042 | 954 |
| 15.60 CFS | 874 | 802 | 738 | 682 | 631 | 586 | 547 | 513 |
| 16.80 CFS | 483 | 456 | 432 | 410 | 390 | 372 | 356 | 342 |
| 18.00 CFS | 329 | 317 | 307 | 297 | 288 | 280 | 272 | 265 |
| 19.20 CFS | 258 | 252 | 246 | 240 | 234 | 229 | 223 | 218 |
| 20.40 CFS | 214 | 209 | 205 | 201 | 197 | 194 | 190 | 187 |
| 21.60 CFS | 184 | 181 | 178 | 175 | 173 | 170 | 168 | 167 |
| 22.80 CFS | 165 | 163 | 162 | 160 | 159 | 158 | 157 | 156 |
| 24.00 CFS | 154 | 151 | 143 | 131 | 118 | 109 | 105 | 103 |
| 25.20 CFS | 101 | 96 | 90 | 82 | 74 | 65 | 57 | 50 |
| 26.40 CFS | 43.14 | 37.03 | 31.62 | 26.88 | 22.76 | 19.21 | 16.16 | 13.56 |
| 27.60 CFS | 11.35 | 9.49 | 7.91 | 6.58 | 5.47 | 4.54 | 3.76 | 3.12 |
| 28.80 CFS | 2.58 | 2.13 | 1.75 | 1.45 | 1.19 | .98 | .81 | .66 |
| 30.00 CFS | .54 | .44 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.24 WATERSHED INCHES; 8676 CFS-HRS; 717.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 4512.7 | (NULL) |
| 13.70 | 3662.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .97 | 1.80 | 2.99 | 4.53 | 6.42 | 8.65 | 11.20 |
| 8.40 CFS | 14.06 | 17.20 | 20.61 | 24.38 | 28.83 | 34.16 | 40.52 | 47.91 |
| 9.60 CFS | 56 | 66 | 77 | 89 | 103 | 119 | 137 | 156 |
| 10.80 CFS | 178 | 204 | 233 | 269 | 313 | 373 | 476 | 742 |
| 12.00 CFS | 1473 | 2745 | 4050 | 4504 | 3759 | 2584 | 2032 | 2287 |
| 13.20 CFS | 2756 | 3220 | 3530 | 3653 | 3634 | 3517 | 3338 | 3124 |
| 14.40 CFS | 2897 | 2668 | 2448 | 2242 | 2051 | 1875 | 1715 | 1569 |
| 15.60 CFS | 1438 | 1321 | 1218 | 1126 | 1046 | 974 | 910 | 855 |
| 16.80 CFS | 808 | 767 | 729 | 695 | 664 | 636 | 611 | 588 |
| 18.00 CFS | 568 | 549 | 533 | 517 | 502 | 489 | 476 | 465 |
| 19.20 CFS | 453 | 443 | 432 | 423 | 413 | 403 | 393 | 384 |
| 20.40 CFS | 376 | 369 | 361 | 354 | 348 | 342 | 336 | 331 |
| 21.60 CFS | 326 | 321 | 316 | 312 | 308 | 304 | 300 | 298 |
| 22.80 CFS | 295 | 292 | 289 | 287 | 285 | 283 | 281 | 279 |
| 24.00 CFS | 277 | 273 | 261 | 238 | 210 | 185 | 172 | 167 |
| 25.20 CFS | 163 | 155 | 144 | 131 | 117 | 103 | 89 | 77 |
| 26.40 CFS | 65.83 | 55.99 | 47.38 | 39.91 | 33.49 | 28.01 | 23.35 | 19.42 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27.60 CFS | 16.11 | 13.34 | 11.03 | 9.10 | 7.50 | 6.17 | 5.07 | 4.16 |
| 28.80 CFS | 3.41 | 2.80 | 2.29 | 1.87 | 1.53 | 1.25 | 1.02 | .83 |
| 30.00 CFS | .67 | .55 | .44 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.23 WATERSHED INCHES; 15618 CFS-HRS; 1290.7 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 4512.7 | (DIVERT) |
| 13.70 | 3662.3 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.20 CFS | .44 | .97 | 1.80 | 2.99 | 4.53 | 6.42 | 8.65 | 11.20 |
| 8.40 CFS | 14.06 | 17.20 | 20.61 | 24.38 | 28.83 | 34.16 | 40.52 | 47.91 |
| 9.60 CFS | 56 | 66 | 77 | 89 | 103 | 119 | 137 | 156 |
| 10.80 CFS | 178 | 204 | 233 | 269 | 313 | 373 | 476 | 742 |
| 12.00 CFS | 1473 | 2745 | 4050 | 4504 | 3759 | 2584 | 2032 | 2287 |
| 13.20 CFS | 2756 | 3220 | 3530 | 3653 | 3634 | 3517 | 3338 | 3124 |
| 14.40 CFS | 2897 | 2668 | 2448 | 2242 | 2051 | 1875 | 1715 | 1569 |
| 15.60 CFS | 1438 | 1321 | 1218 | 1126 | 1046 | 974 | 910 | 855 |
| 16.80 CFS | 808 | 767 | 729 | 695 | 664 | 636 | 611 | 588 |
| 18.00 CFS | 568 | 549 | 533 | 517 | 502 | 489 | 476 | 465 |
| 19.20 CFS | 453 | 443 | 432 | 423 | 413 | 403 | 393 | 384 |
| 20.40 CFS | 376 | 369 | 361 | 354 | 348 | 342 | 336 | 331 |
| 21.60 CFS | 326 | 321 | 316 | 312 | 308 | 304 | 300 | 298 |
| 22.80 CFS | 295 | 292 | 289 | 287 | 285 | 283 | 281 | 279 |
| 24.00 CFS | 277 | 273 | 261 | 238 | 210 | 185 | 172 | 167 |
| 25.20 CFS | 163 | 155 | 144 | 131 | 117 | 103 | 89 | 77 |
| 26.40 CFS | 65.83 | 55.99 | 47.38 | 39.91 | 33.49 | 28.01 | 23.35 | 19.42 |
| 27.60 CFS | 16.11 | 13.34 | 11.03 | 9.10 | 7.50 | 6.17 | 5.07 | 4.16 |
| 28.80 CFS | 3.41 | 2.80 | 2.29 | 1.87 | 1.53 | 1.25 | 1.02 | .83 |
| 30.00 CFS | .67 | .55 | .44 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.23 WATERSHED INCHES; 15618 CFS-HRS; 1290.7 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
180 CFS-HRS; 1290.7 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.61 | 4335.5 | 5.07 |
| 13.90 | 3632.8 | 4.58 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.23 WATERSHED INCHES; 15617 CFS-HRS; 1290.6 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.14 | 2639.3 | (RUNOFF) |
| 21.28 | 42.2 | (RUNOFF) |
| 22.28 | 40.6 | (RUNOFF) |
| 23.21 | 39.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 1.47 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.85 CFS | .24 | .83 | 1.72 | 2.68 | 3.68 | 4.69 | 5.72 | 6.77 |
| 7.05 CFS | 7.84 | 8.97 | 10.10 | 11.33 | 12.54 | 13.59 | 14.69 | 16.01 |
| 8.25 CFS | 17.53 | 19.47 | 21.91 | 24.61 | 27.56 | 30.43 | 33.48 | 36.44 |
| 9.45 CFS | 38.52 | 40.31 | 42.66 | 46.38 | 51.48 | 57.22 | 63.96 | 71.87 |
| 10.65 CFS | 81 | 91 | 105 | 120 | 140 | 168 | 210 | 346 |
| 11.85 CFS | 871 | 1989 | 2633 | 1712 | 643 | 410 | 320 | 265 |
| 13.05 CFS | 236 | 212 | 193 | 179 | 166 | 153 | 143 | 133 |
| 14.25 CFS | 125 | 119 | 115 | 112 | 109 | 106 | 102 | 99 |
| 15.45 CFS | 95.26 | 91.36 | 88.46 | 85.86 | 82.27 | 78.35 | 75.81 | 74.83 |
| 16.65 CFS | 74.05 | 72.59 | 71.03 | 69.96 | 68.82 | 67.19 | 65.93 | 65.11 |
| 17.85 CFS | 63.99 | 62.49 | 61.53 | 60.16 | 58.86 | 57.83 | 56.30 | 55.28 |
| 19.05 CFS | 54.14 | 52.62 | 51.68 | 50.69 | 49.11 | 47.43 | 46.17 | 45.34 |
| 20.25 CFS | 44.55 | 43.84 | 43.43 | 42.80 | 42.69 | 42.58 | 42.19 | 42.25 |
| 21.45 CFS | 42.16 | 41.70 | 41.66 | 41.51 | 40.75 | 40.58 | 40.59 | 40.40 |
| 22.65 CFS | 39.71 | 39.46 | 39.42 | 39.00 | 39.02 | 38.97 | 38.58 | 38.41 |
| 23.85 CFS | 38.36 | 37.64 | 31.99 | 16.10 | 2.28 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.59 WATERSHED INCHES; 2454 CFS-HRS; 202.8 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.54 | 1673.3 | 5.08 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.59 WATERSHED INCHES; 2455 CFS-HRS; 202.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.86 | 1234.3 | 4.11 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.59 WATERSHED INCHES; 2455 CFS-HRS; 202.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.65 | 5342.9 | (NULL) |
| 13.81 | 4072.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .41 | .82 | 1.37 | 2.06 | 2.93 | 4.01 | 5.38 | 7.09 |
| 7.80 CFS | 9.19 | 11.68 | 14.57 | 17.81 | 21.38 | 25.29 | 29.55 | 34.21 |
| 9.00 CFS | 39 | 45 | 53 | 61 | 70 | 81 | 93 | 106 |
| 10.20 CFS | 120 | 137 | 155 | 176 | 199 | 225 | 255 | 291 |
| 11.40 CFS | 333 | 385 | 452 | 560 | 807 | 1468 | 2710 | 4252 |
| 12.60 CFS | 5272 | 5083 | 4092 | 3342 | 3253 | 3479 | 3783 | 4001 |
| 13.80 CFS | 4072 | 4016 | 3868 | 3661 | 3421 | 3169 | 2919 | 2678 |
| 15.00 CFS | 2454 | 2247 | 2058 | 1886 | 1730 | 1589 | 1464 | 1352 |
| 16.20 CFS | 1254 | 1167 | 1088 | 1019 | 958 | 906 | 860 | 819 |
| 17.40 CFS | 782 | 748 | 718 | 690 | 665 | 643 | 623 | 604 |
| 18.60 CFS | 587 | 571 | 556 | 542 | 529 | 516 | 504 | 492 |
| 19.80 CFS | 481 | 470 | 459 | 448 | 438 | 428 | 419 | 411 |
| 21.00 CFS | 403 | 395 | 388 | 382 | 376 | 370 | 365 | 360 |
| 22.20 CFS | 355 | 351 | 347 | 343 | 340 | 337 | 333 | 330 |
| 23.40 CFS | 328 | 325 | 323 | 321 | 319 | 317 | 313 | 303 |
| 24.60 CFS | 282 | 251 | 221 | 199 | 186 | 177 | 166 | 153 |
| 25.80 CFS | 139 | 124 | 109 | 94 | 81 | 70 | 59 | 50 |
| 27.00 CFS | 42.25 | 35.47 | 29.67 | 24.75 | 20.59 | 17.09 | 14.16 | 11.71 |
| 28.20 CFS | 9.66 | 7.96 | 6.56 | 5.39 | 4.43 | 3.63 | 2.98 | 2.44 |
| 29.40 CFS | 1.99 | 1.63 | 1.33 | 1.09 | .88 | .72 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.27 WATERSHED INCHES; 18073 CFS-HRS; 1493.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 4518.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | .32 | 1.49 | 3.96 | 7.80 | 12.57 | 17.70 | 23.26 | 29.57 |
| 10.20 CFS | 37 | 46 | 57 | 70 | 85 | 104 | 126 | 155 |
| 11.40 CFS | 193 | 251 | 382 | 846 | 1965 | 3523 | 4470 | 4209 |
| 12.60 CFS | 2843 | 1440 | 924 | 760 | 653 | 584 | 532 | 490 |
| 13.80 CFS | 453 | 422 | 393 | 367 | 346 | 329 | 316 | 307 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.00 CFS | 299 | 291 | 282 | 272 | 262 | 253 | 245 | 236 |
| 16.20 CFS | 228 | 219 | 212 | 207 | 204 | 201 | 197 | 194 |
| 17.40 CFS | 190 | 187 | 184 | 181 | 178 | 175 | 171 | 168 |
| 18.60 CFS | 165 | 161 | 158 | 155 | 151 | 148 | 145 | 141 |
| 19.80 CFS | 138 | 134 | 130 | 127 | 125 | 123 | 122 | 121 |
| 21.00 CFS | 120 | 119 | 119 | 118 | 118 | 118 | 117 | 116 |
| 22.20 CFS | 115 | 114 | 114 | 113 | 112 | 112 | 111 | 110 |
| 23.40 CFS | 110 | 109 | 109 | 109 | 108 | 102 | 85 | 55 |
| 24.60 CFS | 25.49 | 5.84 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.84 WATERSHED INCHES; 5687 CFS-HRS; 470.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 3227.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.25 CFS | .45 | 1.25 | 2.62 | 4.72 | 7.41 | 10.60 | 14.21 | 18.16 |
| 9.45 CFS | 22.35 | 26.61 | 30.89 | 35.37 | 40.30 | 46.22 | 53.40 | 62.01 |
| 10.65 CFS | 72 | 84 | 99 | 117 | 138 | 166 | 205 | 282 |
| 11.85 CFS | 510 | 1047 | 1935 | 2809 | 3220 | 2998 | 2258 | 1294 |
| 13.05 CFS | 737 | 593 | 508 | 450 | 410 | 377 | 348 | 323 |
| 14.25 CFS | 301 | 282 | 266 | 253 | 243 | 236 | 229 | 222 |
| 15.45 CFS | 215 | 208 | 201 | 194 | 187 | 180 | 174 | 168 |
| 16.65 CFS | 162 | 159 | 156 | 153 | 151 | 148 | 145 | 143 |
| 17.85 CFS | 140 | 138 | 135 | 133 | 130 | 128 | 125 | 123 |
| 19.05 CFS | 120 | 118 | 115 | 113 | 110 | 107 | 105 | 102 |
| 20.25 CFS | 99.17 | 96.93 | 95.23 | 93.83 | 92.68 | 91.80 | 91.16 | 90.65 |
| 21.45 CFS | 90.35 | 90.04 | 89.67 | 89.35 | 88.88 | 88.23 | 87.61 | 87.10 |
| 22.65 CFS | 86.42 | 85.95 | 85.38 | 84.75 | 84.17 | 83.79 | 83.52 | 83.08 |
| 23.85 CFS | 82.81 | 82.25 | 79.54 | 72.48 | 58.11 | 39.66 | 21.26 | 7.26 |
| 25.05 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.05 WATERSHED INCHES; 4597 CFS-HRS; 379.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.39 | 7577.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.25 CFS | .45 | 1.25 | 2.62 | 4.72 | 7.45 | 10.92 | 15.71 | 22.12 |
| 9.45 CFS | 30 | 39 | 49 | 59 | 70 | 83 | 100 | 119 |
| 10.65 CFS | 142 | 169 | 203 | 243 | 294 | 359 | 456 | 663 |
| 11.85 CFS | 1356 | 3013 | 5458 | 7279 | 7429 | 5841 | 3698 | 2217 |
| 13.05 CFS | 1497 | 1246 | 1092 | 982 | 900 | 830 | 770 | 716 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 14.25 CFS | 668 | 628 | 595 | 569 | 550 | 534 | 520 | 504 |
| 15.45 CFS | 488 | 470 | 454 | 438 | 423 | 408 | 393 | 379 |
| 16.65 CFS | 370 | 363 | 357 | 351 | 345 | 339 | 333 | 327 |
| 17.85 CFS | 321 | 315 | 310 | 304 | 298 | 292 | 286 | 281 |
| 19.05 CFS | 275 | 269 | 263 | 257 | 252 | 245 | 238 | 232 |
| 20.25 CFS | 226 | 222 | 218 | 216 | 213 | 212 | 210 | 209 |
| 21.45 CFS | 209 | 208 | 207 | 206 | 205 | 204 | 202 | 201 |
| 22.65 CFS | 200 | 198 | 197 | 195 | 194 | 194 | 193 | 192 |
| 23.85 CFS | 191 | 190 | 181 | 157 | 113 | 65 | 27 | 7 |
| 25.05 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.93 WATERSHED INCHES; 10285 CFS-HRS; 850.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.49 | 11750.6 | (NULL) |
| 13.73 | 4916.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .41 | .82 | 1.37 | 2.06 | 2.93 | 4.01 | 5.38 | 7.09 |
| 7.80 CFS | 9.19 | 11.70 | 14.68 | 18.26 | 22.63 | 27.91 | 34.27 | 41.66 |
| 9.00 CFS | 50 | 61 | 75 | 91 | 110 | 130 | 152 | 176 |
| 10.20 CFS | 204 | 236 | 274 | 318 | 368 | 428 | 498 | 584 |
| 11.40 CFS | 692 | 840 | 1115 | 1915 | 3820 | 6925 | 9989 | 11681 |
| 12.60 CFS | 11112 | 8780 | 6310 | 4839 | 4499 | 4570 | 4765 | 4901 |
| 13.80 CFS | 4902 | 4785 | 4584 | 4329 | 4049 | 3764 | 3488 | 3229 |
| 15.00 CFS | 2988 | 2767 | 2562 | 2374 | 2201 | 2043 | 1902 | 1776 |
| 16.20 CFS | 1662 | 1559 | 1468 | 1389 | 1321 | 1263 | 1211 | 1164 |
| 17.40 CFS | 1120 | 1081 | 1044 | 1011 | 981 | 953 | 927 | 902 |
| 18.60 CFS | 879 | 857 | 836 | 817 | 797 | 779 | 761 | 744 |
| 19.80 CFS | 726 | 709 | 691 | 674 | 660 | 646 | 635 | 624 |
| 21.00 CFS | 614 | 606 | 598 | 591 | 584 | 577 | 571 | 565 |
| 22.20 CFS | 559 | 553 | 548 | 543 | 538 | 533 | 529 | 525 |
| 23.40 CFS | 522 | 518 | 515 | 513 | 509 | 498 | 470 | 416 |
| 24.60 CFS | 347 | 279 | 228 | 199 | 186 | 177 | 166 | 153 |
| 25.80 CFS | 139 | 124 | 109 | 94 | 81 | 70 | 59 | 50 |
| 27.00 CFS | 42.25 | 35.47 | 29.67 | 24.75 | 20.59 | 17.09 | 14.16 | 11.71 |
| 28.20 CFS | 9.66 | 7.96 | 6.56 | 5.39 | 4.43 | 3.63 | 2.98 | 2.44 |
| 29.40 CFS | 1.99 | 1.63 | 1.33 | 1.09 | .88 | .72 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.14 WATERSHED INCHES; 28358 CFS-HRS; 2343.5 ACRE-FEET.

--- XSECTION 76, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1200.0 FEET) CAN ADD .546 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS
WITH 1819.82 AC-FT ( .14 WATERSHED INCHES) FLOOD STORAGE
REMAINING IN RESERVOIR AT ELEV. 1207.05. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 5.55 | 45.6 | 1200.00 |
| 24.79 | 269.1 | 1210.11 |

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 228 CFS
RESVOR ( 85. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.55 CFS | 45.58 | 45.32 | 45.06 | 44.81 | 44.55 | 44.30 | 44.05 | 43.80 |
| 6.75 CFS | 43.56 | 43.31 | 43.08 | 42.85 | 42.62 | 42.41 | 42.20 | 42.01 |
| 7.95 CFS | 41.83 | 41.67 | 41.52 | 41.40 | 41.31 | 41.25 | 41.24 | 41.26 |
| 9.15 CFS | 41.35 | 41.50 | 41.73 | 42.06 | 42.51 | 43.06 | 43.75 | 44.58 |
| 10.35 CFS | 45.58 | 46.77 | 48.18 | 49.86 | 51.83 | 54.17 | 56.94 | 60.24 |
| 11.55 CFS | 64 | 69 | 78 | 93 | 123 | 161 | 173 | 185 |
| 12.75 CFS | 194 | 200 | 204 | 208 | 212 | 215 | 219 | 222 |
| 13.95 CFS | 225 | 228 | 231 | 233 | 236 | 238 | 240 | 242 |
| 15.15 CFS | 243 | 245 | 246 | 247 | 248 | 249 | 250 | 251 |
| 16.35 CFS | 252 | 252 | 253 | 254 | 254 | 255 | 255 | 256 |
| 17.55 CFS | 256 | 257 | 257 | 258 | 258 | 258 | 259 | 259 |
| 18.75 CFS | 259 | 260 | 260 | 260 | 261 | 261 | 261 | 262 |
| 19.95 CFS | 262 | 262 | 262 | 262 | 263 | 263 | 263 | 263 |
| 21.15 CFS | 264 | 264 | 264 | 264 | 264 | 264 | 265 | 265 |
| 22.35 CFS | 265 | 265 | 265 | 265 | 266 | 266 | 267 | 267 |
| 23.55 CFS | 267 | 267 | 268 | 268 | 268 | 269 | 269 | 269 |
| 24.75 CFS | 269 | 269 | 269 | 269 | 269 | 269 | 269 | 268 |
| 25.95 CFS | 268 | 268 | 268 | 268 | 267 | 267 | 267 | 267 |
| 27.15 CFS | 266 | 266 | 266 | 265 | 265 | 265 | 265 | 265 |
| 28.35 CFS | 265 | 264 | 264 | 264 | 264 | 264 | 264 | 264 |
| 29.55 CFS | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 262 |
| 30.75 CFS | 262 | 262 | 262 | 262 | 262 | 262 | 261 | 261 |
| 31.95 CFS | 261 | 261 | 261 | 261 | 260 | 260 | 260 | 260 |
| 33.15 CFS | 260 | 260 | 260 | 259 | 259 | 259 | 259 | 259 |
| 34.35 CFS | 259 | 259 | 258 | 258 | 258 | 258 | 258 | 258 |
| 35.55 CFS | 258 | 257 | 257 | 257 | 257 | 257 | 257 | 257 |
| 36.75 CFS | 256 | 256 | 256 | 256 | 256 | 256 | 256 | 255 |
| 37.95 CFS | 255 | 255 | 255 | 255 | 255 | 255 | 254 | 254 |
| 39.15 CFS | 254 | 254 | 254 | 254 | 253 | 253 | 253 | 253 |
| 40.35 CFS | 253 | 253 | 253 | 252 | 252 | 252 | 252 | 252 |
| 41.55 CFS | 252 | 252 | 251 | 251 | 251 | 251 | 251 | 251 |
| 42.75 CFS | 251 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| 43.95 CFS | 250 | 249 | 249 | 249 | 249 | 249 | 249 | 249 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 45.15 CFS | 248 | 248 | 248 | 248 | 248 | 248 | 248 | 247 |
| 46.35 CFS | 247 | 247 | 247 | 247 | 247 | 247 | 246 | 246 |
| 47.55 CFS | 246 | 246 | 246 | 246 | 246 | 245 | 245 | 245 |
| 48.75 CFS | 245 | 245 | 245 | 245 | 244 | 244 | 244 | 244 |
| 49.95 CFS | 244 | 244 | 244 | 243 | 243 | 243 | 243 | 243 |
| 51.15 CFS | 243 | 243 | 243 | 242 | 242 | 242 | 242 | 242 |
| 52.35 CFS | 242 | 242 | 241 | 241 | 241 | 241 | 241 | 241 |
| 53.55 CFS | 241 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| 54.75 CFS | 239 | 239 | 239 | 239 | 239 | 239 | 238 | 238 |
| 55.95 CFS | 238 | 238 | 238 | 238 | 237 | 237 | 237 | 237 |
| 57.15 CFS | 237 | 237 | 237 | 236 | 236 | 236 | 236 | 236 |
| 58.35 CFS | 236 | 235 | 235 | 235 | 235 | 235 | 235 | 234 |
| 59.55 CFS | 234 | 234 | 234 | 234 | 234 | 234 | 233 | 233 |
| 60.75 CFS | 233 | 233 | 233 | 233 | 232 | 232 | 232 | 232 |
| 61.95 CFS | 232 | 232 | 231 | 231 | 231 | 231 | 231 | 231 |
| 63.15 CFS | 231 | 230 | 230 | 230 | 230 | 230 | 230 | 229 |
| 64.35 CFS | 229 | 229 | 229 | 229 | 229 | 229 | 228 | 228 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.02 WATERSHED INCHES; 13556 CFS-HRS; 1120.2 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 2

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

RAINFALL OF 3.85 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.
RAINTABLE NUMBER 2, ARC 1
MAIN TIME INCREMENT .150 HOURS

ALTERNATE 1 STORM 1

| XSECTION/ STRUCTURE ID | | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|---|
| XSECTION | 1 | RUNOFF | 2.46 | 1.44 | --- | 12.40 | 1705 | 693.1 |
| XSECTION | 5 | REACH | 2.46 | 1.44 | 3.80 | 13.07 | 1009 | 410.2 |
| XSECTION | 10 | REACH | 2.46 | 1.44 | 4.99 | 13.72 | 733 | 298.0 |
| XSECTION | 2 | RUNOFF | 2.38 | .84 | --- | 12.36 | 900 | 378.2 |
| XSECTION | 12 | ADDHYD | 4.84 | 1.15 | --- | 12.37 | 915 | 189.0 |
| XSECTION | 12 | DIVERT | 4.84 | 1.15 | --- | 12.37 | 915 | 189.0 |
| XSECTION | 200 | DIVERT | .00 | 1.15 | --- | .00 | 0 | ******** |
| XSECTION | 20 | REACH | 4.84 | 1.15 | 3.34 | 13.90 | 857 | 177.1 |
| XSECTION | 25 | REACH | 4.84 | 1.15 | 2.08 | 14.08 | 853 | 176.2 |
| XSECTION | 3 | RUNOFF | 3.94 | 1.44 | --- | 12.41 | 2671 | 677.9 |
| XSECTION | 30 | REACH | 3.94 | 1.44 | 3.47 | 13.42 | 1395 | 354.1 |
| XSECTION | 5 | REACH | 3.94 | 1.44 | 3.80 | 14.04 | 1008 | 255.8 |
| XSECTION | 25 | REACH | 3.94 | 1.44 | 2.31 | 14.22 | 1006 | 255.3 |
| XSECTION | 4 | RUNOFF | 2.06 | .66 | --- | 12.43 | 527 | 255.8 |
| XSECTION | 34 | ADDHYD | 6.00 | 1.17 | --- | 14.19 | 1085 | 180.8 |
| XSECTION | 35 | ADDHYD | 10.84 | 1.16 | --- | 14.14 | 1936 | 178.6 |
| XSECTION | 35 | DIVERT | 10.84 | 1.16 | --- | 14.14 | 1936 | 178.6 |
| XSECTION | 199 | DIVERT | .00 | 1.16 | --- | .00 | 0 | ******** |
| XSECTION | 45 | REACH | 10.84 | 1.16 | 3.21 | 14.40 | 1901 | 175.4 |
| XSECTION | 6 | RUNOFF | 1.47 | 1.53 | --- | 12.15 | 1541 | 1048.3 |
| XSECTION | 60 | REACH | 1.47 | 1.53 | 4.20 | 12.59 | 858 | 583.7 |
| XSECTION | 67 | REACH | 1.47 | 1.53 | 3.12 | 13.11 | 621 | 422.4 |
| XSECTION | 64 | ADDHYD | 12.31 | 1.21 | --- | 14.31 | 2131 | 173.1 |
| XSECTION | 5 | RUNOFF | 4.78 | .77 | --- | 12.41 | 1544 | 323.0 |
| XSECTION | 7 | RUNOFF | 3.48 | .96 | --- | 12.54 | 1321 | 379.6 |
| XSECTION | 75 | ADDHYD | 8.26 | .85 | --- | 12.46 | 2800 | 339.0 |
| XSECTION | 76 | ADDHYD | 20.57 | 1.06 | --- | 12.57 | 3492 | 169.8 |
| STRUCTURE | 1 | RESVOR | 20.57 | .83 | 1205.78 | 24.82T | 212T | 10.3 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINTABLE NUMBER 2, ARC 2 | | | | | | | |
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 2.50 | --- | 12.36 | 3097 | 1258.9 |
| XSECTION 5 | REACH | 2.46 | 2.51 | 4.85 | 12.88 | 1860 | 756.1 |
| XSECTION 10 | REACH | 2.46 | 2.51 | 5.93 | 13.54 | 1303 | 529.7 |
| XSECTION 2 | RUNOFF | 2.38 | 1.93 | --- | 12.30 | 2511 | 1055.0 |
| XSECTION 12 | ADDHYD | 4.84 | 2.22 | --- | 12.31 | 2655 | 548.6 |
| XSECTION 12 | DIVERT | 4.84 | 2.22 | --- | 12.31 | 2655 | 548.6 |
| XSECTION 200 | DIVERT | .00 | 2.22 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 2.22 | 6.16 | 12.47 | 2618 | 540.9 |
| XSECTION 25 | REACH | 4.84 | 2.22 | 3.87 | 12.47 | 2618 | 540.9 |
| XSECTION 3 | RUNOFF | 3.94 | 2.51 | --- | 12.38 | 4801 | 1218.5 |
| XSECTION 30 | REACH | 3.94 | 2.51 | 4.10 | 13.23 | 2639 | 669.8 |
| XSECTION 5 | REACH | 3.94 | 2.51 | 4.90 | 13.79 | 1910 | 484.8 |
| XSECTION 25 | REACH | 3.94 | 2.51 | 3.28 | 13.79 | 1910 | 484.8 |
| XSECTION 4 | RUNOFF | 2.06 | 1.73 | --- | 12.35 | 1790 | 868.9 |
| XSECTION 34 | ADDHYD | 6.00 | 2.24 | --- | 13.75 | 2101 | 350.2 |
| XSECTION 35 | ADDHYD | 10.84 | 2.23 | --- | 12.43 | 4513 | 416.3 |
| XSECTION 35 | DIVERT | 10.84 | 2.23 | --- | 12.43 | 4513 | 416.3 |
| XSECTION 199 | DIVERT | .00 | 2.23 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 2.23 | 5.07 | 12.61 | 4335 | 399.9 |
| XSECTION 6 | RUNOFF | 1.47 | 2.59 | --- | 12.14 | 2639 | 1795.2 |
| XSECTION 60 | REACH | 1.47 | 2.59 | 5.08 | 12.54 | 1673 | 1138.1 |
| XSECTION 67 | REACH | 1.47 | 2.59 | 4.11 | 12.86 | 1234 | 839.5 |
| XSECTION 64 | ADDHYD | 12.31 | 2.27 | --- | 12.65 | 5343 | 434.0 |
| XSECTION 5 | RUNOFF | 4.78 | 1.84 | --- | 12.34 | 4519 | 945.4 |
| XSECTION 7 | RUNOFF | 3.48 | 2.05 | --- | 12.47 | 3227 | 927.3 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 75 | ADDHYD | 8.26 | 1.93 | --- | 12.39 | 7577 | 917.3 |
| XSECTION 76 | ADDHYD | 20.57 | 2.14 | --- | 12.49 | 11751 | 571.3 |
| STRUCTURE 1 | RESVOR | 20.57 | 1.02 | 1210.11 | 24.79T | 269T | 13.1 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | HYDROGRAPH INFORMATION: INFLOW PEAK (CFS) | INFLOW TIME (HR) | OUTFLOW PEAK (CFS) | OUTFLOW TIME (HR) | ROUTING PARAMETERS: Q-A EQ. COEFF (X) | Q-A EQ. POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 1678 | 12.4 | 1008 | 13.1 | .78 | 1.24 | .457 | .600 | .23 |
| 10 | 9100 | | 1008 | 13.1 | 729 | 13.6 | .67 | 1.31 | .199 | .724 | .26 |
| 20 | 3332 | | 887 | 12.3 | 855 | 13.9 | .11 | 1.68 | .007 | .963 | .73? |
| 25 | 1950 | | 855 | 13.9 | 853 | 14.1 | .046 | 1.75 | .004 | .998 | .86? |
| 30 | 8865 | | 2652 | 12.4 | 1374 | 13.4 | 1.08 | 1.14 | .588 | .518 | .18 |
| 5 | 8865 | | 1374 | 13.4 | 1006 | 14.1 | .71 | 1.26 | .195 | .732 | .23 |
| 25 | 1950 | | 1006 | 14.1 | 1005 | 14.3 | .046 | 1.75 | .004 | .999 | .89? |
| 45 | 4200 | | 1934 | 14.1 | 1901 | 14.4 | .044 | 1.73 | .009 | .983 | .63 |
| 60 | 7540 | | 1541 | 12.1 | 858 | 12.6 | .67 | 1.29 | .493 | .557 | .30 |
| 67 | 5140 | | 858 | 12.6 | 615 | 13.1 | .65 | 1.28 | .189 | .717 | .35 |
| ALTERNATE 2 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 3036 | 12.3 | 1857 | 12.9 | 1.09 | 1.18 | .473 | .612 | .23 |
| 10 | 9100 | | 1857 | 12.9 | 1301 | 13.5 | 1.29 | 1.17 | .260 | .700 | .23 |
| 20 | 3332 | | 2654 | 12.3 | 2611 | 12.4 | .13 | 1.65 | .008 | .984 | .92? |
| 25 | 1950 | | 2611 | 12.4 | 2611 | 12.4 | .048 | 1.74 | .004 | 1.000 | 1.00? |
| 30 | 8865 | | 4686 | 12.4 | 2632 | 13.2 | 1.21 | 1.12 | .571 | .562 | .19 |
| 5 | 8865 | | 2632 | 13.2 | 1910 | 13.8 | 1.03 | 1.19 | .225 | .726 | .23 |
| 25 | 1950 | | 1910 | 13.8 | 1910 | 13.8 | .046 | 1.75 | .003 | 1.000 | 1.00? |
| 45 | 4200 | | 4504 | 12.4 | 4332 | 12.6 | .046 | 1.73 | .007 | .962 | .79? |
| 60 | 7540 | | 2633 | 12.1 | 1641 | 12.6 | .49 | 1.35 | .383 | .623 | .36 |
| 67 | 5140 | | 1641 | 12.6 | 1230 | 12.9 | .76 | 1.25 | .199 | .749 | .37 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE 1 | | 20.57 | |
| ALTERNATE | 1 | | 212 |
| ALTERNATE | 2 | | 269 |
| XSECTION 1 | | 2.46 | |
| ALTERNATE | 1 | | 1705 |
| ALTERNATE | 2 | | 3097 |
| XSECTION 2 | | 2.38 | |
| ALTERNATE | 1 | | 900 |
| ALTERNATE | 2 | | 2511 |
| XSECTION 3 | | 3.94 | |
| ALTERNATE | 1 | | 2671 |
| ALTERNATE | 2 | | 4801 |
| XSECTION 4 | | 2.06 | |
| ALTERNATE | 1 | | 527 |
| ALTERNATE | 2 | | 1790 |
| XSECTION 5 | | 4.78 | |
| ALTERNATE | 1 | | 1544 |
| ALTERNATE | 2 | | 4519 |
| XSECTION 6 | | 1.47 | |
| ALTERNATE | 1 | | 1541 |
| ALTERNATE | 2 | | 2639 |
| XSECTION 7 | | 3.48 | |
| ALTERNATE | 1 | | 1321 |
| ALTERNATE | 2 | | 3227 |
| XSECTION 10 | | 2.46 | |
| ALTERNATE | 1 | | 733 |
| ALTERNATE | 2 | | 1303 |
| XSECTION 12 | | 4.84 | |
| ALTERNATE | 1 | | 915 |
| ALTERNATE | 2 | | 2655 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 20 | | 4.84 | |
| ALTERNATE | 1 | | 857 |
| ALTERNATE | 2 | | 2618 |
| XSECTION 25 | | 3.94 | |
| ALTERNATE | 1 | | 1006 |
| ALTERNATE | 2 | | 1910 |
| XSECTION 30 | | 3.94 | |
| ALTERNATE | 1 | | 1395 |
| ALTERNATE | 2 | | 2639 |
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 1085 |
| ALTERNATE | 2 | | 2101 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 1936 |
| ALTERNATE | 2 | | 4513 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 1901 |
| ALTERNATE | 2 | | 4335 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 858 |
| ALTERNATE | 2 | | 1673 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 2131 |
| ALTERNATE | 2 | | 5343 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 621 |
| ALTERNATE | 2 | | 1234 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 2800 |
| ALTERNATE | 2 | | 7577 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 3492 |
| ALTERNATE | 2 | | 11751 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

```
TR20 - ---------------------------------------------------------------- SCS -
WT100YR   WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
08/12/**  100-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spil2.04TEST


END OF  1 JOBS IN THIS RUN




                    SCS  TR-20,  VERSION 2.04TEST
                           WT100YR   FILES

     INPUT  = 100INN.DAT                              , GIVEN DATA FILE
     OUTPUT = 100OUT.OUT                              , DATED 08/12/**,11:25:08

              FILES GENERATED - DATED 08/12/**,11:25:08

    FILE 111.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   4,  MESSAGES =   8

                        JOB ENDED AT 11:25:08
                    *** TR-20 RUN COMPLETED ***
```

Future Condition

(Principal spillway closed)

(500-yr 24-hr)

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY*****************

JOB TR-20 WT100YR                        PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROUTING
TITLE     500-yr, 24-hr, Type II Dist, 100-yr Sediment Storage, 1200'Spillway
 4 DIMHYD                .0556                                          WT3
 8          0.0          .03          .10          .19          .31
 8          .47          .66          .82          .93          .99
 8          1.0          .99          .93          .82          .66
 8          .47          .31          .03          .00          .00
 9 ENDTBL
 5 RAINFL 2              .1000                                          TYPE II
 8          .0000        .0010        .0020        .0030        .0041
 8          .0051        .0062        .0072        .0083        .0094
 8          .0105        .0116        .0127        .0138        .0150
 8          .0161        .0173        .0184        .0196        .0208
 8          .0220        .0232        .0244        .0257        .0269
 8          .0281        .0294        .0306        .0319        .0332
 8          .0345        .0358        .0371        .0384        .0398
 8          .0411        .0425        .0439        .0452        .0466
 8          .0480        .0494        .0508        .0523        .0538
 8          .0553        .0568        .0583        .0598        .0614
 8          .0630        .0646        .0662        .0679        .0696
 8          .0712        .0730        .0747        .0764        .0782
 8          .0800        .0818        .0836        .0855        .0874
 8          .0892        .0912        .0931        .0950        .0970
 8          .0990        .1010        .1030        .1051        .1072
 8          .1093        .1114        .1135        .1156        .1178
 8          .1200        .1222        .1246        .1270        .1296
 8          .1322        .1350        .1379        .1408        .1438
 8          .1470        .1502        .1534        .1566        .1598
 8          .1630        .1663        .1697        .1733        .1771
 8          .1810        .1851        .1895        .1941        .1989
 8          .2040        .2094        .2152        .2214        .2280
 8          .2350        .2427        .2513        .2609        .2715
 8          .2830        .3068        .3544        .4308        .5679
 8          .6630        .6820        .6986        .7130        .7252
 8          .7350        .7434        .7514        .7588        .7656
 8          .7720        .7780        .7836        .7890        .7942
 8          .7990        .8036        .8080        .8122        .8162
 8          .8200        .8237        .8273        .8308        .8342
 8          .8376        .8409        .8442        .8474        .8505
 8          .8535        .8565        .8594        .8622        .8649
 8          .8676        .8702        .8728        .8753        .8777
 8          .8800        .8823        .8845        .8868        .8890
 8          .8912        .8934        .8955        .8976        .8997
 8          .9018        .9038        .9058        .9078        .9097
 8          .9117        .9136        .9155        .9173        .9192
 8          .9210        .9228        .9245        .9263        .9280
 8          .9297        .9313        .9330        .9346        .9362
 8          .9377        .9393        .9408        .9423        .9438
 8          .9452        .9466        .9480        .9493        .9507
 8          .9520        .9533        .9546        .9559        .9572
 8          .9584        .9597        .9610        .9622        .9635
 8          .9647        .9660        .9672        .9685        .9697
 8          .9709        .9722        .9734        .9746        .9758
 8          .9770        .9782        .9794        .9806        .9818
 8          .9829        .9841        .9853        .9864        .9876
```

$48 \times 5 + 1 = 24$ ✓

```
 8          .9887       .9899       .9910       .9922       .9933
 8          .9944       .9956       .9967       .9978       .9989
 8          1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         10.41                             BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.86        5.          4.39
 8                      2.01        50.         24.22
 8                      2.58        100.        40.12
 8                      3.46        200.        80.99
 8                      4.14        400.        129.44
 8                      5.16        800.        214.74
 8                      6.39        1600.       441.84
 8                      7.80        3200.       980.75
 8                      9.16        6400.       1891.44
 8                      10.41       12800.      3516.14
 8                      11.75       25600.      6548.98
 8                      13.26       51200.      11081.19
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8                      1.56        500.        203.28
 8                      2.30        1000.       302.00
 8                      3.38        2000.       449.24
 8                      4.97        4000.       673.73
 8                      6.23        6000.       855.96
 8                      7.31        8000.       1016.35
 8                      8.24        10000.      1158.51
 8                      9.09        12000.      1293.31
 8                      9.90        14000.      1425.57
 8                      10.64       16000.      1549.17
 8                      11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030        1.0         9.45                            BOSSCS#6
 8                      0.          0.0         0.0
 8                      0.77        5.          4.67
 8                      1.54        50.         32.06
 8                      1.78        100.        56.64
 8                      2.10        200.        100.59
 8                      2.50        400.        179.97
 8                      3.01        800.        320.25
 8                      3.63        1600.       589.66
 8                      4.35        3200.       1110.72
 8                      5.21        6400.       2084.48
 8                      6.03        12800.      4119.83
 8                      6.99        25600.      6856.75
 8                      8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045        1.0         4.87                            REACHA
 8                      0.          0.0         0.0
 8                      0.60        100.        85.69
 8                      0.90        200.        127.94
 8                      1.13        300.        161.93
 8                      1.52        500.        217.27
 8                      2.25        1000.       324.03
 8                      3.31        2000.       483.02
 8                      4.87        4000.       722.17
 8                      6.09        6000.       914.99
 8                      7.15        8000.       1084.61
 8                      8.05        10000.      1234.17
 8                      8.87        12000.      1373.80
 8                      9.64        14000.      1507.84
 8                      10.34       16000.      1633.45
 8                      11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060        1.0         4.7                             2CP6CP7
 8                      0.          0.0         0.0
 8                      2.36        100.        45.12
 8                      2.88        200.        83.75
 8                      3.18        300.        114.33
 8                      3.64        500.        172.72
 8                      4.42        1000.       289.04
 8                      5.40        2000.       470.72
 8                      6.87        4000.       782.74
 8                      7.91        6000.       1020.12
 8                      8.79        8000.       1231.25
 8                      9.60        10000.      1435.05
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8                        10.26       12000.      1618.34
 8                        10.94       14000.      1812.58
 8                        11.47       16000.      1983.46
 8                        11.96       18000.      2150.12
 9 ENDTBL
 2 XSECTN    067          1.0         8.77                                BOSSCS#5
 8                        0.          0.0         0.0
 8                        0.35        5.          5.56
 8                        1.03        50.         30.95
 8                        1.39        100.        52.16
 8                        1.94        200.        88.72
 8                        2.63        400.        148.61
 8                        3.51        800.        260.63
 8                        4.62        1600.       459.66
 8                        6.04        3200.       929.36
 8                        7.38        6400.       1811.51
 8                        8.77        12800.      3374.20
 8                        10.17       25600.      6398.87
 8                        11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT       01                                                        95/11/6
 8                        1178.0      0.0         0.
 8                        1188.0      0.02        44.8
 8                        1196.8      0.13        300.
 8                        1199.2      0.21        500.
 8                        1202.0      16.00       845.55
 8                        1204.0      28.000      1176.28
 8                        1206.0      39.00       1575.25
 8                        1208.0      50.00       2044.97
 8                        1210.0      63.00       2593.40
 8                        1212.0      73.000      3218.00
 8                        1213.0      2672.00     3556.67
 8                        1214.0      8218.00     3916.02
 8                        1215.0      15533.0     4294.13
 8                        1216.0      24261.0     4692.68
 8                        1217.0      34202.0     5113.19
 8                        1218.0      45221.0     5556.01
 8                        1219.0      57222.0     6021.50
 8                        1220.0      70131.0     6509.75
 9 ENDTBL
 6 RUNOFF 1 001       1 2.46          87.2        0.85        1 1
 6 REACH  3 005   1   7 9100.                                 1           BOSS#6
 6 REACH  3 010   7   2 9100.                                 1           BOSS#4
 6 RUNOFF 1 002       3 2.38          79.9        0.73        1 1
 6 ADDHYD 4 012   2 3 1                                       1 1
 6 DIVERT 6 012   1 4 7 4100.         1.00        200.        1 1         OLIVE
 6 REACH  3 020   4   7 3332.                                 1           REACH C
 6 REACH  3 025   7   5 1950.                                 1           REACH B
 6 RUNOFF 1 003       6 3.94          87.2        0.88        1 1
 6 REACH  3 030   6   7 8865.                                 1           BOSS#6
 6 REACH  3 005   7   1 8865.                                 1           BOSS#5
 6 REACH  3 025   1   7 1950.                                 1           REACH B
 6 RUNOFF 1 004       1 2.06          77.3        0.79        1 1
 6 ADDHYD 4 034   7 1 2                                       1 1
 6 ADDHYD 4 035   5 2 3                                       1 1
 6 DIVERT 6 035   3 4 7 11000.        1.00        199.        1 1         NORTHERN
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 6 REACH   3 045    4    5 4200.                                1            REACH A
 6 RUNOFF  1 006         2 1.47          87.7         0.47      1 1
 6 REACH   3 060    2    3 7540.                                1            CP6CP7
 6 REACH   3 067    3    4 5140.                                1            BOSS#5
 6 ADDHYD  4 064    5 4  3                                      1 1
 6 RUNOFF  1 005         6 4.78          78.8         0.78      1 1
 6 RUNOFF  1 007         7 3.48          81.7         1.01      1 1
 6 ADDHYD  4 075    6 7  1                                      1 1
 6 ADDHYD  4 076    1 3  2                                      1 1      1
 6 RESVOR  2     01 2    1 1199.2                               1 1      1
   ENDATA
 7 LIST                   1.0                    1.
 7 INCREM  6              0.15
 7 COMPUT  7 001       01 0.          4.84         1.0          2 1  01   01
   ENDCMP  1
 7 COMPUT  7 001       01 0.          4.84         1.0          2 2  02   01
   ENDCMP  1
   ENDJOB  2
```

**********END OF 80-80 LIST**********

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST  1.  0.  1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT
DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0017 | .0035 | .0052 | .0070 |
| .0087 | .0105 | .0122 | .0139 | .0157 |
| .0174 | .0192 | .0210 | .0227 | .0245 |
| .0262 | .0280 | .0297 | .0315 | .0332 |
| .0350 | .0368 | .0386 | .0404 | .0423 |
| .0442 | .0461 | .0480 | .0500 | .0520 |
| .0540 | .0561 | .0582 | .0603 | .0625 |
| .0647 | .0669 | .0691 | .0714 | .0737 |
| .0760 | .0784 | .0807 | .0831 | .0855 |
| .0878 | .0902 | .0926 | .0951 | .0975 |
| .1000 | .1024 | .1049 | .1073 | .1098 |
| .1123 | .1148 | .1174 | .1199 | .1225 |
| .1250 | .1276 | .1303 | .1332 | .1361 |
| .1391 | .1423 | .1456 | .1489 | .1524 |
| .1560 | .1597 | .1633 | .1671 | .1708 |
| .1746 | .1784 | .1823 | .1861 | .1901 |
| .1940 | .1982 | .2027 | .2077 | .2132 |
| .2190 | .2252 | .2318 | .2388 | .2462 |
| .2540 | .2623 | .2714 | .2812 | .2917 |
| .3030 | .3194 | .3454 | .3878 | .4632 |
| .5150 | .5322 | .5476 | .5612 | .5730 |
| .5830 | .5919 | .6003 | .6083 | .6159 |
| .6230 | .6298 | .6365 | .6430 | .6493 |
| .6555 | .6615 | .6674 | .6731 | .6786 |
| .6840 | .6892 | .6944 | .6995 | .7044 |
| .7092 | .7140 | .7186 | .7232 | .7276 |
| .7320 | .7362 | .7404 | .7444 | .7484 |
| .7523 | .7560 | .7596 | .7632 | .7667 |
| .7700 | .7733 | .7766 | .7798 | .7830 |
| .7862 | .7894 | .7926 | .7958 | .7989 |
| .8020 | .8051 | .8082 | .8112 | .8142 |
| .8173 | .8202 | .8232 | .8262 | .8291 |
| .8320 | .8349 | .8378 | .8406 | .8434 |
| .8462 | .8490 | .8518 | .8546 | .8573 |
| .8600 | .8627 | .8654 | .8680 | .8706 |
| .8733 | .8758 | .8784 | .8810 | .8835 |
| .8860 | .8885 | .8910 | .8934 | .8958 |
| .8982 | .9006 | .9030 | .9054 | .9077 |
| .9100 | .9123 | .9146 | .9168 | .9190 |
| .9212 | .9234 | .9256 | .9278 | .9299 |
| .9320 | .9341 | .9362 | .9382 | .9402 |
| .9423 | .9442 | .9462 | .9482 | .9501 |
| .9520 | .9539 | .9558 | .9576 | .9594 |
| .9613 | .9630 | .9648 | .9666 | .9683 |
| .9700 | .9717 | .9734 | .9750 | .9766 |
| .9783 | .9798 | .9814 | .9830 | .9845 |
| .9860 | .9875 | .9890 | .9904 | .9918 |
| .9933 | .9946 | .9960 | .9974 | .9987 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

| | | | | | | |
|---|---|---|---|---|---|---|
| RUNOFF | 1 | | 1 | 2.4600 | 87.2000 | .85001 1 0 0 0 1 |
| REACH | 5 | 1 | 7 | 9100.0000 | .0000 | .00001 0 0 0 0 1 |
| REACH | 10 | 7 | 2 | 9100.0000 | .0000 | .00001 0 0 0 0 1 |
| RUNOFF | 2 | | 3 | 2.3800 | 79.9000 | .73001 1 0 0 0 1 |
| ADDHYD | 12 | 2 3 | 1 | | | 1 1 0 0 0 1 |
| DIVERT | 12 | 1 4 | 7 | 4100.0000 | 1.0000 | 200.00001 1 0 0 0 1 |
| REACH | 20 | 4 | 7 | 3332.0000 | .0000 | .00001 0 0 0 0 1 |
| REACH | 25 | 7 | 5 | 1950.0000 | .0000 | .00001 0 0 0 0 1 |
| RUNOFF | 3 | | 6 | 3.9400 | 87.2000 | .88001 1 0 0 0 1 |
| REACH | 30 | 6 | 7 | 8865.0000 | .0000 | .00001 0 0 0 0 1 |
| REACH | 5 | 7 | 1 | 8865.0000 | .0000 | .00001 0 0 0 0 1 |
| REACH | 25 | 1 | 7 | 1950.0000 | .0000 | .00001 0 0 0 0 1 |
| RUNOFF | 4 | | 1 | 2.0600 | 77.3000 | .79001 1 0 0 0 1 |
| ADDHYD | 34 | 7 1 | 2 | | | 1 1 0 0 0 1 |
| ADDHYD | 35 | 5 2 | 3 | | | 1 1 0 0 0 1 |
| DIVERT | 35 | 3 4 | 7 | 11000.0000 | 1.0000 | 199.00001 1 0 0 0 1 |
| REACH | 45 | 4 | 5 | 4200.0000 | .0000 | .00001 0 0 0 0 1 |
| RUNOFF | 6 | | 2 | 1.4700 | 87.7000 | .47001 1 0 0 0 1 |
| REACH | 60 | 2 | 3 | 7540.0000 | .0000 | .00001 0 0 0 0 1 |
| REACH | 67 | 3 | 4 | 5140.0000 | .0000 | .00001 0 0 0 0 1 |
| ADDHYD | 64 | 5 4 | 3 | | | 1 1 0 0 0 1 |
| RUNOFF | 5 | | 6 | 4.7800 | 78.8000 | .78001 1 0 0 0 1 |
| RUNOFF | 7 | | 7 | 3.4800 | 81.7000 | 1.01001 1 0 0 0 1 |
| ADDHYD | 75 | 6 7 | 1 | | | 1 1 0 0 0 1 |
| ADDHYD | 76 | 1 3 | 2 | | | 1 1 0 0 1 1 |
| RESVOR | | 1 2 | 1 | 1199.2000 | | 1 1 0 0 1 1 |
| ENDATA | | | | | | |

END OF LISTING

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .150 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.84 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 1 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 1 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.39 | 2652.3 | |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.30 CFS | .14 | .64 | 1.88 | 3.93 | 6.85 | 10.39 | 14.51 | 19.43 |
| 10.50 CFS | 25 | 32 | 41 | 51 | 64 | 80 | 101 | 131 |
| 11.70 CFS | 196 | 419 | 998 | 1876 | 2542 | 2593 | 1984 | 1122 |
| 12.90 CFS | 627 | 495 | 419 | 370 | 337 | 309 | 286 | 266 |
| 14.10 CFS | 248 | 232 | 218 | 207 | 198 | 192 | 186 | 182 |
| 15.30 CFS | 176 | 171 | 164 | 159 | 153 | 148 | 143 | 137 |
| 16.50 CFS | 133 | 129 | 127 | 125 | 123 | 121 | 119 | 117 |
| 17.70 CFS | 115 | 113 | 111 | 109 | 107 | 105 | 103 | 101 |
| 18.90 CFS | 98.76 | 96.75 | 94.57 | 92.62 | 90.65 | 88.60 | 86.41 | 83.97 |
| 20.10 CFS | 81.66 | 79.74 | 78.28 | 77.10 | 76.07 | 75.28 | 74.75 | 74.28 |
| 21.30 CFS | 74.09 | 73.81 | 73.57 | 73.32 | 73.03 | 72.52 | 72.00 | 71.52 |
| 22.50 CFS | 71.05 | 70.72 | 70.21 | 69.69 | 69.16 | 68.86 | 68.63 | 68.32 |
| 23.70 CFS | 68.10 | 67.82 | 67.20 | 64.08 | 55.49 | 39.11 | 21.20 | 6.63 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 3461 CFS-HRS; 286.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.05 | 1590.2 | 4.61 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 3461 CFS-HRS; 286.0 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.72 | 1122.9 | 5.66 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 3461 CFS-HRS; 286.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 1660.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 2 | 10 | 40 | 181 | 604 | 1257 | 1644 |
| 12.45 CFS | 1515 | 972 | 508 | 381 | 317 | 279 | 253 | 232 |
| 13.65 CFS | 215 | 200 | 187 | 175 | 164 | 155 | 148 | 143 |
| 14.85 CFS | 139 | 136 | 133 | 129 | 124 | 120 | 116 | 112 |
| 16.05 CFS | 109 | 105 | 101 | 98 | 96 | 95 | 94 | 92 |
| 17.25 CFS | 90.62 | 89.11 | 87.59 | 86.11 | 84.82 | 83.46 | 82.06 | 80.49 |
| 18.45 CFS | 79.06 | 77.60 | 76.00 | 74.55 | 72.96 | 71.43 | 70.01 | 68.50 |
| 19.65 CFS | 67.07 | 65.29 | 63.40 | 61.78 | 60.53 | 59.57 | 58.78 | 58.06 |
| 20.85 CFS | 57.62 | 57.25 | 57.05 | 56.90 | 56.72 | 56.62 | 56.41 | 56.17 |
| 22.05 CFS | 55.79 | 55.41 | 55.01 | 54.86 | 54.55 | 54.10 | 53.70 | 53.42 |
| 23.25 CFS | 53.28 | 53.05 | 52.96 | 52.73 | 52.50 | 51.88 | 48.81 | 38.76 |
| 24.45 CFS | 23.78 | 9.43 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.41 WATERSHED INCHES; 2172 CFS-HRS; 179.5 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 1708.7 | (NULL) |
| 13.67 | 1333.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .45 | .97 | 1.79 | 2.97 | 4.58 | 6.97 | 11.49 | 22.39 |
| 11.70 CFS | 57 | 203 | 632 | 1293 | 1689 | 1574 | 1059 | 662 |
| 12.90 CFS | 669 | 809 | 1005 | 1186 | 1297 | 1332 | 1314 | 1260 |
| 14.10 CFS | 1185 | 1101 | 1014 | 930 | 851 | 779 | 713 | 653 |
| 15.30 CFS | 599 | 550 | 507 | 469 | 436 | 407 | 381 | 358 |
| 16.50 CFS | 339 | 323 | 309 | 296 | 284 | 273 | 263 | 254 |
| 17.70 CFS | 246 | 239 | 232 | 226 | 220 | 215 | 210 | 205 |
| 18.90 CFS | 201 | 196 | 192 | 188 | 184 | 180 | 176 | 172 |
| 20.10 CFS | 168 | 165 | 162 | 159 | 156 | 153 | 151 | 149 |
| 21.30 CFS | 146 | 144 | 142 | 141 | 139 | 137 | 135 | 134 |
| 22.50 CFS | 133 | 132 | 131 | 129 | 129 | 128 | 127 | 126 |
| 23.70 CFS | 126 | 125 | 124 | 120 | 110 | 94 | 80 | 70 |
| 24.90 CFS | 69.23 | 68.15 | 65.91 | 62.13 | 56.85 | 50.62 | 44.17 | 37.96 |
| 26.10 CFS | 32.23 | 27.09 | 22.59 | 18.71 | 15.40 | 12.62 | 10.29 | 8.36 |
| 27.30 CFS | 6.77 | 5.46 | 4.40 | 3.53 | 2.83 | 2.26 | 1.80 | 1.44 |
| 28.50 CFS | 1.14 | .91 | .72 | .57 | .45 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5633 CFS-HRS; 465.5 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 1708.7 | (DIVERT) |
| 13.67 | 1333.0 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .45 | .97 | 1.79 | 2.97 | 4.58 | 6.97 | 11.49 | 22.39 |
| 11.70 CFS | 57 | 203 | 632 | 1293 | 1689 | 1574 | 1059 | 662 |
| 12.90 CFS | 669 | 809 | 1005 | 1186 | 1297 | 1332 | 1314 | 1260 |
| 14.10 CFS | 1185 | 1101 | 1014 | 930 | 851 | 779 | 713 | 653 |
| 15.30 CFS | 599 | 550 | 507 | 469 | 436 | 407 | 381 | 358 |
| 16.50 CFS | 339 | 323 | 309 | 296 | 284 | 273 | 263 | 254 |
| 17.70 CFS | 246 | 239 | 232 | 226 | 220 | 215 | 210 | 205 |
| 18.90 CFS | 201 | 196 | 192 | 188 | 184 | 180 | 176 | 172 |
| 20.10 CFS | 168 | 165 | 162 | 159 | 156 | 153 | 151 | 149 |
| 21.30 CFS | 146 | 144 | 142 | 141 | 139 | 137 | 135 | 134 |
| 22.50 CFS | 133 | 132 | 131 | 129 | 129 | 128 | 127 | 126 |
| 23.70 CFS | 126 | 125 | 124 | 120 | 110 | 94 | 80 | 70 |
| 24.90 CFS | 69.23 | 68.15 | 65.91 | 62.13 | 56.85 | 50.62 | 44.17 | 37.96 |
| 26.10 CFS | 32.23 | 27.09 | 22.59 | 18.71 | 15.40 | 12.62 | 10.29 | 8.36 |
| 27.30 CFS | 6.77 | 5.46 | 4.40 | 3.53 | 2.83 | 2.26 | 1.80 | 1.44 |
| 28.50 CFS | 1.14 | .91 | .72 | .57 | .45 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5633 CFS-HRS; 465.5 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
149 CFS-HRS; 465.5 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.52 | 1652.9 | 4.80 |
| 13.85 | 1326.9 | 4.24 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5633 CFS-HRS; 465.5 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.67 | 1650.4 | 3.00 |
| 14.01 | 1326.7 | 2.65 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.80 WATERSHED INCHES; 5632 CFS-HRS; 465.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 4180.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 9.30 | CFS | .19 | .96 | 2.77 | 5.91 | 10.42 | 15.98 | 22.58 | 30.28 |
| 10.50 | CFS | 40 | 51 | 64 | 80 | 100 | 125 | 157 | 204 |
| 11.70 | CFS | 304 | 643 | 1501 | 2830 | 3913 | 4137 | 3309 | 1968 |
| 12.90 | CFS | 1099 | 812 | 685 | 603 | 546 | 501 | 463 | 430 |
| 14.10 | CFS | 400 | 374 | 351 | 333 | 319 | 308 | 300 | 292 |
| 15.30 | CFS | 283 | 274 | 265 | 255 | 247 | 238 | 230 | 221 |
| 16.50 | CFS | 214 | 208 | 204 | 201 | 198 | 194 | 191 | 188 |
| 17.70 | CFS | 184 | 181 | 178 | 175 | 172 | 168 | 165 | 162 |
| 18.90 | CFS | 159 | 155 | 152 | 149 | 146 | 142 | 139 | 135 |
| 20.10 | CFS | 131 | 128 | 126 | 124 | 122 | 121 | 120 | 119 |
| 21.30 | CFS | 119 | 118 | 118 | 117 | 117 | 116 | 115 | 115 |
| 22.50 | CFS | 114 | 113 | 113 | 112 | 111 | 110 | 110 | 109 |
| 23.70 | CFS | 109 | 109 | 108 | 103 | 90 | 66 | 38 | 14 |
| 24.90 | CFS | 1.99 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.0 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.25 | 2215.5 | 3.91 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.1 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.84 | 1612.8 | 4.63 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.1 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.99 | 1612.6 | 2.96 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.18 WATERSHED INCHES; 5543 CFS-HRS; 458.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.40 | 1081.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 6 | 71 | 295 | 685 | 1006 | 1065 | 806 |
| 12.75 CFS | 462 | 299 | 249 | 216 | 195 | 178 | 165 | 154 |
| 13.95 CFS | 144 | 134 | 126 | 119 | 114 | 110 | 107 | 104 |
| 15.15 CFS | 102 | 99 | 96 | 93 | 90 | 87 | 84 | 81 |
| 16.35 CFS | 78.26 | 75.89 | 74.28 | 73.27 | 72.29 | 71.20 | 70.08 | 68.92 |
| 17.55 CFS | 67.81 | 66.69 | 65.67 | 64.67 | 63.62 | 62.46 | 61.35 | 60.25 |
| 18.75 CFS | 59.05 | 57.94 | 56.79 | 55.57 | 54.49 | 53.37 | 52.24 | 50.95 |
| 19.95 CFS | 49.52 | 48.21 | 47.16 | 46.41 | 45.76 | 45.22 | 44.84 | 44.55 |
| 21.15 CFS | 44.36 | 44.27 | 44.14 | 44.05 | 43.90 | 43.74 | 43.47 | 43.19 |
| 22.35 CFS | 42.93 | 42.71 | 42.53 | 42.23 | 41.94 | 41.68 | 41.55 | 41.43 |
| 23.55 CFS | 41.30 | 41.15 | 41.02 | 40.57 | 38.45 | 31.89 | 21.36 | 10.46 |
| 24.75 CFS | 2.62 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.17 WATERSHED INCHES; 1562 CFS-HRS; 129.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 1137.5 | (NULL) |
| 13.97 | 1754.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .20 | .53 | 1.17 | 2.20 | 3.73 | 5.82 | 8.59 | 12.44 |
| 11.70 CFS | 23 | 94 | 324 | 722 | 1054 | 1126 | 886 | 577 |
| 12.90 CFS | 496 | 611 | 833 | 1124 | 1405 | 1611 | 1721 | 1754 |
| 14.10 CFS | 1732 | 1673 | 1591 | 1497 | 1398 | 1298 | 1201 | 1109 |
| 15.30 CFS | 1021 | 940 | 865 | 797 | 736 | 682 | 633 | 590 |
| 16.50 CFS | 551 | 518 | 488 | 462 | 438 | 416 | 397 | 379 |
| 17.70 CFS | 363 | 348 | 335 | 323 | 312 | 302 | 293 | 285 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.90 CFS | 277 | 270 | 263 | 257 | 251 | 246 | 240 | 234 |
| 20.10 CFS | 229 | 224 | 219 | 215 | 211 | 207 | 203 | 199 |
| 21.30 CFS | 196 | 192 | 189 | 186 | 183 | 180 | 177 | 175 |
| 22.50 CFS | 172 | 171 | 169 | 167 | 165 | 164 | 163 | 162 |
| 23.70 CFS | 160 | 159 | 158 | 155 | 148 | 136 | 125 | 116 |
| 24.90 CFS | 113 | 112 | 110 | 108 | 103 | 96 | 88 | 79 |
| 26.10 CFS | 69.67 | 61.03 | 53.00 | 45.70 | 39.17 | 33.39 | 28.35 | 23.97 |
| 27.30 CFS | 20.20 | 16.98 | 14.23 | 11.90 | 9.93 | 8.27 | 6.88 | 5.71 |
| 28.50 CFS | 4.74 | 3.92 | 3.24 | 2.68 | 2.21 | 1.82 | 1.50 | 1.24 |
| 29.70 CFS | 1.02 | .84 | .69 | .56 | .46 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.83 WATERSHED INCHES; 7105 CFS-HRS; 587.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.58 | 2495.4 | (NULL) |
| 13.99 | 3080.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .23 | .68 | 1.57 | 3.07 | 5.37 | 8.58 | 12.86 | 18.96 |
| 11.70 CFS | 34 | 114 | 374 | 900 | 1611 | 2298 | 2491 | 2157 |
| 12.90 CFS | 1641 | 1352 | 1513 | 1911 | 2375 | 2761 | 2994 | 3077 |
| 14.10 CFS | 3048 | 2942 | 2790 | 2614 | 2429 | 2245 | 2068 | 1902 |
| 15.30 CFS | 1747 | 1605 | 1474 | 1357 | 1252 | 1158 | 1076 | 1002 |
| 16.50 CFS | 938 | 880 | 831 | 788 | 749 | 714 | 683 | 654 |
| 17.70 CFS | 628 | 604 | 583 | 563 | 546 | 530 | 515 | 501 |
| 18.90 CFS | 488 | 476 | 465 | 454 | 444 | 434 | 425 | 415 |
| 20.10 CFS | 406 | 397 | 389 | 381 | 373 | 366 | 360 | 353 |
| 21.30 CFS | 347 | 341 | 336 | 330 | 326 | 321 | 316 | 312 |
| 22.50 CFS | 308 | 305 | 302 | 299 | 296 | 294 | 292 | 290 |
| 23.70 CFS | 288 | 286 | 284 | 280 | 272 | 257 | 236 | 213 |
| 24.90 CFS | 195 | 184 | 180 | 176 | 169 | 159 | 145 | 130 |
| 26.10 CFS | 115 | 100 | 86 | 74 | 63 | 53 | 44 | 37 |
| 27.30 CFS | 30.97 | 25.73 | 21.32 | 17.63 | 14.55 | 11.98 | 9.85 | 8.09 |
| 28.50 CFS | 6.63 | 5.43 | 4.45 | 3.63 | 2.97 | 2.42 | 1.98 | 1.61 |
| 29.70 CFS | 1.31 | 1.07 | .87 | .71 | .57 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.82 WATERSHED INCHES; 12737 CFS-HRS; 1052.6 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.58 | 2495.4 | (DIVERT) |
| 13.99 | 3080.1 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.50 CFS | .23 | .68 | 1.57 | 3.07 | 5.37 | 8.58 | 12.86 | 18.96 |
| 11.70 CFS | 34 | 114 | 374 | 900 | 1611 | 2298 | 2491 | 2157 |
| 12.90 CFS | 1641 | 1352 | 1513 | 1911 | 2375 | 2761 | 2994 | 3077 |
| 14.10 CFS | 3048 | 2942 | 2790 | 2614 | 2429 | 2245 | 2068 | 1902 |
| 15.30 CFS | 1747 | 1605 | 1474 | 1357 | 1252 | 1158 | 1076 | 1002 |
| 16.50 CFS | 938 | 880 | 831 | 788 | 749 | 714 | 683 | 654 |
| 17.70 CFS | 628 | 604 | 583 | 563 | 546 | 530 | 515 | 501 |
| 18.90 CFS | 488 | 476 | 465 | 454 | 444 | 434 | 425 | 415 |
| 20.10 CFS | 406 | 397 | 389 | 381 | 373 | 366 | 360 | 353 |
| 21.30 CFS | 347 | 341 | 336 | 330 | 326 | 321 | 316 | 312 |
| 22.50 CFS | 308 | 305 | 302 | 299 | 296 | 294 | 292 | 290 |
| 23.70 CFS | 288 | 286 | 284 | 280 | 272 | 257 | 236 | 213 |
| 24.90 CFS | 195 | 184 | 180 | 176 | 169 | 159 | 145 | 130 |
| 26.10 CFS | 115 | 100 | 86 | 74 | 63 | 53 | 44 | 37 |
| 27.30 CFS | 30.97 | 25.73 | 21.32 | 17.63 | 14.55 | 11.98 | 9.85 | 8.09 |
| 28.50 CFS | 6.63 | 5.43 | 4.45 | 3.63 | 2.97 | 2.42 | 1.98 | 1.61 |
| 29.70 CFS | 1.31 | 1.07 | .87 | .71 | .57 | .46 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.82 WATERSHED INCHES; 12737 CFS-HRS; 1052.6 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
159 CFS-HRS; 1052.6 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.78 | 2366.0 | 3.60 |
| 14.21 | 3043.2 | 4.12 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.82 WATERSHED INCHES; 12737 CFS-HRS; 1052.6 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.15 | 2337.1 | (RUNOFF) |
| 21.38 | 45.5 | (RUNOFF) |
| 22.30 | 43.9 | (RUNOFF) |
| 22.89 | 42.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 1.47 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | .12 | .81 | 2.31 | 4.21 | 6.13 | 8.18 | 10.60 | 13.56 |
| 10.20 CFS | 17.04 | 21.18 | 26.13 | 31.94 | 39.10 | 48.05 | 58.88 | 73.09 |
| 11.40 CFS | 93 | 123 | 229 | 641 | 1641 | 2337 | 1620 | 629 |
| 12.60 CFS | 410 | 323 | 269 | 240 | 217 | 198 | 184 | 171 |
| 13.80 CFS | 158 | 148 | 138 | 130 | 124 | 120 | 117 | 114 |
| 15.00 CFS | 111 | 107 | 104 | 100 | 96 | 93 | 90 | 87 |
| 16.20 CFS | 82.70 | 80.16 | 79.19 | 78.39 | 76.91 | 75.34 | 74.29 | 73.10 |
| 17.40 CFS | 71.40 | 70.15 | 69.34 | 68.15 | 66.58 | 65.58 | 64.15 | 62.87 |
| 18.60 CFS | 61.85 | 60.24 | 59.15 | 57.89 | 56.28 | 55.38 | 54.38 | 52.67 |
| 19.80 CFS | 50.92 | 49.59 | 48.68 | 47.85 | 47.12 | 46.71 | 46.04 | 45.97 |
| 21.00 CFS | 45.88 | 45.40 | 45.46 | 45.46 | 45.02 | 44.95 | 44.81 | 44.03 |
| 22.20 CFS | 43.83 | 43.86 | 43.69 | 42.93 | 42.68 | 42.71 | 42.24 | 42.19 |
| 23.40 CFS | 42.14 | 41.84 | 41.67 | 41.59 | 40.75 | 34.87 | 17.56 | 2.53 |
| 24.60 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 2172 CFS-HRS; 179.5 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.56 | 1443.4 | 4.85 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 2174 CFS-HRS; 179.6 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.90 | 1051.8 | 3.86 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 2174 CFS-HRS; 179.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.81 | 3398.3 | (NULL) |
| 14.14 | 3348.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 12.31 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 9.75 CFS | .45 | 1.07 | 1.98 | 3.16 | 4.61 | 6.39 | 8.64 | 11.51 |
| 10.95 CFS | 15 | 20 | 26 | 34 | 44 | 58 | 80 | 154 |
| 12.15 CFS | 383 | 898 | 1753 | 2767 | 3352 | 3266 | 2798 | 2364 |
| 13.35 CFS | 2260 | 2432 | 2742 | 3050 | 3260 | 3344 | 3320 | 3215 |
| 14.55 CFS | 3059 | 2873 | 2676 | 2479 | 2289 | 2110 | 1944 | 1790 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.75 CFS | 1650 | 1522 | 1407 | 1305 | 1214 | 1133 | 1061 | 997 |
| 16.95 CFS | 941 | 893 | 850 | 811 | 776 | 745 | 716 | 689 |
| 18.15 CFS | 666 | 644 | 625 | 607 | 590 | 574 | 560 | 546 |
| 19.35 CFS | 533 | 521 | 509 | 498 | 487 | 477 | 466 | 455 |
| 20.55 CFS | 445 | 436 | 427 | 419 | 411 | 404 | 397 | 391 |
| 21.75 CFS | 385 | 379 | 374 | 368 | 364 | 359 | 355 | 351 |
| 22.95 CFS | 348 | 344 | 341 | 338 | 336 | 333 | 331 | 329 |
| 24.15 CFS | 327 | 324 | 316 | 303 | 281 | 254 | 228 | 208 |
| 25.35 CFS | 197 | 188 | 179 | 168 | 154 | 139 | 123 | 107 |
| 26.55 CFS | 92.95 | 79.67 | 67.79 | 57.34 | 48.25 | 40.42 | 33.74 | 28.07 |
| 27.75 CFS | 23.29 | 19.27 | 15.91 | 13.12 | 10.79 | 8.87 | 7.28 | 5.96 |
| 28.95 CFS | 4.88 | 3.99 | 3.26 | 2.66 | 2.17 | 1.77 | 1.44 | 1.17 |
| 30.15 CFS | .96 | .78 | .63 | .51 | .41 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.88 WATERSHED INCHES; 14911 CFS-HRS; 1232.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 2948.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 4.78 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 1 | 7 | 45 | 264 | 936 | 2010 | 2815 |
| 12.45 CFS | 2869 | 2084 | 1153 | 759 | 632 | 547 | 493 | 452 |
| 13.65 CFS | 418 | 389 | 363 | 340 | 319 | 301 | 287 | 277 |
| 14.85 CFS | 269 | 263 | 256 | 249 | 241 | 233 | 225 | 218 |
| 16.05 CFS | 211 | 204 | 196 | 190 | 186 | 184 | 181 | 178 |
| 17.25 CFS | 175 | 172 | 170 | 167 | 164 | 162 | 159 | 156 |
| 18.45 CFS | 153 | 150 | 147 | 145 | 142 | 139 | 136 | 133 |
| 19.65 CFS | 130 | 127 | 123 | 120 | 117 | 116 | 114 | 113 |
| 20.85 CFS | 112 | 111 | 110 | 110 | 110 | 110 | 109 | 109 |
| 22.05 CFS | 108 | 107 | 107 | 106 | 106 | 105 | 104 | 104 |
| 23.25 CFS | 103 | 103 | 103 | 102 | 102 | 101 | 95 | 80 |
| 24.45 CFS | 51.97 | 23.95 | 5.33 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.33 WATERSHED INCHES; 4091 CFS-HRS; 338.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.51 | 2316.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 3.48 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 2 | 5 | 14 | 29 | 68 | 200 | 557 |
| 12.15 CFS | 1200 | 1896 | 2284 | 2235 | 1778 | 1088 | 639 | 525 |
| 13.35 CFS | 453 | 404 | 370 | 342 | 317 | 295 | 276 | 259 |
| 14.55 CFS | 245 | 234 | 225 | 219 | 213 | 207 | 201 | 195 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.75 CFS | 188 | 182 | 176 | 170 | 164 | 158 | 154 | 150 |
| 16.95 CFS | 148 | 146 | 143 | 141 | 139 | 136 | 134 | 132 |
| 18.15 CFS | 130 | 127 | 125 | 123 | 120 | 118 | 116 | 113 |
| 19.35 CFS | 111 | 109 | 106 | 104 | 101 | 99 | 96 | 94 |
| 20.55 CFS | 92.39 | 91.09 | 90.02 | 89.23 | 88.66 | 88.22 | 87.97 | 87.72 |
| 21.75 CFS | 87.42 | 87.16 | 86.74 | 86.16 | 85.61 | 85.16 | 84.55 | 84.12 |
| 22.95 CFS | 83.62 | 83.05 | 82.52 | 82.19 | 81.96 | 81.59 | 81.36 | 80.80 |
| 24.15 CFS | 78.20 | 71.11 | 57.14 | 39.02 | 21.01 | 7.17 | .42 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.57 WATERSHED INCHES; 3534 CFS-HRS; 292.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 5168.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 2 | 5 | 14 | 36 | 113 | 464 | 1492 |
| 12.15 CFS | 3209 | 4711 | 5153 | 4318 | 2931 | 1847 | 1271 | 1072 |
| 13.35 CFS | 946 | 856 | 788 | 730 | 680 | 635 | 595 | 560 |
| 14.55 CFS | 532 | 511 | 495 | 482 | 469 | 456 | 443 | 428 |
| 15.75 CFS | 414 | 400 | 387 | 373 | 360 | 348 | 340 | 334 |
| 16.95 CFS | 329 | 324 | 319 | 313 | 308 | 303 | 298 | 293 |
| 18.15 CFS | 289 | 284 | 278 | 273 | 268 | 263 | 257 | 252 |
| 19.35 CFS | 247 | 242 | 237 | 231 | 224 | 219 | 214 | 210 |
| 20.55 CFS | 206 | 204 | 202 | 200 | 199 | 198 | 198 | 197 |
| 21.75 CFS | 197 | 196 | 195 | 194 | 192 | 191 | 190 | 189 |
| 22.95 CFS | 188 | 187 | 186 | 185 | 185 | 184 | 183 | 182 |
| 24.15 CFS | 174 | 151 | 109 | 63 | 26 | 7 | 0 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.43 WATERSHED INCHES; 7625 CFS-HRS; 630.2 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.55 | 7134.6 | (NULL) |
| 14.08 | 3980.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.75 CFS | .45 | 1.07 | 1.98 | 3.16 | 4.61 | 6.39 | 8.64 | 11.52 |
| 10.95 CFS | 16 | 22 | 32 | 48 | 80 | 171 | 544 | 1646 |
| 12.15 CFS | 3592 | 5609 | 6906 | 7085 | 6283 | 5114 | 4069 | 3436 |
| 13.35 CFS | 3206 | 3288 | 3530 | 3781 | 3940 | 3979 | 3914 | 3775 |
| 14.55 CFS | 3591 | 3384 | 3171 | 2961 | 2759 | 2567 | 2386 | 2218 |
| 15.75 CFS | 2063 | 1922 | 1794 | 1679 | 1574 | 1481 | 1401 | 1331 |
| 16.95 CFS | 1270 | 1216 | 1169 | 1125 | 1085 | 1048 | 1014 | 983 |
| 18.15 CFS | 954 | 928 | 903 | 880 | 858 | 837 | 817 | 798 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19.35 CFS | 780 | 763 | 746 | 729 | 712 | 695 | 679 | 665 |
| 20.55 CFS | 652 | 640 | 629 | 619 | 611 | 603 | 595 | 588 |
| 21.75 CFS | 581 | 575 | 568 | 562 | 556 | 550 | 545 | 540 |
| 22.95 CFS | 535 | 531 | 527 | 523 | 520 | 517 | 514 | 511 |
| 24.15 CFS | 501 | 474 | 426 | 366 | 308 | 261 | 228 | 208 |
| 25.35 CFS | 197 | 188 | 179 | 168 | 154 | 139 | 123 | 107 |
| 26.55 CFS | 92.95 | 79.67 | 67.79 | 57.34 | 48.25 | 40.42 | 33.74 | 28.07 |
| 27.75 CFS | 23.29 | 19.27 | 15.91 | 13.12 | 10.79 | 8.87 | 7.28 | 5.96 |
| 28.95 CFS | 4.88 | 3.99 | 3.26 | 2.66 | 2.17 | 1.77 | 1.44 | 1.17 |
| 30.15 CFS | .96 | .78 | .63 | .51 | .41 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.70 WATERSHED INCHES; 22536 CFS-HRS; 1862.4 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1199.2 FEET) CAN ADD .456 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS
WITH 2117.87 AC-FT ( .16 WATERSHED INCHES) FLOOD STORAGE
REMAINING IN RESERVOIR AT ELEV. 1208.27. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.00 | 56.1 * | 1208.94 |

* FIRST POINT OF FLAT PEAK

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 52 CFS
RESVOR ( 92. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.85 CFS | .21 | .21 | .21 | .21 | .21 | .21 | .21 | .21 |
| 10.05 CFS | .21 | .21 | .21 | .22 | .22 | .23 | .23 | .24 |
| 11.25 CFS | .26 | .28 | .32 | .39 | .59 | 1.21 | 2.69 | 5.30 |
| 12.45 CFS | 8.84 | 12.80 | 16.46 | 19.01 | 21.07 | 22.74 | 24.23 | 25.68 |
| 13.65 CFS | 27.20 | 28.63 | 29.94 | 31.28 | 32.62 | 33.92 | 35.17 | 36.35 |
| 14.85 CFS | 37.46 | 38.49 | 39.39 | 40.15 | 40.86 | 41.51 | 42.12 | 42.69 |
| 16.05 CFS | 43.22 | 43.71 | 44.17 | 44.60 | 45.00 | 45.39 | 45.75 | 46.10 |
| 17.25 CFS | 46.43 | 46.75 | 47.06 | 47.35 | 47.64 | 47.92 | 48.18 | 48.44 |
| 18.45 CFS | 48.69 | 48.94 | 49.18 | 49.41 | 49.63 | 49.85 | 50.07 | 50.28 |
| 19.65 CFS | 50.49 | 50.69 | 50.89 | 51.08 | 51.26 | 51.45 | 51.63 | 51.80 |
| 20.85 CFS | 51.97 | 52.14 | 52.30 | 52.47 | 52.63 | 52.79 | 52.94 | 53.10 |
| 22.05 CFS | 53.25 | 53.40 | 53.55 | 53.70 | 53.84 | 53.98 | 54.13 | 54.27 |
| 23.25 CFS | 54.41 | 54.54 | 54.68 | 54.82 | 54.95 | 55.09 | 55.22 | 55.35 |
| 24.45 CFS | 55.46 | 55.56 | 55.65 | 55.71 | 55.77 | 55.82 | 55.86 | 55.90 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 25.65 CFS | 55.94 | 55.97 | 56.00 | 56.03 | 56.05 | 56.07 | 56.08 | 56.09 |
| 26.85 CFS | 56.10 | 56.10 | 56.10 | 56.09 | 56.09 | 56.08 | 56.07 | 56.06 |
| 28.05 CFS | 56.05 | 56.04 | 56.02 | 56.01 | 56.00 | 55.98 | 55.97 | 55.95 |
| 29.25 CFS | 55.94 | 55.92 | 55.91 | 55.89 | 55.87 | 55.86 | 55.84 | 55.83 |
| 30.45 CFS | 55.81 | 55.79 | 55.78 | 55.76 | 55.74 | 55.73 | 55.71 | 55.70 |
| 31.65 CFS | 55.68 | 55.66 | 55.65 | 55.63 | 55.61 | 55.60 | 55.58 | 55.56 |
| 32.85 CFS | 55.55 | 55.53 | 55.52 | 55.50 | 55.48 | 55.47 | 55.45 | 55.43 |
| 34.05 CFS | 55.42 | 55.40 | 55.39 | 55.37 | 55.35 | 55.34 | 55.32 | 55.30 |
| 35.25 CFS | 55.29 | 55.27 | 55.26 | 55.24 | 55.22 | 55.21 | 55.19 | 55.17 |
| 36.45 CFS | 55.16 | 55.14 | 55.13 | 55.11 | 55.09 | 55.08 | 55.06 | 55.04 |
| 37.65 CFS | 55.03 | 55.01 | 55.00 | 54.98 | 54.96 | 54.95 | 54.93 | 54.92 |
| 38.85 CFS | 54.90 | 54.88 | 54.87 | 54.85 | 54.83 | 54.82 | 54.80 | 54.79 |
| 40.05 CFS | 54.77 | 54.75 | 54.74 | 54.72 | 54.71 | 54.69 | 54.67 | 54.66 |
| 41.25 CFS | 54.64 | 54.63 | 54.61 | 54.59 | 54.58 | 54.56 | 54.55 | 54.53 |
| 42.45 CFS | 54.51 | 54.50 | 54.48 | 54.47 | 54.45 | 54.43 | 54.42 | 54.40 |
| 43.65 CFS | 54.39 | 54.37 | 54.35 | 54.34 | 54.32 | 54.31 | 54.29 | 54.27 |
| 44.85 CFS | 54.26 | 54.24 | 54.23 | 54.21 | 54.19 | 54.18 | 54.16 | 54.15 |
| 46.05 CFS | 54.13 | 54.11 | 54.10 | 54.08 | 54.07 | 54.05 | 54.04 | 54.02 |
| 47.25 CFS | 54.00 | 53.99 | 53.97 | 53.96 | 53.94 | 53.92 | 53.91 | 53.89 |
| 48.45 CFS | 53.88 | 53.86 | 53.85 | 53.83 | 53.81 | 53.80 | 53.78 | 53.77 |
| 49.65 CFS | 53.75 | 53.73 | 53.72 | 53.70 | 53.69 | 53.67 | 53.66 | 53.64 |
| 50.85 CFS | 53.62 | 53.61 | 53.59 | 53.58 | 53.56 | 53.55 | 53.53 | 53.51 |
| 52.05 CFS | 53.50 | 53.48 | 53.47 | 53.45 | 53.44 | 53.42 | 53.40 | 53.39 |
| 53.25 CFS | 53.37 | 53.36 | 53.34 | 53.33 | 53.31 | 53.29 | 53.28 | 53.26 |
| 54.45 CFS | 53.25 | 53.23 | 53.22 | 53.20 | 53.18 | 53.17 | 53.15 | 53.14 |
| 55.65 CFS | 53.12 | 53.11 | 53.09 | 53.08 | 53.06 | 53.04 | 53.03 | 53.01 |
| 56.85 CFS | 53.00 | 52.98 | 52.97 | 52.95 | 52.94 | 52.92 | 52.90 | 52.89 |
| 58.05 CFS | 52.87 | 52.86 | 52.84 | 52.83 | 52.81 | 52.80 | 52.78 | 52.76 |
| 59.25 CFS | 52.75 | 52.73 | 52.72 | 52.70 | 52.69 | 52.67 | 52.66 | 52.64 |
| 60.45 CFS | 52.62 | 52.61 | 52.59 | 52.58 | 52.56 | 52.55 | 52.53 | 52.52 |
| 61.65 CFS | 52.50 | 52.49 | 52.47 | 52.46 | 52.44 | 52.42 | 52.41 | 52.39 |
| 62.85 CFS | 52.38 | 52.36 | 52.35 | 52.33 | 52.32 | 52.30 | 52.29 | 52.27 |
| 64.05 CFS | 52.26 | 52.24 | 52.22 | 52.21 | 52.19 | 52.18 | 52.16 | 52.15 |
| 65.25 CFS | 52.13 | 52.12 | 52.10 | 52.09 | 52.07 | 52.06 | 52.04 | 52.03 |
| 66.45 CFS | 52.01 | 51.99 | 51.98 | 51.96 | 51.95 | 51.93 | 51.92 | 51.90 |
| 67.65 CFS | 51.89 | 51.87 | 51.86 | 51.84 | 51.83 | 51.81 | 51.80 | 51.78 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.22 WATERSHED INCHES; 2933 CFS-HRS; 242.4 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.84 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 2 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.35 | 4184.8 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.10 CFS | .13 | .52 | 1.40 | 2.79 | 4.63 | 6.64 | 8.71 | 10.84 |
| 6.30 CFS | 13.04 | 15.32 | 17.69 | 20.07 | 22.48 | 24.89 | 27.34 | 29.88 |
| 7.50 CFS | 32.51 | 35.26 | 37.94 | 40.58 | 43.19 | 46.02 | 49.47 | 53.81 |
| 8.70 CFS | 59 | 65 | 72 | 79 | 86 | 92 | 98 | 103 |
| 9.90 CFS | 108 | 115 | 125 | 138 | 153 | 170 | 190 | 213 |
| 11.10 CFS | 240 | 274 | 317 | 379 | 522 | 915 | 1887 | 3187 |
| 12.30 CFS | 4117 | 3956 | 2908 | 1555 | 847 | 650 | 548 | 483 |
| 13.50 CFS | 437 | 400 | 369 | 342 | 318 | 296 | 278 | 263 |
| 14.70 CFS | 251 | 243 | 236 | 229 | 222 | 215 | 207 | 199 |
| 15.90 CFS | 192 | 185 | 178 | 172 | 165 | 161 | 158 | 156 |
| 17.10 CFS | 153 | 150 | 147 | 145 | 142 | 139 | 137 | 135 |
| 18.30 CFS | 132 | 129 | 127 | 124 | 121 | 119 | 116 | 113 |
| 19.50 CFS | 111 | 108 | 106 | 103 | 100 | 97 | 96 | 94 |
| 20.70 CFS | 92.72 | 91.70 | 91.01 | 90.41 | 90.12 | 89.73 | 89.41 | 89.04 |
| 21.90 CFS | 88.64 | 87.99 | 87.32 | 86.72 | 86.09 | 85.65 | 84.99 | 84.34 |
| 23.10 CFS | 83.65 | 83.23 | 82.92 | 82.49 | 82.21 | 81.83 | 81.21 | 77.53 |
| 24.30 CFS | 66.71 | 47.19 | 25.43 | 7.73 | .56 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 5435 CFS-HRS; 449.1 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.88 | 2472.1 | 5.39 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 5435 CFS-HRS; 449.2 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.57 | 1695.1 | 6.47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 5435 CFS-HRS; 449.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 3544.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.50 CFS | .18 | .76 | 1.87 | 3.49 | 5.37 | 7.39 | 9.65 | 12.23 |
| 8.70 CFS | 15.26 | 18.71 | 22.53 | 26.64 | 30.95 | 35.15 | 39.09 | 42.91 |
| 9.90 CFS | 47 | 53 | 60 | 69 | 79 | 91 | 105 | 122 |
| 11.10 CFS | 142 | 168 | 202 | 251 | 377 | 784 | 1764 | 3027 |
| 12.30 CFS | 3544 | 3002 | 1767 | 849 | 621 | 512 | 445 | 400 |
| 13.50 CFS | 365 | 336 | 311 | 289 | 269 | 252 | 237 | 226 |
| 14.70 CFS | 217 | 211 | 205 | 200 | 193 | 186 | 180 | 173 |
| 15.90 CFS | 167 | 162 | 155 | 149 | 145 | 142 | 140 | 137 |
| 17.10 CFS | 135 | 133 | 130 | 128 | 125 | 123 | 121 | 119 |
| 18.30 CFS | 117 | 114 | 112 | 110 | 107 | 105 | 103 | 101 |
| 19.50 CFS | 98.28 | 96.12 | 93.47 | 90.67 | 88.28 | 86.41 | 84.96 | 83.75 |
| 20.70 CFS | 82.66 | 81.96 | 81.37 | 81.02 | 80.75 | 80.42 | 80.23 | 79.86 |
| 21.90 CFS | 79.45 | 78.84 | 78.25 | 77.61 | 77.35 | 76.85 | 76.17 | 75.55 |
| 23.10 CFS | 75.10 | 74.86 | 74.48 | 74.29 | 73.93 | 73.56 | 72.64 | 68.18 |
| 24.30 CFS | 54.27 | 33.26 | 13.11 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.77 WATERSHED INCHES; 4254 CFS-HRS; 351.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 3754.5 | (NULL) |
| 13.51 | 2051.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .28 | .59 | 1.05 | 1.69 | 2.51 | 3.49 | 4.64 | 5.95 |
| 7.35 CFS | 7.43 | 9.18 | 11.47 | 14.39 | 17.93 | 21.83 | 25.96 | 30.40 |
| 8.55 CFS | 35.24 | 40.60 | 46.43 | 52.71 | 59.43 | 66.56 | 73.86 | 81.23 |
| 9.75 CFS | 89 | 97 | 108 | 120 | 133 | 149 | 166 | 185 |
| 10.95 CFS | 208 | 235 | 269 | 311 | 371 | 508 | 930 | 1926 |
| 12.15 CFS | 3209 | 3754 | 3262 | 2132 | 1409 | 1464 | 1673 | 1882 |
| 13.35 CFS | 2013 | 2051 | 2020 | 1942 | 1834 | 1710 | 1581 | 1454 |
| 14.55 CFS | 1332 | 1220 | 1117 | 1023 | 937 | 859 | 788 | 725 |
| 15.75 CFS | 670 | 621 | 578 | 539 | 504 | 474 | 449 | 427 |
| 16.95 CFS | 408 | 390 | 373 | 359 | 345 | 333 | 322 | 313 |
| 18.15 CFS | 303 | 295 | 287 | 280 | 272 | 266 | 260 | 253 |
| 19.35 CFS | 248 | 242 | 237 | 231 | 225 | 220 | 215 | 211 |
| 20.55 CFS | 207 | 203 | 199 | 196 | 193 | 190 | 188 | 185 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21.75 CFS | 183 | 181 | 178 | 176 | 174 | 173 | 171 | 170 |
| 22.95 CFS | 168 | 167 | 166 | 165 | 164 | 163 | 161 | 160 |
| 24.15 CFS | 155 | 140 | 119 | 98 | 84 | 83 | 81 | 77 |
| 25.35 CFS | 71.00 | 64.28 | 57.19 | 50.18 | 43.55 | 37.46 | 31.98 | 27.13 |
| 26.55 CFS | 22.89 | 19.22 | 16.07 | 13.39 | 11.12 | 9.21 | 7.61 | 6.27 |
| 27.75 CFS | 5.15 | 4.23 | 3.46 | 2.83 | 2.31 | 1.88 | 1.53 | 1.25 |
| 28.95 CFS | 1.01 | .82 | .66 | .54 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9689 CFS-HRS; 800.7 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 3754.5 | (DIVERT) |
| 13.51 | 2051.4 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .28 | .59 | 1.05 | 1.69 | 2.51 | 3.49 | 4.64 | 5.95 |
| 7.35 CFS | 7.43 | 9.18 | 11.47 | 14.39 | 17.93 | 21.83 | 25.96 | 30.40 |
| 8.55 CFS | 35.24 | 40.60 | 46.43 | 52.71 | 59.43 | 66.56 | 73.86 | 81.23 |
| 9.75 CFS | 89 | 97 | 108 | 120 | 133 | 149 | 166 | 185 |
| 10.95 CFS | 208 | 235 | 269 | 311 | 371 | 508 | 930 | 1926 |
| 12.15 CFS | 3209 | 3754 | 3262 | 2132 | 1409 | 1464 | 1673 | 1882 |
| 13.35 CFS | 2013 | 2051 | 2020 | 1942 | 1834 | 1710 | 1581 | 1454 |
| 14.55 CFS | 1332 | 1220 | 1117 | 1023 | 937 | 859 | 788 | 725 |
| 15.75 CFS | 670 | 621 | 578 | 539 | 504 | 474 | 449 | 427 |
| 16.95 CFS | 408 | 390 | 373 | 359 | 345 | 333 | 322 | 313 |
| 18.15 CFS | 303 | 295 | 287 | 280 | 272 | 266 | 260 | 253 |
| 19.35 CFS | 248 | 242 | 237 | 231 | 225 | 220 | 215 | 211 |
| 20.55 CFS | 207 | 203 | 199 | 196 | 193 | 190 | 188 | 185 |
| 21.75 CFS | 183 | 181 | 178 | 176 | 174 | 173 | 171 | 170 |
| 22.95 CFS | 168 | 167 | 166 | 165 | 164 | 163 | 161 | 160 |
| 24.15 CFS | 155 | 140 | 119 | 98 | 84 | 83 | 81 | 77 |
| 25.35 CFS | 71.00 | 64.28 | 57.19 | 50.18 | 43.55 | 37.46 | 31.98 | 27.13 |
| 26.55 CFS | 22.89 | 19.22 | 16.07 | 13.39 | 11.12 | 9.21 | 7.61 | 6.27 |
| 27.75 CFS | 5.15 | 4.23 | 3.46 | 2.83 | 2.31 | 1.88 | 1.53 | 1.25 |
| 28.95 CFS | 1.01 | .82 | .66 | .54 | .43 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9689 CFS-HRS; 800.7 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
181 CFS-HRS; 800.7 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3745.9 | 7.54 |
| 13.66 | 2050.8 | 5.46 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9688 CFS-HRS; 800.7 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3745.9 | 4.77 |
| 13.66 | 2050.8 | 3.42 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.10 WATERSHED INCHES; 9688 CFS-HRS; 800.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.37 | 6595.8 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.10 CFS | .18 | .77 | 2.08 | 4.21 | 7.06 | 10.26 | 13.60 | 17.00 |
| 6.30 CFS | 20.52 | 24.14 | 27.88 | 31.66 | 35.49 | 39.36 | 43.29 | 47.37 |
| 7.50 CFS | 51.57 | 55.98 | 60.28 | 64.50 | 68.70 | 73.17 | 78.64 | 85.39 |
| 8.70 CFS | 94 | 103 | 114 | 125 | 136 | 147 | 156 | 164 |
| 9.90 CFS | 172 | 184 | 199 | 219 | 242 | 269 | 300 | 337 |
| 11.10 CFS | 381 | 434 | 502 | 599 | 801 | 1425 | 2812 | 4862 |
| 12.30 CFS | 6417 | 6374 | 4913 | 2732 | 1425 | 1070 | 899 | 785 |
| 13.50 CFS | 710 | 648 | 597 | 553 | 513 | 478 | 448 | 424 |
| 14.70 CFS | 405 | 391 | 379 | 368 | 357 | 345 | 332 | 320 |
| 15.90 CFS | 309 | 298 | 287 | 276 | 266 | 259 | 254 | 250 |
| 17.10 CFS | 246 | 241 | 237 | 232 | 228 | 224 | 220 | 216 |
| 18.30 CFS | 212 | 207 | 203 | 199 | 195 | 191 | 186 | 182 |
| 19.50 CFS | 178 | 174 | 170 | 165 | 160 | 156 | 153 | 151 |
| 20.70 CFS | 149 | 147 | 146 | 145 | 144 | 144 | 143 | 143 |
| 21.90 CFS | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 135 |
| 23.10 CFS | 134 | 133 | 133 | 132 | 132 | 131 | 130 | 125 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 24.30 CFS | 109 | 79 | 45 | 16 | 2 | 0 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.07 | 3654.0 | 4.47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.65 | 2549.9 | 5.46 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.65 | 2549.9 | 3.82 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.42 WATERSHED INCHES; 8703 CFS-HRS; 719.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 2706.6 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
HRS MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.40 CFS | .37 | 1.15 | 2.56 | 4.55 | 7.03 | 9.79 | 12.80 | 15.90 |
| 9.60 CFS | 18.97 | 22.03 | 25.35 | 29.41 | 34.33 | 40.38 | 47.54 | 55.92 |
| 10.80 CFS | 66 | 78 | 93 | 111 | 135 | 170 | 252 | 530 |
| 12.00 CFS | 1174 | 2106 | 2683 | 2487 | 1692 | 848 | 537 | 440 |
| 13.20 CFS | 377 | 337 | 306 | 282 | 261 | 242 | 225 | 211 |
| 14.40 CFS | 198 | 188 | 181 | 175 | 171 | 166 | 161 | 155 |
| 15.60 CFS | 150 | 145 | 140 | 135 | 130 | 125 | 121 | 118 |
| 16.80 CFS | 116 | 114 | 112 | 110 | 108 | 106 | 104 | 103 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.00 CFS | 101 | 99 | 97 | 95 | 93 | 91 | 90 | 88 |
| 19.20 CFS | 85.71 | 83.93 | 82.12 | 80.26 | 78.21 | 75.94 | 73.86 | 72.20 |
| 20.40 CFS | 70.92 | 69.85 | 68.93 | 68.30 | 67.81 | 67.43 | 67.23 | 66.97 |
| 21.60 CFS | 66.76 | 66.52 | 66.22 | 65.72 | 65.24 | 64.77 | 64.41 | 64.08 |
| 22.80 CFS | 63.57 | 63.07 | 62.63 | 62.37 | 62.15 | 61.89 | 61.64 | 61.38 |
| 24.00 CFS | 60.82 | 57.46 | 47.91 | 31.95 | 15.41 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.54 WATERSHED INCHES; 3372 CFS-HRS; 278.7 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 3037.8 | (NULL) |
| 13.61 | 2834.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .37 | .78 | 1.42 | 2.31 | 3.46 | 4.88 | 6.55 | 8.46 |
| 7.35 CFS | 10.61 | 12.97 | 15.53 | 18.27 | 21.18 | 24.25 | 27.54 | 31.20 |
| 8.55 CFS | 35.47 | 40.49 | 46.18 | 52.50 | 59.30 | 66.66 | 74.50 | 82.81 |
| 9.75 CFS | 92 | 101 | 112 | 124 | 138 | 153 | 170 | 188 |
| 10.95 CFS | 209 | 234 | 264 | 302 | 352 | 452 | 750 | 1419 |
| 12.15 CFS | 2380 | 2997 | 2871 | 2217 | 1634 | 1714 | 2074 | 2434 |
| 13.35 CFS | 2691 | 2815 | 2832 | 2772 | 2660 | 2516 | 2355 | 2187 |
| 14.55 CFS | 2020 | 1860 | 1709 | 1569 | 1438 | 1318 | 1208 | 1109 |
| 15.75 CFS | 1021 | 942 | 871 | 808 | 752 | 702 | 659 | 621 |
| 16.95 CFS | 587 | 557 | 529 | 504 | 481 | 461 | 443 | 427 |
| 18.15 CFS | 412 | 398 | 386 | 374 | 364 | 354 | 345 | 336 |
| 19.35 CFS | 327 | 320 | 312 | 305 | 297 | 290 | 283 | 277 |
| 20.55 CFS | 271 | 266 | 261 | 256 | 251 | 247 | 242 | 238 |
| 21.75 CFS | 235 | 231 | 228 | 225 | 222 | 220 | 217 | 215 |
| 22.95 CFS | 213 | 211 | 209 | 208 | 206 | 205 | 203 | 202 |
| 24.15 CFS | 197 | 187 | 170 | 152 | 136 | 134 | 131 | 125 |
| 25.35 CFS | 118 | 108 | 97 | 87 | 77 | 67 | 58 | 50 |
| 26.55 CFS | 43.26 | 37.00 | 31.52 | 26.76 | 22.65 | 19.11 | 16.09 | 13.52 |
| 27.75 CFS | 11.33 | 9.48 | 7.92 | 6.61 | 5.50 | 4.57 | 3.80 | 3.15 |
| 28.95 CFS | 2.61 | 2.16 | 1.79 | 1.48 | 1.22 | 1.00 | .83 | .68 |
| 30.15 CFS | .56 | .46 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.12 WATERSHED INCHES; 12073 CFS-HRS; 997.7 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 6655.4 | (NULL) |
| 13.63 | 4883.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .47 | 1.06 | 2.00 | 3.35 | 5.14 | 7.37 | 10.02 | 13.09 |
| 7.35 CFS | 16.54 | 20.38 | 24.68 | 29.70 | 35.53 | 42.12 | 49.31 | 57.09 |
| 8.55 CFS | 66 | 76 | 87 | 99 | 112 | 126 | 141 | 157 |
| 9.75 CFS | 173 | 190 | 210 | 232 | 258 | 286 | 318 | 353 |
| 10.95 CFS | 394 | 442 | 499 | 570 | 663 | 822 | 1257 | 2342 |
| 12.15 CFS | 4290 | 6186 | 6616 | 5486 | 3784 | 3135 | 3537 | 4103 |
| 13.35 CFS | 4569 | 4825 | 4882 | 4792 | 4603 | 4352 | 4067 | 3770 |
| 14.55 CFS | 3476 | 3195 | 2931 | 2687 | 2462 | 2256 | 2068 | 1898 |
| 15.75 CFS | 1747 | 1612 | 1493 | 1387 | 1291 | 1207 | 1134 | 1071 |
| 16.95 CFS | 1015 | 965 | 919 | 877 | 840 | 806 | 776 | 749 |
| 18.15 CFS | 725 | 702 | 681 | 661 | 643 | 626 | 611 | 595 |
| 19.35 CFS | 581 | 568 | 554 | 541 | 528 | 515 | 503 | 492 |
| 20.55 CFS | 482 | 473 | 464 | 455 | 447 | 440 | 433 | 426 |
| 21.75 CFS | 420 | 414 | 409 | 403 | 398 | 394 | 390 | 386 |
| 22.95 CFS | 383 | 379 | 376 | 374 | 371 | 368 | 366 | 363 |
| 24.15 CFS | 357 | 342 | 310 | 272 | 234 | 219 | 214 | 206 |
| 25.35 CFS | 194 | 179 | 162 | 144 | 127 | 111 | 96 | 82 |
| 26.55 CFS | 70.47 | 59.96 | 50.80 | 42.89 | 36.08 | 30.27 | 25.33 | 21.15 |
| 27.75 CFS | 17.62 | 14.65 | 12.16 | 10.08 | 8.34 | 6.89 | 5.69 | 4.69 |
| 28.95 CFS | 3.86 | 3.18 | 2.61 | 2.14 | 1.76 | 1.44 | 1.18 | .96 |
| 30.15 CFS | .79 | .64 | .52 | .43 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.11 WATERSHED INCHES; 21762 CFS-HRS; 1798.4 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 6655.4 | (DIVERT) |
| 13.63 | 4883.1 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.15 CFS | .47 | 1.06 | 2.00 | 3.35 | 5.14 | 7.37 | 10.02 | 13.09 |
| 7.35 CFS | 16.54 | 20.38 | 24.68 | 29.70 | 35.53 | 42.12 | 49.31 | 57.09 |
| 8.55 CFS | 66 | 76 | 87 | 99 | 112 | 126 | 141 | 157 |
| 9.75 CFS | 173 | 190 | 210 | 232 | 258 | 286 | 318 | 353 |
| 10.95 CFS | 394 | 442 | 499 | 570 | 663 | 822 | 1257 | 2342 |
| 12.15 CFS | 4290 | 6186 | 6616 | 5486 | 3784 | 3135 | 3537 | 4103 |
| 13.35 CFS | 4569 | 4825 | 4882 | 4792 | 4603 | 4352 | 4067 | 3770 |
| 14.55 CFS | 3476 | 3195 | 2931 | 2687 | 2462 | 2256 | 2068 | 1898 |
| 15.75 CFS | 1747 | 1612 | 1493 | 1387 | 1291 | 1207 | 1134 | 1071 |
| 16.95 CFS | 1015 | 965 | 919 | 877 | 840 | 806 | 776 | 749 |
| 18.15 CFS | 725 | 702 | 681 | 661 | 643 | 626 | 611 | 595 |
| 19.35 CFS | 581 | 568 | 554 | 541 | 528 | 515 | 503 | 492 |
| 20.55 CFS | 482 | 473 | 464 | 455 | 447 | 440 | 433 | 426 |
| 21.75 CFS | 420 | 414 | 409 | 403 | 398 | 394 | 390 | 386 |
| 22.95 CFS | 383 | 379 | 376 | 374 | 371 | 368 | 366 | 363 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 24.15 CFS | 357 | 342 | 310 | 272 | 234 | 219 | 214 | 206 |
| 25.35 CFS | 194 | 179 | 162 | 144 | 127 | 111 | 96 | 82 |
| 26.55 CFS | 70.47 | 59.96 | 50.80 | 42.89 | 36.08 | 30.27 | 25.33 | 21.15 |
| 27.75 CFS | 17.62 | 14.65 | 12.16 | 10.08 | 8.34 | 6.89 | 5.69 | 4.69 |
| 28.95 CFS | 3.86 | 3.18 | 2.61 | 2.14 | 1.76 | 1.44 | 1.18 | .96 |
| 30.15 CFS | .79 | .64 | .52 | .43 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.11 WATERSHED INCHES; 21762 CFS-HRS; 1798.4 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
187 CFS-HRS; 1798.4 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.59 | 6518.7 | 6.36 |
| 13.81 | 4868.2 | 5.40 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.11 WATERSHED INCHES; 21764 CFS-HRS; 1798.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.13 | 3533.0 | (RUNOFF) |
| 21.34 | 54.5 | (RUNOFF) |
| 22.28 | 52.4 | (RUNOFF) |
| 22.88 | 51.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 1.47 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 4.95 CFS | .35 | 1.16 | 2.30 | 3.54 | 4.82 | 6.10 | 7.41 | 8.75 |
| 6.15 CFS | 10.17 | 11.60 | 13.10 | 14.60 | 16.08 | 17.56 | 19.08 | 20.76 |
| 7.35 CFS | 22.35 | 24.15 | 25.90 | 27.28 | 28.75 | 30.65 | 32.91 | 35.85 |
| 8.55 CFS | 39.68 | 43.85 | 48.29 | 52.55 | 57.02 | 61.30 | 63.97 | 66.18 |
| 9.75 CFS | 69 | 75 | 82 | 90 | 100 | 111 | 124 | 139 |
| 10.95 CFS | 158 | 180 | 207 | 247 | 303 | 504 | 1217 | 2709 |
| 12.15 CFS | 3523 | 2295 | 843 | 537 | 419 | 347 | 308 | 278 |
| 13.35 CFS | 252 | 233 | 216 | 200 | 186 | 174 | 163 | 155 |
| 14.55 CFS | 150 | 146 | 142 | 138 | 133 | 128 | 124 | 119 |
| 15.75 CFS | 115 | 111 | 107 | 102 | 98 | 97 | 96 | 94 |
| 16.95 CFS | 92.08 | 90.71 | 89.18 | 87.03 | 85.44 | 84.37 | 82.85 | 80.87 |
| 18.15 CFS | 79.61 | 77.82 | 76.20 | 74.91 | 72.91 | 71.54 | 69.96 | 67.97 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19.35 CFS | 66.86 | 65.61 | 63.51 | 61.36 | 59.72 | 58.59 | 57.57 | 56.67 |
| 20.55 CFS | 56.14 | 55.30 | 55.20 | 55.06 | 54.45 | 54.50 | 54.48 | 53.93 |
| 21.75 CFS | 53.82 | 53.63 | 52.67 | 52.41 | 52.42 | 52.19 | 51.26 | 50.94 |
| 22.95 CFS | 50.96 | 50.37 | 50.29 | 50.22 | 49.84 | 49.62 | 49.49 | 48.49 |
| 24.15 CFS | 41.51 | 20.88 | 2.99 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.52 WATERSHED INCHES; 3336 CFS-HRS; 275.7 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 2337.7 | 5.65 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.52 WATERSHED INCHES; 3339 CFS-HRS; 275.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.69 | 1716.1 | 4.72 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.52 WATERSHED INCHES; 3339 CFS-HRS; 275.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.60 | 8202.1 | (NULL) |
| 13.71 | 5388.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.40 CFS | .23 | .60 | 1.16 | 1.90 | 2.82 | 3.95 | 5.32 | 7.04 |
| 6.60 CFS | 9.18 | 11.77 | 14.85 | 18.41 | 22.41 | 26.86 | 31.74 | 37.03 |
| 7.80 CFS | 43 | 49 | 57 | 65 | 73 | 83 | 93 | 105 |
| 9.00 CFS | 119 | 134 | 150 | 168 | 187 | 206 | 225 | 246 |
| 10.20 CFS | 269 | 295 | 325 | 359 | 398 | 441 | 491 | 549 |
| 11.40 CFS | 619 | 704 | 814 | 992 | 1442 | 2591 | 4797 | 7222 |
| 12.60 CFS | 8201 | 7330 | 5580 | 4576 | 4589 | 4910 | 5219 | 5374 |
| 13.80 CFS | 5360 | 5216 | 4983 | 4696 | 4380 | 4056 | 3739 | 3437 |
| 15.00 CFS | 3157 | 2898 | 2661 | 2444 | 2247 | 2068 | 1908 | 1765 |
| 16.20 CFS | 1639 | 1526 | 1424 | 1333 | 1254 | 1186 | 1127 | 1073 |
| 17.40 CFS | 1024 | 980 | 940 | 904 | 871 | 842 | 815 | 790 |
| 18.60 CFS | 767 | 746 | 726 | 707 | 690 | 673 | 657 | 642 |
| 19.80 CFS | 627 | 612 | 597 | 583 | 569 | 556 | 545 | 534 |
| 21.00 CFS | 524 | 514 | 505 | 497 | 490 | 483 | 476 | 470 |
| 22.20 CFS | 464 | 458 | 453 | 448 | 444 | 440 | 436 | 432 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23.40 CFS | 428 | 425 | 422 | 420 | 417 | 414 | 408 | 393 |
| 24.60 CFS | 359 | 314 | 269 | 243 | 230 | 218 | 204 | 187 |
| 25.80 CFS | 168 | 149 | 131 | 114 | 99 | 85 | 73 | 62 |
| 27.00 CFS | 52.45 | 44.29 | 37.27 | 31.28 | 26.18 | 21.86 | 18.22 | 15.15 |
| 28.20 CFS | 12.58 | 10.43 | 8.63 | 7.14 | 5.89 | 4.86 | 4.00 | 3.29 |
| 29.40 CFS | 2.70 | 2.22 | 1.82 | 1.49 | 1.22 | 1.00 | .82 | .67 |
| 30.60 CFS | .54 | .44 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.16 WATERSHED INCHES; 25103 CFS-HRS; 2074.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.33 | 6605.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.80 CFS | .18 | .92 | 2.59 | 5.38 | 9.19 | 13.72 | 19.00 | 24.98 |
| 9.00 CFS | 31.77 | 39.17 | 47.06 | 54.97 | 62.61 | 70.09 | 78.34 | 88.71 |
| 10.20 CFS | 101 | 117 | 136 | 157 | 183 | 214 | 252 | 298 |
| 11.40 CFS | 360 | 447 | 681 | 1369 | 3042 | 5278 | 6575 | 5959 |
| 12.60 CFS | 4010 | 2089 | 1286 | 1049 | 897 | 801 | 730 | 670 |
| 13.80 CFS | 621 | 576 | 537 | 501 | 473 | 449 | 431 | 418 |
| 15.00 CFS | 407 | 396 | 383 | 370 | 357 | 344 | 332 | 321 |
| 16.20 CFS | 309 | 297 | 287 | 280 | 276 | 272 | 267 | 262 |
| 17.40 CFS | 258 | 253 | 248 | 244 | 240 | 236 | 231 | 227 |
| 18.60 CFS | 222 | 217 | 213 | 208 | 204 | 199 | 195 | 191 |
| 19.80 CFS | 186 | 180 | 175 | 171 | 168 | 166 | 164 | 162 |
| 21.00 CFS | 161 | 160 | 160 | 159 | 159 | 158 | 157 | 156 |
| 22.20 CFS | 155 | 154 | 153 | 152 | 151 | 150 | 149 | 148 |
| 23.40 CFS | 147 | 147 | 146 | 146 | 144 | 136 | 112 | 74 |
| 24.60 CFS | 35.28 | 7.94 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.67 WATERSHED INCHES; 8243 CFS-HRS; 681.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 4569.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.05 CFS | .40 | 1.20 | 2.57 | 4.63 | 7.18 | 10.00 | 12.89 | 15.82 |
| 8.25 CFS | 18.90 | 22.23 | 26.02 | 30.48 | 35.60 | 41.41 | 47.76 | 54.47 |
| 9.45 CFS | 61 | 68 | 74 | 81 | 88 | 97 | 109 | 123 |
| 10.65 CFS | 139 | 158 | 181 | 208 | 241 | 284 | 343 | 464 |
| 11.85 CFS | 800 | 1583 | 2830 | 4050 | 4565 | 4219 | 3139 | 1790 |
| 13.05 CFS | 990 | 803 | 686 | 608 | 553 | 508 | 469 | 435 |
| 14.25 CFS | 405 | 379 | 357 | 340 | 326 | 316 | 307 | 298 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.45 CFS | 288 | 278 | 268 | 259 | 250 | 241 | 232 | 224 |
| 16.65 CFS | 217 | 212 | 208 | 204 | 201 | 197 | 194 | 190 |
| 17.85 CFS | 187 | 183 | 180 | 177 | 173 | 170 | 167 | 163 |
| 19.05 CFS | 160 | 156 | 153 | 149 | 146 | 143 | 139 | 135 |
| 20.25 CFS | 132 | 129 | 126 | 124 | 123 | 122 | 121 | 120 |
| 21.45 CFS | 120 | 119 | 119 | 118 | 118 | 117 | 116 | 115 |
| 22.65 CFS | 114 | 114 | 113 | 112 | 111 | 111 | 110 | 110 |
| 23.85 CFS | 110 | 109 | 105 | 96 | 77 | 52 | 28 | 10 |
| 25.05 CFS | .64 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 6521 CFS-HRS; 538.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.37 | 10903.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.05 CFS | .40 | 1.20 | 2.57 | 4.63 | 7.20 | 10.18 | 13.81 | 18.41 |
| 8.25 CFS | 24 | 31 | 40 | 49 | 61 | 73 | 87 | 102 |
| 9.45 CFS | 116 | 130 | 144 | 159 | 177 | 199 | 226 | 258 |
| 10.65 CFS | 296 | 341 | 395 | 460 | 539 | 644 | 790 | 1145 |
| 11.85 CFS | 2169 | 4626 | 8109 | 10625 | 10524 | 8229 | 5227 | 3076 |
| 13.05 CFS | 2039 | 1700 | 1487 | 1337 | 1224 | 1128 | 1045 | 972 |
| 14.25 CFS | 906 | 851 | 806 | 771 | 744 | 723 | 702 | 681 |
| 15.45 CFS | 658 | 635 | 612 | 591 | 570 | 549 | 529 | 511 |
| 16.65 CFS | 497 | 488 | 480 | 472 | 463 | 455 | 447 | 439 |
| 17.85 CFS | 431 | 423 | 416 | 408 | 400 | 392 | 384 | 376 |
| 19.05 CFS | 368 | 360 | 352 | 344 | 337 | 328 | 319 | 310 |
| 20.25 CFS | 303 | 297 | 292 | 288 | 285 | 283 | 281 | 280 |
| 21.45 CFS | 279 | 278 | 277 | 276 | 274 | 272 | 270 | 268 |
| 22.65 CFS | 267 | 265 | 263 | 261 | 259 | 258 | 257 | 256 |
| 23.85 CFS | 255 | 253 | 241 | 208 | 151 | 88 | 36 | 10 |
| 25.05 CFS | .64 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.77 WATERSHED INCHES; 14763 CFS-HRS; 1220.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 17781.2 | (NULL) |
| 13.62 | 6601.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.40 CFS | .23 | .60 | 1.16 | 1.90 | 2.82 | 3.95 | 5.32 | 7.04 |
| 6.60 CFS | 9.18 | 11.78 | 14.94 | 18.81 | 23.61 | 29.43 | 36.37 | 44.23 |
| 7.80 CFS | 53 | 63 | 75 | 89 | 105 | 123 | 143 | 166 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | 192 | 221 | 252 | 284 | 317 | 350 | 384 | 423 |
| 10.20 CFS | 467 | 521 | 583 | 656 | 739 | 836 | 950 | 1089 |
| 11.40 CFS | 1263 | 1494 | 1959 | 3161 | 6068 | 10700 | 15422 | 17746 |
| 12.60 CFS | 16430 | 12557 | 8655 | 6616 | 6289 | 6397 | 6556 | 6597 |
| 13.80 CFS | 6488 | 6261 | 5955 | 5602 | 5231 | 4862 | 4510 | 4182 |
| 15.00 CFS | 3879 | 3600 | 3342 | 3103 | 2882 | 2680 | 2499 | 2336 |
| 16.20 CFS | 2188 | 2054 | 1935 | 1830 | 1742 | 1666 | 1598 | 1536 |
| 17.40 CFS | 1479 | 1426 | 1378 | 1335 | 1294 | 1258 | 1223 | 1190 |
| 18.60 CFS | 1159 | 1130 | 1102 | 1076 | 1050 | 1025 | 1001 | 978 |
| 19.80 CFS | 955 | 931 | 908 | 886 | 866 | 849 | 833 | 819 |
| 21.00 CFS | 806 | 795 | 785 | 776 | 768 | 759 | 752 | 744 |
| 22.20 CFS | 736 | 728 | 721 | 715 | 709 | 702 | 696 | 691 |
| 23.40 CFS | 687 | 683 | 678 | 675 | 669 | 655 | 616 | 543 |
| 24.60 CFS | 447 | 350 | 278 | 243 | 230 | 218 | 204 | 187 |
| 25.80 CFS | 168 | 149 | 131 | 114 | 99 | 85 | 73 | 62 |
| 27.00 CFS | 52.45 | 44.29 | 37.27 | 31.28 | 26.18 | 21.86 | 18.22 | 15.15 |
| 28.20 CFS | 12.58 | 10.43 | 8.63 | 7.14 | 5.89 | 4.86 | 4.00 | 3.29 |
| 29.40 CFS | 2.70 | 2.22 | 1.82 | 1.49 | 1.22 | 1.00 | .82 | .67 |
| 30.60 CFS | .54 | .44 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
3.00 WATERSHED INCHES; 39860 CFS-HRS; 3294.1 ACRE-FEET.

--- XSECTION 76, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1199.2 FEET) CAN ADD .456 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 3008.98 AC-FT ( .23 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1211.34. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 20.35 | 872.6 | 1212.31 |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4.50 CFS | .21 | .21 | .21 | .21 | .21 | .21 | .21 | .21 |
| 5.70 CFS | .21 | .21 | .21 | .21 | .22 | .22 | .22 | .23 |
| 6.90 CFS | .24 | .25 | .26 | .27 | .29 | .31 | .34 | .37 |
| 8.10 CFS | .41 | .46 | .51 | .58 | .65 | .74 | .84 | .96 |
| 9.30 CFS | 1.09 | 1.24 | 1.41 | 1.60 | 1.81 | 2.03 | 2.29 | 2.56 |
| 10.50 CFS | 2.87 | 3.22 | 3.62 | 4.06 | 4.56 | 5.14 | 5.80 | 6.58 |
| 11.70 CFS | 7.55 | 9.00 | 11.61 | 16.28 | 22.14 | 29.21 | 35.04 | 39.83 |
| 12.90 CFS | 42.90 | 45.10 | 46.96 | 48.79 | 50.66 | 52.58 | 54.49 | 56.34 |
| 14.10 CFS | 58.12 | 59.80 | 61.38 | 62.84 | 63.81 | 64.66 | 65.45 | 66.18 |
| 15.30 CFS | 66.85 | 67.48 | 68.06 | 68.60 | 69.10 | 69.56 | 70.00 | 70.41 |
| 16.50 CFS | 70.79 | 71.15 | 71.49 | 71.81 | 72.12 | 72.42 | 72.70 | 72.98 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 17.70 CFS | 183 | 290 | 383 | 464 | 534 | 595 | 648 | 693 |
| 18.90 CFS | 732 | 764 | 791 | 813 | 832 | 846 | 857 | 865 |
| 20.10 CFS | 870 | 872 | 873 | 871 | 868 | 865 | 860 | 854 |
| 21.30 CFS | 849 | 842 | 836 | 829 | 823 | 816 | 809 | 802 |
| 22.50 CFS | 795 | 788 | 781 | 774 | 767 | 761 | 754 | 748 |
| 23.70 CFS | 742 | 736 | 730 | 724 | 716 | 703 | 685 | 659 |
| 24.90 CFS | 627 | 594 | 562 | 531 | 502 | 474 | 447 | 421 |
| 26.10 CFS | 395 | 371 | 347 | 324 | 301 | 280 | 260 | 241 |
| 27.30 CFS | 223 | 205 | 189 | 174 | 160 | 147 | 135 | 124 |
| 28.50 CFS | 114 | 104 | 95 | 87 | 79 | 73 | 73 | 73 |
| 29.70 CFS | 72.96 | 72.94 | 72.93 | 72.91 | 72.90 | 72.89 | 72.87 | 72.86 |
| 30.90 CFS | 72.84 | 72.83 | 72.81 | 72.80 | 72.79 | 72.77 | 72.76 | 72.74 |
| 32.10 CFS | 72.73 | 72.71 | 72.70 | 72.68 | 72.67 | 72.66 | 72.64 | 72.63 |
| 33.30 CFS | 72.61 | 72.60 | 72.58 | 72.57 | 72.55 | 72.54 | 72.53 | 72.51 |
| 34.50 CFS | 72.50 | 72.48 | 72.47 | 72.45 | 72.44 | 72.43 | 72.41 | 72.40 |
| 35.70 CFS | 72.38 | 72.37 | 72.35 | 72.34 | 72.32 | 72.31 | 72.30 | 72.28 |
| 36.90 CFS | 72.27 | 72.25 | 72.24 | 72.22 | 72.21 | 72.20 | 72.18 | 72.17 |
| 38.10 CFS | 72.15 | 72.14 | 72.12 | 72.11 | 72.10 | 72.08 | 72.07 | 72.05 |
| 39.30 CFS | 72.04 | 72.02 | 72.01 | 72.00 | 71.98 | 71.97 | 71.95 | 71.94 |
| 40.50 CFS | 71.92 | 71.91 | 71.90 | 71.88 | 71.87 | 71.85 | 71.84 | 71.82 |
| 41.70 CFS | 71.81 | 71.80 | 71.78 | 71.77 | 71.75 | 71.74 | 71.72 | 71.71 |
| 42.90 CFS | 71.70 | 71.68 | 71.67 | 71.65 | 71.64 | 71.62 | 71.61 | 71.60 |
| 44.10 CFS | 71.58 | 71.57 | 71.55 | 71.54 | 71.53 | 71.51 | 71.50 | 71.48 |
| 45.30 CFS | 71.47 | 71.45 | 71.44 | 71.43 | 71.41 | 71.40 | 71.38 | 71.37 |
| 46.50 CFS | 71.35 | 71.34 | 71.33 | 71.31 | 71.30 | 71.28 | 71.27 | 71.26 |
| 47.70 CFS | 71.24 | 71.23 | 71.21 | 71.20 | 71.19 | 71.17 | 71.16 | 71.14 |
| 48.90 CFS | 71.13 | 71.11 | 71.10 | 71.09 | 71.07 | 71.06 | 71.04 | 71.03 |
| 50.10 CFS | 71.02 | 71.00 | 70.99 | 70.97 | 70.96 | 70.95 | 70.93 | 70.92 |
| 51.30 CFS | 70.90 | 70.89 | 70.88 | 70.86 | 70.85 | 70.83 | 70.82 | 70.80 |
| 52.50 CFS | 70.79 | 70.78 | 70.76 | 70.75 | 70.73 | 70.72 | 70.71 | 70.69 |
| 53.70 CFS | 70.68 | 70.66 | 70.65 | 70.64 | 70.62 | 70.61 | 70.59 | 70.58 |
| 54.90 CFS | 70.57 | 70.55 | 70.54 | 70.52 | 70.51 | 70.50 | 70.48 | 70.47 |
| 56.10 CFS | 70.45 | 70.44 | 70.43 | 70.41 | 70.40 | 70.38 | 70.37 | 70.36 |
| 57.30 CFS | 70.34 | 70.33 | 70.31 | 70.30 | 70.29 | 70.27 | 70.26 | 70.24 |
| 58.50 CFS | 70.23 | 70.22 | 70.20 | 70.19 | 70.18 | 70.16 | 70.15 | 70.13 |
| 59.70 CFS | 70.12 | 70.11 | 70.09 | 70.08 | 70.06 | 70.05 | 70.04 | 70.02 |
| 60.90 CFS | 70.01 | 69.99 | 69.98 | 69.97 | 69.95 | 69.94 | 69.92 | 69.91 |
| 62.10 CFS | 69.90 | 69.88 | 69.87 | 69.86 | 69.84 | 69.83 | 69.81 | 69.80 |
| 63.30 CFS | 69.79 | 69.77 | 69.76 | 69.74 | 69.73 | 69.72 | 69.70 | 69.69 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.71 WATERSHED INCHES; 9477 CFS-HRS; 783.2 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 2

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

RAINFALL OF 4.84 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.
RAINTABLE NUMBER 2, ARC 1
MAIN TIME INCREMENT .150 HOURS

ALTERNATE 1 STORM 1

| XSECTION/ STRUCTURE ID | | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|---|
| XSECTION | 1 | RUNOFF | 2.46 | 2.18 | --- | 12.39 | 2652 | 1078.0 |
| XSECTION | 5 | REACH | 2.46 | 2.18 | 4.61 | 13.05 | 1590 | 646.3 |
| XSECTION | 10 | REACH | 2.46 | 2.18 | 5.66 | 13.72 | 1123 | 456.5 |
| XSECTION | 2 | RUNOFF | 2.38 | 1.41 | --- | 12.34 | 1660 | 697.5 |
| XSECTION | 12 | ADDHYD | 4.84 | 1.80 | --- | 12.34 | 1709 | 353.1 |
| XSECTION | 12 | DIVERT | 4.84 | 1.80 | --- | 12.34 | 1709 | 353.1 |
| XSECTION | 200 | DIVERT | .00 | 1.80 | --- | .00 | 0 | ******** |
| XSECTION | 20 | REACH | 4.84 | 1.80 | 4.80 | 12.52 | 1653 | 341.5 |
| XSECTION | 25 | REACH | 4.84 | 1.80 | 3.00 | 12.67 | 1650 | 340.9 |
| XSECTION | 3 | RUNOFF | 3.94 | 2.18 | --- | 12.41 | 4180 | 1060.9 |
| XSECTION | 30 | REACH | 3.94 | 2.18 | 3.91 | 13.25 | 2215 | 562.2 |
| XSECTION | 5 | REACH | 3.94 | 2.18 | 4.63 | 13.84 | 1613 | 409.4 |
| XSECTION | 25 | REACH | 3.94 | 2.18 | 2.96 | 13.99 | 1613 | 409.4 |
| XSECTION | 4 | RUNOFF | 2.06 | 1.17 | --- | 12.40 | 1081 | 524.8 |
| XSECTION | 34 | ADDHYD | 6.00 | 1.83 | --- | 13.97 | 1754 | 292.3 |
| XSECTION | 35 | ADDHYD | 10.84 | 1.82 | --- | 13.99 | 3080 | 284.1 |
| XSECTION | 35 | DIVERT | 10.84 | 1.82 | --- | 13.99 | 3080 | 284.1 |
| XSECTION | 199 | DIVERT | .00 | 1.82 | --- | .00 | 0 | ******** |
| XSECTION | 45 | REACH | 10.84 | 1.82 | 4.12 | 14.21 | 3043 | 280.7 |
| XSECTION | 6 | RUNOFF | 1.47 | 2.29 | --- | 12.15 | 2337 | 1589.8 |
| XSECTION | 60 | REACH | 1.47 | 2.29 | 4.85 | 12.56 | 1443 | 981.6 |
| XSECTION | 67 | REACH | 1.47 | 2.29 | 3.86 | 12.90 | 1052 | 715.6 |
| XSECTION | 64 | ADDHYD | 12.31 | 1.88 | --- | 12.81 | 3398 | 276.0 |
| XSECTION | 5 | RUNOFF | 4.78 | 1.33 | --- | 12.38 | 2949 | 616.9 |
| XSECTION | 7 | RUNOFF | 3.48 | 1.57 | --- | 12.51 | 2317 | 665.8 |
| XSECTION | 75 | ADDHYD | 8.26 | 1.43 | --- | 12.43 | 5168 | 625.7 |
| XSECTION | 76 | ADDHYD | 20.57 | 1.70 | --- | 12.55 | 7135 | 346.9 |
| STRUCTURE | 1 | RESVOR | 20.57 | .22 | 1208.94 | 27.00F | 56F | 2.7 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINTABLE NUMBER 2, ARC 2 | | | | | | | |
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 3.42 | --- | 12.35 | 4185 | 1701.2 |
| XSECTION 5 | REACH | 2.46 | 3.42 | 5.39 | 12.88 | 2472 | 1004.9 |
| XSECTION 10 | REACH | 2.46 | 3.42 | 6.47 | 13.57 | 1695 | 689.0 |
| XSECTION 2 | RUNOFF | 2.38 | 2.77 | --- | 12.30 | 3544 | 1489.1 |
| XSECTION 12 | ADDHYD | 4.84 | 3.10 | --- | 12.30 | 3754 | 775.6 |
| XSECTION 12 | DIVERT | 4.84 | 3.10 | --- | 12.30 | 3754 | 775.6 |
| XSECTION 200 | DIVERT | .00 | 3.10 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 3.10 | 7.54 | 12.46 | 3746 | 774.0 |
| XSECTION 25 | REACH | 4.84 | 3.10 | 4.77 | 12.46 | 3746 | 774.0 |
| XSECTION 3 | RUNOFF | 3.94 | 3.42 | --- | 12.37 | 6596 | 1674.1 |
| XSECTION 30 | REACH | 3.94 | 3.42 | 4.47 | 13.07 | 3654 | 927.4 |
| XSECTION 5 | REACH | 3.94 | 3.42 | 5.46 | 13.65 | 2550 | 647.2 |
| XSECTION 25 | REACH | 3.94 | 3.42 | 3.82 | 13.65 | 2550 | 647.2 |
| XSECTION 4 | RUNOFF | 2.06 | 2.54 | --- | 12.34 | 2707 | 1314.1 |
| XSECTION 34 | ADDHYD | 6.00 | 3.12 | --- | 12.35 | 3038 | 506.3 |
| XSECTION 35 | ADDHYD | 10.84 | 3.11 | --- | 12.42 | 6655 | 613.9 |
| XSECTION 35 | DIVERT | 10.84 | 3.11 | --- | 12.42 | 6655 | 613.9 |
| XSECTION 199 | DIVERT | .00 | 3.11 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 3.11 | 6.36 | 12.59 | 6519 | 601.4 |
| XSECTION 6 | RUNOFF | 1.47 | 3.52 | --- | 12.13 | 3533 | 2403.4 |
| XSECTION 60 | REACH | 1.47 | 3.52 | 5.65 | 12.38 | 2338 | 1590.5 |
| XSECTION 67 | REACH | 1.47 | 3.52 | 4.72 | 12.69 | 1716 | 1167.3 |
| XSECTION 64 | ADDHYD | 12.31 | 3.16 | --- | 12.60 | 8202 | 666.3 |
| XSECTION 5 | RUNOFF | 4.78 | 2.67 | --- | 12.33 | 6605 | 1381.8 |
| XSECTION 7 | RUNOFF | 3.48 | 2.90 | --- | 12.46 | 4569 | 1312.9 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 75 | ADDHYD | 8.26 | 2.77 | --- | 12.37 | 10904 | 1320.1 |
| XSECTION 76 | ADDHYD | 20.57 | 3.00 | --- | 12.47 | 17781 | 864.4 |
| STRUCTURE 1 | RESVOR | 20.57 | .71 | 1212.31 | 20.35 | 873 | 42.4 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| | | | HYDROGRAPH INFORMATION | | | | ROUTING PARAMETERS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | INFLOW | | OUTFLOW | | Q-A EQ. | | | PEAK | ATT- |
| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | PEAK (CFS) | TIME (HR) | PEAK (CFS) | TIME (HR) | COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | RATIO Q/I (Q*) | KIN COEFF (C) |
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 2593 | 12.4 | 1590 | 13.1 | .94 | 1.21 | .454 | .613 | .23 |
| 10 | 9100 | | 1590 | 13.1 | 1118 | 13.6 | 1.08 | 1.21 | .239 | .703 | .24 |
| 20 | 3332 | | 1689 | 12.3 | 1609 | 12.4 | .12 | 1.66 | .007 | .952 | .84? |
| 25 | 1950 | | 1609 | 12.4 | 1605 | 12.6 | .046 | 1.75 | .003 | .998 | .99? |
| 30 | 8865 | | 4137 | 12.4 | 2197 | 13.2 | 1.19 | 1.13 | .587 | .531 | .18 |
| 5 | 8865 | | 2197 | 13.2 | 1611 | 13.8 | .87 | 1.22 | .204 | .733 | .24 |
| 25 | 1950 | | 1611 | 13.8 | 1610 | 13.9 | .046 | 1.75 | .003 | 1.000 | .99? |
| 45 | 4200 | | 3077 | 13.9 | 3040 | 14.3 | .045 | 1.73 | .007 | .988 | .71? |
| 60 | 7540 | | 2337 | 12.1 | 1433 | 12.6 | .49 | 1.35 | .402 | .613 | .35 |
| 67 | 5140 | | 1433 | 12.6 | 1052 | 12.9 | .72 | 1.26 | .198 | .734 | .37 |
| ALTERNATE 2 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 4117 | 12.3 | 2470 | 12.9 | 1.36 | 1.14 | .486 | .600 | .22 |
| 10 | 9100 | | 2470 | 12.9 | 1687 | 13.5 | 1.79 | 1.11 | .283 | .683 | .21 |
| 20 | 3332 | | 3754 | 12.3 | 3745 | 12.4 | .14 | 1.63 | .007 | .998 | .98? |
| 25 | 1950 | | 3745 | 12.4 | 3745 | 12.4 | .051 | 1.73 | .003 | 1.000 | 1.00? |
| 30 | 8865 | | 6417 | 12.3 | 3650 | 13.1 | 1.26 | 1.12 | .557 | .569 | .19 |
| 5 | 8865 | | 3650 | 13.1 | 2550 | 13.6 | 1.60 | 1.11 | .261 | .699 | .21 |
| 25 | 1950 | | 2550 | 13.6 | 2550 | 13.6 | .048 | 1.74 | .003 | 1.000 | 1.00? |
| 45 | 4200 | | 6616 | 12.4 | 6514 | 12.6 | .048 | 1.72 | .006 | .984 | .86? |
| 60 | 7540 | | 3523 | 12.1 | 2274 | 12.4 | .48 | 1.35 | .337 | .645 | .39 |
| 67 | 5140 | | 2274 | 12.4 | 1700 | 12.8 | .90 | 1.21 | .206 | .748 | .37 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE 1 | | 20.57 | |
| ALTERNATE | 1 | | 56 |
| ALTERNATE | 2 | | 873 |
| XSECTION 1 | | 2.46 | |
| ALTERNATE | 1 | | 2652 |
| ALTERNATE | 2 | | 4185 |
| XSECTION 2 | | 2.38 | |
| ALTERNATE | 1 | | 1660 |
| ALTERNATE | 2 | | 3544 |
| XSECTION 3 | | 3.94 | |
| ALTERNATE | 1 | | 4180 |
| ALTERNATE | 2 | | 6596 |
| XSECTION 4 | | 2.06 | |
| ALTERNATE | 1 | | 1081 |
| ALTERNATE | 2 | | 2707 |
| XSECTION 5 | | 4.78 | |
| ALTERNATE | 1 | | 2949 |
| ALTERNATE | 2 | | 6605 |
| XSECTION 6 | | 1.47 | |
| ALTERNATE | 1 | | 2337 |
| ALTERNATE | 2 | | 3533 |
| XSECTION 7 | | 3.48 | |
| ALTERNATE | 1 | | 2317 |
| ALTERNATE | 2 | | 4569 |
| XSECTION 10 | | 2.46 | |
| ALTERNATE | 1 | | 1123 |
| ALTERNATE | 2 | | 1695 |
| XSECTION 12 | | 4.84 | |
| ALTERNATE | 1 | | 1709 |
| ALTERNATE | 2 | | 3754 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 20 | | 4.84 | |
| ALTERNATE | 1 | | 1653 |
| ALTERNATE | 2 | | 3746 |
| XSECTION 25 | | 3.94 | |
| ALTERNATE | 1 | | 1613 |
| ALTERNATE | 2 | | 2550 |
| XSECTION 30 | | 3.94 | |
| ALTERNATE | 1 | | 2215 |
| ALTERNATE | 2 | | 3654 |
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 1754 |
| ALTERNATE | 2 | | 3038 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 3080 |
| ALTERNATE | 2 | | 6655 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 3043 |
| ALTERNATE | 2 | | 6519 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 1443 |
| ALTERNATE | 2 | | 2338 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 3398 |
| ALTERNATE | 2 | | 8202 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 1052 |
| ALTERNATE | 2 | | 1716 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 5168 |
| ALTERNATE | 2 | | 10904 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 7135 |
| ALTERNATE | 2 | | 17781 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

```
TR20 ------------------------------------------------------------------------ SCS -
WT100YR   WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
07/23/**  500-yr, 24-hr, Type II Dist, 100-yr Sediment Storage, 1200'Spi2.04TEST


END OF  1 JOBS IN THIS RUN


                    SCS  TR-20,  VERSION 2.04TEST
                         WT100YR   FILES

     INPUT  = 500IN.DAT                                , GIVEN DATA FILE
     OUTPUT = 500OUT.OUT                               , DATED 07/23/**,10:30:25

              FILES GENERATED - DATED 07/23/**,10:30:25

    FILE 111.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   3,  MESSAGES =   8

                       JOB ENDED AT 10:30:25
                   *** TR-20 RUN COMPLETED ***
```

Future Condition

(Principal spillway closed)

200-yr 24-hr

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20 WT100YR                          PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROUTING
TITLE     200-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spillway
 4 DIMHYD                .0556                                          WT3
 8           0.0         .03         .10         .19         .31
 8           .47         .66         .82         .93         .99
 8           1.0         .99         .93         .82         .66
 8           .47         .31         .03         .00         .00
 9 ENDTBL
 5 RAINFL 2              .1000                                          TYPE II
 8           .0000       .0010       .0020       .0030       .0041
 8           .0051       .0062       .0072       .0083       .0094
 8           .0105       .0116       .0127       .0138       .0150
 8           .0161       .0173       .0184       .0196       .0208
 8           .0220       .0232       .0244       .0257       .0269
 8           .0281       .0294       .0306       .0319       .0332
 8           .0345       .0358       .0371       .0384       .0398
 8           .0411       .0425       .0439       .0452       .0466
 8           .0480       .0494       .0508       .0523       .0538
 8           .0553       .0568       .0583       .0598       .0614
 8           .0630       .0646       .0662       .0679       .0696
 8           .0712       .0730       .0747       .0764       .0782
 8           .0800       .0818       .0836       .0855       .0874
 8           .0892       .0912       .0931       .0950       .0970
 8           .0990       .1010       .1030       .1051       .1072
 8           .1093       .1114       .1135       .1156       .1178
 8           .1200       .1222       .1246       .1270       .1296
 8           .1322       .1350       .1379       .1408       .1438
 8           .1470       .1502       .1534       .1566       .1598
 8           .1630       .1663       .1697       .1733       .1771
 8           .1810       .1851       .1895       .1941       .1989
 8           .2040       .2094       .2152       .2214       .2280
 8           .2350       .2427       .2513       .2609       .2715
 8           .2830       .3068       .3544       .4308       .5679
 8           .6630       .6820       .6986       .7130       .7252
 8           .7350       .7434       .7514       .7588       .7656
 8           .7720       .7780       .7836       .7890       .7942
 8           .7990       .8036       .8080       .8122       .8162
 8           .8200       .8237       .8273       .8308       .8342
 8           .8376       .8409       .8442       .8474       .8505
 8           .8535       .8565       .8594       .8622       .8649
 8           .8676       .8702       .8728       .8753       .8777
 8           .8800       .8823       .8845       .8868       .8890
 8           .8912       .8934       .8955       .8976       .8997
 8           .9018       .9038       .9058       .9078       .9097
 8           .9117       .9136       .9155       .9173       .9192
 8           .9210       .9228       .9245       .9263       .9280
 8           .9297       .9313       .9330       .9346       .9362
 8           .9377       .9393       .9408       .9423       .9438
 8           .9452       .9466       .9480       .9493       .9507
 8           .9520       .9533       .9546       .9559       .9572
 8           .9584       .9597       .9610       .9622       .9635
 8           .9647       .9660       .9672       .9685       .9697
 8           .9709       .9722       .9734       .9746       .9758
 8           .9770       .9782       .9794       .9806       .9818
 8           .9829       .9841       .9853       .9864       .9876
```

```
 8          .9887       .9899       .9910       .9922       .9933
 8          .9944       .9956       .9967       .9978       .9989
 8          1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         10.41                             BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.86        5.          4.39
 8                      2.01        50.         24.22
 8                      2.58        100.        40.12
 8                      3.46        200.        80.99
 8                      4.14        400.        129.44
 8                      5.16        800.        214.74
 8                      6.39        1600.       441.84
 8                      7.80        3200.       980.75
 8                      9.16        6400.       1891.44
 8                      10.41       12800.      3516.14
 8                      11.75       25600.      6548.98
 8                      13.26       51200.      11081.19
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
```

```
 8                      1.56        500.        203.28
 8                      2.30        1000.       302.00
 8                      3.38        2000.       449.24
 8                      4.97        4000.       673.73
 8                      6.23        6000.       855.96
 8                      7.31        8000.       1016.35
 8                      8.24        10000.      1158.51
 8                      9.09        12000.      1293.31
 8                      9.90        14000.      1425.57
 8                      10.64       16000.      1549.17
 8                      11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030        1.0         9.45                            BOSSCS#6
 8                      0.          0.0         0.0
 8                      0.77        5.          4.67
 8                      1.54        50.         32.06
 8                      1.78        100.        56.64
 8                      2.10        200.        100.59
 8                      2.50        400.        179.97
 8                      3.01        800.        320.25
 8                      3.63        1600.       589.66
 8                      4.35        3200.       1110.72
 8                      5.21        6400.       2084.48
 8                      6.03        12800.      4119.83
 8                      6.99        25600.      6856.75
 8                      8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045        1.0         4.87                            REACHA
 8                      0.          0.0         0.0
 8                      0.60        100.        85.69
 8                      0.90        200.        127.94
 8                      1.13        300.        161.93
 8                      1.52        500.        217.27
 8                      2.25        1000.       324.03
 8                      3.31        2000.       483.02
 8                      4.87        4000.       722.17
 8                      6.09        6000.       914.99
 8                      7.15        8000.       1084.61
 8                      8.05        10000.      1234.17
 8                      8.87        12000.      1373.80
 8                      9.64        14000.      1507.84
 8                      10.34       16000.      1633.45
 8                      11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060        1.0         4.7                             2CP6CP7
 8                      0.          0.0         0.0
 8                      2.36        100.        45.12
 8                      2.88        200.        83.75
 8                      3.18        300.        114.33
 8                      3.64        500.        172.72
 8                      4.42        1000.       289.04
 8                      5.40        2000.       470.72
 8                      6.87        4000.       782.74
 8                      7.91        6000.       1020.12
 8                      8.79        8000.       1231.25
 8                      9.60        10000.      1435.05
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8                       10.26       12000.      1618.34
 8                       10.94       14000.      1812.58
 8                       11.47       16000.      1983.46
 8                       11.96       18000.      2150.12
 9 ENDTBL
 2 XSECTN    067         1.0         8.77                                BOSSCS#5
 8                       0.          0.0         0.0
 8                       0.35        5.          5.56
 8                       1.03        50.         30.95
 8                       1.39        100.        52.16
 8                       1.94        200.        88.72
 8                       2.63        400.        148.61
 8                       3.51        800.        260.63
 8                       4.62        1600.       459.66
 8                       6.04        3200.       929.36
 8                       7.38        6400.       1811.51
 8                       8.77        12800.      3374.20
 8                       10.17       25600.      6398.87
 8                       11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT       01                                                       95/11/6
 8                       1178.0      0.0         0.
 8                       1188.0      0.02        44.8
 8                       1196.8      0.13        300.
 8                       1199.2      0.21        500.
 8                       1202.0      16.00       845.55
 8                       1204.0      28.000      1176.28
 8                       1206.0      39.00       1575.25
 8                       1208.0      50.00       2044.97
 8                       1210.0      63.00       2593.40
 8                       1212.0      73.000      3218.00
 8                       1213.0      2672.00     3556.67
 8                       1214.0      8218.00     3916.02
 8                       1215.0      15533.0     4294.13
 8                       1216.0      24261.0     4692.68
 8                       1217.0      34202.0     5113.19
 8                       1218.0      45221.0     5556.01
 8                       1219.0      57222.0     6021.50
 8                       1220.0      70131.0     6509.75
 9 ENDTBL
 6 RUNOFF 1 001        1 2.46        87.2        0.85        1 1
 6 REACH  3 005   1    7 9100.                               1           BOSS#6
 6 REACH  3 010   7    2 9100.                               1           BOSS#4
 6 RUNOFF 1 002        3 2.38        79.9        0.73        1 1
 6 ADDHYD 4 012   2 3 1                                      1 1
 6 DIVERT 6 012   1 4 7 4100.       1.00        200.        1 1         OLIVE
 6 REACH  3 020   4    7 3332.                               1           REACH C
 6 REACH  3 025   7    5 1950.                               1           REACH B
 6 RUNOFF 1 003        6 3.94        87.2        0.88        1 1
 6 REACH  3 030   6    7 8865.                               1           BOSS#6
 6 REACH  3 005   7    1 8865.                               1           BOSS#5
 6 REACH  3 025   1    7 1950.                               1           REACH B
 6 RUNOFF 1 004        1 2.06        77.3        0.79        1 1
 6 ADDHYD 4 034   7 1 2                                      1 1
 6 ADDHYD 4 035   5 2 3                                      1 1
 6 DIVERT 6 035   3 4 7 11000.      1.00        199.        1 1         NORTHERN
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 REACH   3 045    4    5 4200.                                  1            REACH A
 6 RUNOFF  1 006         2 1.47          87.7          0.47      1 1
 6 REACH   3 060    2    3 7540.                                  1            CP6CP7
 6 REACH   3 067    3    4 5140.                                  1            BOSS#5
 6 ADDHYD  4 064    5 4  3                                        1 1
 6 RUNOFF  1 005         6 4.78          78.8          0.78      1 1
 6 RUNOFF  1 007         7 3.48          81.7          1.01      1 1
 6 ADDHYD  4 075    6 7  1                                        1 1
 6 ADDHYD  4 076    1 3  2                                        1 1       1
 6 RESVOR  2     01 2    1 1199.2                                 1 1       1
 ENDATA
 7 LIST                    1.0                      1.
 7 INCREM  6               0.15
 7 COMPUT  7 001       01  0.          4.28          1.0         2 1  01   01
   ENDCMP  1
 7 COMPUT  7 001       01  0.          4.28          1.0         2 2  02   01
   ENDCMP  1
   ENDJOB  2

**********END OF 80-80 LIST**********
```

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST 1. 0. 1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT
DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0017 | .0035 | .0052 | .0070 |
| .0087 | .0105 | .0122 | .0139 | .0157 |
| .0174 | .0192 | .0210 | .0227 | .0245 |
| .0262 | .0280 | .0297 | .0315 | .0332 |
| .0350 | .0368 | .0386 | .0404 | .0423 |
| .0442 | .0461 | .0480 | .0500 | .0520 |
| .0540 | .0561 | .0582 | .0603 | .0625 |
| .0647 | .0669 | .0691 | .0714 | .0737 |
| .0760 | .0784 | .0807 | .0831 | .0855 |
| .0878 | .0902 | .0926 | .0951 | .0975 |
| .1000 | .1024 | .1049 | .1073 | .1098 |
| .1123 | .1148 | .1174 | .1199 | .1225 |
| .1250 | .1276 | .1303 | .1332 | .1361 |
| .1391 | .1423 | .1456 | .1489 | .1524 |
| .1560 | .1597 | .1633 | .1671 | .1708 |
| .1746 | .1784 | .1823 | .1861 | .1901 |
| .1940 | .1982 | .2027 | .2077 | .2132 |
| .2190 | .2252 | .2318 | .2388 | .2462 |
| .2540 | .2623 | .2714 | .2812 | .2917 |
| .3030 | .3194 | .3454 | .3878 | .4632 |
| .5150 | .5322 | .5476 | .5612 | .5730 |
| .5830 | .5919 | .6003 | .6083 | .6159 |
| .6230 | .6298 | .6365 | .6430 | .6493 |
| .6555 | .6615 | .6674 | .6731 | .6786 |
| .6840 | .6892 | .6944 | .6995 | .7044 |
| .7092 | .7140 | .7186 | .7232 | .7276 |
| .7320 | .7362 | .7404 | .7444 | .7484 |
| .7523 | .7560 | .7596 | .7632 | .7667 |
| .7700 | .7733 | .7766 | .7798 | .7830 |
| .7862 | .7894 | .7926 | .7958 | .7989 |
| .8020 | .8051 | .8082 | .8112 | .8142 |
| .8173 | .8202 | .8232 | .8262 | .8291 |
| .8320 | .8349 | .8378 | .8406 | .8434 |
| .8462 | .8490 | .8518 | .8546 | .8573 |
| .8600 | .8627 | .8654 | .8680 | .8706 |
| .8733 | .8758 | .8784 | .8810 | .8835 |
| .8860 | .8885 | .8910 | .8934 | .8958 |
| .8982 | .9006 | .9030 | .9054 | .9077 |
| .9100 | .9123 | .9146 | .9168 | .9190 |
| .9212 | .9234 | .9256 | .9278 | .9299 |
| .9320 | .9341 | .9362 | .9382 | .9402 |
| .9423 | .9442 | .9462 | .9482 | .9501 |
| .9520 | .9539 | .9558 | .9576 | .9594 |
| .9613 | .9630 | .9648 | .9666 | .9683 |
| .9700 | .9717 | .9734 | .9750 | .9766 |
| .9783 | .9798 | .9814 | .9830 | .9845 |
| .9860 | .9875 | .9890 | .9904 | .9918 |
| .9933 | .9946 | .9960 | .9974 | .9987 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RUNOFF | 1 | | | 1 | 2.4600 | 87.2000 | .85001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 5 | 1 | | 7 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 10 | 7 | | 2 | 9100.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 2 | | | 3 | 2.3800 | 79.9000 | .73001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 12 | 2 | 3 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 12 | 1 | 4 | 7 | 4100.0000 | 1.0000 | 200.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 20 | 4 | | 7 | 3332.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 7 | | 5 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 3 | | | 6 | 3.9400 | 87.2000 | .88001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 30 | 6 | | 7 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 5 | 7 | | 1 | 8865.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 25 | 1 | | 7 | 1950.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 4 | | | 1 | 2.0600 | 77.3000 | .79001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 34 | 7 | 1 | 2 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 35 | 5 | 2 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| DIVERT | 35 | 3 | 4 | 7 | 11000.0000 | 1.0000 | 199.00001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 45 | 4 | | 5 | 4200.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| RUNOFF | 6 | | | 2 | 1.4700 | 87.7000 | .47001 | 1 | 0 | 0 | 0 | 1 |
| REACH | 60 | 2 | | 3 | 7540.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| REACH | 67 | 3 | | 4 | 5140.0000 | .0000 | .00001 | 0 | 0 | 0 | 0 | 1 |
| ADDHYD | 64 | 5 | 4 | 3 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 5 | | | 6 | 4.7800 | 78.8000 | .78001 | 1 | 0 | 0 | 0 | 1 |
| RUNOFF | 7 | | | 7 | 3.4800 | 81.7000 | 1.01001 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 75 | 6 | 7 | 1 | | | 1 | 1 | 0 | 0 | 0 | 1 |
| ADDHYD | 76 | 1 | 3 | 2 | | | 1 | 1 | 0 | 0 | 1 | 1 |
| RESVOR | | 1 | 2 | 1 | 1199.2000 | | 1 | 1 | 0 | 0 | 1 | 1 |
| ENDATA | | | | | | | | | | | | |

END OF LISTING

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .150 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.28 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 1 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 1 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.39 | 2110.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.90 CFS | .14 | .66 | 2.05 | 4.52 | 8.28 | 13.13 | 19.03 | 26.41 |
| 11.10 CFS | 35 | 47 | 63 | 85 | 140 | 314 | 763 | 1461 |
| 12.30 CFS | 2030 | 2064 | 1596 | 891 | 518 | 407 | 346 | 308 |
| 13.50 CFS | 280 | 257 | 238 | 221 | 206 | 193 | 181 | 172 |
| 14.70 CFS | 165 | 160 | 156 | 152 | 147 | 142 | 137 | 133 |
| 15.90 CFS | 128 | 124 | 120 | 115 | 111 | 108 | 107 | 105 |
| 17.10 CFS | 103 | 102 | 100 | 98 | 96 | 95 | 93 | 92 |
| 18.30 CFS | 89.87 | 88.14 | 86.52 | 84.73 | 83.01 | 81.32 | 79.48 | 77.83 |
| 19.50 CFS | 76.19 | 74.49 | 72.71 | 70.67 | 68.72 | 67.10 | 65.87 | 64.87 |
| 20.70 CFS | 64.02 | 63.38 | 62.94 | 62.57 | 62.39 | 62.16 | 61.97 | 61.76 |
| 21.90 CFS | 61.51 | 61.11 | 60.68 | 60.29 | 59.90 | 59.63 | 59.20 | 58.76 |
| 23.10 CFS | 58.31 | 58.06 | 57.89 | 57.63 | 57.45 | 57.22 | 56.69 | 54.24 |
| 24.30 CFS | 46.42 | 32.99 | 17.83 | 5.79 | .35 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 2783 CFS-HRS; 230.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.06 | 1263.0 | 4.15 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 2783 CFS-HRS; 230.0 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.71 | 908.0 | 5.33 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 2783 CFS-HRS; 230.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1217.2 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.40 CFS | 0 | 1 | 10 | 93 | 383 | 875 | 1197 | 1128 |
| 12.60 CFS | 742 | 397 | 298 | 250 | 220 | 200 | 184 | 170 |
| 13.80 CFS | 159 | 148 | 139 | 131 | 124 | 118 | 114 | 111 |
| 15.00 CFS | 109 | 106 | 103 | 100 | 96 | 93 | 90 | 87 |
| 16.20 CFS | 84.29 | 81.16 | 78.81 | 77.42 | 76.48 | 75.40 | 74.18 | 73.02 |
| 17.40 CFS | 71.83 | 70.63 | 69.46 | 68.44 | 67.37 | 66.26 | 65.02 | 63.88 |
| 18.60 CFS | 62.71 | 61.45 | 60.30 | 59.03 | 57.80 | 56.65 | 55.44 | 54.30 |
| 19.80 CFS | 52.89 | 51.36 | 50.05 | 49.05 | 48.29 | 47.66 | 47.08 | 46.73 |
| 21.00 CFS | 46.45 | 46.29 | 46.18 | 46.04 | 45.96 | 45.81 | 45.62 | 45.32 |
| 22.20 CFS | 45.02 | 44.71 | 44.59 | 44.34 | 43.98 | 43.67 | 43.44 | 43.34 |
| 23.40 CFS | 43.16 | 43.10 | 42.91 | 42.74 | 42.24 | 39.85 | 31.55 | 19.34 |
| 24.60 CFS | 7.71 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.08 WATERSHED INCHES; 1655 CFS-HRS; 136.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1245.6 | (NULL) |
| 13.67 | 1075.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | 0 | 1 | 1 | 2 | 4 | 16 | 103 | 396 |
| 12.15 CFS | 893 | 1222 | 1163 | 801 | 510 | 521 | 642 | 807 |
| 13.35 CFS | 958 | 1048 | 1075 | 1058 | 1011 | 949 | 879 | 808 |
| 14.55 CFS | 739 | 676 | 618 | 565 | 518 | 475 | 437 | 403 |
| 15.75 CFS | 373 | 348 | 326 | 306 | 288 | 273 | 260 | 250 |
| 16.95 CFS | 240 | 231 | 222 | 214 | 207 | 201 | 195 | 190 |
| 18.15 CFS | 185 | 181 | 176 | 172 | 169 | 165 | 162 | 158 |
| 19.35 CFS | 155 | 152 | 149 | 145 | 142 | 139 | 136 | 134 |
| 20.55 CFS | 131 | 129 | 127 | 125 | 123 | 121 | 119 | 118 |
| 21.75 CFS | 116 | 115 | 113 | 112 | 111 | 110 | 109 | 108 |
| 22.95 CFS | 107 | 107 | 106 | 105 | 105 | 104 | 104 | 103 |
| 24.15 CFS | 99.95 | 91.29 | 78.74 | 66.78 | 58.74 | 58.29 | 57.33 | 55.36 |
| 25.35 CFS | 52.02 | 47.40 | 41.98 | 36.41 | 31.08 | 26.20 | 21.86 | 18.09 |
| 26.55 CFS | 14.86 | 12.14 | 9.86 | 7.98 | 6.43 | 5.16 | 4.14 | 3.30 |
| 27.75 CFS | 2.63 | 2.09 | 1.66 | 1.31 | 1.03 | .82 | .64 | .50 |
| 28.95 CFS | .40 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 1245.6 | (DIVERT) |
| 13.67 | 1075.3 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | 0 | 1 | 1 | 2 | 4 | 16 | 103 | 396 |
|---|---|---|---|---|---|---|---|---|
| 10.95 CFS | | | | | | | | |
| 12.15 CFS | 893 | 1222 | 1163 | 801 | 510 | 521 | 642 | 807 |
| 13.35 CFS | 958 | 1048 | 1075 | 1058 | 1011 | 949 | 879 | 808 |
| 14.55 CFS | 739 | 676 | 618 | 565 | 518 | 475 | 437 | 403 |
| 15.75 CFS | 373 | 348 | 326 | 306 | 288 | 273 | 260 | 250 |
| 16.95 CFS | 240 | 231 | 222 | 214 | 207 | 201 | 195 | 190 |
| 18.15 CFS | 185 | 181 | 176 | 172 | 169 | 165 | 162 | 158 |
| 19.35 CFS | 155 | 152 | 149 | 145 | 142 | 139 | 136 | 134 |
| 20.55 CFS | 131 | 129 | 127 | 125 | 123 | 121 | 119 | 118 |
| 21.75 CFS | 116 | 115 | 113 | 112 | 111 | 110 | 109 | 108 |
| 22.95 CFS | 107 | 107 | 106 | 105 | 105 | 104 | 104 | 103 |
| 24.15 CFS | 99.95 | 91.29 | 78.74 | 66.78 | 58.74 | 58.29 | 57.33 | 55.36 |
| 25.35 CFS | 52.02 | 47.40 | 41.98 | 36.41 | 31.08 | 26.20 | 21.86 | 18.09 |
| 26.55 CFS | 14.86 | 12.14 | 9.86 | 7.98 | 6.43 | 5.16 | 4.14 | 3.30 |
| 27.75 CFS | 2.63 | 2.09 | 1.66 | 1.31 | 1.03 | .82 | .64 | .50 |
| 28.95 CFS | .40 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
141 CFS-HRS; 366.8 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.54 | 1180.6 | 3.99 |
| 13.86 | 1067.3 | 3.80 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.70 | 1166.3 | 2.48 |
| 14.02 | 1065.1 | 2.37 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.42 WATERSHED INCHES; 4438 CFS-HRS; 366.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.41 | 3318.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 9.90 | CFS | .19 | .99 | 3.02 | 6.78 | 12.56 | 20.09 | 29.57 | 41.05 |
| 11.10 | CFS | 56 | 74 | 98 | 133 | 209 | 472 | 1128 | 2207 |
| 12.30 | CFS | 3132 | 3285 | 2681 | 1592 | 876 | 669 | 566 | 498 |
| 13.50 | CFS | 453 | 416 | 384 | 357 | 333 | 311 | 293 | 278 |
| 14.70 | CFS | 266 | 257 | 250 | 244 | 237 | 229 | 221 | 213 |
| 15.90 | CFS | 206 | 199 | 192 | 185 | 179 | 174 | 171 | 169 |
| 17.10 | CFS | 166 | 163 | 160 | 157 | 155 | 152 | 149 | 147 |
| 18.30 | CFS | 144 | 141 | 139 | 136 | 133 | 131 | 128 | 125 |
| 19.50 | CFS | 122 | 120 | 117 | 114 | 110 | 108 | 106 | 104 |
| 20.70 | CFS | 103 | 102 | 101 | 100 | 100 | 100 | 99 | 99 |
| 21.90 | CFS | 98.62 | 97.95 | 97.24 | 96.66 | 95.97 | 95.54 | 94.89 | 94.21 |
| 23.10 | CFS | 93.50 | 93.03 | 92.76 | 92.34 | 92.05 | 91.68 | 91.11 | 87.22 |
| 24.30 | CFS | 76.37 | 55.46 | 31.71 | 11.28 | 1.18 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.26 | 1740.0 | 3.69 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.86 | 1258.8 | 4.15 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 14.02 | 1257.3 | 2.58 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.75 WATERSHED INCHES; 4458 CFS-HRS; 368.4 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 751.8 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 1 | 34 | 171 | 440 | 682 | 747 | 587 |
| 12.75 CFS | 345 | 228 | 191 | 166 | 150 | 138 | 128 | 119 |
| 13.95 CFS | 112 | 105 | 98 | 93 | 89 | 86 | 84 | 82 |
| 15.15 CFS | 79.95 | 77.82 | 75.45 | 72.99 | 70.68 | 68.45 | 66.30 | 64.04 |
| 16.35 CFS | 61.75 | 59.90 | 58.66 | 57.90 | 57.15 | 56.32 | 55.45 | 54.57 |
| 17.55 CFS | 53.71 | 52.86 | 52.07 | 51.29 | 50.47 | 49.57 | 48.71 | 47.86 |
| 18.75 CFS | 46.91 | 46.05 | 45.16 | 44.20 | 43.36 | 42.48 | 41.59 | 40.58 |
| 19.95 CFS | 39.45 | 38.42 | 37.60 | 36.99 | 36.48 | 36.07 | 35.77 | 35.56 |
| 21.15 CFS | 35.40 | 35.34 | 35.24 | 35.18 | 35.07 | 34.96 | 34.75 | 34.53 |
| 22.35 CFS | 34.33 | 34.16 | 34.03 | 33.79 | 33.56 | 33.37 | 33.26 | 33.18 |
| 23.55 CFS | 33.07 | 32.96 | 32.87 | 32.53 | 30.81 | 25.59 | 17.14 | 8.38 |
| 24.75 CFS | 2.04 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.87 WATERSHED INCHES; 1160 CFS-HRS; 95.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.42 | 780.6 | (NULL) |
| 14.00 | 1366.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.10 CFS | 0 | 1 | 1 | 2 | 5 | 41 | 182 | 456 |
| 12.30 CFS | 704 | 777 | 630 | 414 | 356 | 440 | 609 | 834 |
| 13.50 CFS | 1059 | 1229 | 1326 | 1364 | 1356 | 1318 | 1261 | 1193 |
| 14.70 CFS | 1120 | 1045 | 971 | 900 | 832 | 768 | 709 | 656 |
| 15.90 CFS | 607 | 563 | 524 | 489 | 458 | 430 | 406 | 384 |
| 17.10 CFS | 365 | 347 | 331 | 316 | 302 | 290 | 279 | 269 |
| 18.30 CFS | 260 | 252 | 245 | 238 | 231 | 225 | 220 | 214 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19.50 CFS | 209 | 205 | 200 | 195 | 191 | 187 | 183 | 179 |
| 20.70 CFS | 176 | 173 | 169 | 166 | 163 | 160 | 158 | 155 |
| 21.90 CFS | 152 | 150 | 148 | 146 | 144 | 142 | 141 | 139 |
| 23.10 CFS | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 129 |
| 24.30 CFS | 123 | 114 | 105 | 98 | 95 | 95 | 93 | 91 |
| 25.50 CFS | 87.29 | 81.73 | 74.89 | 67.45 | 59.94 | 52.70 | 45.93 | 39.75 |
| 26.70 CFS | 34.19 | 29.26 | 24.93 | 21.16 | 17.90 | 15.10 | 12.70 | 10.66 |
| 27.90 CFS | 8.93 | 7.47 | 6.23 | 5.19 | 4.32 | 3.59 | 2.98 | 2.47 |
| 29.10 CFS | 2.05 | 1.70 | 1.40 | 1.16 | .96 | .79 | .65 | .54 |
| 30.30 CFS | .44 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.45 WATERSHED INCHES; 5618 CFS-HRS; 464.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.61 | 1725.8 | (NULL) |
| 14.01 | 2430.9 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.10 CFS | 0 | 1 | 2 | 3 | 7 | 45 | 194 | 534 |
| 12.30 CFS | 1014 | 1513 | 1725 | 1564 | 1254 | 1053 | 1151 | 1447 |
| 13.50 CFS | 1814 | 2133 | 2337 | 2423 | 2415 | 2343 | 2231 | 2096 |
| 14.70 CFS | 1953 | 1809 | 1670 | 1539 | 1417 | 1304 | 1200 | 1106 |
| 15.90 CFS | 1023 | 948 | 882 | 823 | 771 | 725 | 685 | 650 |
| 17.10 CFS | 618 | 590 | 564 | 541 | 520 | 500 | 483 | 467 |
| 18.30 CFS | 452 | 439 | 427 | 416 | 405 | 395 | 386 | 377 |
| 19.50 CFS | 369 | 361 | 353 | 345 | 338 | 330 | 323 | 317 |
| 20.70 CFS | 311 | 305 | 299 | 294 | 289 | 284 | 279 | 275 |
| 21.90 CFS | 271 | 267 | 263 | 259 | 256 | 253 | 251 | 249 |
| 23.10 CFS | 246 | 244 | 242 | 241 | 239 | 238 | 236 | 233 |
| 24.30 CFS | 226 | 215 | 199 | 181 | 166 | 157 | 153 | 149 |
| 25.50 CFS | 143 | 135 | 124 | 111 | 98 | 86 | 74 | 63 |
| 26.70 CFS | 53.69 | 45.34 | 38.10 | 31.89 | 26.60 | 22.12 | 18.35 | 15.19 |
| 27.90 CFS | 12.55 | 10.35 | 8.53 | 7.01 | 5.76 | 4.73 | 3.88 | 3.18 |
| 29.10 CFS | 2.61 | 2.13 | 1.74 | 1.43 | 1.17 | .95 | .78 | .63 |
| 30.30 CFS | .51 | .42 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 10056 CFS-HRS; 831.1 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.61 | 1725.8 | (DIVERT) |
| 14.01 | 2430.9 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = | | 10.84 | SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 11.10 CFS | 0 | 1 | 2 | 3 | 7 | 45 | 194 | 534 |
| 12.30 CFS | 1014 | 1513 | 1725 | 1564 | 1254 | 1053 | 1151 | 1447 |
| 13.50 CFS | 1814 | 2133 | 2337 | 2423 | 2415 | 2343 | 2231 | 2096 |
| 14.70 CFS | 1953 | 1809 | 1670 | 1539 | 1417 | 1304 | 1200 | 1106 |
| 15.90 CFS | 1023 | 948 | 882 | 823 | 771 | 725 | 685 | 650 |
| 17.10 CFS | 618 | 590 | 564 | 541 | 520 | 500 | 483 | 467 |
| 18.30 CFS | 452 | 439 | 427 | 416 | 405 | 395 | 386 | 377 |
| 19.50 CFS | 369 | 361 | 353 | 345 | 338 | 330 | 323 | 317 |
| 20.70 CFS | 311 | 305 | 299 | 294 | 289 | 284 | 279 | 275 |
| 21.90 CFS | 271 | 267 | 263 | 259 | 256 | 253 | 251 | 249 |
| 23.10 CFS | 246 | 244 | 242 | 241 | 239 | 238 | 236 | 233 |
| 24.30 CFS | 226 | 215 | 199 | 181 | 166 | 157 | 153 | 149 |
| 25.50 CFS | 143 | 135 | 124 | 111 | 98 | 86 | 74 | 63 |
| 26.70 CFS | 53.69 | 45.34 | 38.10 | 31.89 | 26.60 | 22.12 | 18.35 | 15.19 |
| 27.90 CFS | 12.55 | 10.35 | 8.53 | 7.01 | 5.76 | 4.73 | 3.88 | 3.18 |
| 29.10 CFS | 2.61 | 2.13 | 1.74 | 1.43 | 1.17 | .95 | .78 | .63 |
| 30.30 CFS | .51 | .42 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 10056 CFS-HRS; 831.1 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
154 CFS-HRS; 831.1 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.82 | 1610.4 | 2.90 |
| 14.26 | 2394.9 | 3.62 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.44 WATERSHED INCHES; 10056 CFS-HRS; 831.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.15 | 1881.8 | (RUNOFF) |
| 21.35 | 38.5 | (RUNOFF) |
| 22.30 | 37.1 | (RUNOFF) |
| 23.29 | 35.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 1.47 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 9.60 CFS | .13 | .80 | 2.25 | 4.30 | 6.73 | 9.68 | 13.21 | 17.42 |
| 10.80 CFS | 23 | 29 | 37 | 48 | 63 | 87 | 165 | 480 |
| 12.00 CFS | 1292 | 1882 | 1313 | 533 | 339 | 268 | 223 | 200 |
| 13.20 CFS | 181 | 165 | 153 | 143 | 132 | 124 | 116 | 109 |
| 14.40 CFS | 104 | 100 | 98 | 96 | 93 | 90 | 87 | 84 |
| 15.60 CFS | 80.64 | 78.18 | 75.98 | 72.91 | 69.53 | 67.38 | 66.55 | 65.89 |
| 16.80 CFS | 64.68 | 63.37 | 62.48 | 61.51 | 60.12 | 59.06 | 58.34 | 57.36 |
| 18.00 CFS | 56.06 | 55.29 | 54.13 | 53.00 | 52.10 | 50.73 | 49.84 | 48.84 |
| 19.20 CFS | 47.51 | 46.73 | 45.87 | 44.44 | 42.95 | 41.82 | 41.10 | 40.43 |
| 20.40 CFS | 39.80 | 39.42 | 38.88 | 38.83 | 38.73 | 38.37 | 38.45 | 38.43 |
| 21.60 CFS | 38.02 | 37.96 | 37.87 | 37.20 | 37.05 | 37.08 | 36.92 | 36.29 |
| 22.80 CFS | 36.11 | 36.11 | 35.69 | 35.72 | 35.71 | 35.39 | 35.22 | 35.20 |
| 24.00 CFS | 34.68 | 29.57 | 14.80 | 1.79 | .00 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.85 WATERSHED INCHES; 1757 CFS-HRS; 145.2 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.58 | 1096.7 | 4.51 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.85 WATERSHED INCHES; 1758 CFS-HRS; 145.3 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.93 | 797.6 | 3.50 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.85 WATERSHED INCHES; 1758 CFS-HRS; 145.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.85 | 2376.9 | (NULL) |
| 14.18 | 2649.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 12.31 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .40 | .97 | 1.89 | 3.18 | 4.90 | 7.12 | 10.00 | 13.78 |
| 11.55 CFS | 19 | 26 | 36 | 71 | 198 | 517 | 1085 | 1808 |
| 12.75 CFS | 2306 | 2363 | 2130 | 1858 | 1770 | 1882 | 2114 | 2363 |
| 13.95 CFS | 2548 | 2639 | 2642 | 2577 | 2466 | 2327 | 2175 | 2021 |
| 15.15 CFS | 1870 | 1728 | 1594 | 1471 | 1358 | 1255 | 1162 | 1079 |
| 16.35 CFS | 1005 | 939 | 880 | 828 | 782 | 742 | 707 | 675 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 17.55 CFS | 646 | 620 | 596 | 574 | 555 | 537 | 520 | 505 |
| 18.75 CFS | 492 | 479 | 467 | 455 | 445 | 435 | 425 | 416 |
| 19.95 CFS | 407 | 398 | 389 | 380 | 372 | 364 | 357 | 350 |
| 21.15 CFS | 344 | 338 | 332 | 326 | 321 | 316 | 312 | 307 |
| 22.35 CFS | 303 | 300 | 296 | 293 | 290 | 287 | 285 | 282 |
| 23.55 CFS | 280 | 278 | 276 | 275 | 273 | 270 | 265 | 254 |
| 24.75 CFS | 238 | 217 | 196 | 180 | 169 | 161 | 153 | 144 |
| 25.95 CFS | 133 | 120 | 107 | 93 | 81 | 70 | 59 | 50 |
| 27.15 CFS | 42.25 | 35.43 | 29.61 | 24.66 | 20.48 | 16.97 | 14.04 | 11.59 |
| 28.35 CFS | 9.55 | 7.86 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.40 |
| 29.55 CFS | 1.96 | 1.60 | 1.31 | 1.07 | .88 | .71 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.49 WATERSHED INCHES; 11814 CFS-HRS; 976.3 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.40 | 2122.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.55 CFS | 0 | 10 | 131 | 567 | 1352 | 1997 | 2083 | 1560 |
| 12.75 CFS | 871 | 590 | 492 | 428 | 386 | 355 | 329 | 306 |
| 13.95 CFS | 287 | 268 | 252 | 238 | 228 | 220 | 214 | 209 |
| 15.15 CFS | 204 | 198 | 192 | 186 | 180 | 174 | 168 | 163 |
| 16.35 CFS | 157 | 152 | 149 | 147 | 145 | 143 | 140 | 138 |
| 17.55 CFS | 136 | 134 | 132 | 130 | 128 | 125 | 123 | 121 |
| 18.75 CFS | 118 | 116 | 114 | 111 | 109 | 107 | 105 | 102 |
| 19.95 CFS | 99.32 | 96.74 | 94.67 | 93.16 | 91.86 | 90.79 | 90.05 | 89.49 |
| 21.15 CFS | 89.10 | 88.93 | 88.66 | 88.50 | 88.25 | 87.91 | 87.34 | 86.78 |
| 22.35 CFS | 86.23 | 85.87 | 85.49 | 84.87 | 84.29 | 83.77 | 83.52 | 83.27 |
| 23.55 CFS | 83.01 | 82.78 | 82.46 | 81.65 | 77.17 | 64.16 | 42.06 | 19.40 |
| 24.75 CFS | 4.66 | .00 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.00 WATERSHED INCHES; 3087 CFS-HRS; 255.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.53 | 1733.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 1 | 5 | 24 | 103 | 371 | 839 | 1375 |
| 12.45 CFS | 1686 | 1695 | 1361 | 863 | 516 | 419 | 361 | 324 |
| 13.65 CFS | 297 | 274 | 255 | 238 | 223 | 209 | 198 | 189 |
| 14.85 CFS | 182 | 177 | 172 | 168 | 163 | 158 | 153 | 148 |
| 16.05 CFS | 143 | 138 | 133 | 129 | 125 | 122 | 120 | 119 |
| 17.25 CFS | 117 | 115 | 113 | 111 | 109 | 107 | 106 | 104 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.45 CFS | 102 | 100 | 98 | 96 | 95 | 93 | 91 | 89 |
| 19.65 CFS | 86.96 | 84.91 | 82.83 | 80.65 | 78.62 | 76.91 | 75.64 | 74.58 |
| 20.85 CFS | 73.75 | 73.12 | 72.66 | 72.31 | 72.11 | 71.92 | 71.67 | 71.46 |
| 22.05 CFS | 71.15 | 70.70 | 70.27 | 69.89 | 69.42 | 69.06 | 68.66 | 68.19 |
| 23.25 CFS | 67.77 | 67.50 | 67.33 | 67.03 | 66.83 | 66.40 | 64.43 | 58.31 |
| 24.45 CFS | 47.04 | 32.03 | 17.30 | 5.67 | .61 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.22 WATERSHED INCHES; 2734 CFS-HRS; 225.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.44 | 3771.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 8.26 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 11.25 CFS | 0 | 1 | 5 | 33 | 234 | 938 | 2191 | 3372 |
| 12.45 CFS | 3769 | 3255 | 2233 | 1452 | 1008 | 848 | 747 | 679 |
| 13.65 CFS | 626 | 581 | 542 | 506 | 475 | 448 | 425 | 408 |
| 14.85 CFS | 396 | 386 | 376 | 366 | 355 | 344 | 332 | 322 |
| 16.05 CFS | 311 | 300 | 290 | 281 | 274 | 269 | 265 | 261 |
| 17.25 CFS | 257 | 253 | 249 | 245 | 241 | 237 | 233 | 229 |
| 18.45 CFS | 225 | 221 | 217 | 213 | 208 | 204 | 200 | 196 |
| 19.65 CFS | 192 | 187 | 182 | 177 | 173 | 170 | 168 | 165 |
| 20.85 CFS | 164 | 163 | 162 | 161 | 161 | 160 | 160 | 159 |
| 22.05 CFS | 158 | 157 | 156 | 156 | 155 | 154 | 153 | 152 |
| 23.25 CFS | 151 | 151 | 150 | 150 | 149 | 148 | 142 | 122 |
| 24.45 CFS | 89.10 | 51.43 | 21.95 | 5.67 | .61 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.09 WATERSHED INCHES; 5822 CFS-HRS; 481.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.57 | 5080.1 | (NULL) |
| 14.12 | 3146.8 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 20.57 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 10.35 CFS | .40 | .97 | 1.89 | 3.18 | 4.90 | 7.12 | 10.09 | 14.70 |
| 11.55 CFS | 24 | 59 | 270 | 1009 | 2389 | 3889 | 4854 | 5063 |
| 12.75 CFS | 4539 | 3816 | 3138 | 2705 | 2517 | 2560 | 2739 | 2944 |
| 13.95 CFS | 3090 | 3146 | 3117 | 3025 | 2891 | 2735 | 2571 | 2406 |
| 15.15 CFS | 2246 | 2094 | 1949 | 1815 | 1690 | 1576 | 1473 | 1379 |
| 16.35 CFS | 1295 | 1219 | 1154 | 1097 | 1047 | 1003 | 964 | 928 |
| 17.55 CFS | 895 | 865 | 837 | 812 | 788 | 766 | 746 | 727 |
| 18.75 CFS | 708 | 691 | 675 | 660 | 645 | 631 | 617 | 603 |
| 19.95 CFS | 589 | 575 | 562 | 550 | 540 | 530 | 521 | 513 |
| 21.15 CFS | 505 | 499 | 493 | 487 | 481 | 476 | 470 | 465 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22.35 CFS | 460 | 455 | 451 | 447 | 443 | 439 | 436 | 433 |
| 23.55 CFS | 430 | 428 | 426 | 423 | 414 | 393 | 354 | 306 |
| 24.75 CFS | 260 | 222 | 197 | 180 | 169 | 161 | 153 | 144 |
| 25.95 CFS | 133 | 120 | 107 | 93 | 81 | 70 | 59 | 50 |
| 27.15 CFS | 42.25 | 35.43 | 29.61 | 24.66 | 20.48 | 16.97 | 14.04 | 11.59 |
| 28.35 CFS | 9.55 | 7.86 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.40 |
| 29.55 CFS | 1.96 | 1.60 | 1.31 | 1.07 | .88 | .71 | .58 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
1.33 WATERSHED INCHES; 17636 CFS-HRS; 1457.4 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1199.2 FEET) CAN ADD .456 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS
WITH 1751.34 AC-FT ( .13 WATERSHED INCHES) FLOOD STORAGE
REMAINING IN RESERVOIR AT ELEV. 1206.76. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.00 | 46.8 * | 1207.41 |

* FIRST POINT OF FLAT PEAK

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 43 CFS
RESVOR ( 92. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.45 CFS | .21 | .21 | .21 | .21 | .21 | .21 | .21 | .21 |
| 10.65 CFS | .21 | .21 | .21 | .22 | .22 | .23 | .24 | .26 |
| 11.85 CFS | .36 | .72 | 1.68 | 3.46 | 5.93 | 8.73 | 11.45 | 13.81 |
| 13.05 CFS | 15.77 | 17.12 | 18.29 | 19.42 | 20.61 | 21.87 | 23.22 | 24.61 |
| 14.25 CFS | 26.01 | 27.38 | 28.53 | 29.48 | 30.38 | 31.22 | 32.00 | 32.73 |
| 15.45 CFS | 33.41 | 34.04 | 34.63 | 35.18 | 35.69 | 36.16 | 36.61 | 37.02 |
| 16.65 CFS | 37.42 | 37.79 | 38.14 | 38.48 | 38.80 | 39.10 | 39.35 | 39.59 |
| 17.85 CFS | 39.83 | 40.06 | 40.28 | 40.49 | 40.70 | 40.90 | 41.10 | 41.29 |
| 19.05 CFS | 41.47 | 41.66 | 41.83 | 42.01 | 42.17 | 42.34 | 42.50 | 42.66 |
| 20.25 CFS | 42.81 | 42.96 | 43.10 | 43.25 | 43.39 | 43.52 | 43.66 | 43.79 |
| 21.45 CFS | 43.92 | 44.05 | 44.18 | 44.31 | 44.43 | 44.55 | 44.67 | 44.79 |
| 22.65 CFS | 44.91 | 45.03 | 45.15 | 45.26 | 45.38 | 45.49 | 45.60 | 45.71 |
| 23.85 CFS | 45.82 | 45.93 | 46.04 | 46.14 | 46.24 | 46.32 | 46.39 | 46.45 |
| 25.05 CFS | 46.49 | 46.53 | 46.57 | 46.61 | 46.64 | 46.67 | 46.69 | 46.72 |
| 26.25 CFS | 46.74 | 46.75 | 46.76 | 46.77 | 46.78 | 46.78 | 46.78 | 46.78 |
| 27.45 CFS | 46.77 | 46.77 | 46.76 | 46.75 | 46.74 | 46.73 | 46.72 | 46.71 |
| 28.65 CFS | 46.70 | 46.69 | 46.68 | 46.66 | 46.65 | 46.64 | 46.63 | 46.61 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 29.85 | CFS | 46.60 | 46.59 | 46.57 | 46.56 | 46.55 | 46.53 | 46.52 | 46.51 |
| 31.05 | CFS | 46.49 | 46.48 | 46.47 | 46.45 | 46.44 | 46.43 | 46.41 | 46.40 |
| 32.25 | CFS | 46.39 | 46.37 | 46.36 | 46.35 | 46.33 | 46.32 | 46.31 | 46.29 |
| 33.45 | CFS | 46.28 | 46.26 | 46.25 | 46.24 | 46.22 | 46.21 | 46.20 | 46.18 |
| 34.65 | CFS | 46.17 | 46.16 | 46.14 | 46.13 | 46.12 | 46.10 | 46.09 | 46.08 |
| 35.85 | CFS | 46.06 | 46.05 | 46.04 | 46.02 | 46.01 | 46.00 | 45.98 | 45.97 |
| 37.05 | CFS | 45.96 | 45.94 | 45.93 | 45.92 | 45.90 | 45.89 | 45.88 | 45.86 |
| 38.25 | CFS | 45.85 | 45.84 | 45.82 | 45.81 | 45.80 | 45.78 | 45.77 | 45.76 |
| 39.45 | CFS | 45.74 | 45.73 | 45.72 | 45.70 | 45.69 | 45.68 | 45.66 | 45.65 |
| 40.65 | CFS | 45.64 | 45.62 | 45.61 | 45.60 | 45.58 | 45.57 | 45.56 | 45.55 |
| 41.85 | CFS | 45.53 | 45.52 | 45.51 | 45.49 | 45.48 | 45.47 | 45.45 | 45.44 |
| 43.05 | CFS | 45.43 | 45.41 | 45.40 | 45.39 | 45.37 | 45.36 | 45.35 | 45.33 |
| 44.25 | CFS | 45.32 | 45.31 | 45.29 | 45.28 | 45.27 | 45.26 | 45.24 | 45.23 |
| 45.45 | CFS | 45.22 | 45.20 | 45.19 | 45.18 | 45.16 | 45.15 | 45.14 | 45.12 |
| 46.65 | CFS | 45.11 | 45.10 | 45.08 | 45.07 | 45.06 | 45.05 | 45.03 | 45.02 |
| 47.85 | CFS | 45.01 | 44.99 | 44.98 | 44.97 | 44.95 | 44.94 | 44.93 | 44.91 |
| 49.05 | CFS | 44.90 | 44.89 | 44.88 | 44.86 | 44.85 | 44.84 | 44.82 | 44.81 |
| 50.25 | CFS | 44.80 | 44.78 | 44.77 | 44.76 | 44.75 | 44.73 | 44.72 | 44.71 |
| 51.45 | CFS | 44.69 | 44.68 | 44.67 | 44.65 | 44.64 | 44.63 | 44.62 | 44.60 |
| 52.65 | CFS | 44.59 | 44.58 | 44.56 | 44.55 | 44.54 | 44.53 | 44.51 | 44.50 |
| 53.85 | CFS | 44.49 | 44.47 | 44.46 | 44.45 | 44.44 | 44.42 | 44.41 | 44.40 |
| 55.05 | CFS | 44.38 | 44.37 | 44.36 | 44.34 | 44.33 | 44.32 | 44.31 | 44.29 |
| 56.25 | CFS | 44.28 | 44.27 | 44.25 | 44.24 | 44.23 | 44.22 | 44.20 | 44.19 |
| 57.45 | CFS | 44.18 | 44.16 | 44.15 | 44.14 | 44.13 | 44.11 | 44.10 | 44.09 |
| 58.65 | CFS | 44.08 | 44.06 | 44.05 | 44.04 | 44.02 | 44.01 | 44.00 | 43.99 |
| 59.85 | CFS | 43.97 | 43.96 | 43.95 | 43.93 | 43.92 | 43.91 | 43.90 | 43.88 |
| 61.05 | CFS | 43.87 | 43.86 | 43.85 | 43.83 | 43.82 | 43.81 | 43.79 | 43.78 |
| 62.25 | CFS | 43.77 | 43.76 | 43.74 | 43.73 | 43.72 | 43.71 | 43.69 | 43.68 |
| 63.45 | CFS | 43.67 | 43.66 | 43.64 | 43.63 | 43.62 | 43.60 | 43.59 | 43.58 |
| 64.65 | CFS | 43.57 | 43.55 | 43.54 | 43.53 | 43.52 | 43.50 | 43.49 | 43.48 |
| 65.85 | CFS | 43.47 | 43.45 | 43.44 | 43.43 | 43.41 | 43.40 | 43.39 | 43.38 |
| 67.05 | CFS | 43.36 | 43.35 | 43.34 | 43.33 | 43.31 | 43.30 | 43.29 | 43.28 |
| 68.25 | CFS | 43.26 | 43.25 | 43.24 | 43.23 | 43.21 | 43.20 | 43.19 | 43.18 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.19 WATERSHED INCHES; 2468 CFS-HRS; 203.9 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 4.28 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .150 HOURS
ALTERNATE NO. = 2 STORM NO. = 1 RAIN TABLE NO. = 2

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.36 | 3560.9 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.70 CFS | .34 | .97 | 2.10 | 3.60 | 5.35 | 7.17 | 9.05 | 10.97 |
| 6.90 CFS | 12.93 | 14.93 | 16.98 | 19.09 | 21.26 | 23.50 | 25.69 | 27.86 |
| 8.10 CFS | 30.04 | 32.42 | 35.28 | 38.77 | 43.02 | 47.91 | 53.24 | 58.80 |
| 9.30 CFS | 64 | 70 | 74 | 79 | 83 | 89 | 98 | 108 |
| 10.50 CFS | 120 | 134 | 150 | 170 | 193 | 221 | 258 | 309 |
| 11.70 CFS | 414 | 759 | 1558 | 2705 | 3483 | 3425 | 2495 | 1338 |
| 12.90 CFS | 723 | 566 | 476 | 419 | 379 | 346 | 320 | 296 |
| 14.10 CFS | 275 | 257 | 241 | 228 | 218 | 211 | 205 | 199 |
| 15.30 CFS | 193 | 186 | 180 | 173 | 167 | 161 | 155 | 149 |
| 16.50 CFS | 144 | 140 | 138 | 136 | 133 | 131 | 128 | 126 |
| 17.70 CFS | 124 | 121 | 119 | 117 | 115 | 112 | 110 | 108 |
| 18.90 CFS | 106 | 103 | 101 | 99 | 97 | 94 | 92 | 89 |
| 20.10 CFS | 86.91 | 84.80 | 83.23 | 81.92 | 80.80 | 79.93 | 79.33 | 78.79 |
| 21.30 CFS | 78.54 | 78.20 | 77.92 | 77.62 | 77.28 | 76.70 | 76.12 | 75.58 |
| 22.50 CFS | 75.05 | 74.68 | 74.10 | 73.52 | 72.93 | 72.59 | 72.32 | 71.97 |
| 23.70 CFS | 71.70 | 71.38 | 70.66 | 67.37 | 58.11 | 41.09 | 22.26 | 7.14 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 4608 CFS-HRS; 380.8 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.88 | 2127.1 | 5.09 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 4608 CFS-HRS; 380.8 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.56 | 1475.8 | 6.20 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 4608 CFS-HRS; 380.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.30 | 2955.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.25 CFS | .49 | 1.39 | 2.94 | 5.01 | 7.46 | 10.23 | 13.28 | 16.56 |
| 9.45 CFS | 19.86 | 23.05 | 26.21 | 29.84 | 34.28 | 39.84 | 46.48 | 54.31 |
| 10.65 CFS | 63 | 74 | 88 | 104 | 124 | 150 | 189 | 279 |
| 11.85 CFS | 613 | 1406 | 2474 | 2956 | 2493 | 1476 | 720 | 525 |
| 13.05 CFS | 433 | 377 | 339 | 310 | 285 | 264 | 246 | 229 |
| 14.25 CFS | 214 | 202 | 192 | 185 | 180 | 175 | 170 | 165 |
| 15.45 CFS | 159 | 153 | 148 | 143 | 138 | 133 | 127 | 123 |
| 16.65 CFS | 121 | 119 | 117 | 115 | 113 | 111 | 109 | 107 |
| 17.85 CFS | 105 | 104 | 102 | 100 | 98 | 96 | 94 | 92 |
| 19.05 CFS | 89.94 | 87.94 | 86.09 | 84.15 | 82.33 | 80.09 | 77.68 | 75.63 |
| 20.25 CFS | 74.04 | 72.81 | 71.79 | 70.85 | 70.26 | 69.77 | 69.46 | 69.23 |
| 21.45 CFS | 68.96 | 68.78 | 68.48 | 68.14 | 67.63 | 67.12 | 66.61 | 66.38 |
| 22.65 CFS | 65.95 | 65.35 | 64.83 | 64.44 | 64.25 | 63.92 | 63.77 | 63.45 |
| 23.85 CFS | 63.14 | 62.36 | 58.77 | 46.53 | 28.51 | 11.37 | .00 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 3513 CFS-HRS; 290.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 3128.1 | (NULL) |
| 13.50 | 1780.7 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.75 CFS | .46 | .84 | 1.39 | 2.09 | 2.95 | 3.96 | 5.11 | 6.39 |
| 7.95 CFS | 7.79 | 9.38 | 11.38 | 13.99 | 17.31 | 21.22 | 25.58 | 30.35 |
| 9.15 CFS | 35.52 | 41.10 | 46.94 | 52.96 | 59.24 | 66.30 | 74.45 | 83.93 |
| 10.35 CFS | 95 | 107 | 120 | 136 | 154 | 176 | 202 | 236 |
| 11.55 CFS | 284 | 384 | 730 | 1537 | 2621 | 3127 | 2707 | 1781 |
| 12.75 CFS | 1199 | 1255 | 1448 | 1637 | 1751 | 1781 | 1748 | 1673 |
| 13.95 CFS | 1574 | 1462 | 1346 | 1233 | 1126 | 1027 | 938 | 857 |
| 15.15 CFS | 784 | 718 | 658 | 606 | 559 | 519 | 483 | 451 |
| 16.35 CFS | 423 | 398 | 378 | 360 | 344 | 330 | 316 | 304 |
| 17.55 CFS | 293 | 283 | 275 | 267 | 259 | 252 | 246 | 239 |
| 18.75 CFS | 234 | 228 | 223 | 218 | 213 | 208 | 204 | 199 |
| 19.95 CFS | 194 | 189 | 185 | 181 | 178 | 175 | 172 | 169 |
| 21.15 CFS | 166 | 164 | 162 | 160 | 158 | 156 | 154 | 152 |
| 22.35 CFS | 150 | 149 | 148 | 146 | 145 | 144 | 143 | 142 |
| 23.55 CFS | 141 | 140 | 140 | 138 | 134 | 121 | 103 | 85 |
| 24.75 CFS | 73.30 | 72.19 | 70.00 | 66.33 | 61.22 | 55.12 | 48.73 | 42.47 |
| 25.95 CFS | 36.60 | 31.25 | 26.47 | 22.28 | 18.65 | 15.53 | 12.88 | 10.65 |
| 27.15 CFS | 8.77 | 7.20 | 5.90 | 4.82 | 3.93 | 3.19 | 2.59 | 2.10 |
| 28.35 CFS | 1.70 | 1.37 | 1.11 | .89 | .72 | .58 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.31 | 3128.1 | (DIVERT) |
| 13.50 | 1780.7 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.75 CFS | .46 | .84 | 1.39 | 2.09 | 2.95 | 3.96 | 5.11 | 6.39 |
| 7.95 CFS | 7.79 | 9.38 | 11.38 | 13.99 | 17.31 | 21.22 | 25.58 | 30.35 |
| 9.15 CFS | 35.52 | 41.10 | 46.94 | 52.96 | 59.24 | 66.30 | 74.45 | 83.93 |
| 10.35 CFS | 95 | 107 | 120 | 136 | 154 | 176 | 202 | 236 |
| 11.55 CFS | 284 | 384 | 730 | 1537 | 2621 | 3127 | 2707 | 1781 |
| 12.75 CFS | 1199 | 1255 | 1448 | 1637 | 1751 | 1781 | 1748 | 1673 |
| 13.95 CFS | 1574 | 1462 | 1346 | 1233 | 1126 | 1027 | 938 | 857 |
| 15.15 CFS | 784 | 718 | 658 | 606 | 559 | 519 | 483 | 451 |
| 16.35 CFS | 423 | 398 | 378 | 360 | 344 | 330 | 316 | 304 |
| 17.55 CFS | 293 | 283 | 275 | 267 | 259 | 252 | 246 | 239 |
| 18.75 CFS | 234 | 228 | 223 | 218 | 213 | 208 | 204 | 199 |
| 19.95 CFS | 194 | 189 | 185 | 181 | 178 | 175 | 172 | 169 |
| 21.15 CFS | 166 | 164 | 162 | 160 | 158 | 156 | 154 | 152 |
| 22.35 CFS | 150 | 149 | 148 | 146 | 145 | 144 | 143 | 142 |
| 23.55 CFS | 141 | 140 | 140 | 138 | 134 | 121 | 103 | 85 |
| 24.75 CFS | 73.30 | 72.19 | 70.00 | 66.33 | 61.22 | 55.12 | 48.73 | 42.47 |
| 25.95 CFS | 36.60 | 31.25 | 26.47 | 22.28 | 18.65 | 15.53 | 12.88 | 10.65 |
| 27.15 CFS | 8.77 | 7.20 | 5.90 | 4.82 | 3.93 | 3.19 | 2.59 | 2.10 |
| 28.35 CFS | 1.70 | 1.37 | 1.11 | .89 | .72 | .58 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
176 CFS-HRS; 671.1 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3103.5 | 6.75 |
| 13.65 | 1779.0 | 5.02 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.46 | 3103.5 | 4.26 |
| 13.65 | 1779.0 | 3.14 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.60 WATERSHED INCHES; 8121 CFS-HRS; 671.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.37 | 5581.6 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.70 CFS | .48 | 1.45 | 3.14 | 5.48 | 8.24 | 11.15 | 14.17 | 17.24 |
| 6.90 CFS | 20.37 | 23.55 | 26.79 | 30.14 | 33.59 | 37.17 | 40.72 | 44.22 |
| 8.10 CFS | 47.74 | 51.52 | 55.99 | 61.46 | 68.12 | 75.78 | 84.32 | 93.21 |
| 9.30 CFS | 102 | 111 | 118 | 125 | 133 | 142 | 154 | 171 |
| 10.50 CFS | 190 | 212 | 238 | 269 | 305 | 349 | 406 | 486 |
| 11.70 CFS | 668 | 1188 | 2390 | 4087 | 5423 | 5399 | 4218 | 2407 |
| 12.90 CFS | 1238 | 928 | 776 | 679 | 614 | 561 | 517 | 479 |
| 14.10 CFS | 445 | 415 | 389 | 368 | 352 | 339 | 329 | 320 |
| 15.30 CFS | 310 | 300 | 289 | 278 | 269 | 259 | 249 | 240 |
| 16.50 CFS | 232 | 225 | 221 | 217 | 214 | 210 | 206 | 202 |
| 17.70 CFS | 198 | 195 | 191 | 188 | 184 | 181 | 177 | 173 |
| 18.90 CFS | 170 | 166 | 162 | 159 | 155 | 152 | 148 | 144 |
| 20.10 CFS | 140 | 136 | 134 | 131 | 130 | 128 | 127 | 126 |
| 21.30 CFS | 126 | 125 | 125 | 124 | 124 | 123 | 122 | 121 |
| 22.50 CFS | 120 | 120 | 119 | 118 | 117 | 116 | 116 | 115 |
| 23.70 CFS | 115 | 114 | 113 | 108 | 95 | 69 | 40 | 15 |
| 24.90 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.1 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.08 | 3079.4 | 4.30 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.0 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.64 | 2205.4 | 5.16 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.1 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 13.64 | 2205.4 | 3.54 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.90 WATERSHED INCHES; 7382 CFS-HRS; 610.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 12.34 | 2177.9 | |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | .39 | 1.25 | 2.80 | 4.89 | 7.30 | 9.79 | 12.49 | 15.58 |
| 10.20 CFS | 19.28 | 23.72 | 28.94 | 35.21 | 42.64 | 51.83 | 63.05 | 77.19 |
| 11.40 CFS | 96 | 122 | 195 | 408 | 948 | 1688 | 2157 | 2007 |
| 12.60 CFS | 1402 | 751 | 458 | 370 | 316 | 282 | 258 | 237 |
| 13.80 CFS | 219 | 204 | 190 | 178 | 167 | 159 | 153 | 148 |
| 15.00 CFS | 144 | 140 | 136 | 131 | 127 | 122 | 118 | 114 |
| 16.20 CFS | 110 | 106 | 102 | 100 | 98 | 97 | 95 | 94 |
| 17.40 CFS | 91.92 | 90.32 | 88.68 | 87.17 | 85.73 | 84.23 | 82.61 | 81.00 |
| 18.60 CFS | 79.47 | 77.77 | 76.19 | 74.58 | 72.88 | 71.36 | 69.83 | 68.27 |
| 19.80 CFS | 66.52 | 64.60 | 62.86 | 61.44 | 60.37 | 59.48 | 58.68 | 58.14 |
| 21.00 CFS | 57.72 | 57.42 | 57.27 | 57.02 | 56.86 | 56.65 | 56.41 | 55.99 |
| 22.20 CFS | 55.58 | 55.21 | 54.90 | 54.62 | 54.17 | 53.77 | 53.38 | 53.17 |
| 23.40 CFS | 52.98 | 52.75 | 52.59 | 52.35 | 51.79 | 48.97 | 40.98 | 27.20 |
| 24.60 CFS | 12.99 | 3.32 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.08 WATERSHED INCHES; 2761 CFS-HRS; 228.2 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.35 | 2448.8 | (NULL) |
| 13.60 | 2446.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .27 | .60 | 1.12 | 1.87 | 2.86 | 4.08 | 5.53 | 7.20 |
| 7.80 CFS | 9.07 | 11.13 | 13.37 | 15.77 | 18.33 | 21.03 | 23.84 | 26.85 |
| 9.00 CFS | 30.23 | 34.35 | 39.42 | 45.37 | 52.04 | 59.24 | 67.12 | 75.82 |
| 10.20 CFS | 85 | 96 | 108 | 121 | 135 | 152 | 172 | 196 |
| 11.40 CFS | 226 | 265 | 352 | 583 | 1143 | 1909 | 2413 | 2323 |
| 12.60 CFS | 1842 | 1423 | 1474 | 1786 | 2102 | 2327 | 2433 | 2442 |
| 13.80 CFS | 2384 | 2281 | 2151 | 2007 | 1859 | 1713 | 1573 | 1443 |
| 15.00 CFS | 1321 | 1209 | 1107 | 1014 | 931 | 856 | 790 | 732 |
| 16.20 CFS | 679 | 632 | 591 | 556 | 524 | 496 | 471 | 448 |
| 17.40 CFS | 427 | 409 | 392 | 377 | 364 | 352 | 340 | 330 |
| 18.60 CFS | 320 | 312 | 303 | 296 | 288 | 281 | 275 | 268 |
| 19.80 CFS | 262 | 256 | 250 | 244 | 239 | 234 | 229 | 225 |
| 21.00 CFS | 220 | 216 | 213 | 209 | 206 | 202 | 199 | 197 |
| 22.20 CFS | 194 | 192 | 190 | 188 | 186 | 184 | 182 | 181 |
| 23.40 CFS | 180 | 178 | 177 | 176 | 174 | 171 | 162 | 147 |
| 24.60 CFS | 132 | 122 | 117 | 114 | 109 | 102 | 93 | 84 |
| 25.80 CFS | 74.17 | 65.14 | 56.71 | 49.03 | 42.13 | 36.01 | 30.65 | 25.98 |
| 27.00 CFS | 21.95 | 18.49 | 15.53 | 13.01 | 10.88 | 9.08 | 7.56 | 6.29 |
| 28.20 CFS | 5.22 | 4.33 | 3.59 | 2.96 | 2.45 | 2.02 | 1.67 | 1.37 |
| 29.40 CFS | 1.13 | .93 | .76 | .63 | .51 | .42 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.62 WATERSHED INCHES; 10145 CFS-HRS; 838.4 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 5438.9 | (NULL) |
| 13.62 | 4222.9 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .34 | .80 | 1.56 | 2.70 | 4.22 | 6.14 | 8.44 | 11.11 |
| 7.80 CFS | 14.12 | 17.45 | 21.08 | 25.07 | 29.61 | 34.88 | 40.99 | 47.87 |
| 9.00 CFS | 56 | 64 | 75 | 86 | 99 | 112 | 126 | 142 |
| 10.20 CFS | 160 | 180 | 202 | 227 | 255 | 287 | 325 | 371 |
| 11.40 CFS | 427 | 500 | 634 | 962 | 1856 | 3405 | 4980 | 5423 |
| 12.60 CFS | 4568 | 3250 | 2703 | 3040 | 3540 | 3954 | 4178 | 4221 |
| 13.80 CFS | 4133 | 3958 | 3730 | 3474 | 3210 | 2951 | 2704 | 2475 |
| 15.00 CFS | 2264 | 2071 | 1895 | 1735 | 1592 | 1465 | 1352 | 1252 |
| 16.20 CFS | 1164 | 1085 | 1015 | 955 | 903 | 858 | 816 | 778 |
| 17.40 CFS | 744 | 714 | 686 | 661 | 639 | 618 | 600 | 582 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18.60 CFS | 566 | 551 | 537 | 524 | 511 | 499 | 488 | 477 |
| 19.80 CFS | 466 | 455 | 444 | 433 | 424 | 416 | 407 | 400 |
| 21.00 CFS | 392 | 385 | 379 | 373 | 367 | 362 | 357 | 352 |
| 22.20 CFS | 348 | 344 | 340 | 337 | 334 | 330 | 327 | 325 |
| 23.40 CFS | 323 | 320 | 319 | 316 | 314 | 309 | 296 | 269 |
| 24.60 CFS | 236 | 208 | 191 | 186 | 179 | 168 | 154 | 139 |
| 25.80 CFS | 123 | 108 | 94 | 81 | 69 | 59 | 49 | 42 |
| 27.00 CFS | 34.97 | 29.25 | 24.39 | 20.29 | 16.84 | 13.95 | 11.53 | 9.52 |
| 28.20 CFS | 7.84 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.39 | 1.96 |
| 29.40 CFS | 1.60 | 1.30 | 1.06 | .87 | .70 | .57 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.61 WATERSHED INCHES; 18266 CFS-HRS; 1509.5 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.43 | 5438.9 | (DIVERT) |
| 13.62 | 4222.9 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .34 | .80 | 1.56 | 2.70 | 4.22 | 6.14 | 8.44 | 11.11 |
| 7.80 CFS | 14.12 | 17.45 | 21.08 | 25.07 | 29.61 | 34.88 | 40.99 | 47.87 |
| 9.00 CFS | 56 | 64 | 75 | 86 | 99 | 112 | 126 | 142 |
| 10.20 CFS | 160 | 180 | 202 | 227 | 255 | 287 | 325 | 371 |
| 11.40 CFS | 427 | 500 | 634 | 962 | 1856 | 3405 | 4980 | 5423 |
| 12.60 CFS | 4568 | 3250 | 2703 | 3040 | 3540 | 3954 | 4178 | 4221 |
| 13.80 CFS | 4133 | 3958 | 3730 | 3474 | 3210 | 2951 | 2704 | 2475 |
| 15.00 CFS | 2264 | 2071 | 1895 | 1735 | 1592 | 1465 | 1352 | 1252 |
| 16.20 CFS | 1164 | 1085 | 1015 | 955 | 903 | 858 | 816 | 778 |
| 17.40 CFS | 744 | 714 | 686 | 661 | 639 | 618 | 600 | 582 |
| 18.60 CFS | 566 | 551 | 537 | 524 | 511 | 499 | 488 | 477 |
| 19.80 CFS | 466 | 455 | 444 | 433 | 424 | 416 | 407 | 400 |
| 21.00 CFS | 392 | 385 | 379 | 373 | 367 | 362 | 357 | 352 |
| 22.20 CFS | 348 | 344 | 340 | 337 | 334 | 330 | 327 | 325 |
| 23.40 CFS | 323 | 320 | 319 | 316 | 314 | 309 | 296 | 269 |
| 24.60 CFS | 236 | 208 | 191 | 186 | 179 | 168 | 154 | 139 |
| 25.80 CFS | 123 | 108 | 94 | 81 | 69 | 59 | 49 | 42 |
| 27.00 CFS | 34.97 | 29.25 | 24.39 | 20.29 | 16.84 | 13.95 | 11.53 | 9.52 |
| 28.20 CFS | 7.84 | 6.46 | 5.31 | 4.36 | 3.57 | 2.93 | 2.39 | 1.96 |
| 29.40 CFS | 1.60 | 1.30 | 1.06 | .87 | .70 | .57 | .46 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.61 WATERSHED INCHES; 18266 CFS-HRS; 1509.5 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

*** MESSAGE - HYDROGRAPH CONTAINS NO FLOW ***

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
182 CFS-HRS; 1509.5 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.60 | 5284.0 | 5.65 |
| 13.81 | 4203.8 | 4.99 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.61 WATERSHED INCHES; 18264 CFS-HRS; 1509.3 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.14 | 3017.4 | (RUNOFF) |
| 21.36 | 47.5 | (RUNOFF) |
| 22.28 | 45.8 | (RUNOFF) |
| 22.88 | 44.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 1.47 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.40 CFS | .23 | .86 | 1.83 | 2.90 | 3.99 | 5.13 | 6.29 | 7.50 |
| 6.60 CFS | 8.72 | 9.95 | 11.17 | 12.44 | 13.81 | 15.13 | 16.61 | 18.05 |
| 7.80 CFS | 19.25 | 20.51 | 22.08 | 23.92 | 26.29 | 29.33 | 32.65 | 36.22 |
| 9.00 CFS | 39.69 | 43.35 | 46.89 | 49.23 | 51.20 | 53.92 | 58.31 | 64.38 |
| 10.20 CFS | 71 | 79 | 89 | 99 | 112 | 127 | 145 | 169 |
| 11.40 CFS | 202 | 249 | 418 | 1018 | 2294 | 3010 | 1975 | 731 |
| 12.60 CFS | 465 | 363 | 301 | 268 | 241 | 219 | 202 | 188 |
| 13.80 CFS | 174 | 162 | 151 | 142 | 135 | 130 | 127 | 124 |
| 15.00 CFS | 120 | 116 | 112 | 108 | 103 | 100 | 97 | 93 |
| 16.20 CFS | 88.45 | 85.66 | 84.53 | 83.59 | 81.94 | 80.20 | 79.02 | 77.69 |
| 17.40 CFS | 75.82 | 74.44 | 73.51 | 72.19 | 70.47 | 69.38 | 67.83 | 66.41 |
| 18.60 CFS | 65.29 | 63.55 | 62.36 | 60.99 | 59.26 | 58.30 | 57.21 | 55.38 |
| 19.80 CFS | 53.51 | 52.08 | 51.10 | 50.21 | 49.43 | 48.96 | 48.24 | 48.15 |
| 21.00 CFS | 48.03 | 47.50 | 47.54 | 47.54 | 47.06 | 46.95 | 46.79 | 45.96 |
| 22.20 CFS | 45.73 | 45.74 | 45.54 | 44.73 | 44.46 | 44.48 | 43.96 | 43.89 |
| 23.40 CFS | 43.83 | 43.50 | 43.31 | 43.20 | 42.33 | 36.27 | 18.23 | 2.58 |
| 24.60 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.99 WATERSHED INCHES; 2836 CFS-HRS; 234.3 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.39 | 1957.2 | 5.36 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.99 WATERSHED INCHES; 2836 CFS-HRS; 234.3 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.71 | 1427.4 | 4.38 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.99 WATERSHED INCHES; 2836 CFS-HRS; 234.3 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.62 | 6687.0 | (NULL) |
| 13.72 | 4667.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 12.31 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.00 CFS | .43 | .88 | 1.48 | 2.23 | 3.15 | 4.29 | 5.72 | 7.49 |
| 7.20 CFS | 9.66 | 12.26 | 15.29 | 18.75 | 22.62 | 26.88 | 31.46 | 36.34 |
| 8.40 CFS | 42 | 47 | 54 | 62 | 71 | 81 | 92 | 105 |
| 9.60 CFS | 119 | 135 | 151 | 167 | 186 | 207 | 230 | 257 |
| 10.80 CFS | 287 | 322 | 361 | 407 | 463 | 530 | 617 | 762 |
| 12.00 CFS | 1098 | 2014 | 3745 | 5737 | 6675 | 6117 | 4811 | 3976 |
| 13.20 CFS | 3952 | 4227 | 4507 | 4652 | 4644 | 4517 | 4308 | 4050 |
| 14.40 CFS | 3768 | 3480 | 3199 | 2933 | 2687 | 2462 | 2257 | 2070 |
| 15.60 CFS | 1900 | 1748 | 1612 | 1492 | 1385 | 1290 | 1205 | 1129 |
| 16.80 CFS | 1064 | 1007 | 957 | 913 | 872 | 835 | 802 | 772 |
| 18.00 CFS | 745 | 721 | 699 | 678 | 659 | 641 | 625 | 609 |
| 19.20 CFS | 594 | 580 | 566 | 553 | 541 | 528 | 516 | 503 |
| 20.40 CFS | 491 | 481 | 471 | 461 | 452 | 444 | 437 | 430 |
| 21.60 CFS | 423 | 417 | 411 | 406 | 401 | 396 | 392 | 387 |
| 22.80 CFS | 384 | 380 | 377 | 374 | 371 | 368 | 366 | 363 |
| 24.00 CFS | 361 | 358 | 353 | 341 | 313 | 275 | 239 | 214 |
| 25.20 CFS | 202 | 191 | 178 | 162 | 146 | 129 | 113 | 98 |
| 26.40 CFS | 84.20 | 71.96 | 61.16 | 51.73 | 43.58 | 36.58 | 30.60 | 25.53 |
| 27.60 CFS | 21.24 | 17.64 | 14.62 | 12.09 | 9.98 | 8.22 | 6.77 | 5.57 |
| 28.80 CFS | 4.57 | 3.75 | 3.07 | 2.52 | 2.06 | 1.68 | 1.37 | 1.12 |
| 30.00 CFS | .91 | .74 | .60 | .49 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.66 WATERSHED INCHES; 21100 CFS-HRS; 1743.7 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.34 | 5366.5 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 4.78 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.40 CFS | .08 | .63 | 2.13 | 5.05 | 9.35 | 14.65 | 20.55 | 26.65 |
| 9.60 CFS | 33 | 39 | 46 | 54 | 63 | 75 | 89 | 106 |
| 10.80 CFS | 125 | 149 | 178 | 215 | 263 | 335 | 513 | 1060 |
| 12.00 CFS | 2437 | 4291 | 5327 | 4955 | 3355 | 1745 | 1077 | 887 |
| 13.20 CFS | 758 | 679 | 618 | 568 | 526 | 489 | 455 | 425 |
| 14.40 CFS | 401 | 381 | 366 | 355 | 346 | 336 | 326 | 315 |
| 15.60 CFS | 303 | 293 | 283 | 273 | 263 | 253 | 244 | 239 |
| 16.80 CFS | 235 | 232 | 228 | 224 | 220 | 216 | 212 | 208 |
| 18.00 CFS | 205 | 201 | 197 | 193 | 190 | 186 | 182 | 178 |
| 19.20 CFS | 174 | 170 | 166 | 163 | 159 | 154 | 150 | 146 |
| 20.40 CFS | 144 | 142 | 140 | 139 | 138 | 137 | 137 | 136 |
| 21.60 CFS | 136 | 135 | 134 | 133 | 132 | 132 | 131 | 130 |
| 22.80 CFS | 129 | 128 | 127 | 127 | 126 | 126 | 125 | 125 |
| 24.00 CFS | 124 | 117 | 97 | 64 | 30 | 0 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.20 WATERSHED INCHES; 6779 CFS-HRS; 560.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.47 | 3789.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.65 CFS | .34 | 1.02 | 2.20 | 3.98 | 6.21 | 8.79 | 11.68 | 14.95 |
| 8.85 CFS | 18.73 | 23.03 | 27.81 | 32.98 | 38.30 | 43.54 | 48.66 | 53.93 |
| 10.05 CFS | 60 | 67 | 76 | 87 | 100 | 115 | 133 | 155 |
| 11.25 CFS | 182 | 215 | 261 | 357 | 621 | 1288 | 2308 | 3320 |
| 12.45 CFS | 3780 | 3543 | 2634 | 1521 | 877 | 686 | 583 | 518 |
| 13.65 CFS | 471 | 433 | 400 | 372 | 347 | 324 | 306 | 291 |
| 14.85 CFS | 279 | 270 | 263 | 255 | 247 | 239 | 230 | 222 |
| 16.05 CFS | 214 | 206 | 199 | 192 | 186 | 182 | 178 | 176 |
| 17.25 CFS | 173 | 169 | 166 | 163 | 160 | 158 | 155 | 152 |
| 18.45 CFS | 149 | 146 | 143 | 140 | 137 | 134 | 131 | 129 |
| 19.65 CFS | 126 | 123 | 120 | 116 | 113 | 111 | 109 | 107 |
| 20.85 CFS | 106 | 105 | 104 | 103 | 103 | 103 | 102 | 102 |
| 22.05 CFS | 101 | 101 | 100 | 99 | 99 | 98 | 97 | 97 |
| 23.25 CFS | 95.98 | 95.54 | 95.25 | 94.74 | 94.41 | 93.80 | 90.87 | 82.34 |
| 24.45 CFS | 66.46 | 45.14 | 24.24 | 8.03 | .73 | .00 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.41 WATERSHED INCHES; 5420 CFS-HRS; 447.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.38 | 8933.6 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 8.26 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.65 CFS | .34 | 1.02 | 2.20 | 3.98 | 6.21 | 8.88 | 12.31 | 17.07 |
| 8.85 CFS | 23.77 | 32.38 | 42.46 | 53.53 | 64.95 | 76.31 | 87.58 | 99.60 |
| 10.05 CFS | 114 | 131 | 151 | 176 | 206 | 240 | 282 | 333 |
| 11.25 CFS | 396 | 477 | 597 | 871 | 1680 | 3726 | 6600 | 8648 |
| 12.45 CFS | 8735 | 6899 | 4380 | 2598 | 1764 | 1444 | 1262 | 1136 |
| 13.65 CFS | 1040 | 959 | 889 | 827 | 772 | 725 | 686 | 657 |
| 14.85 CFS | 634 | 616 | 599 | 581 | 562 | 542 | 523 | 505 |
| 16.05 CFS | 487 | 469 | 452 | 436 | 425 | 417 | 410 | 403 |
| 17.25 CFS | 396 | 389 | 382 | 375 | 369 | 362 | 356 | 349 |
| 18.45 CFS | 342 | 336 | 329 | 322 | 315 | 308 | 302 | 295 |
| 19.65 CFS | 289 | 281 | 273 | 266 | 260 | 255 | 251 | 247 |
| 20.85 CFS | 245 | 242 | 241 | 240 | 239 | 238 | 237 | 236 |
| 22.05 CFS | 235 | 233 | 232 | 230 | 229 | 227 | 225 | 224 |
| 23.25 CFS | 223 | 222 | 221 | 220 | 219 | 217 | 207 | 179 |
| 24.45 CFS | 130 | 75 | 24 | 8 | 1 | 0 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.29 WATERSHED INCHES; 12200 CFS-HRS; 1008.2 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 12.48 | 14530.5 | (NULL) |
| 13.63 | 5693.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1

| HRS | MAIN TIME INCREMENT = .150 hr, | | | | DRAINAGE AREA = 20.57 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.00 CFS | .43 | .88 | 1.48 | 2.23 | 3.15 | 4.29 | 5.72 | 7.49 |
| 7.20 CFS | 9.66 | 12.27 | 15.37 | 19.09 | 23.64 | 29.08 | 35.44 | 42.55 |
| 8.40 CFS | 50 | 60 | 71 | 86 | 103 | 123 | 146 | 170 |
| 9.60 CFS | 196 | 222 | 250 | 281 | 316 | 358 | 407 | 463 |
| 10.80 CFS | 528 | 604 | 694 | 804 | 940 | 1127 | 1487 | 2442 |
| 12.00 CFS | 4824 | 8613 | 12392 | 14472 | 13574 | 10496 | 7409 | 5739 |
| 13.20 CFS | 5397 | 5490 | 5643 | 5692 | 5603 | 5405 | 5134 | 4822 |
| 14.40 CFS | 4493 | 4166 | 3856 | 3567 | 3303 | 3060 | 2837 | 2631 |
| 15.60 CFS | 2442 | 2271 | 2117 | 1979 | 1854 | 1742 | 1641 | 1554 |
| 16.80 CFS | 1481 | 1417 | 1361 | 1309 | 1261 | 1217 | 1177 | 1141 |
| 18.00 CFS | 1107 | 1077 | 1048 | 1020 | 995 | 970 | 947 | 924 |
| 19.20 CFS | 902 | 881 | 861 | 842 | 822 | 802 | 782 | 763 |
| 20.40 CFS | 746 | 731 | 718 | 706 | 695 | 685 | 677 | 669 |
| 21.60 CFS | 661 | 654 | 648 | 641 | 634 | 628 | 622 | 616 |
| 22.80 CFS | 611 | 606 | 601 | 596 | 592 | 589 | 585 | 582 |
| 24.00 CFS | 578 | 566 | 533 | 471 | 388 | 299 | 247 | 215 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 25.20 CFS | 202 | 191 | 178 | 162 | 146 | 129 | 113 | 98 |
| 26.40 CFS | 84.20 | 71.96 | 61.16 | 51.73 | 43.58 | 36.58 | 30.60 | 25.53 |
| 27.60 CFS | 21.24 | 17.64 | 14.62 | 12.09 | 9.98 | 8.22 | 6.77 | 5.57 |
| 28.80 CFS | 4.57 | 3.75 | 3.07 | 2.52 | 2.06 | 1.68 | 1.37 | 1.12 |
| 30.00 CFS | .91 | .74 | .60 | .49 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
2.51 WATERSHED INCHES; 33301 CFS-HRS; 2752.0 ACRE-FEET.

--- XSECTION 76, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1199.2 FEET) CAN ADD .456 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 2950.99 AC-FT ( .22 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1211.15. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.55 | 72.2 * | 1211.85 |

* FIRST POINT OF FLAT PEAK

*** WARNING - STRUCTURE 1, HYDROGRAPH VOLUME TRUNCATED AT 69 CFS
RESVOR ( 95. % OF MAX. HYDROGRAPH COORDINATE)
MAIN TIME INCREMENT TOO SMALL. ***

HYDROGRAPH POINTS FOR ALTERNATE = 2, STORM = 1
MAIN TIME INCREMENT = .150 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4.95 CFS | .21 | .21 | .21 | .21 | .21 | .21 | .21 | .21 |
| 6.15 CFS | .21 | .21 | .21 | .21 | .21 | .22 | .22 | .23 |
| 7.35 CFS | .23 | .24 | .25 | .26 | .28 | .29 | .32 | .34 |
| 8.55 CFS | .37 | .41 | .45 | .51 | .57 | .65 | .74 | .84 |
| 9.75 CFS | .96 | 1.09 | 1.24 | 1.41 | 1.60 | 1.81 | 2.06 | 2.34 |
| 10.95 CFS | 2.66 | 3.02 | 3.45 | 3.94 | 4.52 | 5.26 | 6.37 | 8.42 |
| 12.15 CFS | 12.22 | 17.72 | 23.75 | 29.55 | 33.66 | 36.71 | 38.94 | 40.55 |
| 13.35 CFS | 42.12 | 43.72 | 45.36 | 46.98 | 48.57 | 50.08 | 51.53 | 52.88 |
| 14.55 CFS | 54.14 | 55.30 | 56.38 | 57.37 | 58.29 | 59.14 | 59.92 | 60.65 |
| 15.75 CFS | 61.33 | 61.95 | 62.54 | 63.06 | 63.40 | 63.72 | 64.03 | 64.32 |
| 16.95 CFS | 64.59 | 64.85 | 65.11 | 65.35 | 65.58 | 65.80 | 66.02 | 66.23 |
| 18.15 CFS | 66.44 | 66.63 | 66.82 | 67.01 | 67.19 | 67.37 | 67.54 | 67.71 |
| 19.35 CFS | 67.87 | 68.03 | 68.19 | 68.34 | 68.49 | 68.63 | 68.77 | 68.91 |
| 20.55 CFS | 69.04 | 69.17 | 69.30 | 69.42 | 69.55 | 69.67 | 69.79 | 69.91 |
| 21.75 CFS | 70.02 | 70.14 | 70.25 | 70.36 | 70.47 | 70.58 | 70.69 | 70.80 |
| 22.95 CFS | 70.91 | 71.01 | 71.12 | 71.22 | 71.33 | 71.43 | 71.53 | 71.63 |
| 24.15 CFS | 71.73 | 71.82 | 71.91 | 71.98 | 72.03 | 72.07 | 72.11 | 72.13 |
| 25.35 CFS | 72.16 | 72.18 | 72.20 | 72.22 | 72.23 | 72.24 | 72.24 | 72.25 |
| 26.55 CFS | 72.25 | 72.25 | 72.25 | 72.24 | 72.23 | 72.23 | 72.22 | 72.21 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 27.75 | CFS | 72.20 | 72.19 | 72.17 | 72.16 | 72.15 | 72.14 | 72.12 | 72.11 |
| 28.95 | CFS | 72.10 | 72.08 | 72.07 | 72.06 | 72.04 | 72.03 | 72.01 | 72.00 |
| 30.15 | CFS | 71.99 | 71.97 | 71.96 | 71.94 | 71.93 | 71.92 | 71.90 | 71.89 |
| 31.35 | CFS | 71.87 | 71.86 | 71.84 | 71.83 | 71.82 | 71.80 | 71.79 | 71.77 |
| 32.55 | CFS | 71.76 | 71.74 | 71.73 | 71.72 | 71.70 | 71.69 | 71.67 | 71.66 |
| 33.75 | CFS | 71.64 | 71.63 | 71.62 | 71.60 | 71.59 | 71.57 | 71.56 | 71.55 |
| 34.95 | CFS | 71.53 | 71.52 | 71.50 | 71.49 | 71.47 | 71.46 | 71.45 | 71.43 |
| 36.15 | CFS | 71.42 | 71.40 | 71.39 | 71.38 | 71.36 | 71.35 | 71.33 | 71.32 |
| 37.35 | CFS | 71.30 | 71.29 | 71.28 | 71.26 | 71.25 | 71.23 | 71.22 | 71.21 |
| 38.55 | CFS | 71.19 | 71.18 | 71.16 | 71.15 | 71.13 | 71.12 | 71.11 | 71.09 |
| 39.75 | CFS | 71.08 | 71.06 | 71.05 | 71.04 | 71.02 | 71.01 | 70.99 | 70.98 |
| 40.95 | CFS | 70.97 | 70.95 | 70.94 | 70.92 | 70.91 | 70.90 | 70.88 | 70.87 |
| 42.15 | CFS | 70.85 | 70.84 | 70.82 | 70.81 | 70.80 | 70.78 | 70.77 | 70.75 |
| 43.35 | CFS | 70.74 | 70.73 | 70.71 | 70.70 | 70.68 | 70.67 | 70.66 | 70.64 |
| 44.55 | CFS | 70.63 | 70.61 | 70.60 | 70.59 | 70.57 | 70.56 | 70.54 | 70.53 |
| 45.75 | CFS | 70.52 | 70.50 | 70.49 | 70.47 | 70.46 | 70.45 | 70.43 | 70.42 |
| 46.95 | CFS | 70.40 | 70.39 | 70.38 | 70.36 | 70.35 | 70.33 | 70.32 | 70.31 |
| 48.15 | CFS | 70.29 | 70.28 | 70.26 | 70.25 | 70.24 | 70.22 | 70.21 | 70.19 |
| 49.35 | CFS | 70.18 | 70.17 | 70.15 | 70.14 | 70.13 | 70.11 | 70.10 | 70.08 |
| 50.55 | CFS | 70.07 | 70.06 | 70.04 | 70.03 | 70.01 | 70.00 | 69.99 | 69.97 |
| 51.75 | CFS | 69.96 | 69.94 | 69.93 | 69.92 | 69.90 | 69.89 | 69.88 | 69.86 |
| 52.95 | CFS | 69.85 | 69.83 | 69.82 | 69.81 | 69.79 | 69.78 | 69.76 | 69.75 |
| 54.15 | CFS | 69.74 | 69.72 | 69.71 | 69.70 | 69.68 | 69.67 | 69.65 | 69.64 |
| 55.35 | CFS | 69.63 | 69.61 | 69.60 | 69.58 | 69.57 | 69.56 | 69.54 | 69.53 |
| 56.55 | CFS | 69.52 | 69.50 | 69.49 | 69.47 | 69.46 | 69.45 | 69.43 | 69.42 |
| 57.75 | CFS | 69.41 | 69.39 | 69.38 | 69.36 | 69.35 | 69.34 | 69.32 | 69.31 |
| 58.95 | CFS | 69.30 | 69.28 | 69.27 | 69.25 | 69.24 | 69.23 | 69.21 | 69.20 |
| 60.15 | CFS | 69.19 | 69.17 | 69.16 | 69.14 | 69.13 | 69.12 | 69.10 | 69.09 |
| 61.35 | CFS | 69.08 | 69.06 | 69.05 | 69.03 | 69.02 | 69.01 | 68.99 | 68.98 |
| 62.55 | CFS | 68.97 | 68.95 | 68.94 | 68.92 | 68.91 | 68.90 | 68.88 | 68.87 |
| 63.75 | CFS | 68.86 | 68.84 | 68.83 | 68.82 | 68.80 | 68.79 | 68.77 | 68.76 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
.27 WATERSHED INCHES; 3617 CFS-HRS; 298.9 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 2, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 2

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

RAINFALL OF 4.28 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.
RAINTABLE NUMBER 2, ARC 1
MAIN TIME INCREMENT .150 HOURS

ALTERNATE 1 STORM 1

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| XSECTION 1 | RUNOFF | 2.46 | 1.75 | --- | 12.39 | 2111 | 858.1 |
| XSECTION 5 | REACH | 2.46 | 1.75 | 4.15 | 13.06 | 1263 | 513.4 |
| XSECTION 10 | REACH | 2.46 | 1.75 | 5.33 | 13.71 | 908 | 369.1 |
| XSECTION 2 | RUNOFF | 2.38 | 1.08 | --- | 12.35 | 1217 | 511.3 |
| XSECTION 12 | ADDHYD | 4.84 | 1.42 | --- | 12.35 | 1246 | 257.4 |
| XSECTION 12 | DIVERT | 4.84 | 1.42 | --- | 12.35 | 1246 | 257.4 |
| XSECTION 200 | DIVERT | .00 | 1.42 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 1.42 | 3.99 | 12.54 | 1181 | 244.0 |
| XSECTION 25 | REACH | 4.84 | 1.42 | 2.48 | 12.70 | 1166 | 240.9 |
| XSECTION 3 | RUNOFF | 3.94 | 1.75 | --- | 12.41 | 3318 | 842.1 |
| XSECTION 30 | REACH | 3.94 | 1.75 | 3.69 | 13.26 | 1740 | 441.6 |
| XSECTION 5 | REACH | 3.94 | 1.75 | 4.15 | 13.86 | 1259 | 319.5 |
| XSECTION 25 | REACH | 3.94 | 1.75 | 2.58 | 14.02 | 1257 | 319.0 |
| XSECTION 4 | RUNOFF | 2.06 | .87 | --- | 12.42 | 752 | 365.0 |
| XSECTION 34 | ADDHYD | 6.00 | 1.45 | --- | 14.00 | 1366 | 227.7 |
| XSECTION 35 | ADDHYD | 10.84 | 1.44 | --- | 14.01 | 2431 | 224.3 |
| XSECTION 35 | DIVERT | 10.84 | 1.44 | --- | 14.01 | 2431 | 224.3 |
| XSECTION 199 | DIVERT | .00 | 1.44 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 1.44 | 3.62 | 14.26 | 2395 | 220.9 |
| XSECTION 6 | RUNOFF | 1.47 | 1.85 | --- | 12.15 | 1882 | 1280.3 |
| XSECTION 60 | REACH | 1.47 | 1.85 | 4.51 | 12.58 | 1097 | 746.3 |
| XSECTION 67 | REACH | 1.47 | 1.85 | 3.50 | 12.93 | 798 | 542.9 |
| XSECTION 64 | ADDHYD | 12.31 | 1.49 | --- | 14.18 | 2650 | 215.3 |
| XSECTION 5 | RUNOFF | 4.78 | 1.00 | --- | 12.40 | 2122 | 443.9 |
| XSECTION 7 | RUNOFF | 3.48 | 1.22 | --- | 12.53 | 1734 | 498.3 |
| XSECTION 75 | ADDHYD | 8.26 | 1.09 | --- | 12.44 | 3771 | 456.5 |
| XSECTION 76 | ADDHYD | 20.57 | 1.33 | --- | 12.57 | 5080 | 247.0 |
| STRUCTURE 1 | RESVOR | 20.57 | .19 | 1207.41 | 27.00F | 47F | 2.3 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINTABLE NUMBER 2, ARC 2 | | | | | | | |
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 2.90 | --- | 12.36 | 3561 | 1447.6 |
| XSECTION 5 | REACH | 2.46 | 2.90 | 5.09 | 12.88 | 2127 | 864.6 |
| XSECTION 10 | REACH | 2.46 | 2.90 | 6.20 | 13.56 | 1476 | 600.0 |
| XSECTION 2 | RUNOFF | 2.38 | 2.29 | --- | 12.30 | 2956 | 1242.0 |
| XSECTION 12 | ADDHYD | 4.84 | 2.60 | --- | 12.31 | 3128 | 646.3 |
| XSECTION 12 | DIVERT | 4.84 | 2.60 | --- | 12.31 | 3128 | 646.3 |
| XSECTION 200 | DIVERT | .00 | 2.60 | --- | .00 | 0 | ******** |
| XSECTION 20 | REACH | 4.84 | 2.60 | 6.75 | 12.46 | 3103 | 641.1 |
| XSECTION 25 | REACH | 4.84 | 2.60 | 4.26 | 12.46 | 3103 | 641.1 |
| XSECTION 3 | RUNOFF | 3.94 | 2.90 | --- | 12.37 | 5582 | 1416.8 |
| XSECTION 30 | REACH | 3.94 | 2.90 | 4.30 | 13.08 | 3079 | 781.5 |
| XSECTION 5 | REACH | 3.94 | 2.90 | 5.16 | 13.64 | 2205 | 559.6 |
| XSECTION 25 | REACH | 3.94 | 2.90 | 3.54 | 13.64 | 2205 | 559.6 |
| XSECTION 4 | RUNOFF | 2.06 | 2.08 | --- | 12.34 | 2178 | 1057.3 |
| XSECTION 34 | ADDHYD | 6.00 | 2.62 | --- | 12.35 | 2449 | 408.2 |
| XSECTION 35 | ADDHYD | 10.84 | 2.61 | --- | 12.43 | 5439 | 501.8 |
| XSECTION 35 | DIVERT | 10.84 | 2.61 | --- | 12.43 | 5439 | 501.8 |
| XSECTION 199 | DIVERT | .00 | 2.61 | --- | .00 | 0 | ******** |
| XSECTION 45 | REACH | 10.84 | 2.61 | 5.65 | 12.60 | 5284 | 487.5 |
| XSECTION 6 | RUNOFF | 1.47 | 2.99 | --- | 12.14 | 3017 | 2052.4 |
| XSECTION 60 | REACH | 1.47 | 2.99 | 5.36 | 12.39 | 1957 | 1331.3 |
| XSECTION 67 | REACH | 1.47 | 2.99 | 4.38 | 12.71 | 1427 | 970.7 |
| XSECTION 64 | ADDHYD | 12.31 | 2.66 | --- | 12.62 | 6687 | 543.2 |
| XSECTION 5 | RUNOFF | 4.78 | 2.20 | --- | 12.34 | 5366 | 1122.6 |
| XSECTION 7 | RUNOFF | 3.48 | 2.41 | --- | 12.47 | 3789 | 1088.8 |

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|
| ALTERNATE 2 STORM 1 | | | | | | | |
| XSECTION 75 | ADDHYD | 8.26 | 2.29 | --- | 12.38 | 8934 | 1081.6 |
| XSECTION 76 | ADDHYD | 20.57 | 2.51 | --- | 12.48 | 14531 | 706.4 |
| STRUCTURE 1 | RESVOR | 20.57 | .27 | 1211.85 | 26.55F | 72F | 3.5 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | HYDROGRAPH INFLOW PEAK (CFS) | HYDROGRAPH INFLOW TIME (HR) | HYDROGRAPH OUTFLOW PEAK (CFS) | HYDROGRAPH OUTFLOW TIME (HR) | ROUTING PARAMETERS Q-A EQ. COEFF (X) | Q-A EQ. POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 2064 | 12.4 | 1263 | 13.1 | .82 | 1.23 | .451 | .612 | .23 |
| 10 | 9100 | | 1263 | 13.1 | 905 | 13.6 | .81 | 1.27 | .215 | .716 | .25 |
| 20 | 3332 | | 1222 | 12.3 | 1155 | 12.6 | .11 | 1.67 | .007 | .945 | .79? |
| 25 | 1950 | | 1155 | 12.6 | 1151 | 12.8 | .046 | 1.75 | .004 | .996 | .92? |
| 30 | 8865 | | 3285 | 12.4 | 1721 | 13.2 | 1.15 | 1.13 | .591 | .524 | .18 |
| 5 | 8865 | | 1721 | 13.2 | 1255 | 13.8 | .80 | 1.24 | .201 | .729 | .23 |
| 25 | 1950 | | 1255 | 13.8 | 1252 | 13.9 | .046 | 1.75 | .004 | .998 | .94? |
| 45 | 4200 | | 2423 | 13.9 | 2395 | 14.3 | .045 | 1.73 | .008 | .988 | .67? |
| 60 | 7540 | | 1882 | 12.1 | 1094 | 12.6 | .60 | 1.31 | .454 | .581 | .32 |
| 67 | 5140 | | 1094 | 12.6 | 795 | 12.9 | .68 | 1.27 | .193 | .727 | .36 |
| ALTERNATE 2 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 3483 | 12.3 | 2125 | 12.9 | 1.22 | 1.16 | .477 | .610 | .22 |
| 10 | 9100 | | 2125 | 12.9 | 1471 | 13.5 | 1.51 | 1.14 | .271 | .692 | .22 |
| 20 | 3332 | | 3127 | 12.3 | 3100 | 12.4 | .14 | 1.64 | .008 | .991 | .95? |
| 25 | 1950 | | 3100 | 12.4 | 3100 | 12.4 | .050 | 1.74 | .004 | 1.000 | 1.00? |
| 30 | 8865 | | 5423 | 12.3 | 3073 | 13.1 | 1.23 | 1.12 | .562 | .567 | .19 |
| 5 | 8865 | | 3073 | 13.1 | 2205 | 13.6 | 1.21 | 1.16 | .237 | .718 | .22 |
| 25 | 1950 | | 2205 | 13.6 | 2205 | 13.6 | .047 | 1.74 | .003 | 1.000 | 1.00? |
| 45 | 4200 | | 5423 | 12.4 | 5284 | 12.6 | .047 | 1.73 | .007 | .974 | .82? |
| 60 | 7540 | | 3010 | 12.1 | 1914 | 12.4 | .49 | 1.35 | .359 | .636 | .37 |
| 67 | 5140 | | 1914 | 12.4 | 1421 | 12.8 | .89 | 1.22 | .211 | .742 | .36 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE 1 | | 20.57 | |
| ALTERNATE | 1 | | 47 |
| ALTERNATE | 2 | | 72 |
| XSECTION 1 | | 2.46 | |
| ALTERNATE | 1 | | 2111 |
| ALTERNATE | 2 | | 3561 |
| XSECTION 2 | | 2.38 | |
| ALTERNATE | 1 | | 1217 |
| ALTERNATE | 2 | | 2956 |
| XSECTION 3 | | 3.94 | |
| ALTERNATE | 1 | | 3318 |
| ALTERNATE | 2 | | 5582 |
| XSECTION 4 | | 2.06 | |
| ALTERNATE | 1 | | 752 |
| ALTERNATE | 2 | | 2178 |
| XSECTION 5 | | 4.78 | |
| ALTERNATE | 1 | | 2122 |
| ALTERNATE | 2 | | 5366 |
| XSECTION 6 | | 1.47 | |
| ALTERNATE | 1 | | 1882 |
| ALTERNATE | 2 | | 3017 |
| XSECTION 7 | | 3.48 | |
| ALTERNATE | 1 | | 1734 |
| ALTERNATE | 2 | | 3789 |
| XSECTION 10 | | 2.46 | |
| ALTERNATE | 1 | | 908 |
| ALTERNATE | 2 | | 1476 |
| XSECTION 12 | | 4.84 | |
| ALTERNATE | 1 | | 1246 |
| ALTERNATE | 2 | | 3128 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 20 | | 4.84 | |
| ALTERNATE | 1 | | 1181 |
| ALTERNATE | 2 | | 3103 |
| XSECTION 25 | | 3.94 | |
| ALTERNATE | 1 | | 1257 |
| ALTERNATE | 2 | | 2205 |
| XSECTION 30 | | 3.94 | |
| ALTERNATE | 1 | | 1740 |
| ALTERNATE | 2 | | 3079 |
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 1366 |
| ALTERNATE | 2 | | 2449 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 2431 |
| ALTERNATE | 2 | | 5439 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 2395 |
| ALTERNATE | 2 | | 5284 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 1097 |
| ALTERNATE | 2 | | 1957 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 2650 |
| ALTERNATE | 2 | | 6687 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 798 |
| ALTERNATE | 2 | | 1427 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 3771 |
| ALTERNATE | 2 | | 8934 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 5080 |
| ALTERNATE | 2 | | 14531 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 0 |
| ALTERNATE | 2 | | 0 |

```
TR20 ------------------------------------------------------------------------ SCS -
WT100YR   WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS, NU ROU VERSION
08/05/**  200-yr, 24-hr, Type II Dist, 100-yr Sediment Storage,1200'Spil2.04TEST


END OF  1 JOBS IN THIS RUN




                    SCS  TR-20,  VERSION 2.04TEST
                         WT100YR   FILES

     INPUT  = 200INN.DAT                              , GIVEN DATA FILE
     OUTPUT = 200OUT.OUT                              , DATED 08/05/**,17:14:34

              FILES GENERATED - DATED 08/05/**,17:14:34

    FILE 111.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   4,  MESSAGES =   8

                       JOB ENDED AT 17:14:34
                   *** TR-20 RUN COMPLETED ***
```

(1)

URS

# CALCULATION PACKAGE NO. C-10

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **ESTIMATION OF THE PRINCIPAL SPILLWAY CAPACITY AT WHITE TANK FRS NO.3**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 06/25/04

Checked by: Edd Ringsmuth Date: 8/2/04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 3.

Calculation Approved by: _____ 8/2/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# ESTIMATION OF THE PRINCIPAL SPILLWAY CAPACITY AT WHITE TANK FRS NO.3

**(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)**
**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)**
**23443748**

## PROBLEM STATEMENT

The purpose of this calculation package is to estimate the principal spillway capacity at the White Tank FRS No. 3 reservoir.

### DESIGN BASIS/ASSUMPTIONS/REFERENCES

The principal spillway at the White Tank FRS No.3 consists of a drop inlet spillway riser connected to a 48-inch conduit. The crest of the drop inlet spillway riser is set at an elevation of 1200.0 ft (NAVD 88). The mechanism and hydraulics of the drop inlet riser is explained in detail in *Technical Release No. 29 "Hydraulics of Two-Way Covered Risers" published by U.S. Department of Agriculture, Soil Conservation Service, June 1965.* The relevant portions of Technical Release 29 are attached at the end of this calculation Package for the reference purposes.

As the reservoir water surface rises above the crest of the covered inlet of the standard covered riser, the inlet functions as a weir for the range of heads from zero to 0.50D above the crest where D is the pipe conduit diameter. The riser primes when the head over the crest of the covered inlet becomes equal to 0.50D and flow changes from weir control to pipe control (See Page 19). The weir flow and pipe flow are explained as follows.

### Weir Flow

As explained earlier, the principal spillway inlet functions as weir for the range of heads from zero to 0.50D above the crest of the riser. The weir flow can be determined using the following relationship (See Page 16):

$$Q_{weir} = C_w * (2L) * H_h^{1.5}$$

Where

$C_w$ = Discharge Coefficient for weir flow
$L$ = Inside length of the riser
$H_h$ = Head over the crest of the riser

A $C_w$ of 3.1 (See Page 16) was used for this analysis. The inside length of the riser was set at 12.3 ft.

**Pipe Flow (Inlet Flow)**

As the head over the crest of the covered inlet becomes equal to 0.50D, the flow changes from weir control to pipe control. Pipe flow is defined a follows (See Page 16):

$$Q_{hc} = C_b * a_b * (2gH_0)^{0.5}$$

where

$C_b$ = A coefficient which depends on the characteristics of the riser and conduit.

$a_b$ = Area of the conduit

Ho = Pressure flow head i.e. difference in elevation between the water surface in reservoir and tail water elevation (tail water elevation is set at crown of the pipe conduit at the outlet)

A $C_b$ of 0.61 was used for the pipe flow analysis.

**Outlet Flow**

The outflow corresponding to each reservoir elevation was computed using the following relationship:

Q = Area of the conduit * Flow velocity

Where the flow velocity was determined using the Bernoulli' equation at each elevation. Please see Page 8 to have an idea of how Bernoulli's Equation was applied to the system and to understand the attached spreadsheet.The major friction loses were estimated using the William-Hazen Equation:

$$h_f = 3.03 * (V/C)^{1.85} * L * D^{-1.167}$$

Where

V = mean flow velocity (ft/sec)

C = William Hazen coefficient

L = Length of the Pipe (ft)

D = Diameter of the pipe (ft)

The minor losses were estimated using the flowing relationship:

$$H = K * V^2 / 2g$$

Where K = sum of all friction loss coefficients (entrance coefficient, exit coefficient etc)

**RESULTS**

The outlet flow was determined at each reservoir elevation and was compared against the weir flow and pipe inlet flow. The smallest of these flows was selected as the capacity of the principal spillway. The calculations related to the estimation of principal spillway capacity at different reservoir elevations are presented in a Table on Page 4. All the formulas involved in these calculations are provided on the Page 5-6. Please also note that the Stage-Discharge relationship for the Principal Spillway is provided on page 23.

## White Tanks FRS No. 3
## Principal Spillway (48 inch) - Flow Capacity

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | outside pipe diameter (ft) | N/A | | | | | | | | | | | |
| 2 | pipe wall thickness (in) | N/A | | | | | | | | | | | |
| 3 | inside pipe diameter (ft) | 4.00 | | | | | | | | | | | |
| 4 | length (ft) | 165 | | | | | | | | | | | |
| 5 | pipe slope (ft/ft) | 0.006 | | | | | | | | | | | |
| 6 | outlet invert elevation (ft) | 1190 | | | | | | | | | | | |
| 7 | pipe upturn at inlet (ft) | 2 | | | | | | | | | | | |
| 8 | inlet invert elevation (ft) | 1200 | | | | | | | | | | | |
| 9 | Hazen-Williams Coefficient (C | 130 | smooth, concrete pipe | | | | | | | | | | |
| 10 | $C_b$ | 0.6 | | | | | | | | | | | |
| 11 | Inside Length of Riser | 12.33 | | | | | | | | | | | |
| 12 | Conduit Area | 12.56 | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | |
| 14 | **Weir Flow** | | | | | | | | | | | | |
| 15 | water elevation at inlet | depth over weir | Inlet Control, Q | | | | | | | | | | |
| 16 | (ft) | (ft) | (cfs) | | | | | | | | | | |
| 17 | 1201 | 1.0 | 76.4 | | | | | | | | | | |
| 18 | 1202 | 2.0 | 216.2 | | | | | | | | | | |
| 19 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | |
| 22 | **Pipe Flow** | | | | | | | | | | | | |
| 23 | headwater depth ($h_1$) | Water Elevation at inlet ($z_1$) | Tailwater Depth, h2 | Water Elevation at Outlet ($z_2$) | **Water Surface Elevation Difference ($z_1$-$z_2$)** | Entrance loss coeff. | Exit loss coeff. | velocity | Minor Loses+Major Frictional Loses | Outlet Control, Q | Weir Flow | Pipe Flow (Inlet Control), Q | Estimated Principal Spillway Capacity |
| 24 | (ft) | (ft) | (ft) | (ft) | **(feet)** | | | (fps) | (feet) | (cfs) | (cfs) | (cfs) | (cfs) |
| 25 | 1.0 | 1201.0 | 0 | 1194.00 | **7.00** | 1.00 | 1.0 | **13.3** | **7.00** | 168 | 76 | 160 | 76 |
| 26 | 2.0 | 1202.0 | 0 | 1194.00 | **8.00** | 1.00 | 1.0 | **14.3** | **8.00** | 179 | 216 | 171 | 171 |
| 27 | 3.0 | 1203.0 | 0 | 1194.00 | **9.00** | 1.00 | 1.0 | **15.2** | **9.00** | 190 | NA | 181 | 181 |
| 28 | 4.0 | 1204.0 | 0 | 1194.00 | **10.00** | 1.00 | 1.0 | **16.0** | **10.00** | 201 | NA | 191 | 191 |
| 29 | 5.0 | 1205.0 | 0 | 1194.00 | **11.00** | 1.00 | 1.0 | **16.8** | **11.00** | 211 | NA | 201 | 201 |
| 30 | 6.0 | 1206.0 | 0 | 1194.00 | **12.00** | 1.00 | 1.0 | **17.6** | **12.00** | 220 | NA | 209 | 209 |
| 31 | 7.0 | 1207.0 | 0 | 1194.00 | **13.00** | 1.00 | 1.0 | **18.3** | **13.00** | 230 | NA | 218 | 218 |
| 32 | 8.0 | 1208.0 | 0 | 1194.00 | **14.00** | 1.00 | 1.0 | **19.0** | **14.00** | 238 | NA | 226 | 226 |
| 33 | 9.0 | 1209.0 | 0 | 1194.00 | **15.00** | 1.00 | 1.0 | **19.7** | **15.00** | 247 | NA | 234 | 234 |
| 34 | 10.0 | 1210.0 | 0 | 1194.00 | **16.00** | 1.00 | 1.0 | **20.3** | **16.00** | 255 | NA | 242 | 242 |
| 35 | 11.0 | 1211.0 | 0 | 1194.00 | **17.00** | 1.00 | 1.0 | **20.9** | **17.00** | 263 | NA | 249 | 249 |
| 36 | 12.0 | 1212.0 | 0 | 1194.00 | **18.00** | 1.00 | 1.0 | **21.6** | **18.00** | 271 | NA | 257 | 257 |
| 37 | 13.0 | 1213.0 | 0 | 1194.00 | **19.00** | 1.00 | 1.0 | **22.2** | **19.00** | 278 | NA | 264 | 264 |
| 38 | 14.0 | 1214.0 | 0 | 1194.00 | **20.00** | 1.00 | 1.0 | **22.7** | **20.00** | 286 | NA | 270 | 270 |
| 39 | 15.0 | 1215.0 | 0 | 1194.00 | **21.00** | 1.00 | 1.0 | **23.3** | **21.00** | 293 | NA | 277 | 277 |
| 40 | 16.0 | 1216.0 | 0 | 1194.00 | **22.00** | 1.00 | 1.0 | **23.9** | **22.00** | 300 | NA | 284 | 284 |
| 41 | 17.0 | 1217.0 | 0 | 1194.00 | **23.00** | 1.00 | 1.0 | **24.4** | **23.00** | 307 | NA | 290 | 290 |
| 42 | 18.0 | 1218.0 | 0 | 1194.00 | **24.00** | 1.00 | 1.0 | **25.0** | **24.00** | 313 | NA | 296 | 296 |
| 43 | 19.0 | 1219.0 | 0 | 1194.00 | **25.00** | 1.00 | 1.0 | **25.5** | **25.00** | 320 | NA | 302 | 302 |
| 44 | 20.0 | 1220.0 | 0 | 1194.00 | **26.00** | 1.00 | 1.0 | **26.0** | **26.00** | 326 | NA | 308 | 308 |

**White Tanks RS No. 3**
**Principal Spillway (48 inch) - Flow Capacity**

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | outside pipe diameter (ft) | N/A | | | | | | | |
| 2 | pipe wall thickness (in) | N/A | | | | | | | |
| 3 | inside pipe diameter (ft) | 4 | | | | | | | |
| 4 | length (ft) | 165 | | | | | | | |
| 5 | pipe slope (ft/ft) | 0.006 | | | | | | | |
| 6 | outlet invert elevation (ft) | 1190 | | | | | | | |
| 7 | pipe upturn at inlet (ft) | 2 | | | | | | | |
| 8 | inlet invert elevation (ft) | 1200 | | | | | | | |
| 9 | Hazen-Williams Coefficient ($C_h$) | 130 | smooth, concrete pipe | | | | | | |
| 10 | $C_b$ | 0.6 | | | | | | | |
| 11 | Inside Length of Riser | 12.33 | | | | | | | |
| 12 | Conduit Area | =3.14*(B3^2)/4 | | | | | | | |
| 13 | | | | | | | | | |
| 14 | Weir Flow | | | | | | | | |
| 15 | water elevation at inlet | depth over weir | Inlet Control, Q | | | | | | |
| 16 | (ft) | (ft) | (cfs) | | | | | | |
| 17 | 1201 | =A17-$B$8 | =3.1*(2*$B$11)*(B17^1.5) | | | | | | |
| 18 | 1202 | =A18-$B$8 | =3.1*(2*$B$11)*(B18^1.5) | | | | | | |
| 19 | | | | | | | | | |
| 20 | | | | | | | | | |
| 21 | | | | | | | | | |
| 22 | Pipe Flow | | | | | | | | |
| 23 | headwater depth ($h_1$) | Water Elevation at inlet ($z_1$) | Tailwater Depth, h2 | Water Elevation at Outlet ($z_2$) | Water Surface Elevation Difference ($z_1$-$z_2$) | Entrance loss coeff. | Exit loss coeff. | velocity | Frictional Loses + Minor Loses+ $V^2/2g$ |
| 24 | (ft) | (ft) | (ft) | (ft) | (feet) | | | (fps) | (feet) |
| 25 | 1 | =(A25+$B$8) | 0 | =$B$6+$B$3+C25 | =B25-D25 | 1 | 1 | 10.6200444054358 | =((H25^2)/(2*32.2))*(F25+G25)+3.02*$B$4*($B$3^-1.167)*((H25/$B$9)^1.85) |
| 26 | =(A25+1) | =(A26+$B$8) | 0 | =$B$6+$B$3+C26 | =B26-D26 | 1 | 1 | 11.3680639945838 | =((H26^2)/(2*32.2))*(F26+G26)+3.02*$B$4*($B$3^-1.167)*((H26/$B$9)^1.85) |
| 27 | =(A26+1) | =(A27+$B$8) | 0 | =$B$6+$B$3+C27 | =B27-D27 | 1 | 1 | 12.0705646219678 | =((H27^2)/(2*32.2))*(F27+G27)+3.02*$B$4*($B$3^-1.167)*((H27/$B$9)^1.85) |
| 28 | =(A27+1) | =(A28+$B$8) | 0 | =$B$6+$B$3+C28 | =B28-D28 | 1 | 1 | 12.7356859740864 | =((H28^2)/(2*32.2))*(F28+G28)+3.02*$B$4*($B$3^-1.167)*((H28/$B$9)^1.85) |
| 29 | =(A28+1) | =(A29+$B$8) | 0 | =$B$6+$B$3+C29 | =B29-D29 | 1 | 1 | 13.3696040394382 | =((H29^2)/(2*32.2))*(F29+G29)+3.02*$B$4*($B$3^-1.167)*((H29/$B$9)^1.85) |
| 30 | =(A29+1) | =(A30+$B$8) | 0 | =$B$6+$B$3+C30 | =B30-D30 | 1 | 1 | 13.9749063023099 | =((H30^2)/(2*32.2))*(F30+G30)+3.02*$B$4*($B$3^-1.167)*((H30/$B$9)^1.85) |
| 31 | =(A30+1) | =(A31+$B$8) | 0 | =$B$6+$B$3+C31 | =B31-D31 | 1 | 1 | 14.5566704264586 | =((H31^2)/(2*32.2))*(F31+G31)+3.02*$B$4*($B$3^-1.167)*((H31/$B$9)^1.85) |
| 32 | =(A31+1) | =(A32+$B$8) | 0 | =$B$6+$B$3+C32 | =B32-D32 | 1 | 1 | 15.1165131464952 | =((H32^2)/(2*32.2))*(F32+G32)+3.02*$B$4*($B$3^-1.167)*((H32/$B$9)^1.85) |
| 33 | =(A32+1) | =(A33+$B$8) | 0 | =$B$6+$B$3+C33 | =B33-D33 | 1 | 1 | 15.6569381751863 | =((H33^2)/(2*32.2))*(F33+G33)+3.02*$B$4*($B$3^-1.167)*((H33/$B$9)^1.85) |
| 34 | =(A33+1) | =(A34+$B$8) | 0 | =$B$6+$B$3+C34 | =B34-D34 | 1 | 1 | 16.1799144292489 | =((H34^2)/(2*32.2))*(F34+G34)+3.02*$B$4*($B$3^-1.167)*((H34/$B$9)^1.85) |
| 35 | =(A34+1) | =(A35+$B$8) | 0 | =$B$6+$B$3+C35 | =B35-D35 | 1 | 1 | 16.687041167137 | =((H35^2)/(2*32.2))*(F35+G35)+3.02*$B$4*($B$3^-1.167)*((H35/$B$9)^1.85) |
| 36 | =(A35+1) | =(A36+$B$8) | 0 | =$B$6+$B$3+C36 | =B36-D36 | 1 | 1 | 17.1796905546759 | =((H36^2)/(2*32.2))*(F36+G36)+3.02*$B$4*($B$3^-1.167)*((H36/$B$9)^1.85) |
| 37 | =(A36+1) | =(A37+$B$8) | 0 | =$B$6+$B$3+C37 | =B37-D37 | 1 | 1 | 17.65868347461 | =((H37^2)/(2*32.2))*(F37+G37)+3.02*$B$4*($B$3^-1.167)*((H37/$B$9)^1.85) |
| 38 | =(A37+1) | =(A38+$B$8) | 0 | =$B$6+$B$3+C38 | =B38-D38 | 1 | 1 | 18.1259137783033 | =((H38^2)/(2*32.2))*(F38+G38)+3.02*$B$4*($B$3^-1.167)*((H38/$B$9)^1.85) |
| 39 | =(A38+1) | =(A39+$B$8) | 0 | =$B$6+$B$3+C39 | =B39-D39 | 1 | 1 | 18.5817397179323 | =((H39^2)/(2*32.2))*(F39+G39)+3.02*$B$4*($B$3^-1.167)*((H39/$B$9)^1.85) |
| 40 | =(A39+1) | =(A40+$B$8) | 0 | =$B$6+$B$3+C40 | =B40-D40 | 1 | 1 | 19.0269737300627 | =((H40^2)/(2*32.2))*(F40+G40)+3.02*$B$4*($B$3^-1.167)*((H40/$B$9)^1.85) |
| 41 | =(A40+1) | =(A41+$B$8) | 0 | =$B$6+$B$3+C41 | =B41-D41 | 1 | 1 | 19.4623339245461 | =((H41^2)/(2*32.2))*(F41+G41)+3.02*$B$4*($B$3^-1.167)*((H41/$B$9)^1.85) |
| 42 | =(A41+1) | =(A42+$B$8) | 0 | =$B$6+$B$3+C42 | =B42-D42 | 1 | 1 | 19.888459787147 | =((H42^2)/(2*32.2))*(F42+G42)+3.02*$B$4*($B$3^-1.167)*((H42/$B$9)^1.85) |
| 43 | =(A42+1) | =(A43+$B$8) | 0 | =$B$6+$B$3+C43 | =B43-D43 | 1 | 1 | 20.305923852078 5 | =((H43^2)/(2*32.2))*(F43+G43)+3.02*$B$4*($B$3^-1.167)*((H43/$B$9)^1.85) |
| 44 | =(A43+1) | =(A44+$B$8) | 0 | =$B$6+$B$3+C44 | =B44-D44 | 1 | 1 | 20.7152406475565 | =((H44^2)/(2*32.2))*(F44+G44)+3.02*$B$4*($B$3^-1.167)*((H44/$B$9)^1.85) |

(5)

**White Tanks FRS No. 3**
**Principal Spillway (48 inch) - Flow Capacity**

| | J | K | L | M |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| 16 | | | | |
| 17 | | | | |
| 18 | | | | |
| 19 | | | | |
| 20 | | | | |
| 21 | | | | |
| 22 | | | | |
| 23 | Outlet Control, Q | Weir Flow | Pipe Flow (Inlet Control), Q | Estimated Principal Spillway Capacity |
| 24 | (cfs) | (cfs) | (cfs) | (cfs) |
| 25 | =H25*$B$12 | =C17 | =$B$10*$B$12*((64.4*E25)^0.5) | 76 |
| 26 | =H26*$B$12 | =C18 | =$B$10*$B$12*((64.4*E26)^0.5) | 143 |
| 27 | =H27*$B$12 | NA | =$B$10*$B$12*((64.4*E27)^0.5) | =IF(J27<L27,J27,L27) |
| 28 | =H28*$B$12 | NA | =$B$10*$B$12*((64.4*E28)^0.5) | =IF(J28<L28,J28,L28) |
| 29 | =H29*$B$12 | NA | =$B$10*$B$12*((64.4*E29)^0.5) | =IF(J29<L29,J29,L29) |
| 30 | =H30*$B$12 | NA | =$B$10*$B$12*((64.4*E30)^0.5) | =IF(J30<L30,J30,L30) |
| 31 | =H31*$B$12 | NA | =$B$10*$B$12*((64.4*E31)^0.5) | =IF(J31<L31,J31,L31) |
| 32 | =H32*$B$12 | NA | =$B$10*$B$12*((64.4*E32)^0.5) | =IF(J32<L32,J32,L32) |
| 33 | =H33*$B$12 | NA | =$B$10*$B$12*((64.4*E33)^0.5) | =IF(J33<L33,J33,L33) |
| 34 | =H34*$B$12 | NA | =$B$10*$B$12*((64.4*E34)^0.5) | =IF(J34<L34,J34,L34) |
| 35 | =H35*$B$12 | NA | =$B$10*$B$12*((64.4*E35)^0.5) | =IF(J35<L35,J35,L35) |
| 36 | =H36*$B$12 | NA | =$B$10*$B$12*((64.4*E36)^0.5) | =IF(J36<L36,J36,L36) |
| 37 | =H37*$B$12 | NA | =$B$10*$B$12*((64.4*E37)^0.5) | =IF(J37<L37,J37,L37) |
| 38 | =H38*$B$12 | NA | =$B$10*$B$12*((64.4*E38)^0.5) | =IF(J38<L38,J38,L38) |
| 39 | =H39*$B$12 | NA | =$B$10*$B$12*((64.4*E39)^0.5) | =IF(J39<L39,J39,L39) |
| 40 | =H40*$B$12 | NA | =$B$10*$B$12*((64.4*E40)^0.5) | =IF(J40<L40,J40,L40) |
| 41 | =H41*$B$12 | NA | =$B$10*$B$12*((64.4*E41)^0.5) | =IF(J41<L41,J41,L41) |
| 42 | =H42*$B$12 | NA | =$B$10*$B$12*((64.4*E42)^0.5) | =IF(J42<L42,J42,L42) |
| 43 | =H43*$B$12 | NA | =$B$10*$B$12*((64.4*E43)^0.5) | =IF(J43<L43,J43,L43) |
| 44 | =H44*$B$12 | NA | =$B$10*$B$12*((64.4*E44)^0.5) | =IF(J44<L44,J44,L44) |

presented in a Table on Page 5. All the formulas involved in these calculations are provided on the Page 6-7.

DATE 06/25/04 (8)
PROJECT NO. White Tank FRS 3
PAGE NO. ____ OF ____ BY Hammad Hussain

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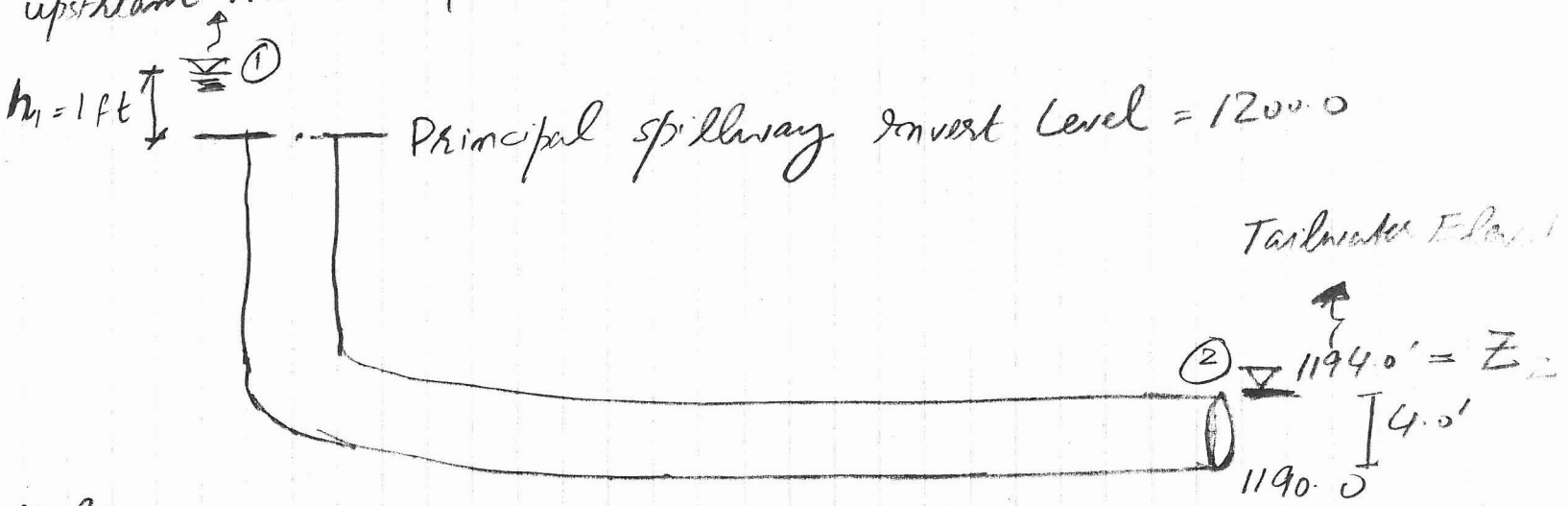


Apply Energy Equation at ① & ②

$$0 \leftarrow \frac{P_1}{\gamma} + \frac{V_1^2}{2g} + Z_1 = \frac{P_2}{\gamma} + Z_2 + \left(\frac{V_2^2}{2g}\right)(1+1) + \text{Major Losses} + \text{Minor Losses}$$

$\frac{V_1^2}{2g} \rightarrow 0$ ; $\frac{P_2}{\gamma} \rightarrow 0$ ; (1+1) = Entrance Coefficient + Exit Coefficient

$$\boxed{Z_1 - Z_2} = \boxed{(2)\frac{V_2^2}{2g} + \text{Major Losses}}$$

$Z_1 - Z_2$ → Column E of spreadsheet

$(2)\frac{V_2^2}{2g}$ + Major Losses → Column I of spreadsheet

Major Losses: Hazen William Equation

Minor Losses: $\left(K * \frac{V^2}{2g}\right)$

(9)

U. S. Department of Agriculture
Soil Conservation Service
Engineering Division

Technical Release No. 29
Design Unit
June 1, 1965

# HYDRAULICS OF TWO-WAY COVERED RISERS

# PREFACE

This Technical Release presents the hydraulic behavior of the covered inlet of two-way covered risers as verified by both air and water model tests conducted by Messrs. F. W. Blaisdell, C. A. Donnelly, and C. G. Hebaus at the St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minnesota. These tests were advocated by and conducted in consultation with Mr. M. M. Culp, Chief, Design Branch, Engineering Division, who conceived the covered inlet originally.

Various criteria and proportions of the two-way covered riser to be used for Standard Covered Risers were selected at a meeting of the "Subcommittee on Standard Structural Details" held in Spartanburg, South Carolina, during October 23 - 27, 1961. These proportions and criteria, together with other pertinent hydraulic and structural standards and criteria, are given in Engineering Standard Drawing ES-150, "Drop Inlet Spillways, Standard for Covered Top Riser," which was issued as one of the attachments to Engineering Memorandum SCS-50 dated May 16, 1963. This Technical Release is primarily concerned with the hydraulics of Standard Covered Risers. It also gives the desirable location and width of low stage inlets in two-way covered risers as shown by model studies.

Mr. Edwin S. Alling prepared this Technical Release under the supervision of Mr. Paul D. Doubt, Head, Design Unit, Design Branch, Engineering Division at Hyattsville, Maryland.

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TECHNICAL RELEASE

NUMBER 29

# HYDRAULICS OF TWO-WAY COVERED RISERS

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# NOMENCLATURE

$a_b$ = area of the conduit

$a_o$ = area of opening of low stage inlet

$a_r$ = area of the riser

$C_b$ = discharge coefficient for pipe flow

$C_w$ = discharge coefficient for weir flow

$C_o$ = discharge coefficient for orifice flow

$D$ = pipe conduit diameter

fps = feet per second

$H_h$ = head over crest of the covered inlet of the riser

$H_l$ = head over crest of the low stage inlet of the riser

$H_o$ = pressure flow head, i.e., difference in elevation between the water surface in the reservoir and the point at which the hydraulic grade line intersects the plane of the conduit outlet. This point is usually taken as 0.5D above the invert of the conduit, or as the tailwater surface, whichever is the higher elevation.

$h_a$ = atmospheric pressure head

$h_{ab}$ = absolute pressure head

$h_{fc}$ = head loss between the reservoir water surface and the mid-height of the riser

$h_{ft}$ = head loss between the mid-height of the riser and the conduit entrance (including conduit entrance)

$h_{pc}$ = pressure head on the crown of the conduit at a section $\frac{1}{2}D$ downstream from the conduit entrance

$h_{vb}$ = velocity head in the conduit

$h_{vr}$ = velocity head in the riser

$K_c$ = crest head loss coefficient

$K_e$ = entrance head loss coefficient

$K_p$ = friction head loss coefficient for circular pipe flowing full. Its value may be obtained from ES-42.

$K_t$ = transition head loss coefficient

$L$ = inside length of riser

$L_b$ = length of the conduit

$L_o$ = anti-vortex plate (cover slab) overhang, measured from the outside of the sidewall

$N_{hc}$ = vertical opening of the covered inlet of the riser

$N_{ih}$ = vertical distance from the pipe invert at the riser to the crest of the covered inlet of the riser

$N_{\ell u}$ = vertical opening of the low stage inlet of the riser

$Q_{hc}$ = discharge through the covered inlet of the riser

$Q_{\ell u}$ = discharge through the low stage inlet of the riser

$v_b$ = mean velocity of flow in the conduit

$v_r$ = mean velocity of flow in the riser

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TECHNICAL RELEASE

NUMBER 29

# HYDRAULICS OF TWO-WAY COVERED RISERS

The two-way covered riser is considered to be the best drop inlet spillway riser for use under a wide variety of conditions.

## Data on Two-way Covered Risers

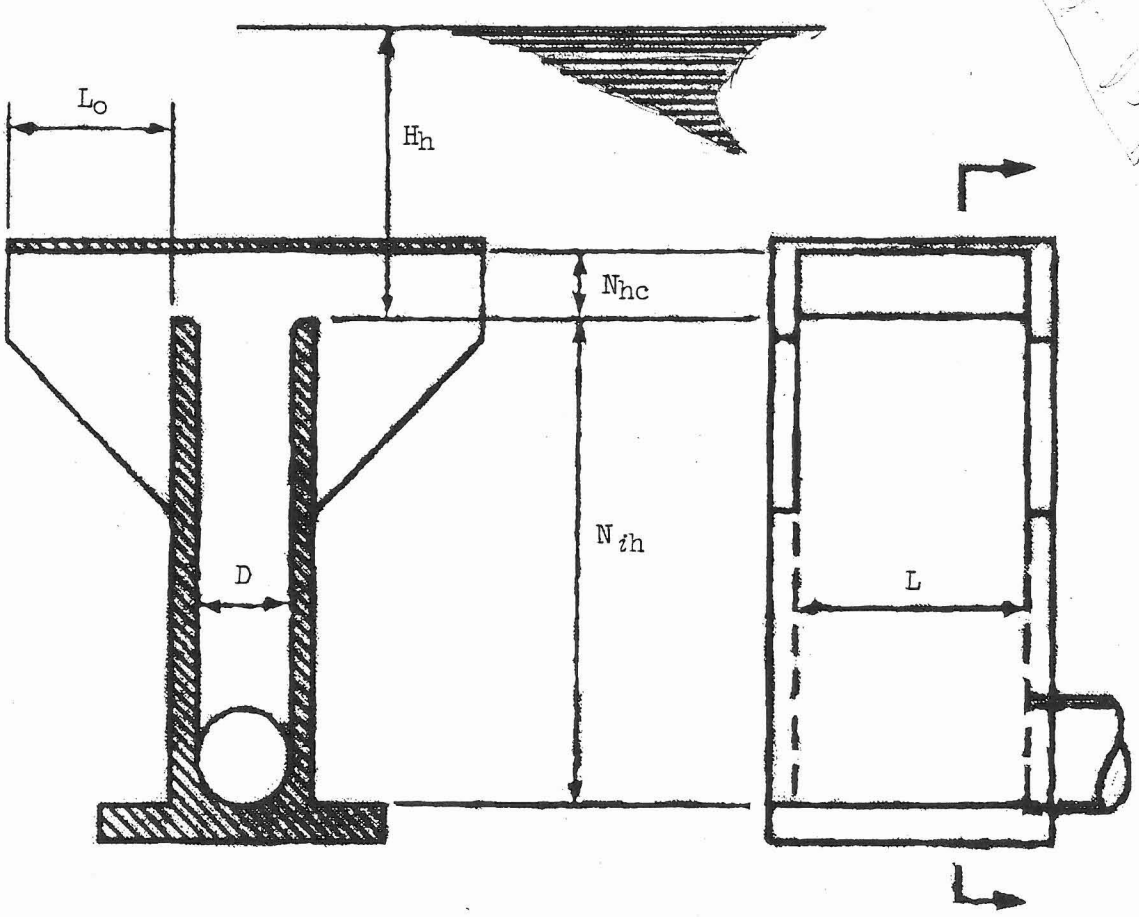


Figure 1. Definition sketch for two-way covered risers.

The vertical distances and other dimensions required to define the two-way covered riser, are illustrated by Figure 1 in which:

$D$ = pipe conduit diameter and inside width of riser

$H_h$ = head over crest of the covered inlet of the riser

$L$ = inside length of riser

$L_o$ = anti-vortex plate (cover slab) overhang, measured from the outside of the sidewall

$N_{hc}$ = vertical opening of the covered inlet of the riser

$N_{ih}$ = vertical distance from the pipe invert at the riser to the crest of the covered inlet of the riser

$Q_{hc}$ = discharge through the covered inlet of the riser

Limiting Values

Numerous model tests have been conducted to establish limiting values and to determine the hydraulic behavior of two-way covered risers. The range of values tested, or the limiting values are given below.

Length of riser, L:

$$1.0 \leq L/D \leq 10.0$$

Height of riser, $N_{ih}$:

$$N_{ih} \geq 3D$$

Conduit slope:

slope $\leq$ 40 percent

Anti-vortex plate overhang, $L_o$:
Vortices, assuming suitable vertical openings $N_{hc}$, will not form if $L_o$ is made $\geq L_{o(min.)}$. Vortex formation may occur if $L_o$ is made $< L_{o(min.)}$.

| $L/D$ | $L_{o(min.)}/D$ |
|---|---|
| 1.5 | 1.0 |
| 2.0 | 0.4 |
| 5.0 | 0.4 |
| 10.0 | 0.1 |

Vertical opening of inlet, $N_{hc}$:
The vertical opening, $N_{hc}$, may range between two limiting values, $N_{hc(max.)}$ and $N_{hc(min.)}$:

$N_{hc(max.)}$ is equal to the head at the intersection of the weir flow curve (extended) and the pipe flow curve as shown on Figure 2. If $N_{hc}$ is made greater than this maximum value, vortex formation may not be prevented.

$N_{hc(min.)}$ is equal to the weir flow head at which $\frac{Q_{hc}}{D^{5/2}} = 5.1$ when

$L/D \geq 2$.

(This criterion is not valid for values $L/D < 2$, for example, if $L/D = 1.5$ the value of $N_{hc(min.)}$ is the head at which $\frac{Q_{hc}}{D^{5/2}}$ = 6.7 to 7.4.)

If $N_{hc}$ is made less than this minimum value, the conduit may not flow full.

Head-discharge Relations

Weir Flow

The head-discharge relation may consist of portions of four curves as described below and as shown in Figure 2. The portions are:

(a) Weir flow for the range of heads from the crest of the covered inlet to the bottom of the anti-vortex plate.

$$Q_{hc} = C_w(2L)H_h^{3/2} = 3.1\ (2L)H_h^{3/2}$$

(b) A horizontal line, a constant-head curve, at a head equal to the vertical opening of the covered inlet, ($N_{hc}$), for the range of discharges from the weir flow curve to the curve (c) next defined or to (d) the pipe flow curve, whichever is first intersected by curve (b).

$$H_h/D = N_{hc}/D$$

(c) A straight line for the range of discharges from the horizontal line at the head equal to $N_{hc}$ to an intersection with (d) the pipe flow curve. The equation of this line is:

$$\frac{H_h}{D} = \frac{N_{hc}}{D} - \left(\frac{0.2}{L/D} - 0.1 \log_{10} \frac{L_o}{D}\right) + \left(0.1 - 0.05 \frac{L_o}{D}\right) \frac{Q_{hc}}{(2L)D^{3/2}}$$

where

$\left(0.1 - 0.05 \frac{L_o}{D}\right)$ is taken equal to zero

when $\frac{L_o}{D} \geq 2$, and

$\left(\frac{0.2}{L/D} - 0.1 \log_{10} \frac{L_o}{D}\right)$ is taken equal to zero

when $\frac{L_o}{D} \geq (10)^{2/(L/D)}$

Thus the term,

Pipe Flow

$\left(\frac{0.2}{L/D} - 0.1 \log_{10} \frac{L_o}{D}\right)$, is never taken less than zero.

(d) Pipe flow for heads and discharges larger than those defined in (b) and (c) above.

$$Q_{hc} = C_b a_b \sqrt{2gH_o}$$ → Pipe Flow Equation

where

$C_b$ = a coefficient which depends on the characteristics of the riser and conduit

$a_b$ = area of the conduit

$H_o$ = pressure flow head, i.e., difference in elevation between the water surface in the reservoir and the point at which the hydraulic grade line intersects the plane of the conduit outlet. This point is usually taken as 0.5D above the invert of the conduit, or as the tailwater surface, whichever is the higher elevation.

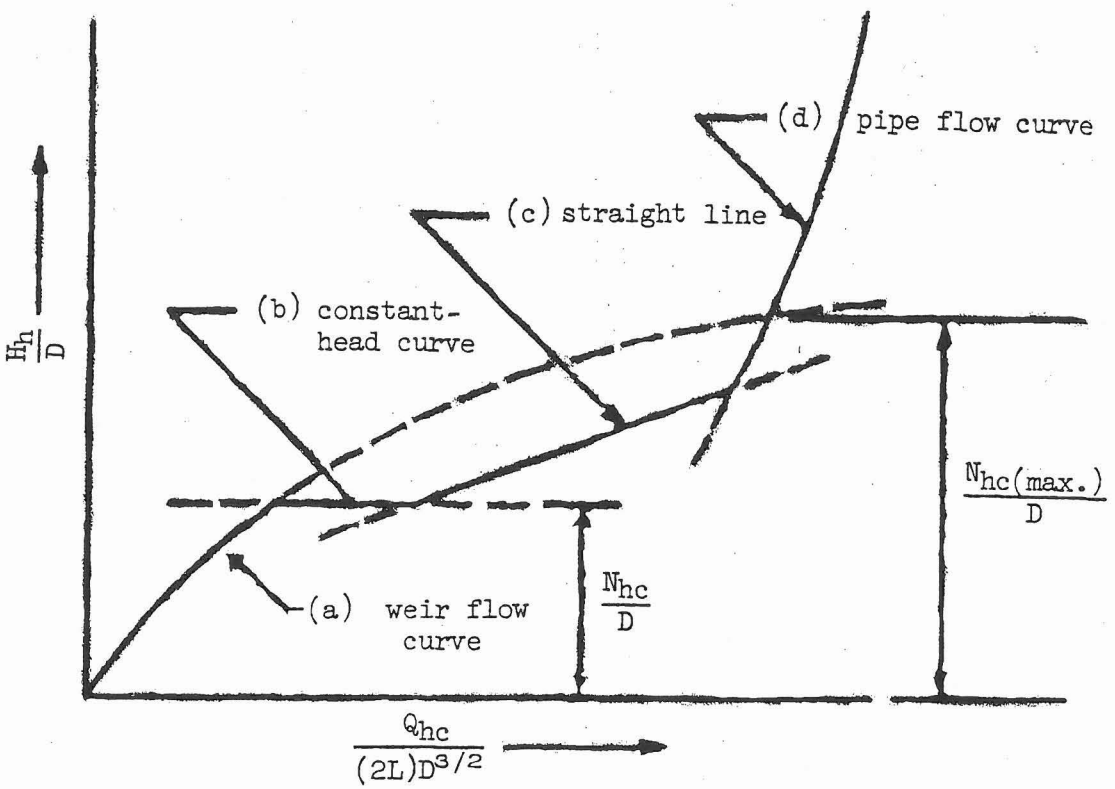


Figure 2. Head-discharge relation for two-way covered risers.

Note that the actual head-discharge relation, for specific riser proportions, may take one of several forms.

Example (1): If $L_o/D \geq 2$, then curve (c) is horizontal and hence is not a part of the head-discharge relation.

Example (2): If $H_o$ is sufficiently small, then the pipe flow curve (d) may intersect curve (b) to the left of curve (c) since curves (a), (b), and (c) are independent of $H_o$.

Example (3): If $N_{hc}$ is made equal to its maximum value, then curves (b) and (c) are not a part of the head-discharge relation.

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## The Standard Covered Riser

Refer to Engineering Standard Drawing ES-150, "Drop Inlet Spillways, Standard for Covered Top Riser", and to Technical Release No. 30 "Structural Design of Standard Covered Risers". Hydraulic aspects and structural aspects of two-way covered risers were considered during the selection of the criteria and proportions establishing the Standard Covered Riser.

### Proportions Selected

**Length of riser, L:**

$$L = 3D$$

**Plate (cover slab) overhang, $L_o$:**
**Selected to provide adequate trash rack net area.**

$$L_o = 2D \quad \checkmark$$

**Vertical opening of inlet, $N_{hc}$:**

Evaluating $N_{hc}$ (max.)

The maximum allowable mean velocity in the pipe conduit of standard risers is set at $v_{b(max.)} = 30$ fps, thus

$$Q_{hc(max.)} = 30 \frac{\pi D^2}{4}$$

and, equating this to weir flow

$$30 \frac{\pi D^2}{4} = 3.1(6D) H_h^{3/2} \quad \checkmark$$

($2L = 6D$)

thus

$$H_h = N_{hc(max.)} = 1.17 D^{2/3} \quad \checkmark$$

or

$$\frac{N_{hc(max.)}}{D} = \frac{1.17}{D^{1/3}} \quad \checkmark$$

which gives

$$\frac{N_{hc(max.)}}{D} = \begin{cases} 0.93 \text{ for } D = 2.0 \text{ ft} \\ 0.74 \text{ for } D = 4.0 \text{ ft} \end{cases}$$

Evaluating $N_{hc(min.)}$

$L/D > 2$, thus

$$\frac{Q_{hc(min.)}}{D^{5/2}} = 5.1$$

($\propto D^2$)

and, equating this to weir flow

$$5.1 D^{5/2} = 3.1(6D) H_h^{3/2} \quad \checkmark$$

thus

$$H_h = N_{hc(min.)} = 0.42D$$

or

$$\frac{N_{hc(min.)}}{D} = 0.42$$

$N_{hc}$ selected

$$\frac{N_{hc}}{D} = 0.50$$

Head-discharge Relations

The term $(0.1 - 0.05 \frac{L_o}{D})$, in the equation of curve (c), equals zero since $\frac{L_o}{D} = 2$. Therefore curve (c) is horizontal and the head-discharge relation for Standard Covered Risers consists of portions of only three curves:

(a) weir flow curve
(b) constant-head curve
(d) pipe flow curve

as shown in Figure 3. The constant-head curve and the weir curve intersect at

$$\frac{H_h}{D} = \frac{N_{hc}}{D} = 0.5$$

and

$$Q'_{hc} = 3.1(6D)\ H_h^{3/2} = 3.1(6D)(0.50D)^{3/2} = 1.096(6)D^{5/2}$$

The location of the intersection of the constant-head curve and the pipe flow curve depends on the particular riser and conduit.

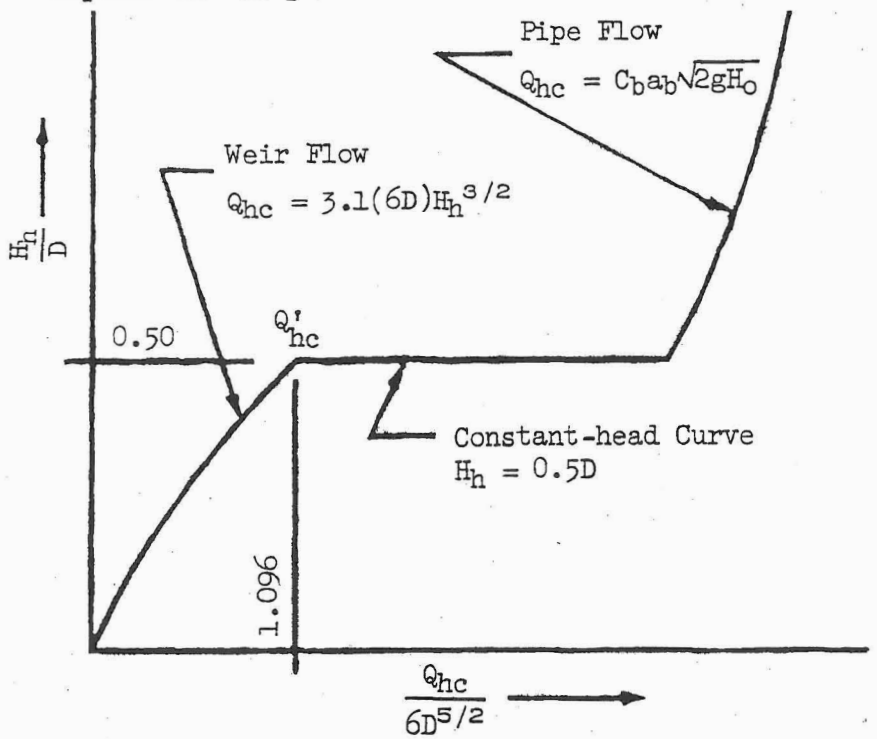


Figure 3. Head-discharge relation for Standard Covered Risers.

(20)

Thus as the reservoir water surface rises above the crest of the covered inlet of the Standard Covered Riser, the inlet functions as a weir for the range of heads from zero to 0.50D above the crest. The riser primes when the head over the crest of the covered inlet becomes equal to 0.50D and flow changes from weir control to pipe control.

Riser Head Losses

Head loss coefficients for pipe flow conditions are defined as follows:

$$K_c = \frac{h_{fc}}{h_{vr}} = \text{crest head loss coefficient}$$

$$K_t = \frac{h_{ft}}{h_{vb}} = \text{transition head loss coefficient}$$

$$K_e = \frac{h_{fc} + h_{ft}}{h_{vb}} = \text{entrance head loss coefficient}$$

where:

$h_{fc}$ = head loss between the reservoir water surface and the mid-height of the riser

$h_{ft}$ = head loss between the mid-height of the riser and the conduit entrance (including conduit entrance).

$h_{vb}$ = the velocity head in the conduit

$h_{vr}$ = the velocity head in the riser

From tests, for the Standard Covered Riser:

$K_c = 2.0$

$K_t = 0.55$

Since

$$a_r/a_b = 3D^2/\frac{\pi D^2}{4} = 3.82$$

then

$$v_r = v_b/3.82$$

and

$$h_{vr} = \frac{v_r^2}{2g} = \frac{1}{2g}\left(\frac{v_b}{3.82}\right)^2 = 0.0686\,\frac{v_b^2}{2g} = 0.0686\ h_{vb}$$

Thus

$h_{fc} = 2.0\ h_{vr} = 0.137\ h_{vb}$

$h_{ft} = 0.55\ h_{vb}$

$h_{fc} + h_{ft} = 0.687\ h_{vb} = K_e h_{vb}$

For design, it has been recommended that $K_e = 1.0$ be used.

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Pipe Flow, Energy and Hydraulic Grade Lines

The pipe flow equation for Standard Covered Risers may be derived from the relations shown in Figure 4. Thus, for full pipe flow:

$$H_o = \frac{v_b^2}{2g}(1 + K_e + K_p L_b) = \frac{v_b^2}{2g}(1 + 1 + K_p L_b)$$

or

$$v_b = \frac{1}{\sqrt{2 + K_p L_b}} \sqrt{2gH_o}$$

and

$$Q_{hc} = a_b v_b = \frac{1}{\sqrt{2 + K_p L_b}} a_b \sqrt{2gH_o} = C_b a_b \sqrt{2gH_o}$$

where

$K_p$ = friction head loss coefficient for circular pipe flowing full. Its value may be obtained from ES-42.

$L_b$ = length of the conduit

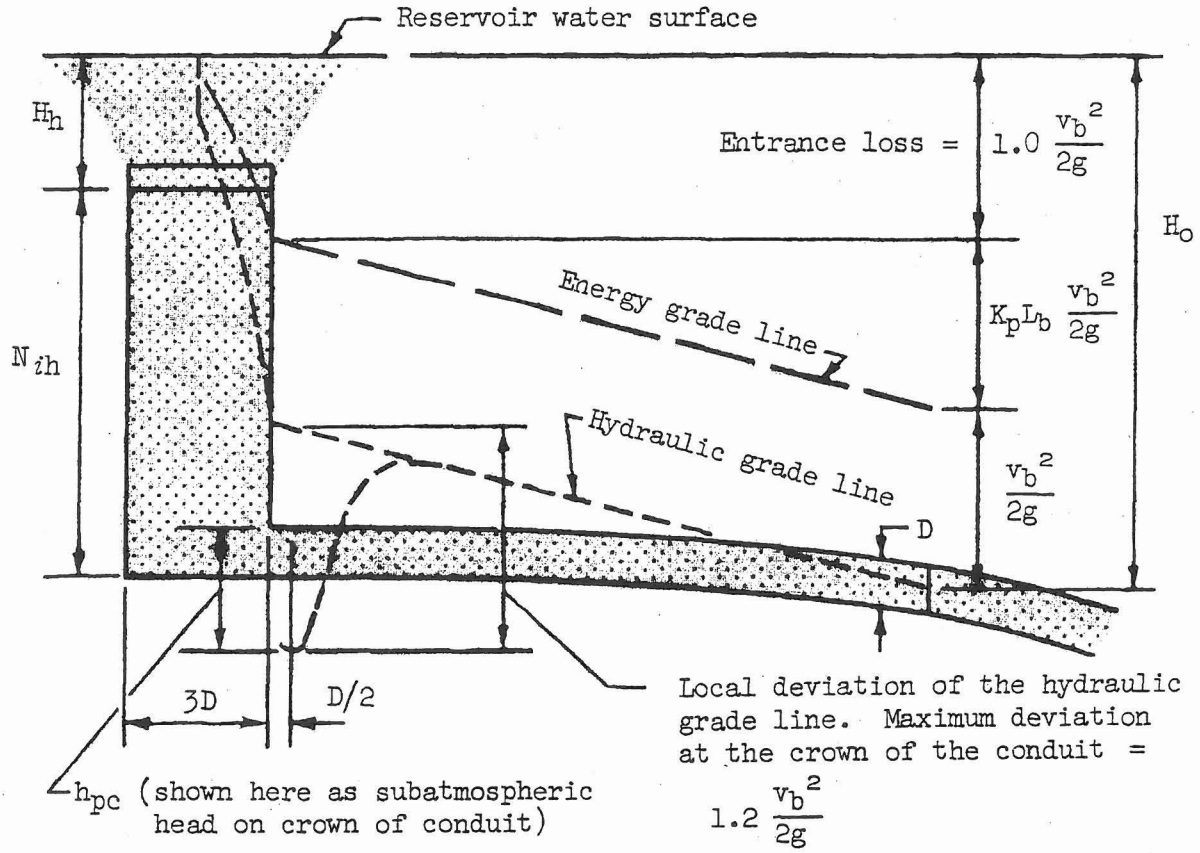



Figure 4. Pressure flow relations in Standard Covered Risers.

Contractions in the conduit near the entrance cause local deviations of the hydraulic grade line from its normally computed position. Tests show that the maximum deviation occurs at the crown of the conduit at a distance of about D/2 downstream from the conduit entrance. As indicated by Figure 4, negative pressures (below atmospheric) are possible in this region. From the figure, the pressure head on the crown of the conduit ($h_{pc}$) at a distance of D/2 from the riser may be written as:

$$h_{pc} = (H_h + N_{ih}) - (1 + K_e + 1.2)\frac{v_b^2}{2g} - D$$

or, with $K_e = 1.0$

$$h_{pc} = (H_h + N_{ih} - D) - 3.2\frac{v_b^2}{2g} = (H_h + N_{ih} - D) - 3.2\frac{H_o}{2 + K_p L_b}$$

Upon substitution of values, a positive result means the absolute pressure is greater than atmospheric, a negative result means the absolute pressure is less than atmospheric.

To avoid cavitation, the absolute pressure must be greater than the vapor pressure corresponding to the temperature of the water. The absolute pressure head at the crown of the conduit at D/2 downstream from the conduit entrance is given algebraically by:

$$h_{ab} = h_a + h_{pc}$$

where $h_a$ is the atmospheric pressure head.

## Low Stage Inlets

It was originally believed that low stage inlets should be located in the riser endwalls and the width should equal the clear width of the endwall. Subsequently, model tests showed such inlets had a detrimental effect on the hydraulic behavior of two-way covered risers.

Tests with openings in the sidewalls and tests with openings in the endwalls showed low stage inlets should be located in the endwalls and the width should equal (3/4)D and be centered in the wall.

As the reservoir water surface rises above the elevation of the crest of the low stage inlet, the inlet first functions as a weir, then with increasing water level, the inlet functions as an orifice. Weir flow is given by:

$$Q_{\ell u} = 3.1(\tfrac{3}{4}D)\ H_\ell^{3/2}$$

where

$H_\ell$ = head over crest of the low stage inlet of the riser.

$Q_{\ell u}$ = discharge through the low stage inlet of the riser

Orifice flow is given by:

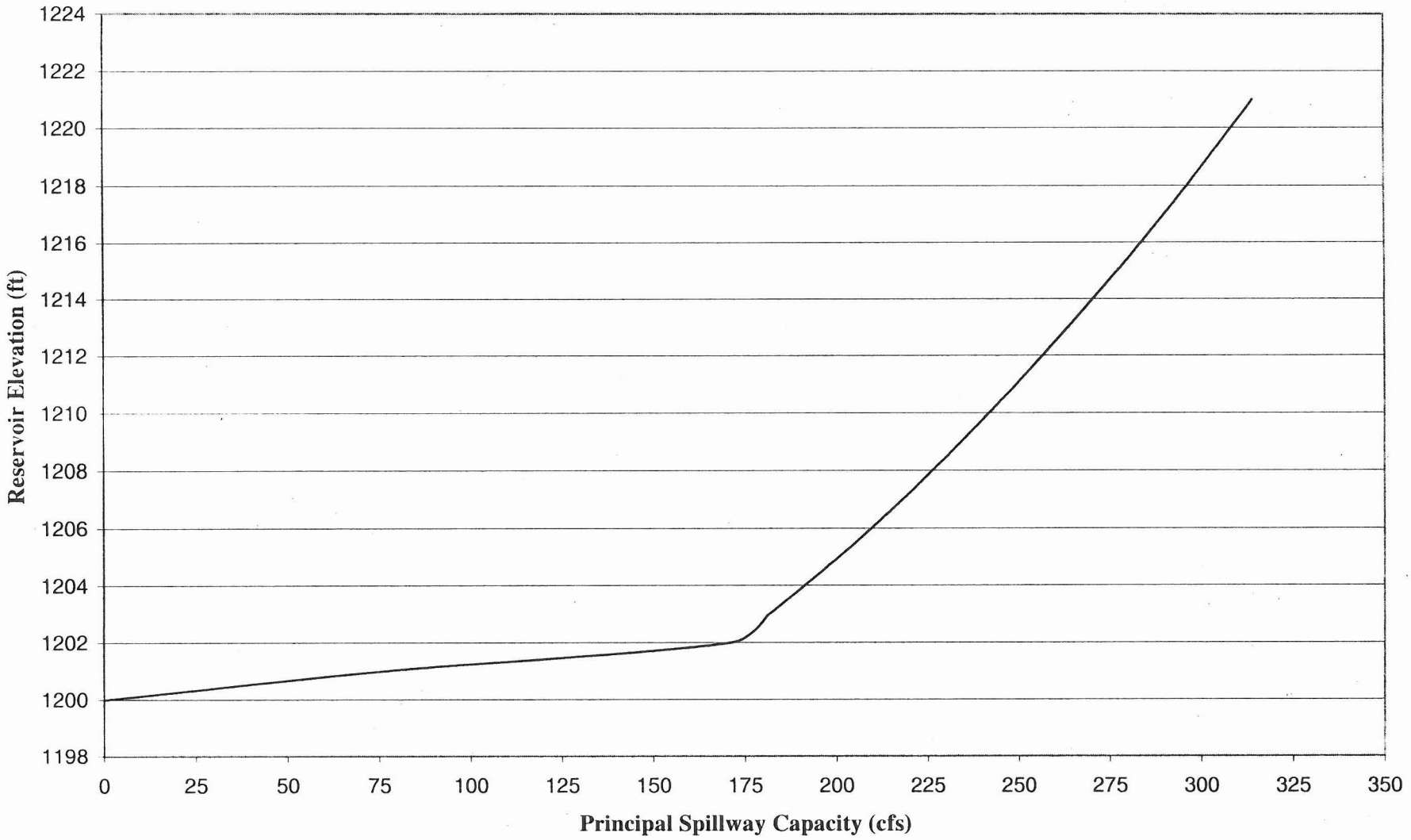
$$Q_{\ell u} = C_o a_o \sqrt{2g(H_\ell - \tfrac{1}{2}N_{\ell u})} = 0.60\left(\tfrac{3}{4}D\ N_{\ell u}\right)\sqrt{2g(H_\ell - \tfrac{1}{2}N_{\ell u})}$$

where

$N_{\ell u}$ = vertical opening of the low stage inlet of the riser.

USDA-SCS-HYATTSVILLE, MD. 1968

## Stage-Discharge Relationship For Principal Spillway



(1)

URS

# CALCULATION PACKAGE NO. C-11

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **ESTIMATION OF THE GATED OUTLET CAPACITY AT WHITE TANK FRS NO.3**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 06/28/04

Checked by: _____ Date: _____

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 3.

Calculation Approved by: _____ 6/2/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| 1 | Revised the Calculation Package for an Inv. of 1197.0' | 3/1/05 |
| | | |
| | | |

Project Manager/Date

# ESTIMATION OF THE GATED OUTLET CAPACITY AT WHITE TANK FRS NO.3

**(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)**
**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)**
**23443748**

## PROBLEM STATEMENT

The purpose of this calculation package is to estimate the gated outlet capacity at the White Tank FRS No. 3 reservoir.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

The proposed outlet works at the White Tank FRS No.3 consists of a gated outlet of 48 inch. The invert of the gated outlet at the entrance is set at an elevation of 1197.0 ft (NAVD 88).

## 1.0 PIPE FLOWING PARTIALLY-FULL (OPEN CHANNEL FLOW)

For a partially-full condition, the gated outlet capacity was estimated for outlet control and inlet control options. The smaller value of these two control options was selected as the final capacity of the gated outlet when the pipe is flowing partially full.

### 1.1 Outlet Control

For outlet control option when pipe is flowing partially full, the gated outlet capacity was determined using the Manning's equation:

$$Q = A * V_1$$

Where

$Q =$ Discharge Capacity of the pipe (cfs)

$A =$ Area of the Pipe ($ft^2$)

$V_1 =$ Mean flow velocity (ft/sec)

Where $V_1 = 1.49/n * R^{2/3} * S^{1/2}$

$R =$ Hydraulic radius of the pipe

$A =$ Bed slope

$n =$ Manning's Roughness Coefficient

All the relevant parameters such as area of the pipe (A), hydraulic radius of the pipe (R) and top width of the pipe (T) for partial flow conditions were taken from Tables 4.5-4.7 of a handbook named *"Modern Sewer Design"* published by *American Iron And Steel Institute (Second Edition 1990)* (Please See Pages 8-10).

### 1.2 Inlet Control

For inlet control option when pipe is flowing partially full, the gated outlet capacity was determined using computer software named CULVERT MASTER.

## 2.0 PIPE FLOWING-FULL (PRESSURIZED FLOW)

For Pipe-Flowing-Full Condition, the gated outlet capacity was estimated for outlet control and inlet control options. The smaller value of these two control options was selected as the final capacity of the gated outlet.

### 2.1 Outlet Control

For the outlet control option when the pipe is flowing-full, the outflow corresponding to each reservoir elevation was computed using the following relationship:

$$Q = \text{Area of the conduit} * \text{Flow velocity}$$

where the flow velocity was determined using the Bernoulli' equation at each elevation. Please see Page 6 to have an idea of how Bernoulli's Equation was applied to the system and to understand the attached spreadsheet. The major friction losses were estimated using the William-Hazen Equation:

$$h_f = 3.03 * (V/C)^{1.85} * L * D^{-1.167}$$

Where

V = mean flow velocity (ft/sec)

C = William Hazen coefficient

L = Length of the Pipe (ft)

D = Diameter of the pipe (ft)

The minor losses (entrance losses and exit losses) were estimated using the flowing relationship:

$$H = K * V^2/2g$$

Where K = sum of all friction loss coefficients (entrance coefficient, exit coefficient etc)

## 2.2 Inlet Control

For the inlet control option when pipe is flowing full, the gated outlet capacity was determined using the Linsley/Franzini equation:

$$Q = 0.62 * A * (2g* (h_1 + D/2))^{0.5}$$

Where

A = Area of the pipe ($ft^2$)

G = Acceleration due to the gravity

$h_1$ = Headwater depth (ft)

D = Inside diameter of the pipe (ft)

## RESULTS

The calculations related to the estimation of the capacity of the gated outlet corresponding to different reservoir elevations are provided in a Tabular form on Page 5. All the formulas involved in these calculations are provided on Pages 6-7. The gated outlet capacity was estimated both for inlet and outlet control. The smaller value of these two control options was selected as the final capacity of the gated outlet.

**White Tan[illegible]RS No. 3**
**Gated Outlet - 48 inch - Flow Capacity**

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | outside pipe diameter (ft) | 4 | | | | | | | | | | | |
| 2 | pipe wall thickness (in) | 0.25 | | | | | | | | | | | |
| 3 | inside pipe diameter (ft) | 3.96 | | | | | | | | | | | |
| 4 | length (ft) | 165 | | | | | | | | | | | |
| 5 | pipe slope (ft/ft) | 0.006 | | | | | | | | | | | |
| 6 | outlet invert elevation (ft) | 1190 | | | | | | | | | | | |
| 7 | pipe upturn at inlet (ft) | 2 | | | | | | | | | | | |
| 8 | inlet invert elevation (ft) | 1197 | | | | | | | | | | | |
| 9 | Hazen-Williams Coefficient ($C_h$) | 130 | smooth, concrete pipe | | | | | | | | | | |
| 10 | Manning's Roughness (n) | 0.012 | all pipes with smooth interior (p.102 of Modern Sewer Design) | | | | | | | | | | |
| 11 | **Pipe Flowing Partially Full Condition** | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 13 | | | | on page 100 of Modern Sewer Design (Please See Attached Pages 8-10). | | | | | Using Manning's Formula | | Inlet control flow was estimated using Culvert Master. Assumes minimal tailwater effects. | | |
| 14 | water elevation at inlet | flow depth in pipe | depth/ diameter (y/D) | $A/D^2$ | R/D | T/D | Flow Area, A | Hydraulic Radius, R | Top Width, T | Flow velocity ($V_1$) ↑ | Outlet Control, Q | Inlet Control, Q | pipe flow |
| 15 | (ft) | (ft) | | | | | (sq. ft) | (feet) | (feet) | (ft/sec) | | | (cfs) |
| 16 | 1198 | 1.0 | 0.25 | 0.154 | 0.147 | 0.866 | 2.413 | 0.582 | 3.4 | 3.7 | 9 | 7 | 7 |
| 17 | 1199 | 2.0 | 0.51 | 0.403 | 0.253 | 1.000 | 6.314 | 1.001 | 4.0 | 6.4 | 40 | 24 | 24 |
| 18 | 1200 | 3.0 | 0.76 | 0.640 | 0.302 | 0.854 | 10.028 | 1.195 | 3.4 | 7.6 | 77 | 47 | 47 |
| 19 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 21 | **Pipe-Flowing-Full Condition** | | | | | | | | | | | | |
| 22 | | | | | | | Using Bernoulli's Equation | | | | | | |
| 23 | water elevation at inlet ($z_1$) | headwater depth, h1 | tailwater depth, h2 | tailwater elevation ($z_2$) | **Water surface elevation difference ($z_1$-$z_2$)** | Entrance loss coeff. | Exit loss coeff. | Velocity (V) ↑ | Frictional Loses + Minor Loses | **Outlet Control, Q** | **Inlet Control, Q** | Gated outlet pipe flow | |
| 24 | (ft) | (ft) | (ft) | (ft) | | | | (fps) | (feet) | **(cfs)** | **(cfs)** | (cfs) | |
| 25 | 1201 | 0.04 | 0 | 1193.96 | **7.04** | 1.00 | 1.0 | **13.4** | **7.04** | 165 | 87 | 87 | |
| 26 | 1202 | 1.04 | 0 | 1193.96 | **8.04** | 1.00 | 1.0 | **14.3** | **8.04** | 176 | 106 | 106 | |
| 27 | 1203 | 2.04 | 0 | 1193.96 | **9.04** | 1.00 | 1.0 | **15.2** | **9.04** | 187 | 123 | 123 | |
| 28 | 1204 | 3.04 | 0 | 1193.96 | **10.04** | 1.00 | 1.0 | **16.0** | **10.04** | 197 | 137 | 137 | |
| 29 | 1205 | 4.04 | 0 | 1193.96 | **11.04** | 1.00 | 1.0 | **16.8** | **11.04** | 207 | 150 | 150 | |
| 30 | 1206 | 5.04 | 0 | 1193.96 | **12.04** | 1.00 | 1.0 | **17.6** | **12.04** | 216 | 162 | 162 | |
| 31 | 1207 | 6.04 | 0 | 1193.96 | **13.04** | 1.00 | 1.0 | **18.3** | **13.04** | 225 | 173 | 173 | |
| 32 | 1208 | 7.04 | 0 | 1193.96 | **14.04** | 1.00 | 1.0 | **19.0** | **14.04** | 234 | 184 | 184 | |
| 33 | 1209 | 8.04 | 0 | 1193.96 | **15.04** | 1.00 | 1.0 | **19.7** | **15.04** | 242 | 194 | 194 | |
| 34 | 1210 | 9.04 | 0 | 1193.96 | **16.04** | 1.00 | 1.0 | **20.3** | **16.04** | 250 | 203 | 203 | |
| 35 | 1211 | 10.04 | 0 | 1193.96 | **17.04** | 1.00 | 1.0 | **20.9** | **17.04** | 258 | 212 | 212 | |
| 36 | 1212 | 11.04 | 0 | 1193.96 | **18.04** | 1.00 | 1.0 | **21.6** | **18.04** | 265 | 221 | 221 | |
| 37 | 1213 | 12.04 | 0 | 1193.96 | **19.04** | 1.00 | 1.0 | **22.2** | **19.04** | 273 | 229 | 229 | |
| 38 | 1214 | 13.04 | 0 | 1193.96 | **20.04** | 1.00 | 1.0 | **22.7** | **20.04** | 280 | 237 | 237 | |
| 39 | 1215 | 14.04 | 0 | 1193.96 | **21.04** | 1.00 | 1.0 | **23.3** | **21.04** | 287 | 245 | 245 | |
| 40 | 1216 | 15.04 | 0 | 1193.96 | **22.04** | 1.00 | 1.0 | **23.9** | **22.04** | 294 | 253 | 253 | |
| 41 | 1217 | 16.04 | 0 | 1193.96 | **23.04** | 1.00 | 1.0 | **24.4** | **23.04** | 300 | 260 | 260 | |
| 42 | 1218 | 17.04 | 0 | 1193.96 | **24.04** | 1.00 | 1.0 | **24.9** | **24.04** | 307 | 267 | 267 | |
| 43 | 1219 | 18.04 | 0 | 1193.96 | **25.04** | 1.00 | 1.0 | **25.5** | **25.04** | 313 | 274 | 274 | |
| 44 | 1220 | 19.04 | 0 | 1193.96 | **26.04** | 1.00 | 1.0 | **26.0** | **26.04** | 320 | 281 | 281 | |

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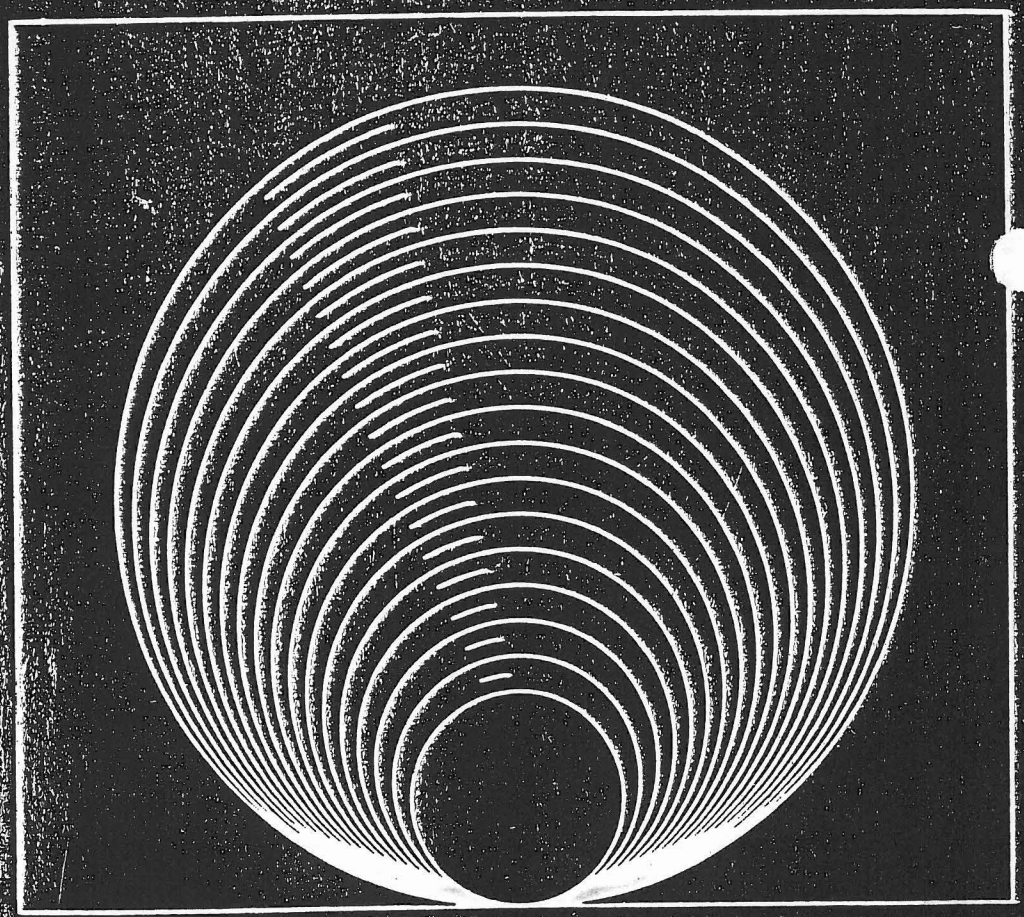
**White Tanks FRS No. 3**
**Gated Outlet - 48 inch - Flow Capacity**

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | outside pipe diameter (ft) | 4 | | | | | | | |
| 2 | pipe wall thickness (in) | 0.25 | | | | | | | |
| 3 | inside pipe diameter (ft) | =B1-2*(B2/12) | | | | | | | |
| 4 | length (ft) | 165 | | | | | | | |
| 5 | pipe slope (ft/ft) | 0.006 | | | | | | | |
| 6 | outlet invert elevation (ft) | 1190 | | | | | | | |
| 7 | pipe upturn at inlet (ft) | 2 | | | | | | | |
| 8 | inlet invert elevation (ft) | 1197 | | | | | | | |
| 9 | Hazen-Williams Coefficient ($C_H$) | 130 | smooth, concrete pipe | | | | | | |
| 10 | Manning's Roughness (n) | 0.012 | all pipes with smooth | | | | | | |
| 11 | **Pipe Flowing Partially** | | | | | | | | |
| 12 | | | | | | | | | |
| 13 | | | | Values below estimated from tables on page 100 of Modern Sewer Design (Please See Attached Pages 8-10). | | | | | Using Manning's Formula |
| 14 | water elevation at inlet | flow depth in pipe | depth/ diameter (y/D) | $A/D^2$ | R/D | T/D | Flow Area, A | Hydraulic Radius, R | Top Width, T |
| 15 | (ft) | (ft) | | | | | (sq. ft) | (feet) | (feet) |
| 16 | =B8+1 | =A16-$B$8 | =B16/$B$3 | 0.154 | 0.147 | 0.866 | =D16*($B$3^2) | =E16*$B$3 | =F16*$B$3 |
| 17 | =A16+1 | =A17-$B$8 | =B17/$B$3 | 0.403 | 0.253 | 1 | =D17*($B$3^2) | =E17*$B$3 | =F17*$B$3 |
| 18 | =A17+1 | =A18-$B$8 | =B18/$B$3 | 0.64 | 0.302 | 0.854 | =D18*($B$3^2) | =E18*$B$3 | =F18*$B$3 |
| 19 | | | | | | | | | |
| 20 | | | | | | | | | |
| 21 | **Pipe-Flowing-Full Cor** | | | | | | | | |
| 22 | | | | | | | | ng Bernoulli's Equat | |
| 23 | water elevation at inlet ($z_1$) | headwater depth, h1 | tailwater depth, h2 | tailwater elevation ($z_2$) | Water surface elevation difference ($z_1$-$z_2$) | Entrance loss coeff. | Exit loss coeff. | Velocity (V) | Frictional Loses + Minor Loses |
| 24 | (ft) | (ft) | (ft) | (ft) | | | | (fps) | (feet) |
| 25 | =A18+1 | =A25-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A25-D25 | 1 | 1 | 13.3700360531813 | =((H25^2)/(2*32.2))*(F25+G25)+3.02*$B$4*($B$3^-1.167)*((H25/$B$9)^1.85) |
| 26 | =A25+1 | =A26-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A26-D26 | 1 | 1 | 14.303850770411 | =((H26^2)/(2*32.2))*(F26+G26)+3.02*$B$4*($B$3^-1.167)*((H26/$B$9)^1.85) |
| 27 | =A26+1 | =A27-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A27-D27 | 1 | 1 | 15.1804818534638 | =((H27^2)/(2*32.2))*(F27+G27)+3.02*$B$4*($B$3^-1.167)*((H27/$B$9)^1.85) |
| 28 | =A27+1 | =A28-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A28-D28 | 1 | 1 | 16.0118103461963 | =((H28^2)/(2*32.2))*(F28+G28)+3.02*$B$4*($B$3^-1.167)*((H28/$B$9)^1.85) |
| 29 | =A28+1 | =A29-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A29-D29 | 1 | 1 | 16.8028245798288 | =((H29^2)/(2*32.2))*(F29+G29)+3.02*$B$4*($B$3^-1.167)*((H29/$B$9)^1.85) |
| 30 | =A29+1 | =A30-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A30-D30 | 1 | 1 | 17.5592757235194 | =((H30^2)/(2*32.2))*(F30+G30)+3.02*$B$4*($B$3^-1.167)*((H30/$B$9)^1.85) |
| 31 | =A30+1 | =A31-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A31-D31 | 1 | 1 | 18.2853023363187 | =((H31^2)/(2*32.2))*(F31+G31)+3.02*$B$4*($B$3^-1.167)*((H31/$B$9)^1.85) |
| 32 | =A31+1 | =A32-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A32-D32 | 1 | 1 | 18.984340037522 | =((H32^2)/(2*32.2))*(F32+G32)+3.02*$B$4*($B$3^-1.167)*((H32/$B$9)^1.85) |
| 33 | =A32+1 | =A33-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A33-D33 | 1 | 1 | 19.659217643878 | =((H33^2)/(2*32.2))*(F33+G33)+3.02*$B$4*($B$3^-1.167)*((H33/$B$9)^1.85) |
| 34 | =A33+1 | =A34-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A34-D34 | 1 | 1 | 20.3122993974794 | =((H34^2)/(2*32.2))*(F34+G34)+3.02*$B$4*($B$3^-1.167)*((H34/$B$9)^1.85) |
| 35 | =A34+1 | =A35-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A35-D35 | 1 | 1 | 20.9449717793285 | =((H35^2)/(2*32.2))*(F35+G35)+3.02*$B$4*($B$3^-1.167)*((H35/$B$9)^1.85) |
| 36 | =A35+1 | =A36-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A36-D36 | 1 | 1 | 21.5604766553026 | =((H36^2)/(2*32.2))*(F36+G36)+3.02*$B$4*($B$3^-1.167)*((H36/$B$9)^1.85) |
| 37 | =A36+1 | =A37-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A37-D37 | 1 | 1 | 22.1592507495587 | =((H37^2)/(2*32.2))*(F37+G37)+3.02*$B$4*($B$3^-1.167)*((H37/$B$9)^1.85) |
| 38 | =A37+1 | =A38-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A38-D38 | 1 | 1 | 22.7426215329485 | =((H38^2)/(2*32.2))*(F38+G38)+3.02*$B$4*($B$3^-1.167)*((H38/$B$9)^1.85) |
| 39 | =A38+1 | =A39-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A39-D39 | 1 | 1 | 23.311744539454 | =((H39^2)/(2*32.2))*(F39+G39)+3.02*$B$4*($B$3^-1.167)*((H39/$B$9)^1.85) |
| 40 | =A39+1 | =A40-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A40-D40 | 1 | 1 | 23.8676337863893 | =((H40^2)/(2*32.2))*(F40+G40)+3.02*$B$4*($B$3^-1.167)*((H40/$B$9)^1.85) |
| 41 | =A40+1 | =A41-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A41-D41 | 1 | 1 | 24.4112071492626 | =((H41^2)/(2*32.2))*(F41+G41)+3.02*$B$4*($B$3^-1.167)*((H41/$B$9)^1.85) |
| 42 | =A41+1 | =A42-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A42-D42 | 1 | 1 | 24.9432646444329 | =((H42^2)/(2*32.2))*(F42+G42)+3.02*$B$4*($B$3^-1.167)*((H42/$B$9)^1.85) |
| 43 | =A42+1 | =A43-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A43-D43 | 1 | 1 | 25.4645082561389 | =((H43^2)/(2*32.2))*(F43+G43)+3.02*$B$4*($B$3^-1.167)*((H43/$B$9)^1.85) |
| 44 | =A43+1 | =A44-$B$8-$B$3 | 0 | =($B$6+$C$25+$B$3) | =A44-D44 | 1 | 1 | 25.9755767098554 | =((H44^2)/(2*32.2))*(F44+G44)+3.02*$B$4*($B$3^-1.167)*((H44/$B$9)^1.85) |

| | C | J | K | L | M |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | smooth, concrete pipe | | | | |
| 10 | all pipes with smooth | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | Inlet control flow was estimated using Culvert Master. Assumes minimal tailwater effects. | | |
| 14 | depth/ diameter (y/D) | Flow velocity ($V_1$) | Outlet Control, Q | Inlet Control, Q | pipe flow |
| 15 | | (ft/sec) | | | (cfs) |
| 16 | =B16/$B$3 | =(1.486/$B$10)*(H16^(2/3))*($B$5^0.5) | =J16*G16 | 7 | =IF(K16<L16,K16,L16) |
| 17 | =B17/$B$3 | =(1.486/$B$10)*(H17^(2/3))*($B$5^0.5) | =J17*G17 | 24 | =IF(K17<L17,K17,L17) |
| 18 | =B18/$B$3 | =(1.486/$B$10)*(H18^(2/3))*($B$5^0.5) | =J18*G18 | 47 | =IF(K18<L18,K18,L18) |
| 19 | | | | | |
| 20 | | | | | |
| 21 | | | | | |
| 22 | | | | | |
| 23 | tailwater depth, h2 | Outlet Control, Q | Inlet Control, Q | Gated outlet pipe flow | |
| 24 | (ft) | (cfs) | (cfs) | (cfs) | |
| 25 | 0 | =H25*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B25+($B$3/2)))^0.5 | =IF(J25<K25,J25,K25) | |
| 26 | 0 | =H26*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B26+($B$3/2)))^0.5 | =IF(J26<K26,J26,K26) | |
| 27 | 0 | =H27*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B27+($B$3/2)))^0.5 | =IF(J27<K27,J27,K27) | |
| 28 | 0 | =H28*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B28+($B$3/2)))^0.5 | =IF(J28<K28,J28,K28) | |
| 29 | 0 | =H29*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B29+($B$3/2)))^0.5 | =IF(J29<K29,J29,K29) | |
| 30 | 0 | =H30*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B30+($B$3/2)))^0.5 | =IF(J30<K30,J30,K30) | |
| 31 | 0 | =H31*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B31+($B$3/2)))^0.5 | =IF(J31<K31,J31,K31) | |
| 32 | 0 | =H32*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B32+($B$3/2)))^0.5 | =IF(J32<K32,J32,K32) | |
| 33 | 0 | =H33*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B33+($B$3/2)))^0.5 | =IF(J33<K33,J33,K33) | |
| 34 | 0 | =H34*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B34+($B$3/2)))^0.5 | =IF(J34<K34,J34,K34) | |
| 35 | 0 | =H35*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B35+($B$3/2)))^0.5 | =IF(J35<K35,J35,K35) | |
| 36 | 0 | =H36*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B36+($B$3/2)))^0.5 | =IF(J36<K36,J36,K36) | |
| 37 | 0 | =H37*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B37+($B$3/2)))^0.5 | =IF(J37<K37,J37,K37) | |
| 38 | 0 | =H38*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B38+($B$3/2)))^0.5 | =IF(J38<K38,J38,K38) | |
| 39 | 0 | =H39*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B39+($B$3/2)))^0.5 | =IF(J39<K39,J39,K39) | |
| 40 | 0 | =H40*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B40+($B$3/2)))^0.5 | =IF(J40<K40,J40,K40) | |
| 41 | 0 | =H41*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B41+($B$3/2)))^0.5 | =IF(J41<K41,J41,K41) | |
| 42 | 0 | =H42*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B42+($B$3/2)))^0.5 | =IF(J42<K42,J42,K42) | |
| 43 | 0 | =H43*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B43+($B$3/2)))^0.5 | =IF(J43<K43,J43,K43) | |
| 44 | 0 | =H44*(3.1416/4)*($B$3^2) | =0.62*((3.1416/4)*($B$3^2))*(2*32.2*(B44+($B$3/2)))^0.5 | =IF(J44<K44,J44,K44) | |

# Modern Sewer Design



(9)

# Modern Sewer Design

Published by

AMERICAN IRON AND STEEL INSTITUTE

First Edition 1980

Second Edition 1990

## HYDRAULIC PROPERTIES CIRCULAR CONDUITS FLOWING PART FULL

**TABLE 4.5**
**Determination of Area**

| $\frac{y}{D}$ | Values of $\frac{A}{D^2}$ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
| .0 | .000 | .001 | .004 | .007 | .011 | .015 | .019 | .024 | .029 | .035 |
| .1 | .041 | .047 | .053 | .060 | .067 | .074 | .081 | .089 | .096 | .104 |
| .2 | .112 | .120 | .128 | .136 | .145 | .154 | .162 | .171 | .180 | .189 |
| .3 | .198 | .207 | .217 | .226 | .236 | .245 | .255 | .264 | .274 | .284 |
| .4 | .293 | .303 | .313 | .323 | .333 | .343 | .353 | .363 | .373 | .383 |
| .5 | .393 | .403 | .413 | .423 | .433 | .443 | .453 | .462 | .472 | .482 |
| .6 | .492 | .502 | .512 | .521 | .531 | .540 | .550 | .559 | .569 | .578 |
| .7 | .587 | .596 | .605 | .614 | .623 | .632 | .640 | .649 | .657 | .666 |
| .8 | .674 | .681 | .689 | .697 | .704 | .712 | .719 | .725 | .732 | .738 |
| .9 | .745 | .750 | .756 | .761 | .766 | .771 | .775 | .779 | .782 | .784 |
| 1.0 | .785 | | | | | | | | | |

**TABLE 4.6**
**Determination of Hydraulic Radius**

| $\frac{y}{D}$ | Values of $\frac{R}{D}$ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
| .0 | .000 | .007 | .013 | .020 | .026 | .033 | .039 | .045 | .051 | .057 |
| .1 | .063 | .070 | .075 | .081 | .087 | .093 | .099 | .104 | .110 | .115 |
| .2 | .121 | .126 | .131 | .136 | .142 | .147 | .152 | .157 | .161 | .166 |
| .3 | .171 | .176 | .180 | .185 | .189 | .193 | .198 | .202 | .206 | .210 |
| .4 | .214 | .218 | .222 | .226 | .229 | .233 | .236 | .240 | .243 | .247 |
| .5 | .250 | .253 | .256 | .259 | .262 | .265 | .268 | .270 | .273 | .275 |
| .6 | .278 | .280 | .282 | .284 | .286 | .288 | .290 | .292 | .293 | .295 |
| .7 | .296 | .298 | .299 | .300 | .301 | .302 | .302 | .303 | .304 | .304 |
| .8 | .304 | .304 | .304 | .304 | .304 | .303 | .303 | .302 | .301 | .299 |
| .9 | .298 | .296 | .294 | .292 | .289 | .286 | .283 | .279 | .274 | .267 |
| 1.0 | .250 | | | | | | | | | |




D = Diameter
y = Depth of flow
A = Area of flow
R = Hydraulic radius
T = Top width

**TABLE 4.7**
**Determination of Top Width**

| $\frac{y}{D}$ | Values of $\frac{T}{D}$ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
| .0 | .000 | .199 | .280 | .341 | .392 | .436 | .457 | .510 | .543 | .572 |
| .1 | .600 | .626 | .650 | .673 | .694 | .714 | .733 | .751 | .768 | .785 |
| .2 | .800 | .815 | .828 | .842 | .854 | .866 | .877 | .888 | .898 | .908 |
| .3 | .917 | .925 | .933 | .940 | .947 | .954 | .960 | .966 | .971 | .975 |
| .4 | .980 | .984 | .987 | .990 | .993 | .995 | .997 | .998 | .999 | 1.000 |
| .5 | 1.000 | 1.000 | .999 | .998 | .997 | .995 | .993 | .990 | .987 | .984 |
| .6 | .980 | .975 | .971 | .966 | .960 | .954 | .947 | .940 | .933 | .925 |
| .7 | .917 | .980 | .898 | .888 | .877 | .866 | .854 | .842 | .828 | .815 |
| .8 | .800 | .785 | .768 | .751 | .733 | .714 | .694 | .673 | .650 | .626 |
| .9 | .600 | .572 | .543 | .510 | .475 | .436 | .392 | .341 | .280 | .199 |
| 1.0 | .000 | | | | | | | | | |

i.e. Given y = 3 ft., D = 4 ft., $\frac{y}{D} = 0.75$,

From tables; $\frac{A}{D^2} = 0.632$, $\frac{R}{D} = 0.302$, and $\frac{T}{D} = 0.866$



## FRICTION LOSSES

In North America, the Manning and Ku
estimate the friction gradient for turbule
tions fully developed rough turbulent f
per unit length of conduit is approxima
discharge (or velocity). Both equatior
describe the roughness of the channel b
gested values for 'n' for various corru

### Manning Equation

The Manning Equation is one of a numb
It is widely used in open channel flow l
duit flow. The equation is not dimensic
factor must be applied depending upo

$$V = \frac{M}{n} R^{2/3} S^{1/2}$$

Where M = 1.486
V = average velocity
Q = discharge
R = hydraulic radius = A/
A = cross-sectional area
P = wetted perimeter
$S_f$ = friction gradient or slo
n = Manning's roughness

**TABLE 4.8** **Effective Absolute Rou Coefficients[3]**

| Conduit |
|---|
| Closed conduits |
| Asbestos-cement pipe |
| Brick |
| Cast iron pipe |
| Uncoated (new) |
| Asphalt dipped (new) |
| Cement-lined & seal coated |
| Concrete (monolithic) |
| Smooth forms |
| Rough forms |
| Concrete pipe |
| Plastic pipe (smooth) |
| Vitrified clay |
| Pipes |
| Liner plates |
| Open channels |
| Lined channels |
| a. Asphalt |
| b. Brick |
| c. Concrete |
| d. Rubble or riprap |
| e. Vegetal |
| Excavated or dredged |
| Earth, straight and uniform |
| Earth, winding, fairly uniform |
| Rock |
| Unmaintained |
| Natural Channels (minor streams, top widt |
| Fairly regular section |

URS

# CALCULATION PACKAGE NO. C-12

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **LEVEL-POOL RESERVOIR CALCULATIONS FOR WHITE TANK FRS NO. 3 SPILLWAY**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 07/15/04

Checked by: JUNSU KIM Date: _____

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 4.

Calculation Approved by: _____ 7/23/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# LEVEL-POOL RESERVOIR CALCULATIONS FOR WHITE TANK FRS NO. 3 SPILLWAY

**(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)**
**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)**
**23443748**

## PROBLEM STATEMENT

The purpose of this calculation package is to determine whether:

1) The reservoir upstream of White Tank FRS No.3 Spillway conforms to the level pool assumption;

2) The flows through the reservoir do not result in appreciable slope on the water surface and;

3) The reservoir has enough conveyance capacity.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

As the water enters the reservoir of the White Tank FRS No. 3 upstream of the proposed spillway, and flows from North to South, the reservoir narrows down because of the proposed excavation plan and the constraints imposed by the extent of the property line (Please See Figure 1 on page 5). Therefore, one of the major concerns about the proposed alignment of White Tank FRS No.3 Spillway is the formation of a long and narrow reservoir upstream of the spillway, which may not conform to the level-pool reservoir assumption because the flows may cause an appreciable slope on the water surface. The elevation of the water surface in a level-pool reservoir is same at all points across the reservoir. The proposed spillway at White Tank FRS No.3 is a curved spillway with a radius of 700 ft and a total length of 1200 ft. The alignment of the proposed spillway is shown on Figure 1 of Page 5.

EW cross-sections, cross sections 1-13, were drawn across the reservoir, perpendicular to the spillway, extended to the embankment to the West (See Figure 1 on Page 5). The bottom width of each cross-section as shown on Figure 1 varied depending upon the location of FCDMC's property line and the proposed excavation line. The side slope was assumed to be equal to 6:1 on both sides (H:V) which was used to calculate the top width of flow. The water surface elevation at each cross section was assumed to be equal to 1216.4 ft resulting form the reservoir routing of a 6-hr Local PMP storm. The flow depth at each cross section was the difference between the

water surface elevation of 1216.4 ft and the reservoir invert at that cross-section. It should be noted that reservoir inverts from South to North (from cross section 13 to cross section 1) at 0.2 percent slope. The reservoir elevation at South end of the spillway (at cross section 13) is 1206.0 ft. The cross-sections 1-13 were drawn perpendicularly every 100 feet along the spillway. Based on the flow depth and top width at each cross section, flow area and hydraulic radius at each cross section was estimated (see Table 1 on Page 6).

From a continuity standpoint, the discharge passing through each cross-section was supposed to be equal to the discharge passing through the spillway at that point. The reservoir routing of a 6-hour local PMP storm based on the NRCS criteria resulted in maximum outflow discharge equal to approximately 30,000 cfs. It was assumed that the spillway discharge would linearly decrease every 100 ft over its entire length from North to South. Therefore, the spillway discharge was calculated at every 100 ft along the entire length of the spillway with, 30,000 cfs passing through the North end of the spillway (cross-section 1), and zero discharge passing through the South end of the spillway (cross section 13) (Please See Table 1 on Page 6).

FCDMC used a Manning's n of 0.045 in its HECRAS model. Therefore, URS also decided to use the same Manning's n for this analysis.

Given that the discharge passing through each cross-section (Q), Manning's n, flow area and hydraulic radius were known, the water surface slope at each cross-section was calculated using the Manning relationship:

$$Q = A * V$$

Where

$$V = 1.49 / n * R^{2/3} * S^{1/2}$$

Where

Q = Flow Discharge (cfs)

A = Flow Area ($ft^2$)

V = Mean flow velocity (ft/sec)

n = Manning's Roughness Coefficient

R = Hydraulic Radius (ft)

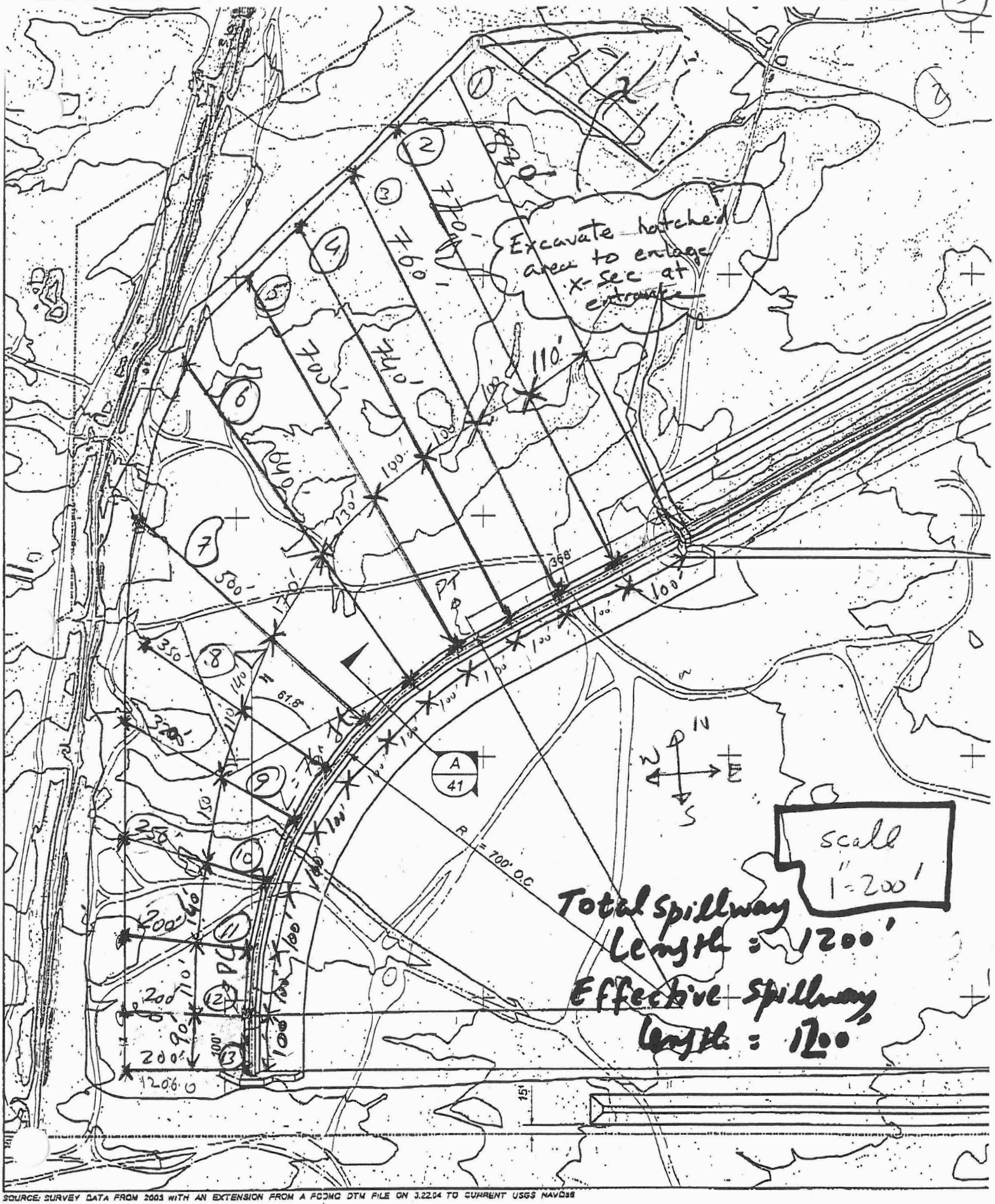
S = Water Surface Slope (ft/ft)

The average water surface slope at each cross-section was calculated. As noted above, the water surface elevation at each cross section was assumed 1216.4 ft and the next step was to re-calculate the water surface elevation at each cross section based on the average water surface slope at each cross-section and the distance between the subsequent cross sections.

## RESULTS

The results indicated that the water surface elevation drops by 0.25 ft in 1500 ft (See Table 1 on page 6). Given that the water surface does not drop significantly throughout the entire reservoir length, it is safe to assume that the reservoir upstream of the spillway conforms to the level-pool concept.

(5)




SOURCE: SURVEY DATA FROM 2003 WITH AN EXTENSION FROM A FCDMC DTM FILE ON 3.22.04 TO CURRENT USGS NAVD88

P:\FCDMC\23443698 White Tanks\Calcs\SpillwayPlan.dgn

XREFS: SZ804_TOPO.DGN, PL-FCD.DGN

# TABLE 1

## LEVEL-POOL RESERVOIR CALCULATIONS

## (TOTAL SPILLWAY LENGTH = 1200 FT)

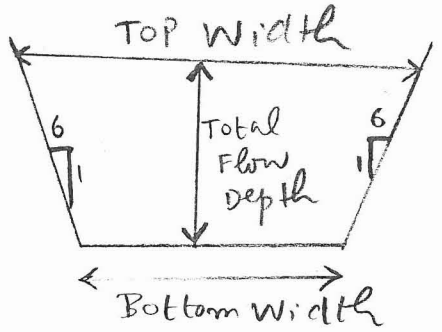
| | | | | |
|---|---|---|---|---|
| 6-hr Local WSE | | 1216.4 | ft | |
| Invert Elevation at South End | | 1206.0 | ft | |
| Side Slope | 6 | | | |

| Cross Section No[*1] | Bottom Width (ft) | Distance From Upstream Cross Section (ft) | Excavation Depth (ft) | Total Depth (ft) | Top Width (ft) | Area (A) (ft2) | Flow Perimeter (ft) | Hydraulic Radius (ft) | Mannings n | Length Along Spillway (ft) | Spillway Discharge (Q) (cfs) | Flow Velocity (V=Q/A) (ft/sec) | Water Surface Slope (ft/ft) | Average Water Surface Slope (ft/ft) | Water Surface Elevation[*2] (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 820 | 0 | 2.9 | 13.3 | 980 | 11967 | 982 | 12.19 | 0.045 | 0 | 30000 | 2.51 | 2.01E-04 | 2.01E-04 | 1216.65 |
| 2 | 770 | 110 | 2.7 | 13.1 | 927 | 11098 | 929 | 11.94 | 0.045 | 100 | 27500 | 2.48 | 2.02E-04 | 1.91E-04 | 1216.63 |
| 3 | 760 | 100 | 2.5 | 12.9 | 915 | 10784 | 917 | 11.76 | 0.045 | 200 | 25000 | 2.32 | 1.80E-04 | 1.71E-04 | 1216.61 |
| 4 | 740 | 100 | 2.3 | 12.7 | 892 | 10348 | 894 | 11.57 | 0.045 | 300 | 22500 | 2.17 | 1.62E-04 | 1.56E-04 | 1216.60 |
| 5 | 700 | 100 | 2.1 | 12.5 | 850 | 9671 | 852 | 11.35 | 0.045 | 400 | 20000 | 2.07 | 1.50E-04 | 1.49E-04 | 1216.58 |
| 6 | 640 | 130 | 1.8 | 12.2 | 787 | 8717 | 789 | 11.05 | 0.045 | 500 | 17500 | 2.01 | 1.47E-04 | 1.68E-04 | 1216.56 |
| 7 | 500 | 170 | 1.5 | 11.9 | 643 | 6787 | 645 | 10.53 | 0.045 | 600 | 15000 | 2.21 | 1.90E-04 | 2.34E-04 | 1216.53 |
| 8 | 350 | 140 | 1.2 | 11.6 | 489 | 4867 | 491 | 9.91 | 0.045 | 700 | 12500 | 2.57 | 2.78E-04 | 2.51E-04 | 1216.50 |
| 9 | 320 | 110 | 1.0 | 11.4 | 457 | 4419 | 458 | 9.64 | 0.045 | 800 | 10000 | 2.26 | 2.24E-04 | 2.20E-04 | 1216.47 |
| 10 | 250 | 150 | 0.7 | 11.1 | 383 | 3507 | 385 | 9.11 | 0.045 | 900 | 7500 | 2.14 | 2.16E-04 | 1.86E-04 | 1216.44 |
| 11 | 200 | 140 | 0.4 | 10.8 | 330 | 2860 | 331 | 8.63 | 0.045 | 1000 | 5000 | 1.75 | 1.55E-04 | 9.85E-05 | 1216.41 |
| 12 | 200 | 110 | 0.2 | 10.6 | 327 | 2788 | 329 | 8.48 | 0.045 | 1100 | 2500 | 0.90 | 4.18E-05 | 2.09E-05 | 1216.40 |
| 13 | 200 | 90 | 0 | 10.4 | 325 | 2729 | 327 | 8.36 | 0.045 | 1200 | 0 | 0.00 | 0.00E+00 | 0.00E+00 | 1216.40 |

1 The water surface elevation (WSE) at the downstream most cross-section 13 was assumed to be equal to 1216.4 ft and the WSE at each cross section upstream was caluclated based on the average water surface slope and the distance betweeen the cross sections.

2 The direction of flow into the reservoir is from North to South ( from Cross-Section 1 to Cross-Section 13) whereas the channel inverts at 0.2 % slope in the opposite direction from South to North (from Cross-Section 13 to Cross-Section 1).

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TABLE 1 | | | | | | | | | | | | | | | |
| 2 | LEVEL-POOL RESERVOIR CALCULATIONS | | | | | | | | | | | | | | | |
| 3 | (TOTAL SPILLWAY LENGTH = 1200 FT) | | | | | | | | | | | | | | | |
| 4 | 6-hr Local WSE | | | 1216.4 | ft | | | | | | | | | | | |
| 5 | End | | | 1206 | ft | | | | | | | | | | | |
| 6 | Side Slope | 6 | (H:V) | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | |
| 8 | Cross Section No.[1] | Bottom Width | Distance From Upstream Cross Section | Excavation Depth | Total Depth | Top Width | Area (A) | Flow Perimeter | Hydraulic Radius | Mannings n | Length Along Spillway | Spillway Discharge (Q) | Flow Velocity (V=Q/A) | Water Surface Slope | Average Water Surface Slope | Water Surface Elevation[2] |
| 9 | | (ft) | (ft) | (ft) | (ft) | (ft) | (ft2) | (ft) | (ft) | | (ft) | (cfs) | (ft/sec) | (ft/ft) | (ft/ft) | (ft) |
| 10 | 1 | 820 | 0 | =(C11*0.002)+D11 | =(D10+$E$22) | =B10+((E10*$B$6)*2) | =(B10*E10)+((0.5*(E10*$B$6)*(E10))*2) | =B10+(((E10)^2+((E10*$B$6)^2))^0.5)*2 | =G10/H10 | 0.045 | 0 | 30000 | =L10/G10 | =((M10*J10/1.49)*(1/(I10)^0.67))^2 | =(N11+N10)/2 | =P11+(O10*C11) |
| 11 | =(A10+1) | 770 | 110 | =(C12*0.002)+D12 | =(D11+$E$22) | =B11+((E11*$B$6)*2) | =(B11*E11)+((0.5*(E11*$B$6)*(E11))*2) | =B11+(((E11)^2+((E11*$B$6)^2))^0.5)*2 | =G11/H11 | 0.045 | 100 | =((1200-K11)/1200)*$L$10 | =L11/G11 | =((M11*J11/1.49)*(1/(I11)^0.67))^2 | =(N12+N11)/2 | =P12+(O11*C12) |
| 12 | =(A11+1) | 760 | 100 | =(C13*0.002)+D13 | =(D12+$E$22) | =B12+((E12*$B$6)*2) | =(B12*E12)+((0.5*(E12*$B$6)*(E12))*2) | =B12+(((E12)^2+((E12*$B$6)^2))^0.5)*2 | =G12/H12 | 0.045 | =(K11+100) | =((1200-K12)/1200)*$L$10 | =L12/G12 | =((M12*J12/1.49)*(1/(I12)^0.67))^2 | =(N13+N12)/2 | =P13+(O12*C13) |
| 13 | =(A12+1) | 740 | 100 | =(C14*0.002)+D14 | =(D13+$E$22) | =B13+((E13*$B$6)*2) | =(B13*E13)+((0.5*(E13*$B$6)*(E13))*2) | =B13+(((E13)^2+((E13*$B$6)^2))^0.5)*2 | =G13/H13 | 0.045 | =(K12+100) | =((1200-K13)/1200)*$L$10 | =L13/G13 | =((M13*J13/1.49)*(1/(I13)^0.67))^2 | =(N14+N13)/2 | =P14+(O13*C14) |
| 14 | =(A13+1) | 700 | 100 | =(C15*0.002)+D15 | =(D14+$E$22) | =B14+((E14*$B$6)*2) | =(B14*E14)+((0.5*(E14*$B$6)*(E14))*2) | =B14+(((E14)^2+((E14*$B$6)^2))^0.5)*2 | =G14/H14 | 0.045 | =(K13+100) | =((1200-K14)/1200)*$L$10 | =L14/G14 | =((M14*J14/1.49)*(1/(I14)^0.67))^2 | =(N15+N14)/2 | =P15+(O14*C15) |
| 15 | =(A14+1) | 640 | 130 | =(C16*0.002)+D16 | =(D15+$E$22) | =B15+((E15*$B$6)*2) | =(B15*E15)+((0.5*(E15*$B$6)*(E15))*2) | =B15+(((E15)^2+((E15*$B$6)^2))^0.5)*2 | =G15/H15 | 0.045 | =(K14+100) | =((1200-K15)/1200)*$L$10 | =L15/G15 | =((M15*J15/1.49)*(1/(I15)^0.67))^2 | =(N16+N15)/2 | =P16+(O15*C16) |
| 16 | =(A15+1) | 500 | 170 | =(C17*0.002)+D17 | =(D16+$E$22) | =B16+((E16*$B$6)*2) | =(B16*E16)+((0.5*(E16*$B$6)*(E16))*2) | =B16+(((E16)^2+((E16*$B$6)^2))^0.5)*2 | =G16/H16 | 0.045 | =(K15+100) | =((1200-K16)/1200)*$L$10 | =L16/G16 | =((M16*J16/1.49)*(1/(I16)^0.67))^2 | =(N17+N16)/2 | =P17+(O16*C17) |
| 17 | =(A16+1) | 350 | 140 | =(C18*0.002)+D18 | =(D17+$E$22) | =B17+((E17*$B$6)*2) | =(B17*E17)+((0.5*(E17*$B$6)*(E17))*2) | =B17+(((E17)^2+((E17*$B$6)^2))^0.5)*2 | =G17/H17 | 0.045 | =(K16+100) | =((1200-K17)/1200)*$L$10 | =L17/G17 | =((M17*J17/1.49)*(1/(I17)^0.67))^2 | =(N18+N17)/2 | =P18+(O17*C18) |
| 18 | =(A17+1) | 320 | 110 | =(C19*0.002)+D19 | =(D18+$E$22) | =B18+((E18*$B$6)*2) | =(B18*E18)+((0.5*(E18*$B$6)*(E18))*2) | =B18+(((E18)^2+((E18*$B$6)^2))^0.5)*2 | =G18/H18 | 0.045 | =(K17+100) | =((1200-K18)/1200)*$L$10 | =L18/G18 | =((M18*J18/1.49)*(1/(I18)^0.67))^2 | =(N19+N18)/2 | =P19+(O18*C19) |
| 19 | =(A18+1) | 250 | 150 | =(C20*0.002)+D20 | =(D19+$E$22) | =B19+((E19*$B$6)*2) | =(B19*E19)+((0.5*(E19*$B$6)*(E19))*2) | =B19+(((E19)^2+((E19*$B$6)^2))^0.5)*2 | =G19/H19 | 0.045 | =(K18+100) | =((1200-K19)/1200)*$L$10 | =L19/G19 | =((M19*J19/1.49)*(1/(I19)^0.67))^2 | =(N20+N19)/2 | =P20+(O19*C20) |
| 20 | =(A19+1) | 200 | 140 | =(C21*0.002)+D21 | =(D20+$E$22) | =B20+((E20*$B$6)*2) | =(B20*E20)+((0.5*(E20*$B$6)*(E20))*2) | =B20+(((E20)^2+((E20*$B$6)^2))^0.5)*2 | =G20/H20 | 0.045 | =(K19+100) | =((1200-K20)/1200)*$L$10 | =L20/G20 | =((M20*J20/1.49)*(1/(I20)^0.67))^2 | =(N21+N20)/2 | =P21+(O20*C21) |
| 21 | =(A20+1) | 200 | 110 | =(C22*0.002)+D22 | =(D21+$E$22) | =B21+((E21*$B$6)*2) | =(B21*E21)+((0.5*(E21*$B$6)*(E21))*2) | =B21+(((E21)^2+((E21*$B$6)^2))^0.5)*2 | =G21/H21 | 0.045 | =(K20+100) | =((1200-K21)/1200)*$L$10 | =L21/G21 | =((M21*J21/1.49)*(1/(I21)^0.67))^2 | =(N22+N21)/2 | =P22+(O21*C22) |
| 22 | 13 | 200 | 90 | 0 | =D4-D5 | =B22+((E22*$B$6)*2) | =(B22*E22)+((0.5*(E22*$B$6)*(E22))*2) | =B22+(((E22)^2+((E22*$B$6)^2))^0.5)*2 | =G22/H22 | 0.045 | =(K21+100) | =((1200-K22)/1200)*$L$10 | =L22/G22 | =((M22*J22/1.49)*(1/(I22)^0.67))^2 | =N22 | =1216.4 |
| 23 | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | | |
| 25 | 1 The water surface elevation (WSE) at the downstream most cross-section 13 was assumed to be equal to 1216.4 ft and the WSE at each cross section upstream was caluclated based on the average water surface slope and the distance betweeen the cross section. | | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | | | | |
| 27 | 2 The direction of flow into the reservoir is from North to South ( from Cross-Section 1 to Cross-Section 13) whereas the channel inverts at 0.2 % slope in the opposite direction from South to North (from Cross-Section 13 to Cross-Section 1). | | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | | | |




Top Width =
= (Bottom Width) *
* [(Flow Depth * Side Slope) * 2]

(1)

URS

# CALCULATION PACKAGE NO. C-13

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **DETERMINATION OF SUBMERGENCE EFFECTS AT WHITE TANK FRS NO. 3 SPILLWAY**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 07/16/04

Checked by: JUNELL KIM Date: 7/16/04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 4.

Calculation Approved by: _____ 7/23/04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

# DETERMINATION OF SUBMERGENCE EFFECTS AT WHITE TANK FRS NO. 3 SPILLWAY

(WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3)
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
23443748

## PROBLEM STATEMENT

The purpose of this calculation package is to determine the submergence effect at the White Tank FRS No. 3 Spillway.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

When the water level below an overflow weir is high enough to affect the discharge, the weir is said to be submerged. The vertical distance from the crest of the overflow (spillway in this case) to the downstream apron and the depth of flow in the downstream channel, as it relates to the head pool level, are factors that alter the discharge coefficient (*Design of Small Dams, United State Department of Interior Bureau of Reclamation, Third edition, 1987*). Please see attached Pages 6-9.

In order to determine the possible submergence effects at White Tank FRS No.3 Spillway, Figure 9-26 of *Design of Small Dams, Third Edition, 1987* was used. Figure 9-26 presents a chart plotted with Degree of Submergence on Y-axis and Position of Downstream Apron on X-Axis (Please See Page 9). The degree of submergence was determined using the following relationship:

$$\textit{Degree of Submergence} = h_d/H_e$$

Where $h_d$ = Difference in head pool level and tail water level

$H_e$ = Height of water above the spillway crest

The position of downstream apron was determined using the following relationship:

$$\textit{Position of Downstream Apron} = (h_d + d) / H_e$$

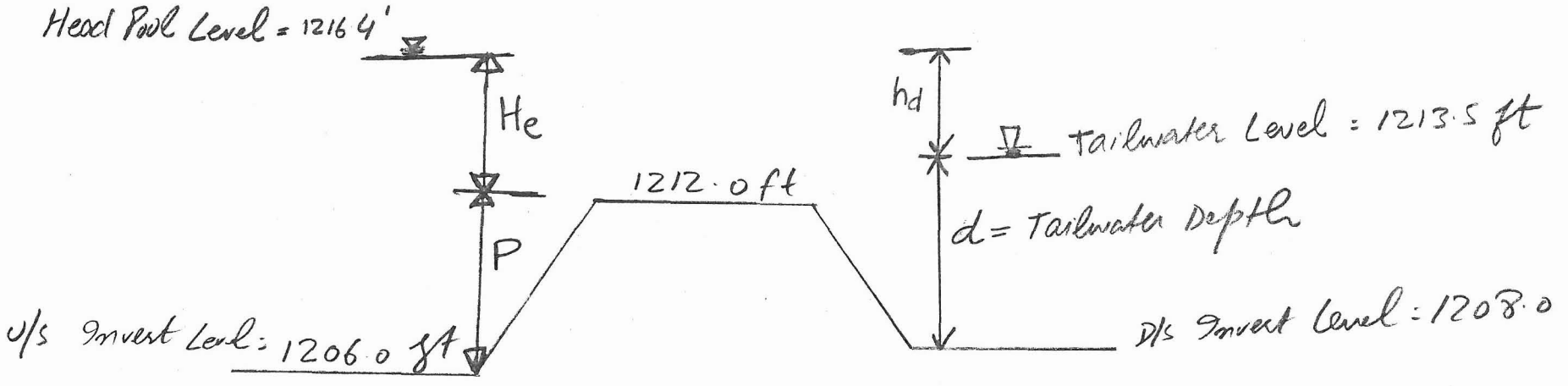
Where d = Tail water depth (ft)

$h_d$ and $H_e$ are same as defined above.

## RESULTS

Form Figure 9-26, it can be seen that in order to have no submergence effects, the $(h_d + d) / H_e$ should exceed about 1.7 and $h_d/H_e$ should exceed at least 0.65. Based on the computation results tabulated in Table 1, the ***Degree of Submergence*** was found to be equal to 0.67 and ***Position of Downstream Apron*** was found to be equal to 1.91. Therefore, the proposed spillway at White tank FRS No.3 should not experience any submergence effects.

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **TABLE 1** | | | | | | | | | | | | | |
| 2 | **SUBMERGENCE EFFECT AT WHITE TANK FRS NO. 3 SPILLWAY** | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 4 | Head Pool Level | Upstream Channel Invert | Spillway Crest Level | Height of Spillway (P) | Height of Water Above the Crest ($H_e$) | D/S Channel Invert | Tailwater Depth (d) | Tailwater Level (ft) | Water Level Difference ($h_d$) | Degree of Submergence ($h_d$/He) | Position of D/S Apron ($h_d$+d)/$H_e$ | Allowable Degree of Submergence | Position of D/S Apron | Submergence Effect |
| 5 | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | |
| 6 | 1216.4 | 1206.0 | 1212.0 | 6.0 | 4.4 | 1208.0 | 5.5 | 1213.5 | 2.90 | **0.66** | **1.91** | 0.65 or Greater | 1.7 or Greater | None |



| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **TABLE 1** | | | | | | | | | | | | | |
| 2 | **SUBMERGENCE EFFECT AT WHITE TANK FRS NO. 3 SPILLWAY** | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 4 | Upstream Water Level | Upstream Channel Invert | Spillway Crest Level | Height of Spillway (P) | Height of Water Above the Crest ($H_e$) | D/S Channel Invert | Tailwater Depth (d) | Tailwater Level (ft) | Water Level Difference ($h_d$) | Degree of Submergence ($h_d$/He) | Position of D/S Apron ($h_d$+d)/$H_e$ | Allowable Degree of Submergence | Position of D/S Apron | Submergence Effect |
| 5 | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | |
| 6 | 1216.4 | 1206 | 1212 | =C6-B6 | =A6-C6 | 1208 | 5.5 | =F6+G6 | =A6-H6 | **=I6/E6** | **=(I6+G6)/E6** | 0.65 or Greater | 1.7 or Greater | None |

(6)



UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

# DESIGN OF SMALL DAMS

A Water Resources Technical Publication

First Edition, 1960
Second Edition, 1973
Revised Reprint, 1977
Third Edition, 1987

to direction of flow, when $0.5H_o \leq r \leq 0.15H_o$: $K_a = 0.10$

- For rounded abutments where $r > 0.5H_o$ and headwall is placed not more than 45° to direction of flow: $K_a = 0.0$

where $r$ = radius abutment rounding.

**9.12. *Discharge Coefficient for Uncontrolled Ogee Crests.***—(a) *Effect of Depth of Approach.*—For a high sharp-crested weir placed in a channel, the velocity of approach is small and the underside of the nappe flowing over the weir attains maximum vertical contraction. As the approach depth is decreased, the velocity of approach increases and the vertical contraction diminishes. For sharp-crested wiers whose heights are not less than about one-fifth the heads producing flow over them, the discharge coefficient remains fairly constant with a value of about 3.3, although the contraction diminishes. For weir heights less than about one-fifth the head, the contraction of the flow becomes increasingly suppressed and the crest coefficient decreases. When the weir height becomes zero, the contraction is entirely suppressed and the overflow weir becomes, in effect, a channel or a broad-crested weir, for which the theoretical discharge coefficient is 3.087. If the sharp-crested weir coefficients are related to the head measured from the point of maximum contraction instead of to the head above the sharp crest, coefficients applicable to ogee crests shaped to profiles of undernappes for various approach velocities can be established. The relationship of the ogee crest coefficient, $C_o$, to various values of $P/H_o$ is shown on figure 9-23. These coefficients are valid only when the ogee is formed to the ideal nappe shape; that is, when $H_e/H_o = 1$.

(b) *Effect of Heads Different from Design Head.*—When the ogee crest shape is different from the ideal shape or when the crest has been shaped for a head larger or smaller than the one under consideration, the discharge coefficient will differ from that shown on figure 9-23. A wider shape will result in positive pressures along the crest contact surface, thereby reducing the discharge. With a narrower crest shape, negative pressures along the contact surface will occur, resulting in an increased discharge. Figure 9-24 shows the variation of the coefficient as related to values of $H_e/H_o$, where $H_e$ is the actual head being considered.

An approximate discharge coefficient for an irregularly shaped crest whose profile has not been formed according to the undernappe of the overflow jet can be estimated by finding the ideal shape that most nearly matches it. The design head, $H_o$, corresponding to the matching shape can then be used as a basis for determining the coefficients [19].

The coefficients for partial heads on the crest, for preparing a discharge-head relationship, can be determined from figure 9-24.

(c) *Effect of Upstream Face Slope.*—For small ratios of the approach depth to the head on the crest, sloping the upstream face of the overflow results in an increase in the discharge coefficient. For large ratios the effect is a decrease in the coefficient. Within the range considered in this text, the discharge coefficient is reduced for large ratios of $P/H_o$ only for relatively flat upstream slopes. Figure 9-25 shows the ratio for the coefficient for an overflow ogee crest with a sloping (inclined) face, $C_i$, to the coefficient for a crest with a vertical upstream face, $C_v$, as obtained from figure 9-23 (and as adjusted by figure 9-24 if appropriate), as related to values of $P/H_o$.

(d) *Effect of Downstream Apron Interference and Downstream Submergence.*—When the water level below an overflow weir is high enough to affect the discharge, the weir is said to be submerged. The vertical distance from the crest of the overflow to the downstream apron and the depth of flow in the downstream channel, as it relates to the head pool level, are factors that alter the discharge coefficient.

Five distinct characteristic flows can occur below an overflow crest, depending on the relative positions of the apron and the downstream water surface: (1) flow can continue at supercritical stage; (2) a partial or incomplete hydraulic jump can occur immediately downstream from the crest; (3) a true hydraulic jump can occur; (4) a drowned jump can occur in which the high-velocity jet will follow the face of the overflow and then continue in an erratic and fluctuating path for a considerable distance under and through the slower water; and (5) no jump may occur—the jet will break away from the face of the overflow and ride along the surface for a short distance and then erratically intermingle with the slow moving water underneath. Figure 9-26 shows the relationship of the floor positions and downstream submergences that produce these distinctive flows.

Where the downstream flow is at supercritical stage or where the hydraulic jump occurs, the decrease in the discharge coefficient is principally caused by the back-pressure effect of the down-

stream apron and is independent of any submergence effect from the tailwater. Figure 9-27 shows the effect of downstream apron conditions on the discharge coefficient. It should be noted that this curve plots, in a slightly different form, the same data represented by the vertical dashed lines on figure 9-26. As the downstream apron level nears the crest of the overflow, $(h_d + d)/H_e$ approaches 1.0, and the discharge coefficient is about 77 percent of the coefficient for unretarded flow. On the basis of a coefficient of 4.0 for unretarded flow over a high weir, the coefficient when the weir is submerged will be about 3.08, which is virtually the coefficient for a broad-crested weir.

From figure 9-26, it can be seen that when $(h_d + d)/H_e$ exceeds about 1.7, the downstream floor position has little effect on the coefficient, but there is a decrease in the coefficient caused by tailwater submergence. Figure 9-28 shows the ratio of the discharge coefficient where affected by tailwater conditions to the coefficient for free flow conditions. This curve plots, in a slightly different form, the data represented by the horizontal dashed lines on figure 9-26. Where the dashed lines on figure 9-26 are curved, the decrease in the coefficient is the result of a combination of tailwater effects and downstream apron position.

**9.13. *Examples of Designs of Uncontrolled Ogee Crests.*—**The two examples cited below illustrate the methods of designing uncontrolled ogee crests, including the computation of approach channel losses and velocity head, the determination of the total length of the crest, and the correction of the discharge coefficient for various effects.

(a) *Example 1.*—Design an uncontrolled overflow ogee crest for a chute spillway that will discharge 2,000 ft³/s at a 5-foot head, and prepare a discharge-head curve. The upstream face of the

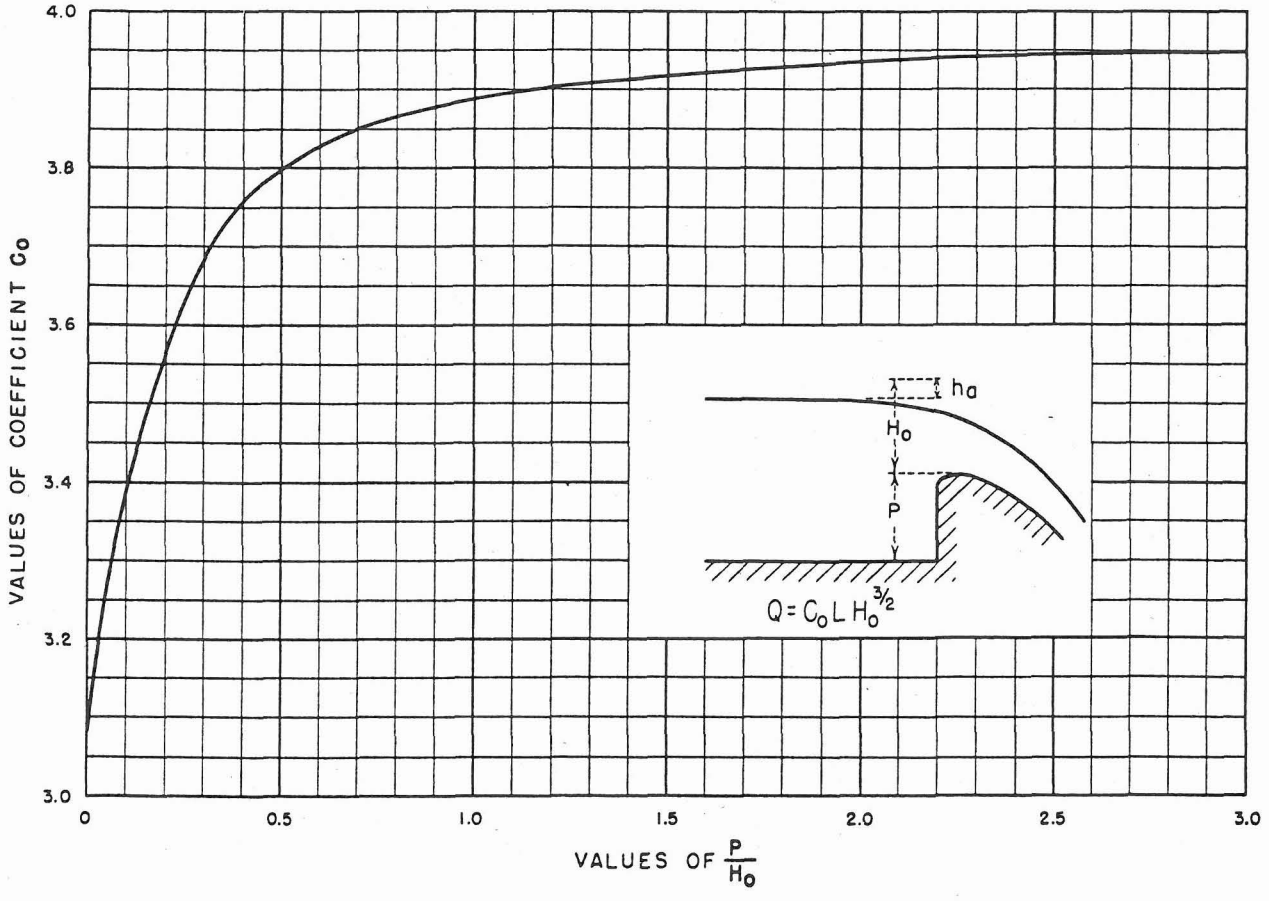



Figure 9-23.—Discharge coefficients for vertical-faced ogee crest. 288-D-2409.

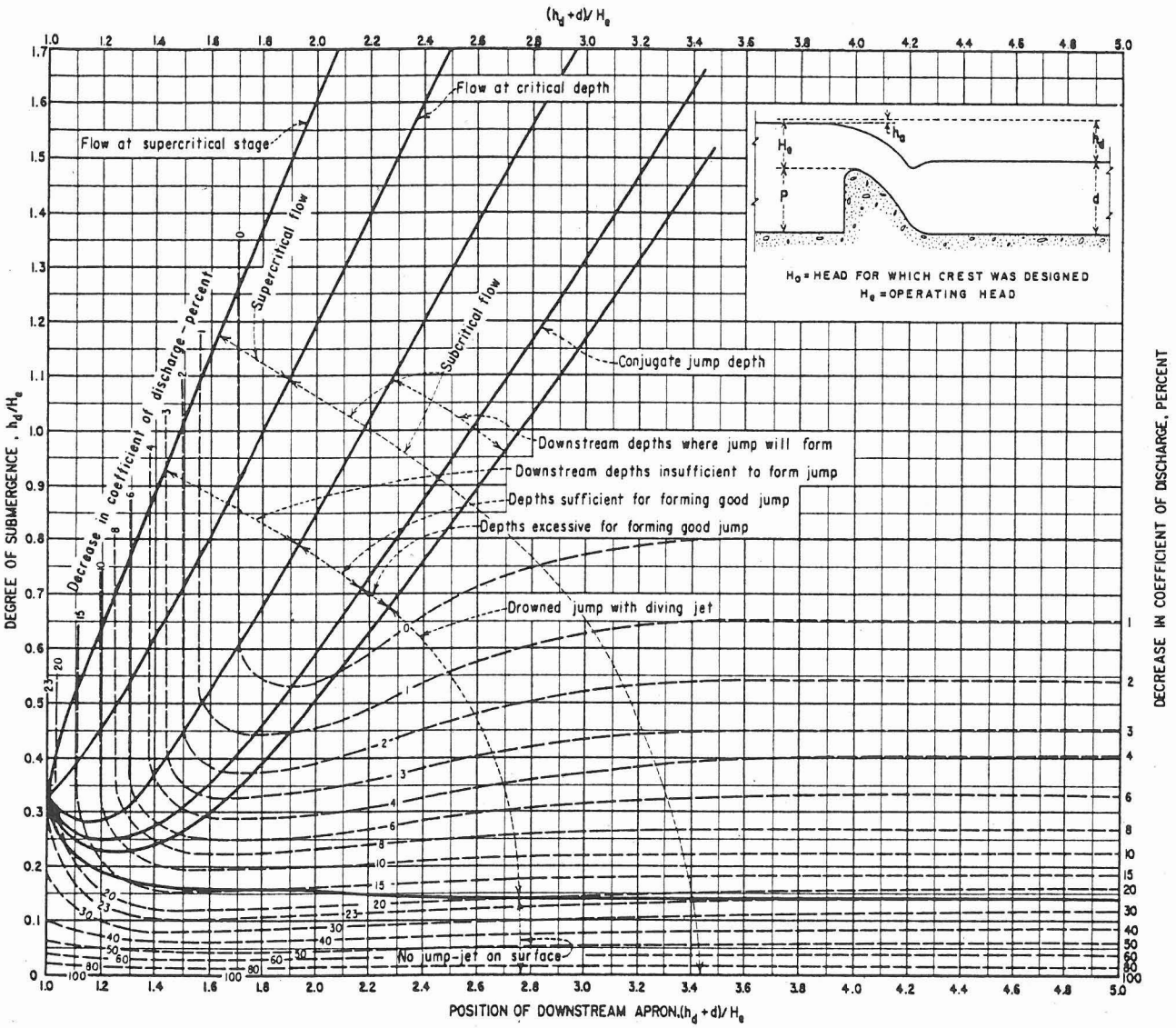



Figure 9-26.—Effects of downstream influences on flow over weir crests. 288-D-2412.

solutions will show both procedures.

(1) *Procedure 1.*—First, assume the position of the approach and downstream apron levels with respect to the crest level, say 2 feet below crest level. Then $H_e + P$ is approximately 7 feet.

To evaluate the approach channel losses, assume a value of $C$ to obtain an approximate approach velocity, say $C = 3.7$. Then the discharge per unit of crest length, $q$, is equal to $CH_e^{3/2} = 3.7 \times 5^{3/2} = 41$ ft$^3$/s. Therefore, the velocity of approach $v_a = q/(H_e + P) = 41/7 = 5.9$ ft/s, and the approach velocity head, $h_a = v_a^2/2g = 5.9^2/64.4 = 0.5$ feet.

Assuming the friction coefficient in Manning's formula $n = 0.0225$, and assuming the hydraulic radius $r$ = the depth of approach, then the friction slope is equal to:

$$s = \left(\frac{v_a n}{1.486 r^{2/3}}\right)^2 = \left(\frac{5.9 \times 0.0225}{1.486 \times 7^{2/3}}\right)^2 = 0.0006$$

Therefore, the total approach channel friction loss, $h_f = 100\ (0.0006) = 0.06$ feet. Assuming an entrance loss into the approach channel equal to $0.1h_a$, the total loss of head in the approach is approximately $0.06 + (0.1 \times 0.5) = 0.11$ feet.

(1)

URS

# CALCULATION PACKAGE NO. C-14

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **ESTIMATION OF UNIFORM FLOW DEPTH DOWNSTREAM OF WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 06/25/04

Checked by: Todd Ringsmuth Date: 7-27-04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Pages 2-4.

Calculation Approved by: Todd Ringsmuth 7-27-04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# ESTIMATION OF UNIFORM FLOW DEPTH DOWNSTREAM OF WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
23443748

## PROBLEM STATEMENT

The aim of this calculation package is to determine the uniform flow depth downstream of White Tank FRS No. 3 within an excavated spillway channel.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

The outflows released from the emergency spillway at White Tank FRS No.3 are planned to be discharged into a channel (referred as Excavated Spillway Channel from hereon) of bottom width of approximately 835 ft with a side slopes of 2 to 1 (H: V). The Excavated Spillway Channel slopes at 0.5 percent until it daylights to the existing grade, approximately 1560 ft long. Further downstream, the Excavated Spillway Channel transitions into a natural channel, which is wider and steeper (1 percent) than the Excavated Spillway Channel. Therefore, the water depth within the natural channel is expected to be lower than the flow depth in the Excavated Spillway Channel causing no backwater effects. A uniform flow is expected to occur within the Excavated Spillway Channel

The reservoir routing of a 6-hour local PMF storm for future conditions with a broad-crested weir in place and a closed Principal Spillway revealed the maximum outflow discharge to be equal to 30,000 cfs. Therefore, the Excavated Spillway Channel was designed for a capacity of 30,000 cfs. A Manning's Roughness coefficient of 0.06 and 0.045 was used for the channel banks and the channel bed respectively. It should be noted that these Manning's Roughness coefficients were selected with an anticipation of future vegetation growth in the channel. A computer software FLOWMASTER was used to determine the uniform flow depth for the Excavated Spillway Channel. Please note that the FLOWMASTER does not allow entering separate Manning's Roughness coefficient for channel banks and the channel bed. Therefore, an average Manning's Roughness coefficient of 0.05 was used for the FLOWMASTER analysis.

## RESULTS

The FLOWMASTER analysis indicates a uniform flow depth of 5.5 ft within the downstream channel with the mean flow velocity equal to 6.5 ft/sec (Please See Pages 3 and 4).

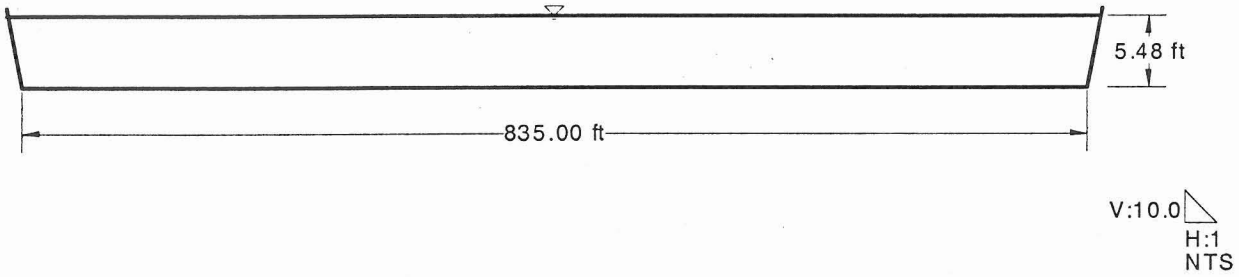
# Cross Section Of White Tank FRS No.3 Downstream Conveyance Channel
## Cross Section for Trapezoidal Channel

(3)

| Project Description | |
|---|---|
| Worksheet | Channel Sizing (n=0.05, S=0.5%, |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Section Data | | |
|---|---|---|
| Mannings Coeffic | 0.050 | |
| Slope | 0.005000 | ft/ft |
| Depth | 5.48 | ft |
| Left Side Slope | 2.00 | H : V |
| Right Side Slope | 2.00 | H : V |
| Bottom Width | 835.00 | ft |
| Discharge | 30,000.00 | cfs |

Depth of Flow



# White Tank FRS No.3 Downstream Conveyance Channel Sizing
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | Channel Sizing (n=0.05, S=0.5%, |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Channel Depth |

| Input Data | | |
|---|---|---|
| Mannings Coeffic | 0.050 | |
| Slope | 0.005000 | ft/ft |
| Left Side Slope | 2.00 | H : V |
| Right Side Slope | 2.00 | H : V |
| Bottom Width | 835.00 | ft |
| Discharge | 30,000.00 | cfs |

| Results | | |
|---|---|---|
| Depth | 5.48 | ft |
| Flow Area | 4,639.5 | ft² |
| Wetted Perim | 859.53 | ft |
| Top Width | 856.94 | ft |
| Critical Depth | 3.41 | ft |
| Critical Slope | 0.024320 | ft/ft |
| Velocity | 6.47 | ft/s |
| Velocity Head | 0.65 | ft |
| Specific Ener | 6.13 | ft |
| Froude Numb | 0.49 | |
| Flow Type | Subcritical | |

URS

# CALCULATION PACKAGE NO. C-15

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **WAVE RUNUP AND FREEBOARD ESTIMATION AT WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3**

Total Number of Pages (including cover sheet):

Total Number of Computer Runs:

Prepared by: Hammad Hussain Date: 08/09/04

Checked by: John Klamut Date: 8/13/04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Pages 5-6.

Calculation Approved by: 8-19-04
Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| 1 | USBR Methodology used | 1/14/05 |
| | | |
| | | |

Project Manager/Date

# WAVE RUNUP AND FREEBOARD ESTIMATION AT WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
23443748

## PROBLEM STATEMENT

The aim of this calculation package is to estimate the wave runup and the corresponding freeboard at White Tank FRS No. 3 reservoir.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

When a dam is being designed, the crest of the dam must be made higher than the maximum pool level in the reservoir to prevent overtopping of the dam as the wind generated waves strike the dam slope. The additional height given to the crest of the dam to take care of wave action and set up is called freeboard.

The freeboard at White Tank FRS No.3 related to the wave action was determined using the procedure outlined in USBR's Manual ACER Technical Memorandum No.2 (1980) titled as " Freeboard Criteria and Guidelines For Computing Freeboard Allowances For Storage Dams". The stepwise procedure used in estimating the wave run-up and freeboard is described below:

### 1) Fetch Length (F)

Fetch length is the distance across water that wind blows to generate waves. In other words, fetch is the open water distance (in the direction of the wind velocity) upwind of the point in question.

A trail and error method was used in the selection of a station along the White Tank FRS No.3 for determining the direction of the central radial to obtain a maximum effective fetch. The effective fetch at a given station was estimated using the following relationship as described in Equation 1 on Page 11 of ACER TM No.2 (See Page 14):

$$F_e = \Sigma X_i * \text{Cos}\alpha_i \; / \; \Sigma \text{Cos}\alpha_i$$

Where

$F_e$ = Effective fetch length

$\alpha_i$ = Angle between the central radial and radial i

$X_i$ = Length of projection of radial i on the central radial

The effective fetch length was found to be equal to 0.60 miles. All calculations related to the estimation of effective fetch length are provided in Table 1 (See Page 6) and Figure 1 (See Page 10).

### 2) Wind Speed & Duration

The overland fastest mile (approximate 1-minute duration) and 1-hour wind speed for Arizona were estimated from Figures 4 and 5 of USBR's Manual ACER TM. No. 2 (1981) (See Pages 19-20) and were found to be equal to 70 mph and 40 mph respectively. The overland 1- hour wind speed of 40 mph for Arizona obtained from Figure 5 was in agreement with the average maximum hourly wind speed of 35 mph for a 50-year period (1948-1997) recorded at Phoenix Sky Harbor Airport.

The overland 2-hour wind speed was estimated by multiplying 1-hour wind speed by a factor of 0.96 as suggested on Page 11 of ACER TM. No. 2 (1981) (See Page 14). An adjustment for over-water winds was estimated by multiplying the overland wind speeds by a velocity ratio of 1.1 as suggested in Table 2 of ACER TM. No. 2 (1981) (See Page 15). A summary of overland and over-water wind speeds for Arizona is provided in Table 2 (See Page 7).

The relationship between wind speed (over water) and wind duration for a given fetch (0.6 miles) was developed from Figure 9 of ACER TM. No. 2 (1981) (See Page 21) and is provided in Table 3 (See Page 7).

The next step was to plot wind speed-wind duration curves based on the data presented in Table 2 and Table 3 respectively. The intersection of these wind speed-wind duration curves determined the design wind speed at White Tank FRS No.3 project site (See Figure 2 on Page 11). The design wind speed was equal to 55 mph.

### 3) Significant Wave Height ($H_o$)

The significant wave height ($H_o$) was obtained using Figure 9 of USBR's Manual ACER TM. No. 2 (1981) for an effective fetch length of 0.6 mile and a design wind speed of 55 mph and was found to be equal to 1.9 ft (See Page 21).

### 4) Specific Wave Height (H)

Please note that as per information provided on Page 15 of ACER TM. No. 2 (1981) (See Page 18), for normal freeboard computations, the significant wave height should be replaced by the average of the highest 10 percent of the waves, which is 1.27 times the significant wave height. Therefore, the significant wave height ($H_o$) of 1.9 ft was multiplied by 1.27 to obtain the specific wave height (H) of

2.41 ft. All calculations related to the estimation of the specific wave height are provided in Table 4 (See Page 8). All the formulas related to these calculations are provided in Table 5 (See Page 9).

**5) Wave-Length (L)**

The wave-length was estimated using the relationship provided on Page 12 of ACER TM. No. 2 (1981) (See Page 15):

$$L = 5.12T^2$$

Where L = Wave length (ft)

T = Wave Time Period (sec)

The wave time period (T) was estimated using Figure 10 of USBR's Manual ACER TM. No. 2 (1981) (See Page 22).

**6) Wave Runup (R)**

The Wave run-up 'R', was determined using the relationship provided on Page 13 of ACER TM. No. 2 (1981) (See Page 16). It is described as follows:

$$R = H / [0.4 + (H/L)^{0.5} * \cot\theta\ ]$$

Where

H = Specific wave height in feet

L = Wave length in feet

$\theta$ = Angle of the upstream face of the dam with horizontal

Please note that in the above equation, the significant wave height ($H_s$) should be used instead of specific wave height (H) if calculations are being made for the minimum freeboard. However, for the normal freeboard calculations, specific wave height (H) should be used. Please also note that the above wave runup equation should not be used on slopes flatter than 5:1 (H: V). Also, note that for embankment dams with soil cement or other smooth upstream surfaces, the wave runup computed by above equation should be multiplied by a factor of up to 1.5, depending on the smoothness of the surface (See Page 16). In example problems documented in ACER TM. No. 2, a factor of 1.4 was used for the soil cement and a factor of 1.0 was used for the riprap. For White Tank FRS No.3, the upstream surface would be consisted of vegetated surface, somewhere between a riprap and a soil cement surface. Therefore, a factor of 1.4 was used for estimation of the wave runup.

The estimated wave runup was equal to 2.25 ft for an average embankment slope of 4:1 (H: V) at White Tank FRS No.3. Please note that the wave runup was also estimated using Figure 12 of ACER TM. No. 2 (See page 23) and it was found to be equal to 2.25 ft. However, as per the information provided on Page 14 of ACER TM. No. 2 (1981) (See Page 17), if the wave propagation direction as defined by the central radial is not normal to the dam, a correction factor should be applied to the computed runup. The correction factor consists of multiplying the cosine of the angle between the wave propagation direction and a line normal to the dam times the computed runup as long as the angle is les than about 50 degree. In White Tank FRS No.3 case, the angle between the wave propagation direction as defined by the central radial and the line normal to the dam was about 50 degree (See Figure 1 on Page 10). Therefore, the wave runup of 2.25 ft was multiplied by cosine of 50 degree which resulted in a wave runup of 1.45 ft. All calculations related to the estimation of the wave run-up are provided in Table 4 (See Page 8). All the formulas related to these calculations are provided in Table 5 (See Page 9).

7) **Setup (S)**

When no wind is blowing, the water surface in the reservoir is horizontal. However, when the wind is blowing, a shear stress acts on the water surface and because of this the surface will tilt known as setup or wind tide. The wind setup in a reservoir was estimated using the relationship provided on Page 14 of ACER TM. No. 2 (1981) (See Page 17):

$$S = (U^2F) / (1400D)$$

Where

S = Wind Setup (ft)
U = Wind Speed (mph)
F = Fetch Length (miles), normally equals $2F_e$
D = Average Water Depth of the Reservoir (ft)

The wind setup was found to equal to 0.13 ft. All calculations related to the estimation of the wave run-up are provided in Table 4 (See Page 8). All the formulas related to these calculations are provided in Table 5 (See Page 9).

**RESULTS**

The freeboard at White Tank FRS No.3 reservoir was calculated by summing the amount of setup and the wave run up that might be expected. The free board was found to be approximately 1.58 ft (see Table 4 on Page 8).

## Table 1

**Estimation of Effective Fetch Length**
**Trial 3**

| α | Cos (α) | Fetch Length X (ft) | Fetch Length X (miles) | X*(Cosα) |
|---|---|---|---|---|
| 50 | 0.643 | 2900 | 0.55 | 0.353 |
| 40 | 0.766 | 2700 | 0.51 | 0.392 |
| 30 | 0.866 | 2800 | 0.53 | 0.459 |
| 20 | 0.940 | 3000 | 0.57 | 0.534 |
| 10 | 0.985 | 2950 | 0.56 | 0.550 |
| 0 | 1.000 | 3800 | 0.72 | 0.720 |
| 10 | 0.985 | 3300 | 0.63 | 0.616 |
| 20 | 0.940 | 3300 | 0.63 | 0.587 |
| 30 | 0.866 | 3700 | 0.70 | 0.607 |

Σ Cosα = 7.991 Σ XCosα = 4.818

Effective Fetch Length = (Σ Cosα) / (Σ XCosα) 0.60 miles

Angle between the central radial and a line normal to the dam = 50 degree

# Wind Data

## Table 2 - Over Water Wind Speed Computations

| Wind Duration (minutes) | Wind Velocity Over Land (mi/hr)[1] | Wind Velocity Over Water (mi/hr)[2] |
|---|---|---|
| 1 | 70 | 77 |
| 60 | 40 | 44 |
| 120 | 38.4 | 42 |

Notes:

1 - The wind speed over land is based on Figures 4 and 5 of USBR's Manual ACER TM. No. 2 (1981).

2 - The wind speed over water is based on Table 2 of USBR's Manual ACER TM. No. 2 (1981).

## Table 3 - Wind Velocity and Duration Points
## Trial No 3

| Wind Velocity (mi/hr) | Fetch (mi) | Duration (min) |
|---|---|---|
| 20 | 0.6 | 18 |
| 30 | 0.6 | 15 |
| 40 | 0.6 | 14 |
| 50 | 0.6 | 13 |
| 60 | 0.6 | 12 |
| 70 | 0.6 | 11 |

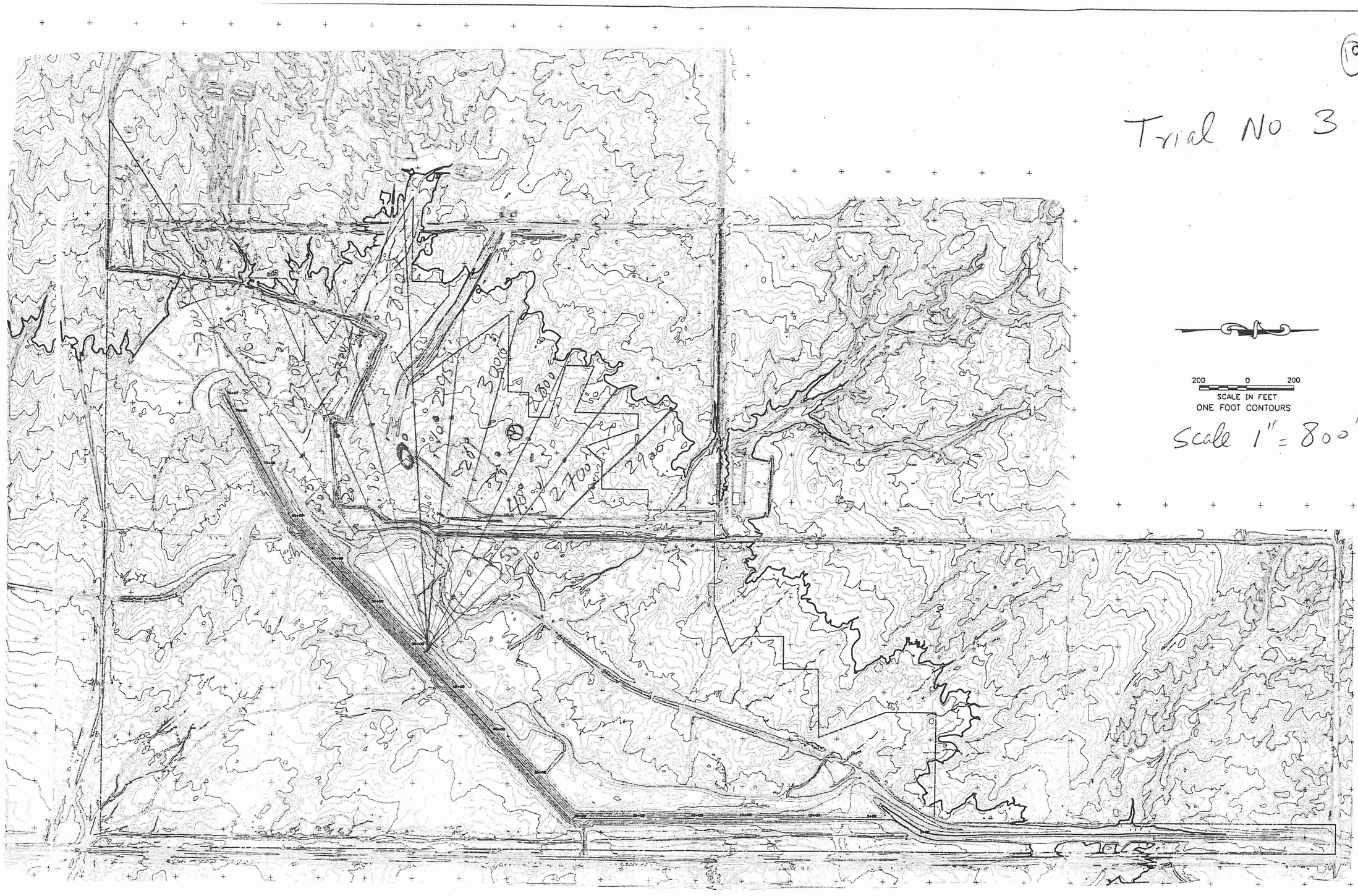
1) The duration of wind is determined using Figure 9 of USBR's Manual ACER TM. No. 2 (1981).

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **TABLE 4** | | | | | | | | | | |
| 2 | **ESTIMATION OF FREE BOARD AT WHITE TANK FRS NO. 3 RESERVOIR** | | | | | | | | | | |
| 3 | **Trial No. 3** | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | Fetch Length | | | 0.6 | Miles | | | | | | |
| 6 | **Wind Speed** | | | **55** | **MPH** | | | | | | |
| 7 | Average Depth | | | 20 | ft | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | Significant Wave Height ($H_s$) *1 | Significant Wave Height Factor | Specific Wave Height $(H)^2$ | Significant Wave Period $(T)^3$ | Wave Length (L) | Embankment Slope (H:V) | Wave Runup ( $R)^4$ | Direction of Wave Propagation | Actual Wave Runup ( R ) | Wind Setup $(S)^5$ | Normal Freeboard |
| 11 | (ft) | - | (ft) | (sec) | (ft) | - | (ft) | (Degree) | (ft) | (ft) | (ft) |
| 12 | 1.9 | 1.27 | 2.41 | 2.50 | 32.00 | 4 to 1 | 2.25 | 50 | 1.45 | 0.13 | 1.58 |
| 13 | | | | | | | | | | | |
| 14 | Notes: | | | | | | | | | | |
| 15 | 1) The Significant Wave Height ($H_s$) is determined using Figure 9 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |
| 16 | 2) The Specific Wave Height (H) is based on information provided on Page 15 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |
| 17 | 3) The Significant Wave Period (T) is determined using Figure 10 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |
| 18 | 4) The Wave Runup (R) is determined using equation provided on Page 13 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |
| 19 | 5) The Wind Setup (S) is determined using equation provided on Page 14 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **TABLE 5** | | | | | | | | | | |
| 2 | **FORUMULA SHEET FOR ESTIMATION OF FREE BOARD AT WHITE TANK FRS NO. 3 RESERVOIR** | | | | | | | | | | |
| 3 | **Trial No. 1** | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | Fetch Length | | | 0.6 | Miles | | | | | | |
| 6 | **Wind Speed** | | | **55** | **MPH** | | | | | | |
| 7 | Average Depth | | | 20 | ft | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | Significant Wave Height ($H_s$) *1 | Significant Wave Height Factor | Specific Wave Height $(H)^2$ | Significant Wave Period $(T)^3$ | Wave Length (L) | Embankment Slope (H:V) | Wave Runup ( R)$^4$ | Direction of Wave Propagation | Actual Wave Runup ( R ) | Wind Setup $(S)^5$ | Normal Freeboard |
| 11 | (ft) | - | (ft) | (sec) | (ft) | - | (ft) | (Degree) | (ft) | (ft) | (ft) |
| 12 | 1.9 | 1.27 | =A12*B12 | 2.5 | =5.12*D12^2 | 4 to 1 | =(1.4*C12)/(0.4+(C12/E12)^0.5*4) | 50 | =(COS(H12*3.14/180))*G12 | =((D6*D6)*(2*D5))/(1400*D7) | =SUM(J12+I12) |
| 13 | | | | | | | | | | | |
| 14 | Notes: | | | | | | | | | | |
| 15 | 1) The Significant Wave Height ($H_s$) is determined using Figure 9 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |
| 16 | 2) The Specific Wave Height (H) is based on information provided on Page 15 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |
| 17 | 3) The Significant Wave Period (T) is determined using Figure 10 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |
| 18 | 4) The Wave Runup (R) is determined using equation provided on Page 13 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |
| 19 | 5) The Wind Setup (S) is determined using equation provided on Page 14 of USBR's Manual ACER TM No. 2. | | | | | | | | | | |

(10)

Trial No 3


E 524400
E 524800
E 525200
E 525600
E 526000
E 526400
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E 531200
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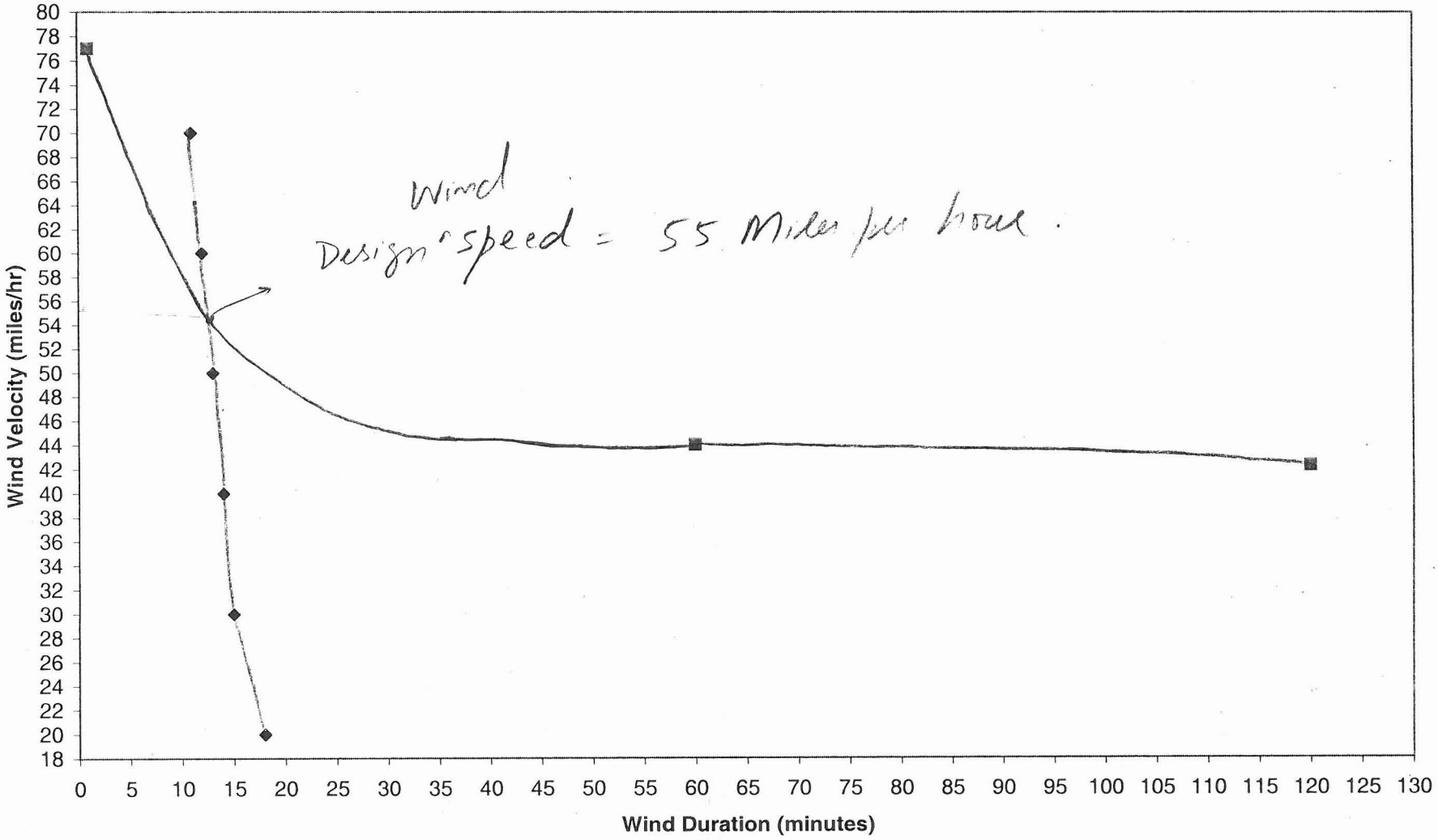
N 925200
N 925600
N 926000
N 926400
N 926800
N 927200
N 927600
N 928000
N 928400
N 928800
200 0 200
SCALE IN FEET
ONE FOOT CONTOURS
Scale 1" = 800'

**Figure 1: Water Wind Velocity vs Duration ( WT FRS No 3 Reservoir)**
**(Trial No 3)**



(12)

ACER TECHNICAL MEMORANDUM NO. 2
ASSISTANT COMMISSIONER - ENGINEERING AND RESEARCH
DENVER, COLORADO

# FREEBOARD CRITERIA AND GUIDELINES FOR COMPUTING FREEBOARD ALLOWANCES FOR STORAGE DAMS

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Reclamation
1981

upstream faces, depending on the smoothness of the surface, the values shown in table 1 should be multiplied by a factor of up to 1.5.

2. Detailed Studies

For specifications designs and some feasibility designs, computational procedures such as those presented in the U.S. Army Corps of Engineers ETL (Engineering Technical Letter) 1110-2-221 [3] and modified in this document should be followed in determining freeboard requirements.

Wind-generated wave runup and setup are sensitive to site-specific conditions at the reservoir such as the seasonal magnitude and direction of winds concurrent with given water levels, orientation of the central radial of the effective fetch, influence of topography, shape of the shoreline and other factors. Detailed analysis of wind data for meteorologic stations located near the damsite should be used in the computations when such data are available. Transposition of wind data from meteorologic stations to the specific reservoir site should reflect the influence of changed topography and ground cover on wind direction and velocity. Designers should fully utilize detailed site-specific wind data that can be obtained from Bureau technical specialists, the National Weather Service, or other sources for use in these computations. Either detailed or generalized wind data can be used with these procedures; however, using detailed wind data will provide more reliable results.

The computations are based on significant wave height which is the average of the highest one-third of the waves in the wave spectrum. A step-by-step computational procedure follows:

a. In inland waters, fetches are limited by land forms surrounding the body of water. Shorelines are irregular and a general method must be applied. The effective fetch at a given station can be computed by [3,4,5]:

$$F_e = \frac{\Sigma X_i \cos \alpha_i}{\Sigma \cos \alpha_i} \qquad \text{[Equation 1]}$$

in which $\alpha_i$ = angle between the central radial and radial i

and $X_i$ = length of projection of radial i on the central radial.

A trial-and-error method should be used in the selection of a station along the dam for determining the direction of the central radial to obtain a maximum effective fetch for a given reservoir shoreline configuration. The radials spanning 45° on each side of the central radial should be used in computing the effective fetch.

b. The generalized fastest mile (approximate 1-minute duration) and 1-hour winds can be estimated from figures 1-4 and 5-8, respectively, based on the location of the reservoir and the season of storm occurrence if detailed wind data are not available. Note previous emphasis on obtaining detailed site-specific wind data. The 2-hour wind velocity can be estimated by multiplying a factor of 0.96 times the 1-hour wind velocity determined from figures 5 through 8. These over land wind velocities have been adjusted to 25 feet above ground level. An adjustment for over water winds can be estimated by multiplying the over land winds by the velocity ratios given in table 2.

Table 2. - Wind relationship - Water to land

| Effective fetch ($F_e$) in miles* | 0.5 | 1 | 2 | 3 | 4 | 5 (or more) |
|---|---|---|---|---|---|---|
| Wind velocity ratio $\frac{\text{(Over water)}}{\text{(Over land)}}$ | 1.08 | 1.13 | 1.21 | 1.26 | 1.28 | 1.30 |

*For effective fetch values between those listed, interpolate to obtain the most appropriate multiplier.

c. The relationship between wind velocity over water and wind duration at a given reservoir can be developed from figure 9 by entering the effective fetch computed in step a.

d. The intersection of the wind velocity-duration curves for given sites and fetches developed from steps b and c will determine the design wind velocity and duration.

e. The significant wave height can be estimated from figure 9 and the wave period from figure 10 by entering the design wind velocity determined in step d and the effective fetch.

f. The deep water wave length in feet can be computed by

$$L = 5.12\ T^2 \qquad \text{[Equation 2]}$$

in which T = the wave period in seconds from step e.

Most dams have relatively deep reservoirs compared to the wind-generated wave length and the wave is unaffected by the reservoir floor. Equation 2 is valid when the water is deeper than one half of the wave length. If reservoir depth becomes a limiting factor,

adjustments to L can be made by following procedures defined in reference 6, volume III.

g. Runup, from a significant wave, on an embankment with riprap surface is:

$$R_S = \frac{H_S}{0.4 + (H_S/L)^{0.5} \cot \theta} \qquad \text{[Equation 3]}$$

in which $H_S$ = significant wave height in feet,

L = wave length in feet from step f,

$\theta$ = angle of the upstream face of the dam with horizon.

This equation should not be used on slopes flatter than 0.2:1.

For embankment dams with soil cement or other smooth upstream faces, the runup computed by equation 3 should be multiplied by a factor of up to 1.5, depending on the smoothness of the surface.

Equation 3 should not be used for computing runup for rockfill dams. Rockfill acts more like a rubble mound structure and has a different effect on energy dissipation than riprap placed on an impervious embankment. Runup for rockfill dams may be determined from figure 11. These data were taken from figure 7-20 of reference 6, volume II.

For smooth impermeable slopes of concrete and other smooth surface dams with water depth at the dam ($d_S$) greater than three times the wave height ($H_0$), the relationship between wave runup and wave

height can be determined from figure 12. These data were taken from figure 7-12 of reference 6.

Results predicted by figure 12 are probably less than the runup on prototype structures because of scale effects due to the inability to scale roughness effects into small-scale laboratory tests. Runup values from figure 12 should be adjusted for scale effects by using a factor obtained from figure 13.

If the wave propagation direction as defined by the central radial is not normal to the dam, a correction factor should be applied to the computed runup. This factor consists of multiplying the cosine of the angle between the wave propagation direction and a line normal to the dam times the computed runup as long as the angle is less than about 50° [7].

h. The wind setup in feet is:

$$S = \frac{U^2 F}{1400\ D} \qquad \text{[Equation 4]}$$

in which U = the design wind velocity over water in miles per hour from step d.

F = wind fetch in miles, normally equals 2 $F_e$

D = average water depth along the central radial in feet.

(18)

i. The minimum freeboard requirement for wind-generated waves is the sum of wave runup and wind setup and should be determined using moderate winds. These represent winds in terms of velocity, duration, direction, and seasonal distribution that may reasonably occur concurrently with maximum pool levels. If the response time between the design storm and the resulting maximum pool elevation is short, high winds that are sometimes associated with storms may not have subsided and must be considered in determining freeboard requirements. If the response time is longer than the storm period, a lower, more moderate wind would be appropriate. If adequate data for probability analyses are available, a moderate wind on the order of a 10-year event is appropriate.

The normal freeboard computation follows the same procedures as that for the minimum freeboard except that the significant wave height in equation 3 should be replaced by the average of the highest 10 percent of the waves which is 1.27 times the significant wave height [5,8] and maximum expected wind values should be used. These represent the most severe winds in terms of velocity, duration, direction, and seasonal distribution that are reasonably characteristic of the region where the reservoir is located. This determination generally includes results of meteorologic studies and probability analyses of recorded wind data. The values selected should exceed 100-year winds determined by probability analyses and generally should exceed maximum recorded winds.

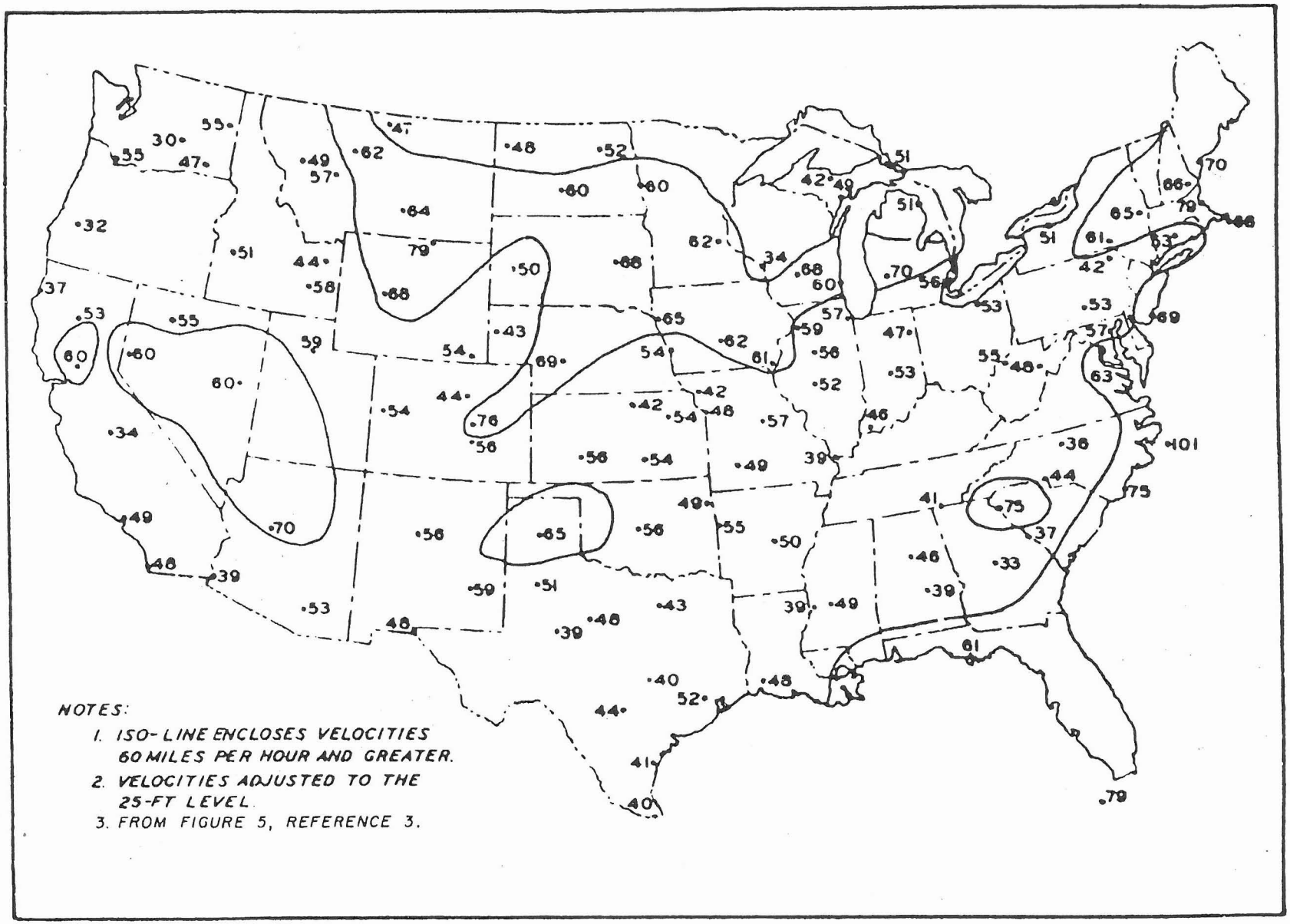



FIGURE 4.-FASTEST MILE OF RECORD-FALL

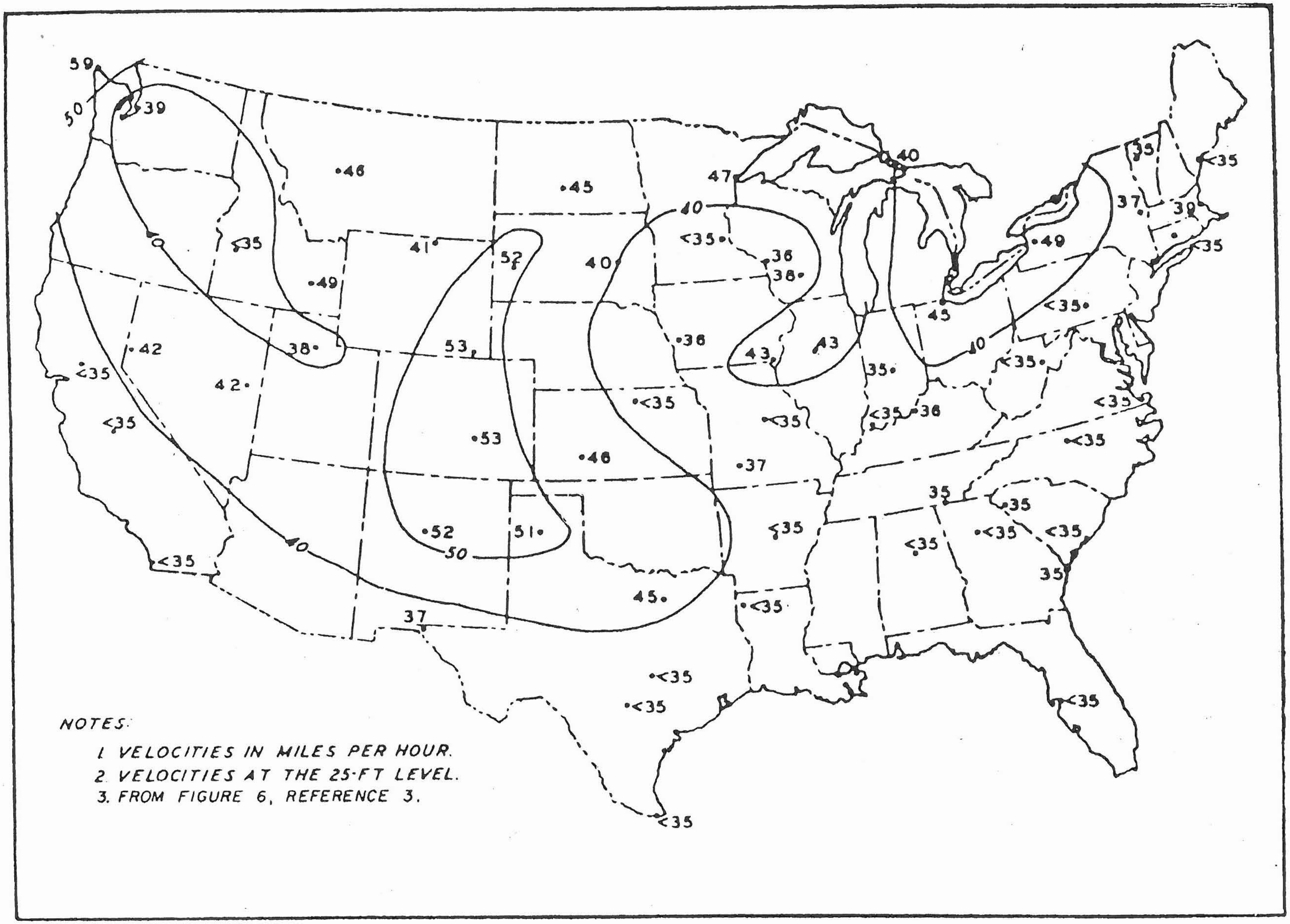



FIGURE 5.- MAXIMUM ONE HOUR VELOCITY - WINTER

LEGEND:

Solid Lines represent significant wave heights, in feet.

Dashed Lines represent minimum wind duration, in minutes, required for generation of wave heights indicated for corresponding wind velocities and fetch distance.

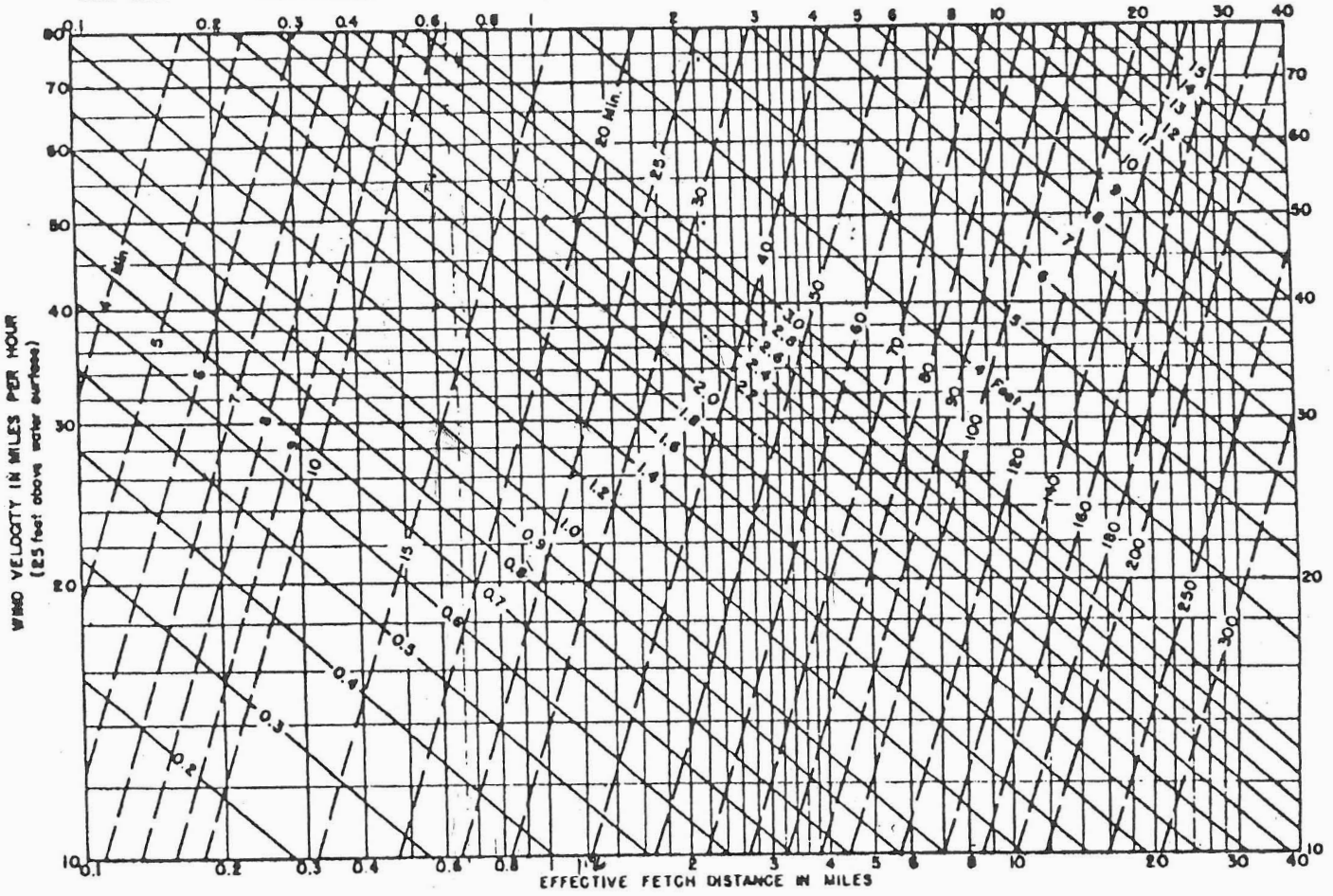



FIGURE 9. - GENERALIZED CORRELATIONS OF SIGNIFICANT WAVE HEIGHTS ($H_s$) WITH RELATED FACTORS -DEEP WATER CONDITIONS (FROM FIGURE 11, REF. 3)



(21)

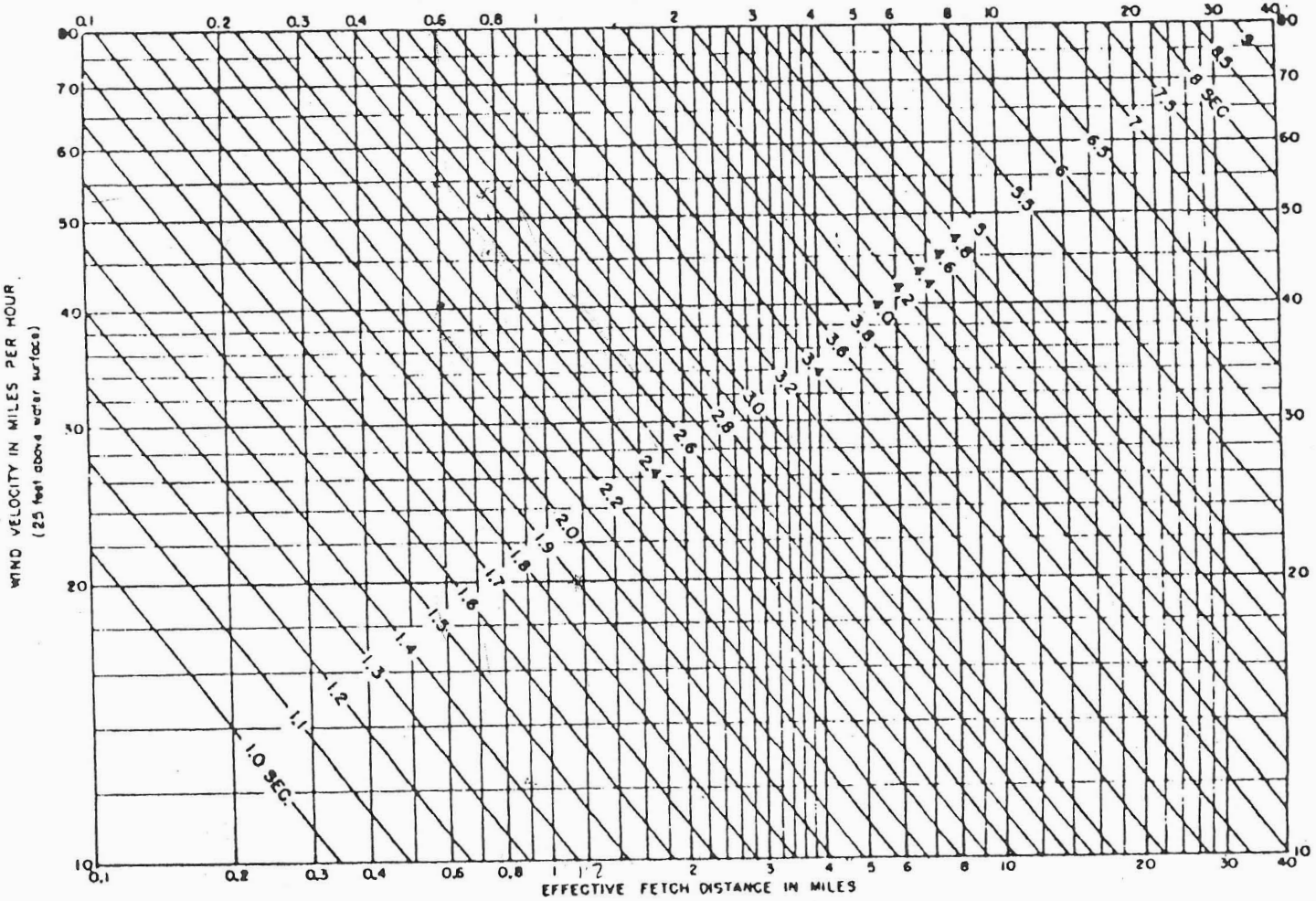



FIGURE 10.- GENERALIZED RELATIONS BETWEEN WAVE PERIODS AND RELATED FACTORS -DEEP WATER CONDITIONS (FROM FIGURE 12, REF. 3)

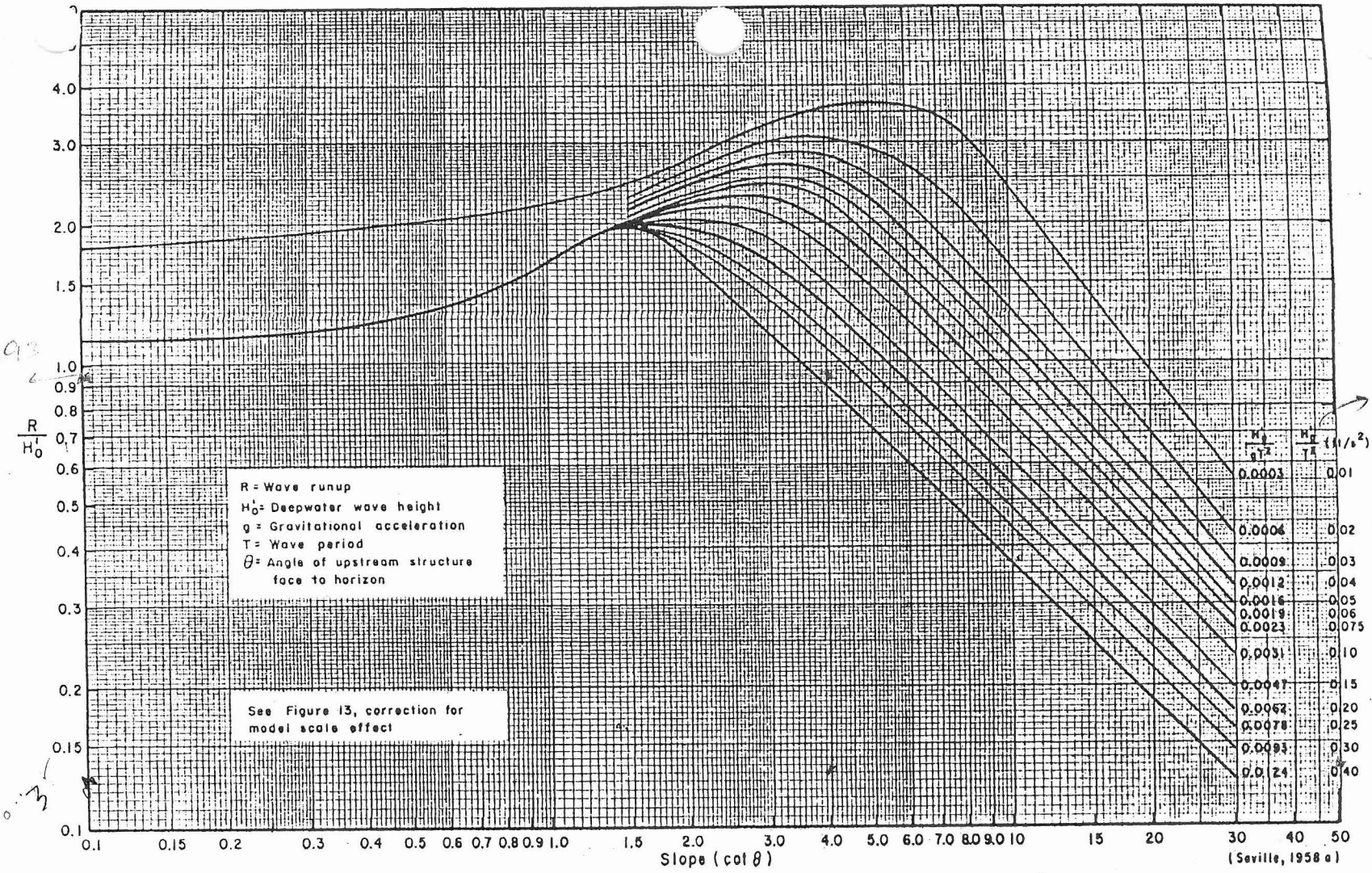



FIGURE 12. – WAVE RUNUP ON SMOOTH, IMPERMEABLE SLOPES, $d_s/H'_0 \geq 3.0$
(FROM FIGURE 7-12, REF. 6)

$H_0 = 2.41'$

$T = 2.50$ sec

$\frac{H_0}{T^2} = \frac{2.41}{(2.5)^2} = 0.39$

$\frac{R}{H_0} = 0.93$

$R = 2.41 \times 0.93$

$R = 2.25'$

for U/S slope 4:1 H:V

27

23

URS

# CALCULATION PACKAGE NO. C-16

EXHIBIT 4.7-2

## CALCULATION COVER SHEET

Client: Flood Control District of Maricopa County (FCDMC)

Project Name: White Tank FRS No. 3 Design

Project/Calculation Number: 23443748

Title: **EVALUATION OF REDUCED STORAGE AT WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3**

Total Number of Pages (including cover sheet): _____

Total Number of Computer Runs: _____

Prepared by: Hammad Hussain Date: 08/09/04

Checked by: [signature] Date: 8/19/04

Description and Purpose:

See Page 2

Design Basis /Assumptions

See Page 2

Remarks/Conclusions/Results:

See Page 3

Calculation Approved by: [signature] 8-19-04

Project Manager/Date

| Revision No.: | Description of Revision: | Approved by: |
|---|---|---|
| | | |
| | | |
| | | |

Project Manager/Date

# EVALUATION OF REDUCED STORAGE AT WHITE TANK FLOOD RETARDING STRUCTURE (FRS) NO. 3

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)
23443748

## PROBLEM STATEMENT

The aim of this calculation package is to evaluate the impacts of reduced storage at White Tank FRS No. 3 reservoir.

## DESIGN BASIS/ASSUMPTIONS/REFERENCES

The construction of Fissure Risk and Non-Fissure Risk zone embankments would result in a re-alignment of existing dam which will result in a modification of the storage rating curve at White Tank FRS No. 3 reservoir. The purpose of this calculation package is to evaluate the impacts of those modifications.

The upstream embankment slope of 10:1 (H:V) for Fissure Risk and Non-Fissure Risk zone embankments was assumed for this analysis. A 10:1 upstream slope is a conservative estimate because the anticipated final slope ranges from 3:1 to 10:1. The horizontal distance by which the surface area at White Tank FRS No. 3 reservoir would reduce at each elevation is shown on Figure 1 and Figure 2 for Fissure Risk and Non-Fissure Risk zone embankments respectively (See Pages 15-16). The reduced surface area was used to estimate the modified storage cap city at each duration.

It should be noted that the construction material required for Fissure Risk and Non-Fissure Risk zone embankments will likely be borrowed from areas below elevation 1,212 ft (NAVD 88). Since this borrowed material will be placed in the embankment above and below elevation 1,212 ft (NAVD 88), it is expected that the storage capacity will increase below elevation 1,212 ft (NAVD 88) and decrease above elevation 1212 ft (NAVD 88). The elevation 1,212 ft (NAVD 88) is significant because it is the elevation of the emergency spillway. This evaluation conservatively assumed that the storage below 1212 ft (NAVD 88) would remain unchanged following construction and would only reduce the storage capacity above elevation 1212 ft (NAVD 88).

Table 3 provides the summary results of total reduction in surface area at each elevation (See Page 5). Table 4 provides the formula spreadsheet for the calculations performed in Table 3 (See Page 6). Tables 5, 7 and 9 provide a detailed breakdown of calculations related to the possible reduction in surface area or

storage capacity at White Tank FRS No. 3 Reservoir (See Pages 7, 9 & 11 respectively). Tables 6, 8 and 10 provide the formula spreadsheets for the calculations performed in Tables 5, 7 and 9 respectively (See Pages. 8, 10 & 12). Table 11 provides the elevation-area-capacity data at White Tank FRS No. 3 for the modified storage capacity (See Page 13). Table 12 provides the formula spreadsheet for the calculations performed in Table 11 (See Page 14).

URS selected the most critical PMF hydrographs to be routed through the White Tank FRS No. 3 reservoir for ADWR and NRCS criteria using revised elevation-area-capacity curve for modified storage.

For ADWR criteria, 6-hr Local and 72-hr General PMF hydrographs were routed for Future Condition (principal spillway open) as this condition resulted in highest water surface elevation for ADWR criteria.

For NRCS criteria, only 6-hr Local PMF hydrograph was routed for Future Condition (principal spillway closed) as this condition resulted in highest water surface elevation for NRCS criteria.

**RESULTS**

The reservoir routing results of PMF hydrographs based on modified elevation-area-capacity curve were compared with the results based on original elevation-storage curve (See Tables 1 and 2).

For ADWR criteria, the water surface elevation (WSE) increased from 1215.96 ft to 1216.01 ft and from 1215.85 ft to 1215.88 ft for 6-hr Local and 72-hr General PMF hydrographs respectively. The results based on the modified elevation-area-capacity curve do not differ significantly from the results based on the existing elevation-area-capacity curve.

For NRCS criteria, the water surface elevation (WSE) increased from 1216.47 ft to 1216.53 ft for a 6-hr Local PMF hydrograph. Design water surface elevations are rounded to the nearest tenth of a foot. Therefore, the modified elevation-area-capacity curve is not expected to change the design routing results.

(The TR-20 output files related to reservoir routing of 6-hr Local and 72-hr general PMF hydrographs for ADWR criteria and 6-hr Local PMF hydrograph for NRCS criteria for modified storage capacity are attached with this calculation package. The TR-20 output files related to reservoir routing of 6-hr Local and 72-hr general PMF hydrographs for ADWR criteria and 6-hr Local PMF hydrograph for NRCS criteria for existing storage capacity are provided in separate calculation packages.)

## TABLE 1

**RESERVOIR ROUTING RESULTS**
**(BASED ON ADWR CRITERION ONLY)**
**(FUTURE CONDITON - PRINCIPAL SPILLWAY OPEN)**

| Storm Duration | Inflow to White Tanks FRS No. 3 | | Outflow From White Tanks FRS No. 3 (Based On Existing Elevation-Storage Data) | | | Outflow From White Tanks FRS No. 3 (Based On Modified Elevation-Storage Data) | | |
|---|---|---|---|---|---|---|---|---|
| | Precipitation | Peak Inflow | Antecedent Reservoir Condition (ARC) | Peak Outflow | Maximum Reservoir Elevation (NAVD 88) | Antecedent Reservoir Condition (ARC) | Peak Outflow | Maximum Reservoir Elevation (NAVD 88) |
| | (inches) | (cfs) | (ft) | (cfs) | (ft) | (ft) | (cfs) | (ft) |
| 6-hr Local | 12.7 | 68,291 | 1200.0 | 24,230 | **1215.96** | 1200.0 | 24,646 | **1216.01** |
| 72-hr General | 15.8 | 32,764 | 1200.0 | 23,197 | **1215.85** | 1200.0 | 23,509 | **1215.88** |

## TABLE 2

**RESERVOIR ROUTING RESULTS**
**(BASED ON NRCS CRITERION ONLY)**
**(FUTURE CONDITON - PRINCIPAL SPILLWAY CLOSED)**

| Storm Duration | Inflow to White Tanks FRS No. 3 | | Outflow From White Tanks FRS No. 3 (Based On Existing Elevation-Storage Data) | | | Outflow From White Tanks FRS No. 3 (Based On Modified Elevation-Storage Data) | | |
|---|---|---|---|---|---|---|---|---|
| | Precipitation | Peak Inflow | Antecedent Reservoir Condition (ARC) | Peak Outflow | Maximum Reservoir Elevation (NAVD 88) | Antecedent Reservoir Condition (ARC) | Peak Outflow | Maximum Reservoir Elevation (NAVD 88) |
| | (inches) | (cfs) | (ft) | (cfs) | (ft) | (ft) | (cfs) | (ft) |
| 6-hr Local | 12.7 | 68,291 | 1204.8 | 28,968 | **1216.47** | 1204.8 | 29,518 | **1216.53** |

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | **TABLE 3** | | | | | | |
| 2 | **SUMMARY OF RESULTS FOR REDUCTION IN SURFACE AREA** | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | Elevation (ft) | Reduction In Storage Area (Acre) | | | Total Reduction In Storgae Area (Acre) | | |
| 6 | | (Fissure Risk Zone - South) | (Non-Fissure Risk Zone - North) | (Non-Fissure Risk Zone - South) | | | |
| 7 | 1212 | 8.7 | 3.6 | 3.3 | 15.5 | | |
| 8 | 1213 | 8.1 | 3.1 | 2.9 | 14.1 | | |
| 9 | 1214 | 7.4 | 2.8 | 2.5 | 12.7 | | |
| 10 | 1215 | 6.8 | 2.2 | 2.0 | 11.0 | | |
| 11 | 1216 | 6.2 | 1.9 | 1.7 | 9.8 | | |
| 12 | 1217 | 5.6 | 1.4 | 1.3 | 8.2 | | |
| 13 | 1218 | 5.0 | 0.9 | 0.9 | 6.8 | | |
| 14 | 1219 | 5.0 | 0.9 | 0.9 | 6.8 | | |
| 15 | 1220 | 5.0 | 0.9 | 0.9 | 6.8 | | |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | **TABLE 4** | | | | |
| 2 | **SUMMARY OF RESULTS FOR REDUCTION IN SURFACE AREA** | | | | |
| 3 | **FORMULA SPREADSHEET** | | | | |
| 4 | | | | | |
| 5 | Elevation (ft) | Reduction In Storage Area (Acre) | | | Total Reduction In Storgae Area (Acre) |
| 6 | | (Fissure Risk Zone - South) | (Non-Fissure Risk Zone - North) | (Non-Fissure Risk Zone - South) | |
| 7 | 1212 | =E23 | =E40 | =E57 | =SUM(B7:D7) |
| 8 | =A7+1 | =E24 | =E41 | =E58 | =SUM(B8:D8) |
| 9 | =A8+1 | =E25 | =E42 | =E59 | =SUM(B9:D9) |
| 10 | =A9+1 | =E26 | =E43 | =E60 | =SUM(B10:D10) |
| 11 | =A10+1 | =E27 | =E44 | =E61 | =SUM(B11:D11) |
| 12 | =A11+1 | =E28 | =E45 | =E62 | =SUM(B12:D12) |
| 13 | =A12+1 | =E29 | =E46 | =E63 | =SUM(B13:D13) |
| 14 | =A13+1 | =E30 | =E47 | =E64 | =SUM(B14:D14) |
| 15 | =A14+1 | =E31 | =E48 | =E65 | =SUM(B15:D15) |

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 16 | **TABLE 5** | | | | | | |
| 17 | **REDUCTION IN SURFACE AREA WITHIN FISSURE RISK ZONE (SOUTH)** | | | | | | |
| 18 | Embankment Slope | | 10 to 1 | H:V | | | |
| 19 | | | | | | | |
| 20 | Elevation | Distance (X-axis) | Length of Fissure Risk Zone | Area Reduced | Area Reduced | | |
| 21 | (ft) | (ft) | (ft) | ($ft^2$) | (Acre) | | |
| 22 | 1212 | 140 | 2700 | 378000 | 8.7 | | |
| 23 | 1213 | 130 | 2700 | 351000 | 8.1 | | |
| 24 | 1214 | 120 | 2700 | 324000 | 7.4 | | |
| 25 | 1215 | 110 | 2700 | 297000 | 6.8 | | |
| 26 | 1216 | 100 | 2700 | 270000 | 6.2 | | |
| 27 | 1217 | 90 | 2700 | 243000 | 5.6 | | |
| 28 | 1218 | 80 | 2700 | 216000 | 5.0 | | |
| 29 | 1219 | 80 | 2700 | 216000 | 5.0 | | |
| 30 | 1220 | 80 | 2700 | 216000 | 5.0 | | |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 16 | **TABLE 6** | | | | |
| 17 | **REDUCTION IN SURFACE AREA WITHIN FISSURE RISK ZONE (SOUTH)** | | | | |
| 18 | **FORMULA SPREADSHEET** | | | | |
| 19 | Embankment Slope | | 10 to 1 | H:V | |
| 20 | | | | | |
| 21 | Elevation | Distance (X-axis) | Length of Fissure Risk Zone | Area Reduced | Area Reduced |
| 22 | (ft) | (ft) | (ft) | ($ft^2$) | (Acre) |
| 23 | 1212 | 140 | 2700 | =B23*C23 | =D23/43560 |
| 24 | =A23+1 | 130 | 2700 | =B24*C24 | =D24/43560 |
| 25 | =A24+1 | 120 | 2700 | =B25*C25 | =D25/43560 |
| 26 | =A25+1 | 110 | 2700 | =B26*C26 | =D26/43560 |
| 27 | =A26+1 | 100 | 2700 | =B27*C27 | =D27/43560 |
| 28 | =A27+1 | 90 | 2700 | =B28*C28 | =D28/43560 |
| 29 | =A28+1 | 80 | 2700 | =B29*C29 | =D29/43560 |
| 30 | =A29+1 | 80 | 2700 | =B30*C30 | =D30/43560 |
| 31 | =A30+1 | 80 | 2700 | =B31*C31 | =D31/43560 |

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 31 | | | | | | | |
| 32 | **TABLE 7** | | | | | | |
| 33 | **REDUCTION IN SURFACE AREA WITHIN NON-FISSURE RISK ZONE (NORTH)** | | | | | | |
| 34 | Embankment Slope | | 10 to 1 | H:V | | | |
| 35 | | | | | | | |
| 36 | Elevation | Distance (X-axis) | Length of Non-Fissure Risk Zone (North) | Area Reduced | Area Reduced | | |
| 37 | (ft) | (ft) | (ft) | ($ft^2$) | (Acre) | | |
| 38 | 1212 | 65 | 2400 | 156000 | 3.6 | | |
| 39 | 1213 | 57 | 2400 | 136800 | 3.1 | | |
| 40 | 1214 | 50 | 2400 | 120000 | 2.8 | | |
| 41 | 1215 | 40 | 2400 | 96000 | 2.2 | | |
| 42 | 1216 | 34 | 2400 | 81600 | 1.9 | | |
| 43 | 1217 | 25 | 2400 | 60000 | 1.4 | | |
| 44 | 1218 | 17 | 2400 | 40800 | 0.9 | | |
| 45 | 1219 | 17 | 2400 | 40800 | 0.9 | | |
| 46 | 1220 | 17 | 2400 | 40800 | 0.9 | | |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 32 | | | | | |
| 33 | **TABLE 8** | | | | |
| 34 | **REDUCTION IN SURFACE AREA WITHIN NON-FISSURE RISK ZONE (NORTH)** | | | | |
| 35 | **FORMULA SPREADSHEET** | | | | |
| 36 | Embankment Slope | | 10 to 1 | H:V | |
| 37 | | | | | |
| 38 | Elevation | Distance (X-axis) | Length of Non-Fissure Risk Zone (North) | Area Reduced | Area Reduced |
| 39 | (ft) | (ft) | (ft) | ($ft^2$) | (Acre) |
| 40 | 1212 | 65 | 2400 | =B40*C40 | =D40/43560 |
| 41 | =A40+1 | 57 | 2400 | =B41*C41 | =D41/43560 |
| 42 | =A41+1 | 50 | 2400 | =B42*C42 | =D42/43560 |
| 43 | =A42+1 | 40 | 2400 | =B43*C43 | =D43/43560 |
| 44 | =A43+1 | 34 | 2400 | =B44*C44 | =D44/43560 |
| 45 | =A44+1 | 25 | 2400 | =B45*C45 | =D45/43560 |
| 46 | =A45+1 | 17 | 2400 | =B46*C46 | =D46/43560 |
| 47 | =A46+1 | 17 | 2400 | =B47*C47 | =D47/43560 |
| 48 | =A47+1 | 17 | 2400 | =B48*C48 | =D48/43560 |

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 47 | | | | | | | |
| 48 | **TABLE 9** | | | | | | |
| 49 | **REDUCTION IN STORAGE AREA WITHIN NON-FISSURE RISK ZONE (SOUTH)** | | | | | | |
| 50 | Embankment Slope | | 10 to 1 | H:V | | | |
| 51 | | | | | | | |
| 52 | Elevation | Distance (X-axis) | Length of Non-Fissure Risk Zone (South) | Area Reduced | Area Reduced | | |
| 53 | (ft) | (ft) | (ft) | ($ft^2$) | (Acre) | | |
| 54 | 1212 | 65 | 2200 | 143000 | 3.3 | | |
| 55 | 1213 | 57 | 2200 | 125400 | 2.9 | | |
| 56 | 1214 | 50 | 2200 | 110000 | 2.5 | | |
| 57 | 1215 | 40 | 2200 | 88000 | 2.0 | | |
| 58 | 1216 | 34 | 2200 | 74800 | 1.7 | | |
| 59 | 1217 | 25 | 2200 | 55000 | 1.3 | | |
| 60 | 1218 | 17 | 2200 | 37400 | 0.9 | | |
| 61 | 1219 | 17 | 2200 | 37400 | 0.9 | | |
| 62 | 1220 | 17 | 2200 | 37400 | 0.9 | | |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 49 | | | | | |
| 50 | **TABLE 10** | | | | |
| 51 | **REDUCTION IN SURFACE AREA WITHIN NON-FISSURE RISK ZONE (SOUTH)** | | | | |
| 52 | **FORMULA SPREADSHEET** | | | | |
| 53 | Embankment Slope | | 10 to 1 | H:V | |
| 54 | | | | | |
| 55 | Elevation | Distance (X-axis) | Length of Non-Fissure Risk Zone (South) | Area Reduced | Area Reduced |
| 56 | (ft) | (ft) | (ft) | ($ft^2$) | (Acre) |
| 57 | 1212 | 65 | 2200 | =B57*C57 | =D57/43560 |
| 58 | =A57+1 | 57 | 2200 | =B58*C58 | =D58/43560 |
| 59 | =A58+1 | 50 | 2200 | =B59*C59 | =D59/43560 |
| 60 | =A59+1 | 40 | 2200 | =B60*C60 | =D60/43560 |
| 61 | =A60+1 | 34 | 2200 | =B61*C61 | =D61/43560 |
| 62 | =A61+1 | 25 | 2200 | =B62*C62 | =D62/43560 |
| 63 | =A62+1 | 17 | 2200 | =B63*C63 | =D63/43560 |
| 64 | =A63+1 | 17 | 2200 | =B64*C64 | =D64/43560 |
| 65 | =A64+1 | 17 | 2200 | =B65*C65 | =D65/43560 |

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | TABLE 11 | | | | | | | | |
| 2 | ELEVATION-STORAGE CURVE AT WHITE TANK FRS NO. 3 | | | | | | | | |
| 3 | (MODIFIED STORAGE CAPACITY) | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | Reservoir Elevation | Surface Area | Reduction In Storage Area | Reduced Storage | Average Storage | Elevation Difference | Reservoir Storage | Accumulative Storage | Comments |
| 6 | (ft) | (acre) | (acre) | (acre) | (acre) | (ft) | (acre-ft) | (acre-ft) | |
| 7 | 1178 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8 | 1179 | 0.51 | 0.00 | 0.51 | 0.25 | 1.00 | 0.25 | 0.25 | |
| 9 | 1180 | 1.05 | 0.00 | 1.05 | 0.78 | 1.00 | 0.78 | 1.03 | |
| 10 | 1181 | 1.75 | 0.00 | 1.75 | 1.40 | 1.00 | 1.40 | 2.43 | |
| 11 | 1182 | 3.07 | 0.00 | 3.07 | 2.41 | 1.00 | 2.41 | 4.84 | |
| 12 | 1183 | 4.79 | 0.00 | 4.79 | 3.93 | 1.00 | 3.93 | 8.77 | |
| 13 | 1184 | 5.81 | 0.00 | 5.81 | 5.30 | 1.00 | 5.30 | 14.07 | |
| 14 | 1185 | 6.60 | 0.00 | 6.60 | 6.21 | 1.00 | 6.21 | 20.28 | |
| 15 | 1186 | 7.44 | 0.00 | 7.44 | 7.02 | 1.00 | 7.02 | 27.30 | |
| 16 | 1187 | 8.65 | 0.00 | 8.65 | 8.05 | 1.00 | 8.05 | 35.34 | |
| 17 | 1188 | 10.32 | 0.00 | 10.32 | 9.49 | 1.00 | 9.49 | 44.83 | |
| 18 | 1189 | 11.93 | 0.00 | 11.93 | 11.13 | 1.00 | 11.13 | 55.95 | |
| 19 | 1190 | 13.93 | 0.00 | 13.93 | 12.93 | 1.00 | 12.93 | 68.88 | |
| 20 | 1191 | 15.98 | 0.00 | 15.98 | 14.96 | 1.00 | 14.96 | 83.84 | |
| 21 | 1192 | 22.46 | 0.00 | 22.46 | 19.22 | 1.00 | 19.22 | 103.06 | |
| 22 | 1193 | 27.82 | 0.00 | 27.82 | 25.14 | 1.00 | 25.14 | 128.20 | |
| 23 | 1194 | 33.83 | 0.00 | 33.83 | 30.83 | 1.00 | 30.83 | 159.02 | |
| 24 | 1195 | 44.05 | 0.00 | 44.05 | 38.94 | 1.00 | 38.94 | 197.96 | |
| 25 | 1196 | 56.65 | 0.00 | 56.65 | 50.35 | 1.00 | 50.35 | 248.31 | |
| 26 | 1197 | 69.49 | 0.00 | 69.49 | 63.07 | 1.00 | 63.07 | 311.38 | |
| 27 | 1198 | 83.88 | 0.00 | 83.88 | 76.69 | 1.00 | 76.69 | 388.07 | |
| 28 | 1199 | 98.77 | 0.00 | 98.77 | 91.33 | 1.00 | 91.33 | 479.39 | |
| 29 | 1199.2 | 102.0 | 0.00 | 102.00 | 100.39 | 0.21 | 20.63 | 500.02 | 100-yr Sediment Pool Level |
| 30 | 1200 | 112.95 | 0.00 | 112.95 | 105.86 | 1.00 | 105.86 | 585.25 | |
| 31 | 1201 | 130.05 | 0.00 | 130.05 | 121.50 | 1.00 | 121.50 | 706.75 | |
| 32 | 1202 | 147.55 | 0.00 | 147.55 | 138.80 | 1.00 | 138.80 | 845.55 | |
| 33 | 1203 | 165.40 | 0.00 | 165.40 | 156.48 | 1.00 | 156.48 | 1002.03 | |
| 34 | 1204 | 183.11 | 0.00 | 183.11 | 174.25 | 1.00 | 174.25 | 1176.28 | |
| 35 | 1205 | 199.09 | 0.00 | 199.09 | 191.10 | 1.00 | 191.10 | 1367.38 | |
| 36 | 1206 | 216.66 | 0.00 | 216.66 | 207.88 | 1.00 | 207.88 | 1575.25 | |
| 37 | 1207 | 234.81 | 0.00 | 234.81 | 225.74 | 1.00 | 225.74 | 1800.99 | |
| 38 | 1208 | 253.15 | 0.00 | 253.15 | 243.98 | 1.00 | 243.98 | 2044.97 | |
| 39 | 1209 | 274.77 | 0.00 | 274.77 | 263.96 | 1.00 | 263.96 | 2308.93 | |
| 40 | 1210 | 294.10 | 0.00 | 294.10 | 284.44 | 1.00 | 284.44 | 2593.36 | |
| 41 | 1211 | 313.41 | 0.00 | 313.41 | 303.76 | 1.00 | 303.76 | 2897.12 | |
| 42 | 1212 | 327.85 | 15.54 | 312.31 | 312.86 | 1.00 | 312.86 | 3209.97 | Crest of Emergency Spillway |
| 43 | 1213 | 350.00 | 14.08 | 335.92 | 324.12 | 1.00 | 324.12 | 3534.09 | |
| 44 | 1214 | 368.69 | 12.72 | 355.97 | 345.95 | 1.00 | 345.95 | 3880.04 | |
| 45 | 1215 | 387.54 | 11.04 | 376.50 | 366.23 | 1.00 | 366.23 | 4246.27 | |
| 46 | 1216 | 409.55 | 9.79 | 399.76 | 388.13 | 1.00 | 388.13 | 4634.40 | |
| 47 | 1217 | 431.48 | 8.22 | 423.26 | 411.51 | 1.00 | 411.51 | 5045.91 | |
| 48 | 1218 | 454.15 | 6.75 | 447.40 | 435.33 | 1.00 | 435.33 | 5481.24 | |
| 49 | 1219 | 476.15 | 6.75 | 469.40 | 458.40 | 1.00 | 458.40 | 5939.64 | |
| 50 | 1220 | 501.04 | 6.75 | 494.29 | 481.84 | 1.00 | 481.84 | 6421.48 | |

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | TABLE 12 | | | | | | | | |
| 2 | ELEVATION-STORAGE CURVE AT WHITE TANK FRS NO. 3 | | | | | | | | |
| 3 | (MODIFIED STORAGE CAPACITY) | | | | | | | | |
| 4 | FORMULA SPREADSHEET | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | Reservoir Elevation | Surface Area | Reduction In Storage Area | Reduced Storage | Average Storage | Elevation Difference | Reservoir Storage | Accumulative Storage | Comments |
| 7 | (ft) | (acre) | (acre) | (acre) | (acre) | (ft) | (acre-ft) | (acre-ft) | |
| 8 | 1178 | 0 | 0 | =B8-C8 | 0 | 0 | =E8*F8 | 0 | |
| 9 | =(A8+1) | 0.5066 | 0 | =B9-C9 | =(D9+D8)/2 | =A9-A8 | =E9*F9 | =(H8+G9) | |
| 10 | =(A9+1) | 1.0486 | 0 | =B10-C10 | =(D10+D9)/2 | =A10-A9 | =E10*F10 | =(H9+G10) | |
| 11 | =(A10+1) | 1.75 | 0 | =B11-C11 | =(D11+D10)/2 | =A11-A10 | =E11*F11 | =(H10+G11) | |
| 12 | =(A11+1) | 3.07 | 0 | =B12-C12 | =(D12+D11)/2 | =A12-A11 | =E12*F12 | =(H11+G12) | |
| 13 | =(A12+1) | 4.79 | 0 | =B13-C13 | =(D13+D12)/2 | =A13-A12 | =E13*F13 | =(H12+G13) | |
| 14 | =A13+1 | 5.81 | 0 | =B14-C14 | =(D14+D13)/2 | =A14-A13 | =E14*F14 | =(H13+G14) | |
| 15 | =A14+1 | 6.6 | 0 | =B15-C15 | =(D15+D14)/2 | =A15-A14 | =E15*F15 | =(H14+G15) | |
| 16 | =A15+1 | 7.44 | 0 | =B16-C16 | =(D16+D15)/2 | =A16-A15 | =E16*F16 | =(H15+G16) | |
| 17 | =A16+1 | 8.65 | 0 | =B17-C17 | =(D17+D16)/2 | =A17-A16 | =E17*F17 | =(H16+G17) | |
| 18 | =A17+1 | 10.32 | 0 | =B18-C18 | =(D18+D17)/2 | =A18-A17 | =E18*F18 | =(H17+G18) | |
| 19 | =A18+1 | 11.93 | 0 | =B19-C19 | =(D19+D18)/2 | =A19-A18 | =E19*F19 | =(H18+G19) | |
| 20 | =A19+1 | 13.93 | 0 | =B20-C20 | =(D20+D19)/2 | =A20-A19 | =E20*F20 | =(H19+G20) | |
| 21 | =A20+1 | 15.98 | 0 | =B21-C21 | =(D21+D20)/2 | =A21-A20 | =E21*F21 | =(H20+G21) | |
| 22 | =A21+1 | 22.46 | 0 | =B22-C22 | =(D22+D21)/2 | =A22-A21 | =E22*F22 | =(H21+G22) | |
| 23 | =A22+1 | 27.82 | 0 | =B23-C23 | =(D23+D22)/2 | =A23-A22 | =E23*F23 | =(H22+G23) | |
| 24 | =A23+1 | 33.83 | 0 | =B24-C24 | =(D24+D23)/2 | =A24-A23 | =E24*F24 | =(H23+G24) | |
| 25 | =A24+1 | 44.05 | 0 | =B25-C25 | =(D25+D24)/2 | =A25-A24 | =E25*F25 | =(H24+G25) | |
| 26 | =A25+1 | 56.65 | 0 | =B26-C26 | =(D26+D25)/2 | =A26-A25 | =E26*F26 | =(H25+G26) | |
| 27 | =A26+1 | 69.49 | 0 | =B27-C27 | =(D27+D26)/2 | =A27-A26 | =E27*F27 | =(H26+G27) | |
| 28 | =A27+1 | 83.88 | 0 | =B28-C28 | =(D28+D27)/2 | =A28-A27 | =E28*F28 | =(H27+G28) | |
| 29 | =A28+1 | 98.77 | 0 | =B29-C29 | =(D29+D28)/2 | =A29-A28 | =E29*F29 | =(H28+G29) | |
| 30 | 1199.2055 | 102 | 0 | =B30-C30 | =(D30+D29)/2 | =A30-A29 | =E30*F30 | =(H29+G30) | 100-yr Sediment Pool Level |
| 31 | =A29+1 | 112.95 | 0 | =B31-C31 | =(D31+D29)/2 | =A31-A29 | =E31*F31 | =(H29+G31) | |
| 32 | =A31+1 | 130.05 | 0 | =B32-C32 | =(D32+D31)/2 | =A32-A31 | =E32*F32 | =(H31+G32) | |
| 33 | =A32+1 | 147.55 | 0 | =B33-C33 | =(D33+D32)/2 | =A33-A32 | =E33*F33 | =(H32+G33) | |
| 34 | =A33+1 | 165.4 | 0 | =B34-C34 | =(D34+D33)/2 | =A34-A33 | =E34*F34 | =(H33+G34) | |
| 35 | =A34+1 | 183.105 | 0 | =B35-C35 | =(D35+D34)/2 | =A35-A34 | =E35*F35 | =(H34+G35) | |
| 36 | =A35+1 | 199.09 | 0 | =B36-C36 | =(D36+D35)/2 | =A36-A35 | =E36*F36 | =(H35+G36) | |
| 37 | =A36+1 | 216.66 | 0 | =B37-C37 | =(D37+D36)/2 | =A37-A36 | =E37*F37 | =(H36+G37) | |
| 38 | =A37+1 | 234.81 | 0 | =B38-C38 | =(D38+D37)/2 | =A38-A37 | =E38*F38 | =(H37+G38) | |
| 39 | =A38+1 | 253.15 | 0 | =B39-C39 | =(D39+D38)/2 | =A39-A38 | =E39*F39 | =(H38+G39) | |
| 40 | =A39+1 | 274.77 | 0 | =B40-C40 | =(D40+D39)/2 | =A40-A39 | =E40*F40 | =(H39+G40) | |
| 41 | =A40+1 | 294.1 | 0 | =B41-C41 | =(D41+D40)/2 | =A41-A40 | =E41*F41 | =(H40+G41) | |
| 42 | =A41+1 | 313.41 | 0 | =B42-C42 | =(D42+D41)/2 | =A42-A41 | =E42*F42 | =(H41+G42) | |
| 43 | =A42+1 | 327.85 | 15.5417814508724 | =B43-C43 | =(D43+D42)/2 | =A43-A42 | =E43*F43 | =(H42+G43) | Crest of Emergency Spillway |
| 44 | =A43+1 | 350 | 14.0771349862259 | =B44-C44 | =(D44+D43)/2 | =A44-A43 | =E44*F44 | =(H43+G44) | |
| 45 | =A44+1 | 368.69 | 12.7180899908173 | =B45-C45 | =(D45+D44)/2 | =A45-A44 | =E45*F45 | =(H44+G45) | |
| 46 | =A45+1 | 387.54 | 11.0422405876951 | =B46-C46 | =(D46+D45)/2 | =A46-A45 | =E46*F46 | =(H45+G46) | |
| 47 | =A46+1 | 409.55 | 9.78879706152433 | =B47-C47 | =(D47+D46)/2 | =A47-A46 | =E47*F47 | =(H46+G47) | |
| 48 | =A47+1 | 431.48 | 8.21854912764004 | =B48-C48 | =(D48+D47)/2 | =A48-A47 | =E48*F48 | =(H47+G48) | |
| 49 | =A48+1 | 454.15 | 6.75390266299357 | =B49-C49 | =(D49+D48)/2 | =A49-A48 | =E49*F49 | =(H48+G49) | |
| 50 | =A49+1 | 476.15 | 6.75390266299357 | =B50-C50 | =(D50+D49)/2 | =A50-A49 | =E50*F50 | =(H49+G50) | |
| 51 | =A50+1 | 501.04 | 6.75390266299357 | =B51-C51 | =(D51+D50)/2 | =A51-A50 | =E51*F51 | =(H50+G51) | |

1221.00
1216.00
1211.00
1206.00
1201.00
1196.00
1191.00
1186.00
1181.00

0.00 40.00 80.00 120.00 160.00 200.00 240.00 280.00 320.00 360.00 400.00 440.00 480.00 520.00 560.00 600.00

1213
1212.0

80'
90'
100'
110'
120'
130'
140'

(10:1)

current

New Dam

Existing Dam

MAXIMUM EMBANKMENT SECTION
AT STATION 33+00

20 0 20
SCALE IN FEET

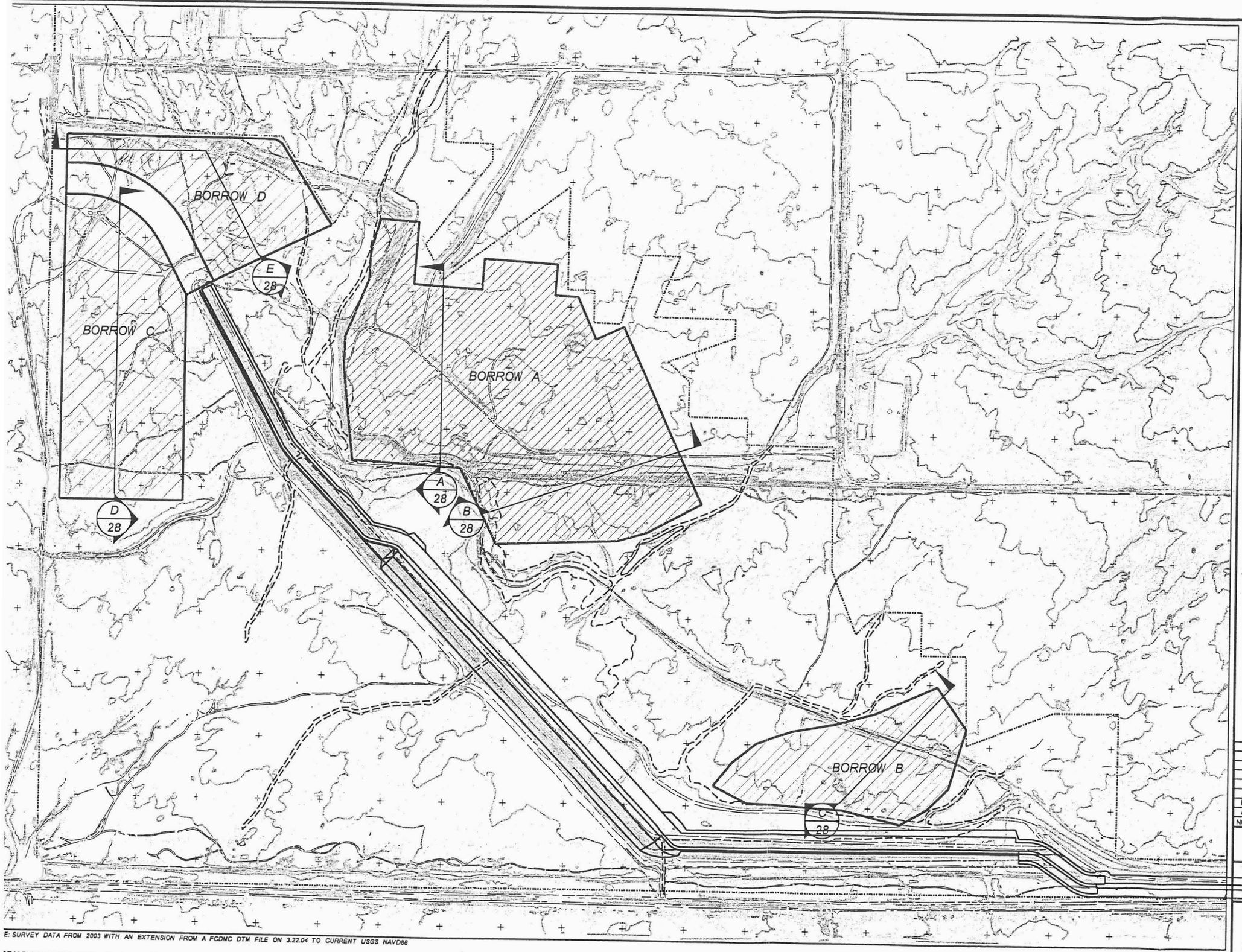
SECTION A

# FISSURE RISK ZONE (SOUTH)

| Elevation (ft) | Distance (ft) (X-axis) | Length of Fissure Risk Zone |
|---|---|---|
| 1212.0 | 140' | 2700' |
| 1213.0 | 130' | 2700' |
| 1214.0 | 120' | 2700' |
| 1215.0 | 110' | 2700' |
| 1216.0 | 100' | 2700' |
| 1217.0 | 90' | 2700' |
| 1218.0 | 80' | 2700' |
| 1219.0 | 80' | 2700' |
| 1220.0 | 80' | 2700' |

Figure-1

100 0 100
SCALE IN FEET




| ITEM NO. | ITEM DESCRIPTION | QUANTITY |
|---|---|---|

17

MJ

N

TWO WORKING DAYS BEFORE YOU DIG, CALL
263-1100
BLUE STAKE

ADWR APPROVAL

Figure -3

| NO. | REVISION | BY | DATE |
|---|---|---|---|
| B | 60% DESIGN SUBMITTAL | TER | 5-04 |
| A | 30% DESIGN SUBMITTAL | TER | 4-04 |

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**
ENGINEERING DIVISION

WHITE TANKS FRS NO 3
REMEDIATION DESIGN - PHASE 1
PWN 470.04.30, FCD CONTRACT NO. 2004C017

| | BY | DATE |
|---|---|---|
| DESIGNED | TER | 6-04 |
| DRAWN | MSJ | 6-04 |
| CHECKED | RM | 6-04 |

PRELIMINARY NOT FOR CONSTRUCTION

URS
7720 NORTH 16TH STREET
SUITE 100
PHOENIX, AZ 85020

DRAWING NO. C1

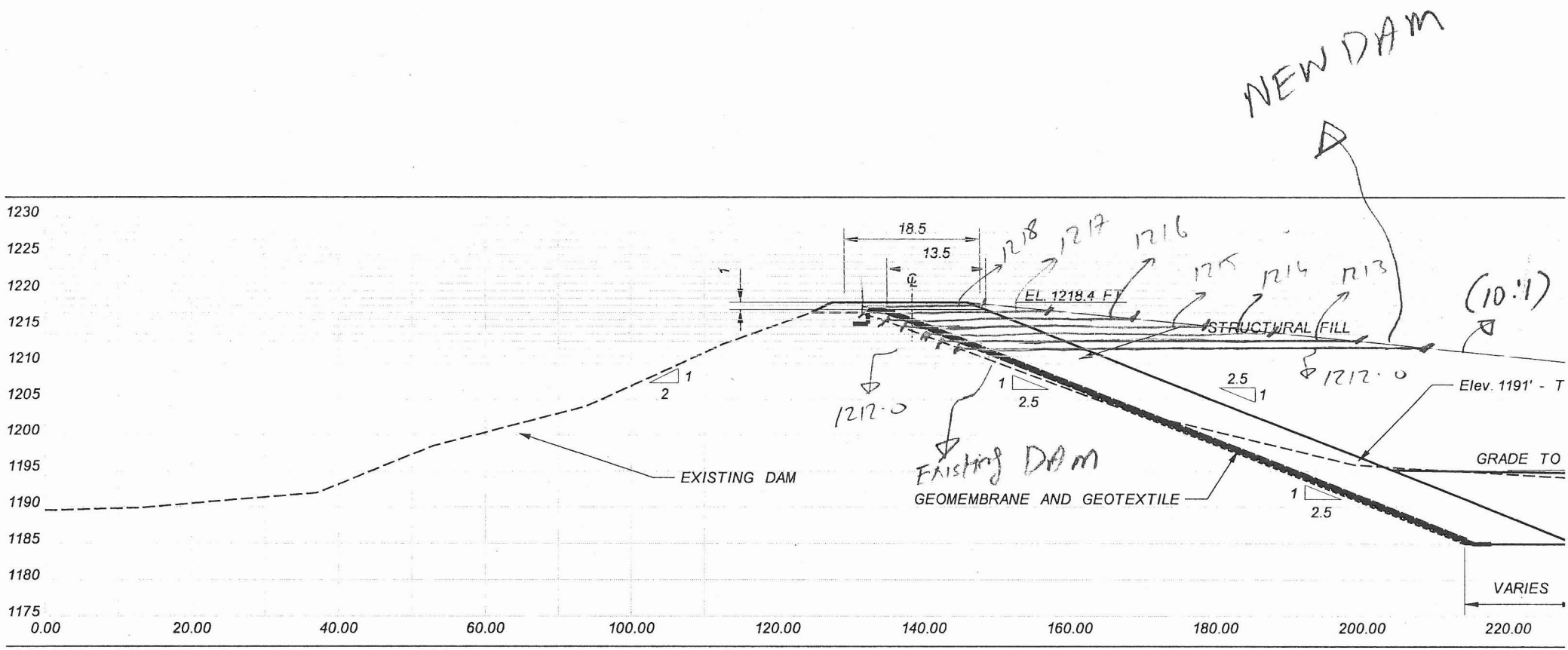
BORROW PLAN

SHEET OF

E: SURVEY DATA FROM 2003 WITH AN EXTENSION FROM A FCDMC DTM FILE ON 3.22.04 TO CURRENT USGS NAVD88

CDMC\23443698 White Tanks\cadd\P1\REV B\WT3_C4-P1-REVB.dgn
FCDMC TOPO.DGN, NEW CREST ALIGNMENT.DGN, 52604_TOPO.DGN, BORROW SOURCE.DGN, WHITETANKS3_WOFUS.DGN, PL-FCD.DGN

150 0 150 300
Scale in Feet
ONE FOOT CONTOURS




..\CADD\xrefs\XSEC-5.dgn 8/9/2004 2:37:26 PM

| Ele (ft) | Distance (X-axis) (ft) | Length of Non Fissure Risk Zone | |
|---|---|---|---|
| | | NORTH | SOUTH |
| 1217 | 65' → | 2400' | 2200' |
| 1213 | 57' | " | " |
| 1214 | 50' | " | " |
| 1215 | 40' | " | " |
| 1216 | 34' | " | " |
| 1217 | 25' | " | " |
| 1218 | 12' | " | " |

Scale
1" = 20'

A TYPICAL CROSS-SECTION OF
NON-FISSURE RISK ZONE

Figure -2

6

TR-20 6-hr Local Results

(Based on Reduced storage)

ADWR Criteria

(Future Condition - Principal spillway Open)

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20 WT3PMP6   ECON                PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE     6HR LOCAL, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT
 5 RAINFL 1             0.1                                          6HRLOCAL
 8          .0000       .003        .006        .009        .013
 8          .016        .020        .025        .030        .035
 8          .039        .046        .052        .058        .065
 8          .071        .080        .090        .099        .109
 8          .118        .283        .449        .567        .622
 8          .669        .701        .732        .756        .780
 8          .795        .809        .824        .838        .852
 8          .866        .876        .885        .894        .904
 8          .913        .920        .926        .932        .939
 8          .945        .950        .954        .959        .964
 8          .969        .972        .976        .980        .984
 8          .988        .991        .993        .995        .998
 8          1.          1.          1.          1.          1.
 9 ENDTBL
 5 RAINFL 2             .1                                           6HR GEN
 8          .000        .005        .013        .020        .028
 8          .038        .045        .053        .060        .070
 8          .080        .085        .095        .108        .120
 8          .138        .150        .165        .190        .210
 8          .238        .280        .350        .440        .550
 8          .590        .620        .645        .668        .685
 8          .700        .720        .735        .753        .765
 8          .775        .790        .800        .810        .820
 8          .835        .843        .850        .863        .870
 8          .880        .890        .898        .908        .915
 8          .925        .930        .940        .945        .955
 8          .963        .970        .978        .985        .990
 8          1.00        1.00        1.00        1.00        1.00
 9 ENDTBL
 5 RAINFL 3             0.1                                          12HRGEN
 8          .000        .003        .007        .010        .013
 8          .016        .019        .022        .025        .028
 8          .031        .034        .037        .040        .043
 8          .045        .050        .054        .058        .062
 8          .066        .071        .075        .080        .085
 8          .089        .095        .101        .107        .112
 8          .118        .125        .132        .139        .146
 8          .153        .162        .171        .180        .189
 8          .198        .211        .224        .237        .250
 8          .264        .300        .345        .391        .436
 8          .491        .536        .564        .586        .607
 8          .629        .643        .657        .672        .686
 8          .700        .711        .721        .732        .742
 8          .753        .761        .769        .778        .786
 8          .795        .802        .809        .817        .824
 8          .832        .837        .843        .848        .854
 8          .859        .865        .870        .875        .881
 8          .886        .891        .895        .900        .905
 8          .909        .913        .917        .921        .925
 8          .929        .933        .936        .940        .944
 8          .948        .951        .954        .957        .960
 8          .963        .966        .969        .971        .974
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8          .977        .980        .982        .984        .986
 8          .989        .991        .993        .995        .998
 8         1.000       01.000       1.000       1.000       1.00
 9 ENDTBL
 5 RAINFL 4              0.1                                        18HRGEN
 8          .000        .001        .002        .003        .004
 8          .005        .005        .006        .007        .008
 8          .009        .012        .014        .017        .020
 8          .023        .025        .028        .031        .033
 8          .036        .040        .044        .049        .053
 8          .057        .061        .065        .070        .074
 8          .078        .084        .090        .096        .102
 8          .108        .114        .120        .126        .132
 8          .138        .146        .154        .162        .170
 8          .179        .187        .195        .203        .211
 8          .220        .238        .256        .275        .293
 8          .311        .330        .348        .367        .385
 8          .403        .430        .457        .484        .511
 8          .538        .557        .577        .597        .616
 8          .636        .653        .670        .687        .704
 8          .721        .734        .746        .759        .771
 8          .784        .792        .801        .810        .818
 8          .827        .832        .838        .843        .848
 8          .853        .856        .859        .862        .864
 8          .867        .870        .872        .875        .878
 8          .880        .882        .885        .887        .889
 8          .891        .893        .895        .897        .899
 8          .901        .903        .905        .907        .909
 8          .911        .912        .914        .916        .917
 8          .919        .920        .922        .924        .925
 8          .927        .929        .930        .932        .934
 8          .935        .937        .938        .940        .941
 8          .943        .945        .946        .948        .949
 8          .951        .952        .953        .955        .956
 8          .957        .959        .960        .961        .963
 8          .964        .965        .967        .968        .970
 8          .971        .972        .974        .975        .976
 8          .978        .979        .980        .982        .983
 8          .984        .985        .986        .988        .989
 8          .990        .991        .992        .993        .994
 8          .995        .996        .997        .998        .999
 8         1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 5 RAINFL 5              0.1                                        24HRGEN
 8        0.000       0.000       0.001       0.001       0.002
 8        0.002       0.002       0.003       0.003       0.003
 8        0.004       0.005       0.007       0.009       0.010
 8        0.012       0.013       0.015       0.016       0.018
 8        0.019       0.022       0.024       0.027       0.030
 8        0.032       0.035       0.037       0.040       0.042
 8        0.045       0.048       0.051       0.055       0.058
 8        0.061       0.064       0.068       0.071       0.074
 8        0.078       0.082       0.087       0.091       0.096
 8        0.100       0.104       0.109       0.113       0.118
 8        0.122       0.127       0.132       0.137       0.142
 8        0.147       0.151       0.156       0.161       0.166
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8          0.171       0.177       0.184       0.191       0.198
 8          0.205       0.214       0.224       0.233       0.242
 8          0.252       0.265       0.278       0.291       0.303
 8          0.316       0.334       0.351       0.368       0.386
 8          0.403       0.425       0.447       0.468       0.490
 8          0.512       0.527       0.543       0.558       0.574
 8          0.589       0.603       0.617       0.631       0.645
 8          0.659       0.671       0.684       0.696       0.709
 8          0.721       0.731       0.741       0.751       0.761
 8          0.771       0.779       0.786       0.793       0.800
 8          0.808       0.814       0.820       0.825       0.831
 8          0.837       0.840       0.843       0.847       0.850
 8          0.853       0.855       0.857       0.859       0.861
 8          0.864       0.866       0.868       0.870       0.872
 8          0.874       0.876       0.878       0.880       0.881
 8          0.883       0.885       0.886       0.888       0.890
 8          0.891       0.893       0.895       0.896       0.898
 8          0.899       0.901       0.902       0.904       0.905
 8          0.907       0.908       0.909       0.910       0.912
 8          0.913       0.914       0.915       0.916       0.917
 8          0.919       0.920       0.921       0.922       0.923
 8          0.924       0.926       0.927       0.928       0.929
 8          0.930       0.932       0.933       0.935       0.936
 8          0.938       0.940       0.941       0.943       0.944
 8          0.946       0.947       0.947       0.948       0.949
 8          0.950       0.950       0.951       0.952       0.953
 8          0.953       0.955       0.956       0.957       0.958
 8          0.959       0.960       0.961       0.962       0.963
 8          0.964       0.965       0.966       0.967       0.968
 8          0.969       0.970       0.971       0.972       0.973
 8          0.974       0.975       0.976       0.977       0.978
 8          0.979       0.980       0.981       0.982       0.983
 8          0.984       0.985       0.986       0.987       0.988
 8          0.988       0.989       0.990       0.991       0.991
 8          0.992       0.993       0.994       0.995       0.995
 8          0.996       0.997       0.998       0.998       0.999
 8          1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 5 RAINFL 6             .25                                         48HRGEN
 8          0.0000      0.0015      0.0029      0.0044      0.0058
 8          0.0073      0.0088      0.0102      0.0117      0.0131
 8          0.0146      0.0160      0.0175      0.0190      0.0204
 8          0.0219      0.0233      0.0248      0.0263      0.0277
 8          0.0292      0.0306      0.0321      0.0335      0.0350
 8          0.0365      0.0379      0.0394      0.0408      0.0423
 8          0.0438      0.0452      0.0467      0.0481      0.0496
 8          0.0510      0.0525      0.0542      0.0558      0.0575
 8          0.0592      0.0608      0.0625      0.0642      0.0658
 8          0.0692      0.0725      0.0758      0.0792      0.0825
 8          0.0858      0.0892      0.0925      0.0975      0.1025
 8          0.1075      0.1125      0.1175      0.1225      0.1275
 8          0.1325      0.1442      0.1560      0.1677      0.1794
 8          0.1985      0.2176      0.2366      0.2557      0.3239
 8          0.3921      0.4603      0.5285      0.5520      0.5754
 8          0.5989      0.6224      0.6356      0.6488      0.6620
 8          0.6752      0.6862      0.6972      0.7082      0.7192
```

```
 8          0.7267      0.7342      0.7417      0.7492      0.7558
 8          0.7625      0.7692      0.7758      0.7825      0.7892
 8          0.7958      0.8025      0.8083      0.8142      0.8200
 8          0.8258      0.8308      0.8358      0.8408      0.8458
 8          0.8508      0.8558      0.8608      0.8658      0.8683
 8          0.8708      0.8733      0.8758      0.8783      0.8808
 8          0.8833      0.8858      0.8875      0.8892      0.8908
 8          0.8925      0.8942      0.8958      0.8975      0.8992
 8          0.9008      0.9025      0.9042      0.9058      0.9075
 8          0.9092      0.9108      0.9125      0.9140      0.9154
 8          0.9169      0.9183      0.9198      0.9213      0.9227
 8          0.9242      0.9256      0.9271      0.9285      0.9300
 8          0.9315      0.9329      0.9344      0.9358      0.9373
 8          0.9388      0.9402      0.9417      0.9431      0.9446
 8          0.9460      0.9475      0.9490      0.9504      0.9519
 8          0.9533      0.9548      0.9563      0.9577      0.9592
 8          0.9606      0.9621      0.9635      0.9650      0.9665
 8          0.9679      0.9694      0.9708      0.9723      0.9737
 8          0.9752      0.9767      0.9781      0.9796      0.9810
 8          0.9825      0.9840      0.9854      0.9869      0.9883
 8          0.9898      0.9912      0.9927      0.9942      0.9956
 8          0.9971      0.9985      1.0000      1.0000      1.0
 9 ENDTBL
 5 RAINFL 7              .25                                          72HRGEN
 8          0.0000      0.0005      0.0009      0.0014      0.0019
 8          0.0025      0.0032      0.0038      0.0044      0.0051
 8          0.0057      0.0063      0.0070      0.0076      0.0082
 8          0.0089      0.0095      0.0103      0.0111      0.0119
 8          0.0127      0.0134      0.0142      0.0150      0.0158
 8          0.0171      0.0184      0.0196      0.0209      0.0222
 8          0.0234      0.0247      0.0259      0.0272      0.0285
 8          0.0297      0.0310      0.0323      0.0335      0.0348
 8          0.0361      0.0375      0.0389      0.0403      0.0418
 8          0.0432      0.0446      0.0460      0.0475      0.0489
 8          0.0503      0.0517      0.0532      0.0546      0.0560
 8          0.0574      0.0589      0.0604      0.0620      0.0636
 8          0.0652      0.0668      0.0684      0.0699      0.0715
 8          0.0731      0.0747      0.0763      0.0778      0.0797
 8          0.0816      0.0835      0.0854      0.0877      0.0899
 8          0.0921      0.0943      0.0968      0.0994      0.1019
 8          0.1044      0.1073      0.1101      0.1130      0.1158
 8          0.1193      0.1228      0.1263      0.1297      0.1335
 8          0.1373      0.1411      0.1449      0.1491      0.1532
 8          0.1573      0.1614      0.1725      0.1837      0.1948
 8          0.2059      0.2241      0.2422      0.2603      0.2784
 8          0.3431      0.4078      0.4726      0.5373      0.5596
 8          0.5819      0.6042      0.6265      0.6390      0.6515
 8          0.6641      0.6766      0.6870      0.6975      0.7079
 8          0.7184      0.7255      0.7326      0.7397      0.7468
 8          0.7535      0.7601      0.7668      0.7734      0.7794
 8          0.7854      0.7915      0.7975      0.8030      0.8085
 8          0.8141      0.8196      0.8247      0.8297      0.8348
 8          0.8399      0.8443      0.8487      0.8532      0.8576
 8          0.8598      0.8620      0.8642      0.8665      0.8685
 8          0.8706      0.8726      0.8747      0.8766      0.8785
 8          0.8804      0.8823      0.8840      0.8858      0.8875
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8          0.8892      0.8908      0.8924      0.8940      0.8956
 8          0.8972      0.8987      0.9003      0.9019      0.9035
 8          0.9051      0.9066      0.9082      0.9098      0.9114
 8          0.9130      0.9146      0.9160      0.9174      0.9188
 8          0.9203      0.9217      0.9231      0.9245      0.9259
 8          0.9274      0.9288      0.9302      0.9316      0.9329
 8          0.9342      0.9354      0.9367      0.9380      0.9392
 8          0.9405      0.9418      0.9430      0.9443      0.9456
 8          0.9468      0.9481      0.9494      0.9506      0.9519
 8          0.9530      0.9541      0.9552      0.9563      0.9574
 8          0.9585      0.9597      0.9608      0.9619      0.9630
 8          0.9641      0.9652      0.9661      0.9671      0.9680
 8          0.9690      0.9699      0.9709      0.9718      0.9728
 8          0.9736      0.9744      0.9752      0.9759      0.9767
 8          0.9775      0.9783      0.9791      0.9797      0.9804
 8          0.9810      0.9816      0.9823      0.9829      0.9835
 8          0.9842      0.9847      0.9851      0.9856      0.9861
 8          0.9866      0.9870      0.9875      0.9880      0.9884
 8          0.9889      0.9894      0.9899      0.9902      0.9905
 8          0.9908      0.9911      0.9915      0.9918      0.9921
 8          0.9924      0.9927      0.9930      0.9934      0.9937
 8          0.9940      0.9943      0.9946      0.9949      0.9953
 8          0.9956      0.9959      0.9962      0.9965      0.9968
 8          0.9972      0.9975      0.9978      0.9981      0.9984
 8          0.9987      0.9989      0.9991      0.9992      0.9994
 8          0.9995      0.9997      0.9998      1.0000      1.0000
 9 ENDTBL
 5 RAINFL 8     1        2.4                                          10-DAY
 8          .0000       .0024       .0048       .0073       .0097
 8          .0121       .0148       .0174       .0201       .0228
 8          .0254       .0284       .0314       .0344       .0374
 8          .0404       .0437       .0471       .0505       .0539
 8          .0572       .0612       .0651       .0690       .0729
 8          .0768       .0815       .0862       .0909       .0955
 8          .1002       .1061       .1120       .1179       .1238
 8          .1297       .1377       .1458       .1538       .1618
 8          .1699       .1832       .1966       .2099       .2232
 8          .2366       .2548       .2778       .3093       .3614
 8          1.092       1.174       1.213       1.240       1.260
 8          1.276       1.286       1.296       1.306       1.316
 8          1.326       1.333       1.340       1.347       1.354
 8          1.360       1.365       1.371       1.376       1.381
 8          1.386       1.391       1.395       1.399       1.403
 8          1.408       1.411       1.415       1.418       1.422
 8          1.426       1.429       1.432       1.435       1.438
 8          1.442       1.444       1.447       1.450       1.453
 8          1.456       1.458       1.461       1.463       1.466
 8          1.468       1.471       1.473       1.475       1.477
 8          1.48        1.48        1.48        1.48        1.48
 9 ENDTBL
 4 DIMHYD                .0556                                        WT3
 8          0.0         .03         .10         .19         .31
 8          .47         .66         .82         .93         .99
 8          1.0         .99         .93         .82         .66
 8          .47         .31         .03         .00         .00
 9 ENDTBL
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 2 XSECTN   005         1.0         8.77                              BOSSCS#5
 8                      0.          0.0         0.0
 8                      0.35        5.          5.56
 8                      1.03        50.         30.95
 8                      1.39        100.        52.16
 8                      1.94        200.        88.72
 8                      2.63        400.        148.61
 8                      3.51        800.        260.63
 8                      4.62        1600.       459.66
 8                      6.04        3200.       929.36
 8                      7.38        6400.       1811.51
 8                      8.77        12800.      3374.20
 8                      10.17       25600.      6398.87
 8                      11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN   010         1.0         8.94                              BOSSCS#4
 8                      0.          0.0         0.0
 8                      0.91        5.          4.95
 8                      2.03        50.         24.80
 8                      2.63        100.        41.32
 8                      3.34        200.        74.14
 8                      4.15        400.        130.28
 8                      5.23        800.        223.37
 8                      6.41        1600.       447.51
 8                      7.65        3200.       898.64
 8                      8.94        6400.       1690.88
 8                      10.29       12800.      3331.95
 8                      11.64       25600.      6185.81
 8                      13.14       51200.      10661.04
 9 ENDTBL
 2 XSECTN   020         1.0         7.3                               REACHC
 8                      0.          0.0         0.0
 8                      1.01        100.        57.78
 8                      1.49        200.        86.81
 8                      1.88        300.        110.25
 8                      2.49        500.        149.47
 8                      3.68        1000.       226.31
 8                      5.40        2000.       346.26
 8                      7.85        4000.       533.39
 8                      9.64        6000.       688.07
 8                      11.16       8000.       838.10
 8                      12.46       10000.      985.31
 8                      13.61       12000.      1122.03
 8                      14.56       14000.      1236.94
 8                      15.43       16000.      1345.18
 8                      16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN   025         1.0         7.3                               REACHB
 8                      0.          0.0         0.0
 8                      0.63        100.        80.89
 8                      0.93        200.        120.32
 8                      1.17        300.        151.77
 8                      1.56        500.        203.28
 8                      2.30        1000.       302.00
 8                      3.38        2000.       449.24
 8                      4.97        4000.       673.73
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8                      6.23        6000.       855.96
 8                      7.31        8000.       1016.35
 8                      8.24        10000.      1158.51
 8                      9.09        12000.      1293.31
 8                      9.90        14000.      1425.57
 8                      10.64       16000.      1549.17
 8                      11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030        1.0         9.45                                BOSSCS#6
 8                      0.          0.0         0.0
 8                      0.77        5.          4.67
 8                      1.54        50.         32.06
 8                      1.78        100.        56.64
 8                      2.10        200.        100.59
 8                      2.50        400.        179.97
 8                      3.01        800.        320.25
 8                      3.63        1600.       589.66
 8                      4.35        3200.       1110.72
 8                      5.21        6400.       2084.48
 8                      6.03        12800.      4119.83
 8                      6.99        25600.      6856.75
 8                      8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045        1.0         4.87                                REACHA
 8                      0.          0.0         0.0
 8                      0.60        100.        85.69
 8                      0.90        200.        127.94
 8                      1.13        300.        161.93
 8                      1.52        500.        217.27
 8                      2.25        1000.       324.03
 8                      3.31        2000.       483.02
 8                      4.87        4000.       722.17
 8                      6.09        6000.       914.99
 8                      7.15        8000.       1084.61
 8                      8.05        10000.      1234.17
 8                      8.87        12000.      1373.80
 8                      9.64        14000.      1507.84
 8                      10.34       16000.      1633.45
 8                      11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060        1.0         4.7                                 2CP6CP7
 8                      0.          0.0         0.0
 8                      2.36        100.        45.12
 8                      2.88        200.        83.75
 8                      3.18        300.        114.33
 8                      3.64        500.        172.72
 8                      4.42        1000.       289.04
 8                      5.40        2000.       470.72
 8                      6.87        4000.       782.74
 8                      7.91        6000.       1020.12
 8                      8.79        8000.       1231.25
 8                      9.60        10000.      1435.05
 8                      10.26       12000.      1618.34
 8                      10.94       14000.      1812.58
 8                      11.47       16000.      1983.46
 8                      11.96       18000.      2150.12
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 9 ENDTBL
 2 XSECTN   067          1.0         8.77                                BOSSCS#5
 8                       0.          0.0         0.0
 8                       0.35        5.          5.56
 8                       1.03        50.         30.95
 8                       1.39        100.        52.16
 8                       1.94        200.        88.72
 8                       2.63        400.        148.61
 8                       3.51        800.        260.63
 8                       4.62        1600.       459.66
 8                       6.04        3200.       929.36
 8                       7.38        6400.       1811.51
 8                       8.77        12800.      3374.20
 8                       10.17       25600.      6398.87
 8                       11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT       01                                                        95/11/6
 8                       1178.0      0.0         0.
 8                       1188.0      0.02        44.8
 8                       1196.8      0.13        300.
 8                       1199.2      0.21        500.
 8                       1202.0      159.0       845.55
 8                       1204.0      187.75      1176.28
 8                       1206.0      214.9       1575.25
 8                       1208.0      240.3       2044.97
 8                       1210.0      265.4       2593.40
 8                       1212.0      330.00      3209.97
 8                       1213.0      2936.00     3534.09
 8                       1214.0      8488.00     3880.04
 8                       1215.0      15810.0     4246.27
 8                       1216.0      24545.0     4634.40
 8                       1217.0      34492.0     5045.91
 8                       1218.0      45517.0     5481.24
 8                       1219.0      57524.0     5939.64
 8                       1220.0      70439.0     6421.48
 9 ENDTBL
 6 RUNOFF 1 001        1 2.46        87.2        0.85        1 1
 6 REACH  3 005   1    7 9100.                               1           BOSS#6
 6 REACH  3 010   7    2 9100.                               1           BOSS#4
 6 RUNOFF 1 002        3 2.38        79.9        0.73        1 1
 6 ADDHYD 4 012   2 3 1                                      1 1
 6 DIVERT 6 012   1 4 7 4100.        1.00        200.        1 1         OLIVE
 6 REACH  3 020   4    7 3332.                               1           REACH C
 6 REACH  3 025   7    5 1950.                               1           REACH B
 6 RUNOFF 1 003        6 3.94        87.2        0.88        1 1
 6 REACH  3 030   6    7 8865.                               1           BOSS#6
 6 REACH  3 005   7    1 8865.                               1           BOSS#5
 6 REACH  3 025   1    7 1950.                               1           REACH B
 6 RUNOFF 1 004        1 2.06        77.3        0.79        1 1
 6 ADDHYD 4 034   7 1 2                                      1 1
 6 ADDHYD 4 035   5 2 3                                      1 1
 6 DIVERT 6 035   3 4 7 11000.       1.00        199.        1 1         NORTHERN
 6 REACH  3 045   4    5 4200.                               1           REACH A
 6 RUNOFF 1 006        2 1.47        87.7        0.47        1 1
 6 REACH  3 060   2    3 7540.                               1           CP6CP7
 6 REACH  3 067   3    4 5140.                               1           BOSS#5
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 ADDHYD 4 064    5 4 3                                        1 1
 6 RUNOFF 1 005        6 4.78         78.8         0.78         1 1
 6 RUNOFF 1 007        7 3.48         81.7         1.01         1 1
 6 ADDHYD 4 075    6 7 1                                        1 1
 6 ADDHYD 4 076    1 3 2                                        1 1      1
 6 RESVOR 2     01 2   1 1200.0                                 1 1      1
 ENDATA
 7 LIST                  1.0                      1.
 7 INCREM 6              0.05
 7 COMPUT 7 001       01 0.          12.7         1.0          1 2  01  01
   ENDCMP 1
   ENDJOB 2

**********END OF 80-80 LIST**********
```

RUNOFF OPTION USED WITH RAINTABLE NO. 8, RUNOFF CURVE NO. = 100.

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST 1. 0. 1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT
DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0030 | .0060 | .0090 | .0130 |
| .0160 | .0200 | .0250 | .0300 | .0350 |
| .0390 | .0460 | .0520 | .0580 | .0650 |
| .0710 | .0800 | .0900 | .0990 | .1090 |
| .1180 | .2830 | .4490 | .5670 | .6220 |
| .6690 | .7010 | .7320 | .7560 | .7800 |
| .7950 | .8090 | .8240 | .8380 | .8520 |
| .8660 | .8760 | .8850 | .8940 | .9040 |
| .9130 | .9200 | .9260 | .9320 | .9390 |
| .9450 | .9500 | .9540 | .9590 | .9640 |
| .9690 | .9720 | .9760 | .9800 | .9840 |
| .9880 | .9910 | .9930 | .9950 | .9980 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

```
RUNOFF      1       1      2.4600     87.2000      .85001 1 0 0 0 1
REACH       5   1   7   9100.0000       .0000      .00001 0 0 0 0 1
REACH      10   7   2   9100.0000       .0000      .00001 0 0 0 0 1
RUNOFF      2       3      2.3800     79.9000      .73001 1 0 0 0 1
ADDHYD     12   2 3 1                                  1 1 0 0 0 1
DIVERT     12   1 4 7   4100.0000      1.0000   200.00001 1 0 0 0 1
REACH      20   4   7   3332.0000       .0000      .00001 0 0 0 0 1
REACH      25   7   5   1950.0000       .0000      .00001 0 0 0 0 1
RUNOFF      3       6      3.9400     87.2000      .88001 1 0 0 0 1
REACH      30   6   7   8865.0000       .0000      .00001 0 0 0 0 1
REACH       5   7   1   8865.0000       .0000      .00001 0 0 0 0 1
REACH      25   1   7   1950.0000       .0000      .00001 0 0 0 0 1
RUNOFF      4       1      2.0600     77.3000      .79001 1 0 0 0 1
ADDHYD     34   7 1 2                                  1 1 0 0 0 1
ADDHYD     35   5 2 3                                  1 1 0 0 0 1
DIVERT     35   3 4 7  11000.0000      1.0000   199.00001 1 0 0 0 1
REACH      45   4   5   4200.0000       .0000      .00001 0 0 0 0 1
RUNOFF      6       2      1.4700     87.7000      .47001 1 0 0 0 1
REACH      60   2   3   7540.0000       .0000      .00001 0 0 0 0 1
REACH      67   3   4   5140.0000       .0000      .00001 0 0 0 0 1
ADDHYD     64   5 4 3                                  1 1 0 0 0 1
RUNOFF      5       6      4.7800     78.8000      .78001 1 0 0 0 1
RUNOFF      7       7      3.4800     81.7000     1.01001 1 0 0 0 1
ADDHYD     75   6 7 1                                  1 1 0 0 0 1
ADDHYD     76   1 3 2                                  1 1 0 0 1 1
RESVOR        1 2   1   1200.0000                      1 1 0 0 1 1
ENDATA
```

END OF LISTING

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .050 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 12.70 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .050 HOURS
ALTERNATE NO. = 1 STORM NO. = 1 RAIN TABLE NO. = 1

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) (RUNOFF) |
|---|---|---|
| 2.71 | 17873.0 | |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| .75 CFS | .38 | 1.15 | 2.73 | 5.54 | 9.95 | 16.43 | 25.70 | 38.37 |
| 1.15 CFS | 55 | 75 | 99 | 128 | 160 | 196 | 235 | 276 |
| 1.55 CFS | 318 | 362 | 409 | 458 | 510 | 566 | 625 | 688 |
| 1.95 CFS | 753 | 830 | 978 | 1279 | 1794 | 2595 | 3743 | 5287 |
| 2.35 CFS | 7187 | 9294 | 11447 | 13473 | 15219 | 16590 | 17491 | 17866 |
| 2.75 CFS | 17674 | 16919 | 15643 | 13899 | 11960 | 10148 | 8586 | 7352 |
| 3.15 CFS | 6416 | 5736 | 5217 | 4765 | 4374 | 4049 | 3771 | 3525 |
| 3.55 CFS | 3312 | 3138 | 2995 | 2873 | 2772 | 2690 | 2613 | 2530 |
| 3.95 CFS | 2439 | 2343 | 2247 | 2154 | 2065 | 1978 | 1896 | 1819 |
| 4.35 CFS | 1749 | 1687 | 1631 | 1574 | 1516 | 1458 | 1400 | 1342 |
| 4.75 CFS | 1287 | 1239 | 1196 | 1160 | 1128 | 1098 | 1069 | 1038 |
| 5.15 CFS | 1007 | 976 | 947 | 922 | 901 | 882 | 867 | 852 |
| 5.55 CFS | 837 | 819 | 800 | 781 | 762 | 742 | 721 | 700 |
| 5.95 CFS | 676 | 646 | 612 | 576 | 539 | 500 | 458 | 413 |
| 6.35 CFS | 367 | 322 | 278 | 234 | 191 | 147 | 106 | 68 |
| 6.75 CFS | 37.92 | 17.14 | 5.12 | .74 | .04 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.09 WATERSHED INCHES; 17613 CFS-HRS; 1455.5 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 3.32 | 10200.1 | 8.21 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.09 WATERSHED INCHES; 17613 CFS-HRS; 1455.5 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 3.96 | 7060.0 | 9.08 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.09 WATERSHED INCHES; 17613 CFS-HRS; 1455.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.64 | 16995.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.05 CFS | .16 | .69 | 1.94 | 4.40 | 8.67 | 15.34 | 25.03 | 38.19 |
| 1.45 CFS | 55 | 75 | 99 | 128 | 161 | 198 | 240 | 286 |
| 1.85 CFS | 336 | 390 | 445 | 523 | 689 | 1033 | 1648 | 2632 |
| 2.25 CFS | 4059 | 5924 | 8106 | 10407 | 12610 | 14524 | 15972 | 16813 |
| 2.65 CFS | 16970 | 16435 | 15174 | 13412 | 11508 | 9715 | 8223 | 7053 |
| 3.05 CFS | 6203 | 5583 | 5079 | 4636 | 4253 | 3923 | 3631 | 3372 |
| 3.45 CFS | 3155 | 2982 | 2842 | 2733 | 2654 | 2597 | 2536 | 2461 |
| 3.85 CFS | 2371 | 2271 | 2170 | 2073 | 1981 | 1896 | 1820 | 1752 |
| 4.25 CFS | 1694 | 1642 | 1588 | 1530 | 1468 | 1405 | 1343 | 1286 |
| 4.65 CFS | 1236 | 1194 | 1158 | 1126 | 1094 | 1061 | 1028 | 995 |
| 5.05 CFS | 962 | 932 | 906 | 886 | 869 | 852 | 836 | 819 |
| 5.45 CFS | 801 | 781 | 762 | 746 | 733 | 721 | 708 | 691 |
| 5.85 CFS | 668 | 636 | 601 | 565 | 530 | 495 | 459 | 422 |
| 6.25 CFS | 383 | 341 | 298 | 252 | 204 | 155 | 108 | 65 |
| 6.65 CFS | 33.37 | 12.75 | 2.82 | .21 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
10.12 WATERSHED INCHES; 15550 CFS-HRS; 1285.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.64 | 17248.4 | (NULL) |
| 3.81 | 9386.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.05 CFS | .16 | .69 | 1.94 | 4.40 | 8.68 | 15.37 | 25.12 | 38.38 |
| 1.45 CFS | 55 | 76 | 101 | 130 | 164 | 203 | 246 | 295 |
| 1.85 CFS | 349 | 407 | 468 | 552 | 726 | 1078 | 1702 | 2698 |
| 2.25 CFS | 4138 | 6017 | 8214 | 10533 | 12754 | 14690 | 16164 | 17035 |
| 2.65 CFS | 17234 | 16756 | 15574 | 13921 | 12165 | 10563 | 9314 | 8436 |
| 3.05 CFS | 7930 | 7699 | 7624 | 7638 | 7731 | 7880 | 8056 | 8240 |
| 3.45 CFS | 8433 | 8628 | 8811 | 8978 | 9131 | 9262 | 9350 | 9385 |
| 3.85 CFS | 9371 | 9316 | 9230 | 9123 | 8998 | 8860 | 8713 | 8560 |
| 4.25 CFS | 8404 | 8243 | 8072 | 7889 | 7696 | 7497 | 7295 | 7095 |
| 4.65 CFS | 6900 | 6711 | 6528 | 6348 | 6169 | 5990 | 5812 | 5635 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.05 CFS | 5461 | 5291 | 5129 | 4974 | 4825 | 4679 | 4537 | 4397 |
| 5.45 CFS | 4259 | 4123 | 3991 | 3865 | 3745 | 3630 | 3517 | 3404 |
| 5.85 CFS | 3287 | 3165 | 3043 | 2923 | 2807 | 2695 | 2585 | 2475 |
| 6.25 CFS | 2367 | 2259 | 2152 | 2045 | 1937 | 1831 | 1727 | 1631 |
| 6.65 CFS | 1547 | 1475 | 1416 | 1364 | 1316 | 1269 | 1223 | 1177 |
| 7.05 CFS | 1132 | 1087 | 1043 | 999 | 956 | 913 | 871 | 830 |
| 7.45 CFS | 790 | 751 | 714 | 678 | 642 | 609 | 576 | 545 |
| 7.85 CFS | 516 | 487 | 460 | 434 | 409 | 386 | 363 | 342 |
| 8.25 CFS | 322 | 303 | 285 | 268 | 252 | 236 | 222 | 208 |
| 8.65 CFS | 195 | 183 | 172 | 161 | 151 | 141 | 132 | 124 |
| 9.05 CFS | 116 | 109 | 102 | 95 | 89 | 83 | 78 | 73 |
| 9.45 CFS | 67.78 | 63.31 | 59.13 | 55.22 | 51.55 | 48.12 | 44.91 | 41.90 |
| 9.85 CFS | 39.10 | 36.47 | 34.01 | 31.72 | 29.57 | 27.57 | 25.70 | 23.95 |
| 10.25 CFS | 22.32 | 20.79 | 19.37 | 18.04 | 16.81 | 15.65 | 14.57 | 13.57 |
| 10.65 CFS | 12.63 | 11.76 | 10.94 | 10.18 | 9.47 | 8.81 | 8.20 | 7.63 |
| 11.05 CFS | 7.10 | 6.60 | 6.14 | 5.71 | 5.30 | 4.93 | 4.58 | 4.26 |
| 11.45 CFS | 3.96 | 3.68 | 3.42 | 3.18 | 2.95 | 2.74 | 2.55 | 2.37 |
| 11.85 CFS | 2.20 | 2.04 | 1.89 | 1.76 | 1.63 | 1.51 | 1.40 | 1.30 |
| 12.25 CFS | 1.21 | 1.12 | 1.04 | .97 | .90 | .83 | .77 | .71 |
| 12.65 CFS | .66 | .61 | .57 | .53 | .49 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
10.62 WATERSHED INCHES; 33163 CFS-HRS; 2740.6 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.25 | 4100.0 * | (DIVERT) |

* FIRST POINT OF FLAT PEAK

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.05 CFS | .16 | .69 | 1.94 | 4.40 | 8.68 | 15.37 | 25.12 | 38.38 |
| 1.45 CFS | 55 | 76 | 101 | 130 | 164 | 203 | 246 | 295 |
| 1.85 CFS | 349 | 407 | 468 | 552 | 726 | 1078 | 1702 | 2698 |
| 2.25 CFS | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 |
| 2.65 CFS | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 |
| 3.05 CFS | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 |
| 3.45 CFS | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 |
| 3.85 CFS | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 |
| 4.25 CFS | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 |
| 4.65 CFS | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 |
| 5.05 CFS | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 |
| 5.45 CFS | 4100 | 4100 | 3991 | 3865 | 3745 | 3630 | 3517 | 3404 |
| 5.85 CFS | 3287 | 3165 | 3043 | 2923 | 2807 | 2695 | 2585 | 2475 |
| 6.25 CFS | 2367 | 2259 | 2152 | 2045 | 1937 | 1831 | 1727 | 1631 |
| 6.65 CFS | 1547 | 1475 | 1416 | 1364 | 1316 | 1269 | 1223 | 1177 |
| 7.05 CFS | 1132 | 1087 | 1043 | 999 | 956 | 913 | 871 | 830 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.45 CFS | 790 | 751 | 714 | 678 | 642 | 609 | 576 | 545 |
| 7.85 CFS | 516 | 487 | 460 | 434 | 409 | 386 | 363 | 342 |
| 8.25 CFS | 322 | 303 | 285 | 268 | 252 | 236 | 222 | 208 |
| 8.65 CFS | 195 | 183 | 172 | 161 | 151 | 141 | 132 | 124 |
| 9.05 CFS | 116 | 109 | 102 | 95 | 89 | 83 | 78 | 73 |
| 9.45 CFS | 67.78 | 63.31 | 59.13 | 55.22 | 51.55 | 48.12 | 44.91 | 41.90 |
| 9.85 CFS | 39.10 | 36.47 | 34.01 | 31.72 | 29.57 | 27.57 | 25.70 | 23.95 |
| 10.25 CFS | 22.32 | 20.79 | 19.37 | 18.04 | 16.81 | 15.65 | 14.57 | 13.57 |
| 10.65 CFS | 12.63 | 11.76 | 10.94 | 10.18 | 9.47 | 8.81 | 8.20 | 7.63 |
| 11.05 CFS | 7.10 | 6.60 | 6.14 | 5.71 | 5.30 | 4.93 | 4.58 | 4.26 |
| 11.45 CFS | 3.96 | 3.68 | 3.42 | 3.18 | 2.95 | 2.74 | 2.55 | 2.37 |
| 11.85 CFS | 2.20 | 2.04 | 1.89 | 1.76 | 1.63 | 1.51 | 1.40 | 1.30 |
| 12.25 CFS | 1.21 | 1.12 | 1.04 | .97 | .90 | .83 | .77 | .71 |
| 12.65 CFS | .66 | .61 | .57 | .53 | .49 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
5.98 WATERSHED INCHES; 18666 CFS-HRS; 1542.6 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.64 | 13148.4 | (DIVERT) |
| 3.81 | 5286.1 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .050 hr, | | | | DRAINAGE AREA = | | .00 SQ.MI. | |
|---|---|---|---|---|---|---|---|---|
| 2.20 CFS | 0 | 38 | 1917 | 4114 | 6433 | 8654 | 10590 | 12064 |
| 2.60 CFS | 12935 | 13134 | 12656 | 11474 | 9821 | 8065 | 6463 | 5214 |
| 3.00 CFS | 4336 | 3830 | 3599 | 3524 | 3538 | 3631 | 3780 | 3956 |
| 3.40 CFS | 4140 | 4333 | 4528 | 4711 | 4878 | 5031 | 5162 | 5250 |
| 3.80 CFS | 5285 | 5271 | 5216 | 5130 | 5023 | 4898 | 4760 | 4613 |
| 4.20 CFS | 4460 | 4304 | 4143 | 3972 | 3789 | 3596 | 3397 | 3195 |
| 4.60 CFS | 2995 | 2800 | 2611 | 2428 | 2248 | 2069 | 1890 | 1712 |
| 5.00 CFS | 1535 | 1361 | 1191 | 1029 | 874 | 725 | 579 | 437 |
| 5.40 CFS | 297 | 159 | 23 | 0 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14497 CFS-HRS; 1198.0 ACRE-FEET.

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 3.35 | 4100.0 * | 7.94 |

* FIRST POINT OF FLAT PEAK

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
5.98 WATERSHED INCHES; 18674 CFS-HRS; 1543.2 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 3.40 | 4100.0 * | 5.03 |

* FIRST POINT OF FLAT PEAK

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
5.98 WATERSHED INCHES; 18671 CFS-HRS; 1543.0 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.73 | 28008.6 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 3.94 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| .70 CFS | .11 | .53 | 1.63 | 3.91 | 7.97 | 14.38 | 23.74 | 37.26 |
| 1.10 CFS | 56 | 80 | 110 | 147 | 190 | 239 | 295 | 355 |
| 1.50 CFS | 419 | 485 | 555 | 629 | 707 | 789 | 876 | 970 |
| 1.90 CFS | 1070 | 1172 | 1291 | 1520 | 1978 | 2754 | 3947 | 5645 |
| 2.30 CFS | 7914 | 10709 | 13856 | 17125 | 20269 | 23051 | 25326 | 26959 |
| 2.70 CFS | 27856 | 27941 | 27181 | 25638 | 23334 | 20446 | 17522 | 14870 |
| 3.10 CFS | 12659 | 10940 | 9640 | 8690 | 7921 | 7256 | 6690 | 6220 |
| 3.50 CFS | 5813 | 5453 | 5146 | 4895 | 4684 | 4501 | 4348 | 4218 |
| 3.90 CFS | 4089 | 3952 | 3806 | 3656 | 3508 | 3364 | 3224 | 3089 |
| 4.30 CFS | 2960 | 2840 | 2733 | 2639 | 2550 | 2461 | 2371 | 2280 |
| 4.70 CFS | 2188 | 2099 | 2016 | 1942 | 1879 | 1824 | 1775 | 1729 |
| 5.10 CFS | 1682 | 1634 | 1585 | 1537 | 1492 | 1455 | 1423 | 1396 |
| 5.50 CFS | 1372 | 1350 | 1324 | 1294 | 1262 | 1230 | 1197 | 1163 |
| 5.90 CFS | 1128 | 1091 | 1048 | 998 | 943 | 885 | 823 | 756 |
| 6.30 CFS | 686 | 612 | 539 | 468 | 398 | 331 | 264 | 199 |
| 6.70 CFS | 138 | 85 | 45 | 18 | 5 | 0 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.10 WATERSHED INCHES; 28213 CFS-HRS; 2331.5 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 3.40 | 16237.6 | 6.29 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.10 WATERSHED INCHES; 28213 CFS-HRS; 2331.5 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 4.00 | 11557.4 | 8.50 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.10 WATERSHED INCHES; 28213 CFS-HRS; 2331.5 ACRE-FEET.

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 4.06 | 11552.0 | 8.90 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.10 WATERSHED INCHES; 28213 CFS-HRS; 2331.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.68 | 13580.0 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.20 CFS | .32 | .94 | 2.20 | 4.53 | 8.43 | 14.25 | 22.34 | 33.25 |
| 1.60 CFS | 48 | 65 | 87 | 114 | 145 | 180 | 219 | 260 |
| 2.00 CFS | 305 | 403 | 622 | 1013 | 1651 | 2596 | 3893 | 5471 |
| 2.40 CFS | 7211 | 8963 | 10567 | 11924 | 12911 | 13469 | 13552 | 13136 |
| 2.80 CFS | 12289 | 10903 | 9457 | 8031 | 6802 | 5872 | 5130 | 4648 |
| 3.20 CFS | 4233 | 3871 | 3547 | 3287 | 3055 | 2849 | 2670 | 2532 |
| 3.60 CFS | 2417 | 2323 | 2247 | 2197 | 2140 | 2073 | 1998 | 1916 |
| 4.00 CFS | 1834 | 1756 | 1682 | 1611 | 1545 | 1485 | 1430 | 1385 |
| 4.40 CFS | 1339 | 1292 | 1243 | 1192 | 1143 | 1095 | 1051 | 1014 |
| 4.80 CFS | 980 | 952 | 925 | 899 | 874 | 848 | 822 | 796 |
| 5.20 CFS | 773 | 754 | 738 | 723 | 709 | 697 | 684 | 668 |
| 5.60 CFS | 652 | 638 | 624 | 611 | 596 | 581 | 561 | 535 |
| 6.00 CFS | 506 | 477 | 447 | 416 | 384 | 349 | 313 | 276 |
| 6.40 CFS | 239 | 203 | 165 | 126 | 89 | 55 | 29 | 12 |
| 6.80 CFS | 2.44 | .16 | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
9.75 WATERSHED INCHES; 12960 CFS-HRS; 1071.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.69 | 13913.0 | (NULL) |
| 3.98 | 13359.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.20 CFS | .32 | .94 | 2.20 | 4.54 | 8.47 | 14.37 | 22.62 | 33.79 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.60 CFS | 49 | 67 | 90 | 118 | 151 | 190 | 233 | 279 |
| 2.00 CFS | 331 | 437 | 665 | 1068 | 1719 | 2680 | 3994 | 5593 |
| 2.40 CFS | 7355 | 9131 | 10763 | 12150 | 13171 | 13769 | 13900 | 13547 |
| 2.80 CFS | 12787 | 11520 | 10239 | 9034 | 8094 | 7531 | 7235 | 7282 |
| 3.20 CFS | 7472 | 7784 | 8186 | 8690 | 9239 | 9807 | 10376 | 10937 |
| 3.60 CFS | 11459 | 11929 | 12340 | 12699 | 12977 | 13175 | 13298 | 13353 |
| 4.00 CFS | 13354 | 13307 | 13219 | 13096 | 12942 | 12763 | 12562 | 12350 |
| 4.40 CFS | 12118 | 11870 | 11608 | 11334 | 11053 | 10768 | 10482 | 10199 |
| 4.80 CFS | 9918 | 9642 | 9367 | 9094 | 8823 | 8555 | 8290 | 8028 |
| 5.20 CFS | 7773 | 7527 | 7288 | 7056 | 6829 | 6609 | 6394 | 6181 |
| 5.60 CFS | 5974 | 5774 | 5582 | 5394 | 5212 | 5034 | 4857 | 4679 |
| 6.00 CFS | 4504 | 4334 | 4169 | 4009 | 3851 | 3697 | 3545 | 3398 |
| 6.40 CFS | 3255 | 3116 | 2979 | 2846 | 2718 | 2596 | 2485 | 2385 |
| 6.80 CFS | 2295 | 2215 | 2138 | 2062 | 1988 | 1916 | 1844 | 1773 |
| 7.20 CFS | 1702 | 1633 | 1564 | 1495 | 1428 | 1362 | 1297 | 1234 |
| 7.60 CFS | 1172 | 1112 | 1054 | 998 | 945 | 893 | 844 | 796 |
| 8.00 CFS | 751 | 708 | 667 | 628 | 591 | 555 | 522 | 490 |
| 8.40 CFS | 460 | 432 | 405 | 380 | 356 | 334 | 312 | 292 |
| 8.80 CFS | 274 | 256 | 239 | 224 | 209 | 195 | 182 | 170 |
| 9.20 CFS | 159 | 148 | 139 | 129 | 120 | 112 | 105 | 98 |
| 9.60 CFS | 90.94 | 84.72 | 78.91 | 73.48 | 68.41 | 63.69 | 59.27 | 55.16 |
| 10.00 CFS | 51.32 | 47.74 | 44.40 | 41.29 | 38.39 | 35.69 | 33.17 | 30.83 |
| 10.40 CFS | 28.65 | 26.62 | 24.73 | 22.97 | 21.34 | 19.81 | 18.40 | 17.08 |
| 10.80 CFS | 15.86 | 14.72 | 13.66 | 12.68 | 11.76 | 10.91 | 10.12 | 9.39 |
| 11.20 CFS | 8.71 | 8.08 | 7.49 | 6.95 | 6.44 | 5.97 | 5.53 | 5.13 |
| 11.60 CFS | 4.75 | 4.40 | 4.08 | 3.78 | 3.50 | 3.24 | 3.00 | 2.78 |
| 12.00 CFS | 2.58 | 2.38 | 2.21 | 2.04 | 1.89 | 1.75 | 1.62 | 1.50 |
| 12.40 CFS | 1.39 | 1.28 | 1.19 | 1.10 | 1.02 | .94 | .87 | .80 |
| 12.80 CFS | .74 | .69 | .63 | .58 | .54 | .50 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
10.63 WATERSHED INCHES; 41173 CFS-HRS; 3402.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.69 | 17992.4 | (NULL) |
| 3.98 | 17459.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .050 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 1.15 CFS | .13 | .58 | 1.78 | 4.30 | 8.98 | 16.87 | 28.87 | 45.91 |
| 1.55 CFS | 69 | 99 | 137 | 183 | 238 | 302 | 377 | 461 |
| 1.95 CFS | 554 | 656 | 817 | 1111 | 1616 | 2456 | 3763 | 5660 |
| 2.35 CFS | 8149 | 10567 | 12747 | 14606 | 16117 | 17202 | 17834 | 17983 |
| 2.75 CFS | 17639 | 16883 | 15618 | 14338 | 13133 | 12193 | 11631 | 11335 |
| 3.15 CFS | 11382 | 11572 | 11884 | 12286 | 12790 | 13339 | 13907 | 14476 |
| 3.55 CFS | 15037 | 15559 | 16029 | 16440 | 16799 | 17077 | 17275 | 17398 |
| 3.95 CFS | 17453 | 17454 | 17407 | 17319 | 17196 | 17042 | 16863 | 16662 |
| 4.35 CFS | 16450 | 16218 | 15970 | 15708 | 15434 | 15153 | 14868 | 14582 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4.75 CFS | 14299 | 14018 | 13742 | 13467 | 13194 | 12923 | 12655 | 12390 |
| 5.15 CFS | 12128 | 11873 | 11627 | 11388 | 11156 | 10929 | 10709 | 10494 |
| 5.55 CFS | 10281 | 10074 | 9839 | 9576 | 9296 | 9008 | 8722 | 8434 |
| 5.95 CFS | 8142 | 7851 | 7562 | 7278 | 6998 | 6725 | 6456 | 6193 |
| 6.35 CFS | 5935 | 5683 | 5435 | 5191 | 4950 | 4714 | 4487 | 4272 |
| 6.75 CFS | 4077 | 3900 | 3743 | 3600 | 3466 | 3338 | 3215 | 3094 |
| 7.15 CFS | 2976 | 2860 | 2745 | 2631 | 2519 | 2408 | 2299 | 2192 |
| 7.55 CFS | 2087 | 1985 | 1886 | 1790 | 1697 | 1608 | 1522 | 1439 |
| 7.95 CFS | 1360 | 1285 | 1212 | 1143 | 1078 | 1015 | 956 | 899 |
| 8.35 CFS | 846 | 795 | 747 | 701 | 658 | 618 | 579 | 543 |
| 8.75 CFS | 509 | 477 | 447 | 418 | 392 | 366 | 343 | 321 |
| 9.15 CFS | 300 | 280 | 262 | 245 | 228 | 213 | 199 | 186 |
| 9.55 CFS | 173 | 162 | 151 | 141 | 131 | 122 | 114 | 106 |
| 9.95 CFS | 98.98 | 92.21 | 85.89 | 79.99 | 74.48 | 69.34 | 64.54 | 60.07 |
| 10.35 CFS | 55.90 | 52.01 | 48.39 | 45.01 | 41.87 | 38.94 | 36.21 | 33.66 |
| 10.75 CFS | 31.29 | 29.09 | 27.04 | 25.13 | 23.35 | 21.69 | 20.15 | 18.72 |
| 11.15 CFS | 17.39 | 16.15 | 15.00 | 13.92 | 12.93 | 12.00 | 11.14 | 10.34 |
| 11.55 CFS | 9.59 | 8.90 | 8.26 | 7.66 | 7.11 | 6.60 | 6.12 | 5.68 |
| 11.95 CFS | 5.26 | 4.88 | 4.52 | 4.19 | 3.89 | 3.60 | 3.34 | 3.09 |
| 12.35 CFS | 2.87 | 2.66 | 2.46 | 2.28 | 2.11 | 1.96 | 1.81 | 1.68 |
| 12.75 CFS | 1.55 | 1.44 | 1.33 | 1.23 | 1.14 | 1.05 | .97 | .90 |
| 13.15 CFS | .83 | .77 | .71 | .65 | .61 | .56 | .51 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
8.55 WATERSHED INCHES; 59845 CFS-HRS; 4945.6 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.45 | 11000.0 * | (DIVERT) |

* FIRST POINT OF FLAT PEAK

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.15 CFS | .13 | .58 | 1.78 | 4.30 | 8.98 | 16.87 | 28.87 | 45.91 |
| 1.55 CFS | 69 | 99 | 137 | 183 | 238 | 302 | 377 | 461 |
| 1.95 CFS | 554 | 656 | 817 | 1111 | 1616 | 2456 | 3763 | 5660 |
| 2.35 CFS | 8149 | 10567 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 |
| 2.75 CFS | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 |
| 3.15 CFS | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 |
| 3.55 CFS | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 |
| 3.95 CFS | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 |
| 4.35 CFS | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 |
| 4.75 CFS | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 | 11000 |
| 5.15 CFS | 11000 | 11000 | 11000 | 11000 | 11000 | 10929 | 10709 | 10494 |
| 5.55 CFS | 10281 | 10074 | 9839 | 9576 | 9296 | 9008 | 8722 | 8434 |
| 5.95 CFS | 8142 | 7851 | 7562 | 7278 | 6998 | 6725 | 6456 | 6193 |
| 6.35 CFS | 5935 | 5683 | 5435 | 5191 | 4950 | 4714 | 4487 | 4272 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.75 CFS | 4077 | 3900 | 3743 | 3600 | 3466 | 3338 | 3215 | 3094 |
| 7.15 CFS | 2976 | 2860 | 2745 | 2631 | 2519 | 2408 | 2299 | 2192 |
| 7.55 CFS | 2087 | 1985 | 1886 | 1790 | 1697 | 1608 | 1522 | 1439 |
| 7.95 CFS | 1360 | 1285 | 1212 | 1143 | 1078 | 1015 | 956 | 899 |
| 8.35 CFS | 846 | 795 | 747 | 701 | 658 | 618 | 579 | 543 |
| 8.75 CFS | 509 | 477 | 447 | 418 | 392 | 366 | 343 | 321 |
| 9.15 CFS | 300 | 280 | 262 | 245 | 228 | 213 | 199 | 186 |
| 9.55 CFS | 173 | 162 | 151 | 141 | 131 | 122 | 114 | 106 |
| 9.95 CFS | 98.98 | 92.21 | 85.89 | 79.99 | 74.48 | 69.34 | 64.54 | 60.07 |
| 10.35 CFS | 55.90 | 52.01 | 48.39 | 45.01 | 41.87 | 38.94 | 36.21 | 33.66 |
| 10.75 CFS | 31.29 | 29.09 | 27.04 | 25.13 | 23.35 | 21.69 | 20.15 | 18.72 |
| 11.15 CFS | 17.39 | 16.15 | 15.00 | 13.92 | 12.93 | 12.00 | 11.14 | 10.34 |
| 11.55 CFS | 9.59 | 8.90 | 8.26 | 7.66 | 7.11 | 6.60 | 6.12 | 5.68 |
| 11.95 CFS | 5.26 | 4.88 | 4.52 | 4.19 | 3.89 | 3.60 | 3.34 | 3.09 |
| 12.35 CFS | 2.87 | 2.66 | 2.46 | 2.28 | 2.11 | 1.96 | 1.81 | 1.68 |
| 12.75 CFS | 1.55 | 1.44 | 1.33 | 1.23 | 1.14 | 1.05 | .97 | .90 |
| 13.15 CFS | .83 | .77 | .71 | .65 | .61 | .56 | .51 | .47 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
6.98 WATERSHED INCHES; 48844 CFS-HRS; 4036.5 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.69 | 6992.4 | (DIVERT) |
| 3.98 | 6459.3 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = .00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.40 CFS | 0 | 1747 | 3606 | 5117 | 6202 | 6834 | 6983 | 6639 |
| 2.80 CFS | 5883 | 4618 | 3338 | 2133 | 1193 | 631 | 335 | 382 |
| 3.20 CFS | 572 | 884 | 1286 | 1790 | 2339 | 2907 | 3476 | 4037 |
| 3.60 CFS | 4559 | 5029 | 5440 | 5799 | 6077 | 6275 | 6398 | 6453 |
| 4.00 CFS | 6454 | 6407 | 6319 | 6196 | 6042 | 5863 | 5662 | 5450 |
| 4.40 CFS | 5218 | 4970 | 4708 | 4434 | 4153 | 3868 | 3582 | 3299 |
| 4.80 CFS | 3018 | 2742 | 2467 | 2194 | 1923 | 1655 | 1390 | 1128 |
| 5.20 CFS | 873 | 627 | 388 | 156 | 0 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11001 CFS-HRS; 909.1 ACRE-FEET.

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 3.60 | 11000.0 * | 8.46 |

* FIRST POINT OF FLAT PEAK

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
6.98 WATERSHED INCHES; 48837 CFS-HRS; 4035.9 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.44 | 14477.1 | (RUNOFF) |
| 5.09 | 565.7 | (RUNOFF) |
| 5.57 | 467.7 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .050 hr, | | | | DRAINAGE AREA = 1.47 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| .70 CFS | .49 | 1.79 | 4.72 | 10.27 | 19.17 | 31.25 | 46.11 | 63.69 |
| 1.10 CFS | 84 | 107 | 133 | 161 | 189 | 217 | 246 | 272 |
| 1.50 CFS | 296 | 320 | 348 | 382 | 424 | 473 | 525 | 578 |
| 1.90 CFS | 629 | 673 | 751 | 1016 | 1675 | 2951 | 4958 | 7479 |
| 2.30 CFS | 10139 | 12487 | 14048 | 14453 | 13548 | 11805 | 9813 | 7930 |
| 2.70 CFS | 6413 | 5301 | 4595 | 4109 | 3719 | 3397 | 3144 | 2908 |
| 3.10 CFS | 2660 | 2416 | 2203 | 2019 | 1869 | 1766 | 1716 | 1699 |
| 3.50 CFS | 1689 | 1673 | 1643 | 1594 | 1528 | 1446 | 1355 | 1265 |
| 3.90 CFS | 1188 | 1135 | 1109 | 1100 | 1091 | 1070 | 1033 | 980 |
| 4.30 CFS | 915 | 851 | 800 | 767 | 752 | 748 | 744 | 734 |
| 4.70 CFS | 711 | 676 | 634 | 596 | 571 | 559 | 559 | 563 |
| 5.10 CFS | 565 | 559 | 539 | 512 | 488 | 468 | 456 | 454 |
| 5.50 CFS | 460 | 467 | 466 | 456 | 437 | 410 | 376 | 342 |
| 5.90 CFS | 311 | 289 | 278 | 271 | 262 | 243 | 211 | 166 |
| 6.30 CFS | 116 | 68 | 32 | 10 | 1 | 0 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.12 WATERSHED INCHES; 10551 CFS-HRS; 871.9 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.65 | 11037.3 | 9.94 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.12 WATERSHED INCHES; 10551 CFS-HRS; 871.9 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.98 | 7397.2 | 7.60 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.12 WATERSHED INCHES; 10551 CFS-HRS; 871.9 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.98 | 18393.8 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .050 hr, | | | | DRAINAGE AREA = 12.31 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 1.00 CFS | .28 | .72 | 1.60 | 3.11 | 5.54 | 9.19 | 14.51 | 22.08 |
| 1.40 CFS | 33 | 47 | 67 | 92 | 124 | 163 | 210 | 265 |
| 1.80 CFS | 330 | 405 | 491 | 588 | 696 | 816 | 970 | 1207 |
| 2.20 CFS | 1588 | 2212 | 3205 | 4714 | 6841 | 9347 | 11203 | 12592 |
| 2.60 CFS | 13786 | 14881 | 15877 | 16738 | 17427 | 17925 | 18235 | 18378 |
| 3.00 CFS | 18383 | 18283 | 18103 | 17867 | 17594 | 17296 | 16984 | 16665 |
| 3.40 CFS | 16344 | 16027 | 15718 | 15420 | 15137 | 14873 | 14630 | 14407 |
| 3.80 CFS | 14203 | 14018 | 13849 | 13692 | 13546 | 13409 | 13280 | 13159 |
| 4.20 CFS | 13045 | 12940 | 12844 | 12756 | 12674 | 12599 | 12527 | 12459 |
| 4.60 CFS | 12392 | 12329 | 12268 | 12212 | 12160 | 12112 | 12068 | 12026 |
| 5.00 CFS | 11986 | 11947 | 11910 | 11874 | 11840 | 11809 | 11781 | 11755 |
| 5.40 CFS | 11731 | 11675 | 11531 | 11344 | 11135 | 10918 | 10685 | 10430 |
| 5.80 CFS | 10158 | 9872 | 9581 | 9285 | 8984 | 8680 | 8375 | 8071 |
| 6.20 CFS | 7771 | 7475 | 7184 | 6898 | 6617 | 6340 | 6066 | 5795 |
| 6.60 CFS | 5526 | 5260 | 5000 | 4750 | 4516 | 4299 | 4102 | 3922 |
| 7.00 CFS | 3757 | 3603 | 3459 | 3320 | 3188 | 3059 | 2933 | 2810 |
| 7.40 CFS | 2690 | 2571 | 2456 | 2342 | 2231 | 2123 | 2019 | 1917 |
| 7.80 CFS | 1819 | 1724 | 1633 | 1545 | 1461 | 1380 | 1303 | 1230 |
| 8.20 CFS | 1159 | 1093 | 1029 | 969 | 912 | 857 | 806 | 757 |
| 8.60 CFS | 711 | 667 | 626 | 587 | 551 | 516 | 484 | 453 |
| 9.00 CFS | 424 | 397 | 371 | 347 | 325 | 304 | 284 | 265 |
| 9.40 CFS | 248 | 232 | 216 | 202 | 188 | 176 | 164 | 153 |
| 9.80 CFS | 143 | 133 | 124 | 116 | 108 | 100 | 94 | 87 |
| 10.20 CFS | 81.15 | 75.56 | 70.35 | 65.49 | 60.95 | 56.72 | 52.78 | 49.10 |
| 10.60 CFS | 45.68 | 42.49 | 39.51 | 36.74 | 34.17 | 31.76 | 29.52 | 27.44 |
| 11.00 CFS | 25.50 | 23.70 | 22.02 | 20.46 | 19.00 | 17.65 | 16.40 | 15.23 |
| 11.40 CFS | 14.14 | 13.13 | 12.19 | 11.31 | 10.50 | 9.74 | 9.04 | 8.39 |
| 11.80 CFS | 7.78 | 7.22 | 6.70 | 6.21 | 5.76 | 5.34 | 4.95 | 4.59 |
| 12.20 CFS | 4.26 | 3.95 | 3.66 | 3.39 | 3.14 | 2.91 | 2.70 | 2.50 |
| 12.60 CFS | 2.32 | 2.14 | 1.99 | 1.84 | 1.70 | 1.58 | 1.46 | 1.35 |
| 13.00 CFS | 1.25 | 1.15 | 1.07 | .99 | .91 | .84 | .78 | .72 |
| 13.40 CFS | .67 | .61 | .57 | .52 | .48 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
7.48 WATERSHED INCHES; 59391 CFS-HRS; 4908.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.67 | 32338.6 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .050 hr, | | | | DRAINAGE AREA = | | | 4.78 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 1.10 CFS | .35 | 1.23 | 3.30 | 7.30 | 14.19 | 25.19 | 41.59 | 63.91 |
| 1.50 CFS | 93 | 129 | 173 | 226 | 289 | 361 | 444 | 535 |
| 1.90 CFS | 634 | 737 | 869 | 1142 | 1708 | 2714 | 4325 | 6694 |
| 2.30 CFS | 9866 | 13685 | 17849 | 21989 | 25760 | 28874 | 31081 | 32214 |
| 2.70 CFS | 32167 | 30967 | 28567 | 25291 | 21793 | 18489 | 15718 | 13544 |
| 3.10 CFS | 11939 | 10771 | 9814 | 8968 | 8240 | 7625 | 7085 | 6605 |
| 3.50 CFS | 6203 | 5882 | 5620 | 5407 | 5246 | 5124 | 4988 | 4829 |
| 3.90 CFS | 4648 | 4454 | 4262 | 4079 | 3905 | 3741 | 3591 | 3453 |
| 4.30 CFS | 3329 | 3225 | 3117 | 3005 | 2887 | 2768 | 2653 | 2541 |
| 4.70 CFS | 2441 | 2356 | 2280 | 2217 | 2154 | 2093 | 2032 | 1970 |
| 5.10 CFS | 1909 | 1848 | 1797 | 1756 | 1718 | 1685 | 1653 | 1624 |
| 5.50 CFS | 1591 | 1553 | 1517 | 1484 | 1454 | 1423 | 1390 | 1353 |
| 5.90 CFS | 1303 | 1240 | 1173 | 1104 | 1034 | 961 | 886 | 805 |
| 6.30 CFS | 722 | 637 | 550 | 463 | 372 | 282 | 195 | 118 |
| 6.70 CFS | 60.08 | 22.99 | 4.65 | .29 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
9.96 WATERSHED INCHES; 30716 CFS-HRS; 2538.3 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.83 | 21194.2 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1

| HRS | MAIN TIME INCREMENT = .050 hr, | | | | DRAINAGE AREA = | | | 3.48 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 1.00 CFS | .19 | .70 | 1.87 | 4.06 | 7.63 | 13.12 | 21.11 | 32.24 |
| 1.40 CFS | 47 | 66 | 88 | 115 | 147 | 185 | 228 | 276 |
| 1.80 CFS | 330 | 390 | 456 | 526 | 613 | 762 | 1034 | 1484 |
| 2.20 CFS | 2161 | 3116 | 4397 | 6018 | 7955 | 10115 | 12368 | 14560 |
| 2.60 CFS | 16553 | 18252 | 19605 | 20564 | 21097 | 21158 | 20717 | 19797 |
| 3.00 CFS | 18426 | 16619 | 14575 | 12598 | 10822 | 9364 | 8214 | 7356 |
| 3.40 CFS | 6708 | 6164 | 5698 | 5314 | 4987 | 4694 | 4434 | 4215 |
| 3.80 CFS | 4027 | 3858 | 3706 | 3582 | 3469 | 3358 | 3243 | 3124 |
| 4.20 CFS | 3003 | 2884 | 2765 | 2649 | 2537 | 2431 | 2335 | 2251 |
| 4.60 CFS | 2177 | 2104 | 2032 | 1957 | 1882 | 1806 | 1734 | 1669 |
| 5.00 CFS | 1613 | 1566 | 1525 | 1486 | 1449 | 1410 | 1370 | 1328 |
| 5.40 CFS | 1288 | 1254 | 1227 | 1204 | 1184 | 1165 | 1144 | 1117 |
| 5.80 CFS | 1087 | 1055 | 1022 | 988 | 954 | 920 | 884 | 843 |
| 6.20 CFS | 795 | 743 | 686 | 625 | 562 | 497 | 435 | 375 |
| 6.60 CFS | 320 | 267 | 216 | 168 | 123 | 81 | 47 | 23 |
| 7.00 CFS | 7.37 | 1.46 | .17 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
10.35 WATERSHED INCHES; 23254 CFS-HRS; 1921.7 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.72 | 51863.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.00 CFS | .19 | .78 | 2.22 | 5.28 | 10.93 | 20.42 | 35.29 | 57.43 |
| 1.40 CFS | 89 | 130 | 181 | 244 | 320 | 411 | 517 | 638 |
| 1.80 CFS | 774 | 925 | 1090 | 1263 | 1482 | 1904 | 2742 | 4198 |
| 2.20 CFS | 6486 | 9810 | 14263 | 19702 | 25804 | 32104 | 38127 | 43435 |
| 2.60 CFS | 47634 | 50466 | 51771 | 51531 | 49664 | 46449 | 42510 | 38287 |
| 3.00 CFS | 34144 | 30163 | 26514 | 23368 | 20636 | 18333 | 16454 | 14981 |
| 3.40 CFS | 13793 | 12769 | 11901 | 11196 | 10607 | 10101 | 9680 | 9339 |
| 3.80 CFS | 9015 | 8687 | 8354 | 8036 | 7732 | 7437 | 7148 | 6866 |
| 4.20 CFS | 6594 | 6337 | 6094 | 5874 | 5654 | 5436 | 5222 | 5019 |
| 4.60 CFS | 4829 | 4645 | 4473 | 4313 | 4162 | 4023 | 3887 | 3762 |
| 5.00 CFS | 3645 | 3536 | 3434 | 3335 | 3245 | 3165 | 3087 | 3012 |
| 5.40 CFS | 2941 | 2878 | 2817 | 2757 | 2701 | 2649 | 2597 | 2540 |
| 5.80 CFS | 2477 | 2408 | 2325 | 2229 | 2127 | 2024 | 1918 | 1804 |
| 6.20 CFS | 1681 | 1548 | 1408 | 1262 | 1112 | 960 | 807 | 657 |
| 6.60 CFS | 515 | 385 | 276 | 191 | 127 | 81 | 47 | 23 |
| 7.00 CFS | 7.37 | 1.46 | .17 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
10.12 WATERSHED INCHES; 53970 CFS-HRS; 4460.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 2.74 | 68291.0 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.00 CFS | .46 | 1.50 | 3.81 | 8.39 | 16.46 | 29.61 | 49.80 | 79.52 |
| 1.40 CFS | 121 | 177 | 248 | 336 | 444 | 574 | 726 | 903 |
| 1.80 CFS | 1104 | 1330 | 1580 | 1851 | 2178 | 2720 | 3712 | 5404 |
| 2.20 CFS | 8074 | 12021 | 17468 | 24416 | 32645 | 41451 | 49331 | 56027 |
| 2.60 CFS | 61419 | 65347 | 67649 | 68269 | 67091 | 64374 | 60745 | 56664 |
| 3.00 CFS | 52527 | 48446 | 44617 | 41236 | 38230 | 35629 | 33438 | 31646 |
| 3.40 CFS | 30137 | 28797 | 27619 | 26615 | 25744 | 24974 | 24309 | 23745 |
| 3.80 CFS | 23218 | 22705 | 22202 | 21728 | 21278 | 20847 | 20429 | 20024 |
| 4.20 CFS | 19639 | 19277 | 18938 | 18630 | 18328 | 18035 | 17749 | 17477 |
| 4.60 CFS | 17221 | 16974 | 16741 | 16525 | 16322 | 16136 | 15955 | 15788 |
| 5.00 CFS | 15631 | 15484 | 15344 | 15209 | 15085 | 14974 | 14868 | 14768 |
| 5.40 CFS | 14672 | 14553 | 14349 | 14101 | 13835 | 13567 | 13282 | 12970 |
| 5.80 CFS | 12634 | 12280 | 11906 | 11513 | 11111 | 10704 | 10293 | 9875 |
| 6.20 CFS | 9452 | 9023 | 8592 | 8160 | 7729 | 7300 | 6873 | 6452 |
| 6.60 CFS | 6040 | 5645 | 5277 | 4941 | 4643 | 4380 | 4148 | 3945 |
| 7.00 CFS | 3764 | 3605 | 3459 | 3320 | 3188 | 3059 | 2933 | 2810 |
| 7.40 CFS | 2690 | 2571 | 2456 | 2342 | 2231 | 2123 | 2019 | 1917 |
| 7.80 CFS | 1819 | 1724 | 1633 | 1545 | 1461 | 1380 | 1303 | 1230 |
| 8.20 CFS | 1159 | 1093 | 1029 | 969 | 912 | 857 | 806 | 757 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.60 CFS | 711 | 667 | 626 | 587 | 551 | 516 | 484 | 453 |
| 9.00 CFS | 424 | 397 | 371 | 347 | 325 | 304 | 284 | 265 |
| 9.40 CFS | 248 | 232 | 216 | 202 | 188 | 176 | 164 | 153 |
| 9.80 CFS | 143 | 133 | 124 | 116 | 108 | 100 | 94 | 87 |
| 10.20 CFS | 81.15 | 75.56 | 70.35 | 65.49 | 60.95 | 56.72 | 52.78 | 49.10 |
| 10.60 CFS | 45.68 | 42.49 | 39.51 | 36.74 | 34.17 | 31.76 | 29.52 | 27.44 |
| 11.00 CFS | 25.50 | 23.70 | 22.02 | 20.46 | 19.00 | 17.65 | 16.40 | 15.23 |
| 11.40 CFS | 14.14 | 13.13 | 12.19 | 11.31 | 10.50 | 9.74 | 9.04 | 8.39 |
| 11.80 CFS | 7.78 | 7.22 | 6.70 | 6.21 | 5.76 | 5.34 | 4.95 | 4.59 |
| 12.20 CFS | 4.26 | 3.95 | 3.66 | 3.39 | 3.14 | 2.91 | 2.70 | 2.50 |
| 12.60 CFS | 2.32 | 2.14 | 1.99 | 1.84 | 1.70 | 1.58 | 1.46 | 1.35 |
| 13.00 CFS | 1.25 | 1.15 | 1.07 | .99 | .91 | .84 | .78 | .72 |
| 13.40 CFS | .67 | .61 | .57 | .52 | .48 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
8.54 WATERSHED INCHES; 113361 CFS-HRS; 9368.2 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1200.0 FEET) CAN ADD .546 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 2980.75 AC-FT ( .22 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1211.26. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| .70 | 45.6 | 1200.00 |
| 3.68 | 24645.6 | 1216.01 |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 1
MAIN TIME INCREMENT = .050 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| .70 CFS | 45.58 | 45.49 | 45.41 | 45.32 | 45.24 | 45.15 | 45.06 | 44.98 |
| 1.10 CFS | 44.90 | 44.83 | 44.77 | 44.72 | 44.72 | 44.75 | 44.86 | 45.06 |
| 1.50 CFS | 45.37 | 45.84 | 46.49 | 47.37 | 48.51 | 49.97 | 51.78 | 53.99 |
| 1.90 CFS | 57 | 60 | 64 | 68 | 74 | 83 | 95 | 114 |
| 2.30 CFS | 142 | 163 | 173 | 187 | 200 | 214 | 228 | 241 |
| 2.70 CFS | 254 | 269 | 298 | 326 | 2064 | 4860 | 8052 | 11316 |
| 3.10 CFS | 14110 | 16467 | 18534 | 20169 | 21445 | 22432 | 23183 | 23742 |
| 3.50 CFS | 24139 | 24403 | 24562 | 24638 | 24638 | 24580 | 24480 | 24345 |
| 3.90 CFS | 24177 | 23981 | 23760 | 23521 | 23264 | 22995 | 22713 | 22424 |
| 4.30 CFS | 22129 | 21832 | 21534 | 21236 | 20939 | 20643 | 20351 | 20062 |
| 4.70 CFS | 19777 | 19498 | 19224 | 18958 | 18699 | 18448 | 18205 | 17969 |
| 5.10 CFS | 17742 | 17523 | 17312 | 17109 | 16915 | 16728 | 16550 | 16378 |
| 5.50 CFS | 16207 | 16030 | 15847 | 15673 | 15495 | 15307 | 15108 | 14898 |
| 5.90 CFS | 14675 | 14440 | 14192 | 13931 | 13659 | 13375 | 13081 | 12776 |
| 6.30 CFS | 12461 | 12137 | 11804 | 11464 | 11117 | 10763 | 10405 | 10043 |
| 6.70 CFS | 9679 | 9317 | 8958 | 8605 | 8304 | 8031 | 7763 | 7501 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.10 CFS | 7246 | 6999 | 6758 | 6525 | 6298 | 6078 | 5865 | 5657 |
| 7.50 CFS | 5455 | 5259 | 5068 | 4883 | 4702 | 4527 | 4356 | 4190 |
| 7.90 CFS | 4029 | 3872 | 3720 | 3573 | 3429 | 3291 | 3156 | 3026 |
| 8.30 CFS | 2917 | 2855 | 2792 | 2730 | 2668 | 2606 | 2545 | 2484 |
| 8.70 CFS | 2424 | 2365 | 2306 | 2248 | 2191 | 2135 | 2079 | 2025 |
| 9.10 CFS | 1971 | 1919 | 1867 | 1816 | 1766 | 1718 | 1670 | 1623 |
| 9.50 CFS | 1577 | 1533 | 1489 | 1446 | 1405 | 1364 | 1324 | 1285 |
| 9.90 CFS | 1247 | 1211 | 1175 | 1140 | 1106 | 1072 | 1040 | 1009 |
| 10.30 CFS | 978 | 948 | 919 | 891 | 864 | 837 | 812 | 787 |
| 10.70 CFS | 762 | 739 | 716 | 693 | 672 | 651 | 630 | 610 |
| 11.10 CFS | 591 | 573 | 554 | 537 | 520 | 503 | 488 | 472 |
| 11.50 CFS | 457 | 442 | 428 | 415 | 401 | 389 | 376 | 364 |
| 11.90 CFS | 352 | 341 | 330 | 330 | 330 | 330 | 329 | 329 |
| 12.30 CFS | 329 | 329 | 329 | 329 | 329 | 328 | 328 | 328 |
| 12.70 CFS | 328 | 328 | 328 | 328 | 327 | 327 | 327 | 327 |
| 13.10 CFS | 327 | 327 | 327 | 326 | 326 | 326 | 326 | 326 |
| 13.50 CFS | 326 | 326 | 325 | 325 | 325 | 325 | 325 | 325 |
| 13.90 CFS | 325 | 325 | 324 | 324 | 324 | 324 | 324 | 324 |
| 14.30 CFS | 324 | 323 | 323 | 323 | 323 | 323 | 323 | 323 |
| 14.70 CFS | 322 | 322 | 322 | 322 | 322 | 322 | 322 | 321 |
| 15.10 CFS | 321 | 321 | 321 | 321 | 321 | 321 | 320 | 320 |
| 15.50 CFS | 320 | 320 | 320 | 320 | 320 | 319 | 319 | 319 |
| 15.90 CFS | 319 | 319 | 319 | 319 | 319 | 318 | 318 | 318 |
| 16.30 CFS | 318 | 318 | 318 | 318 | 317 | 317 | 317 | 317 |
| 16.70 CFS | 317 | 317 | 317 | 316 | 316 | 316 | 316 | 316 |
| 17.10 CFS | 316 | 316 | 316 | 315 | 315 | 315 | 315 | 315 |
| 17.50 CFS | 315 | 315 | 314 | 314 | 314 | 314 | 314 | 314 |
| 17.90 CFS | 314 | 313 | 313 | 313 | 313 | 313 | 313 | 313 |
| 18.30 CFS | 313 | 312 | 312 | 312 | 312 | 312 | 312 | 312 |
| 18.70 CFS | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 310 |
| 19.10 CFS | 310 | 310 | 310 | 310 | 310 | 310 | 310 | 309 |
| 19.50 CFS | 309 | 309 | 309 | 309 | 309 | 309 | 308 | 308 |
| 19.90 CFS | 308 | 308 | 308 | 308 | 308 | 308 | 307 | 307 |
| 20.30 CFS | 307 | 307 | 307 | 307 | 307 | 306 | 306 | 306 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
6.37 WATERSHED INCHES; 84506 CFS-HRS; 6983.6 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 1, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

| XSECTION/ STRUCTURE ID | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | TIME (HR) | RATE (CFS) | RATE (CSM) |
|---|---|---|---|---|---|---|---|
| RAINFALL OF 12.70 inches AND 6.00 hr DURATION, BEGINS AT .0 hrs. | | | | | | | |
| RAINTABLE NUMBER 1, ARC 2 | | | | | | | |
| MAIN TIME INCREMENT .050 HOURS | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | |
| XSECTION 1 | RUNOFF | 2.46 | 11.09 | --- | 2.71 | 17873 | 7265.4 |
| XSECTION 5 | REACH | 2.46 | 11.09 | 8.21 | 3.32 | 10200 | 4146.3 |
| XSECTION 10 | REACH | 2.46 | 11.09 | 9.08 | 3.96 | 7060 | 2869.9 |
| XSECTION 2 | RUNOFF | 2.38 | 10.12 | --- | 2.64 | 16996 | 7141.2 |
| XSECTION 12 | ADDHYD | 4.84 | 10.62 | --- | 2.64 | 17248 | 3563.6 |
| XSECTION 12 | DIVERT | 4.84 | 5.98 | --- | 2.25F | 4100F | 847.1 |
| XSECTION 200 | DIVERT | .00 | 5.98 | --- | 2.64 | 13148 | ******** |
| XSECTION 20 | REACH | 4.84 | 5.98 | 7.94 | 3.35F | 4100F | 847.1 |
| XSECTION 25 | REACH | 4.84 | 5.98 | 5.03 | 3.40F | 4100F | 847.1 |
| XSECTION 3 | RUNOFF | 3.94 | 11.10 | --- | 2.73 | 28009 | 7108.9 |
| XSECTION 30 | REACH | 3.94 | 11.10 | 6.29 | 3.40 | 16238 | 4121.3 |
| XSECTION 5 | REACH | 3.94 | 11.10 | 8.50 | 4.00 | 11557 | 2933.2 |
| XSECTION 25 | REACH | 3.94 | 11.10 | 8.90 | 4.06 | 11552 | 2932.0 |
| XSECTION 4 | RUNOFF | 2.06 | 9.75 | --- | 2.68 | 13580 | 6592.2 |
| XSECTION 34 | ADDHYD | 6.00 | 10.63 | --- | 2.69 | 13913 | 2318.8 |
| XSECTION 35 | ADDHYD | 10.84 | 8.55 | --- | 2.69 | 17992 | 1659.8 |
| XSECTION 35 | DIVERT | 10.84 | 6.98 | --- | 2.45F | 11000F | 1014.8 |
| XSECTION 199 | DIVERT | .00 | 6.98 | --- | 2.69 | 6992 | ******** |
| XSECTION 45 | REACH | 10.84 | 6.98 | 8.46 | 3.60F | 11000F | 1014.8 |
| XSECTION 6 | RUNOFF | 1.47 | 11.12 | --- | 2.44 | 14477 | 9848.3 |
| XSECTION 60 | REACH | 1.47 | 11.12 | 9.94 | 2.65 | 11037 | 7508.2 |
| XSECTION 67 | REACH | 1.47 | 11.12 | 7.60 | 2.98 | 7397 | 5032.0 |
| XSECTION 64 | ADDHYD | 12.31 | 7.48 | --- | 2.98 | 18394 | 1494.2 |
| XSECTION 5 | RUNOFF | 4.78 | 9.96 | --- | 2.67 | 32339 | 6765.5 |
| XSECTION 7 | RUNOFF | 3.48 | 10.35 | --- | 2.83 | 21194 | 6090.2 |
| XSECTION 75 | ADDHYD | 8.26 | 10.12 | --- | 2.72 | 51863 | 6278.8 |
| XSECTION 76 | ADDHYD | 20.57 | 8.54 | --- | 2.74 | 68291 | 3319.9 |
| STRUCTURE 1 | RESVOR | 20.57 | 6.37 | 1216.01 | 3.68 | 24646 | 1198.2 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| | | | HYDROGRAPH INFORMATION | | | | ROUTING PARAMETERS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | INFLOW | | OUTFLOW | | Q-A EQ. | | | | |
| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | PEAK (CFS) | TIME (HR) | PEAK (CFS) | TIME (HR) | COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 1 | | | | | | | | | | | |
| 5 | 9100 | | 17866 | 2.7 | 10182 | 3.3 | 1.77 | 1.09 | .634 | .570 | .08 |
| 10 | 9100 | | 10182 | 3.3 | 7060 | 4.0 | 2.37 | 1.06 | .361 | .693 | .08 |
| 20 | 3332 | | 4100 | 2.3 | 4100 | 3.3 | .14 | 1.63 | .003 | 1.000 | .50 |
| 25 | 1950 | | 4100 | 3.3 | 4100 | 3.4 | .052 | 1.73 | .001 | 1.000 | .65 |
| 30 | 8865 | | 27941 | 2.8 | 16238 | 3.4 | .95 | 1.15 | .638 | .581 | .08 |
| 5 | 8865 | | 16238 | 3.4 | 11557 | 4.0 | 1.76 | 1.09 | .334 | .712 | .08 |
| 25 | 1950 | | 11557 | 4.0 | 11551 | 4.1 | .062 | 1.70 | .002 | .999 | .84? |
| 45 | 4200 | | 11000 | 2.5 | 11000 | 3.6 | .049 | 1.72 | .003 | 1.000 | .47 |
| 60 | 7540 | | 14453 | 2.5 | 11037 | 2.7 | .28 | 1.44 | .236 | .764 | .24 |
| 67 | 5140 | | 11037 | 2.7 | 7386 | 3.0 | 1.78 | 1.09 | .367 | .669 | .13 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| STRUCTURE | 1 | 20.57 | |
| ALTERNATE | 1 | | 24646 |
| XSECTION | 1 | 2.46 | |
| ALTERNATE | 1 | | 17873 |
| XSECTION | 2 | 2.38 | |
| ALTERNATE | 1 | | 16996 |
| XSECTION | 3 | 3.94 | |
| ALTERNATE | 1 | | 28009 |
| XSECTION | 4 | 2.06 | |
| ALTERNATE | 1 | | 13580 |
| XSECTION | 5 | 4.78 | |
| ALTERNATE | 1 | | 32339 |
| XSECTION | 6 | 1.47 | |
| ALTERNATE | 1 | | 14477 |
| XSECTION | 7 | 3.48 | |
| ALTERNATE | 1 | | 21194 |
| XSECTION | 10 | 2.46 | |
| ALTERNATE | 1 | | 7060 |
| XSECTION | 12 | 4.84 | |
| ALTERNATE | 1 | | 4100 |
| XSECTION | 20 | 4.84 | |
| ALTERNATE | 1 | | 4100 |
| XSECTION | 25 | 3.94 | |
| ALTERNATE | 1 | | 11552 |
| XSECTION | 30 | 3.94 | |
| ALTERNATE | 1 | | 16238 |
| XSECTION | 34 | 6.00 | |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 1 |
|---|---|---|---|
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 13913 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 11000 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 11000 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 11037 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 18394 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 7397 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 51863 |
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 68291 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 6992 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 13148 |

ECON2 DATA FILE

```
ECON2
TITLE        WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE         6HR LOCAL, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT
FLOW-FREQ    -1          24646.                                    ALT  1   1
FLOW-FREQ     1          17873.                                    ALT  1   2
FLOW-FREQ     2          16996.                                    ALT  1   3
FLOW-FREQ     3          28009.                                    ALT  1   4
FLOW-FREQ     4          13580.                                    ALT  1   5
FLOW-FREQ     5          32339.                                    ALT  1   6
FLOW-FREQ     6          14477.                                    ALT  1   7
FLOW-FREQ     7          21194.                                    ALT  1   8
FLOW-FREQ    10           7060.                                    ALT  1   9
FLOW-FREQ    12           4100.                                    ALT  1  10
FLOW-FREQ    20           4100.                                    ALT  1  11
FLOW-FREQ    25          11552.                                    ALT  1  12
FLOW-FREQ    30          16238.                                    ALT  1  13
FLOW-FREQ    34          13913.                                    ALT  1  14
FLOW-FREQ    35          11000.                                    ALT  1  15
FLOW-FREQ    45          11000.                                    ALT  1  16
FLOW-FREQ    60          11037.                                    ALT  1  17
FLOW-FREQ    64          18394.                                    ALT  1  18
FLOW-FREQ    67           7397.                                    ALT  1  19
FLOW-FREQ    75          51863.                                    ALT  1  20
FLOW-FREQ    76          68291.                                    ALT  1  21
FLOW-FREQ   199           6992.                                    ALT  1  22
FLOW-FREQ   200          13148.                                    ALT  1  23
```

```
TR20 ------------------------------------------------------------------------ SCS -
WT3PMP6       WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS       VERSION
08/10/**       6HR LOCAL, INITIAL EMPTY RESERVOIR W/100-YR SEDIMENT       2.04TEST


END OF  1 JOBS IN THIS RUN




                    SCS  TR-20,  VERSION 2.04TEST
                         WT3PMP6   FILES

     INPUT  = 6L.DAT                                    , GIVEN DATA FILE
     OUTPUT = 6LOUT.OUT                                 , DATED 08/10/**,16:03:33

              FILES GENERATED - DATED 08/10/**,16:03:33

    FILE 111.TEC CONTAINS ECON2 INFORMATION

    FILE 111.TRD CONTAINS READHD INFORMATION


           TOTAL NUMBER OF WARNINGS =   0,  MESSAGES =   2

                       JOB ENDED AT 16:03:33
                   *** TR-20 RUN COMPLETED ***
```

TR-20 Output

72-hr General

(Reduced storage Impacts)

ADWR Criteria

(Future Condition - Principal spillway open)

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20 WT3PMP72  ECON                PASS=001  SUMMARY
TITLE     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE     72-HR PMP (MTI=.2), RESERVOIR INIT EMPTY W/100-YR SED
 5 RAINFL 1              0.1                                          6HRLOCAL
 8          .0000        .003        .006        .009        .013
 8          .016         .020        .025        .030        .035
 8          .039         .046        .052        .058        .065
 8          .071         .080        .090        .099        .109
 8          .118         .283        .449        .567        .622
 8          .669         .701        .732        .756        .780
 8          .795         .809        .824        .838        .852
 8          .866         .876        .885        .894        .904
 8          .913         .920        .926        .932        .939
 8          .945         .950        .954        .959        .964
 8          .969         .972        .976        .980        .984
 8          .988         .991        .993        .995        .998
 8          1.           1.          1.          1.          1.
 9 ENDTBL
 5 RAINFL 2              .1                                           6HR GEN
 8          .000         .005        .013        .020        .028
 8          .038         .045        .053        .060        .070
 8          .080         .085        .095        .108        .120
 8          .138         .150        .165        .190        .210
 8          .238         .280        .350        .440        .550
 8          .590         .620        .645        .668        .685
 8          .700         .720        .735        .753        .765
 8          .775         .790        .800        .810        .820
 8          .835         .843        .850        .863        .870
 8          .880         .890        .898        .908        .915
 8          .925         .930        .940        .945        .955
 8          .963         .970        .978        .985        .990
 8          1.00         1.00        1.00        1.00        1.00
 9 ENDTBL
 5 RAINFL 3              0.1                                          12HRGEN
 8          .000         .003        .007        .010        .013
 8          .016         .019        .022        .025        .028
 8          .031         .034        .037        .040        .043
 8          .045         .050        .054        .058        .062
 8          .066         .071        .075        .080        .085
 8          .089         .095        .101        .107        .112
 8          .118         .125        .132        .139        .146
 8          .153         .162        .171        .180        .189
 8          .198         .211        .224        .237        .250
 8          .264         .300        .345        .391        .436
 8          .491         .536        .564        .586        .607
 8          .629         .643        .657        .672        .686
 8          .700         .711        .721        .732        .742
 8          .753         .761        .769        .778        .786
 8          .795         .802        .809        .817        .824
 8          .832         .837        .843        .848        .854
 8          .859         .865        .870        .875        .881
 8          .886         .891        .895        .900        .905
 8          .909         .913        .917        .921        .925
 8          .929         .933        .936        .940        .944
 8          .948         .951        .954        .957        .960
 8          .963         .966        .969        .971        .974
```

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**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 8          .977        .980        .982        .984        .986
 8          .989        .991        .993        .995        .998
 8         1.000       01.000       1.000       1.000       1.00
 9 ENDTBL
 5 RAINFL 4              0.1                                        18HRGEN
 8          .000        .001        .002        .003        .004
 8          .005        .005        .006        .007        .008
 8          .009        .012        .014        .017        .020
 8          .023        .025        .028        .031        .033
 8          .036        .040        .044        .049        .053
 8          .057        .061        .065        .070        .074
 8          .078        .084        .090        .096        .102
 8          .108        .114        .120        .126        .132
 8          .138        .146        .154        .162        .170
 8          .179        .187        .195        .203        .211
 8          .220        .238        .256        .275        .293
 8          .311        .330        .348        .367        .385
 8          .403        .430        .457        .484        .511
 8          .538        .557        .577        .597        .616
 8          .636        .653        .670        .687        .704
 8          .721        .734        .746        .759        .771
 8          .784        .792        .801        .810        .818
 8          .827        .832        .838        .843        .848
 8          .853        .856        .859        .862        .864
 8          .867        .870        .872        .875        .878
 8          .880        .882        .885        .887        .889
 8          .891        .893        .895        .897        .899
 8          .901        .903        .905        .907        .909
 8          .911        .912        .914        .916        .917
 8          .919        .920        .922        .924        .925
 8          .927        .929        .930        .932        .934
 8          .935        .937        .938        .940        .941
 8          .943        .945        .946        .948        .949
 8          .951        .952        .953        .955        .956
 8          .957        .959        .960        .961        .963
 8          .964        .965        .967        .968        .970
 8          .971        .972        .974        .975        .976
 8          .978        .979        .980        .982        .983
 8          .984        .985        .986        .988        .989
 8          .990        .991        .992        .993        .994
 8          .995        .996        .997        .998        .999
 8         1.000       1.000       1.000       1.000       1.000
 9 ENDTBL
 5 RAINFL 5              0.1                                        24HRGEN
 8        0.000       0.000       0.001       0.001       0.002
 8        0.002       0.002       0.003       0.003       0.003
 8        0.004       0.005       0.007       0.009       0.010
 8        0.012       0.013       0.015       0.016       0.018
 8        0.019       0.022       0.024       0.027       0.030
 8        0.032       0.035       0.037       0.040       0.042
 8        0.045       0.048       0.051       0.055       0.058
 8        0.061       0.064       0.068       0.071       0.074
 8        0.078       0.082       0.087       0.091       0.096
 8        0.100       0.104       0.109       0.113       0.118
 8        0.122       0.127       0.132       0.137       0.142
 8        0.147       0.151       0.156       0.161       0.166
```

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 8          0.171       0.177       0.184       0.191       0.198
 8          0.205       0.214       0.224       0.233       0.242
 8          0.252       0.265       0.278       0.291       0.303
 8          0.316       0.334       0.351       0.368       0.386
 8          0.403       0.425       0.447       0.468       0.490
 8          0.512       0.527       0.543       0.558       0.574
 8          0.589       0.603       0.617       0.631       0.645
 8          0.659       0.671       0.684       0.696       0.709
 8          0.721       0.731       0.741       0.751       0.761
 8          0.771       0.779       0.786       0.793       0.800
 8          0.808       0.814       0.820       0.825       0.831
 8          0.837       0.840       0.843       0.847       0.850
 8          0.853       0.855       0.857       0.859       0.861
 8          0.864       0.866       0.868       0.870       0.872
 8          0.874       0.876       0.878       0.880       0.881
 8          0.883       0.885       0.886       0.888       0.890
 8          0.891       0.893       0.895       0.896       0.898
 8          0.899       0.901       0.902       0.904       0.905
 8          0.907       0.908       0.909       0.910       0.912
 8          0.913       0.914       0.915       0.916       0.917
 8          0.919       0.920       0.921       0.922       0.923
 8          0.924       0.926       0.927       0.928       0.929
 8          0.930       0.932       0.933       0.935       0.936
 8          0.938       0.940       0.941       0.943       0.944
 8          0.946       0.947       0.947       0.948       0.949
 8          0.950       0.950       0.951       0.952       0.953
 8          0.953       0.955       0.956       0.957       0.958
 8          0.959       0.960       0.961       0.962       0.963
 8          0.964       0.965       0.966       0.967       0.968
 8          0.969       0.970       0.971       0.972       0.973
 8          0.974       0.975       0.976       0.977       0.978
 8          0.979       0.980       0.981       0.982       0.983
 8          0.984       0.985       0.986       0.987       0.988
 8          0.988       0.989       0.990       0.991       0.991
 8          0.992       0.993       0.994       0.995       0.995
 8          0.996       0.997       0.998       0.998       0.999
 8          1.000       1.000       1.000       1.000       1.000
 9  ENDTBL
 5 RAINFL 6             .25                                         48HRGEN
 8          0.0000      0.0015      0.0029      0.0044      0.0058
 8          0.0073      0.0088      0.0102      0.0117      0.0131
 8          0.0146      0.0160      0.0175      0.0190      0.0204
 8          0.0219      0.0233      0.0248      0.0263      0.0277
 8          0.0292      0.0306      0.0321      0.0335      0.0350
 8          0.0365      0.0379      0.0394      0.0408      0.0423
 8          0.0438      0.0452      0.0467      0.0481      0.0496
 8          0.0510      0.0525      0.0542      0.0558      0.0575
 8          0.0592      0.0608      0.0625      0.0642      0.0658
 8          0.0692      0.0725      0.0758      0.0792      0.0825
 8          0.0858      0.0892      0.0925      0.0975      0.1025
 8          0.1075      0.1125      0.1175      0.1225      0.1275
 8          0.1325      0.1442      0.1560      0.1677      0.1794
 8          0.1985      0.2176      0.2366      0.2557      0.3239
 8          0.3921      0.4603      0.5285      0.5520      0.5754
 8          0.5989      0.6224      0.6356      0.6488      0.6620
 8          0.6752      0.6862      0.6972      0.7082      0.7192
```

```
 8          0.7267      0.7342      0.7417      0.7492      0.7558
 8          0.7625      0.7692      0.7758      0.7825      0.7892
 8          0.7958      0.8025      0.8083      0.8142      0.8200
 8          0.8258      0.8308      0.8358      0.8408      0.8458
 8          0.8508      0.8558      0.8608      0.8658      0.8683
 8          0.8708      0.8733      0.8758      0.8783      0.8808
 8          0.8833      0.8858      0.8875      0.8892      0.8908
 8          0.8925      0.8942      0.8958      0.8975      0.8992
 8          0.9008      0.9025      0.9042      0.9058      0.9075
 8          0.9092      0.9108      0.9125      0.9140      0.9154
 8          0.9169      0.9183      0.9198      0.9213      0.9227
 8          0.9242      0.9256      0.9271      0.9285      0.9300
 8          0.9315      0.9329      0.9344      0.9358      0.9373
 8          0.9388      0.9402      0.9417      0.9431      0.9446
 8          0.9460      0.9475      0.9490      0.9504      0.9519
 8          0.9533      0.9548      0.9563      0.9577      0.9592
 8          0.9606      0.9621      0.9635      0.9650      0.9665
 8          0.9679      0.9694      0.9708      0.9723      0.9737
 8          0.9752      0.9767      0.9781      0.9796      0.9810
 8          0.9825      0.9840      0.9854      0.9869      0.9883
 8          0.9898      0.9912      0.9927      0.9942      0.9956
 8          0.9971      0.9985      1.0000      1.0000      1.0
 9 ENDTBL
 5 RAINFL 7              .25                                          72HRGEN
 8          0.0000      0.0005      0.0009      0.0014      0.0019
 8          0.0025      0.0032      0.0038      0.0044      0.0051
 8          0.0057      0.0063      0.0070      0.0076      0.0082
 8          0.0089      0.0095      0.0103      0.0111      0.0119
 8          0.0127      0.0134      0.0142      0.0150      0.0158
 8          0.0171      0.0184      0.0196      0.0209      0.0222
 8          0.0234      0.0247      0.0259      0.0272      0.0285
 8          0.0297      0.0310      0.0323      0.0335      0.0348
 8          0.0361      0.0375      0.0389      0.0403      0.0418
 8          0.0432      0.0446      0.0460      0.0475      0.0489
 8          0.0503      0.0517      0.0532      0.0546      0.0560
 8          0.0574      0.0589      0.0604      0.0620      0.0636
 8          0.0652      0.0668      0.0684      0.0699      0.0715
 8          0.0731      0.0747      0.0763      0.0778      0.0797
 8          0.0816      0.0835      0.0854      0.0877      0.0899
 8          0.0921      0.0943      0.0968      0.0994      0.1019
 8          0.1044      0.1073      0.1101      0.1130      0.1158
 8          0.1193      0.1228      0.1263      0.1297      0.1335
 8          0.1373      0.1411      0.1449      0.1491      0.1532
 8          0.1573      0.1614      0.1725      0.1837      0.1948
 8          0.2059      0.2241      0.2422      0.2603      0.2784
 8          0.3431      0.4078      0.4726      0.5373      0.5596
 8          0.5819      0.6042      0.6265      0.6390      0.6515
 8          0.6641      0.6766      0.6870      0.6975      0.7079
 8          0.7184      0.7255      0.7326      0.7397      0.7468
 8          0.7535      0.7601      0.7668      0.7734      0.7794
 8          0.7854      0.7915      0.7975      0.8030      0.8085
 8          0.8141      0.8196      0.8247      0.8297      0.8348
 8          0.8399      0.8443      0.8487      0.8532      0.8576
 8          0.8598      0.8620      0.8642      0.8665      0.8685
 8          0.8706      0.8726      0.8747      0.8766      0.8785
 8          0.8804      0.8823      0.8840      0.8858      0.8875
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8          0.8892      0.8908      0.8924      0.8940      0.8956
 8          0.8972      0.8987      0.9003      0.9019      0.9035
 8          0.9051      0.9066      0.9082      0.9098      0.9114
 8          0.9130      0.9146      0.9160      0.9174      0.9188
 8          0.9203      0.9217      0.9231      0.9245      0.9259
 8          0.9274      0.9288      0.9302      0.9316      0.9329
 8          0.9342      0.9354      0.9367      0.9380      0.9392
 8          0.9405      0.9418      0.9430      0.9443      0.9456
 8          0.9468      0.9481      0.9494      0.9506      0.9519
 8          0.9530      0.9541      0.9552      0.9563      0.9574
 8          0.9585      0.9597      0.9608      0.9619      0.9630
 8          0.9641      0.9652      0.9661      0.9671      0.9680
 8          0.9690      0.9699      0.9709      0.9718      0.9728
 8          0.9736      0.9744      0.9752      0.9759      0.9767
 8          0.9775      0.9783      0.9791      0.9797      0.9804
 8          0.9810      0.9816      0.9823      0.9829      0.9835
 8          0.9842      0.9847      0.9851      0.9856      0.9861
 8          0.9866      0.9870      0.9875      0.9880      0.9884
 8          0.9889      0.9894      0.9899      0.9902      0.9905
 8          0.9908      0.9911      0.9915      0.9918      0.9921
 8          0.9924      0.9927      0.9930      0.9934      0.9937
 8          0.9940      0.9943      0.9946      0.9949      0.9953
 8          0.9956      0.9959      0.9962      0.9965      0.9968
 8          0.9972      0.9975      0.9978      0.9981      0.9984
 8          0.9987      0.9989      0.9991      0.9992      0.9994
 8          0.9995      0.9997      0.9998      1.0000      1.0000
 9 ENDTBL
 5 RAINFL 8     1        2.4                                          10-DAY
 8          .0000       .0024       .0048       .0073       .0097
 8          .0121       .0148       .0174       .0201       .0228
 8          .0254       .0284       .0314       .0344       .0374
 8          .0404       .0437       .0471       .0505       .0539
 8          .0572       .0612       .0651       .0690       .0729
 8          .0768       .0815       .0862       .0909       .0955
 8          .1002       .1061       .1120       .1179       .1238
 8          .1297       .1377       .1458       .1538       .1618
 8          .1699       .1832       .1966       .2099       .2232
 8          .2366       .2548       .2778       .3093       .3614
 8          1.092       1.174       1.213       1.240       1.260
 8          1.276       1.286       1.296       1.306       1.316
 8          1.326       1.333       1.340       1.347       1.354
 8          1.360       1.365       1.371       1.376       1.381
 8          1.386       1.391       1.395       1.399       1.403
 8          1.408       1.411       1.415       1.418       1.422
 8          1.426       1.429       1.432       1.435       1.438
 8          1.442       1.444       1.447       1.450       1.453
 8          1.456       1.458       1.461       1.463       1.466
 8          1.468       1.471       1.473       1.475       1.477
 8          1.48        1.48        1.48        1.48        1.48
 9 ENDTBL
 4 DIMHYD                .0556                                        WT3
 8          0.0         .03         .10         .19         .31
 8          .47         .66         .82         .93         .99
 8          1.0         .99         .93         .82         .66
 8          .47         .31         .03         .00         .00
 9 ENDTBL
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 2 XSECTN    005         1.0         8.77                              BOSSCS#5
 8                       0.          0.0         0.0
 8                       0.35        5.          5.56
 8                       1.03        50.         30.95
 8                       1.39        100.        52.16
 8                       1.94        200.        88.72
 8                       2.63        400.        148.61
 8                       3.51        800.        260.63
 8                       4.62        1600.       459.66
 8                       6.04        3200.       929.36
 8                       7.38        6400.       1811.51
 8                       8.77        12800.      3374.20
 8                       10.17       25600.      6398.87
 8                       11.89       51200.      10982.51
 9 ENDTBL
 2 XSECTN    010         1.0         8.94                              BOSSCS#4
 8                       0.          0.0         0.0
 8                       0.91        5.          4.95
 8                       2.03        50.         24.80
 8                       2.63        100.        41.32
 8                       3.34        200.        74.14
 8                       4.15        400.        130.28
 8                       5.23        800.        223.37
 8                       6.41        1600.       447.51
 8                       7.65        3200.       898.64
 8                       8.94        6400.       1690.88
 8                       10.29       12800.      3331.95
 8                       11.64       25600.      6185.81
 8                       13.14       51200.      10661.04
 9 ENDTBL
 2 XSECTN    020         1.0         7.3                               REACHC
 8                       0.          0.0         0.0
 8                       1.01        100.        57.78
 8                       1.49        200.        86.81
 8                       1.88        300.        110.25
 8                       2.49        500.        149.47
 8                       3.68        1000.       226.31
 8                       5.40        2000.       346.26
 8                       7.85        4000.       533.39
 8                       9.64        6000.       688.07
 8                       11.16       8000.       838.10
 8                       12.46       10000.      985.31
 8                       13.61       12000.      1122.03
 8                       14.56       14000.      1236.94
 8                       15.43       16000.      1345.18
 8                       16.31       18000.      1456.68
 9 ENDTBL
 2 XSECTN    025         1.0         7.3                               REACHB
 8                       0.          0.0         0.0
 8                       0.63        100.        80.89
 8                       0.93        200.        120.32
 8                       1.17        300.        151.77
 8                       1.56        500.        203.28
 8                       2.30        1000.       302.00
 8                       3.38        2000.       449.24
 8                       4.97        4000.       673.73
```

```
 8                       6.23        6000.       855.96
 8                       7.31        8000.       1016.35
 8                       8.24        10000.      1158.51
 8                       9.09        12000.      1293.31
 8                       9.90        14000.      1425.57
 8                       10.64       16000.      1549.17
 8                       11.36       18000.      1673.11
 9 ENDTBL
 2 XSECTN    030         1.0         9.45                                BOSSCS#6
 8                       0.          0.0         0.0
 8                       0.77        5.          4.67
 8                       1.54        50.         32.06
 8                       1.78        100.        56.64
 8                       2.10        200.        100.59
 8                       2.50        400.        179.97
 8                       3.01        800.        320.25
 8                       3.63        1600.       589.66
 8                       4.35        3200.       1110.72
 8                       5.21        6400.       2084.48
 8                       6.03        12800.      4119.83
 8                       6.99        25600.      6856.75
 8                       8.28        51200.      11085.87
 9 ENDTBL
 2 XSECTN    045         1.0         4.87                                REACHA
 8                       0.          0.0         0.0
 8                       0.60        100.        85.69
 8                       0.90        200.        127.94
 8                       1.13        300.        161.93
 8                       1.52        500.        217.27
 8                       2.25        1000.       324.03
 8                       3.31        2000.       483.02
 8                       4.87        4000.       722.17
 8                       6.09        6000.       914.99
 8                       7.15        8000.       1084.61
 8                       8.05        10000.      1234.17
 8                       8.87        12000.      1373.80
 8                       9.64        14000.      1507.84
 8                       10.34       16000.      1633.45
 8                       11.00       18000.      1753.12
 9 ENDTBL
 2 XSECTN    060         1.0         4.7                                 2CP6CP7
 8                       0.          0.0         0.0
 8                       2.36        100.        45.12
 8                       2.88        200.        83.75
 8                       3.18        300.        114.33
 8                       3.64        500.        172.72
 8                       4.42        1000.       289.04
 8                       5.40        2000.       470.72
 8                       6.87        4000.       782.74
 8                       7.91        6000.       1020.12
 8                       8.79        8000.       1231.25
 8                       9.60        10000.      1435.05
 8                       10.26       12000.      1618.34
 8                       10.94       14000.      1812.58
 8                       11.47       16000.      1983.46
 8                       11.96       18000.      2150.12
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 9 ENDTBL
 2 XSECTN   067          1.0         8.77                                BOSSCS#5
 8                       0.          0.0         0.0
 8                       0.35        5.          5.56
 8                       1.03        50.         30.95
 8                       1.39        100.        52.16
 8                       1.94        200.        88.72
 8                       2.63        400.        148.61
 8                       3.51        800.        260.63
 8                       4.62        1600.       459.66
 8                       6.04        3200.       929.36
 8                       7.38        6400.       1811.51
 8                       8.77        12800.      3374.20
 8                       10.17       25600.      6398.87
 8                       11.89       51200.      10982.51
 9 ENDTBL
 3 STRUCT       01                                                       95/11/6
 8                       1178.0      0.0         0.
 8                       1188.0      0.02        44.8
 8                       1196.8      0.13        300.
 8                       1199.2      0.21        500.
 8                       1202.0      159.0       845.55
 8                       1204.0      187.75      1176.28
 8                       1206.0      214.9       1575.25
 8                       1208.0      240.3       2044.97
 8                       1210.0      265.4       2593.40
 8                       1212.0      330.00      3209.97
 8                       1213.0      2936.00     3534.09
 8                       1214.0      8488.00     3880.04
 8                       1215.0      15810.0     4246.27
 8                       1216.0      24545.0     4634.40
 8                       1217.0      34492.0     5045.91
 8                       1218.0      45517.0     5481.24
 8                       1219.0      57524.0     5939.64
 8                       1220.0      70439.0     6421.48
 9 ENDTBL
 6 RUNOFF  1 001            1 2.46   87.2        0.85        1 1
 6 REACH   3 005    1       7 9100.                         1           BOSS#6
 6 REACH   3 010    7       2 9100.                         1           BOSS#4
 6 RUNOFF  1 002            3 2.38   79.9        0.73        1 1
 6 ADDHYD  4 012    2 3 1                                    1 1
 6 DIVERT  6 012    1 4 7 4100.      1.00        200.        1 1         OLIVE
 6 REACH   3 020    4       7 3332.                         1           REACH C
 6 REACH   3 025    7       5 1950.                         1           REACH B
 6 RUNOFF  1 003            6 3.94   87.2        0.88        1 1
 6 REACH   3 030    6       7 8865.                         1           BOSS#6
 6 REACH   3 005    7       1 8865.                         1           BOSS#5
 6 REACH   3 025    1       7 1950.                         1           REACH B
 6 RUNOFF  1 004            1 2.06   77.3        0.79        1 1
 6 ADDHYD  4 034    7 1 2                                    1 1
 6 ADDHYD  4 035    5 2 3                                    1 1
 6 DIVERT  6 035    3 4 7 11000.     1.00        199.        1 1         NORTHERN
 6 REACH   3 045    4       5 4200.                         1           REACH A
 6 RUNOFF  1 006            2 1.47   87.7        0.47        1 1
 6 REACH   3 060    2       3 7540.                         1           CP6CP7
 6 REACH   3 067    3       4 5140.                         1           BOSS#5
```

```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********

 6 ADDHYD 4 064    5 4 3                                        1 1
 6 RUNOFF 1 005        6 4.78         78.8         0.78         1 1
 6 RUNOFF 1 007        7 3.48         81.7         1.01         1 1
 6 ADDHYD 4 075    6 7 1                                        1 1
 6 ADDHYD 4 076    1 3 2                                        1 1      1
 6 RESVOR 2     01 2   1 1200.0                                 1 1      1
   ENDATA
 7 LIST                  1.0                      1.
 7 INCREM 6              0.20
 7 COMPUT 7 001       01 0.          15.8         1.0          7 2  01  07
   ENDCMP 1
   ENDJOB 2

**********END OF 80-80 LIST**********
```

RUNOFF OPTION USED WITH RAINTABLE NO. 8, RUNOFF CURVE NO. = 100.

COMPUTED DIMHYD PEAK RATE FACTOR = 664.607

EXECUTIVE CONTROL LIST 1. 0. 1.

LISTING OF CURRENT DATA

COMPUTED TIME INCREMENT
DIMHYD .0556

| | | | | |
|---|---|---|---|---|
| .0000 | .0300 | .1000 | .1900 | .3100 |
| .4700 | .6600 | .8200 | .9300 | .9900 |
| 1.0000 | .9900 | .9300 | .8200 | .6600 |
| .4700 | .3100 | .0300 | .0000 | .0000 |

ENDTBL

COMPUTED PEAK RATE FACTOR = 664.607

TABLE NO. TIME INCREMENT
RAINFL 1 .1000

| | | | | |
|---|---|---|---|---|
| .0000 | .0030 | .0060 | .0090 | .0130 |
| .0160 | .0200 | .0250 | .0300 | .0350 |
| .0390 | .0460 | .0520 | .0580 | .0650 |
| .0710 | .0800 | .0900 | .0990 | .1090 |
| .1180 | .2830 | .4490 | .5670 | .6220 |
| .6690 | .7010 | .7320 | .7560 | .7800 |
| .7950 | .8090 | .8240 | .8380 | .8520 |
| .8660 | .8760 | .8850 | .8940 | .9040 |
| .9130 | .9200 | .9260 | .9320 | .9390 |
| .9450 | .9500 | .9540 | .9590 | .9640 |
| .9690 | .9720 | .9760 | .9800 | .9840 |
| .9880 | .9910 | .9930 | .9950 | .9980 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

ENDTBL

STANDARD CONTROL INSTRUCTIONS

```
RUNOFF      1       1      2.4600     87.2000      .85001 1 0 0 0 1
REACH       5   1   7   9100.0000       .0000      .00001 0 0 0 0 1
REACH      10   7   2   9100.0000       .0000      .00001 0 0 0 0 1
RUNOFF      2       3      2.3800     79.9000      .73001 1 0 0 0 1
ADDHYD     12   2 3 1                                   1 1 0 0 0 1
DIVERT     12   1 4 7   4100.0000      1.0000   200.00001 1 0 0 0 1
REACH      20   4   7   3332.0000       .0000      .00001 0 0 0 0 1
REACH      25   7   5   1950.0000       .0000      .00001 0 0 0 0 1
RUNOFF      3       6      3.9400     87.2000      .88001 1 0 0 0 1
REACH      30   6   7   8865.0000       .0000      .00001 0 0 0 0 1
REACH       5   7   1   8865.0000       .0000      .00001 0 0 0 0 1
REACH      25   1   7   1950.0000       .0000      .00001 0 0 0 0 1
RUNOFF      4       1      2.0600     77.3000      .79001 1 0 0 0 1
ADDHYD     34   7 1 2                                   1 1 0 0 0 1
ADDHYD     35   5 2 3                                   1 1 0 0 0 1
DIVERT     35   3 4 7  11000.0000      1.0000   199.00001 1 0 0 0 1
REACH      45   4   5   4200.0000       .0000      .00001 0 0 0 0 1
RUNOFF      6       2      1.4700     87.7000      .47001 1 0 0 0 1
REACH      60   2   3   7540.0000       .0000      .00001 0 0 0 0 1
REACH      67   3   4   5140.0000       .0000      .00001 0 0 0 0 1
ADDHYD     64   5 4 3                                   1 1 0 0 0 1
RUNOFF      5       6      4.7800     78.8000      .78001 1 0 0 0 1
RUNOFF      7       7      3.4800     81.7000     1.01001 1 0 0 0 1
ADDHYD     75   6 7 1                                   1 1 0 0 0 1
ADDHYD     76   1 3 2                                   1 1 0 0 1 1
RESVOR        1 2   1   1200.0000                       1 1 0 0 1 1
ENDATA
```

END OF LISTING

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .200 HOURS

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 1
STARTING TIME = .00 RAIN DEPTH = 15.80 RAIN DURATION = 1.00
ANT. RUNOFF COND. = 2 MAIN TIME INCREMENT = .200 HOURS
ALTERNATE NO. = 1 STORM NO. = 7 RAIN TABLE NO. = 7

OPERATION RUNOFF XSECTION 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.01 | 6290.9 | (RUNOFF) |
| 37.14 | 222.8 | (RUNOFF) |
| 42.48 | 160.6 | (RUNOFF) |
| 43.88 | 160.6 | (RUNOFF) |
| 45.39 | 144.8 | (RUNOFF) |
| 46.63 | 144.8 | (RUNOFF) |
| 48.53 | 128.1 | (RUNOFF) |
| 49.25 | 128.1 | (RUNOFF) |
| 50.01 | 128.2 | (RUNOFF) |
| 50.78 | 128.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 2.46 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.80 CFS | .23 | .99 | 2.60 | 4.92 | 7.41 | 9.80 | 12.16 | 14.48 |
| 8.40 CFS | 16.85 | 19.25 | 21.48 | 23.29 | 25.31 | 27.59 | 29.55 | 31.06 |
| 10.00 CFS | 32.94 | 35.51 | 38.49 | 41.46 | 44.22 | 46.72 | 49.35 | 51.53 |
| 11.60 CFS | 52.88 | 53.84 | 55.72 | 58.23 | 60.26 | 61.25 | 61.85 | 63.48 |
| 13.20 CFS | 65.94 | 67.81 | 68.54 | 68.83 | 70.26 | 73.02 | 76.35 | 79.85 |
| 14.80 CFS | 83.14 | 86.13 | 88.09 | 89.48 | 90.66 | 91.14 | 91.12 | 92.08 |
| 16.40 CFS | 94 | 97 | 98 | 98 | 100 | 105 | 113 | 121 |
| 18.00 CFS | 124 | 127 | 135 | 144 | 151 | 152 | 154 | 162 |
| 19.60 CFS | 172 | 180 | 184 | 186 | 193 | 204 | 212 | 215 |
| 21.20 CFS | 220 | 234 | 253 | 270 | 275 | 277 | 284 | 296 |
| 22.80 CFS | 306 | 311 | 315 | 325 | 337 | 345 | 350 | 394 |
| 24.40 CFS | 545 | 760 | 926 | 983 | 1033 | 1205 | 1437 | 1616 |
| 26.00 CFS | 1680 | 1996 | 3130 | 4708 | 5958 | 6290 | 6037 | 5038 |
| 27.60 CFS | 3598 | 2474 | 2209 | 2138 | 1905 | 1567 | 1316 | 1248 |
| 29.20 CFS | 1233 | 1182 | 1109 | 1057 | 1041 | 1019 | 937 | 822 |
| 30.80 CFS | 735 | 709 | 707 | 696 | 681 | 669 | 665 | 660 |
| 32.40 CFS | 643 | 621 | 606 | 604 | 601 | 587 | 568 | 556 |
| 34.00 CFS | 554 | 552 | 540 | 522 | 510 | 507 | 504 | 489 |
| 35.60 CFS | 465 | 448 | 444 | 429 | 373 | 294 | 237 | 222 |
| 37.20 CFS | 223 | 219 | 212 | 207 | 206 | 205 | 202 | 197 |
| 38.80 CFS | 192 | 190 | 189 | 185 | 179 | 176 | 174 | 172 |
| 40.40 CFS | 167 | 164 | 161 | 161 | 161 | 160 | 158 | 156 |
| 42.00 CFS | 157 | 159 | 160 | 160 | 159 | 157 | 156 | 158 |
| 43.60 CFS | 160 | 161 | 161 | 159 | 154 | 147 | 142 | 142 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 45.20 CFS | 144 | 145 | 144 | 141 | 141 | 141 | 143 | 145 |
| 46.80 CFS | 144 | 142 | 140 | 137 | 134 | 130 | 127 | 126 |
| 48.40 CFS | 128 | 128 | 126 | 127 | 128 | 128 | 126 | 127 |
| 50.00 CFS | 128 | 127 | 126 | 127 | 128 | 127 | 125 | 122 |
| 51.60 CFS | 117 | 112 | 110 | 110 | 110 | 111 | 112 | 114 |
| 53.20 CFS | 115 | 113 | 111 | 110 | 110 | 109 | 104 | 99 |
| 54.80 CFS | 95.92 | 95.49 | 95.53 | 95.31 | 95.58 | 95.24 | 95.48 | 94.73 |
| 56.40 CFS | 91.62 | 86.71 | 81.65 | 79.19 | 77.09 | 76.07 | 77.39 | 79.64 |
| 58.00 CFS | 80.28 | 78.85 | 74.36 | 69.21 | 65.85 | 64.21 | 62.73 | 63.19 |
| 59.60 CFS | 64.51 | 63.90 | 62.57 | 63.01 | 60.90 | 54.36 | 47.42 | 46.33 |
| 61.20 CFS | 48.46 | 49.63 | 48.07 | 46.12 | 46.28 | 47.66 | 47.31 | 45.89 |
| 62.80 CFS | 46.76 | 48.96 | 48.66 | 43.81 | 36.83 | 31.65 | 30.19 | 30.89 |
| 64.40 CFS | 32.94 | 34.37 | 33.62 | 31.35 | 30.17 | 30.15 | 30.41 | 31.81 |
| 66.00 CFS | 33.98 | 34.30 | 32.52 | 30.50 | 30.15 | 30.18 | 30.92 | 32.95 |
| 67.60 CFS | 34.48 | 33.68 | 31.30 | 30.16 | 30.15 | 30.33 | 31.78 | 33.88 |
| 69.20 CFS | 34.35 | 32.60 | 30.51 | 30.15 | 30.11 | 29.43 | 26.91 | 23.19 |
| 70.80 CFS | 19.16 | 16.26 | 15.21 | 14.96 | 15.26 | 14.90 | 15.12 | 14.45 |
| 72.40 CFS | 11.29 | 6.32 | 1.19 | .00 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.29 WATERSHED INCHES; 22681 CFS-HRS; 1874.3 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.54 | 4816.3 | 6.72 |
| 42.76 | 160.0 | 1.72 |
| 44.25 | 159.6 | 1.72 |
| 46.94 | 143.7 | 1.63 |
| 51.01 | 127.5 | 1.54 |
| 53.42 | 113.7 | 1.47 |
| 63.33 | 48.1 | 1.00 |
| 66.47 | 32.9 | .77 |
| 68.00 | 32.7 | .77 |
| 69.50 | 32.6 | .77 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.29 WATERSHED INCHES; 22692 CFS-HRS; 1875.3 ACRE-FEET.

OPERATION REACH XSECTION 10

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 28.12 | 3932.3 | 7.95 |
| 44.51 | 159.4 | 3.05 |
| 68.36 | 32.2 | 1.59 |
| 69.88 | 32.1 | 1.58 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.29 WATERSHED INCHES; 22690 CFS-HRS; 1875.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 2

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.97 | 5804.6 | (RUNOFF) |
| 27.91 | 2083.0 | (RUNOFF) |
| 32.95 | 574.5 | (RUNOFF) |
| 33.97 | 527.8 | (RUNOFF) |
| 34.96 | 482.6 | (RUNOFF) |
| 35.91 | 425.5 | (RUNOFF) |
| 37.12 | 212.6 | (RUNOFF) |
| 41.10 | 153.0 | (RUNOFF) |
| 42.43 | 153.0 | (RUNOFF) |
| 43.72 | 153.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 2.38 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.40 CFS | .14 | .63 | 1.68 | 3.16 | 4.81 | 6.60 | 8.47 | 10.27 |
| 11.00 CFS | 12.14 | 14.12 | 15.84 | 17.19 | 18.61 | 20.39 | 22.36 | 23.92 |
| 12.60 CFS | 24.94 | 26.12 | 27.84 | 29.82 | 31.23 | 32.00 | 32.96 | 34.62 |
| 14.20 CFS | 36.86 | 39.25 | 41.70 | 44.25 | 46.40 | 47.92 | 49.37 | 50.69 |
| 15.80 CFS | 51.39 | 51.89 | 53.40 | 55.71 | 57.36 | 58.57 | 59.27 | 60.59 |
| 17.40 CFS | 65.67 | 72.65 | 76.93 | 78.70 | 82.05 | 89.12 | 96.33 | 99.53 |
| 19.00 CFS | 101 | 104 | 111 | 119 | 125 | 127 | 129 | 138 |
| 20.60 CFS | 147 | 152 | 155 | 161 | 174 | 192 | 201 | 204 |
| 22.20 CFS | 207 | 216 | 228 | 235 | 239 | 244 | 255 | 267 |
| 23.80 CFS | 272 | 274 | 324 | 491 | 691 | 792 | 812 | 882 |
| 25.40 CFS | 1076 | 1303 | 1422 | 1470 | 1892 | 3231 | 4839 | 5662 |
| 27.00 CFS | 5799 | 5531 | 4259 | 2748 | 2071 | 2073 | 1988 | 1688 |
| 28.60 CFS | 1339 | 1182 | 1177 | 1158 | 1092 | 1019 | 987 | 985 |
| 30.20 CFS | 955 | 852 | 729 | 672 | 672 | 669 | 656 | 639 |
| 31.80 CFS | 630 | 630 | 624 | 603 | 580 | 573 | 574 | 569 |
| 33.40 CFS | 551 | 532 | 526 | 528 | 524 | 508 | 489 | 481 |
| 35.00 CFS | 482 | 479 | 457 | 432 | 422 | 423 | 401 | 330 |
| 36.60 CFS | 249 | 212 | 211 | 212 | 207 | 199 | 196 | 196 |
| 38.20 CFS | 195 | 191 | 185 | 181 | 181 | 180 | 174 | 169 |
| 39.80 CFS | 167 | 166 | 162 | 158 | 155 | 153 | 153 | 153 |
| 41.40 CFS | 152 | 150 | 148 | 150 | 152 | 153 | 153 | 151 |
| 43.00 CFS | 149 | 149 | 152 | 153 | 153 | 153 | 151 | 145 |
| 44.60 CFS | 137 | 134 | 136 | 138 | 138 | 136 | 134 | 134 |
| 46.20 CFS | 135 | 138 | 139 | 137 | 134 | 133 | 130 | 126 |
| 47.80 CFS | 122 | 120 | 121 | 123 | 122 | 120 | 121 | 123 |
| 49.40 CFS | 121 | 120 | 122 | 123 | 120 | 120 | 123 | 122 |
| 51.00 CFS | 120 | 119 | 115 | 109 | 106 | 105 | 105 | 105 |
| 52.60 CFS | 106 | 108 | 110 | 109 | 107 | 105 | 105 | 105 |
| 54.20 CFS | 103 | 98 | 93 | 91 | 91 | 91 | 91 | 91 |
| 55.80 CFS | 91.23 | 91.13 | 90.16 | 86.63 | 80.12 | 76.62 | 75.20 | 72.57 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 57.40 CFS | 72.39 | 75.00 | 76.69 | 76.65 | 74.70 | 68.97 | 64.00 | 62.46 |
| 59.00 CFS | 60.92 | 59.14 | 61.17 | 62.23 | 60.18 | 59.29 | 60.96 | 57.31 |
| 60.60 CFS | 48.43 | 43.26 | 44.74 | 47.42 | 47.41 | 45.10 | 43.32 | 44.67 |
| 62.20 CFS | 46.36 | 44.37 | 43.36 | 45.53 | 47.73 | 46.08 | 39.71 | 32.21 |
| 63.80 CFS | 28.79 | 28.81 | 29.70 | 32.36 | 33.49 | 31.36 | 29.05 | 28.80 |
| 65.40 CFS | 28.79 | 29.11 | 31.05 | 33.35 | 32.66 | 29.83 | 28.80 | 28.80 |
| 67.00 CFS | 28.82 | 29.71 | 32.40 | 33.52 | 31.37 | 29.04 | 28.80 | 28.80 |
| 68.60 CFS | 29.10 | 31.02 | 33.34 | 32.68 | 29.88 | 28.80 | 28.80 | 28.77 |
| 70.20 CFS | 27.82 | 24.66 | 20.68 | 17.06 | 14.62 | 14.36 | 14.56 | 14.23 |
| 71.80 CFS | 14.45 | 14.35 | 13.29 | 9.79 | 3.54 | .17 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
13.26 WATERSHED INCHES; 20363 CFS-HRS; 1682.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 12

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.15 | 7758.9 | (NULL) |
| 28.05 | 5991.2 | (NULL) |
| 42.16 | 319.5 | (NULL) |
| 43.60 | 313.0 | (NULL) |
| 45.17 | 294.5 | (NULL) |
| 46.50 | 285.0 | (NULL) |
| 48.33 | 261.8 | (NULL) |
| 49.13 | 256.0 | (NULL) |
| 49.92 | 252.4 | (NULL) |
| 50.66 | 250.9 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.60 CFS | .31 | .76 | 1.47 | 2.44 | 3.66 | 5.08 | 6.68 | 8.43 |
| 9.20 CFS | 10.32 | 12.37 | 14.83 | 17.89 | 21.39 | 25.05 | 28.81 | 32.69 |
| 10.80 CFS | 36.59 | 40.66 | 44.94 | 49.03 | 52.79 | 56.64 | 60.79 | 64.98 |
| 12.40 CFS | 68.67 | 71.80 | 75.05 | 78.77 | 82.60 | 85.76 | 88.29 | 91.01 |
| 14.00 CFS | 94 | 98 | 102 | 106 | 110 | 114 | 118 | 122 |
| 15.60 CFS | 125 | 128 | 131 | 135 | 139 | 142 | 145 | 147 |
| 17.20 CFS | 150 | 156 | 165 | 171 | 175 | 181 | 192 | 202 |
| 18.80 CFS | 210 | 215 | 223 | 235 | 249 | 260 | 266 | 275 |
| 20.40 CFS | 289 | 304 | 314 | 323 | 335 | 355 | 379 | 395 |
| 22.00 CFS | 406 | 418 | 436 | 457 | 473 | 486 | 500 | 520 |
| 23.60 CFS | 540 | 553 | 564 | 622 | 797 | 1008 | 1131 | 1193 |
| 25.20 CFS | 1323 | 1589 | 1892 | 2095 | 2242 | 2778 | 4235 | 5976 |
| 26.80 CFS | 7013 | 7503 | 7727 | 7011 | 6032 | 5765 | 5982 | 5910 |
| 28.40 CFS | 5496 | 4966 | 4590 | 4337 | 4052 | 3727 | 3415 | 3168 |
| 30.00 CFS | 2974 | 2775 | 2526 | 2277 | 2110 | 2006 | 1905 | 1801 |
| 31.60 CFS | 1705 | 1627 | 1568 | 1510 | 1446 | 1387 | 1348 | 1322 |
| 33.20 CFS | 1292 | 1252 | 1214 | 1191 | 1177 | 1158 | 1128 | 1097 |
| 34.80 CFS | 1077 | 1067 | 1052 | 1020 | 984 | 965 | 955 | 921 |
| 36.40 CFS | 838 | 745 | 693 | 671 | 644 | 609 | 573 | 543 |
| 38.00 CFS | 519 | 497 | 475 | 454 | 437 | 426 | 414 | 400 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 39.60 CFS | 388 | 380 | 373 | 364 | 355 | 347 | 341 | 337 |
| 41.20 CFS | 334 | 330 | 324 | 320 | 319 | 319 | 318 | 316 |
| 42.80 CFS | 313 | 310 | 310 | 313 | 313 | 313 | 312 | 310 |
| 44.40 CFS | 304 | 297 | 293 | 294 | 294 | 293 | 288 | 285 |
| 46.00 CFS | 284 | 283 | 285 | 285 | 282 | 279 | 278 | 274 |
| 47.60 CFS | 270 | 265 | 262 | 261 | 262 | 258 | 255 | 255 |
| 49.20 CFS | 256 | 252 | 250 | 252 | 252 | 249 | 249 | 251 |
| 50.80 CFS | 250 | 248 | 246 | 243 | 236 | 232 | 231 | 230 |
| 52.40 CFS | 228 | 226 | 227 | 227 | 226 | 222 | 220 | 220 |
| 54.00 CFS | 220 | 217 | 211 | 205 | 203 | 201 | 200 | 198 |
| 55.60 CFS | 196 | 194 | 193 | 191 | 186 | 179 | 174 | 172 |
| 57.20 CFS | 167 | 165 | 165 | 165 | 163 | 159 | 153 | 147 |
| 58.80 CFS | 144 | 141 | 137 | 137 | 137 | 133 | 130 | 130 |
| 60.40 CFS | 126 | 116 | 110 | 110 | 110 | 108 | 104 | 100 |
| 62.00 CFS | 99.93 | 100.12 | 96.80 | 94.73 | 96.04 | 97.46 | 95.17 | 88.45 |
| 63.60 CFS | 80.75 | 76.90 | 75.87 | 75.11 | 75.80 | 74.97 | 71.19 | 67.60 |
| 65.20 CFS | 66.31 | 65.31 | 64.63 | 65.66 | 67.17 | 65.92 | 62.83 | 61.76 |
| 66.80 CFS | 61.70 | 61.52 | 62.12 | 64.50 | 65.36 | 63.16 | 60.98 | 60.96 |
| 68.40 CFS | 61.01 | 61.18 | 62.91 | 65.00 | 64.23 | 61.54 | 60.71 | 60.90 |
| 70.00 CFS | 60.84 | 59.75 | 56.38 | 52.13 | 48.04 | 44.79 | 43.32 | 41.96 |
| 71.60 CFS | 39.92 | 38.46 | 36.84 | 34.42 | 29.76 | 22.49 | 18.03 | 16.46 |
| 73.20 CFS | 14.61 | 12.59 | 10.60 | 8.78 | 7.18 | 5.80 | 4.65 | 3.70 |
| 74.80 CFS | 2.93 | 2.30 | 1.80 | 1.41 | 1.09 | .85 | .65 | .50 |
| 76.40 CFS | .38 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
13.78 WATERSHED INCHES; 43053 CFS-HRS; 3557.9 ACRE-FEET.

OPERATION DIVERT XSECTION 12
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.40 | 4100.0 * | (DIVERT) |
| 42.16 | 319.5 | (DIVERT) |
| 43.60 | 313.0 | (DIVERT) |
| 45.17 | 294.5 | (DIVERT) |
| 46.50 | 285.0 | (DIVERT) |
| 48.33 | 261.8 | (DIVERT) |
| 49.13 | 256.0 | (DIVERT) |
| 49.92 | 252.4 | (DIVERT) |
| 50.66 | 250.9 | (DIVERT) |
| 52.97 | 227.5 | (DIVERT) |

* FIRST POINT OF FLAT PEAK

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 4.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.60 CFS | .31 | .76 | 1.47 | 2.44 | 3.66 | 5.08 | 6.68 | 8.43 |
| 9.20 CFS | 10.32 | 12.37 | 14.83 | 17.89 | 21.39 | 25.05 | 28.81 | 32.69 |
| 10.80 CFS | 36.59 | 40.66 | 44.94 | 49.03 | 52.79 | 56.64 | 60.79 | 64.98 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12.40 CFS | 68.67 | 71.80 | 75.05 | 78.77 | 82.60 | 85.76 | 88.29 | 91.01 |
| 14.00 CFS | 94 | 98 | 102 | 106 | 110 | 114 | 118 | 122 |
| 15.60 CFS | 125 | 128 | 131 | 135 | 139 | 142 | 145 | 147 |
| 17.20 CFS | 150 | 156 | 165 | 171 | 175 | 181 | 192 | 202 |
| 18.80 CFS | 210 | 215 | 223 | 235 | 249 | 260 | 266 | 275 |
| 20.40 CFS | 289 | 304 | 314 | 323 | 335 | 355 | 379 | 395 |
| 22.00 CFS | 406 | 418 | 436 | 457 | 473 | 486 | 500 | 520 |
| 23.60 CFS | 540 | 553 | 564 | 622 | 797 | 1008 | 1131 | 1193 |
| 25.20 CFS | 1323 | 1589 | 1892 | 2095 | 2242 | 2778 | 4100 | 4100 |
| 26.80 CFS | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 | 4100 |
| 28.40 CFS | 4100 | 4100 | 4100 | 4100 | 4052 | 3727 | 3415 | 3168 |
| 30.00 CFS | 2974 | 2775 | 2526 | 2277 | 2110 | 2006 | 1905 | 1801 |
| 31.60 CFS | 1705 | 1627 | 1568 | 1510 | 1446 | 1387 | 1348 | 1322 |
| 33.20 CFS | 1292 | 1252 | 1214 | 1191 | 1177 | 1158 | 1128 | 1097 |
| 34.80 CFS | 1077 | 1067 | 1052 | 1020 | 984 | 965 | 955 | 921 |
| 36.40 CFS | 838 | 745 | 693 | 671 | 644 | 609 | 573 | 543 |
| 38.00 CFS | 519 | 497 | 475 | 454 | 437 | 426 | 414 | 400 |
| 39.60 CFS | 388 | 380 | 373 | 364 | 355 | 347 | 341 | 337 |
| 41.20 CFS | 334 | 330 | 324 | 320 | 319 | 319 | 318 | 316 |
| 42.80 CFS | 313 | 310 | 310 | 313 | 313 | 313 | 312 | 310 |
| 44.40 CFS | 304 | 297 | 293 | 294 | 294 | 293 | 288 | 285 |
| 46.00 CFS | 284 | 283 | 285 | 285 | 282 | 279 | 278 | 274 |
| 47.60 CFS | 270 | 265 | 262 | 261 | 262 | 258 | 255 | 255 |
| 49.20 CFS | 256 | 252 | 250 | 252 | 252 | 249 | 249 | 251 |
| 50.80 CFS | 250 | 248 | 246 | 243 | 236 | 232 | 231 | 230 |
| 52.40 CFS | 228 | 226 | 227 | 227 | 226 | 222 | 220 | 220 |
| 54.00 CFS | 220 | 217 | 211 | 205 | 203 | 201 | 200 | 198 |
| 55.60 CFS | 196 | 194 | 193 | 191 | 186 | 179 | 174 | 172 |
| 57.20 CFS | 167 | 165 | 165 | 165 | 163 | 159 | 153 | 147 |
| 58.80 CFS | 144 | 141 | 137 | 137 | 137 | 133 | 130 | 130 |
| 60.40 CFS | 126 | 116 | 110 | 110 | 110 | 108 | 104 | 100 |
| 62.00 CFS | 99.93 | 100.12 | 96.80 | 94.73 | 96.04 | 97.46 | 95.17 | 88.45 |
| 63.60 CFS | 80.75 | 76.90 | 75.87 | 75.11 | 75.80 | 74.97 | 71.19 | 67.60 |
| 65.20 CFS | 66.31 | 65.31 | 64.63 | 65.66 | 67.17 | 65.92 | 62.83 | 61.76 |
| 66.80 CFS | 61.70 | 61.52 | 62.12 | 64.50 | 65.36 | 63.16 | 60.98 | 60.96 |
| 68.40 CFS | 61.01 | 61.18 | 62.91 | 65.00 | 64.23 | 61.54 | 60.71 | 60.90 |
| 70.00 CFS | 60.84 | 59.75 | 56.38 | 52.13 | 48.04 | 44.79 | 43.32 | 41.96 |
| 71.60 CFS | 39.92 | 38.46 | 36.84 | 34.42 | 29.76 | 22.49 | 18.03 | 16.46 |
| 73.20 CFS | 14.61 | 12.59 | 10.60 | 8.78 | 7.18 | 5.80 | 4.65 | 3.70 |
| 74.80 CFS | 2.93 | 2.30 | 1.80 | 1.41 | 1.09 | .85 | .65 | .50 |
| 76.40 CFS | .38 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
12.16 WATERSHED INCHES; 37998 CFS-HRS; 3140.2 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 200)

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.15 | 3658.9 | (DIVERT) |
| 28.05 | 1891.2 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = .00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 26.20 CFS | 0 | 135 | 1876 | 2913 | 3403 | 3627 | 2911 | 1932 |
| 27.80 CFS | 1665 | 1882 | 1810 | 1396 | 866 | 490 | 237 | 0 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
5055 CFS-HRS; 417.7 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 20. ***

OPERATION REACH XSECTION 20

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.40 | 4100.0 * | 7.94 |
| 42.16 | 319.5 | 1.94 |
| 43.60 | 313.0 | 1.92 |
| 45.17 | 294.5 | 1.86 |
| 46.50 | 285.0 | 1.82 |
| 48.33 | 261.8 | 1.73 |
| 49.13 | 256.0 | 1.71 |
| 49.92 | 252.4 | 1.69 |
| 50.66 | 250.9 | 1.69 |
| 52.97 | 227.5 | 1.60 |

* FIRST POINT OF FLAT PEAK

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
12.16 WATERSHED INCHES; 37998 CFS-HRS; 3140.2 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 26.40 | 4100.0 * | 5.03 |
| 42.16 | 319.5 | 1.21 |
| 43.60 | 313.0 | 1.20 |
| 45.17 | 294.5 | 1.16 |
| 46.50 | 285.0 | 1.13 |
| 48.33 | 261.8 | 1.08 |
| 49.13 | 256.0 | 1.06 |
| 49.92 | 252.4 | 1.06 |
| 50.66 | 250.9 | 1.05 |
| 52.97 | 227.5 | 1.00 |

* FIRST POINT OF FLAT PEAK

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
12.16 WATERSHED INCHES; 37998 CFS-HRS; 3140.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 3

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.03 | 10040.5 | (RUNOFF) |
| 37.12 | 356.5 | (RUNOFF) |
| 41.10 | 257.2 | (RUNOFF) |
| 42.50 | 257.2 | (RUNOFF) |
| 43.87 | 257.2 | (RUNOFF) |
| 45.40 | 231.7 | (RUNOFF) |
| 46.65 | 231.7 | (RUNOFF) |
| 48.55 | 205.0 | (RUNOFF) |
| 50.03 | 205.0 | (RUNOFF) |
| 50.79 | 205.1 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7

| HRS | MAIN TIME INCREMENT = .200 hr, | | | | DRAINAGE AREA = 3.94 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 6.80 CFS | .34 | 1.45 | 3.89 | 7.54 | 11.53 | 15.39 | 19.17 | 22.84 |
| 8.40 CFS | 26.59 | 30.43 | 34.07 | 37.14 | 40.32 | 43.87 | 47.03 | 49.53 |
| 10.00 CFS | 52.51 | 56.50 | 61.23 | 65.95 | 70.39 | 74.49 | 78.70 | 82.25 |
| 11.60 CFS | 85 | 86 | 89 | 93 | 96 | 98 | 99 | 101 |
| 13.20 CFS | 105 | 108 | 110 | 110 | 112 | 117 | 122 | 127 |
| 14.80 CFS | 133 | 138 | 141 | 143 | 145 | 146 | 146 | 147 |
| 16.40 CFS | 151 | 154 | 157 | 158 | 159 | 167 | 180 | 192 |
| 18.00 CFS | 198 | 203 | 215 | 230 | 241 | 244 | 247 | 258 |
| 19.60 CFS | 274 | 287 | 294 | 297 | 308 | 325 | 339 | 345 |
| 21.20 CFS | 353 | 373 | 403 | 429 | 440 | 443 | 454 | 472 |
| 22.80 CFS | 489 | 497 | 504 | 519 | 538 | 551 | 558 | 621 |
| 24.40 CFS | 852 | 1184 | 1469 | 1571 | 1659 | 1902 | 2263 | 2558 |
| 26.00 CFS | 2703 | 3170 | 4869 | 7282 | 9355 | 10029 | 9667 | 8221 |
| 27.60 CFS | 5995 | 4199 | 3538 | 3445 | 3081 | 2567 | 2137 | 2004 |
| 29.20 CFS | 1977 | 1901 | 1788 | 1701 | 1668 | 1637 | 1511 | 1335 |
| 30.80 CFS | 1187 | 1138 | 1132 | 1117 | 1093 | 1073 | 1065 | 1058 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 32.40 CFS | 1033 | 998 | 973 | 967 | 963 | 942 | 912 | 892 |
| 34.00 CFS | 887 | 884 | 867 | 840 | 818 | 812 | 807 | 785 |
| 35.60 CFS | 748 | 719 | 710 | 688 | 605 | 485 | 388 | 355 |
| 37.20 CFS | 356 | 351 | 341 | 332 | 329 | 328 | 323 | 316 |
| 38.80 CFS | 308 | 305 | 303 | 296 | 288 | 282 | 279 | 275 |
| 40.40 CFS | 269 | 263 | 259 | 257 | 257 | 256 | 254 | 251 |
| 42.00 CFS | 251 | 254 | 257 | 257 | 255 | 251 | 251 | 253 |
| 43.60 CFS | 256 | 257 | 257 | 255 | 248 | 237 | 228 | 227 |
| 45.20 CFS | 230 | 232 | 230 | 226 | 225 | 226 | 229 | 232 |
| 46.80 CFS | 231 | 227 | 224 | 220 | 215 | 208 | 203 | 203 |
| 48.40 CFS | 204 | 205 | 203 | 203 | 205 | 205 | 203 | 203 |
| 50.00 CFS | 205 | 204 | 202 | 204 | 205 | 203 | 200 | 195 |
| 51.60 CFS | 188 | 180 | 177 | 177 | 177 | 177 | 179 | 183 |
| 53.20 CFS | 184 | 181 | 178 | 177 | 177 | 175 | 168 | 160 |
| 54.80 CFS | 154 | 153 | 153 | 153 | 153 | 153 | 153 | 152 |
| 56.40 CFS | 147 | 140 | 132 | 127 | 124 | 122 | 124 | 127 |
| 58.00 CFS | 129 | 127 | 120 | 112 | 106 | 103 | 101 | 101 |
| 59.60 CFS | 103 | 102 | 101 | 101 | 98 | 88 | 77 | 74 |
| 61.20 CFS | 77.10 | 79.45 | 77.17 | 74.29 | 74.14 | 76.15 | 75.93 | 73.85 |
| 62.80 CFS | 74.62 | 77.92 | 78.02 | 70.90 | 60.16 | 51.49 | 48.30 | 49.34 |
| 64.40 CFS | 52.39 | 54.88 | 54.13 | 50.67 | 48.42 | 48.28 | 48.64 | 50.74 |
| 66.00 CFS | 54.08 | 54.91 | 52.48 | 49.07 | 48.29 | 48.36 | 49.44 | 52.43 |
| 67.60 CFS | 54.81 | 53.98 | 50.67 | 48.40 | 48.29 | 48.68 | 50.71 | 53.91 |
| 69.20 CFS | 54.79 | 52.53 | 49.19 | 48.29 | 48.24 | 47.24 | 43.47 | 37.73 |
| 70.80 CFS | 31.21 | 26.55 | 24.54 | 23.82 | 24.43 | 24.09 | 23.99 | 23.32 |
| 72.40 CFS | 18.27 | 11.03 | 2.94 | .12 | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.29 WATERSHED INCHES; 36347 CFS-HRS; 3003.7 ACRE-FEET.

OPERATION REACH XSECTION 30

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.78 | 7435.3 | 5.34 |
| 42.91 | 256.8 | 2.21 |
| 44.45 | 255.5 | 2.21 |
| 47.13 | 230.4 | 2.16 |
| 50.38 | 204.6 | 2.11 |
| 51.21 | 204.2 | 2.11 |
| 53.62 | 182.4 | 2.04 |
| 63.53 | 77.1 | 1.67 |
| 66.69 | 52.7 | 1.55 |
| 68.22 | 52.2 | 1.55 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.30 WATERSHED INCHES; 36355 CFS-HRS; 3004.3 ACRE-FEET.

OPERATION REACH XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 28.39 | 6138.2 | 7.27 |
| 44.55 | 255.5 | 2.13 |
| 68.57 | 51.6 | 1.04 |
| 70.11 | 51.4 | 1.04 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.30 WATERSHED INCHES; 36353 CFS-HRS; 3004.2 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 25. ***

OPERATION REACH XSECTION 25

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 28.39 | 6138.2 | 6.30 |
| 44.55 | 255.5 | 1.06 |
| 68.57 | 51.6 | .32 |
| 70.11 | 51.4 | .32 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.30 WATERSHED INCHES; 36353 CFS-HRS; 3004.2 ACRE-FEET.

OPERATION RUNOFF XSECTION 4

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.01 | 4861.6 | (RUNOFF) |
| 32.92 | 492.2 | (RUNOFF) |
| 33.95 | 452.3 | (RUNOFF) |
| 37.13 | 182.2 | (RUNOFF) |
| 42.46 | 131.5 | (RUNOFF) |
| 43.75 | 131.5 | (RUNOFF) |
| 45.36 | 118.9 | (RUNOFF) |
| 46.60 | 118.9 | (RUNOFF) |
| 49.22 | 105.4 | (RUNOFF) |
| 49.98 | 105.4 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 2.06 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.60 CFS | .44 | 1.24 | 2.48 | 3.94 | 5.36 | 6.65 | 7.89 | 9.27 |
| 12.20 CFS | 10.74 | 12.07 | 13.16 | 14.21 | 15.50 | 16.98 | 18.25 | 19.14 |
| 13.80 CFS | 19.98 | 21.24 | 22.86 | 24.65 | 26.54 | 28.44 | 30.17 | 31.57 |
| 15.40 CFS | 32.82 | 33.98 | 34.79 | 35.41 | 36.53 | 38.22 | 39.73 | 40.82 |
| 17.00 CFS | 41.60 | 42.73 | 45.98 | 50.80 | 54.70 | 56.41 | 58.79 | 63.74 |
| 18.60 CFS | 69.28 | 72.69 | 73.87 | 76.25 | 81.12 | 87.59 | 92.71 | 94.71 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 20.20 CFS | 97 | 103 | 110 | 115 | 117 | 122 | 132 | 145 |
| 21.80 CFS | 154 | 158 | 160 | 167 | 176 | 183 | 187 | 191 |
| 23.40 CFS | 200 | 209 | 215 | 217 | 251 | 368 | 521 | 625 |
| 25.00 CFS | 653 | 705 | 846 | 1029 | 1155 | 1197 | 1491 | 2480 |
| 26.60 CFS | 3780 | 4657 | 4861 | 4677 | 3805 | 2608 | 1849 | 1768 |
| 28.20 CFS | 1709 | 1489 | 1203 | 1026 | 1006 | 993 | 945 | 883 |
| 29.80 CFS | 847 | 843 | 822 | 746 | 646 | 583 | 575 | 573 |
| 31.40 CFS | 564 | 550 | 541 | 540 | 536 | 520 | 501 | 492 |
| 33.00 CFS | 492 | 489 | 475 | 459 | 451 | 452 | 450 | 438 |
| 34.60 CFS | 423 | 414 | 414 | 411 | 396 | 375 | 363 | 363 |
| 36.20 CFS | 348 | 295 | 227 | 186 | 181 | 182 | 178 | 172 |
| 37.80 CFS | 168 | 168 | 167 | 165 | 160 | 156 | 156 | 154 |
| 39.40 CFS | 150 | 146 | 144 | 143 | 140 | 136 | 133 | 132 |
| 41.00 CFS | 131 | 131 | 131 | 129 | 128 | 128 | 131 | 131 |
| 42.60 CFS | 131 | 130 | 128 | 128 | 130 | 131 | 131 | 131 |
| 44.20 CFS | 130 | 125 | 119 | 116 | 116 | 118 | 119 | 117 |
| 45.80 CFS | 115 | 115 | 116 | 118 | 119 | 118 | 116 | 114 |
| 47.40 CFS | 112 | 109 | 106 | 104 | 104 | 105 | 105 | 103 |
| 49.00 CFS | 104 | 105 | 104 | 103 | 104 | 105 | 104 | 103 |
| 50.60 CFS | 105 | 105 | 104 | 102 | 100 | 95 | 91 | 91 |
| 52.20 CFS | 90.63 | 90.64 | 90.88 | 92.26 | 94.14 | 94.12 | 92.10 | 90.69 |
| 53.80 CFS | 90.67 | 90.60 | 89.19 | 84.94 | 80.60 | 78.49 | 78.43 | 78.29 |
| 55.40 CFS | 78.35 | 78.44 | 78.27 | 78.37 | 77.50 | 74.80 | 70.18 | 66.39 |
| 57.00 CFS | 64.88 | 62.84 | 62.23 | 63.93 | 65.76 | 65.92 | 64.49 | 60.24 |
| 58.60 CFS | 55.90 | 53.70 | 52.67 | 51.12 | 52.17 | 53.31 | 52.22 | 51.16 |
| 60.20 CFS | 51.85 | 49.69 | 43.38 | 38.08 | 38.11 | 40.32 | 40.86 | 39.10 |
| 61.80 CFS | 37.54 | 38.17 | 39.57 | 38.58 | 37.50 | 38.68 | 40.75 | 39.92 |
| 63.40 CFS | 35.14 | 28.96 | 25.22 | 24.80 | 25.52 | 27.45 | 28.54 | 27.35 |
| 65.00 CFS | 25.23 | 24.76 | 24.76 | 24.95 | 26.35 | 28.23 | 28.22 | 26.27 |
| 66.60 CFS | 24.86 | 24.76 | 24.78 | 25.42 | 27.43 | 28.56 | 27.40 | 25.33 |
| 68.20 CFS | 24.77 | 24.77 | 25.00 | 26.37 | 28.27 | 28.27 | 26.22 | 24.84 |
| 69.80 CFS | 24.77 | 24.73 | 24.01 | 21.69 | 18.44 | 15.17 | 12.99 | 12.36 |
| 71.40 CFS | 12.40 | 12.44 | 12.29 | 12.40 | 11.54 | 8.86 | 4.23 | .50 |
| 73.00 CFS | .00 | | | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
12.87 WATERSHED INCHES; 17108 CFS-HRS; 1413.8 ACRE-FEET.

OPERATION ADDHYD XSECTION 34

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.24 | 7273.8 | (NULL) |
| 28.25 | 7762.8 | (NULL) |
| 43.54 | 389.7 | (NULL) |
| 45.15 | 371.8 | (NULL) |
| 50.68 | 311.1 | (NULL) |
| 61.10 | 145.4 | (NULL) |
| 62.94 | 122.6 | (NULL) |
| 65.94 | 84.5 | (NULL) |
| 67.56 | 80.3 | (NULL) |
| 69.07 | 79.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 6.00 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.80 CFS | .43 | 1.07 | 2.10 | 3.54 | 5.35 | 7.50 | 9.93 | 12.62 |
| 9.40 CFS | 15.50 | 18.51 | 21.60 | 24.76 | 27.97 | 31.23 | 34.74 | 38.74 |
| 11.00 CFS | 43.30 | 48.23 | 53.28 | 58.30 | 63.39 | 68.64 | 73.89 | 78.81 |
| 12.60 CFS | 83 | 88 | 92 | 97 | 101 | 105 | 109 | 113 |
| 14.20 CFS | 117 | 122 | 126 | 130 | 135 | 139 | 144 | 148 |
| 15.80 CFS | 153 | 157 | 162 | 167 | 171 | 175 | 178 | 182 |
| 17.40 CFS | 188 | 195 | 201 | 206 | 211 | 221 | 232 | 241 |
| 19.00 CFS | 248 | 257 | 270 | 284 | 297 | 307 | 317 | 332 |
| 20.60 CFS | 349 | 362 | 374 | 388 | 408 | 430 | 450 | 464 |
| 22.20 CFS | 479 | 499 | 523 | 545 | 562 | 581 | 604 | 627 |
| 23.80 CFS | 646 | 662 | 709 | 839 | 1006 | 1125 | 1186 | 1298 |
| 25.40 CFS | 1529 | 1820 | 2063 | 2234 | 2680 | 3842 | 5325 | 6410 |
| 27.00 CFS | 6933 | 7265 | 7120 | 6765 | 6830 | 7417 | 7751 | 7627 |
| 28.60 CFS | 7224 | 6815 | 6489 | 6116 | 5675 | 5217 | 4808 | 4463 |
| 30.20 CFS | 4134 | 3782 | 3440 | 3168 | 2974 | 2800 | 2627 | 2463 |
| 31.80 CFS | 2320 | 2201 | 2095 | 1991 | 1896 | 1823 | 1769 | 1717 |
| 33.40 CFS | 1660 | 1606 | 1565 | 1536 | 1506 | 1468 | 1430 | 1400 |
| 35.00 CFS | 1380 | 1358 | 1324 | 1285 | 1257 | 1240 | 1208 | 1136 |
| 36.60 CFS | 1049 | 988 | 960 | 929 | 884 | 832 | 783 | 741 |
| 38.20 CFS | 701 | 664 | 629 | 600 | 577 | 557 | 536 | 517 |
| 39.80 CFS | 502 | 490 | 477 | 465 | 454 | 444 | 437 | 430 |
| 41.40 CFS | 424 | 416 | 409 | 406 | 404 | 401 | 397 | 393 |
| 43.00 CFS | 390 | 388 | 389 | 390 | 388 | 388 | 386 | 381 |
| 44.60 CFS | 375 | 371 | 371 | 372 | 370 | 365 | 361 | 358 |
| 46.20 CFS | 357 | 356 | 355 | 352 | 349 | 347 | 344 | 340 |
| 47.80 CFS | 336 | 333 | 331 | 331 | 328 | 324 | 321 | 321 |
| 49.40 CFS | 318 | 315 | 314 | 314 | 312 | 310 | 311 | 311 |
| 51.00 CFS | 309 | 307 | 304 | 299 | 295 | 294 | 293 | 290 |
| 52.60 CFS | 288 | 286 | 286 | 283 | 279 | 276 | 275 | 275 |
| 54.20 CFS | 272 | 267 | 262 | 259 | 258 | 256 | 253 | 250 |
| 55.80 CFS | 247 | 245 | 242 | 237 | 230 | 225 | 222 | 218 |
| 57.40 CFS | 215 | 213 | 212 | 208 | 204 | 197 | 191 | 187 |
| 59.00 CFS | 184 | 180 | 179 | 177 | 172 | 168 | 166 | 162 |
| 60.60 CFS | 154 | 147 | 145 | 145 | 143 | 137 | 133 | 130 |
| 62.20 CFS | 129 | 126 | 123 | 122 | 123 | 120 | 114 | 108 |
| 63.80 CFS | 103 | 102 | 101 | 101 | 99 | 95 | 90 | 87 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 65.40 CFS | 85.71 | 84.27 | 84.05 | 84.42 | 83.09 | 80.13 | 78.18 | 77.89 |
| 67.00 CFS | 77.76 | 78.06 | 79.59 | 80.22 | 78.63 | 76.40 | 75.99 | 76.26 |
| 68.60 CFS | 76.59 | 77.80 | 79.41 | 79.08 | 76.85 | 75.58 | 75.84 | 76.07 |
| 70.20 CFS | 75.37 | 72.85 | 69.30 | 65.63 | 62.78 | 60.98 | 59.24 | 56.97 |
| 71.80 CFS | 54.23 | 51.74 | 48.46 | 43.59 | 37.07 | 31.66 | 29.39 | 27.21 |
| 73.40 CFS | 24.42 | 21.29 | 18.17 | 15.25 | 12.65 | 10.38 | 8.44 | 6.82 |
| 75.00 CFS | 5.48 | 4.38 | 3.48 | 2.76 | 2.18 | 1.72 | 1.35 | 1.05 |
| 76.60 CFS | .82 | .64 | .50 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
13.81 WATERSHED INCHES; 53461 CFS-HRS; 4418.0 ACRE-FEET.

OPERATION ADDHYD XSECTION 35

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.24 | 11373.8 | (NULL) |
| 28.25 | 11862.8 | (NULL) |
| 43.56 | 702.7 | (NULL) |
| 45.16 | 666.3 | (NULL) |
| 46.41 | 641.0 | (NULL) |
| 49.91 | 566.9 | (NULL) |
| 50.66 | 562.0 | (NULL) |
| 52.91 | 513.5 | (NULL) |
| 61.13 | 255.8 | (NULL) |
| 62.96 | 220.1 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7

| HRS | MAIN TIME INCREMENT = .200 hr, | | | | DRAINAGE AREA = 10.84 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.60 CFS | .44 | 1.19 | 2.53 | 4.54 | 7.19 | 10.43 | 14.18 | 18.37 |
| 9.20 CFS | 22.93 | 27.87 | 33.34 | 39.49 | 46.16 | 53.02 | 60.04 | 67.44 |
| 10.80 CFS | 75 | 84 | 93 | 102 | 111 | 120 | 129 | 139 |
| 12.40 CFS | 147 | 155 | 163 | 171 | 180 | 187 | 193 | 200 |
| 14.00 CFS | 207 | 215 | 224 | 232 | 241 | 249 | 257 | 265 |
| 15.60 CFS | 274 | 281 | 288 | 296 | 306 | 313 | 320 | 325 |
| 17.20 CFS | 332 | 344 | 360 | 372 | 380 | 393 | 413 | 434 |
| 18.80 CFS | 450 | 463 | 481 | 505 | 533 | 557 | 573 | 592 |
| 20.40 CFS | 621 | 652 | 677 | 697 | 723 | 763 | 809 | 845 |
| 22.00 CFS | 870 | 897 | 936 | 980 | 1018 | 1048 | 1081 | 1124 |
| 23.60 CFS | 1167 | 1199 | 1226 | 1331 | 1636 | 2013 | 2256 | 2378 |
| 25.20 CFS | 2621 | 3118 | 3712 | 4157 | 4477 | 5458 | 7942 | 9425 |
| 26.80 CFS | 10510 | 11033 | 11365 | 11220 | 10865 | 10930 | 11517 | 11851 |
| 28.40 CFS | 11727 | 11324 | 10915 | 10589 | 10169 | 9402 | 8633 | 7976 |
| 30.00 CFS | 7438 | 6909 | 6308 | 5718 | 5278 | 4980 | 4704 | 4429 |
| 31.60 CFS | 4168 | 3947 | 3769 | 3605 | 3436 | 3284 | 3171 | 3091 |
| 33.20 CFS | 3009 | 2912 | 2820 | 2756 | 2713 | 2664 | 2596 | 2527 |
| 34.80 CFS | 2477 | 2447 | 2410 | 2344 | 2269 | 2221 | 2195 | 2129 |
| 36.40 CFS | 1974 | 1794 | 1681 | 1631 | 1573 | 1493 | 1405 | 1326 |
| 38.00 CFS | 1260 | 1199 | 1140 | 1083 | 1037 | 1003 | 971 | 936 |
| 39.60 CFS | 905 | 882 | 863 | 841 | 820 | 801 | 786 | 774 |
| 41.20 CFS | 764 | 753 | 740 | 729 | 724 | 723 | 719 | 714 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 42.80 CFS | 707 | 700 | 699 | 702 | 703 | 701 | 700 | 696 |
| 44.40 CFS | 685 | 672 | 664 | 665 | 666 | 663 | 654 | 646 |
| 46.00 CFS | 642 | 640 | 641 | 640 | 634 | 628 | 624 | 618 |
| 47.60 CFS | 610 | 601 | 595 | 592 | 592 | 586 | 579 | 577 |
| 49.20 CFS | 576 | 570 | 565 | 566 | 566 | 561 | 559 | 562 |
| 50.80 CFS | 561 | 557 | 554 | 547 | 536 | 528 | 525 | 522 |
| 52.40 CFS | 518 | 514 | 513 | 513 | 509 | 501 | 497 | 496 |
| 54.00 CFS | 494 | 490 | 478 | 467 | 462 | 459 | 455 | 451 |
| 55.60 CFS | 446 | 442 | 438 | 432 | 423 | 409 | 399 | 394 |
| 57.20 CFS | 385 | 380 | 379 | 377 | 371 | 363 | 350 | 337 |
| 58.80 CFS | 331 | 325 | 318 | 316 | 313 | 305 | 298 | 297 |
| 60.40 CFS | 288 | 269 | 256 | 255 | 255 | 251 | 241 | 233 |
| 62.00 CFS | 230 | 229 | 223 | 217 | 218 | 220 | 216 | 203 |
| 63.60 CFS | 188 | 180 | 178 | 177 | 177 | 174 | 166 | 158 |
| 65.20 CFS | 154 | 151 | 149 | 150 | 152 | 149 | 143 | 140 |
| 66.80 CFS | 140 | 139 | 140 | 144 | 146 | 142 | 137 | 137 |
| 68.40 CFS | 137 | 138 | 141 | 144 | 143 | 138 | 136 | 137 |
| 70.00 CFS | 137 | 135 | 129 | 121 | 114 | 108 | 104 | 101 |
| 71.60 CFS | 96.90 | 92.69 | 88.57 | 82.87 | 73.36 | 59.56 | 49.69 | 45.85 |
| 73.20 CFS | 41.82 | 37.01 | 31.89 | 26.95 | 22.43 | 18.45 | 15.03 | 12.14 |
| 74.80 CFS | 9.75 | 7.78 | 6.18 | 4.89 | 3.85 | 3.03 | 2.37 | 1.85 |
| 76.40 CFS | 1.44 | 1.12 | .87 | .67 | .52 | .40 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
13.07 WATERSHED INCHES; 91445 CFS-HRS; 7557.0 ACRE-FEET.

OPERATION DIVERT XSECTION 35
OUTPUT #1 HYDROGRAPH

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.00 | 11000.0 * | (DIVERT) |
| 28.00 | 11000.0 * | (DIVERT) |
| 43.56 | 702.7 | (DIVERT) |
| 45.16 | 666.3 | (DIVERT) |
| 46.41 | 641.0 | (DIVERT) |
| 49.91 | 566.9 | (DIVERT) |
| 50.66 | 562.0 | (DIVERT) |
| 52.91 | 513.5 | (DIVERT) |
| 61.13 | 255.8 | (DIVERT) |
| 62.96 | 220.1 | (DIVERT) |

* FIRST POINT OF FLAT PEAK

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 10.84 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.60 CFS | .44 | 1.19 | 2.53 | 4.54 | 7.19 | 10.43 | 14.18 | 18.37 |
| 9.20 CFS | 22.93 | 27.87 | 33.34 | 39.49 | 46.16 | 53.02 | 60.04 | 67.44 |
| 10.80 CFS | 75 | 84 | 93 | 102 | 111 | 120 | 129 | 139 |
| 12.40 CFS | 147 | 155 | 163 | 171 | 180 | 187 | 193 | 200 |
| 14.00 CFS | 207 | 215 | 224 | 232 | 241 | 249 | 257 | 265 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15.60 CFS | 274 | 281 | 288 | 296 | 306 | 313 | 320 | 325 |
| 17.20 CFS | 332 | 344 | 360 | 372 | 380 | 393 | 413 | 434 |
| 18.80 CFS | 450 | 463 | 481 | 505 | 533 | 557 | 573 | 592 |
| 20.40 CFS | 621 | 652 | 677 | 697 | 723 | 763 | 809 | 845 |
| 22.00 CFS | 870 | 897 | 936 | 980 | 1018 | 1048 | 1081 | 1124 |
| 23.60 CFS | 1167 | 1199 | 1226 | 1331 | 1636 | 2013 | 2256 | 2378 |
| 25.20 CFS | 2621 | 3118 | 3712 | 4157 | 4477 | 5458 | 7942 | 9425 |
| 26.80 CFS | 10510 | 11000 | 11000 | 11000 | 10865 | 10930 | 11000 | 11000 |
| 28.40 CFS | 11000 | 11000 | 10915 | 10589 | 10169 | 9402 | 8633 | 7976 |
| 30.00 CFS | 7438 | 6909 | 6308 | 5718 | 5278 | 4980 | 4704 | 4429 |
| 31.60 CFS | 4168 | 3947 | 3769 | 3605 | 3436 | 3284 | 3171 | 3091 |
| 33.20 CFS | 3009 | 2912 | 2820 | 2756 | 2713 | 2664 | 2596 | 2527 |
| 34.80 CFS | 2477 | 2447 | 2410 | 2344 | 2269 | 2221 | 2195 | 2129 |
| 36.40 CFS | 1974 | 1794 | 1681 | 1631 | 1573 | 1493 | 1405 | 1326 |
| 38.00 CFS | 1260 | 1199 | 1140 | 1083 | 1037 | 1003 | 971 | 936 |
| 39.60 CFS | 905 | 882 | 863 | 841 | 820 | 801 | 786 | 774 |
| 41.20 CFS | 764 | 753 | 740 | 729 | 724 | 723 | 719 | 714 |
| 42.80 CFS | 707 | 700 | 699 | 702 | 703 | 701 | 700 | 696 |
| 44.40 CFS | 685 | 672 | 664 | 665 | 666 | 663 | 654 | 646 |
| 46.00 CFS | 642 | 640 | 641 | 640 | 634 | 628 | 624 | 618 |
| 47.60 CFS | 610 | 601 | 595 | 592 | 592 | 586 | 579 | 577 |
| 49.20 CFS | 576 | 570 | 565 | 566 | 566 | 561 | 559 | 562 |
| 50.80 CFS | 561 | 557 | 554 | 547 | 536 | 528 | 525 | 522 |
| 52.40 CFS | 518 | 514 | 513 | 513 | 509 | 501 | 497 | 496 |
| 54.00 CFS | 494 | 490 | 478 | 467 | 462 | 459 | 455 | 451 |
| 55.60 CFS | 446 | 442 | 438 | 432 | 423 | 409 | 399 | 394 |
| 57.20 CFS | 385 | 380 | 379 | 377 | 371 | 363 | 350 | 337 |
| 58.80 CFS | 331 | 325 | 318 | 316 | 313 | 305 | 298 | 297 |
| 60.40 CFS | 288 | 269 | 256 | 255 | 255 | 251 | 241 | 233 |
| 62.00 CFS | 230 | 229 | 223 | 217 | 218 | 220 | 216 | 203 |
| 63.60 CFS | 188 | 180 | 178 | 177 | 177 | 174 | 166 | 158 |
| 65.20 CFS | 154 | 151 | 149 | 150 | 152 | 149 | 143 | 140 |
| 66.80 CFS | 140 | 139 | 140 | 144 | 146 | 142 | 137 | 137 |
| 68.40 CFS | 137 | 138 | 141 | 144 | 143 | 138 | 136 | 137 |
| 70.00 CFS | 137 | 135 | 129 | 121 | 114 | 108 | 104 | 101 |
| 71.60 CFS | 96.90 | 92.69 | 88.57 | 82.87 | 73.36 | 59.56 | 49.69 | 45.85 |
| 73.20 CFS | 41.82 | 37.01 | 31.89 | 26.95 | 22.43 | 18.45 | 15.03 | 12.14 |
| 74.80 CFS | 9.75 | 7.78 | 6.18 | 4.89 | 3.85 | 3.03 | 2.37 | 1.85 |
| 76.40 CFS | 1.44 | 1.12 | .87 | .67 | .52 | .40 | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
12.99 WATERSHED INCHES; 90850 CFS-HRS; 7507.8 ACRE-FEET.

OUTPUT #2 DIVERTED HYDROGRAPH (XSECTION 199)

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.24 | 373.8 | (DIVERT) |
| 28.25 | 862.8 | (DIVERT) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7

| HRS | MAIN TIME INCREMENT = .200 hr, | | | | DRAINAGE AREA = | | | .00 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 26.80 CFS | 0 | 33 | 365 | 220 | 0 | 0 | 517 | 851 |
| 28.40 CFS | 727 | 324 | 0 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
595 CFS-HRS; 49.2 ACRE-FEET.

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 45. ***

OPERATION REACH XSECTION 45

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.00 | 11000.0 * | 8.46 |
| 28.00 | 11000.0 * | 8.46 |
| 43.56 | 702.7 | 1.82 |
| 45.16 | 666.3 | 1.76 |
| 46.41 | 641.0 | 1.73 |
| 49.91 | 566.9 | 1.62 |
| 50.66 | 562.0 | 1.61 |
| 52.91 | 513.5 | 1.54 |
| 61.13 | 255.8 | 1.03 |
| 62.96 | 220.1 | .95 |

* FIRST POINT OF FLAT PEAK

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
12.99 WATERSHED INCHES; 90850 CFS-HRS; 7507.8 ACRE-FEET.

OPERATION RUNOFF XSECTION 6

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 21.84 | 167.4 | (RUNOFF) |
| 26.91 | 3876.1 | (RUNOFF) |
| 27.90 | 1343.4 | (RUNOFF) |
| 28.90 | 752.9 | (RUNOFF) |
| 30.90 | 425.2 | (RUNOFF) |
| 31.90 | 399.8 | (RUNOFF) |
| 32.90 | 363.9 | (RUNOFF) |
| 33.90 | 334.0 | (RUNOFF) |
| 34.94 | 306.1 | (RUNOFF) |
| 35.88 | 267.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7

| HRS | MAIN TIME INCREMENT = .200 hr, | | | | DRAINAGE AREA = | | | 1.47 SQ.MI. |
|---|---|---|---|---|---|---|---|---|
| 6.60 CFS | .30 | 1.29 | 2.91 | 4.65 | 6.19 | 7.39 | 9.02 | 10.41 |
| 8.20 CFS | 11.55 | 13.39 | 14.79 | 15.46 | 16.67 | 18.57 | 19.60 | 19.88 |
| 9.80 CFS | 21.35 | 23.15 | 24.75 | 27.00 | 28.43 | 29.62 | 31.63 | 33.39 |
| 11.40 CFS | 33.22 | 33.89 | 34.93 | 36.91 | 38.61 | 38.11 | 38.59 | 39.51 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 13.00 CFS | 41.48 | 43.13 | 42.35 | 42.67 | 43.49 | 45.46 | 47.91 | 49.32 |
| 14.60 CFS | 52.03 | 53.78 | 54.61 | 55.40 | 56.16 | 56.67 | 55.66 | 56.24 |
| 16.20 CFS | 58.78 | 59.66 | 60.31 | 60.86 | 60.06 | 62.65 | 72.28 | 75.36 |
| 17.80 CFS | 76.15 | 77.01 | 82.04 | 91.96 | 92.94 | 92.70 | 93.65 | 97.87 |
| 19.40 CFS | 107 | 112 | 112 | 111 | 117 | 128 | 129 | 131 |
| 21.00 CFS | 133 | 140 | 160 | 166 | 167 | 167 | 171 | 183 |
| 22.60 CFS | 187 | 188 | 190 | 196 | 208 | 210 | 209 | 212 |
| 24.20 CFS | 307 | 524 | 588 | 593 | 597 | 703 | 936 | 1001 |
| 25.80 CFS | 1008 | 1023 | 1718 | 3306 | 3746 | 3784 | 3805 | 3173 |
| 27.40 CFS | 1696 | 1323 | 1325 | 1325 | 1177 | 831 | 745 | 748 |
| 29.00 CFS | 749 | 714 | 640 | 625 | 624 | 623 | 575 | 454 |
| 30.60 CFS | 424 | 424 | 424 | 418 | 403 | 397 | 398 | 398 |
| 32.20 CFS | 386 | 364 | 359 | 362 | 363 | 352 | 334 | 330 |
| 33.80 CFS | 333 | 333 | 324 | 308 | 302 | 303 | 305 | 295 |
| 35.40 CFS | 270 | 264 | 267 | 267 | 230 | 152 | 132 | 132 |
| 37.00 CFS | 134 | 133 | 123 | 124 | 123 | 122 | 122 | 116 |
| 38.60 CFS | 114 | 114 | 114 | 111 | 105 | 106 | 105 | 102 |
| 40.20 CFS | 100 | 97 | 96 | 96 | 96 | 96 | 95 | 92 |
| 41.80 CFS | 93.41 | 95.91 | 96.01 | 96.01 | 95.65 | 92.75 | 92.58 | 95.64 |
| 43.40 CFS | 96.02 | 96.03 | 96.03 | 95.97 | 92.86 | 85.84 | 84.03 | 84.16 |
| 45.00 CFS | 86.47 | 88.07 | 84.94 | 84.04 | 84.04 | 84.07 | 85.63 | 88.28 |
| 46.60 CFS | 85.71 | 84.05 | 84.02 | 82.47 | 78.95 | 77.69 | 74.74 | 74.58 |
| 48.20 CFS | 77.68 | 77.20 | 74.07 | 75.48 | 77.98 | 76.49 | 73.81 | 76.40 |
| 49.80 CFS | 77.96 | 75.63 | 73.98 | 77.17 | 77.71 | 74.75 | 74.53 | 74.61 |
| 51.40 CFS | 67.84 | 66.06 | 66.06 | 66.06 | 66.06 | 66.07 | 66.42 | 69.39 |
| 53.00 CFS | 69.62 | 66.38 | 66.07 | 66.07 | 66.07 | 66.06 | 63.00 | 56.65 |
| 54.60 CFS | 58.04 | 56.76 | 56.53 | 58.22 | 55.78 | 58.03 | 56.77 | 56.53 |
| 56.20 CFS | 56.68 | 49.83 | 48.06 | 47.94 | 45.62 | 43.90 | 47.17 | 48.06 |
| 57.80 CFS | 48.06 | 48.02 | 44.98 | 38.67 | 39.99 | 38.64 | 36.14 | 37.60 |
| 59.40 CFS | 40.33 | 37.73 | 36.19 | 38.46 | 38.60 | 30.97 | 26.10 | 27.45 |
| 61.00 CFS | 29.96 | 30.04 | 29.21 | 26.10 | 27.45 | 29.92 | 28.47 | 25.74 |
| 62.60 CFS | 28.37 | 30.04 | 29.98 | 26.87 | 19.78 | 18.02 | 18.03 | 18.06 |
| 64.20 CFS | 19.62 | 22.31 | 19.70 | 18.02 | 18.03 | 18.03 | 18.02 | 18.39 |
| 65.80 CFS | 21.31 | 21.47 | 18.41 | 18.03 | 18.03 | 18.03 | 18.06 | 19.62 |
| 67.40 CFS | 22.27 | 19.68 | 18.03 | 18.03 | 18.03 | 18.03 | 18.38 | 21.33 |
| 69.00 CFS | 21.48 | 18.40 | 18.03 | 18.03 | 18.03 | 18.01 | 16.44 | 12.92 |
| 70.60 CFS | 11.66 | 8.70 | 8.53 | 10.07 | 7.77 | 10.00 | 8.69 | 8.50 |
| 72.20 CFS | 8.50 | 1.80 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.39 WATERSHED INCHES; 13656 CFS-HRS; 1128.5 ACRE-FEET.

OPERATION REACH XSECTION 60

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.40 | 3596.1 | 6.57 |
| 42.89 | 95.7 | 2.26 |
| 44.31 | 96.1 | 2.27 |
| 45.60 | 87.1 | 2.05 |
| 46.86 | 86.7 | 2.05 |
| 48.73 | 77.1 | 1.82 |
| 49.48 | 76.8 | 1.81 |
| 50.23 | 76.9 | 1.81 |
| 50.98 | 76.9 | 1.82 |
| 53.39 | 68.7 | 1.62 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.36 WATERSHED INCHES; 13620 CFS-HRS; 1125.6 ACRE-FEET.

OPERATION REACH XSECTION 67

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.76 | 3220.8 | 6.05 |
| 43.15 | 95.5 | 1.36 |
| 44.56 | 95.6 | 1.36 |
| 47.18 | 85.9 | 1.29 |
| 49.73 | 76.5 | 1.22 |
| 50.49 | 76.3 | 1.22 |
| 51.23 | 76.4 | 1.22 |
| 53.67 | 67.9 | 1.16 |
| 58.55 | 47.6 | .99 |
| 60.71 | 38.3 | .85 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
14.37 WATERSHED INCHES; 13631 CFS-HRS; 1126.5 ACRE-FEET.

OPERATION ADDHYD XSECTION 64

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.80 | 14144.0 | (NULL) |
| 43.51 | 797.1 | (NULL) |
| 46.36 | 726.5 | (NULL) |
| 49.85 | 642.6 | (NULL) |
| 50.64 | 638.2 | (NULL) |
| 62.95 | 248.2 | (NULL) |
| 65.97 | 170.2 | (NULL) |
| 67.55 | 164.1 | (NULL) |
| 69.05 | 163.0 | (NULL) |
| 69.84 | 156.4 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7

| HRS | MAIN TIME INCREMENT = .200 hr, | | | | DRAINAGE AREA = 12.31 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 7.40 CFS | .46 | 1.40 | 3.10 | 5.61 | 8.86 | 12.86 | 17.48 | 22.57 |
| 9.00 CFS | 28.20 | 34.22 | 40.45 | 47.15 | 54.66 | 62.64 | 70.59 | 78.72 |
| 10.60 CFS | 87 | 97 | 107 | 118 | 128 | 139 | 149 | 160 |
| 12.20 CFS | 171 | 180 | 189 | 198 | 207 | 217 | 225 | 232 |
| 13.80 CFS | 240 | 248 | 257 | 266 | 275 | 285 | 295 | 304 |
| 15.40 CFS | 314 | 324 | 333 | 342 | 351 | 361 | 369 | 376 |
| 17.00 CFS | 383 | 390 | 403 | 419 | 432 | 443 | 459 | 482 |
| 18.60 CFS | 506 | 525 | 542 | 564 | 592 | 622 | 648 | 669 |
| 20.20 CFS | 692 | 725 | 759 | 787 | 811 | 842 | 885 | 935 |
| 21.80 CFS | 975 | 1007 | 1042 | 1088 | 1138 | 1180 | 1215 | 1254 |
| 23.40 CFS | 1301 | 1348 | 1385 | 1417 | 1528 | 1838 | 2218 | 2483 |
| 25.00 CFS | 2674 | 2998 | 3563 | 4209 | 4713 | 5128 | 6210 | 8777 |
| 26.60 CFS | 10324 | 11598 | 12607 | 13205 | 13709 | 13950 | 14144 | 13935 |
| 28.20 CFS | 13517 | 13146 | 12866 | 12555 | 11994 | 11368 | 10446 | 9570 |
| 29.80 CFS | 8836 | 8228 | 7645 | 7004 | 6387 | 5920 | 5575 | 5250 |
| 31.40 CFS | 4934 | 4645 | 4403 | 4208 | 4030 | 3852 | 3693 | 3574 |
| 33.00 CFS | 3483 | 3391 | 3288 | 3191 | 3121 | 3070 | 3013 | 2940 |
| 34.60 CFS | 2866 | 2812 | 2775 | 2731 | 2659 | 2580 | 2528 | 2493 |
| 36.20 CFS | 2417 | 2254 | 2070 | 1946 | 1869 | 1781 | 1676 | 1571 |
| 37.80 CFS | 1480 | 1404 | 1336 | 1272 | 1211 | 1163 | 1126 | 1091 |
| 39.40 CFS | 1054 | 1022 | 997 | 975 | 951 | 929 | 908 | 891 |
| 41.00 CFS | 877 | 865 | 852 | 838 | 826 | 821 | 819 | 814 |
| 42.60 CFS | 809 | 802 | 795 | 794 | 797 | 797 | 795 | 795 |
| 44.20 CFS | 791 | 780 | 767 | 759 | 758 | 757 | 751 | 741 |
| 45.80 CFS | 733 | 728 | 726 | 726 | 725 | 719 | 714 | 710 |
| 47.40 CFS | 704 | 695 | 686 | 678 | 674 | 672 | 664 | 656 |
| 49.00 CFS | 654 | 653 | 646 | 641 | 643 | 642 | 637 | 635 |
| 50.60 CFS | 638 | 637 | 632 | 630 | 623 | 611 | 603 | 599 |
| 52.20 CFS | 594 | 588 | 583 | 581 | 580 | 576 | 568 | 565 |
| 53.80 CFS | 563 | 562 | 556 | 545 | 534 | 528 | 523 | 517 |
| 55.40 CFS | 511 | 505 | 500 | 495 | 490 | 480 | 466 | 456 |
| 57.00 CFS | 449 | 439 | 431 | 429 | 425 | 419 | 411 | 397 |
| 58.60 CFS | 385 | 378 | 370 | 361 | 358 | 354 | 344 | 338 |
| 60.20 CFS | 336 | 326 | 308 | 294 | 291 | 289 | 283 | 272 |
| 61.80 CFS | 263 | 260 | 258 | 251 | 246 | 247 | 248 | 243 |
| 63.40 CFS | 231 | 217 | 209 | 205 | 201 | 199 | 195 | 186 |
| 65.00 CFS | 178 | 174 | 171 | 168 | 169 | 170 | 167 | 162 |
| 66.60 CFS | 160 | 159 | 159 | 159 | 163 | 164 | 160 | 157 |
| 68.20 CFS | 157 | 157 | 157 | 159 | 163 | 162 | 157 | 156 |
| 69.80 CFS | 156 | 156 | 154 | 148 | 140 | 132 | 124 | 120 |
| 71.40 CFS | 115 | 109 | 104 | 99 | 93 | 83 | 69 | 59 |
| 73.00 CFS | 53.25 | 47.22 | 40.69 | 34.30 | 28.48 | 23.39 | 19.04 | 15.39 |
| 74.60 CFS | 12.36 | 9.88 | 7.86 | 6.22 | 4.91 | 3.87 | 3.03 | 2.37 |
| 76.20 CFS | 1.85 | 1.44 | 1.12 | .87 | .67 | .52 | .40 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
13.15 WATERSHED INCHES; 104481 CFS-HRS; 8634.3 ACRE-FEET.

OPERATION RUNOFF XSECTION 5

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.00 | 11470.2 | (RUNOFF) |
| 32.95 | 1148.8 | (RUNOFF) |
| 33.95 | 1055.1 | (RUNOFF) |
| 35.90 | 851.1 | (RUNOFF) |
| 37.13 | 424.7 | (RUNOFF) |
| 41.10 | 306.3 | (RUNOFF) |
| 42.46 | 306.5 | (RUNOFF) |
| 43.79 | 306.5 | (RUNOFF) |
| 45.35 | 277.2 | (RUNOFF) |
| 46.60 | 277.3 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7

| HRS | MAIN TIME INCREMENT = .200 hr, | | | | DRAINAGE AREA = 4.78 SQ.MI. | | | |
|---|---|---|---|---|---|---|---|---|
| 9.80 CFS | .17 | .88 | 2.64 | 5.48 | 8.88 | 12.34 | 15.87 | 19.61 |
| 11.40 CFS | 23.07 | 25.98 | 28.79 | 32.15 | 35.85 | 39.03 | 41.43 | 43.75 |
| 13.00 CFS | 46.94 | 50.62 | 53.59 | 55.52 | 57.42 | 60.45 | 64.54 | 69.10 |
| 14.60 CFS | 73.78 | 78.50 | 82.82 | 86.04 | 88.94 | 91.63 | 93.34 | 94.60 |
| 16.20 CFS | 97 | 101 | 105 | 108 | 109 | 112 | 120 | 133 |
| 17.80 CFS | 142 | 146 | 152 | 164 | 178 | 186 | 189 | 194 |
| 19.40 CFS | 207 | 223 | 235 | 239 | 244 | 259 | 277 | 288 |
| 21.00 CFS | 294 | 305 | 329 | 361 | 384 | 391 | 397 | 413 |
| 22.60 CFS | 435 | 452 | 459 | 470 | 490 | 512 | 525 | 534 |
| 24.20 CFS | 623 | 905 | 1277 | 1520 | 1577 | 1689 | 2044 | 2490 |
| 25.80 CFS | 2775 | 2885 | 3634 | 5974 | 9027 | 11023 | 11470 | 11007 |
| 27.40 CFS | 8865 | 5998 | 4286 | 4139 | 3998 | 3467 | 2789 | 2389 |
| 29.00 CFS | 2351 | 2319 | 2204 | 2061 | 1978 | 1970 | 1922 | 1736 |
| 30.60 CFS | 1497 | 1356 | 1343 | 1337 | 1315 | 1284 | 1263 | 1261 |
| 32.20 CFS | 1250 | 1213 | 1168 | 1146 | 1149 | 1141 | 1108 | 1070 |
| 33.80 CFS | 1053 | 1055 | 1048 | 1021 | 986 | 965 | 965 | 959 |
| 35.40 CFS | 922 | 872 | 846 | 847 | 811 | 683 | 524 | 431 |
| 37.00 CFS | 423 | 424 | 415 | 401 | 393 | 392 | 390 | 384 |
| 38.60 CFS | 372 | 364 | 363 | 360 | 350 | 340 | 335 | 332 |
| 40.20 CFS | 326 | 318 | 311 | 307 | 306 | 306 | 305 | 301 |
| 41.80 CFS | 298 | 299 | 304 | 306 | 306 | 303 | 298 | 298 |
| 43.40 CFS | 303 | 306 | 306 | 306 | 303 | 292 | 278 | 269 |
| 45.00 CFS | 271 | 276 | 277 | 273 | 269 | 268 | 270 | 275 |
| 46.60 CFS | 277 | 274 | 269 | 267 | 261 | 254 | 246 | 241 |
| 48.20 CFS | 241 | 245 | 244 | 240 | 242 | 246 | 243 | 241 |
| 49.80 CFS | 243 | 246 | 242 | 241 | 244 | 245 | 241 | 238 |
| 51.40 CFS | 232 | 220 | 212 | 211 | 211 | 211 | 212 | 215 |
| 53.00 CFS | 219 | 219 | 214 | 211 | 211 | 211 | 208 | 198 |
| 54.60 CFS | 187 | 183 | 183 | 182 | 183 | 183 | 182 | 183 |
| 56.20 CFS | 181 | 174 | 163 | 154 | 151 | 146 | 145 | 149 |
| 57.80 CFS | 153 | 154 | 150 | 140 | 130 | 125 | 123 | 119 |
| 59.40 CFS | 122 | 124 | 122 | 119 | 121 | 116 | 101 | 88 |
| 61.00 CFS | 88.84 | 94.09 | 95.16 | 90.93 | 87.21 | 88.97 | 92.51 | 89.79 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 62.60 CFS | 87.29 | 90.19 | 94.81 | 92.54 | 81.45 | 67.19 | 58.59 | 57.70 |
| 64.20 CFS | 59.20 | 64.01 | 66.64 | 63.72 | 58.85 | 57.68 | 57.68 | 58.25 |
| 65.80 CFS | 61.55 | 65.97 | 65.73 | 60.86 | 57.69 | 57.69 | 57.73 | 59.33 |
| 67.40 CFS | 64.01 | 66.55 | 63.67 | 58.85 | 57.70 | 57.69 | 58.22 | 61.50 |
| 69.00 CFS | 66.00 | 65.84 | 60.87 | 57.79 | 57.70 | 57.62 | 55.95 | 50.37 |
| 70.60 CFS | 42.70 | 35.08 | 30.08 | 28.71 | 28.96 | 29.05 | 28.72 | 29.10 |
| 72.20 CFS | 27.20 | 20.64 | 9.19 | .81 | .00 | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
13.10 WATERSHED INCHES; 40399 CFS-HRS; 3338.5 ACRE-FEET.

OPERATION RUNOFF XSECTION 7

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.12 | 8392.6 | (RUNOFF) |
| 42.60 | 224.5 | (RUNOFF) |
| 43.91 | 224.8 | (RUNOFF) |
| 45.48 | 201.9 | (RUNOFF) |
| 46.73 | 201.9 | (RUNOFF) |
| 48.62 | 178.6 | (RUNOFF) |
| 49.41 | 178.6 | (RUNOFF) |
| 50.13 | 178.5 | (RUNOFF) |
| 50.87 | 178.7 | (RUNOFF) |
| 53.23 | 159.9 | (RUNOFF) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 3.48 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.80 CFS | .24 | .95 | 2.29 | 4.33 | 6.65 | 9.00 | 11.37 | 13.93 |
| 10.40 CFS | 16.73 | 19.73 | 22.74 | 25.72 | 28.67 | 31.47 | 33.95 | 36.07 |
| 12.00 CFS | 38.28 | 41.00 | 43.70 | 45.92 | 47.72 | 49.59 | 52.14 | 54.64 |
| 13.60 CFS | 56.59 | 58.06 | 59.73 | 62.40 | 65.81 | 69.63 | 73.54 | 77.11 |
| 15.20 CFS | 80.23 | 82.71 | 84.69 | 86.26 | 87.33 | 88.70 | 90.88 | 93.63 |
| 16.80 CFS | 96 | 98 | 99 | 104 | 111 | 120 | 126 | 131 |
| 18.40 CFS | 138 | 147 | 156 | 161 | 165 | 171 | 181 | 192 |
| 20.00 CFS | 200 | 205 | 212 | 222 | 233 | 242 | 249 | 262 |
| 21.60 CFS | 281 | 301 | 316 | 322 | 330 | 342 | 356 | 367 |
| 23.20 CFS | 374 | 385 | 399 | 412 | 421 | 463 | 591 | 813 |
| 24.80 CFS | 1044 | 1197 | 1285 | 1448 | 1698 | 1953 | 2149 | 2524 |
| 26.40 CFS | 3559 | 5276 | 7060 | 8232 | 8309 | 7435 | 5884 | 4292 |
| 28.00 CFS | 3293 | 2991 | 2765 | 2398 | 2026 | 1783 | 1719 | 1673 |
| 29.60 CFS | 1591 | 1509 | 1459 | 1428 | 1348 | 1221 | 1092 | 1007 |
| 31.20 CFS | 986 | 976 | 959 | 941 | 930 | 922 | 906 | 882 |
| 32.80 CFS | 858 | 845 | 839 | 827 | 806 | 786 | 775 | 771 |
| 34.40 CFS | 761 | 742 | 722 | 711 | 705 | 691 | 666 | 640 |
| 36.00 CFS | 624 | 606 | 554 | 464 | 373 | 321 | 310 | 308 |
| 37.60 CFS | 301 | 294 | 288 | 287 | 284 | 278 | 272 | 268 |
| 39.20 CFS | 265 | 261 | 255 | 249 | 245 | 242 | 237 | 232 |
| 40.80 CFS | 228 | 225 | 225 | 224 | 223 | 220 | 220 | 221 |
| 42.40 CFS | 223 | 224 | 223 | 221 | 220 | 220 | 223 | 225 |
| 44.00 CFS | 225 | 223 | 218 | 211 | 203 | 199 | 200 | 202 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 45.60 CFS | 202 | 200 | 197 | 198 | 200 | 202 | 202 | 200 |
| 47.20 CFS | 197 | 194 | 190 | 184 | 180 | 178 | 178 | 179 |
| 48.80 CFS | 178 | 178 | 178 | 179 | 178 | 178 | 178 | 178 |
| 50.40 CFS | 178 | 178 | 179 | 178 | 176 | 172 | 167 | 161 |
| 52.00 CFS | 156 | 155 | 155 | 155 | 156 | 159 | 160 | 159 |
| 53.60 CFS | 157 | 155 | 155 | 153 | 149 | 143 | 137 | 134 |
| 55.20 CFS | 134 | 134 | 134 | 134 | 134 | 133 | 130 | 124 |
| 56.80 CFS | 118 | 113 | 109 | 108 | 108 | 110 | 112 | 111 |
| 58.40 CFS | 107 | 101 | 95 | 91 | 89 | 89 | 89 | 90 |
| 60.00 CFS | 89.06 | 88.07 | 85.84 | 80.03 | 71.88 | 66.46 | 66.43 | 68.48 |
| 61.60 CFS | 68.33 | 66.16 | 65.30 | 65.78 | 66.19 | 65.53 | 65.34 | 66.92 |
| 63.20 CFS | 68.11 | 64.03 | 56.32 | 48.50 | 43.31 | 42.97 | 44.89 | 46.96 |
| 64.80 CFS | 47.39 | 45.74 | 43.20 | 42.27 | 42.48 | 43.85 | 46.20 | 47.42 |
| 66.40 CFS | 46.73 | 44.40 | 42.46 | 42.33 | 43.03 | 44.98 | 47.00 | 47.28 |
| 68.00 CFS | 45.63 | 43.22 | 42.31 | 42.54 | 43.90 | 46.13 | 47.33 | 46.71 |
| 69.60 CFS | 44.40 | 42.49 | 42.21 | 41.55 | 39.07 | 35.00 | 29.68 | 24.77 |
| 71.20 CFS | 22.38 | 21.11 | 21.09 | 21.33 | 20.80 | 20.64 | 17.41 | 11.87 |
| 72.80 CFS | 5.89 | 1.17 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
13.52 WATERSHED INCHES; 30362 CFS-HRS; 2509.1 ACRE-FEET.

OPERATION ADDHYD XSECTION 75

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.06 | 19796.8 | (NULL) |
| 42.53 | 530.7 | (NULL) |
| 43.89 | 531.3 | (NULL) |
| 45.39 | 478.8 | (NULL) |
| 46.63 | 478.9 | (NULL) |
| 48.48 | 423.6 | (NULL) |
| 49.23 | 423.9 | (NULL) |
| 49.99 | 424.1 | (NULL) |
| 50.76 | 424.0 | (NULL) |
| 53.13 | 379.5 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 8.26 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.80 CFS | .24 | .95 | 2.29 | 4.33 | 6.66 | 9.17 | 12.25 | 16.57 |
| 10.40 CFS | 22.21 | 28.61 | 35.07 | 41.59 | 48.28 | 54.54 | 59.93 | 64.86 |
| 12.00 CFS | 70 | 77 | 83 | 87 | 91 | 97 | 103 | 108 |
| 13.60 CFS | 112 | 115 | 120 | 127 | 135 | 143 | 152 | 160 |
| 15.20 CFS | 166 | 172 | 176 | 180 | 182 | 186 | 192 | 199 |
| 16.80 CFS | 204 | 207 | 211 | 224 | 244 | 262 | 273 | 283 |
| 18.40 CFS | 302 | 325 | 342 | 350 | 359 | 378 | 404 | 427 |
| 20.00 CFS | 439 | 449 | 471 | 499 | 522 | 536 | 553 | 591 |
| 21.60 CFS | 642 | 685 | 706 | 719 | 743 | 777 | 808 | 826 |
| 23.20 CFS | 844 | 876 | 911 | 937 | 955 | 1087 | 1496 | 2090 |
| 24.80 CFS | 2564 | 2774 | 2975 | 3492 | 4188 | 4728 | 5034 | 6158 |
| 26.40 CFS | 9533 | 14303 | 18083 | 19702 | 19317 | 16300 | 11881 | 8578 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 28.00 CFS | 7432 | 6988 | 6231 | 5187 | 4415 | 4134 | 4038 | 3877 |
| 29.60 CFS | 3652 | 3487 | 3429 | 3350 | 3084 | 2718 | 2448 | 2350 |
| 31.20 CFS | 2323 | 2291 | 2243 | 2205 | 2190 | 2172 | 2119 | 2049 |
| 32.80 CFS | 2004 | 1994 | 1981 | 1936 | 1876 | 1839 | 1830 | 1819 |
| 34.40 CFS | 1782 | 1728 | 1687 | 1675 | 1664 | 1613 | 1538 | 1486 |
| 36.00 CFS | 1471 | 1416 | 1238 | 989 | 804 | 744 | 734 | 723 |
| 37.60 CFS | 703 | 686 | 680 | 677 | 668 | 651 | 636 | 631 |
| 39.20 CFS | 625 | 611 | 594 | 584 | 577 | 567 | 555 | 542 |
| 40.80 CFS | 534 | 531 | 531 | 529 | 524 | 518 | 519 | 525 |
| 42.40 CFS | 530 | 530 | 526 | 519 | 518 | 524 | 529 | 531 |
| 44.00 CFS | 531 | 526 | 510 | 489 | 473 | 470 | 476 | 479 |
| 45.60 CFS | 475 | 468 | 466 | 467 | 474 | 479 | 476 | 470 |
| 47.20 CFS | 464 | 455 | 443 | 430 | 421 | 419 | 423 | 423 |
| 48.80 CFS | 419 | 420 | 424 | 422 | 419 | 421 | 424 | 421 |
| 50.40 CFS | 419 | 422 | 424 | 420 | 415 | 404 | 387 | 373 |
| 52.00 CFS | 367 | 366 | 366 | 367 | 371 | 378 | 379 | 374 |
| 53.60 CFS | 368 | 366 | 366 | 361 | 347 | 330 | 320 | 317 |
| 55.20 CFS | 316 | 316 | 316 | 316 | 316 | 314 | 304 | 287 |
| 56.80 CFS | 273 | 264 | 256 | 253 | 257 | 263 | 266 | 261 |
| 58.40 CFS | 247 | 230 | 220 | 213 | 208 | 210 | 213 | 211 |
| 60.00 CFS | 208 | 209 | 201 | 181 | 160 | 155 | 161 | 164 |
| 61.60 CFS | 159 | 153 | 154 | 158 | 156 | 153 | 156 | 162 |
| 63.20 CFS | 161 | 145 | 124 | 107 | 101 | 102 | 109 | 114 |
| 64.80 CFS | 111 | 105 | 101 | 100 | 101 | 105 | 112 | 113 |
| 66.40 CFS | 108 | 102 | 100 | 100 | 102 | 109 | 114 | 111 |
| 68.00 CFS | 104 | 101 | 100 | 101 | 105 | 112 | 113 | 108 |
| 69.60 CFS | 102 | 100 | 100 | 97 | 89 | 78 | 65 | 55 |
| 71.20 CFS | 51.09 | 50.07 | 50.14 | 50.05 | 49.90 | 47.84 | 38.06 | 21.05 |
| 72.80 CFS | 6.70 | 1.17 | .00 | | | | | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
13.27 WATERSHED INCHES; 70760 CFS-HRS; 5847.6 ACRE-FEET.

OPERATION ADDHYD XSECTION 76

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 27.12 | 32763.8 | (NULL) |
| 42.29 | 1343.9 | (NULL) |
| 43.78 | 1326.6 | (NULL) |
| 45.23 | 1232.4 | (NULL) |
| 46.56 | 1204.1 | (NULL) |
| 48.34 | 1095.7 | (NULL) |
| 49.15 | 1077.2 | (NULL) |
| 49.95 | 1066.8 | (NULL) |
| 50.71 | 1061.7 | (NULL) |
| 53.03 | 958.3 | (NULL) |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7.40 CFS | .46 | 1.40 | 3.10 | 5.61 | 8.86 | 12.86 | 17.52 | 22.81 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9.00 CFS | 29 | 37 | 45 | 54 | 64 | 75 | 87 | 101 |
| 10.60 CFS | 116 | 132 | 148 | 166 | 183 | 199 | 214 | 230 |
| 12.20 CFS | 247 | 263 | 276 | 289 | 304 | 319 | 333 | 344 |
| 13.80 CFS | 355 | 368 | 384 | 401 | 418 | 437 | 455 | 471 |
| 15.40 CFS | 486 | 501 | 513 | 524 | 537 | 553 | 567 | 580 |
| 17.00 CFS | 589 | 601 | 627 | 663 | 694 | 716 | 742 | 784 |
| 18.60 CFS | 831 | 867 | 892 | 924 | 970 | 1027 | 1075 | 1108 |
| 20.20 CFS | 1141 | 1196 | 1258 | 1308 | 1347 | 1395 | 1476 | 1577 |
| 21.80 CFS | 1660 | 1713 | 1761 | 1831 | 1915 | 1987 | 2041 | 2098 |
| 23.40 CFS | 2177 | 2260 | 2322 | 2372 | 2615 | 3334 | 4308 | 5047 |
| 25.00 CFS | 5448 | 5972 | 7055 | 8397 | 9441 | 10163 | 12368 | 18311 |
| 26.60 CFS | 24627 | 29682 | 32309 | 32521 | 30010 | 25831 | 22722 | 21367 |
| 28.20 CFS | 20505 | 19377 | 18053 | 16970 | 16128 | 15406 | 14323 | 13222 |
| 29.80 CFS | 12323 | 11657 | 10995 | 10088 | 9105 | 8368 | 7925 | 7573 |
| 31.40 CFS | 7226 | 6888 | 6608 | 6398 | 6202 | 5971 | 5742 | 5578 |
| 33.00 CFS | 5477 | 5372 | 5223 | 5067 | 4960 | 4901 | 4832 | 4721 |
| 34.60 CFS | 4594 | 4499 | 4451 | 4395 | 4271 | 4118 | 4014 | 3963 |
| 36.20 CFS | 3833 | 3492 | 3059 | 2751 | 2613 | 2515 | 2399 | 2274 |
| 37.80 CFS | 2167 | 2084 | 2013 | 1939 | 1862 | 1800 | 1757 | 1716 |
| 39.40 CFS | 1665 | 1616 | 1581 | 1552 | 1519 | 1484 | 1450 | 1425 |
| 41.00 CFS | 1408 | 1395 | 1382 | 1362 | 1344 | 1340 | 1344 | 1343 |
| 42.60 CFS | 1339 | 1328 | 1314 | 1312 | 1320 | 1326 | 1327 | 1326 |
| 44.20 CFS | 1318 | 1291 | 1256 | 1232 | 1227 | 1232 | 1230 | 1216 |
| 45.80 CFS | 1201 | 1194 | 1193 | 1201 | 1204 | 1195 | 1183 | 1174 |
| 47.40 CFS | 1158 | 1138 | 1116 | 1098 | 1093 | 1095 | 1087 | 1075 |
| 49.00 CFS | 1074 | 1077 | 1068 | 1060 | 1064 | 1066 | 1057 | 1054 |
| 50.60 CFS | 1060 | 1061 | 1052 | 1044 | 1027 | 998 | 976 | 966 |
| 52.20 CFS | 960 | 954 | 950 | 952 | 958 | 955 | 942 | 933 |
| 53.80 CFS | 930 | 927 | 918 | 891 | 864 | 848 | 839 | 833 |
| 55.40 CFS | 827 | 821 | 817 | 812 | 804 | 785 | 754 | 729 |
| 57.00 CFS | 713 | 694 | 684 | 686 | 688 | 684 | 672 | 644 |
| 58.60 CFS | 616 | 598 | 584 | 569 | 568 | 567 | 556 | 546 |
| 60.20 CFS | 545 | 527 | 488 | 455 | 447 | 450 | 446 | 431 |
| 61.80 CFS | 416 | 415 | 417 | 407 | 399 | 402 | 410 | 404 |
| 63.40 CFS | 377 | 341 | 316 | 306 | 303 | 308 | 308 | 297 |
| 65.00 CFS | 283 | 275 | 271 | 269 | 274 | 282 | 281 | 270 |
| 66.60 CFS | 262 | 259 | 259 | 261 | 272 | 278 | 271 | 261 |
| 68.20 CFS | 258 | 257 | 258 | 265 | 275 | 275 | 265 | 258 |
| 69.80 CFS | 257 | 256 | 252 | 237 | 218 | 196 | 179 | 171 |
| 71.40 CFS | 165 | 159 | 154 | 149 | 141 | 121 | 90 | 65 |
| 73.00 CFS | 54.41 | 47.22 | 40.69 | 34.30 | 28.48 | 23.39 | 19.04 | 15.39 |
| 74.60 CFS | 12.36 | 9.88 | 7.86 | 6.22 | 4.91 | 3.87 | 3.03 | 2.37 |
| 76.20 CFS | 1.85 | 1.44 | 1.12 | .87 | .67 | .52 | .40 | |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
13.20 WATERSHED INCHES; 175222 CFS-HRS; 14480.4 ACRE-FEET.

--- XSECTION 76, ALTERNATE 1, STORM 7, HYDROGRAPH ADDED TO READHD FILE ---

*** MESSAGE - STRUCTURE 1, USER ENTERED STARTING ELEVATION ( 1200.0 FEET) CAN ADD .546 INCHES OF RUNOFF TO THE OUTFLOW HYDROGRAPH VOLUME.***

*** MESSAGE - RESERVOIR ROUTING, STRUCTURE 1, TRUNCATED AT 400 POINTS WITH 2815.45 AC-FT ( .21 WATERSHED INCHES) FLOOD STORAGE REMAINING IN RESERVOIR AT ELEV. 1210.73. ***

OPERATION RESVOR STRUCTURE 1

| PEAK TIME(HRS) | PEAK DISCHARGE(CFS) | PEAK ELEVATION(FEET) |
|---|---|---|
| 6.40 | 45.6 | 1200.00 |
| 27.79 | 23508.9 | 1215.88 |

HYDROGRAPH POINTS FOR ALTERNATE = 1, STORM = 7
MAIN TIME INCREMENT = .200 hr, DRAINAGE AREA = 20.57 SQ.MI.

| HRS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6.40 CFS | 45.58 | 45.24 | 44.89 | 44.55 | 44.22 | 43.88 | 43.56 | 43.25 |
| 8.00 CFS | 42.95 | 42.68 | 42.44 | 42.24 | 42.07 | 41.95 | 41.88 | 41.87 |
| 9.60 CFS | 41.92 | 42.05 | 42.26 | 42.55 | 42.94 | 43.44 | 44.05 | 44.77 |
| 11.20 CFS | 45.62 | 46.60 | 47.69 | 48.89 | 50.20 | 51.63 | 53.17 | 54.81 |
| 12.80 CFS | 56.54 | 58.35 | 60.27 | 62.28 | 64.37 | 66.53 | 68.77 | 71.09 |
| 14.40 CFS | 73.52 | 76.06 | 78.72 | 81.50 | 84.38 | 87.37 | 90.44 | 93.59 |
| 16.00 CFS | 97 | 100 | 103 | 107 | 110 | 114 | 118 | 121 |
| 17.60 CFS | 125 | 130 | 134 | 138 | 143 | 148 | 153 | 159 |
| 19.20 CFS | 160 | 161 | 162 | 164 | 165 | 166 | 168 | 169 |
| 20.80 CFS | 171 | 173 | 174 | 176 | 178 | 180 | 182 | 185 |
| 22.40 CFS | 187 | 189 | 191 | 193 | 195 | 197 | 200 | 202 |
| 24.00 CFS | 204 | 207 | 210 | 214 | 218 | 223 | 228 | 233 |
| 25.60 CFS | 240 | 247 | 254 | 262 | 284 | 321 | 3047 | 9825 |
| 27.20 CFS | 16276 | 20978 | 23155 | 23507 | 23048 | 22386 | 21619 | 20708 |
| 28.80 CFS | 19705 | 18715 | 17791 | 16873 | 15900 | 15005 | 14150 | 13349 |
| 30.40 CFS | 12553 | 11714 | 10870 | 10098 | 9432 | 8855 | 8370 | 7990 |
| 32.00 CFS | 7642 | 7328 | 7037 | 6761 | 6503 | 6274 | 6075 | 5893 |
| 33.60 CFS | 5718 | 5553 | 5407 | 5280 | 5162 | 5044 | 4928 | 4822 |
| 35.20 CFS | 4728 | 4636 | 4532 | 4423 | 4321 | 4222 | 4091 | 3900 |
| 36.80 CFS | 3667 | 3436 | 3232 | 3051 | 2908 | 2822 | 2736 | 2650 |
| 38.40 CFS | 2566 | 2483 | 2402 | 2324 | 2251 | 2181 | 2114 | 2050 |
| 40.00 CFS | 1989 | 1933 | 1879 | 1828 | 1779 | 1734 | 1693 | 1655 |
| 41.60 CFS | 1619 | 1586 | 1556 | 1529 | 1506 | 1485 | 1466 | 1448 |
| 43.20 CFS | 1432 | 1417 | 1405 | 1396 | 1387 | 1379 | 1369 | 1358 |
| 44.80 CFS | 1343 | 1329 | 1317 | 1306 | 1296 | 1285 | 1274 | 1264 |
| 46.40 CFS | 1256 | 1249 | 1243 | 1236 | 1229 | 1221 | 1212 | 1201 |
| 48.00 CFS | 1190 | 1178 | 1168 | 1158 | 1148 | 1139 | 1131 | 1124 |
| 49.60 CFS | 1116 | 1110 | 1104 | 1099 | 1093 | 1089 | 1085 | 1082 |
| 51.20 CFS | 1078 | 1072 | 1065 | 1055 | 1045 | 1035 | 1025 | 1016 |
| 52.80 CFS | 1008 | 1001 | 996 | 990 | 983 | 977 | 971 | 965 |
| 54.40 CFS | 957 | 947 | 936 | 924 | 913 | 903 | 893 | 884 |
| 56.00 CFS | 875 | 867 | 858 | 847 | 834 | 820 | 805 | 791 |
| 57.60 CFS | 778 | 766 | 756 | 747 | 735 | 722 | 708 | 693 |
| 59.20 CFS | 679 | 665 | 653 | 642 | 630 | 620 | 609 | 597 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 60.80 CFS | 581 | 565 | 550 | 537 | 525 | 513 | 500 | 490 |
| 62.40 CFS | 480 | 471 | 462 | 455 | 449 | 442 | 431 | 418 |
| 64.00 CFS | 405 | 392 | 382 | 372 | 364 | 355 | 345 | 336 |
| 65.60 CFS | 330 | 330 | 330 | 330 | 330 | 329 | 329 | 329 |
| 67.20 CFS | 329 | 329 | 329 | 329 | 329 | 329 | 328 | 328 |
| 68.80 CFS | 328 | 328 | 328 | 328 | 328 | 328 | 328 | 327 |
| 70.40 CFS | 327 | 327 | 327 | 327 | 326 | 326 | 326 | 326 |
| 72.00 CFS | 325 | 325 | 325 | 324 | 324 | 323 | 323 | 322 |
| 73.60 CFS | 322 | 321 | 321 | 320 | 320 | 319 | 319 | 318 |
| 75.20 CFS | 318 | 317 | 317 | 316 | 316 | 315 | 314 | 314 |
| 76.80 CFS | 313 | 313 | 312 | 312 | 311 | 311 | 310 | 310 |
| 78.40 CFS | 309 | 309 | 308 | 307 | 307 | 306 | 306 | 305 |
| 80.00 CFS | 305 | 304 | 304 | 303 | 303 | 302 | 302 | 301 |
| 81.60 CFS | 301 | 300 | 300 | 299 | 299 | 298 | 298 | 297 |
| 83.20 CFS | 297 | 296 | 295 | 295 | 294 | 294 | 293 | 293 |
| 84.80 CFS | 292 | 292 | 291 | 291 | 290 | 290 | 289 | 289 |

RUNOFF ABOVE BASEFLOW (BASEFLOW = .00 CFS)
11.18 WATERSHED INCHES; 148432 CFS-HRS; 12266.4 ACRE-FEET.

--- STRUCTURE 1, ALTERNATE 1, STORM 7, HYDROGRAPH ADDED TO READHD FILE ---

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 1

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

RAINFALL OF 15.80 inches AND 72.00 hr DURATION, BEGINS AT .0 hrs.
RAINTABLE NUMBER 7, ARC 2
MAIN TIME INCREMENT .200 HOURS

ALTERNATE 1 STORM 7

| XSECTION/ STRUCTURE ID | | STANDARD CONTROL OPERATION | DRAINAGE AREA (SQ MI) | RUNOFF AMOUNT (IN) | PEAK DISCHARGE ELEVATION (FT) | PEAK DISCHARGE TIME (HR) | PEAK DISCHARGE RATE (CFS) | PEAK DISCHARGE RATE (CSM) |
|---|---|---|---|---|---|---|---|---|
| XSECTION | 1 | RUNOFF | 2.46 | 14.29 | --- | 27.01 | 6291 | 2557.3 |
| XSECTION | 5 | REACH | 2.46 | 14.29 | 6.72 | 27.54 | 4816 | 1957.7 |
| XSECTION | 10 | REACH | 2.46 | 14.29 | 7.95 | 28.12 | 3932 | 1598.4 |
| XSECTION | 2 | RUNOFF | 2.38 | 13.26 | --- | 26.97 | 5805 | 2439.1 |
| XSECTION | 12 | ADDHYD | 4.84 | 13.78 | --- | 27.15 | 7759 | 1603.1 |
| XSECTION | 12 | DIVERT | 4.84 | 12.16 | --- | 26.40F | 4100F | 847.1 |
| XSECTION | 200 | DIVERT | .00 | 12.16 | --- | 27.15 | 3659 | ******** |
| XSECTION | 20 | REACH | 4.84 | 12.16 | 7.94 | 26.40F | 4100F | 847.1 |
| XSECTION | 25 | REACH | 4.84 | 12.16 | 5.03 | 26.40F | 4100F | 847.1 |
| XSECTION | 3 | RUNOFF | 3.94 | 14.29 | --- | 27.03 | 10041 | 2548.5 |
| XSECTION | 30 | REACH | 3.94 | 14.30 | 5.34 | 27.78 | 7435 | 1887.1 |
| XSECTION | 5 | REACH | 3.94 | 14.30 | 7.27 | 28.39 | 6138 | 1557.9 |
| XSECTION | 25 | REACH | 3.94 | 14.30 | 6.30 | 28.39 | 6138 | 1557.9 |
| XSECTION | 4 | RUNOFF | 2.06 | 12.87 | --- | 27.01 | 4862 | 2360.2 |
| XSECTION | 34 | ADDHYD | 6.00 | 13.81 | --- | 28.25 | 7763 | 1293.8 |
| XSECTION | 35 | ADDHYD | 10.84 | 13.07 | --- | 28.25 | 11863 | 1094.4 |
| XSECTION | 35 | DIVERT | 10.84 | 12.99 | --- | 27.00F | 11000F | 1014.8 |
| XSECTION | 199 | DIVERT | .00 | 12.99 | --- | 28.25 | 863 | ******** |
| XSECTION | 45 | REACH | 10.84 | 12.99 | 8.46 | 27.00F | 11000F | 1014.8 |
| XSECTION | 6 | RUNOFF | 1.47 | 14.39 | --- | 26.91 | 3876 | 2636.7 |
| XSECTION | 60 | REACH | 1.47 | 14.36 | 6.57 | 27.40 | 3596 | 2446.3 |
| XSECTION | 67 | REACH | 1.47 | 14.37 | 6.05 | 27.76 | 3221 | 2191.2 |
| XSECTION | 64 | ADDHYD | 12.31 | 13.15 | --- | 27.80 | 14144 | 1149.0 |
| XSECTION | 5 | RUNOFF | 4.78 | 13.10 | --- | 27.00 | 11470 | 2399.6 |
| XSECTION | 7 | RUNOFF | 3.48 | 13.52 | --- | 27.12 | 8393 | 2411.8 |
| XSECTION | 75 | ADDHYD | 8.26 | 13.27 | --- | 27.06 | 19797 | 2396.7 |
| XSECTION | 76 | ADDHYD | 20.57 | 13.20 | --- | 27.12 | 32764 | 1592.8 |
| STRUCTURE | 1 | RESVOR | 20.57 | 11.18 | 1215.88 | 27.79 | 23509 | 1142.9 |

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
LENGTH FACTOR - VALUE k* GREATER THAN 1.0;
ATT-KIN COEFF - VALUE C GREATER THAN 0.667.

| | | | HYDROGRAPH INFORMATION | | | | ROUTING PARAMETERS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | INFLOW | | OUTFLOW | | Q-A EQ. | | | | |
| XSEC ID | REACH LENGTH (FT) | FLOOD PLAIN LENGTH (FT) | PEAK (CFS) | TIME (HR) | PEAK (CFS) | TIME (HR) | COEFF (X) | POWER (M) | LENGTH FACTOR (k*) | PEAK RATIO Q/I (Q*) | ATT-KIN COEFF (C) |
| BASEFLOW IS .0 CFS | | | | | | | | | | | |
| ALTERNATE 1 STORM 7 | | | | | | | | | | | |
| 5 | 9100 | | 6290 | 27.0 | 4800 | 27.6 | 1.95 | 1.08 | .175 | .763 | .26 |
| 10 | 9100 | | 4800 | 27.6 | 3922 | 28.2 | 2.17 | 1.07 | .126 | .817 | .27 |
| 20 | 3332 | | 4100 | 26.4 | 4100 | 26.4 | .14 | 1.63 | .001 | 1.000 | 1.00? |
| 25 | 1950 | | 4100 | 26.4 | 4100 | 26.4 | .052 | 1.73 | .000 | 1.000 | 1.00? |
| 30 | 8865 | | 10029 | 27.0 | 7433 | 27.8 | 1.57 | 1.08 | .193 | .741 | .24 |
| 5 | 8865 | | 7433 | 27.8 | 6138 | 28.4 | 1.91 | 1.08 | .119 | .826 | .27 |
| 25 | 1950 | | 6138 | 28.4 | 6138 | 28.4 | .056 | 1.72 | .001 | 1.000 | 1.00? |
| 45 | 4200 | | 11000 | 27.0 | 11000 | 27.0 | .049 | 1.72 | .001 | 1.000 | 1.00? |
| 60 | 7540 | | 3805 | 27.0 | 3596 | 27.4 | .48 | 1.36 | .054 | .945 | .49 |
| 67 | 5140 | | 3596 | 27.4 | 3214 | 27.8 | 1.59 | 1.11 | .085 | .894 | .42 |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 7 |
|---|---|---|---|
| STRUCTURE | 1 | 20.57 | |
| ALTERNATE | 1 | | 23509 |
| XSECTION | 1 | 2.46 | |
| ALTERNATE | 1 | | 6291 |
| XSECTION | 2 | 2.38 | |
| ALTERNATE | 1 | | 5805 |
| XSECTION | 3 | 3.94 | |
| ALTERNATE | 1 | | 10041 |
| XSECTION | 4 | 2.06 | |
| ALTERNATE | 1 | | 4862 |
| XSECTION | 5 | 4.78 | |
| ALTERNATE | 1 | | 11470 |
| XSECTION | 6 | 1.47 | |
| ALTERNATE | 1 | | 3876 |
| XSECTION | 7 | 3.48 | |
| ALTERNATE | 1 | | 8393 |
| XSECTION | 10 | 2.46 | |
| ALTERNATE | 1 | | 3932 |
| XSECTION | 12 | 4.84 | |
| ALTERNATE | 1 | | 4100 |
| XSECTION | 20 | 4.84 | |
| ALTERNATE | 1 | | 4100 |
| XSECTION | 25 | 3.94 | |
| ALTERNATE | 1 | | 6138 |
| XSECTION | 30 | 3.94 | |
| ALTERNATE | 1 | | 7435 |
| XSECTION | 34 | 6.00 | |

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES
QUESTION MARK (?) AFTER: OUTFLOW PEAK - RISING TRUNCATED HYDROGRAPH.

| XSECTION/ STRUCTURE ID | | DRAINAGE AREA (SQ MI) | STORM NUMBERS..... 7 |
|---|---|---|---|
| XSECTION 34 | | 6.00 | |
| ALTERNATE | 1 | | 7763 |
| XSECTION 35 | | 10.84 | |
| ALTERNATE | 1 | | 11000 |
| XSECTION 45 | | 10.84 | |
| ALTERNATE | 1 | | 11000 |
| XSECTION 60 | | 1.47 | |
| ALTERNATE | 1 | | 3596 |
| XSECTION 64 | | 12.31 | |
| ALTERNATE | 1 | | 14144 |
| XSECTION 67 | | 1.47 | |
| ALTERNATE | 1 | | 3221 |
| XSECTION 75 | | 8.26 | |
| ALTERNATE | 1 | | 19797 |
| XSECTION 76 | | 20.57 | |
| ALTERNATE | 1 | | 32764 |
| XSECTION 199 | | .00 | |
| ALTERNATE | 1 | | 863 |
| XSECTION 200 | | .00 | |
| ALTERNATE | 1 | | 3659 |

ECON2 DATA FILE

```
ECON2
TITLE        WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS
TITLE        72-HR PMP (MTI=.2), RESERVOIR INIT EMPTY W/100-YR SED
FLOW-FREQ    -1         23509.                                      ALT  1   1
FLOW-FREQ     1          6291.                                      ALT  1   2
FLOW-FREQ     2          5805.                                      ALT  1   3
FLOW-FREQ     3         10041.                                      ALT  1   4
FLOW-FREQ     4          4862.                                      ALT  1   5
FLOW-FREQ     5         11470.                                      ALT  1   6
FLOW-FREQ     6          3876.                                      ALT  1   7
FLOW-FREQ     7          8393.                                      ALT  1   8
FLOW-FREQ    10          3932.                                      ALT  1   9
FLOW-FREQ    12          4100.                                      ALT  1  10
FLOW-FREQ    20          4100.                                      ALT  1  11
FLOW-FREQ    25          6138.                                      ALT  1  12
FLOW-FREQ    30          7435.                                      ALT  1  13
FLOW-FREQ    34          7763.                                      ALT  1  14
FLOW-FREQ    35         11000.                                      ALT  1  15
FLOW-FREQ    45         11000.                                      ALT  1  16
FLOW-FREQ    60          3596.                                      ALT  1  17
FLOW-FREQ    64         14144.                                      ALT  1  18
FLOW-FREQ    67          3221.                                      ALT  1  19
FLOW-FREQ    75         19797.                                      ALT  1  20
FLOW-FREQ    76         32764.                                      ALT  1  21
FLOW-FREQ   199           863.                                      ALT  1  22
FLOW-FREQ   200          3659.                                      ALT  1  23
```

```
TR20 ------------------------------------------------------------------------ SCS -
WT3PMP72     WHITE TANK FRS #3, WATERSHED DIVIDED INTO 7 SUB-BASINS      VERSION
08/10/**     72-HR PMP (MTI=.2), RESERVOIR INIT EMPTY W/100-YR SED      2.04TEST


END OF  1 JOBS IN THIS RUN
```

SCS TR-20, VERSION 2.04TEST
WT3PMP72 FILES

INPUT = 72H.DAT , GIVEN DATA FILE
OUTPUT = 72OUT.OUT , DATED 08/10/**,16:06:13

FILES GENERATED - DATED 08/10/**,16:06:13

FILE LLL.TEC CONTAINS ECON2 INFORMATION

FILE LLL.TRD CONTAINS READHD INFORMATION

TOTAL NUMBER OF WARNINGS = 4, MESSAGES = 2

JOB ENDED AT 16:06:13
*** TR-20 RUN COMPLETED ***