COMMENT QUESTIONNAIRE
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY
AMOLE ARROYO - WESTGATE DAM DRAINAGE MANAGEMENT PLAN - OCTOBER, 1993

We appreciate your review of the enclosed report and invite you to make comments and to ask questions. We have identified a few specific elements that we feel are of primary importance to the successful implementation of a drainage management plan for the drainage area contributing to the Westgate Dam. We invite your comments on the form below or in a separate letter if you so desire.

1. Section 5.2 of the study describes the assumptions that were made to develop land treatment (land use) percentages for future developed conditions. Given that the watershed is mostly undeveloped at present, do you feel that the assumed land treatment percentages associated with the "planned communities" concept are reasonable?

2. Section 6.9 discusses channel lining options in detail. Both branches of the Amole Arroyo appear to be relatively stable with respect to erosion at present. Increased development pressure is expected to accelerate the rate of degradation both vertically (bed erosion) and laterally (bank erosion). Given the 2 to 3% slopes inherent to the existing arroyos, would you prefer erosion stabilization through drop structures or hard lining of the channels, or through a non-structural approach such as a development limiting boundary (prudent limit) ? Do you envision arroyo treatment to be incorporated into other development such as a park or golf course?

3. Improvement and mitigation alternatives are described in Section 6. Which alternative(s) do you prefer and why? (use back of sheet, if necessary)

4. Three "preferred alternatives" are discussed in Section 7 and the overall preferred alternative (H) is discussed in Section H. The most significant differences associated with the three alternatives are the impact on Westgate Dam and a transfer of flows "out of basin". Is the overall preferred alternative (H) clear and do you agree with this recommendation?

5. Sections 8.3 through 8.5 contain an estimate of project costs, a recommended plan and actions. Sources of funding are included in the recommended actions. Do you have any comments concerning these recommendations?

Please feel free to provide any additional written comments.

Submitted by:

Name	Representing	Date

SCANLON & ASSOCIATES INC CONSULTING ENGINEERS

PLEASE REPLY TO:

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December 20, 1993

City of Albuquerque
Hydrology Division
P.O. Box 1293
Albuquerque, New Mexico 87103

Re: Draft Amole Arroyo - Westgate Dam Drainage Management Plan
October, 1993

Gentlemen:

I am transmitting to your division one copy of the Draft Amole Arroyo - Westgate Dam Drainage Management Plan, dated October, 1993, on behalf of the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) for your review and comment. In addition to the report I am also including a questionnaire which addresses specific parts of the report which are of interest.

AMAFCA and Scanlon and Associates would greatly appreciate your review and comments on the report. We are requesting all comments and questionnaires be returned to AMAFCA or Scanlon and Associates, Inc. no later than Monday, January 31, 1994.

AMAFCA and Scanlon and Associates will be hosting a public information meeting regarding the report in the near future. The date has not been set as of yet, due to the holidays. As soon as the date, times and location have established you will be notified. We would greatly appreciate your attendance.

If you have any questions, please do not hesitate to contact Cliff Anderson with AMAFCA at 884-2215 or Debra Vaughan-Cleff with Scanlon at 265-6941.

Sincerely,

Scanlon and Associates, Inc.

Debra Vaughan-Cleff

Debra Vaughan-Cleff, PE

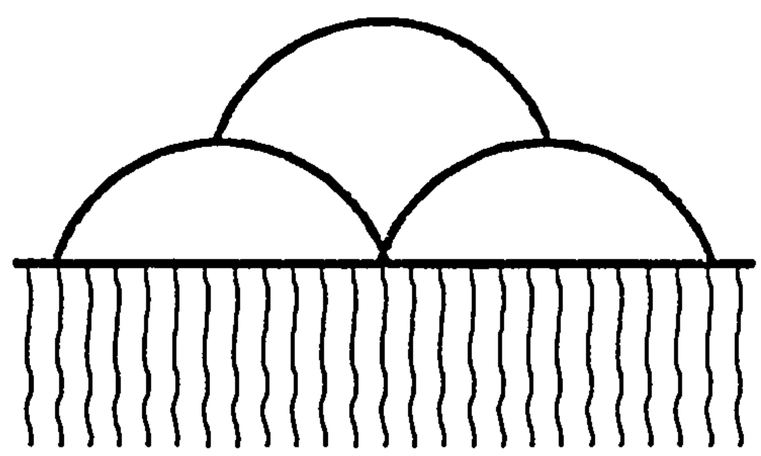
Debbie Cleff
249-6196

attach.

AMOLE ARROYO - WESTGATE DAM DRAINAGE MANAGEMENT PLAN

DRAFT

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority



prepared by:

SCANLON & ASSOCIATES, INC.

in association with:

Thomas R. Mann & Associates, Inc.
Dr. Richard J. Heggen
Marron Tashek Knight, Inc.
SHB AGRA

SCANLON & ASSOCIATES, INC.
a KLH engineering group company

OCTOBER 1993

I, DEBRA VAUGHAN-CLEFF, a New Mexico Professional Engineer in Civil Engineering, certify that the accompanying report was prepared by me or under my direction, and is true and correct to the best of my knowledge and belief.

DEBRA VAUGHAN-CLEFF, P.E.
N.M.P.E. #11992

DEBRA S. VAUGHAN-CLEFF
NEW MEXICO
11992
REGISTERED PROFESSIONAL ENGINEER

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NOTE: This report is accompanied by a separately bound set of supporting material entitled:

AMOLE ARROYO - WESTGATE DAM
DRAINAGE MANAGEMENT PLAN
TECHNICAL APPENDIX
SEPTEMBER 1993

Which Includes:

A. Correspondence
B. Literature Review Report
C. Limited Environmental Analysis
D. Geologic/Geotechnical Overview Report
E. Sediment Analysis Report (Supporting Appendices only)
F. Recommended Facility Sizing Computations
G. Cost Analyses
H. Hydrologic Analyses

This report is also accompanied by a set of 24"x36" map documents entitled:

AMOLE ARROYO - WESTGATE DAM
DRAINAGE MANAGEMENT PLAN
MAP SUPPLEMENT
SEPTEMBER 1993

Both the Technical Appendix and the Map Supplement are available for inspection at AMAFCA offices.

The Westgate Dam and its tributary arroyos provide stormwater collection, detention, and controlled release discharge for approximately 18.7 square miles (12000 acres) on Albuquerque's west side. The dam was originally conceived in 1975 and construction completed in 1976. It's primary purpose when constructed was to provide flood protection to downstream properties, particularly the Westgate Heights development, from runoff generated by the upstream watershed. The prevailing land use conditions at the time were, and for the most part still are, essentially natural and sparsely developed.

In the period since the dam's construction, the trend of westward growth of the City and the potential for increased development activity within the drainage basin has necessitated a review of the adequacy of the existing facilities considering fully developed future conditions.

This study, commissioned by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), is an effort to provide the framework for safe and orderly implementation of storm drainage facilities and controls within the basin, either ahead of or in conjunction with development.

1.1 AUTHORIZATION

On January 24, 1991, the AMAFCA Board of Directors authorized negotiation of an engineering services agreement with Scanlon & Associates, Inc. to prepare the study. The agreement was subsequently executed on January 28, 1991, initiating the preparation of this document.

1.2 STUDY AREA

General features of the watershed are identified on Figure 2 - Vicinity Map (end of this section). The basin covers an area of approximately 18.7 square miles. Figure 1 - Watershed Location, on the following page, provides a general relationship of the Westgate Dam drainage basin to the west side of Albuquerque. Of the overall basin, 4.2 sq. mi. are south and 14.5 sq. mi. are north of Interstate 40.

In addition to the base watershed, two adjacent basins are considered in the analysis:

- Playa lake basins in the northwest portion of the study area, exhibiting no natural outlet, but which could potentially overflow or be diverted to Westgate Dam.

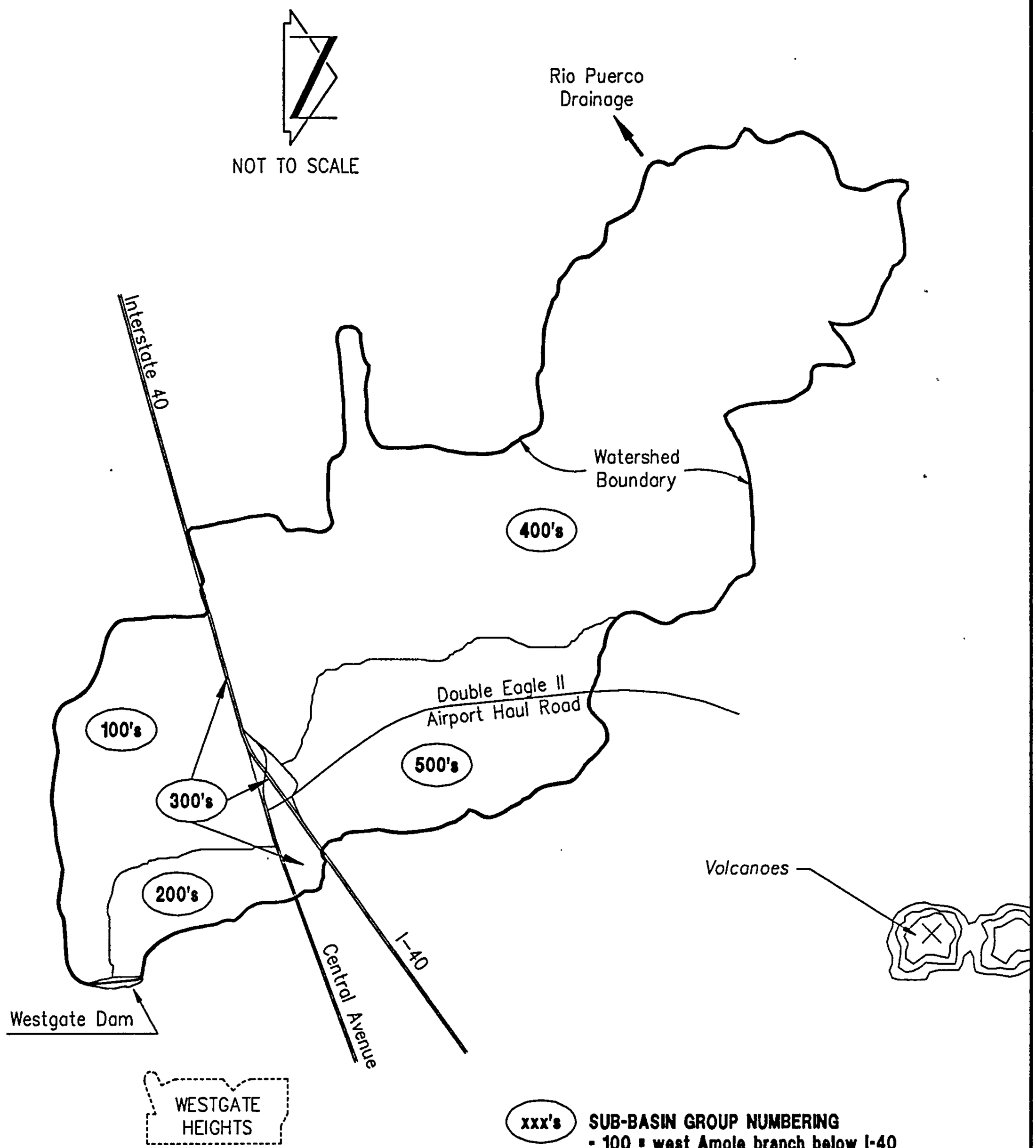


FIGURE 1

WATERSHED LOCATION

- A portion of the watershed in the vicinity of the Double Eagle II Airport which could potentially be diverted to Westgate Dam.

The Amole Arroyo is the only named arroyo within the watershed contributing to Westgate Dam. The Amole has two branches which divide just upstream (west) of the dam and are identified as the geographically east and west branches for the purposes of this study. Both branches lose most of their defining features upstream (north) of I-40 at which point stormwater runoff is initially concentrated by crossing structures.

The watershed generally slopes from northwest to southeast and sits atop the geologic formation known as the Ceja Mesa. The total elevation difference between the high point of the study area boundary and the toe of Westgate Dam is approximately 663 feet. The basin is generally undeveloped with the exception of the Central Avenue/I-40 Interchange area and scattered residential and commercial development along I-40. The extreme northwest edge of the basin borders the top of the escarpment which defines the drainage divide of the Rio Puerco basin to the west. The west side volcano area lies just north and east of the upper reaches of the study area.

Figure 2 also identifies the areas which were mapped at a scale of 1"=500'. Topographic base mapping for this study was composited from aerial photogrammetric coverage of the study area from prior studies (Bohannan-Huston, Inc. 1980, T.R. Mann 1982) where available and from new mapping where necessary. New orthophoto image was acquired for the entire watershed with this study to enhance the identification of physical features.

1.3 SCOPE OF STUDY

Development of the Drainage Management Plan involved the following sequence of tasks:

1.3.1 Updated orthophoto base mapping was obtained for the basin area and adjacent playa lake and Double Eagle II Airport areas.

1.3.2 A literature review was conducted which considered prior hydrologic evaluations and drainage studies, planning documents, development plans for both existing and proposed development projects, and design documents for existing flood control

facilities including the Westgate Dam. A copy of the May 1991 Literature Review report is included in Technical Appendix B for reference.

1.3.3 Field surveys were conducted to verify sizes, invert elevations, and locations of existing drainage facilities. Additionally, flow patterns and playa lake depths were verified.

1.3.4 A hydrologic evaluation was performed for existing conditions within the basin, for the 100-year storm event. A detailed description of the analysis methods utilized is provided in Section 3. Hydrologic data is summarized in Technical Appendix H.

1.3.5 A limited environmental analysis was conducted to identify cultural resources and sensitive areas within the watershed potentially impacted by future development and proposed facilities. The following resources are addressed in the analysis:

- Geology and Paleontology
- Archaeology
- Wildlife - Raptors and Migratory Birds
- Endangered or Sensitive Species
- Vegetation
- Impaired Properties

A copy of the Analysis is provided in Technical Appendix C.

1.3.6 A geotechnical overview investigation was performed to identify geologic conditions and features within the watershed which could potentially affect the size, type, or location of proposed facilities. A copy of the Geologic/Geotechnical Overview Report is provided in Technical Appendix D.

1.3.7 Coordination was provided with the various agencies and entities having on-going planning and design efforts underway within the basin.

1.3.8 A fully developed conditions scenario was compiled for the watershed based on the information obtained from the above research. A detailed description of the

assumptions made with respect to future conditions and the associated hydrologic analysis are presented in Section 5.

1.3.9 Hydrologic evaluations for both existing and fully developed conditions were performed in order to assess the adequacy of existing drainage facilities and to incorporate the following:

- Detailed delineation of sub-basin areas.
- An update of prior hydrologic studies to current AMAFCA standards and criteria.
- Development scenario assumptions.
- Analysis for the 100-year storm event as noted in Section 1.3.4 above.

1.4 STUDY GOALS

The ultimate goal of the information presented herein, is to portray a master plan for adoption by AMAFCA which will serve as the framework for managing storm drainage and implementing flood control facilities within the basin.

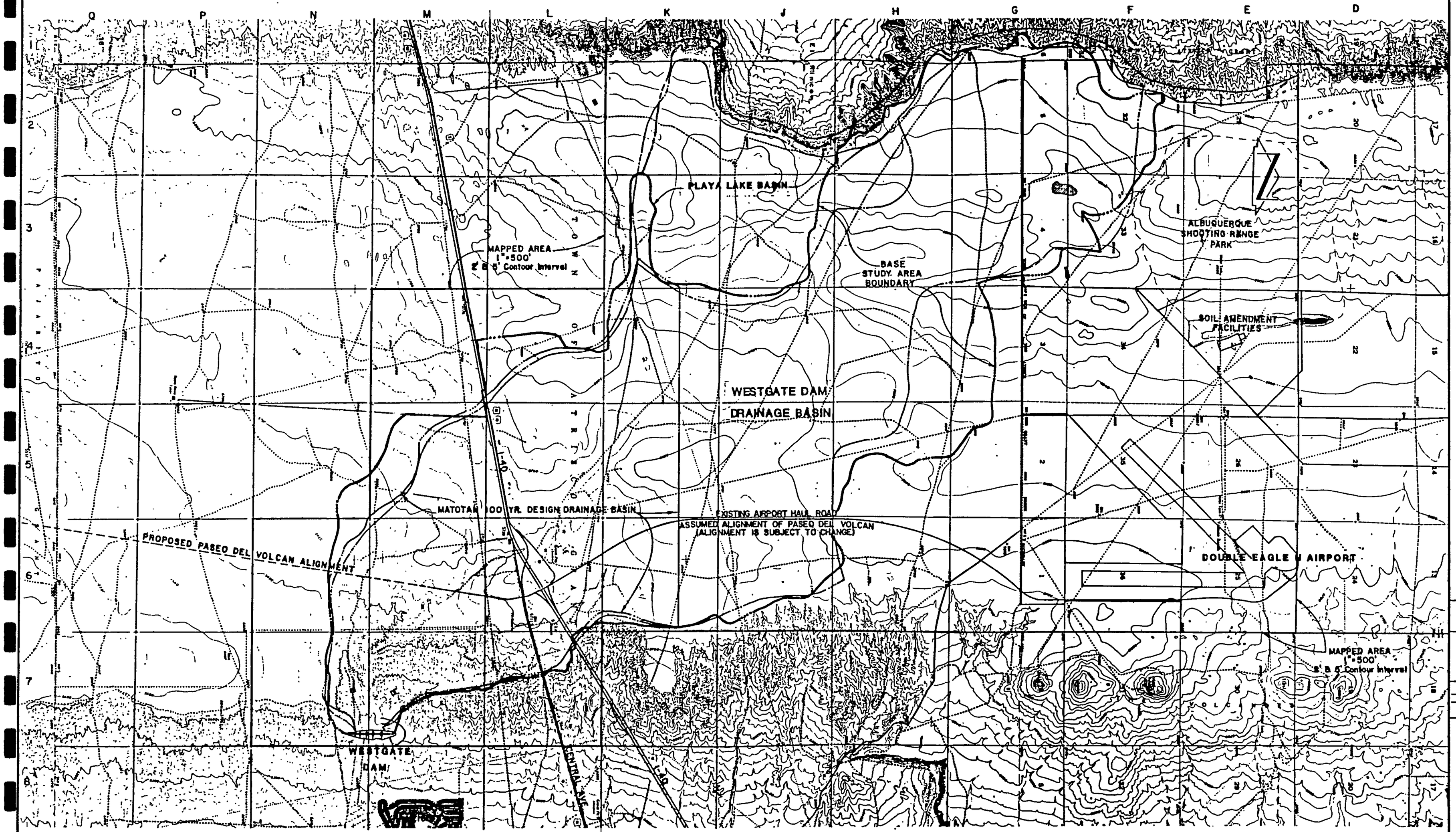
Within that broad context, specific goals of this plan are to:

- Project a future developed conditions scenario, applied to the basin, to be used in estimating storm runoff.

- Assess both the capacity and capability of existing facilities to handle the anticipated runoff.

- Identify and evaluate alternative approaches for attenuating, mitigating, or otherwise controlling flows.

- Identify the availability of funding sources and possible cost sharing arrangements to implement drainage controls or improvements.



SHEET INDEX

NOTE:
Base map is reproduced from Geological Survey Quadrangle Maps.
La Mesita Negra SE Quadrangle
Volcano Ranch Quadrangle

VICINITY MAP

SCALE IN FEET
2000 0 2000
SCALE: 1"=2000' (1:24000)
CONTOUR INTERVAL 20'

BOAN, ONA & ASSOCIATES

AMOLE ARROYO - WESTGATE DAM

DRAINAGE MANAGEMENT PLAN

BERNALILLO COUNTY

NEW MEXICO

FIGURE 2

Sheet 2

Albuquerque Metropolitan Arroyo Flood Control Authority

A number of sources provided valuable input and background data for this investigation including AMAFCA, the City of Albuquerque, Bernalillo County, private utility companies, the New Mexico State Highway & Transportation Department, private developers and landowners, and other consultants.

2.1 STUDY TEAM

The members of the study team working directly on preparation of the plan documents include:

- AMAFCA
- Scanlon & Associates, Inc.
- Thomas R. Mann & Associates - Mapping
- Dr. Richard J. Heggen - Sediment and Erosion Analysis
- MTK, Inc. - Environmental Analyses
- Sergent, Hauskins & Beckwith - Geotechnical Investigations.

2.2 PARTICIPATION

In order to predict future developed conditions within the watershed, it was necessary to coordinate with the various parties having on-going planning and design efforts, and those with other direct interests regarding the basin. A number of those providing input include:

2.2.1 Public Entities

- Bernalillo County
- City of Albuquerque - Utility Coordinator
- City of Albuquerque - Planning
- City of Albuquerque - Transportation
- City of Albuquerque - Open Space
- City of Albuquerque - Hydrology
- NMSH&TD

2.2.2 Land Owners/Developers

- Tierra West Partners
- Westland Development Company, Inc.
- Jonathan Feld

2.2.3 Utility Companies

- US West Communications
- Public Service Company of New Mexico
- Jones Intercable
- Gas Company of New Mexico

Technical Appendix A contains copies of the pertinent correspondence between the various entities listed above and the project study team.

2.3 LITERATURE REVIEW

Some of the most valuable information, used to assess existing conditions within the watershed and to predict future development, came from a review of relevant documents. Those reviewed include planning documents, design analyses, and construction plans; and development plans for completed projects, projects in progress, and planned projects. The following table lists the predominant planning documents which have bearing on the watershed.

LITERATURE REVIEW IN CHRONOLOGICAL ORDER

REPORT OR DOCUMENT	YEAR ADOPTED		
	CITY OF ALBUQUERQUE	COUNTY OF BERNALILLO	AMAFCA
Drainage Management Plan Western Albuquerque Metropolitan Area	*	*	1975
Facility Plan for Arroyos	1986	1986	**
Southwest Area Plan	1987	1988	**
Albuquerque/Bernalillo County Comprehensive Plan	1988	1988	**
Planned Communities Criteria: Policy Statement	1990	1990	
Amole Arroyo Corridor Plan	*	*	
Northwest Area Plan	*	*	
Far Northwest Drainage Management Plan	*	*	

* Not yet adopted or not formally adopted

** Endorsed by AMAFCA

The detailed Literature Review report is provided in Technical Appendix B. A brief summary of the pertinent information extracted from those documents is given below:

2.3.1 ALBUQUERQUE/BERNALILLO COUNTY COMPREHENSIVE PLAN

The Comprehensive Plan[1] was adopted by both the City and County in August, 1988, and was endorsed by AMAFCA in October, 1988. An earlier Comprehensive Plan was adopted in 1975 and subsequently amended. It serves as the Rank One planning document and establishes general policy and guidelines for orderly growth and development throughout the County. As a Rank One plan, the Comprehensive Plan will

provide the criteria for attaining such goals by which all lower ranking plans must abide. Elements of the Plan which relate to the Westgate/Amole Watershed include:

- It established the "reserve area" within which most of the watershed falls.
- It recognizes that environmental factors such as soils, drainage, and vegetation should play a role in controlling development density and location within the Reserve Area.
- It deems the Reserve Area as being "particularly appropriate areas to be considered for siting planned communities".
- The Plan establishes goals for land development drainage options which minimize the need to install extensive underground systems to convey stormwater.
- It promotes Reserve Area development which will respect natural features and preserve resources.
- It established an overall gross density limit of 2 dwelling units per acre (2 du/ac), with allowance for density transfer through planned communities.
- It promotes water management through maximizing rainfall infiltration. Utilization of on-site detention in new developments, minimization of impervious cover, and requirements for regular maintenance of drainage facilities are also suggested.

2.3.2 FACILITY PLAN FOR ARROYOS

Adopted by the City and County in February, 1986, the Facility Plan[2] constitutes a Rank Two planning document which implements Comprehensive Plan policies. Additionally, it specifies development standards and designates arroyo corridors associated with the multiple use of specific arroyos. Although the Facility Plan primarily

Boundary for meander of nat.
Channel [illegible] ? Prudent line ?

addresses the Amole Arroyo downstream (east) of Westgate Dam, a number of policies and recommendations apply to the arroyo system in general:

- Establishes a number of arroyos, including the Amole, as Major Open Space Links, with the Amole ranked fourth out of six arroyo corridors for implementation.

- The preferred method of drainage R.O.W. acquisition promotes owner dedication of arroyo floodplains (100-year) as open space, park, or recreational easement.

- Recognizes that channel treatments may vary and that the range of treatment alternatives should weigh the potential additional costs incurred against the benefits to be derived.

- Establishes a goal to preserve arroyos and their floodplains in a natural or semi-natural condition. Where channel stability improvements are necessary they should incorporate "naturalistic" treatments such as gabions, ungrouted riprap, tinted concrete, or soil cement.

- Recommends platting and property acquisition as necessary to allow for the associated trail system to by-pass physical barriers such as detention facilities and crossing structures.

- Recommends acquisition of a 20 foot wide easement on at least one side of arroyos and outside the 100-year floodplain for a trail system and channel maintenance.

2.3.3 AMOLE ARROYO CORRIDOR PLAN

The Corridor Plan[3] is a Rank Three planning document supporting the Facility Plan for Arroyos. The Plan also focuses primarily on the Amole Arroyo near and downstream of Westgate Dam. It is not presently an adopted plan but has been recommended for approval by the City Land Use Planning and Zoning Committee and the Bernalillo

County Planning Commission. Elements of the corridor plan pertinent to the Westgate/Amole basin include:

- A goal of the plan is to implement a trail corridor which recognizes the primary drainage function of the arroyo.

- Channel treatment, where required, should be as natural in appearance as possible.

- Recommends that the drainage management plan minimize maintenance and future improvements by addressing the transition from "soft treatments into hardline treatments."

- Recommends designating a "limited development" boundary or "prudent line" adjacent to the western portion of the arroyo, to limit the encroachment of structures into the zone of the arroyo susceptible to erosion damage.

- Recommends a "soft arroyo floor" where feasible to allow for a natural appearance and to provide infiltration.

minimal.

2.3.4 NORTHWEST AREA PLAN

Four goals of primary importance were identified by the Area Plan[4] Task Force. Goal 2 directly affects this study, as follows:

"TO DEFINE GEOGRAPHICAL BOUNDARIES FOR MAJOR PUBLIC OPEN SPACE, INCLUDING THE EAST AND WEST FACING ESCARPMENTS, THE RIO PUERCO, THE SAND DUNES AND PLAYA LAKES; AND TO DEVELOP BUFFER AREAS INCORPORATING SETBACKS, DESIGN GUIDELINES AND DENSITY RANGES FOR DEVELOPMENT ADJACENT TO MAJOR PUBLIC OPEN SPACE LAND."

2.3.5 SOUTHWEST AREA PLAN

Adopted in 1987-88, this Plan[5] is a Rank Two planning document which reiterates a number of policies and recommendations of the Comprehensive Plan and adds additional policy elements, as follows:

- Reinforces the concept of self-sufficient planned communities as the primary development mode.

- Recognizes the sensitivity and erodibility of existing soils within the Westgate Dam watershed and maintains the intent to retain playa lake areas as open space.

- Identifies the need for an open space trail system leading eastward from Westgate Dam.

- The participating Citizen's Goals Committee supported the preservation of natural arroyos when hydrologically feasible, recognizing that as development occurs stabilized channel treatments could become necessary. The intent is to retain a "naturalistic" appearance to the extent practical.

- Policy 46 establishes that all future development shall be required to limit the level of runoff so as to not exceed the capacity of existing facilities.

2.3.6 DRAINAGE MANAGEMENT PLAN - WESTERN ALBUQUERQUE METROPOLITAN AREA.

Completed in 1975, the Management Plan[6] studied a large area on Albuquerque's west side. Westgate Dam was originally proposed by the study and the design analyses and hydrologic evaluation for the dam was performed as part of the investigation. The Plan was adopted by AMAFCA Resolution #1975-8 in Sept. 1975.

2.3.7 FAR NORTHWEST DRAINAGE MANAGEMENT PLAN

Completed in March, 1986, for the City, the Far Northwest Plan[7] investigated broad drainage management policies for a large portion of the northwest area, including the watershed of Westgate Dam. Specific recommendations and alternatives considered with the Plan, as they relate to this study, include:

- Playa Management

  - o Playa lakes could be used for detention storage of developed conditions runoff if provided with a proper controlled release outfall facility.

- o As an alternative, development restrictions around the playas to fixed elevation limits could be considered.

- o Flowage diversions could be used to route upstream and adjacent area runoff to the playa lakes.

- Watershed Policy (Westgate Dam)

  - o Development controls could be placed on the watershed north of I-40 to limit peak runoff to the capacity of the existing structures under I-40, including: a discharge per acre limit, providing detention storage at the I-40 structures, or providing detention storage in conjunction with development within the watershed.

  - o The portion of the watershed south of I-40 can free discharge developed condition flows to the dam, provided the upstream controls are enforced. Otherwise, controls would be required on the south portion in order to not exceed the capacity of Westgate Dam.

- Arroyo Policy

  - o Endorses the use of "naturalistic" channel treatments where feasible, but considers other methods such as concrete lining, soil cement, concrete low flow channels, and storm drains as acceptable alternatives.

  - o Recognizes that special attention should be given to the management of flows over the escarpment faces in keeping with Major Open Space goals.

  - o Recommends acquisition of a 150 foot wide corridor along arroyos to allow flexibility in channel design and to incorporate multiple uses.

2.3.8 PLANNED COMMUNITIES CRITERIA: POLICY STATEMENT

Adopted by the City and County in October, 1990, the Policy Statement[8] provides goals, policies, and criteria governing planned communities within the Reserve Area. Specific elements include:

- Establishes an overall gross density limit of 3 dwelling units per acre (3 du/ac).

- Specific densities will be based on the approved master plan associated with individual planned communities.

- Endorses protection of the "natural status/functions of steep slopes, sensitive soils, significant vegetation, floodplains, and runoff."

- Promotes preservation and enhancement of natural drainage corridors "with appropriate treatment for the safe conveyance and management of stormwater runoff."

Symbols in table:
meaning:

This section describes the parameters and methods used to evaluate the hydrology and sedimentation/erosion potential of the drainage basin.

3.1 MAPPING

Orthophoto/topographic mapping of the Amole - Westgate watershed and adjacent areas was acquired for this study in two phases:

Phase I consisted of production of new 1" = 200' and 2' contour interval mapping of the following Zone Atlas Sections:

L-6, L-7 (west 1/2)
M-6, M-7
N-6 (north 1/2), N-7 (north 1/2)

Phase II consisted of reproducing the Phase I maps at 1" = 500' and producing 1" = 500' mapping with a 2' contour interval of the following Zone Atlas Sections:

	1	2	3	4	5	6
E	●	●	●	▲	▲	▲
F	●	●	●	▲	▲	▲
G	¤	¤	¤	†	†	†
H	¤	¤	¤	†	†	†
J	☼	☼	☼	★	★	★
K	☼	☼	☼	★	★	★
L				◇	◇	◇
M				◇	◇	◇

The highlighted sections represent the area mapped with a 5' contour interval (in lieu of a 2' interval). Like symbols in the above table denote the sections covered by one map sheet at 1" = 500'.

Except for the areas covered in Phase I, no new topography was compiled for these zone atlas sections but was instead reassembled from prior mapping projects, by Bohannan-Huston (1980) and T.R. Mann (1982), to provide coverage for the area.

New orthophoto-based photography was obtained for the entire study area to allow for visual identification of features present in the watershed.

Both topographic/planimetric mapping and composite orthophoto/topographic/planimetric maps at a scale of 1" = 500' (2' and 5' contour intervals) are utilized in the accompanying **MAP SUPPLEMENT**.

3.2 AHYMO991

The AHYMO computer program, incorporating modifications and enhancements by AMAFCA, is used as the hydrologic model in predicting runoff from the watershed. This method is prescribed in DPM Section 22.2, Part B (January 1991).

AHYMO is a modification to the HYMO computer program originally developed for the USDA Agricultural Research Service[9]. The latest version at the time of this study, including AMAFCA's modifications, has been named AHYMO991. The last three digits of the program name (991) represent the month and year of release by AMAFCA for that version. A description of the program and the latest enhancements can be found in detail in the AHYMO Users Manual[10].

3.3 RAINFALL

Cumulative rainfall depths for the 2-, 10-, and 100-year storm events, for durations of 1-, 6-, and 24-hours, were obtained from the design storm regression equations provided in PART B, Section B.3, of the January, 1991 DPM Section 22.2 - Hydrology Manual[11]. The principal design storms (100-year, 6-hour and 24-hour events) are defined by the NOAA Atlas 2, Precipitation - Frequency Atlas of the Western United States, Volume IV - New Mexico for Region 3 - Rio Grande basin North of El Paso, Texas.

The principal design storm used to evaluate the response of the watershed and to assess the capacity of existing facilities, is the 100-year, 6-hour storm. In addition, the 100-year, 24-hour storm is used to evaluate detention and routing through Westgate Dam. The flowrates computed for the 24-hour storm are the same as using the 6-hour storm. The advantage in using the 6-hour storm is in the fact that a smaller time increment can be used therefore decreasing the integration interval and increasing the accuracy of predicting peak flowrates.

Values for the cumulative rainfall depths input to AHYMO are provided below:

TABLE 1
Cumulative Rainfall Depths (inches)

	2-year	10-year	100-year
P_{60}	0.73	1.24	1.87
P_{360}	0.95	1.47	2.20
P_{1440}	1.15	1.77	2.66

The above 100-year values were obtained from Figures D-F, Section B.3, of DPM Section 22.2. The 2-year, 1-hour depth of 0.73" was computed using the following equation:

$$P_{60\text{-}2} = -0.011 + 0.942 * \left[P_{360\text{-}2} * \frac{P_{360\text{-}2}}{P_{1440\text{-}2}} \right] \qquad \text{EQ.(2)}$$

Where: $P_{60\text{-}2}$ = Precipitation depth for the 2-year, 1-hour storm,
$P_{360\text{-}2}$ = Precipitation depth for the 2-year, 6-hour storm,
$P_{1440\text{-}2}$ = Precipitation depth for the 2-year, 24-hour storm.

The 6-hour and 24-hour values for the 2- and 10-year events were computed using the values in Table 3 (Return Period Factors) found in Section A.2. The 10-year 1-hour storm depth was computed by interpolation of the log-normal plot of the 2-year and 100-year, 1-hour depths as represented by the following equation:

$$\left.\left.\left.

In accordance with Section 22.2 of City of Albuquerque DPM Section B.3, areal reductions may be applied to uncontrolled watersheds which are greater than five square miles. Areal reductions are achieved by using Figure G (depth-area curves) in DPM Section 22.2 to solve for the percent of precipitation for a given area and storm duration. The amount of reduction is different for the various structures in the basin because their contributing areas are different. Three versions of areal reduction values were considered with the hydrologic modeling:

- No areal reduction - to evaluate the general response of the watershed and the impact on existing structures. P_{60} = 1.87", P_{360} = 2.20", P_{1440} = 2.66"

- For analysis of the impact on Westgate Dam. P_{60} = 1.68", P_{360} = 2.12", P_{1440} = 2.59"

- For analysis of the impact on I-40 structures. P_{60} = 1.75", P_{360} = 2.15", P_{1440} = 2.62"

3.4 HYDROLOGIC AND HYDRAULIC CRITERIA

The unit hydrograph procedure of the AHYMO model, incorporating the two new functions "RAINFALL" and "COMPUTE NM HYD", is used for the runoff analysis in this study. Descriptions of the usage of these functions are detailed in Section B.6 of DPM Section 22.2. The RAINFALL function was developed to simplify the computation of the mass rainfall distribution input to AHYMO. By varying the 6 parameters (rainfall duration, time increment, fifteen minute depth, one hour depth, six hour depth, and one day depth) in the RAINFALL command, the user is able to employ a number of rainfall tables for several known rainfall distributions as prescribed by NOAA Atlas 2 and HMR-55a.

The COMPUTE NM HYD function is used to compute individual sub-basin runoff hydrographs. In using the COMPUTE NM HYD command the modeler inputs the following physical parameters which describe each sub-basin: time-to-peak (tp); sub-basin area; percent of land treatment types A,B,C,D; and the mass rainfall variable. The time-to-peak parameter is given in hours and is equal to 2/3 of the time of concentration for the sub-basin (being no less than 8 minutes). Times of concentration are calculated using the following equations:

For sub-basins with reach lengths < 4000 ft:

$$T_c = \frac{\left[\left(\frac{L_1}{V_1}\right) + \left(\frac{L_2}{V_2}\right) + \ldots\right]}{60}$$

EQ.(12)
DPM Sect. 22.2

For sub-basins with reach lengths between 4000 and 12000 ft:

$$T_c = \left[\frac{(12000 - L)}{(120 * K * \sqrt{S})}\right] + \left[\frac{(L - 4000) * K_n * \left(\frac{L_{ca}}{L}\right)^{0.33}}{(4.305 * S^{0.165})}\right]$$

EQ.(14)
DPM Sect. 22.2

Where: T_c = Time of concentration (minutes)
L(i) = Sub-reach length (ft.)
V(i) = Sub-reach velocities (ft/s)
L = Distance of longest watercourse (ft.)
K = Conveyance factor
L_{ca} = Distance along L from Point of Concentration to a point opposite centroid of drainage basin (ft.)
S = Mean basin slope
K_n = Basin roughness factor

The COMPUTE NM HYD command will compute a pervious and an impervious hydrograph for each sub-basin. Abstractions are subtracted from both hydrographs in the amounts prescribed by the following equations:

IAp = (0.65*AA+0.5*AB+0.35*AC)/(AA+AB+AC) EQ.(30) DPM Sect. 22.

Ip = (1.67*AA+1.25*AB+0.83*AC)/(AA+AB+AC) EQ.(31) DPM Sect. 22.2

IAip = 0.10 t>0 min.

Iip = 0.04 t<180 min.
= 0.08-(.04t/180) 180>t<360 min.
= 0.00 t>360 min.

Where: IAp = Initial abstractions for pervious area
Ip = Constant infiltration for pervious area
IAip = Initial abstractions for impervious area
Iip = Time dependent infiltration (for impervious)
AA = Area of type A land condition
AB = Area of type B land condition
AC = Area of type C land condition
t = Time in minutes

The initial abstractions represent the amounts of water which will be detained at the beginning of the storm event by vegetation, surface depressions, or surface absorption before any direct runoff will

occur. The COMPUTE NM HYD function internally adds the pervious and the impervious hydrographs. The shapes of the resulting outflow hydrographs are determined by the recession constant K, and the ratio K/tp. This ratio is used to calibrate the peak flowrate. K/tp is ultimately a function of the sub-basin area, land treatment, and precipitation depth.

3.5 LAND USE PARAMETERS

Land use parameters assigned to sub-basin areas are described by a combination of one or more of four basic land treatments. These treatments labeled A, B, C, and D are summarized on the following page:

TREATMENT	LAND CONDITION
A	- uncompacted soil with < 10% slopes - high infiltration capacity
B	- irrigated land with < 10% slopes - uncompacted soils; 10% < slopes < 20% - medium infiltration capacity
C	- compacted soils - irrigated land with slopes > 10% - uncompacted soils; slopes > 20% - low infiltration capacity
D	- impervious land - minimal infiltration capacity

3.6 SEDIMENT ANALYSIS

A detailed discussion of sediment issues relative to the study area is presented in Technical Appendix E. A summary of the pertinent findings of the sediment analysis are provided below. Four major aspects of the basin were studied in detail with respect to existing and future conditions: geomorphology, mitigation alternatives, sediment yield, sediment transport.

3.6.1 Geomorphology

Surficial soils within the basin are approximately 13.6% hydrologic soil group A and 86.4% soil group B. By SCS classification 84.1% of the basin will exhibit slow runoff

and 15.9% will exhibit medium runoff. Slopes are typically in the two to three percent range. Only 25.4% of the watershed is likely to exhibit erosion hazard due to water, two-thirds of which is only moderate or slight. Greater than 90%, though, is subject to wind erosion, most of which is severe. Research of a 31 year photo history of the watershed indicates only very slight adjustments in channel cross-sections during that period, most of which is localized at bends. Sediment loss appears to roughly balance sediment input under existing conditions. In fact, the photo record indicates that the watershed's hydrologic condition appears to have improved with time. The reach of the west branch of the Amole Arroyo from about 5000 ft. above Central to about 5000 ft. below is common to all of the past photography and appears to be an active zone of sediment transport. Channels beds in general do not indicate signs of major scour or deposition of sediments.

3.6.2 Alternatives

Two alternative schemes for mitigation of future developed condition runoff were evaluated for sediment transport characteristics. Eight alternatives, as described in Section 6, were compared overall with Alternatives G and H being selected as the preferred alternatives. Dr. Heggen's treatment of sediment characteristics under future conditions is limited to these two scenarios.

3.6.3 Sediment Yield

The sediment yield analysis attempts to quantify the potential of the basin to supply sediment on an annualized basis and on a per event basis (100 year storm). In fourteen years of operation, a total of 3.59 acre-ft of sediment have been removed by AMAFCA from Westgate Dam. The planning recommendations for basin mean annual yield (existing conditions) is 0.2 ac-ft/mi^2/yr and 0.1 ac-ft/mi^2/yr for future conditions. For the 100-year event a value of 0.3 ac-ft/mi^2 is recommended for planning purposes under both existing conditions and future conditions.

3.6.2 Sediment Transport

The sediment transport analysis addresses sediment flux within and from the watershed and assesses the ability of the channel system to move the sediment. Transport capacities are computed separately for the east and west branches of the Amole Arroyo for both existing and future conditions (Alternatives G and H). A comparison is then made between the projected sediment yield from the watershed and the capacity to

transport it to evaluate whether the channel system will tend to aggrade or degrade. Finally, an estimate of the expected sediment bulking for the channel system is provided. See Tables 12 and 14 of Appendix A for predicted sediment transport values associated with future condition Alternatives G and H.

3.6.3 Bulking Factor

The recommended 100-year bulking factor for existing conditions is 0.025 or 2.5% sediment. This value should be conservative for hydraulic design as it is double the computed value.

3.6.4 Conclusions

- The watershed is fairly stable with respect to sediment transport under existing conditions.
- It does not appear that currently significant quantities of sediment cross Central/I-40 from the upper reaches of the basin.
- The limiting factor with respect to sediment transport is transport capacity and not sediment supply (yield).
- Westgate Dam receives only a small portion of the sediment influx anticipated in the original design.
- Development within the watershed will decrease the sediment yield potential while increasing the capacity of the channel system to transport it. This will increase the sediment influx to Westgate Dam and increase the degradation potential of the channels.
- Possible structural measures necessary to accommodate development include: upland sediment control facilities, detention ponds to reduce peak discharges in upper reaches, diversion of flows from the west branch to the east branch coupled with lining of the east branch (Alt. G), and a combination of detention and diversion of upper basin flows (north of I-40) to the future West Bluff Outfall (Alt. H).

4.1 DESCRIPTION OF AREA

The contributing drainage basin is characterized by relatively flat sandy areas (0.3-2% slopes) in the north and northwesterly portions of the basin, and rolling hills (1-17% slopes) cut by deep arroyos south of I-40 and in the vicinity of Westgate Dam. Vegetation is typically low grasses and shrubs with some scattered juniper. Development within the basin is sparse, consisting mostly of scattered residential and commercial facilities adjacent to I-40 and in the vicinity of the I-40/Central Avenue/Paseo del Volcan interchange.

4.2 OWNERSHIP AND EXISTING DEVELOPMENT

By far, the majority of the property located in the watershed is in private ownership, with Westland Development Company, Inc. being the major landholder. As can be seen in **MAP SUPPLEMENT** Sheets 14-21, approximately 84% of the property belongs to Westland. The following table provides a summary of existing ownership.

TABLE 2
EXISTING OWNERSHIP

OWNER	ACREAGE	% TOTAL
Westland Development Co., Inc.	11670	84
Tierra West	263	2
AMAFCA	54	0.4
Federal Land - leased	1153	9.6
Others	548	4

4.3 SOILS

Soils information was extracted from the **Soil Survey of Bernalillo County**[12] for the basin area. Approximately nine soil series are represented in the basin as described in the following table and as shown on Sheet 3 of the **MAP SUPPLEMENT.**

TABLE 3
SURFICIAL SOILS

MAP SYMBOL	NAME	HYDROLOGIC SOIL GROUP	USDA TEXTURE	UNIFIED CLASSIFICATION	SOIL FEATURES AFFECTING	
					RESERVOIR AREAS	EMBANKMENTS
Bb	Bluepoint - fine sand, hummocky	A	Loamy fine sand and loamy sand	SP	Seepage	Piping; seepage
BCC	Bluepoint loamy fine sand, 1 to 9 percent slopes	A	Loamy fine sand and loamy sand	SP-SM or SM	Seepage	Piping; seepage
BKD	Bluepoint-Kokan association, hilly	A	Loamy fine sand and loamy sand	SP-SM or SM	Seepage	Piping; seepage
LtB	Latene sandy loam, 1 to 5 percent slopes	B	Sandy loam	SM or SC-SM	Seepage; small stones	Piping; erodes easily
MaB	Madurez loamy fine sand, 1 to 5 percent slopes	B	Loamy fine sand	SM	Slope if more than 3%	Low strength; piping
MWA	Madurez-Wink association, gently sloping	B	Fine sandy loam and sandy clay loam	SC-SM, SC, or CL	Slope if more than 3%	Low strength; piping
PAC	Pajarito loamy fine sand, 1 to 9 percent slopes	B	Fine sandy loam and sandy loam	SM of CL-ML	Seepage	Piping; seepage
To	Tome very fine sandy loam	B	Sandy loam to fine sandy clay loam	ML or CL-ML to CL-ML or CL	Seepage	Piping; erodes easily
WaB	Wink fine sandy loam 0 to 5 percent slopes	B	Sandy loam	SM or SM-SC	Seepage	Piping; erodes easily

4.4 GEOLOGIC AND GEOMORPHIC FEATURES

The comprehensive Geologic/Geotechnical Overview Report, prepared by Sergent, Hauskins and Beckwith (SHB), is provided in Appendix D. The report addresses both regional and watershed specific geology, seismology, and soils, based on a review of available literature and field reconnaissance surveys by SHB staff.

As concluded in the report, there appears to be no geologic or geotechnical hazards which would prevent implementation of flood control structures within the watershed. Detailed investigation on a site specific basis should be considered, however, to further verify expected conditions.

The potential for wind erosion in the northern most part of the watershed is moderate to severe. The portion of the drainage area just north of I-40 and approximately 50% of that south of I-40 also exhibits severe hazard of wind erosion. Runoff from both of these areas is generally slow with high permeability as evidenced by the lack of defined gullies and channels.

exist. water quality

(measure develop. effects)

The steeper portions of the watershed south of I-40 exhibit a moderate to severe potential for erosion by water.

4.5 ENVIRONMENTAL FACTORS

As previously noted, MTK, Inc. prepared a limited environmental analysis of the Amole Arroyo watershed which is included in Appendix C.

A summary of the pertinent aspects of the analysis include:

- The greatest potential impact on paleontological resources, from surface disturbances associated with future drainage facilities, will be in the Ceja Formation in the area between Westgate Dam and Interstate 40.

- Three primary areas have been identified from past surveys as having a known or potential archaeological site:

  1. The extreme western edge of the study area along the escarpment at the western edge of Ceja Mesa.

  2. The area westward from Westgate Dam for approximately two miles and north to I-40.

  3. The area adjacent to the actual Amole Arroyo drainageway.

  A Class III ground survey is recommended prior to any surface disturbance within these areas.

- With respect to impacts on wildlife due to surface disturbances for drainage facilities, only the burrowing owl is known to consistently nest in similar habitat to that found within the watershed. Potential sites for future facilities should consider a ground survey prior to disturbance to ascertain if the owl is present. The presence of State or Federal endangered animal species are not expected.

- The potential exists for the occurrence of two State endangered plant species within the study area: the gramma grass cactus and the dune unicorn plant; and two State sensitive plant

species: the cyanic milkvetch and the La Jolla Prairie Cover. An endangered plant survey should precede any surface disturbance operation.

- Only two potentially impaired properties are specifically identified in the report. Both are World War II era bombing targets. One is located near the Albuquerque Shooting Range Park and the other is north of the Double Eagle II Airport. Both are located north of and outside the base watershed boundary. The potential for impairment is from practice bombs which did not normally contain explosives. Approximate locations of the bombing targets are shown on Sheet 3 of the MAP SUPPLEMENT. Where?

4.6 UTILITIES

Being relatively undeveloped, existing utilities traversing the watershed are generally major transmission facilities. Approximate locations and sizes of the utilities are shown on **MAP SUPPLEMENT** Sheets 14 through 21 as provided by the utility companies and City of Albuquerque system maps.

Major utilities within the study area include:

- A 15" and 18" sanitary sewer line which runs south from the Tierra West Estates development, adjacent to the west branch of the Amole Arroyo, then eastward past Westgate Dam. The main sewer line crosses the arroyo in one location. However, three smaller diameter laterals to the main line also cross the arroyo at separate locations.

- An overhead 345 KV powerline which runs approximately north-south within a 100 foot El Paso Electric easement. The powerline runs from I-40 south and adjacent to the proposed Paseo del Volcan alignment.

- Two overhead PNM powerlines running westward from the vicinity of Central Avenue/Paseo del Volcan. One of the lines crosses to the north side of I-40, then parallels the Interstate. The other line turns southwesterly to where it exits the study area.

- An 8" HP gas line (Gas Co. of New Mexico) running west along Central Avenue to the I-40/Central Avenue Interchange area. The gas line then turns southward along the proposed Paseo del Volcan alignment to Phase II of Tierra West Estates.

- A 115 KV overhead powerline within a Plains Electric Easement. The line runs generally southwest to northeast, north of Interstate 40.

- A 16" VHP gas line (Gas Co. of New Mexico - "Rio Puerco Main") which runs generally southwest to northeast through the northwesterly portion of the study area.

- AT&T operates a fiber optics cable from the radio tower in Zone Atlas Section P-4 (Section 10), north along the access road to I-40; then east along I-40 to Central Ave.; then paralleling Central to Bridge Blvd.

4.7 DRAINAGE STRUCTURE INVENTORY

The following table lists existing drainage structures found from field reconnaissance and a search of pertinent record drawings. A number of smaller pipes and structures (less than 18" dia.) were also located in the field but are not shown in the table. Capacities were determined using inlet and outlet control nomographs assuming a headwater depth which does not allow roadway overtopping.

TABLE 4
DRAINAGE STRUCTURE INVENTORY

I.D.	SIZE	NUMBER	MATERIAL	CAPACITY	COMMENTS
I-1	24"	3	RCP	84 cfs	
I-2	24"	2	RCP	46 cfs	
I-3	24"	1	RCP	22 cfs	
I-4	18"	1	CMP	7 cfs	
I-5	48"	3	RCP	435 cfs	West Amole crossing (same as X-3)
I-6	30"	1	CMP	35 cfs	
I-7	10'x4'	2	CBC	700 cfs	East Amole crossing
X-1	24"	1	RCP	30 cfs	
X-2	24"	1	CMP	13 cfs	From catch basin
X-3	48"	3	RCP	435, 504, 555 cfs	West Amole crossing of north frontage road, on-ramp, south frontage road.
C-1	8'x4'	1	CBC	365 cfs	East Amole crossing
C-2	15' Bottom 2:1ss	350 LF	Channel		East Amole, concrete lined channel
H-1	30"	1	RCP	30 cfs	At interchange
H-2	24"	1	CMP	13 cfs	
H-3	24"	1	CMP	13 cfs	
H-4	18"	1	CMP	17 cfs	
T-1	36"	3	CMP	34 cfs	
T-2	30"	1	CMP	16 cfs	
T-3	30"	1	CMP	16 cfs	
T-4	18"	1	CMP	7 cfs	

I - Interstate 40 crossing structures.
X - Central/I-40 Interchange structures.
C - Central Avenue crossing structures.
H - Haul road crossing structures.
T - Crossing structures on roadway south of I-40 near Tierra West Mobile Home Park.

why 141 basins?

A series of reduced maps showing the delineation of sub-basin boundaries, the above drainage structures and their ID numbers, and AHYMO hydrograph ID numbers are provided at the end of Appendix B.

4.8 HYDROLOGIC ANALYSIS

Sub-basins contributing to Westgate Dam under existing conditions are delineated on **MAP SUPPLEMENT** Sheets 4-11. 141 individual sub-basins are identified and used to estimate runoff. For the purposes of organizing the hydrologic analysis, a numbering system for the sub-basins was developed corresponding to specific study area regions (see Fig.1), as follows:

- Sub-basins numbered in the 100's correspond to the west branch of the Amole Arroyo between Westgate Dam and I-40.

- Sub-basins numbered in the 200's correspond to the east branch of the Amole between Westgate Dam and Central Avenue.

- Sub-basins in the 300's range correspond to the I-40/Central Interchange area, the median areas of I-40, and the area between I-40 and Central Avenue.

- Sub-basins in the 400's range contribute to the west branch of the Amole Arroyo upstream (north) of I-40.

- Sub-basins numbered in the 500's contribute to the east branch of the Amole upstream (north) of I-40.

- Basins numbered P-1 and P-2 correspond to the playa lake sub-basins located adjacent to the northwest portion of the base study area (**MAP SUPPLEMENT** Sheet 7).

Sub-basin parameters for the individual sub-areas are shown in Appendix H, along with the AHYMO output summary tables.

Sub-basin routing is presented schematically on **MAP SUPPLEMENT** Sheets 12 and 13. Additionally, 100-yr, 24-hr peak flow contributions from each sub-area, sub-basin areas in acres, cumulative routed flow rates, and corresponding AHYMO hydrograph I.D. numbers are also shown.

For the analysis representing existing conditions, seven key locations are the focus of the resulting hydrology:

4.8.1 Westgate Dam

The following table lists the characteristic data for which Westgate Dam was designed:

TABLE 5
WESTGATE DAM DESIGN PARAMETERS

100-year peak inflow - westerly Amole Arroyo	1475 cfs
100-year peak inflow - easterly Amole Arroyo	943 cfs
100-year combined peak inflow to dam	2418 cfs
100-year accumulated inflow volume	347 ac-ft
100-year sediment inflow	69 ac-ft
Emergency spillway crest elevation	5398.9
Emergency spillway width/depth	400 ft/12.1 ft
Top of dam elevation	5411.0
Length of dam	2095 ft
Base width of dam	280 ft
Crest width of dam	15 ft
Slope of upstream face	3:1
Slope of downstream face	2.5:1
Diameter of outlet pipe	24" CCP
100-year max. water surface elev.	5398.4
Evacuation period	78 hrs
100-year peak outflow	80 cfs

The above parameters were extracted from the filing sheet contained in the construction plans for Westgate Dam. It should be noted that the computed storage-depth curve from the new mapping differs slightly from the storage-depth curve on the filing sheet. The filing sheet data is used when discussing the dam design parameters. Computed curves are used in all new modelling.

Table 6 below provides a comparison of the dam design parameters and those computed under AHYMO991 for this study. Areal reduction is applied in calculating the values shown in the AHYMO991 column ($P_{24\ hr.}$ = 2.59").

TABLE 6
WESTGATE DAM PARAMETERS COMPARISON
(EXISTING CONDITIONS)

PARAMETER	DESIGN	AHYMO991
100-year peak inflow - westerly Amole	1475 cfs	854 cfs
100-year peak inflow - easterly Amole	943 cfs	532 cfs
100-year combined peak inflow	2418 cfs	1313 cfs
100-year accumulated inflow volume	347 ac-ft	345 ac-ft
100-year sediment inflow	69 ac-ft	14.4 ac-ft
100-year max. water surface elev.	5398.4	5396.5 *
Total detention at max. w.s. elev.	360 ac-ft	266 ac-ft
Evacuation period	78 hrs	67 hrs
100-year peak outflow	80 cfs	73 cfs

* Maximum water surface elevation is determined in AHYMO model and does not account for sediment inflow.

4.8.2 East Amole Arroyo Crossing at Interstate 40

The existing crossing structure (I-7) consists of a 2 barrel 10'x4' CBC under I-40. The computed capacity of this crossing is 700 cfs. Peak inflow to the structure is estimated at 485 cfs.

4.8.3 East Amole Arroyo Crossing at Central Avenue

The computed capacity of the 8'x4' CBC (C-1) is 365 cfs. Peak inflow to this crossing, based on existing conditions, is estimated at 535 cfs for a 100-yr, 6-hr event (P_6=2.20"). This crossing was originally a 2 barrel 8'x4' CBC. The furthest east barrel was not continued under the entire existing width of the road and the upstream end of this barrel is currently blocked.

4.8.4 West Amole Arroyo Crossing at Interstate 40

The west Amole branch is routed through the I-40/Central Avenue interchange area via three separate crossings as described below. Each crossing consists of 3-48" dia. concrete pipes. The first crossing (furthest upstream) has a computed capacity of 435 cfs. The other crossings have additional capacity due to the ability to build up a higher

headwater elevation without flooding the road. Routing affects due to detention storage within the interchange area are accounted for in the analysis.

- North Frontage Road

  The three pipes under the north frontage road are the point at which flows are initially concentrated on the west Amole branch. Peak inflow ($P_6 = 2.15"$) to the pipes is estimated at 593 cfs. This flowrate would just overtop the road.

- On-Ramp

  Peak inflow ($P_6 = 2.15"$) to the three pipes crossing the I-40 on-ramp is 594 cfs, which includes contribution from the interior of the interchange area north of I-40.

- South Frontage Road/Interstate 40

  Peak inflow ($P_6 = 2.15"$) to the three pipes is 519 cfs. Peak outflow is estimated to be 504 cfs downstream (south) of the interchange area.

4.8.5 East Amole Arroyo Branch

Under existing conditions, peak flows in the channelized portion of the east Amole branch, between Central Avenue and Westgate Dam, will vary from 535 cfs to 595 cfs ($P_6 = 2.20"$). The average bed slope through this reach of the arroyo is approximately 2.48%.

4.8.6 West Amole Arroyo Branch

Peak flows in the channelized portion of the west Amole branch will range from 563 cfs at the south frontage road to 960 cfs at Westgate Dam ($P_6 = 2.20"$). The average bed slope between I-40 and the dam is approximately 2.12% for the main arroyo and 2.78% for the west tributary.

4.8.7 Playa Lake Basins

Under present conditions, there is limited drainage area contributing to the two playas in the northwest portion of the study area. Playa 1 retains runoff from approximately 776 acres, resulting in a peak inflow of 949 cfs and a volume of 28 ac-ft for the 100-yr 24-hr storm (P_{24} = 2.66").

Playa 2 intercepts runoff from 746 acres, resulting in a peak inflow of 1041 cfs and a volume of 27 ac-ft.

Sub-basin No. 406, at the extreme western edge of the study area and adjacent to the north side of I-40, is a special case. Under normal conditions, flows generated within the sub-basin would be conveyed to the south side of I-40 via 3-24" pipes, then to the southwest and away from the study area. However, in the event that the capacity of the existing pipes is exceeded or clogged, excess flows will route into sub-basin No. 404 and consequently contribute to Westgate Dam.

5.1 PLANNED OR PENDING DEVELOPMENTS AND PROJECTS

A number of projects, in various stages of planning and implementation, are proposed within the basin. Known or anticipated facilities include:

- Paseo del Volcan - Originating in the vicinity of the existing I-40/Central Avenue Interchange, this proposed limited access roadway will traverse the watershed in a north-south direction.

  Bernalillo County has completed a Location Study Corridor Analysis for the portion of the roadway south of the I-40/Central Interchange. The proposed alignment of the facility as shown on **MAP SUPPLEMENT** Sheet 14 was taken from the corridor analysis. Design of Paseo del Volcan, south of I-40, is underway.

  The New Mexico State Highway and Transportation Department has recently begun a Corridor Location Study for Paseo del Volcan north of the I-40/Central Avenue interchange. For the proposes of this study it is assumed that the future location of Paseo del Volcan north of I-40 will follow the alignment of the existing Haul Road towards Double Eagle II Airport. That assumption is likely to change as a recommended location is refined in the Corridor Study. This could have significant impact on the way sub-basins are delineated.

- Outdoor Entertainment Complex - Conceptual plans for this facility, which is to be located at the northeast corner of I-40 and Paseo del Volcan, include: an amphitheater/stage complex, administration and maintenance buildings, and miscellaneous other structures. Approximately 42.5 acres of parking are proposed as well as 12.9 acres of landscaping. Conceptual grading and drainage plans for the site anticipate three on-site detention/retention ponds to control both off-site and on-site flows, and channelization on-site to route flows through the development.

- Nine Mile Hill Truck Plaza - Located at the northwest corner of Paseo del Volcan and the north I-40 frontage road, the proposed development consists of 100 acres zoned

Pollution concern? NPDES.

to allow for Truck Plaza uses. Of the 100 acres, approximately 18 acres is proposed for a truck stop anchor, 62 acres for a truck terminal, and 20 acres reserved for related C-2 uses such as restaurants, tire sales, hotel, etc.

- Amole Golf Course and Residential Development - A preliminary master plan of the proposed development, provided by Westland, indicates that the golf course facility will ultimately consist of twenty seven holes. The course extends from immediately upstream of Westgate Dam, westward to and abutting the proposed alignment of Paseo del Volcan south of I-40. Adjacent to both the east and west branches of the Amole Arroyo, the course will be located partially within the 100-year floodplain. Ultimately, the development is anticipated to consist of 200 acres of golf course surrounded by residential development.

- Paseo del Volcan Industrial Corridor - In correspondence dated March 19 and June 26, 1991, Westland Development Corporation expressed their interest in creating an industrial corridor on both sides of Paseo del Volcan, from I-40 to the Double Eagle II Airport. The industrial corridor is envisioned as encompassing approximately 1000 feet on either side of the roadway. Land uses adjacent to this corridor will transition to less intense predominately residential densities away from the roadway.

- Tierra West Mobile Home Park - Phase II, consisting of approximately 10 acres, will entail an expansion of the existing mobile home park to the south. Construction is anticipated to be completed on or about the middle of July 1992. Ultimate build out will encompass 106 acres currently masterplanned and will expand an additional 50 acres over the new few years.

5.2 DEVELOPMENT ASSUMPTIONS

Developed conditions projections for the study area are based on land uses allowable under the governing planning documents and on the anticipated projects discussed in the previous section.

20% is 0% b ≥ 70% is 17.5%
50% is a 35% b.
30% is a 75% b ~ 30% is 22%

Variation 31%

5.2.1 Land Uses

In making those projections, two development scenarios were compared for predicting percentages of land treatments A-D, as follows:

- The first scenario is based on a blanket three dwelling units per acre (3 du's/acre) applied to the watershed. The resulting land treatment percentages are:

A	B	C	D
0	30	35	35

- The second scenario, which was used for the hydrologic analysis in this study, is based on the "planned communities" concept and the resulting densities expected. From the Planned Communities Criteria: Policy Statement[8]:

"A planned community typically consists of 4 to 8 villages encompassing 5,000 - 10,000 acres .... The land use mix within a planned community should promote self-sufficiency, with approximately one half the land area devoted to residential uses, up to one fifth devoted to open space, and the remainder to non-residential service and job producing uses." 0.5 + 0.2 = 0.7/1.0

The resulting land treatment percentages are:

TABLE 7
DEVELOPED CONDITIONS LAND TREATMENTS

A	B	C	D
5	21	26	48

50% ? NO WAY!

These percentages were used in coordination with the known improvements to determine treatment percentages for each sub-basin.

5.2.2 Channel Routing

The land use scenario above is used in the computation of the hydrograph for each individual sub-basin. The channel through which this hydrograph is routed to the next point of concentration has a tremendous impact on the peak flowrate. Even with the planned communities criteria in place, it is difficult to anticipate how all these channels

[illegible]

will or won't eventually be constructed. They could range from streets to natural channels to concrete lined flumes. The hydrologic model was run with various channel sections and roughnesses for a range of flowrates. It is reasonable to use a flowrate which falls in the middle of the range. The resulting channel routing typically has little effect on volume calculations, but can have a significant effect on peak flow values.

5.3 HYDROLOGIC ANALYSIS AND IMPACT ON EXISTING FACILITIES

The discussion contained in this section presents the results of the AHYMO analysis for fully developed conditions without proposed improvements or development controls considered. The impacts to existing drainage facilities under these conditions are discussed below. This analysis is not considered an alternate to improvements within the watershed. It is principally included to serve as a baseline and to assess the impact to existing facilities under developed conditions. Technical Appendix H contains sub-basin parameters for the individual sub-areas and the AHYMO output summary table.

5.3.1 Westgate Dam

- Table 8 below provides a comparison of design parameters for Westgate Dam and those computed for this study assuming developed conditions.

TABLE 8
WESTGATE DAM PARAMETERS COMPARISON
(FUTURE CONDITIONS)

PARAMETER	DESIGN	(EXISTING) AHYMO99 1	(FUTURE) AHYMO991
100-year peak inflow - westerly Amole	1475 cfs	854 cfs	2849 cfs
100-year peak inflow - easterly Amole	943 cfs	532 cfs	2328 cfs
100-year combined peak inflow	2418 cfs	1313 cfs	4809 cfs
100-year accumulated inflow volume	347 ac-ft	345 ac-ft	1511 ac-ft
100-year sediment inflow	69 ac-ft	14.4 ac-ft	12.5
100-year max. water surface elev.	5398.4	5396.5 *	5400.3 *
Total detention at max. w.s. elev.	360 ac-ft	266 ac-ft	395 ac-ft
Evacuation period	78 hrs	67 hrs	92 hrs
100-year peak outflow	80 cfs	73 cfs	1970 cfs **

* Maximum water surface elevation is determined in AHYMO model and does not account for sediment inflow.

** Flow over emergency spillway

Without improvements to the dam, it is estimated that the depth of flow through the emergency spillway will be approximately 1.4 feet, representing a peak discharge of 1893 cfs. The peak discharge through the principal spillway would be 77 cfs.

5.3.2 East Amole Arroyo Crossing at Interstate 40

- Peak inflow to the existing 2 barrel 10'x4'CBC under I-40 (I-7) is 2074 cfs, causing I-40 to flood. It's estimated capacity, without overtopping I-40, is 700 cfs.

5.3.3 East Amole Arroyo Crossing at Central Avenue

- Peak inflow to the 8'x4' CBC (C-1), is computed to be 2215 cfs for the 100-yr 6-hr event ($P_6 = 2.20"$). It's capacity is approximately 365 cfs. Central Ave. would flood under these conditions.

5.3.4 West Amole Crossing at Interstate 40 (Note: All crossings fail. The floodwaters would inundate Interstate on-ramps but never reach the lanes of the Interstate).

- North Frontage Road

  The three 48" pipes are significantly under capacity to convey developed condition flows. The peak flow rate impacting this location is 3866 cfs. The capacity of the existing crossing is about 435 cfs resulting in excess flows overtopping the roadway by about 1.5 ft.

- On-Ramp

  Peak inflow to the three 48" pipes crossing the on-ramp is estimated at 3884 cfs, accounting for detention storage within the interior of the interchange area. The maximum depth of ponded water where the on-ramp crosses under I-40 could be as much as 12 feet, impeding the passage of vehicular traffic.

- South Frontage Road/Interstate 40

Peak inflow to the three existing 48" pipes is 3893 cfs. Peak outflow downstream (south) of the interchange area is 1552 cfs. It is not expected that I-40 will be overtopped by the projected flows at this location.

5.3.5 East Amole Arroyo Branch

- Peak flowrates in the channelized portion of the east branch, between Central and Westgate Dam, will vary from 2215 cfs at the upper end to 2652 cfs at the dam.

5.3.6 West Amole Arroyo Branch

- Peak flowrates in the channelized portion of the west branch will range from 1707 cfs at the south I-40 frontage road to 3189 cfs at Westgate Dam.

5.3.7 Playa Lake Basins

- Playa 1 will accumulate approximately 101 ac-ft of runoff from a peak inflow of 2230 cfs for the 100-yr 24-hr storm. The resulting increase from existing conditions due to surrounding development is 73 ac-ft in volume and 1281 cfs in peak inflow. On that basis the 100-yr water surface elevation is raised from 5880.2 ft. to 5882.4 ft.

- Playa 2 will accumulate 97 ac-ft. of runoff from a peak inflow of 2384 cfs, resulting in an increase of 70 ac-ft of volume and 1343 cfs in peak flow rate from existing conditions. The 100-yr water surface elevation will vary from 5827.0 ft. to 5829.0 ft.

Eight alternatives designated A through H, are investigated for their ability to mitigate the impact on existing facilities associated with development within the watershed. Because of basin deficiencies, primarily the storage volume of Westgate Dam, the option of diverting runoff from the vicinity of the Double Eagle II Airport (Ladera basin) to the Westgate basin was not further considered. The features of each alternative and the considerations associated with their implementation are discussed below. With the exception of Alternatives D and E, figures describing each of the alternatives are included at the end of this section.

6.1 ALTERNATIVE A - NO BUILD

6.1.1 Features

- Development is not allowed to proceed without restriction. The controlling planning documents state that development cannot exceed downstream capacities.

- No drainage improvements are proposed within the watershed.

6.1.2 Considerations

- Developers will put pressure on governing agencies to lift restrictions.

- A number of existing structures are marginal or under capacity at present. No progress is made in correcting these deficiencies.

6.2 ALTERNATIVE B - Improvement of Structures

6.2.1 Features

- Westgate Dam is raised to provide additional detention storage capacity, from the current 427 ac-ft to 1350 acre-feet. This can be accomplished by raising the dam (spillway crest) by 18.1 ft. to elevation 5417, or by excavating to

enlarge the storage pool behind the dam and raising the dam (spillway crest) by 8.1 ft. to elevation 5407.

- Interstate 40 crossing structures are improved for the east and west Amole Arroyo branches to pass developed condition flows. Depending on the channel routing assumptions in the AHYMO model, the flowrates crossing the Interstate can vary from 3727 cfs to 9630 cfs on the west arroyo and from 1841 cfs to 3159 cfs on the east arroyo. The required crossing structures associated with the higher flowrates for this alternative consist of the equivalent of 26-10'x4' CBC's on the west arroyo and 10-10'x4' CBC's on the east arroyo.

- Channel lining improvements are made to both the east and west branches of the Amole Arroyo, between I-40 and Westgate Dam, to convey the increased flowrates and velocities.

- No additional controls are placed on development within the study area. This alternate assumes a free discharge condition.

6.2.2 Considerations

- Peak flowrates will increase due to development.

- Runoff volume will increase due to development. Without capacity modifications to the principal spillway outlet at Westgate Dam, detention storage will increase. With additional head above the dam, the principal spillway discharge will increase from 73 to 87 cfs without any modifications.

- Modifications to the emergency spillway location and elevation will be necessary in conjunction with raising of the dam.

- An increased erosion rate and consequential increase in maintenance costs is expected.

- Flood hazard limits will increase - impairing additional properties.

water rights?

West gate Dam compound
houses?

- The increased volume of runoff to Westgate Dam would increase the storage time from the current 67 hours to approximately 295 hours assuming no increase in discharge capacity of the principal spillway outlet. The increase in maximum storage elevation and impoundment time could potentially impact the stability of the embankment. The "Foundation and Materials Investigation Report for Proposed Westgate Detention Area Dam", dated September 3, 1975, by Albuquerque Testing Laboratory, indicates that existing materials (presumed to have been used to construct the dam) exhibit a permeability rate on the order of 1755 ft/year. This equates to 0.20 ft/hour or 59 ft/295 hours.

6.3 ALTERNATIVE C - Detention Above Interstate 40

6.3.1 Features

- New detention facility just upstream of the existing 2 barrel 10'x4' CBC under I-40 on the east Amole Arroyo branch.

- New detention facility upstream of the three existing 48" diameter concrete pipes under the north frontage road on the west Amole Arroyo branch. There is also an alternate location for detention further upstream of the Interstate in sub-basin 408. The detention facility used in sub-basin 408 would require seven additional 48" diameter crossing structures at the Interstate.

- No additional controls are placed on development upstream or downstream of I-40. This is a free discharge assumption.

- New detention facilities are sized to limit peak discharge rates to historic 100-year levels downstream of I-40. The entire storm volume, however, continues to Westgate Dam.

6.3.2 Considerations

- Two alternative locations for proposed detention facilities are shown in the MAP SUPPLEMENT.

Exm Wing Dams hall
Principal Principal

Log Sheets ने मार्क्स।

Table 8 Sheets less,
P.33

- The proposed Outdoor Entertainment Complex, as currently envisioned, is in the area where a new detention facility would be located on the east Amole branch.

- The volume of runoff contributing to Westgate Dam will increase due to development, from 418 ac-ft to 1491 ac-ft for a 100-yr event.

- The rate of erosion is expected to increase, conveying additional sediment to all three detention facilities. Higher costs and more frequent maintenance is likely. Ultimately, channel lining improvements would be necessary.

6.4 ALTERNATIVE D - Local Detention

6.4.1 Features

- Planned communities and developments are required to detain and release generated flows at historic peak levels.

6.4.2 Considerations

- Peak flowrates are required to be maintained at or below historic values and sufficient detention times provided so that the maximum storage in Westgate Dam does not increase.

- Total runoff volumes will increase due to development. As noted above, on-site detention associated with development must detain for sufficiently long periods to ensure that the integrity of Westgate Dam is not compromised.

- Particularly in the portion of the watershed above I-40, controlled release from detention facilities at a point of concentration will incise channels where little or no channelization currently exists.

- Maintenance cost associated with numerous small detention facilities will be increased. Maintenance responsibility and enforcement becomes an issue.

6.5 ALTERNATIVE E - Development Limitations

6.5.1 Features

- New development is required to limit peak discharge to specified cfs/acre values so as not to exceed the capacity of existing facilities.

- New development is also potentially required to limit runoff volumes to a specified vol/acre.

6.5.2 Considerations

- In order to estimate a cfs/acre limit over the entire watershed, two representative sub-basins were analyzed. Sub-basin No. 134 is south of I-40 and sub-basin No. 412 is north of I-40. Based on the areal percentage contributed by each sub-basin, it is calculated that the overall watershed must be limited to between a 0.44 and 1.18 cfs/acre increase over existing conditions to remain within the parameters for which the dam was designed.

- From Table 6, it is obvious that the increase in runoff volume computed by AHYMO is a controlling factor in assessing the capacity of Westgate Dam. According to the analysis for existing conditions, the combined peak inflow is 54% of that for which the dam was designed. The accumulated inflow volume however, is 92% of the design value.

6.6 ALTERNATIVE F - Diversion to Playa Lakes

6.6.1 Features

- Playa lakes are utilized as detention storage facilities to detain and release developed condition flows at a controlled rate.

- Diversion of upstream watershed areas to playa basins is made to the extent practical to utilize the natural storage volume available.

6.6.2 Considerations

- By inspection of the topographic conditions surrounding Playa 1, it is not practical to divert "out of basin" flows to the playa. In order to capture enough of the adjacent sub-areas to derive any substantial benefit from the available storage capacity of the playa, an extremely long and expensive diversion would be necessary.

- Playa 2 however, could potentially capture in excess of 2965 acres of adjacent basin area with a relatively short (1400 LF) diversion facility. For developed conditions, the resulting peak flow rate diverted to Playa 2 is 2931 cfs. As a retention facility (no discharge) the water elevation would be raised to elevation 5833. In order to drain the incremental volume, between that accumulated for existing conditions and developed conditions (with diversion), in less than 96 hours, a 48" diameter pipe outlet is necessary. Storage in excess of 96 hrs would involve a water rights review by the State Engineer's Office.

- Although a substantial area can be collected by the playa, peak flowrates impacting the I-40 crossing structures downstream are not substantially decreased.

6.7 ALTERNATIVE G - Detention/Diversion

6.7.1 Features

- Runoff from the west Amole branch, upstream (north) of I-40, is diverted to the east Amole branch at I-40 and conveyed to Westgate Dam within the existing east Amole arroyo channel alignment. Three sub-options for this diversion were considered. Alternate G1 assumes a lined trapezoidal channel within the median area of I-40 to redirect flows from the west branch to the east branch (see Fig. 8). Alternate G2 assumes a channelized diversion upstream (north) of I-40 (see Fig. 9). Alternate G3 combines a detention dam on the west branch north of I-40, to attenuate peak flowrates, with a channelized diversion from the west branch to the east branch (see Fig. 10).

- The east Amole channel is lined or stabilized to accommodate the increased combined flow.

- Additionally, detention of runoff collected within the interchange area is considered to reduce downstream peak flowrates.

6.7.2 Considerations

- North of I-40 a diversion facility would conflict with both the proposed Truck Plaza and Outdoor Entertainment Complex and a new crossing structure under Paseo del Volcan would be required for the channel. The size of the crossing structure would be much smaller under Alternate G3 that necessary to accommodate full peak flows associated with Alternate G2. Existing topography along the north side of the Interstate would necessitate cuts on the order of 47 ft. to construct the diversion channel (Alternates G2 and G3). To install the diversion within the median, a channel would potentially conflict with the bridge piers (2) of the overpass. Additionally, cuts in the range of 15-25 feet are necessary to construct a channel in the median at a grade of 0.2%.

6.8 ALTERNATIVE H - West Bluff Outfall Detention/Diversion

6.8.1 Features

- Alternative H is a modification of the improvements proposed in Alternative G3.

- In addition to the west branch detention dam and diversion of flows from the west to east branch proposed by Alt. G3, a second and smaller detention dam is proposed on the east branch just upstream of I-40.

- 100% of the flows discharged from the east branch detention dam, which would constitute 100% of the runoff intercepted above I-40 on both branches, would be subsequently diverted eastward along the north side of I-40.

- Ultimate discharge of the diverted flows would be into the upper end of the future West Bluff Outfall system near 98th Street. The West Bluff Outfall (WBO) is a City of Albuquerque drainage collection and conveyance system

Requires min. e/o previous

which parallels I-40 from 98th Street eastward to the Rio Grande River. Phase One of the WBO is a buried conduit, from Coors Road to the river, which has been constructed. Phase II-A consists of an extension of the buried conduit from Coors to Estancia Road, which has been designed but not constructed. Future phases have only been conceptually designed to date and are expected to consist of a concrete-lined open channel from Estancia to 98th Street.

6.8.2 Considerations

- Each of the alternates previously discussed (A-G), except for Alternate H, have one facet in common - 100% of the direct runoff generated by development must pass through the Westgate Dam.

- Development within the watershed will significantly increase the volume of runoff as the percentage of pervious cover is reduced.

- While peak flowrates can be greatly attenuated by routing through detention facilities, the total volume of runoff is only slightly reduced.

- Alternative H would divert all of the runoff volume intercepted from the watershed above I-40 so that it would not pass through Westgate Dam. Only those flows generated below I-40 would still contribute to Westgate Dam

Table 9 provides a hydrologic comparison of Alternatives A, B, C, G , and H.

TABLE 9
HYDROLOGIC SUMMARY OF ALTERNATIVES

Location	A	B	C	G1	G2	G3	H
West Amole @ I-40 (cfs)	532	9630	1725	9630	681	681	681
West Amole @ Westgate (cfs)	854	10831	3790	3694	3648	3648	3648
East Amole @ I-40 (cfs)	371	3138	3137/1726*	3176/12566*	3904	1751	29
East Amole @ Westgate (cfs)	487	3626	1934	12794	4194	1129	1163
Westgate Dam inflow (cfs)	1313	14170	5368	14600	7523	6686	4671
Westgate Dam inflow (ac-ft)	345	1518	1516	1517	1463	1463	421

* x/y denotes (flow from East Amole Branch) / (combined flow with West Amole Diversion and East Amole)

Alternatives D and E would place restrictions on developers so that capacities of existing facilities are not exceeded. Alternative F reduces the peak flowrate in the West Amole Arroyo by only 6%.

6.9 CHANNEL LINING OPTIONS

The following sections provide a general discussion of different conveyance options and their applicability to the conditions associated with the improvement and mitigation alternatives presented above. Five channel sections are considered. As prescribed in the Amole Arroyo Corridor Plan, an additional 20 feet of right-of-way should be provided for trails and maintenance access.

6.9.1 Earth Lined

Generally, unlined earth channels are feasible where slopes are mild and soils are erosion resistent. Erosion is an important consideration in these channels. Velocities normally should not exceed 2 to 3 feet per second. The soils in this watershed are highly erosive and velocities under 2 feet per second are recommended. This requires very mild slopes and usually some sort of grade control. Although in many instances earth channels are comparatively inexpensive to build, they tend to have higher maintenance expenses, require greater right-of-way widths, and exhibit a shorter life between major reconstruction cycles. For the future developed conditions case, unlined channels are impractical. In order to maintain flow velocities at or below 2 ft/sec, for the projected peak flowrates, channel slopes would need to be reduced to around 0.0001 ft/ft (existing slopes are 0.02 to 0.03 ft/ft). Assuming a maximum drop structure height of five feet, drops or grade control structures would be required every 225 ft. in order to maintain stable velocities. For the west branch reach below I-40, approximately 65 drop structures would be required and flow depths would be on the order of eight feet. For the east branch reach below I-40, at least 42 drops would be required.

6.9.2 Grass Lined

Grass lined channels may be feasible in fairly mild slopes, favorable soil conditions, and where well-maintained grass can be assured. In locations where future conditions may introduce constant or base flows, trickle channels or underdrain systems are often used in conjunction with grass lined channels. Flow velocities need to be limited in order to

minimize scour potential of the soil-vegetative cover complex. Generally, maximum velocities range from 2.5 to 5.0 feet per second depending on the soil gradation and the type of grass used. Side slopes of 4H:1V or flatter are desirable, however, 3H:1V slopes may be used where right-of-way is restricted. Grasses require irrigation and maintenance expenses are typically high for grass-lined channels.

6.9.3 Riprap Lined

Riprap is available in several forms: dumped, wire-tied, and grouted. Grouted riprap can provide a smoother lining (lower Manning's n-value) than dumped riprap. However, a smoother lining will result in higher velocities of flow and may be undesirable for certain conditions. Gabions are a form of riprap consisting of wire-tied baskets filled with rock. Riprap is effective in deterring erosion and can provide some of the aesthetic qualities of natural channels, however, maintenance costs also tend to be high to preserve these qualities and the life of the channel is limited. Stable velocities for riprap lined channels can be considerably higher than those for earth channels but limitation to subcritical flow regimes is recommended. Riprap normally requires an engineered filter bedding or fabric to control erosion of the finer particles beneath it. It is more often used to stabilize bends, at drop structures, and at other highly erosive locations. Riprap has flow velocity limitations, particularly in Albuquerque, due to the light rock available. In addition, riprap can provide prime habitat for snakes and rodents, and is the subject of theft and vandalism.

6.9.4 Soil Cement Lined

Soil cement is re-emerging as a popular means of lining channels and for erosion control. In most cases, soil cement blends in well with the surrounding environment is less obtrusive than other "hard" linings. Similar to riprap, soil cement is often placed on the banks of channel bends and at drop structures for stabilization and added erosion protection. The soil cement is structurally more stable for steeper side slopes than other "naturalistic" linings, allowing for a narrower top of channel width. Velocities can also be considerably higher than in an earth channel, and supercritical flows can sometimes be tolerated. Proper installation of soil cement channel lining typically requires the processing of large volumes of material and rigid construction

controls. Soil cement becomes more cost effective as an alternative channel lining method as the volume of the material to be processed and length of channel increases.

6.9.5 Combined Sections

Examples of combined sections include: concrete bottom with earth sides, earth bottom with concrete sides, earth bottom with soil cement sides, earth bottom with riprap sides, and grass-lined overbanks with a hard-lined (soil cement, concrete, etc.) inner channel to convey frequent runoff events (i.e. 10-year storm). When lining only the sides of a channel, the width of the channel can vary in its natural state without affecting the cost of the lining. When lining a narrow channel, it is more cost effective to line the entire channel than lining only the sides. Providing a side lining with an earth bottom requires extending the lining material fairly deep below the ground's surface and providing grade control structures. Lining only the bottom of a channel is effective for controlling low flows; however the section may be sacrificial during a severe storm.

6.9.6 Concrete Lined

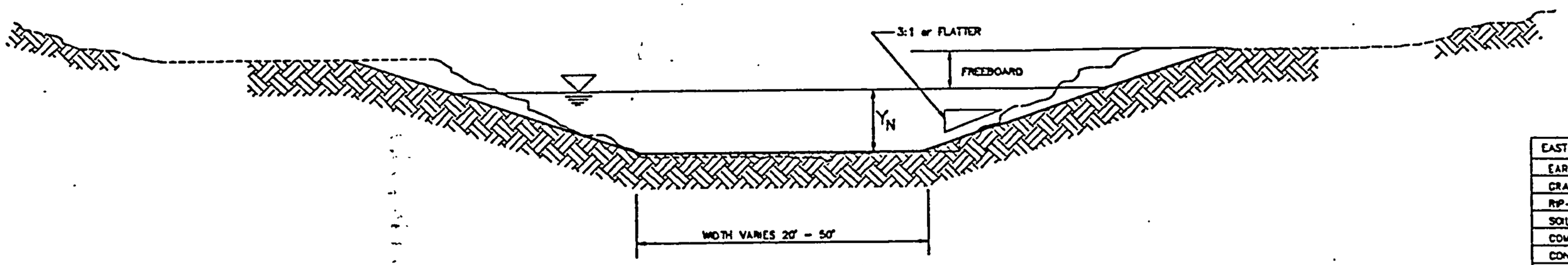
Concrete lined channels are the most efficient and effective means of conveying high velocity flows, although, soil cement can tolerate fairly high velocity flows. When the topography exhibits steep slopes, the way to lower flow velocities is to flatten the slopes and provide numerous drop structures. Albuquerque has concrete lined channels in many areas of the city. In some areas, where a more rural appearance is desirable, the concrete is tinted to blend with the natural soils. As required by the Amole Arroyo Corridor Plan, any concrete lining recommended in this basin will need to be "earth tone" tinted. Because of the typically high velocities associated with concrete channels, additional safety measures, such as escape ladders, are often required.

6.9.7 Prudent Limit

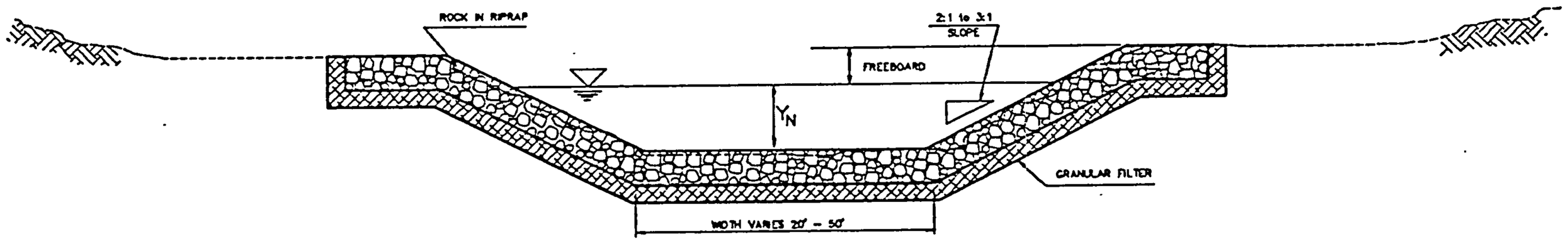
The establishment of prudent limits for natural arroyo channels is not a physical improvement in the same sense as the lining alternatives discussed above, however, the concept may be used in conjunction with one or more of the above methods to control erosion at specific locations. The prudent limit method may be an acceptable "treatment" for controlling the physical processes of erosion and meander for a finite

period of time, provided sufficient land can be set aside adjacent to the arroyo to allow these natural processes to occur. The evolving practice of establishing prudent lines is typically based on a specified duration (30 years) and major storm event (100-year). The anticipated changes in bank alignment occurring during the period, based on an erosion analysis, are then used to limit the proximity of adjacent development to the arroyo. Development may occur in various forms such as housing, maintenance access, recreational trails, etc. When erosion effects reach the prudent limit, structural measures are required to protect adjacent property. These may be affected with grade control, limited bank stabilization, or with channel lining. The prudent line approach is generally considered an "interim" measure with respect to a long term conveyance solution. Where flowrates or volumes are substantially increased, the erosion process is also likely to accelerate dramatically. This may make using prudent limit impractical in these instances. When arroyo flows can be maintained at or near historic levels, the prudent limit may be feasible.

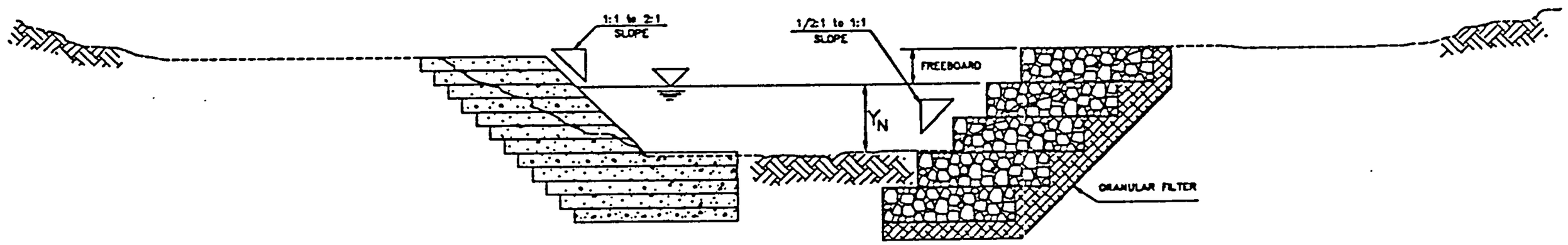
Selected channel treatment alternatives are shown graphically in the following Figure (3).



EARTH LINED

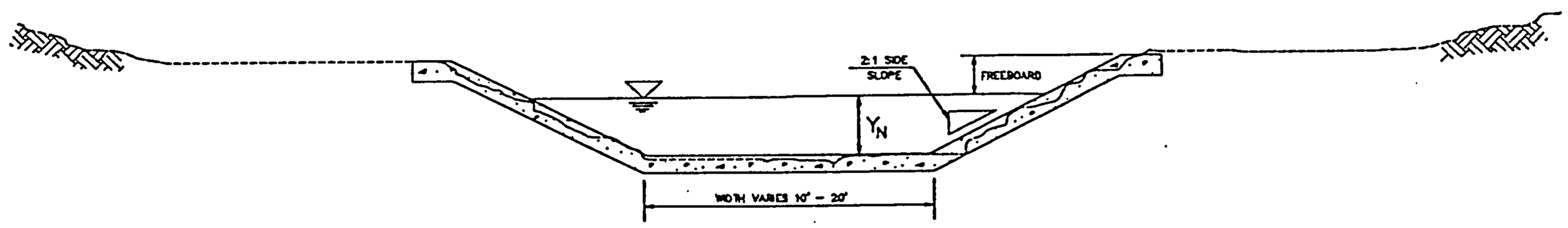


RIPRAP LINED



SOIL CEMENT BANK STABILIZATION

GABION BANK STABILIZATION



CONCRETE LINED

FEASIBLE ALTERNATIVES
FUTURE CONDITIONS – CHANNEL TREATMENT OPTIONS

	ALTERNATIVE															
	A		B		C		F		G1		G2		G3		N	
EAST/WEST BRANCH >	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W
EARTH-LINED						●				●		●		●	●	●
GRASS LINED																
RIP-RAP LINED						●				●		●		●	●	●
SOIL CEMENT LINED	●	●	●	●	●		●	●	●		●		●			
COMBINED SECTION						●				●		●		●	●	●
CONCRETE LINED	●	●	●	●	●		●	●	●		●		●			
PRUDENT LIMIT						●				●		●		●	●	●

AMOLE ARROYO – WESTGATE DAM DRAINAGE MNGMT PLAN

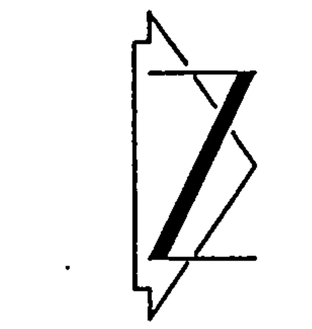
FIGURE 3
Channel Treatment Alternatives

ALBUQUERQUE METROPOLITAN ARROYO
FLOOD CONTROL AUTHORITY

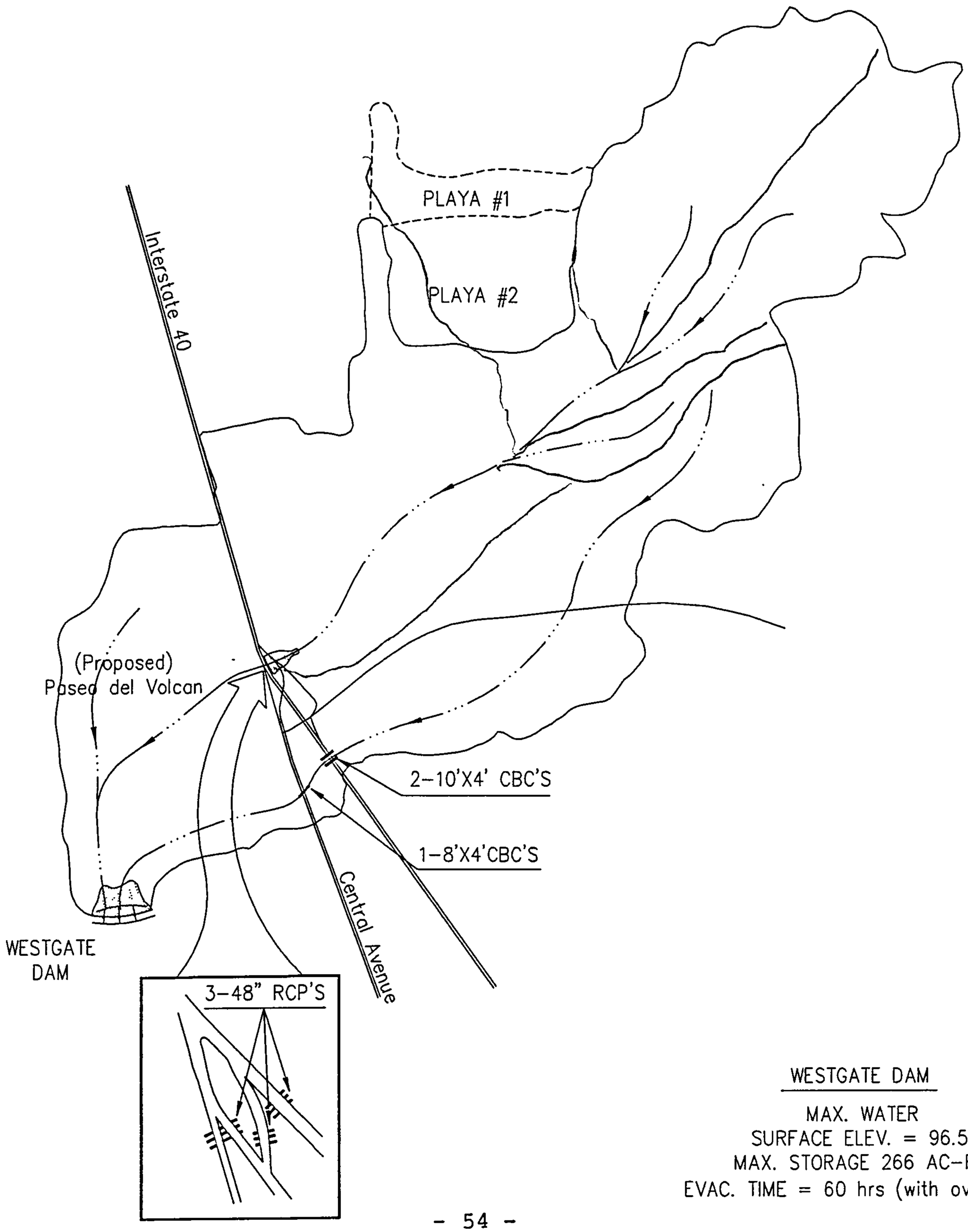
DATE	JOB NO.	SCALE	DRAWN / CHECKED	SHEET OF
AUG 91	91101	NONE		

ALBUQUERQUE • SANTA FE
SCANLON & ASSOCIATES INC
CONSULTING ENGINEERS

ALTERNATE A – No Build Option
Existing Facilities



NOT TO SCALE

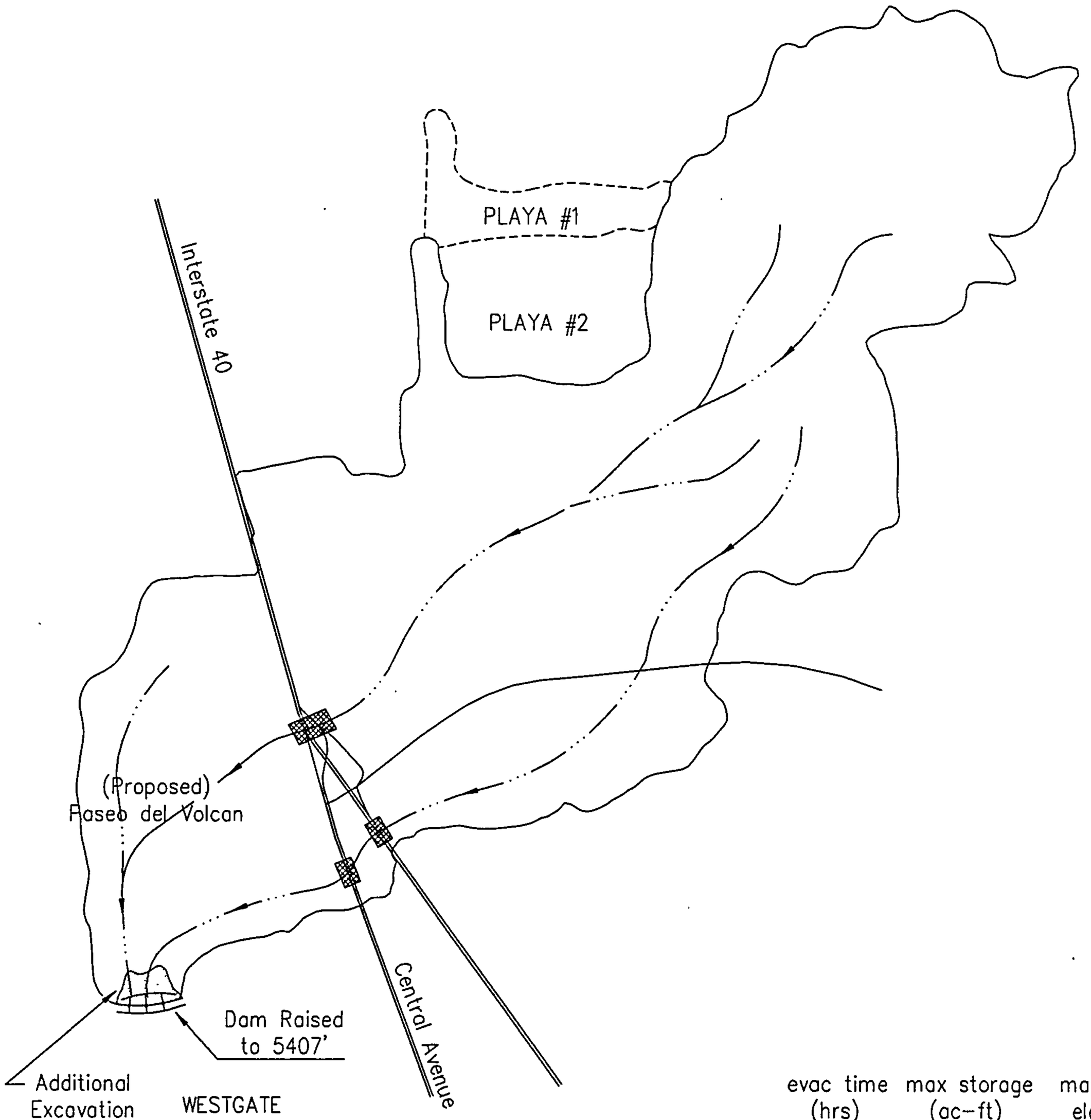


WESTGATE DAM

MAX. WATER
SURFACE ELEV. = 96.5'
MAX. STORAGE 266 AC–FT.
EVAC. TIME = 60 hrs (with overflow)

ALTERNATE B – Improved Crossings,
Excavation Behind Westgate
Dam, Dam Raised

NOT TO SCALE

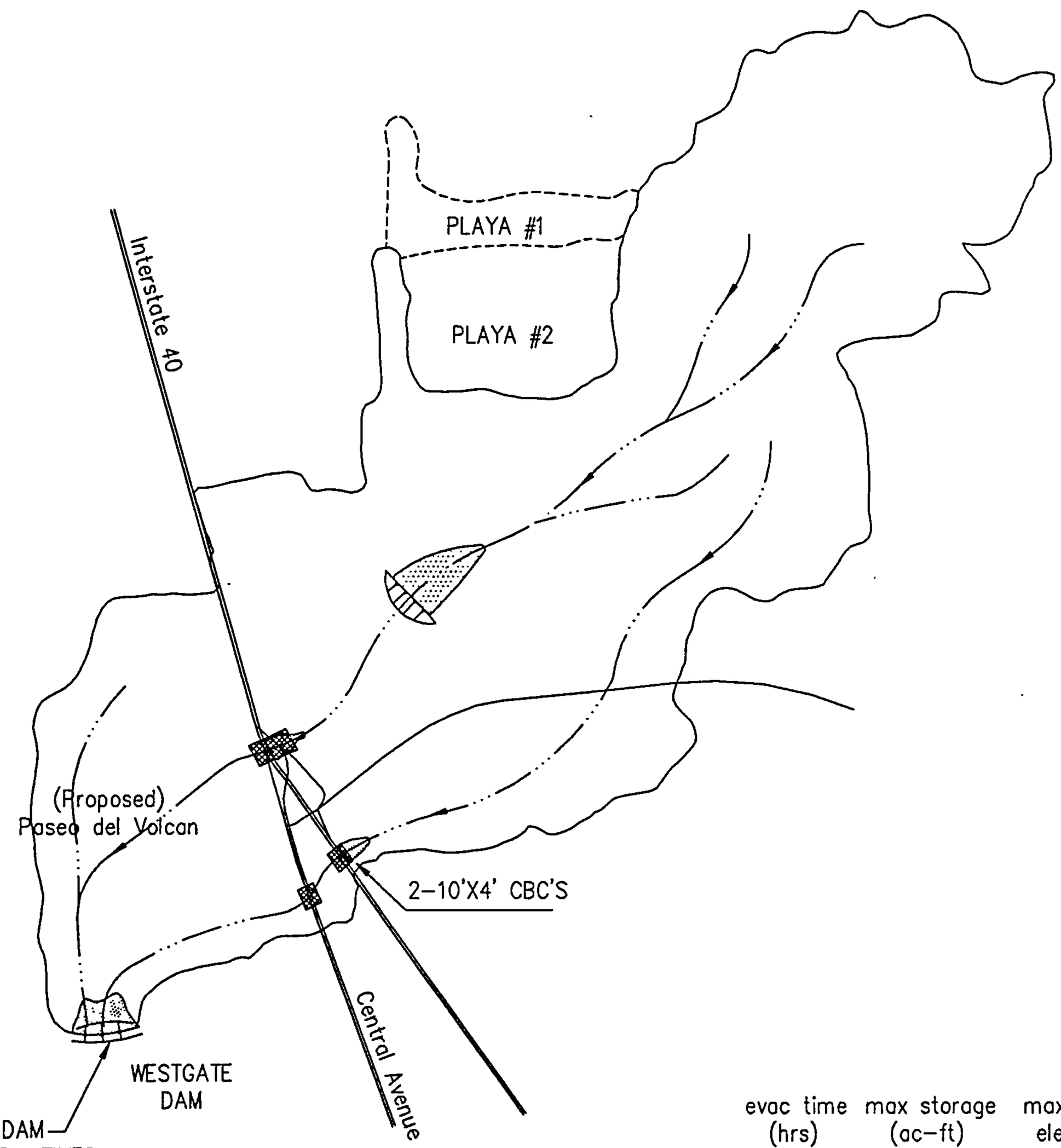


	evac time (hrs)	max storage (ac-ft)	max ws elev
Raised Dam w/o emergency spillway	220	1229	5415.5
Raised Dam w/ excavated pool	295	1244	5404.4
Raised Dam w/o emergency spillway and w/ 48" outlet	50	1015	5412.3

IMPROVED CROSSING

ALTERNATE C – Use of Detention / Dam Facility Above I–40

NOT TO SCALE



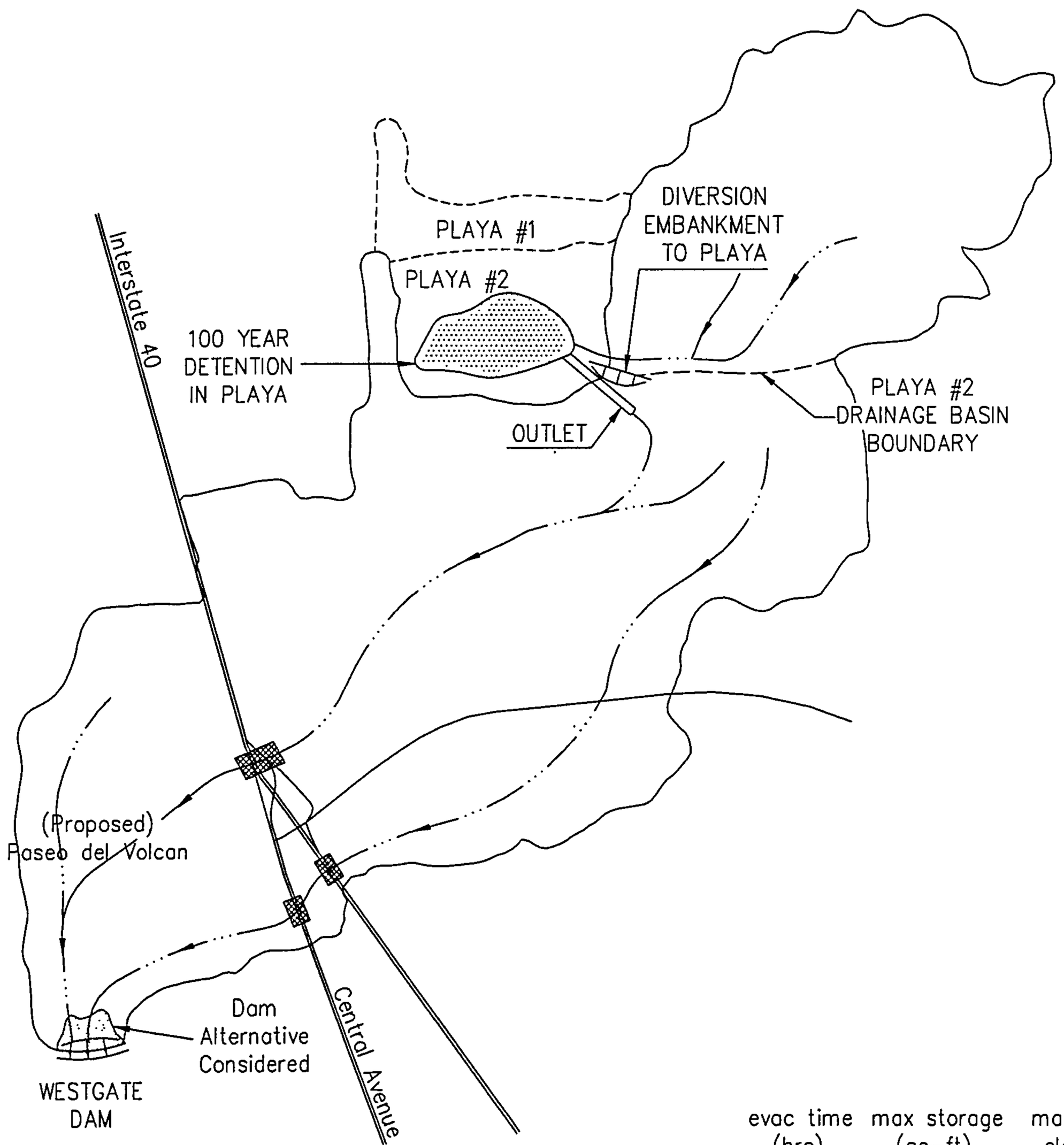
	evac time (hrs)	max storage (ac–ft)	max ws elev
Existing Dam w/ overflow	120	447	5401.7
Raised Dam w/o emergency spillway	220	1054	5414.7
Raised Dam w/ excavated pool	295	1104	5401.2

DETENTION STORAGE

IMPROVED CROSSING

ALTERNATE F – Use of Playa #2
For Detention of
Upland flows

NOT TO SCALE



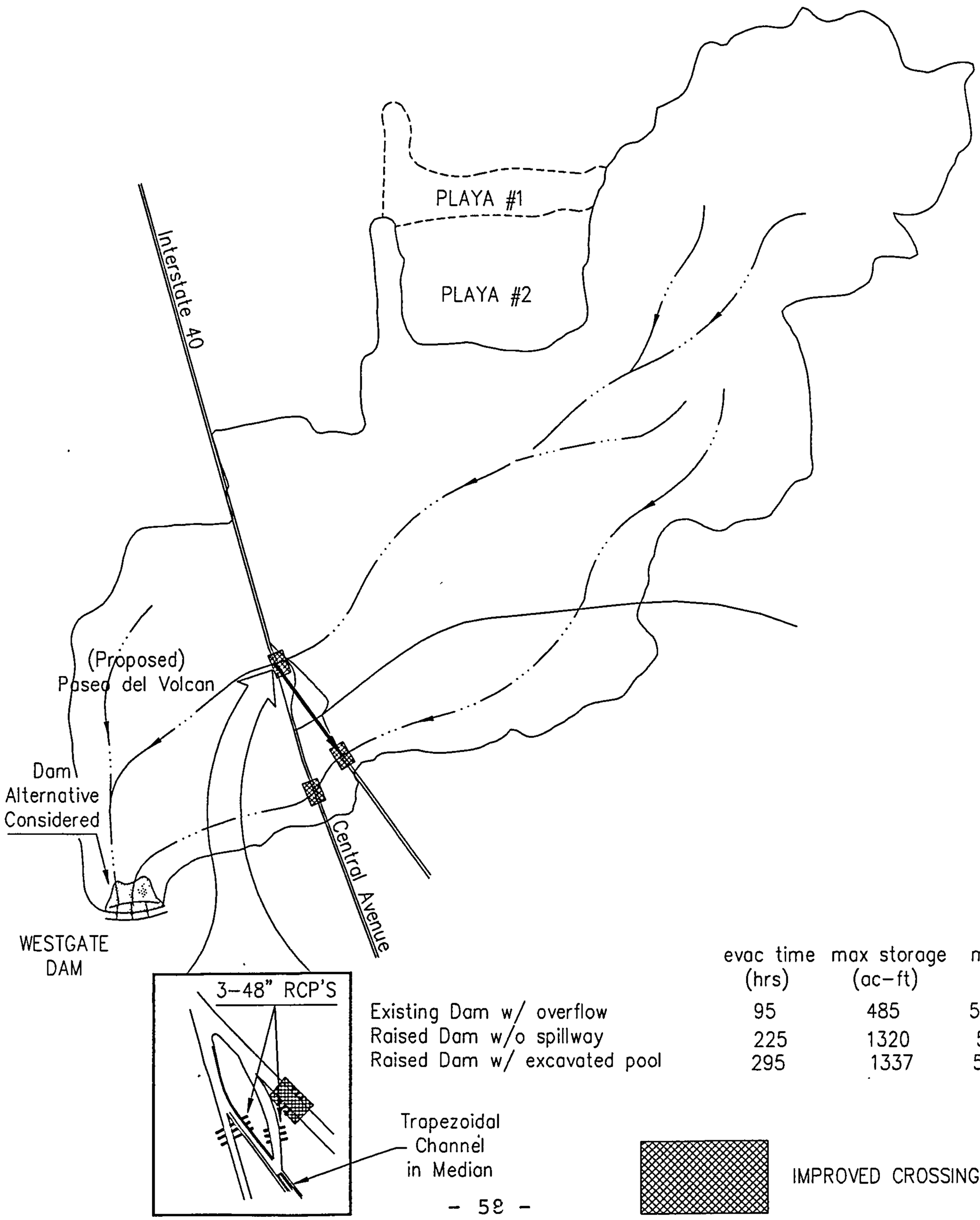
	evac time (hrs)	max storage (ac-ft)	max ws elev
Existing Dam w/ overflow	115	485	5402.4
Raised Dam w/ existing pool	225	1268	5416.2
Raised Dam w/ excavated pool	295	1266	5402.0

DETENTION STORAGE

IMPROVED CROSSING

ALTERNATE G1 – Diversion of Flows from West to East Amole via Trapezoidal Channel in I–40 Median

NOT TO SCALE

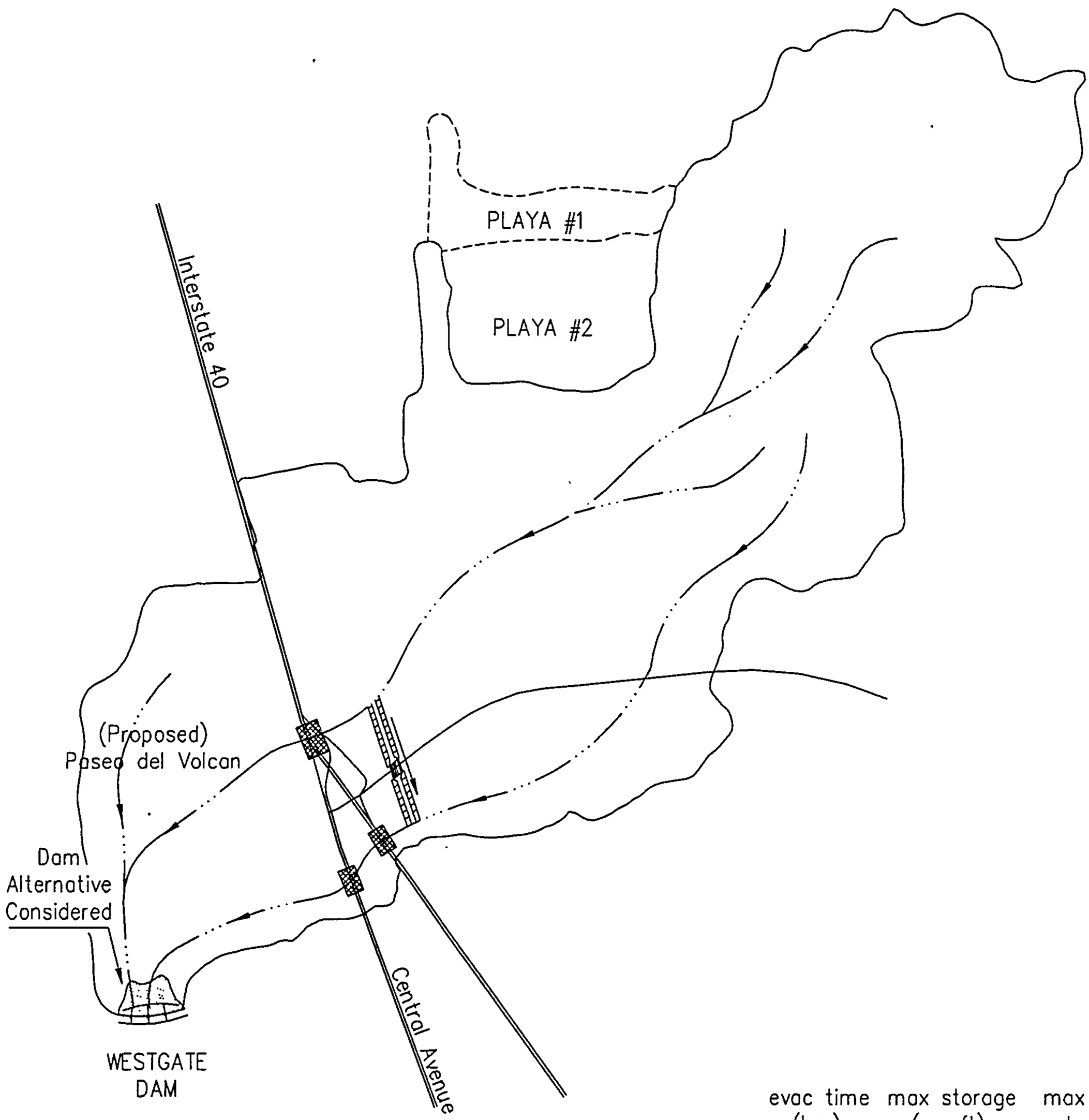


	evac time (hrs)	max storage (ac–ft)	max ws elev
Existing Dam w/ overflow	95	485	5402.4
Raised Dam w/o spillway	225	1320	5418.3
Raised Dam w/ excavated pool	295	1337	5405.3

IMPROVED CROSSING

ALTERNATE G2 – Diversion Channel
North of I–40 from
West to East Amole

NOT TO SCALE

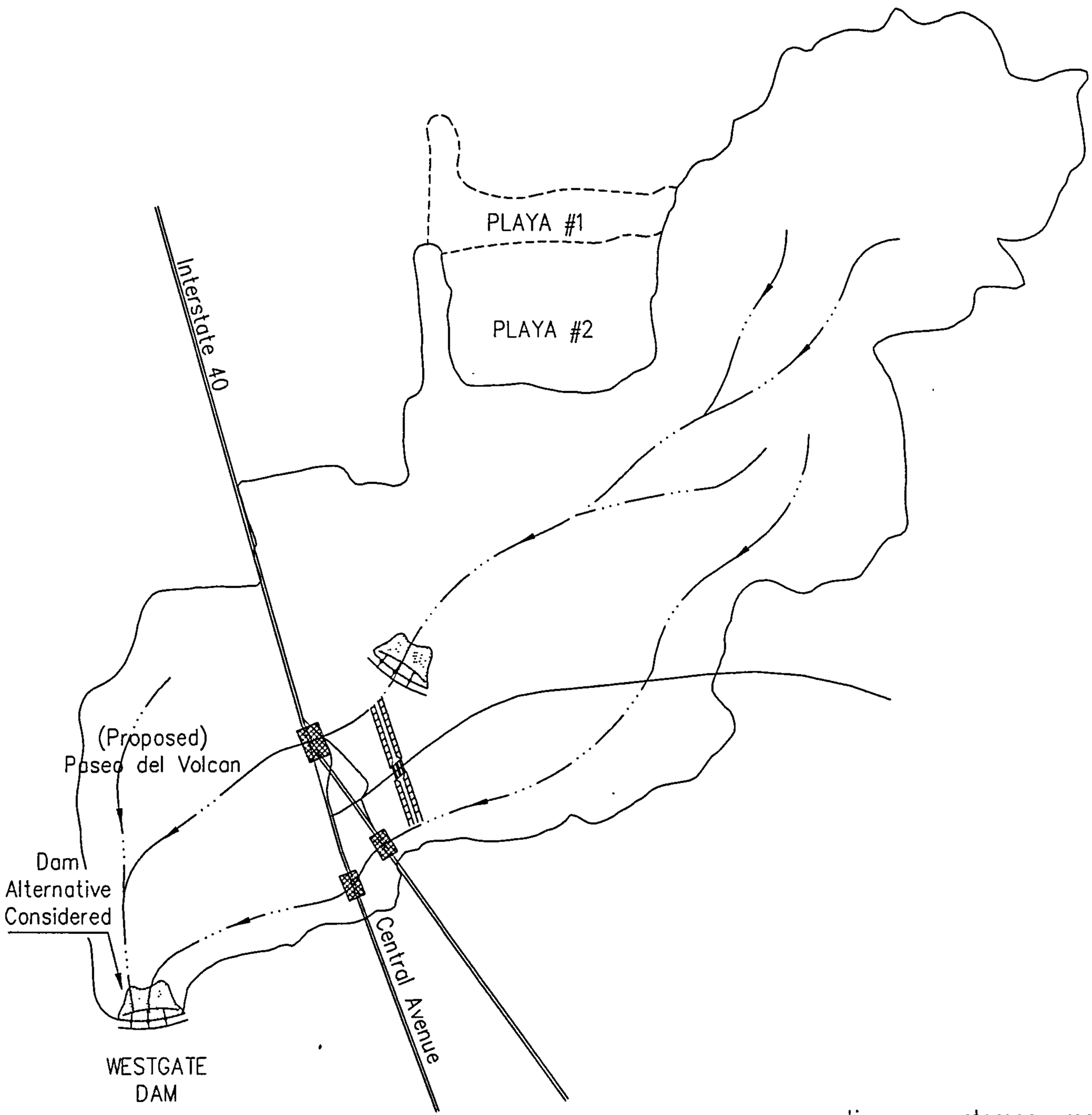


	evac time (hrs)	max storage (ac–ft)	max ws elev
Existing Dam w/ overflow	95	483	5402.6
Existing Dam w/o emergency spillway	230	1325	5416.5
Raised Dam w/o emergency spillway	225	1323	5418.3
Raised Dam w/ excavated pool	295	1340	5405.5

IMPROVED CROSSING

ALTERNATE G3 – Diversion Channel North of I–40 from West to East Amole. Detention basin on the west branch of Amole arroyo.

NOT TO SCALE



	evac time (hrs)	max storage (ac–ft)	max ws elev
Existing Dam w/o overflow	125	459	5401.7
Raised Dam w/o emergency spillway	225	1155	5415.6
Raised Dam w/ excavated pool	295	1199	5402.3

IMPROVED CROSSING

ALTERNATE H – Diversion Channel North of I–40 from West to East Amole. Detention basins on both the east and west branches of the Amole arroyo. Diversion of all intercepted flows north of I–40 to the West Bluff Outfall

NOT TO SCALE

PLAYA #1

PLAYA #2

Interstate 40

(Proposed) Paseo del Volcan

Dam Alternative Considered

WESTGATE DAM

Central Avenue

to West Bluff Outfall

	evac time (hrs)	max storage (ac–ft)	max ws elev
Existing Westgate Dam	80	316	5398.2
Raised Dam w/ excavated pool	150	334	5380.3

IMPROVED CROSSING

7.1 COMPARISON CRITERIA

A numerical ranking system, described below, was developed to evaluate the alternatives. Of the eight options previously discussed only C, G3, and H are considered realistic options and lend themselves to the following analysis. Alternatives A, B, D, E, F, G1 and G2 are not further considered. In weighing the relative merits of each alternative, the following criteria were addressed:

- **Consistency with planning goals and development issues for the study area (DEV).** Alternatives evaluated under this criteria are ranked from -1 to +1. A positive ranking indicates consistency with current planning strategy, and a negative rank indicates either an inconsistency or a negative impact on existing development.

- **Environmental and geologic impact (ENV).** Any new structural improvement or facility is considered to have an adverse impact on existing environment conditions. Alternatives evaluated under this criteria are ranked from -5 to 0. A negative number indicates a conflict with identified geologic constraints or cultural resources.

- **Conflict with existing utilities (UTIL).** This criteria is evaluated between -5 and 0, with a negative value indicating the extent of the conflict or the size of the utility. A zero indicates no impact.

- **Reduction in peak flowrates (FLOW).** Alternatives evaluated for their benefit in reducing peak flowrates, and consequently the size of facilities and the potential for flood damage, are ranked between 0 and +5.

- **Reduction in volume of runoff (VOL).** This criteria primarily addresses the impact of runoff volume on detention facilities. Alternatives evaluated under this criteria are ranked from 0 to 5. A zero score indicates no reduction, and a 5 indicates the alternative with the greatest reduction (Alt. H). The other alternatives are prorated between 0 and 5.

- **Right-of-way acquisition requirements (ROW).** This criteria is also evaluated between -5 and 0. A zero score indicates that minimal additional rights-of-way are required. A negative indicates the extent of additional ROW prorated between 0 and -5.

- **Maintenance costs (MAINT).** Maintenance costs are evaluated between - 5 and 0 also. Any new facilities are expected to incur costs associated with their upkeep. However, it is also anticipated that existing facilities will require maintenance associated with their continued operation.

- **Cost to implement (COST).** Construction costs for new facilities are evaluated between -5 and 0. A zero indicates no improvement costs. Alternatives that do require construction are prorated between -5 and 0, with -5 being the greatest cost.

7.2 DECISION FACTORS

- Timing of improvements - Development within the watershed has occurred slowly. The drainage improvements necessary to convey and mitigate the impact of increased flowrates and runoff volume due to development are closely tied to the development itself.

- Potential funding sources - A number of agencies and entities have facilities or other interests within the watershed. Each potentially derives benefits from drainage management in the watershed or conversely incurs responsibility for the implementation of drainage regulating faciliites.

- Westgate Dam and downstream facilities - Westgate Dam presently is the first in a series of detention and conveyance facilities providing flood control protection to the west side of Albuquerque.

7.3 ANALYSIS OF ALTERNATIVES

As previously noted, the storage volume, maximum water surface elevation, and evacuation time of Westgate Dam are key considerations. AMAFCA is concerned with not increasing the outlet size at the dam and consequently increasing the discharge which could adversely impact downstream facilities. None of the three primary alternates appear to directly impact cultural

resources in the basin. However, siting of improvements in the lower portion of the basin should consider a more in-depth investigation. All three options discussed below impact proposed developments north of I-40 in the vicinity of the interchange. There is minimal impact on existing development.

7.3.1 Alternative C - Detention above I-40. This option was considered initially to reduce peak flowrates impacting existing crossing structures on both branches of the Amole at I-40 and Central. Neither of the proposed detention basins impact existing utilities. A reduction in peak flowrates is realized in both arroyo branches and at Westgate Dam, however, the total volume of inflow to the dam is not reduced. Maximum storage in the proposed west branch detention dam is estimated to be 567 ac-ft. The east branch detention dam is estimated to store a maximum of 51 ac-ft. It is expected that both arroyo channels will require a hard lining (concrete or soil cement) at some point in the future as development increases. Prudent limit boundaries could be considered as an interim approach for both the east and west branches. Structure improvements are required at I-40 on the west branch for the north and south frontage roads and at the on-ramp. On the east Amole branch, structural improvements are required at Central Avenue to upgrade the capacity of the existing 8'x4' CBC. The crest of Westgate Dam must be raised and the impoundment area enlarged to accommodate the increased volume for future conditions.

7.3.2 Alternate G3 - Detention/Diversion (above I-40). This option focuses the majority of the impact of channelized flow to the east branch of the Amole. Maximum storage in the proposed detention facility upstream of I-40, on the west Amole branch (sub-basin 408), is estimated to be 501 ac-ft. The diversion between the detention dam and the east branch requires a new crossing structure at Paseo del Volcan. Significant improvements are required at the east branch crossings with I-40 and Central Ave. to accommodate the combined flows of the diversion and the contributing area above I-40 on the east branch. In addition, improvements to Westgate Dam are necessary to provide adequate storage for the full developed condition volume. These improvements include raising the crest of the dam and enlarging the impoundment area. The east branch main channel, from I-40 to Westgate Dam will require a hardened lining (soil cement or concrete) to accommodate the increased flowrates and velocities. A prudent limit boundary on the west branch should be considered, particularly in light of the proposed golf course and residential development in the lower reaches of the basin.

7.3.3 Alternative H - Detention/Diversion (West Bluff Outfall). This option was considered primarily to address the large storage requirements and evacuation period at Westgate Dam associated with the other options. The intent is to look at a solution which would allow Westgate Dam to discharge to less than 10 ac-ft of storage in a 96 hour period. The future conditions hydrologic model predicts that the dam would contain approximately 799 ac-ft after 96 hours, assuming no upstream diversion out of the basin, and assuming that Westgate dam is enlarged to increase its capacity. Diverting 100% of the volume intercepted by the east branch above I-40 would only reduce the volume seen at the dam by 236 ac-ft. Therefore, some portion of the west branch flows must also be diverted. Diversion of 100% of the flows contributing to both branches above I-40 amounts to approximately 1043 ac-ft. 86% of the 1043 ac-ft, or 897 ac-ft, must be diverted to meet the 10 ac-ft/96 hr. criteria at Westgate Dam. The resulting solution is based on diverting 100% of the upland flows (above I-40) to the West Bluff Outfall facility. Alternate H includes:

- A new 186 ac-ft detention dam in sub-basin 504 on the east branch above I-40. This dam presents a potential conflict with the proposed outdoor entertainment complex.

- A new 500 ac-ft detention dam in sub-basin 408 on the west branch above I-40.

- A new diversion channel between the two detention dams and a new crossing at Paseo del Volcan.

- A new 54"/48" diversion pipe from the east branch dam to the upper end of the future West Bluff Outfall at 98th street. The diversion would likely parallel I-40 on the north side and be approximately 13,200 ft. in length. The pipe would convey a peak discharge of 307 cfs.

- Hard channel lining improvements will eventually be required for both branches as development increases, particularly in the lower basin. Both branches should be considered for a prudent limit boundary approach as an interim solution.

- No improvements to existing structures at I-40 or Central crossings, or at Westgate Dam are otherwise anticipated.

Using the comparison criteria listed in Section 7.1, the alternates are compared as follows:

TABLE 10
COMPARISON OF ALTERNATIVES

	C	G3	H
DEV (-1 to 1)	-1	0	-1
ENV (-5 to 0)	-1	-1	-1
UTIL (-5 to 0)	0	0	0
FLOW (0 to 5)	3	4	5
VOL (0 to 5)	1	1	5
ROW (-5 to 0)	-2	-1	-3
MAINT (-5 to 0)	-2	-1	-3
COST (-5 to 0)	-4	-5	-4
TOTAL RANKING	-6	-3	-2

8.1 CURRENT SITUATION

In general, existing structures are marginally adequate to control and convey runoff for existing conditions. Increased development, without the implementation of adequate controls, will overtax existing facilities and increase the potential for additional flooding, damage, and erosion. AMAFCA initiated this study to anticipate future conditions, quantify the runoff therefrom, and to establish the framework for orderly implementation of planning controls and physical improvements to handle the future conditions. Since the watershed is relatively undeveloped at present, and since the "planned communities" criteria is currently an untested concept, the actual development of the watershed will be a dynamic and long term program. Fortunately, the hydrologic model developed with the study is easily adapted for changing conditions. Responsibilities for the implementation of drainage controls are long term and should be shared between the public and private sectors.

8.2 ASSUMPTIONS

A. Land will develop according to the "planned communities" concept (see Section 5.2.1).

B. Limited development will occur below (south of) I-40 and in the vicinity of the I-40/Central/Paseo del Volcan Interchange. Later development will occur north of I-40.

C. Facilities can be constructed as development progresses.

D. Adequate capacity must exist at Westgate Dam and in new facilities before upstream development is allowed to descharge developed flows. As an interim measure, retention ponding might be allowed to restrict runoff to historic conditions.

E. Full development will require lining and/or stabilization of channels. Prudent limit boundaries may be permissible as an interim measure.

8.3 RECOMMENDED ALTERNATIVES

Three "preferred alternatives" were developed from the previous analysis. Estimated costs associated with each of the three primary options (C, G3, and H) are shown in Table 11 below. Both Alternatives C and G3 assume that the detention time at Westgate Dam can be increased to approximately 296 hours, which significantly exceeds the 96 hour criteria established by the State Engineer's Office (SEO). Alternative H has a positive effect on the storage in Westgate Dam by discharging the 421 ac.-ft. of water in 13 hours which is significantly less than the 96 hour arteria established by the SEO.

Alternative H is the preferred option overall (-2 ranking). It provides the least impact on existing facilities and improves the overall operation and storage requirements at Westgate Dam. This option is contingent, however, upon the completion of design and construction of the West Bluff Outfall facilities to 98th Street. Alternative G3 is the preferred option (-3 ranking) for the case where all contributing runoff is routed through Westgate Dam. Even though the overall cost of the facilities is higher, to accommodate fully developed conditions, long term maintenance costs are expected to be less. Also, with the upstream detention facility in place the west branch of the Amole arroyo lends itself to a non-structural approach (prudent limit) for a longer interim time period.

TABLE 11

ESTIMATED COST OF IMPROVEMENTS

IMPROVEMENT	ALT. C	ALT. G3	ALT. H
Westgate Dam Modifications	2,500,000	2,500,000	-
Dam - West Branch of Amole Arroyo	1,300,000	1,300,000	1,300,000
Dam - East Branch of Amole Arroyo	625,000	-	1,200,000
Channel Lining - West Branch of Amole Arroyo	7,960,000	7,600,000	7,560,000
Channel Lining - East Branch of Amole Arroyo	5,600,000	6,325,000	4,400,000
Crossing Structures - West Branch of Amole Arroyo	566,000	400,000	400,000
Crossing Structures - East Branch of Amole Arroyo	794,000	794,000	-
Diversion - West Amole to East Amole above I-40	-	1,551,000	1,551,000
Diversion to West Bluff Outfall	-	-	2,200,000
TOTAL ESTIMATED COST *	19,345,000	20,470,000	18,611,000

* includes construction, engineering, and right-of-way

8.4 ALLOCATION OF RESPONSIBILITY AND COSTS

Possible scenarios for allocating responsibility and cost of proposed drainage facilities are as follows:

A. Private development bears all costs for improvements, including major facilities (detention dams, channels, diversions, etc.), minor facilities (storm drains, crossing structures, drop structures, etc.), and dedication of rights-of-way.

B. Public agencies bear the entire cost of major facilities necessary to control developed conditions. Private development would dedicate necessary rights-of-way and install minor facilities.

C. Public agencies pay for major drainage facilities (or the equivalent cost) necessary to accommodate existing conditions runoff. Private development pays for expanding major drainage facilities, above that necessary for existing conditions (to mitigate the effects of development), for minor facilities, and dedicates rights-of-way necessary for all drainage facilities.

D. Some negotiated variation of the above scenarios.

Potential funding sources include the following:

- Private Land Development Projects (with infrastructure agreements).
- Impact Fees on Private Development, or Special Assessment Districts.*
- The New Mexico State Highway and Transportation Department (NMSHTD).
- The Federal Highway Administration (FHWA).
- Bernalillo County
- The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA).
- The City of Albuquerque

* Not currently available for AMAFCA. Can be implemented by City of Albuquerque and Bernalillo County.

8.5 RECOMMENDED PLAN

Alternative H is the recommended option, but is contigent on, and dependent on, the construction of the West Bluff Outfall. Alternative H calls for the following improvements:

- Construction of the West Bluff Outfall (not a part of this study).
- A dam on the west branch of the Amole Arroyo above (north of) I-40.
- A dam on the east branch of the Amole Arroyo above (north of) I-40.
- A diversion from the outlet of the west branch dam to the east branch dam, including a drainage structure under Paseo del Volcan.
- A diversion from the outfall of the east branch dam to the upper (west) end of the West Bluff Outfall.
- Improvement of crossing structures under the I-40/Central interchange at the Amole west branch.

- Eventual lining of both branches of the Amole Arroyo from north of I-40 to the Westgate Dam.

Recommended actions are as follows:

TABLE 12 - RECOMMENDED ACTIONS

ACTION	TIME FRAME	FUNDING
Limit drainage releases to historic conditions	Immediate	
Analyze and plan for West Bluff Outfall	1993-1995 Immediate	AMAFCA/CITY
Prepare conceptual designs for dams and diversions	1994	AMAFCA
Acquire rights-of-way for dams and diversions. Prepare final designs.	1994-1996	Private/AMAFCA
South of I-40, establish prudent limit boundaries on both arroyo branches (interim measure)	To be determined	Private
South of I-40, dedicate rights-of-way for channels	To be determined	Private
Construct/reconstruct highway crossing structures, west branch of Amole Arroyo.	To be determined	Bernalillo County/ NMSHTD
North of I-40, construct dams, connecting diversion, and diversion to West Bluff Outfall	1997	AMAFCA
Partially release drainage restrictions	1997	AMAFCA
South of I-40, line both arroyo branches.	As needed	Private

REFERENCES

(1) ALBUQUERQUE BERNALILLO COUNTY COMPREHENSIVE PLAN, August 1988, Albuquerque/Bernalillo County Planning Division Planning Department

(2) FACILITY PLAN FOR ARROYOS: Multiple Use of Albuquerque's Arroyos and their Floodplains, February 3, 1986, City of Albuquerque, Planning Department, Planning Department.

(3) THE AMOLE ARROYO CORRIDOR PLAN, January 1991, City of Albuquerque and Bernalillo County, New Mexico

(4) NORTHWEST AREA PLAN - VOLUME II - GOALS & ISSUES, May 1987, City of Albuquerque/Bernalillo County

(5) SOUTHWEST AREA PLAN, VOLUME IV, THE PLAN, City of Albuquerque

(6) WESTERN METROPOLITAN DRAINAGE SYSTEM - WESTGATE DETENTION DAM, October 1975, Albuquerque Metropolitan Arroyo Flood Control Authority, William Matotan & Associates Engineers, Albuquerque, New Mexico

(7) FAR NORTHWEST DRAINAGE MANAGEMENT PLAN PRELIMINARY REPORT, August, 1985, Bohannan-Huston, Inc., Albuquerque, New Mexico

(8) PLANNED COMMUNITIES CRITERIA: POLICY ELEMENT, February 1991, Albuquerque/Bernalillo County Planning Department, Albuquerque, New Mexico

(9) HYMO: PROBLEM-ORIENTED COMPUTER LANGUAGE FOR HYDROLOGIC MODELING USERS MANUAL, May 1973, Southern Region, Agricultural Research Service, U.S. Department of Agriculture

(10) AHYMO, PROBLEM-ORIENTED COMPUTER LANGUAGE FOR HYDROLOGIC MODELING, AMAFCA VERSION, USERS MANUAL (Preliminary), September, 1990, Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)

(11) SECTION 22.2, HYDROLOGY OF THE DEVELOPMENT PROCESS MANUAL VOLUME 2 DESIGN CRITERIA, January, 1991, City of Albuquerque, New Mexico

(12) SOIL SURVEY OF BERNALILLO COUNTY AND PARTS OF SANDOVAL AND VALENCIA COUNTIES, NEW MEXICO, June 1977, United States Department of Agriculture Soil Conservation Service and Forest Service and United States Department of the Interior Bureau of Indian Affairs and Bureau of Land Management in cooperation with New Mexico Agricultural Experiment Station

NOTATION AND ABBREVIATIONS

AHYMO - AMAFCA version of the HYMO model.

AMAFCA - Albuquerque Metropolitan Arroyo and Flood Control Authority.

cfs - Cubic feet per second.

CBC - Concrete box culvert.

CCP - Concrete cylinder pipe.

CMP - Corrugated metal pipe.

dia. - Diameter of pipe.

DPM - Developmental Process Manual.

du/ac - Dwelling units per acre.

ft - Feet.

HP - High pressure.

hrs - Hours.

HYMO - USDA's hydrological Model.

NMSH&TD - New Mexico State Highway and Transportation Department.

No. - Number.

KV - Kilovolt.

RCP - Reinforced Concrete Pipe.

VHP - Very high pressure.

*-year / *-yr - Indicates the return period or frequency of a given storm event.

P_{60} - One hour (60 minute) precipitation

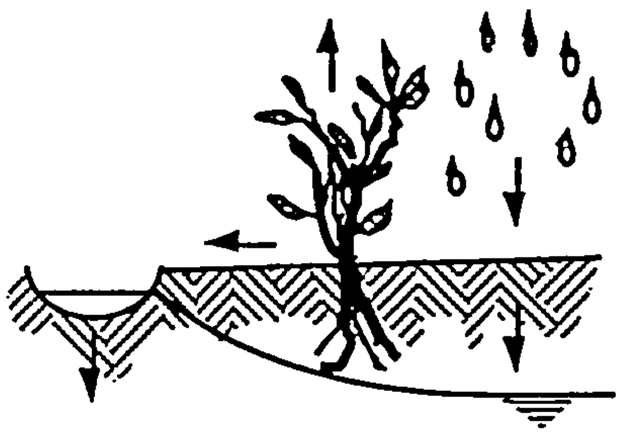
P_{360} - Six hour (360 minute) precipitation

P_{1440} - One day (24 hour or 1440 minute) precipitation

SEDIMENT ISSUES IN THE AMOLE BASIN
A Report Prepared for Scanlon & Associates
Friday, January 22, 1993

Richard J. Heggen, PE, PH, PhD
Water Resources Engineering

APPENDIX A



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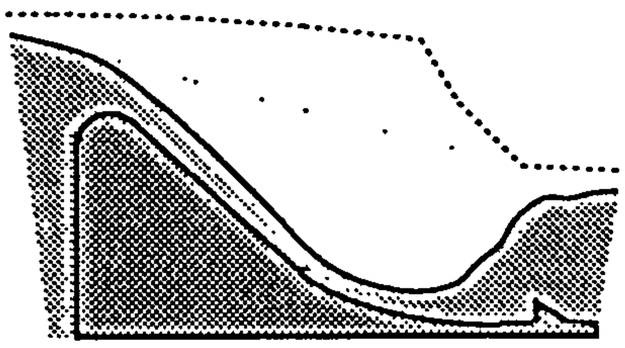

Friday, January 22, 1993

Sediment Issues in the Amole Basin

A Report Prepared for Scanlon & Assoc.

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Sediment Issues in the Amole Basin

A Report Prepared for Scanlon & Assoc.

Introduction

This report is divided into four sections: Geomorphology, Alternatives, Sediment Yield, and Sediment Transport. The first section discusses soils, channel shape, slope, planform and overall sediment behavior. The second section summarizes two alternatives for drainage system improvement proposed by Scanlon & Assoc. (SA). The third section quantifies erosion within the watershed. The fourth section discusses sediment flux within and from the watershed.

Geomorphology

Soils

The Amole system consists of the East and West branches which drain in the southerly direction, cross I-40 and Central and merge at the Westgate Dam. The 18.68 mi^2 basin includes 8 different soil types shown in Table 1.

Table 1. Soil Types

Percent of Area	Soil	Description	HSG	Runoff	Erosion Potential
50.2	MWA, Madurez	Fine Sandy loam and sandy clay loam	B	Slow	Blowing, moderate to severe
21.7	MaB, Madurez	Loamy fine sand	B	Slow	Blowing, severe
12.0	WaB, Wink	Sandy loam	A	Medium	Water, slight to moderate Blowing, moderate
9.5	BKD, Bluepoint	Loamy fine sand	A	Slow	Water, moderate to severe
3.8	LtB, Latene	Sandy loam	B	Medium	Water, moderate Blowing, moderate
2.5	PAC, Pajarito	Fine sandy loam and sandy loam	B	Slow	Blowing, severe
0.2	BCC, Bluepoint	Loamy fine sand	A	Slow	Blowing, severe
0.1	To, Tome	Silty loam	B	Medium	Water, moderate

The basin has 13.6 percent hydrologic soil groups A and 86.4 percent B. By SCS classification, 84.1 percent of the basin has slow runoff and 15.9 percent has medium runoff. Only 25.4 percent of the basin has hazard of water erosion, two-thirds of which is only moderate or slight. More than 90 percent, however, has hazard of wind erosion, most of which is severe. Eolian erosion is

evidenced by sand dunes and surface ripples. Unlike fluvial transport, however, which moves sediment unidirectionally, wind-borne particles follow less regular paths and have no particular propensity to follow the direction of drainage. Slopes are in the 2 to 3 percent range.

Photo Interpretation

Aerial negatives, approximately 1:18,000 scale, exist from 11/6/59 and 9/22/67 for the eastern half of the basin. Aerial positives at 1:6,000, 1:12,000 and 1:36,000 over the southern portion of the basin were taken on 1/27/91 and 2/5/91. Together there is a 31 year photo history of watershed condition for the southeastern portion of the basin.

A reach of the West Branch from approximately 5,000 ft. above Central to 5,000 ft. below is common to all the photography. This reach is of particular interest for two reasons: 1) it has definite banks that should indicate any changes in channel width or direction, and 2) this area has experienced development, including the I-40 interchange, freeway commerce, and the Tierra West Mobile Home Park adjacent to the West Branch. This is a zone of active sediment transport.

Additionally, there are approximately 7,000 ft. of unchannelized watershed further north common to all photos. This zone has experienced little development other than the construction of a portion of Paseo del Volcan Rd. to the Double Eagle Airport. Field inspection reveals swales of eolian sand with good vegetative cover. There is only minor indication of overland flow.

The watershed not in the common aerial photography appears to be hydrologically comparable to the photographed areas.

The watershed's hydrologic condition appears to have improved with time. If in fact this is the case, the reasons may include 1) a change in grazing practice, 2) vegetative recovery from a pre-1959 massive pattern of radial disturbances, perhaps a proposed subdivision, on the high mesa, and 3) the cessation of gravel mining above the Central crossing.

Channel Cross-section

Photographic inspection reveals an almost total lack of cross-sectional adjustment over the 31 years. Channel widths do not appear to have been significantly altered. There are no new headcuts identifiable from the photos.

Channels below Central have bank slumps of recent origin, indication of ongoing adjustment, but such adjustments appear to be only local. Channel widening appears to be at predictable locations, generally along the outside of bends. Sediment loss appears to roughly balance sediment input.

Channel Slope

The channel bed does not appear to be undergoing major scour or deposition. Significant bed discontinuities, a standard sign of degradation, are absent. A 3-ft. exploratory pit was dug in the West and East Branches (Sites 1 and 5, Appendix 1). The d_{50}'s for the sites (surface, 18 in. and 36 in.) were 1.7, 2.9 and 1.7 mm and 0.8, 2.1 and 2.0 mm. Uniformity coefficients averaged 9.6. Bed laminas noted by the differences in d_{50}'s indicate that bed material is deposited and scoured as layers, rather than being deeply churned with each runoff event. This is consistent with slow runoff, an SCS soil classification characteristic discussed earlier.

There is no impression in the field of any net grade change, consistent with the stationary planform evidenced in the photographic record.

Planform

Planform describes a channel planar pattern, the migrations, meanders and the braids. In classical fluvial geomorphology, planform is predicted by grade and sediment size. In practical measures, ephemeral channels are typified by an ill-behaved planform, one in which straight reaches abruptly turn, widen and narrow with little periodicity.

Few watercourses above I-40 can readily be identified in 1:6,000 aerial photography. Field inspection indicates that the channels are not incised and are regularly filled by wind-borne particles.

Several small watering ponds that might have sediment control value predate 1959. They do not appear to be altered over time. The I-40 interchange obliterated the original channel just above Central, but once under Central, the channel is little modified from pre I-40 conditions. Any channel disruption caused by I-40 effectively halts at Central.

Below Central, the channels assume the more typical arroyo planform, sporadically turning after short linear reaches. Ephemeral watercourses are not only characterized by an abrupt planform, but also by a planform unstable over time. From the photographic evidence, the Amole is uncharacteristically well behaved in the latter aspect. Channels incised below Central are relatively fixed in location.

Alternatives

Development

In its current development, the basin is 98 percent land treatment A as defined in Section 22.2 of the Development Process Manual (DPM). Correction for slopes over 10 percent done subsequent to this report yielded a small decrease in land treatment A and a resultant 1.2 percent increase in runoff to Westgate Dam. While the correction is included in the hydrologic findings by SA, the correction is insignificant to sediment study and not here included.

Future development projected by SA show the basin to be 4, 20, 26 and 50 percent land treatments A, B, C and D respectively.

SA has considered several alternative drainage improvement plans. Two of the plans are evaluated here. The subsequent designations (1) and (2) are particular to this report. Alternative 1 in this report corresponds to SA Alternative G. Alternative 2 in this report corresponds to SA Alternative H.

Alternative 1

Alternative 1 is a diversion of the West Branch headwaters above I-40 to the East Branch. The latter would be lined to the Westgate Dam. Table 2 indicates the respective drainage areas.

Table 2. Drainage Areas, Alternative 1

Branch	Existing Conditions Area(mi^2)	Future Conditions Area(mi^2)
West	14.35	3.18
East	4.33	15.50

Alternative 2

Alternative 2 is a detention of both branches above I-40 in a new reservoir, from where discharge would be diverted by conduit to the West Bluff Outfall along I-40 to the Rio Grande. Table 3 indicates the respective drainage areas.

Table 3. Drainage Areas, Alternative 2

Destination	Existing Conditions Area(mi^2)	Future Conditions Area(mi^2)
Westgate Dam	18.68	5.17
West Bluff Outfall	0.00	13.51

Sediment Yield

A Rule of Thumb

This study benefits from the previous investigation, *Sediment Issues in the San Antonio Arroyo* by Molzen-Corbin & Assoc. That study in turn drew upon *Black Arroyo Sediment Issues* by Bohannan-Huston, Inc., *Unser Bridge/Calabacillas Arroyo Detention Basin* by Resource Consultants, Inc., and *Erosion Study to Determine Boundaries for Adjacent Development - Calabacillas Arroyo, Bernalillo County, New Mexico* by Simons, Li & Assoc. The Amole, San Antonio, Calabacillas and Black Arroyos are within a few miles of one another on Albuquerque's west side. All are of similar terrain and face similar issues of management.

In *Sediment Issues in the San Antonio Arroyo*, the rule-of-thumb basin mean sediment yield, vol_s, of 1.0 acre-ft/mi^2/year was reviewed. This mean has been somewhat accepted for the Albuquerque area, albeit with little site-specific verification. This mean takes no account of basin-specific characteristics. The estimate is generally applied to undeveloped land in minimally-disturbed or undisturbed condition.

Maps

The 1973 SCS New Mexico erosion map and the 1978 NMNRD Soil and Water Conservation Division erosion map independently indicate a range of vol_s in Bernalillo County from 0.00-0.02 to 1.0-3.0 acre-ft/mi^2/year. Both maps show the Amole basin in the 0.2-0.5 acre-ft/mi^2/year range.

Westgate Dam

The Westgate Dam is not designed for long-term sediment accumulation, but rather to be cleaned of sediment deposition as required. A 0.20 bulking factor was applied in dam design to the 100-year inflow, yielding an anticipated 69 acre-ft of sediment for that event (*Literature Review, Amole Arroyo Westgate Dam Drainage Management Plan,* SA, 1991).

The reservoir behind the dam has a several-percent slope towards the tower outlet. Were sediment entering at anything approaching the rule of thumb, several feet of fresh deposits should be apparent over several acres around the tower. There is indication neither of the rule-of-thumb 18.68 acre-ft/year sediment filling nor of any storm-borne influx of the 69 acre-ft magnitude anticipated by the designers. In 14 years, only 3.59 acre-ft of sediment have been removed by AMAFCA. By this record, vol_s is 0.014 acre-ft/mi^2/year. As the reservoir has not been resurveyed to determine net change in capacity, the exact deposition rate cannot be verified.

Two storms (1980 and 1988) may have precipitated approximately 1 in., on the order of a 5-year storm, over the watershed. Most of the sediment removed from the reservoir can be attributed to these events. There has been no documentation of a 100-year 2.2 in. storm over the watershed. The sensitivity to a single storm makes a vol_s estimate over a short term of questionable precision.

As discussed in the earlier Geomorphology section of this report, the topography of the upper basin is suited to trapping sediment. The low value of Westgate accumulation may in large part be due to upstream retention.

Universal Soil Loss Equation

Distributed soil loss behavior in the basin was modeled with the Universal Soil Loss Equation (USLE) analysis (*Predicting Rainfall Erosion Losses*, superseding Agricultural Handbook No. 282, USDA, 1978). This model predicts soil loss on an average annual basis.

The USLE does not account for sediment loss from streambank and bed and uncontrolled roadsides. The USLE was developed for plots, not watersheds. The USLE does not model the flux of sediment, once mobilized.

Whereas the USLE is highly precise in several of its parameters, it is loose is the estimation of others. The USLE requires subjectively-determined parameters for nonidealized, nonhomogeneous watersheds. Any result should be considered to have at least a 50 percent margin of error. In some cases, reality departs from theory even more.

The USLE is useful for sensitivity analysis of the factors which influence soil loss. The USLE can thus be used for relative modifications to a independently-determined vol_s.

Each of the 140 subbasins defined in AHYMO was modeled with the USLE. Analysis of the existing basin is included in Appendix 2. By the USLE, the existing basin has a vol_s of 0.191 acre-ft/mi^2/year.

USLE assumes a watershed with the entire area contributing sediment. Yield must be corrected for the areas either paved or in sod. This requires multiplying by the proportion in land treatments A and C. Under future conditions, where land treatments B and D to not contribute to basin loss, vol_s is 0.058 acre-ft/mi^2/year for the overall basin.

Sediment Delivery Ratio

The sediment delivery ratio (SDR) is the proportion of eroded soil that is carried from the basin by streamflow. Both size and homogeneity of the basin are significant to the SDR.

Chapter 6, Section 3 of the SCS NEH suggests a ratio of 0.19 be applied to vol_s for an 18.68 mi^2 basin. This SDR is reasonable by the Corps EM 1110-2-4000. This correction applied to the existing watershed indicates a net vol_s of 0.036 acre-ft/mi^2/year.

For a fully developed basin, the SDR is 1.0. Storm drains and improved channels should have velocities sufficient to transport all sediment inflow to the basin outlet. Were sediment traps maintained in the drainage system, the SDR would be less. Such traps are not anticipated.

Pacific Southwest Inter-Agency Committee

The Pacific Southwest Inter-Agency Committee (PSIAC) estimate of vol_s is approximately 0.2 acre-ft/mi^2/year for natural conditions. PSIAC variables A-I are 5, 5, 0, 5, 0, 10, -10, 0, and 0, summing to 15. The method is not appropriate for urbanized watersheds. Unlike USLE, PSIAC considers channel factors.

While the USLE is multiplicative, the PSIAC is mathematically additive. An error in a single USLE parameter proportionally biases the overall result. An error in a single PSIAC parameter influences the overall result to a smaller

extent. The PSIAC method is not appropriate for fine-tuned analysis, as the USLE can be made to seem. The PSIAC's robustness provides a check on reasonableness, much as the Rational method provides a check on more-complicated watershed models.

Table 4 summarizes annual vol_s estimates for application to the total basin area.

Table 4. Annual Sediment Yield, vol_s (acre-ft/mi^2/year)

Estimate	Conditions: Existing	Conditions: Future
Rule of thumb	1.000	
Maps	0.200-0.500	
Westgate Dam	0.014	
USLE	0.191	0.058
USLE-SDR	0.036	0.058
PSIAC	0.200	

The difference between the rule of thumb and all other estimates is significant. To carry out watershed planning using a rule-of-thumb estimate may incur unwarranted infrastructure costs.

Modified Universal Soil Loss Equation

Distributed soil loss behavior was also modeled with the Modified Universal Soil Loss Equation (MUSLE) analysis (Williams, J., "Sediment-Yield Prediction with Universal Equation using Runoff Energy Factor", *Present and Predictive Technology for Predicting Sediment Yields and Sources*, ARS-S-40, 1975). In the MUSLE method,

$$vol_s = \frac{4.36(Q\ q_p)^{0.56}}{\gamma A}(K\ LS\ C\ P) \qquad (1)$$

where q_p is peak runoff rate in cfs, Q is runoff volume in acre-ft, A is basin area in mi^2, K, LS, C and P are the coefficients of the USLE, γ is the sediment density, here taken as 90 pcf, and 4.36 changes units from the conventional tons to acre-ft.

Unlike the preceding vol_s estimates, the MUSLE result is an event, not annual, yield. In this study, the 100-year storm was modeled. Because the MUSLE computation employs q_p, the yield depends on channel and reservoir routing. Alternative 2 hydrology was used for the MUSLE computation in this report. The MUSLE estimate for the 100-year future vol_s is 0.088 acre-ft/mi^2, as shown in Appendix 3.

Experience in the Albuquerque area indicates that the MUSLE estimate is low.

Recurrence Interval

Sediment Issues in the San Antonio Arroyo reviews the proportions between the annual, 10-year and 100-year vol_s. As the Amole is near the earlier-studied basins and there is no new data regarding recurrence intervals, the results are transferred. The 100-year sediment transport capacity Q_s is 6.66 times the annual value and the 10-year Q_s is 2.66 times the annual value. Annual yield is presumed to be lost in the annual event. In reality, smaller storms initiate the mobilization process, but it is a larger storm that carries the bulk of this sediment downstream. To model sediment yield at less than the annual event would require MUSLE and hydrologic simulations of a year's storm series.

The 2.66 and 6.66 factors relate the capacity of streamflow to transport sediment, not sediment yield from the watershed. In only an approximate sense, these factors may relate vol_s for different recurrence intervals. Table 5 summarizes the event-based yields for the total basin area.

Table 5. Event Sediment Yield, vol_s (acre-ft/mi^2/event)

Estimate	Conditions Existing	Conditions Future
USLE-SDR (10-year)[1]	0.096	0.154
USLE-SDR (100-year)[2]	0.240	0.386
MUSLE (100-year)		0.088

[1] vol_s USLE-SDR (Table 4) * 2.66
[2] vol_s USLE-SDR (Table 4) * 6.66

Sediment Yield Assignment

Based upon judgments from Tables 4 and 5, Table 6 summarizes the recommended vol_s for application to the total basin area.

Table 6. Planning recommendation, vol_s (acre-ft/mi^2)

Event	Conditions Existing	Conditions Future
Annual	0.2	0.1
10-year	0.25	0.2
100-year	0.3	0.3

A vol_s of 0.2 acre-ft/mi^2/year is recommended for planning purposes for the existing basin. This value approximates the PSIAC and USLE without

correction for SDR. This value substantially exceeds that evidenced by Westgate maintenance records. This value falls within the mapped range of yields throughout the region.

A vol_s of 0.1 acre-ft/mi^2/year is recommended for planning purposes for the future basin. This value is less than that recommended for existing conditions because land treatments A and C decrease from 98 to 40 percent. This value stretches the USLE on the conservative side, presuming an SDR of 1.00. Not included in this estimate is sediment loss associated with construction. It is assumed that the development process will incorporate construction requirements for soil conservation. Such measures may include silt fencing, debris basins, seasonal restrictions, temporary grading and buffer zones. Also not included is sediment yield associated with degrading and/or widening channels. It is assumed that the development process will be in concert with protection of vulnerable reaches.

It is coincidental that the recommended existing and future values for the 100-year event are each 0.3 acre-ft/mi^2. The ratio of 100-year/annual vol_s for the existing basin is only 1.5 because the existing channel system is an efficient trapping mechanism. Little sediment from any storm appears to cross I-40. The ratio increases to 3.0 for future conditions because the future system will deliver basin yield more efficiently to the basin outlet.

A 10-year vol_s was not explicitly computed. As an approximation, a value midway between the annual value and the 100-year value is suggested.

Spatial Variability

SA partitioned the basin into 5 subbasin groups: the 100's feed the West Branch below Central; the 200's feed the East Branch below Central; the 300's lie between Central and I-40; the 400's lie above I-40, generally west of Paseo del Volcan Rd.; the 500's lie above I-40, generally east of Paseo del Volcan Rd. Table 7 summarizes the USLE results for existing conditions

Table 7. Sediment Yield by Subbasin Group, USLE

Group	Area (mi^2)	vol_s (acre-ft/mi^2/year)
100's	3.009	0.180
200's	0.838	0.308
300's	0.380	0.146
400's	11.208	0.193
500's	2.758	0.166

The USLE identifies two subbasins where vol_s is approximately 3 times the basin mean. These are subbasins 108 and 109, steep slopes immediately to the west of the Westgate Dam. Gully erosion in this area is locally pronounced, atypical of the overall basin. While there are subbasins to the south of Central

where soil erosion may limit land use, there is no broad zone within the watershed where the drainage system seems prone to exceptional problems of sediment loss.

PSIAC qualitatively supports the finding that vol_s below Central (the 100's and 200's) is greater than that above. Large USLE variances within each of the five groups (Appendix 2), however, statistically discourage fine-tuning different vol_s planning values (Table 6) above and below Central.

Sediment Transport

Alternative 1. Hydrographs

AHYMO 100-year hydrographs for the West Branch under existing and future conditions are shown in Figs. 1 and 2. As points are plotted only on the 30-minute interval, maximum discharge is not necessarily shown. A major tributary enters reach 113.

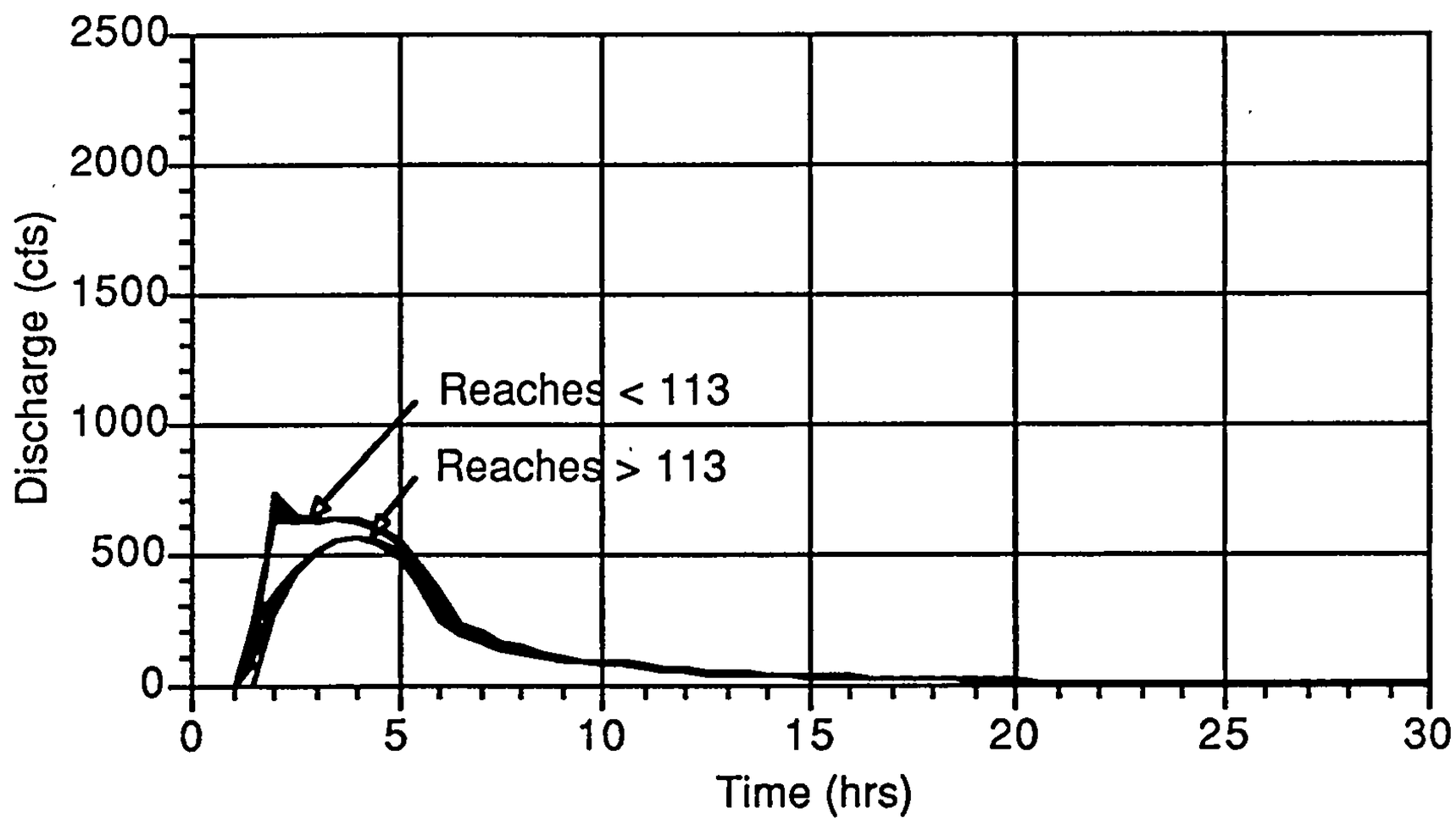

Figure 1. Hydrographs, existing conditions, Alternative 1

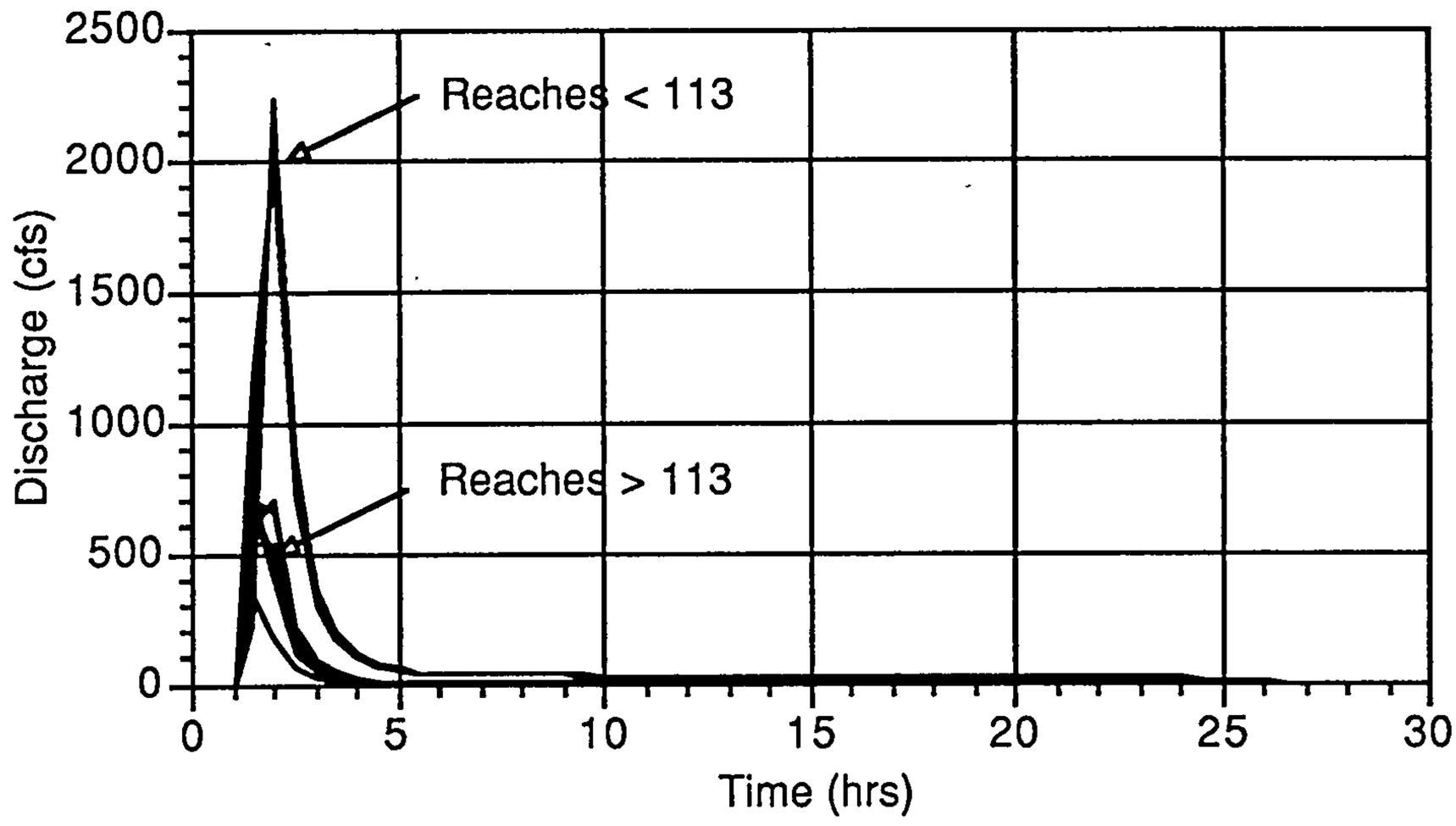

Figure 2. Hydrographs, future conditions, Alternative 1

While future conditions have a higher peak rate (3180 vs. 1017 cfs), future conditions have a lower volume (255 vs. 316 acre-ft) due to diversion to the East Branch.

Alternative 1. Sediment Transport

There is a tendency in engineering studies to apply a myriad of sediment transport capacity equations in search of some sort of intermediate result. This approach is sound if there is reasonable selection of the methodologies. The approach becomes invalid as the list is padded with improper models.

An area-specific regression equation of the Meyer-Peter, Muller and Einstein equations was developed in *Erosion Study to Determine Boundaries for Adjacent Development - Calabacillas Arroyo, Bernalillo County, New Mexico*. As noted in that report,

> "This transport relationship.... is a function of the hydraulics of the study reach of Calabacillas and should not be applied to other systems unless they have similar slopes and bed material characteristics."

The slope of the Calabacillas is 1.0-1.5 percent. The Amole below Central is 2.5 percent. The lower Calabacillas bed material has a d_{50} of 0.58 mm and a Uniformity Coefficient of 5.98 (Sites E, G, J and L). The West Branch has a d_{50} of 1.15 mm and a Uniformity Coefficient of 7.12 (Samples 1-top, 3, 5-top and 7, Appendix 1). The Amole bed material is somewhat larger than that of the Calabacillas, but still within the USDA coarse sand classification. As the two arroyos are similar in major respects and subsequent analysis corrects for particle size, the Meyer-Peter, Muller and Einstein model is appropriate for this study. Eq. 2 is a regressed form of this model.

$$q_s = a\,V^b\,Y^c \qquad (2)$$

where q_s is sediment transport capacity in cfs/ft, V is mean velocity in fps and Y is depth in feet. Coefficients are given in Table 8.

Table 8. Regression Coefficients

Geometric Mean Size (mm)	Coefficient a	b	c
0.15	0.00034	3.664	0.628
0.80	0.000017	4.638	-0.225
2.65	0.0000053	4.723	-0.400
9.25	0.000021	3.904	-0.410

Total sediment transport capacity per runoff event is the weighted sum, Eq. 3.

$$Q_s = \frac{b\Delta t \sum q_s f_s}{43560} \qquad (3)$$

where Q_s is acre-ft, b is bed width in feet, Δt is the time increment in seconds and f_s is the decimal fraction of the respective particle size ($\sum f_s = 1$).

Channel bed width varies substantially. Reaches 103, 104, 106, 107, 109, 110, 111, 112, 114, 118, 127, 131, 133, 134 and 142, the West Branch from the Central to the Westgate Dam, were modeled with Eq. 3. As the area of the existing East Branch watershed is 30 percent of that of the West Branch and the future East Branch will be lined, explicit sediment transport modeling is confined to the West Branch. Reach parameters and cross sections are shown in Appendix 4. "Effective b" in Appendix 4 is the rectangular width which conserves Q and V of the actual cross-section.

Sediment Issues in the San Antonio Arroyo shows that the ordinates of the 10- and 2-year event hydrographs for developed conditions are 0.54 and 0.26 of the 100-year values. The Borrega watershed has corresponding ratios of 0.13 and 0.00 for the 10- and 2-year undeveloped conditions. The San Antonio values are used for the Amole. For statistical reasons, the mean annual event has a return period of 2.33 years, here used to approximating the 2-year value.

Solution of Eq. 3 for 100-year existing conditions, reach 103 is illustrated in Appendix 5. The "Factor" term in Appendix 5 allows Q to be proportionally changed to model other than 100-year events, as described above. Westgate capacity, the channel capacity entering the reservoir, is the mean of the three terminal reaches, 103, 104 and 106. Summary results are shown in Table 9.

Table 9. Uncorrected Sediment Transport Capacities, West Branch

	Bed Load Q_s (acre-ft/event)					
	Existing Conditions Recurrence Interval			Future Conditions Recurrence Interval		
Reach	Annual	10-year	100-year	Annual	10-year	100-year
103	0.09	0.78	5.17	0.33	1.66	6.67
104	0.14	1.11	7.43	0.48	2.39	9.57
106	0.13	1.07	7.11	0.48	2.33	9.19
107	0.04	0.30	1.93	0.14	0.67	2.55
109	0.09	0.74	4.90	0.34	1.68	6.61
110	0.06	0.47	3.08	0.21	1.05	4.17
111	0.14	1.09	7.13	0.54	2.58	9.93
112	0.09	0.76	4.96	0.38	1.84	7.13
114	0.06	0.47	3.07	0.06	0.30	1.18
118	0.10	0.84	5.49	0.12	0.57	2.23
127	0.06	0.50	3.30	0.05	0.23	0.92
131	0.20	1.58	10.41	0.18	0.85	3.30
133	0.08	0.62	4.02	0.07	0.34	1.29
134	0.08	0.67	4.35	0.07	0.31	1.21
142	0.06	0.46	2.93	0.01	0.06	0.24
Westgate	0.12	0.99	6.57	0.43	2.13	8.48

Two corrections are in order for Eq. 3 and Table 9: wash load, and increased bed-load capacity due to silt-elevated viscosity. The conservative approach to the wash-load correction is to presume that clays and fine silts are transported in their entirety, independent of bed-load mechanics. Eq. 2, by virtue of its lowest category, 0.15 mm, models the larger-silt transport. Within the watershed, only the MWA soil has significant fines (Table 1). By SCS Soil Survey gradation, clay and fine silt accounts for roughly 25 percent of the upper MWA horizon. As MWA is 50.2 percent of the basin, the result is a (0.25)(0.502) = 12.5 percent wash load increase in Q_s.

The Colby correction is employed for the viscosity change. As the load of fine sediment (12.5 percent of Eq. 3, corrected for weight) is not above 10,000 ppm , the Colby k_2 correction factor is roughly 1.5. The wash load and Colby corrections are independent. Table 10 corrects the bottom row of Table 9 for washload and viscosity.

Table 10. Corrected Sediment Transport Capacities, West Branch

	Total Load Q_s (acre-ft/event)					
	Existing Conditions Recurrence Interval			Future Conditions Recurrence Interval		
Reach	Annual	10-year	100-year	Annual	10-year	100-year
Westgate[1]	0.20	1.67	11.09	0.73	3.59	14.31

[1] Q_s (Table 9) * 1.125 * 1.5

Sediment modeling is sensitive to channel slope, cross section and the stage-discharge relationship. Parameters employed to generate Tables 9 and 10 are taken from the AHYMO data set, values obtained for general runoff modeling, but not sufficient for precise sediment computations. Reach-by-reach differences are qualitatively informative, but not numerically accurate. Design-level engineering should employ HEC-2 for prudent line analyses.

Table 11 summarizes the transport capacities.

Table 11. Sediment Transport Capacities, West and East Branches

	Q_s (acre-ft/event)					
	Existing Conditions Recurrence Interval			Future Conditions Recurrence Interval		
Branch	Annual	10-year	100-year	Annual	10-year	100-year
West[1]	0.20	1.67	11.09	0.73	3.59	14.31
East	0.06[2]	0.50[2]	3.35[2]	1.55[3]	3.10[3]	4.65[3]
Total	0.26	2.17	14.43	2.28	6.69	18.96

[1] Table 10
[2] approximated by adjusting West Branch Q_s for drainage areas (Table 2)
[3] $Q_s = Vol_s$ for lined channel = vol_s (Table 6) * area (Table 2)

The existing 10-year transport capacity figures are somewhat verified by the sediment removal record for the Westgate Dam.

Alternative 1. Sediment Balance

The geomorphologic response of the watershed can be qualitatively predicted by comparing the sediment yield to the capacity for transport. Table 12 summarizes the balances.

Table 12. Sediment Supply and Transport Capacity

	Existing Conditions Recurrence Interval			Future Conditions Recurrence Interval		
	Annual	10-year	100-year	Annual	10-year	100-year
West Branch						
Vol_s (acre-ft/event)[1]	2.87	3.59	4.31	0.32	0.64	0.95
Q_s (acre-ft/event)[2]	0.20	1.67	11.09	0.73	3.59	14.31
East Branch						
Vol_s (acre-ft/event)[1]	0.87	1.08	1.30	1.55	3.10	4.65
Q_s (acre-ft/event)[2]	0.06	0.50	3.35	1.55	3.10	4.65

[1] area (Table 2) * vol_s (Table 6)
[2] Table 11

As Vol_s exceeds Q_s for existing condition annual and 10-year events, both branches should generally be aggrading. The existing condition 100-year event, where Q_s exceeds Vol_s, is degradational in both branches. Field observation, however, as discussed in the section Geomorphology, indicates that net change is currently of imperceptible magnitude.

For future West Branch conditions, Q_s exceeds Vol_s for all events. Both frequent and rarer storms will degrade the channel.

Table 12 in conjunction with the channel cross sections in Appendix 4 indicates a mitigating behavior associated with channel width. Q_s is greater for narrower channels than for wide ones, as illustrated by reach 131. Over time, high Q_s will lead to disproportionate loss of channel material from the narrower reaches. These reaches will widen more rapidly than those already widened. A prudent line study will indicate that such reaches as 131 are prone to scour, bank sloughing and eventual widening.

The West Branch slope S is 0.025. The equilibrium slope S_{eq} for a mobile-bed channel used in *Erosion Study to Determine Boundaries for Adjacent Development - Calabacillas Arroyo, Bernalillo County, New Mexico* is,

$$S_{eq} = S\left(\frac{Vol_s}{Q_s}\right)^{\left(\frac{2}{b-x}\right)} \tag{4}$$

where

$$x = \frac{3}{5}\left(\frac{2}{3}b + c\right) \tag{5}$$

and a, b and c are defined in Table 8. For 3 mm particles (d_{80}), the Eq. 4 exponent is 0.658. Annual Vol_s and Q_s should be used, as these common events maintain the channel. Vol_s should be for the 0.84 mi^2 drainage below

Central, as little sediment crosses that boundary. Table 13 indicates S_{eq} for Alternative 1.

Table 13. Equilibrium Slope, West Branch

	Conditions	
	Existing	Future
Vol_s (acre-ft/year)[1]	0.17	0.08
Q_s (acre-ft/event)[2]	0.20	0.73
S_{eq}	0.022	0.005

[1] vol_s (Table 6) * 0.84 mi^2
[2] Table 10

Under existing conditions S is near S_{eq}. Future S_{eq} will decrease by several-fold, actuating headcutting and general degradation in the West Branch. While Eq. 4 is useful for such qualitative predictions, it is not sufficient for engineering design.

Alternative 2. Hydrographs

AHYMO 100-year inflow and outflow hydrographs for the proposed reservoir future conditions are shown in Fig. 3.

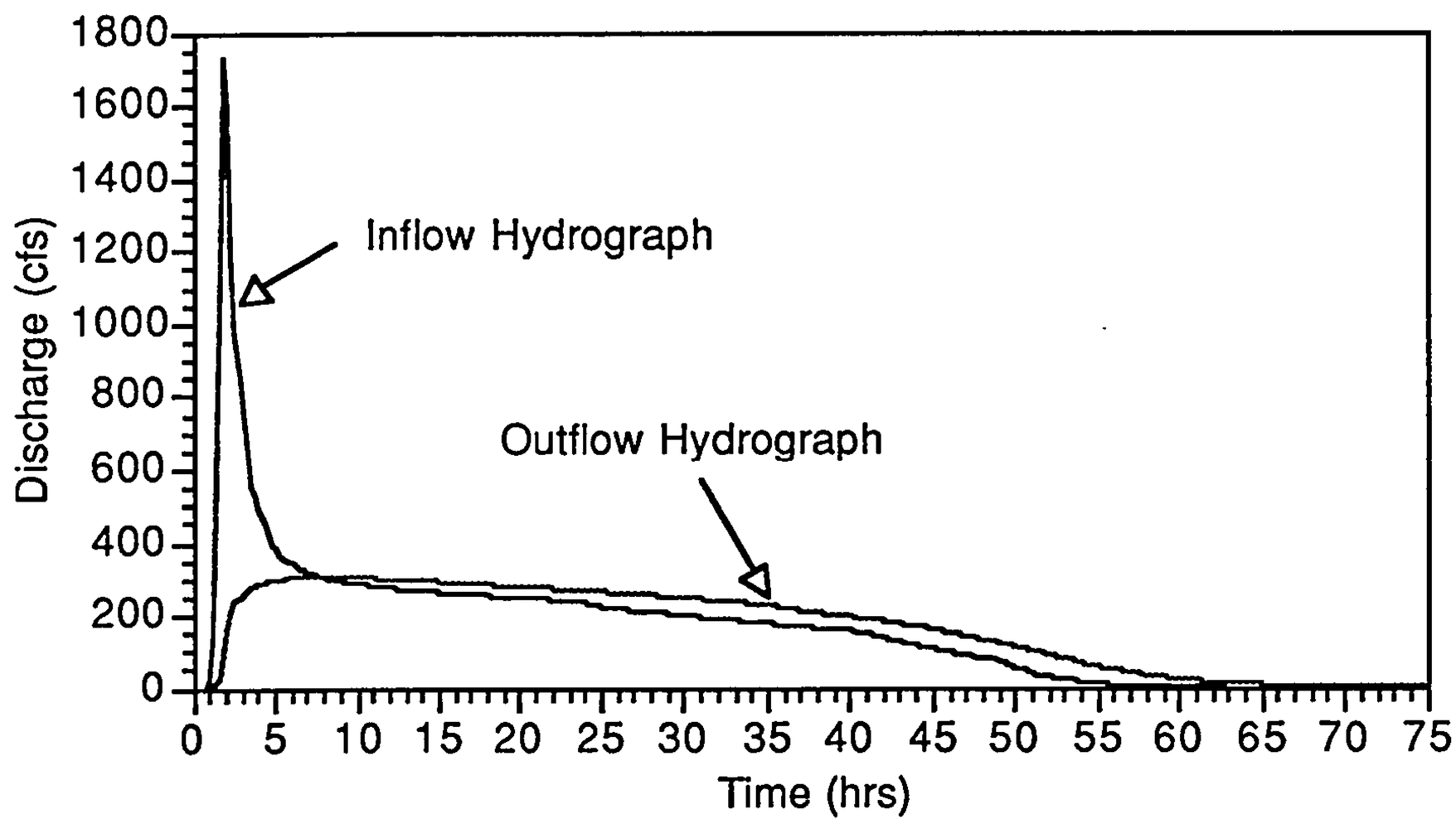

Figure 3. Reservoir hydrographs, Alternative 2

The proposed reservoir cuts the peak flow from 1731 to 307 cfs, a value SA has determined to be an allowable addition to the West Bluff Outfall.

Alternative 2. Sediment Transport

Sediment was routed through the proposed reservoir by a program written in EXCEL-3 simulating sediment deposition over a runoff event. The following data are required:

- An inflow hydrograph (standard output from HEC-1 or AHYMO).
- An outflow hydrograph (standard output from HEC-1 or AHYMO).
- A stage-surface area table for the sediment retention structure. The stage-area table is converted into a stage-storage table by the conic formula.
- The maximum sediment storage depth for the reservoir.
- A discrete distribution of sediment settling velocities, typically derived from the gradation distribution.
- The ideal-to-actual removal efficiency. 1.0 is an ideal basin having no resuspension of sediment. 0.9 is a well functioning reservoir with good inlet and outlet hydraulics. 0.0 is a completely mixed reservoir. 0.85 is used in this analysis.
- The influent sediment load or concentration.

The program computes water storage at each time step from the cumulative hydrographs. Sediment storage from the previous time step is added to water storage, yielding total storage. The stage-storage table is interpolated to determine total stage and sediment stage, with water depth constituting the difference. Water surface area is water storage divided by water depth. This area is used to compute upflow velocity. Upflow and settling velocities are used to determine the ideal trap efficiency for each sediment gradation. The ideal trap efficiencies are weighted by particle distribution to yield a net ideal trap efficiency. Influent sediment is computed as the ratio of the total sediment to total water flux times the water inflow in the time step. Ideal deposition in the time step is the product of net ideal trap efficiency and sediment inflow. Deposition is ideal deposition corrected for the ideal-to-actual efficiency or the remaining capacity for sediment storage, whichever is less. Deposition is added to previous sediment storage, the bed is accordingly raised and the algorithm is repeated.

The program yields a summary of sediment transport as well as a table of deposition and water, sediment and total stage over time.

The program treats the inflow sediment concentration and the ideal-to-actual efficiency as stationary parameters. With minor modification these parameters can be made to vary with inflow, time, storage or other variables. At present there is insufficient data to calibrate such adjustments.

Using the future vol_s (Table 6) and the drainage area (Table 3), 100-year event Vol_s to the reservoir is 0.3 * 13.51 = 4.05 acre-ft. Appendix 6 indicates computation of water volume (1041 acre-ft), sediment deposition (3.44 acre-ft) and sediment outflow (0.61 acre-ft). Table 14 summarizes sediment routing for the reservoir.

Table 14. Water and Sediment Transport (acre-ft)

	Reservoir Capacity	Inflow	Outflow
Water	201	1041	1041
Sediment		4.05	0.61

The reservoir has storage capacity substantially greater than Vol_s for the 100-year event. Finer sediment will pass through the reservoir, but in quantities almost negligible in relation to the water volume. Table 14 sediment inflow and outflow do not include the wash load thruput discussed below in the Bulking Factor section.

Alternative 2. Sediment Balance

As the bulk of water and sediment supply will be diverted above the Westgate dam, the two branches feeding Westgate below Central, now deeply incised, will have less flow. Left alone, these reaches would be expected to aggrade, as adjacent sediment is blown or washed in. There is little propensity for such accumulation to precede at a measurable rate, however. The channels will likely simply stabilize. The new reservoir will accumulate sediment slowly. A normal program of observation and maintenance will be sufficient.

Alternatives 1 and 2. Bulking Factor

Erosion Study to Determine Boundaries for Adjacent Development - Calabacillas Arroyo, Bernalillo County, New Mexico employed a bulking factor of 0.10 below the Black Reservoir for the 100-year event. Cleanup of the Raymac and Don Felipe Reservoirs after the major storms of 1988 indicated a bulking factor near 0.15. Walnut Gulch, Arizona bulking factors reach 0.04 for annual events and are greater for major storms.

Using the wash load and viscosity correction, the 100-year bulking factor generated by AHYMO is

$$Vol_s = 4.06 \text{ acre-ft} * 1.125 * 1.5 = 6.84 \text{ acre-ft}$$

$$\text{bulking factor} = \frac{6.82}{1041 + 6.82} = 0.007$$

The sediment deposition program yields a value of 0.0039, uncorrected for viscosity and washload. Corrected, the value is 0.006. The minor difference

from the above 0.007 computation is due to the program's use of subbasin-by-subbasin land treatment.

Bulking factor on a per-mi^2 basis may be estimated by a quick check of AHYMO results. For DPM Zone 1, future conditions, the 100-year excess precipitation is

$$\text{precip} = 0.04 * 0.44 + 0.20 * 0.67 + 0.26 * 0.99 + 0.50 * 1.97 = 1.394 \text{ in}$$

$$\text{vol}_w = \frac{1.394}{12} (640 \text{ acres}) = 74.34 \text{ acre-ft/mi}^2$$

$$\text{vol}_s = 0.3 * 1.125 * 1.5 = 0.51 \text{ acre-ft/mi}^2$$

$$\text{bulking factor} = \frac{0.51}{74.34 + 0.51} = 0.007$$

The above values do not dispute that high bulking factors may occur in the Albuquerque area. Exceptionally high values reported in some cases may be attributed to poor watershed conditions, laterally-confined channels with resulting high velocities and bed shear, or bank-slough cleanout. To achieve a bulking factor of 0.10, for example, vol_s need be 8.2 acre-ft/mi^2. Soil loss to this degree might occur on vulnerable slopes or in headcutting channels, but would not occur over a entire basin. For a stable watershed with wide, quasi-"regime" channels such as the Amole, runoff will generally transport at most a few percent sediment.

For conservative hydraulic design, a bulking factor of 0.025 is suggested.

Conclusions

1) The Amole watershed is reasonably stable with respect to sediment transport. The photographic record shows no recent geomorphic trends. Field inspection indicates no evidence of recent watercourse alterations.

2) Significant quantities of sediment do not cross Central. This is indicated by the minimal channelization above Central and the relative stability of the incised channels below.

3) Sediment transport throughout the basin is limited by transport capacity, not by sediment supply.

4) The Westgate Dam receives only a small fraction of the sediment inflow anticipated in its design.

5) Development will alter the sediment balance. Sediment yield will remain roughly constant as erosion decreases while delivery ratio increases. The capacity to transport sediment will increase. Without upstream diversion from the basin, there will be more sediment carried to the Westgate Dam, but in quantities well within the dam's storage capacity. With neither

channel lining below Central nor upstream diversion, the channels below Central will degrade.

6) To accommodate development, structural measures are required. Such measures may include;

   1) upland sediment control structures,

   2) detention ponds to reduce peak discharge in unlined upper reaches,

   3) diversion from the West Branch to East Branch (Alternative 1),

   4) lining of the East Branch (Alternative 1), and/or

   5) detention and diversion to the West Bluff Outfall (Alternative 2).

7) Both Alternative 1 and Alternative 2 appear to be sound concepts from the perspective of sediment management. Both alternatives reduce the propensity for channel degradation below Central.

8) The choice between Alternatives 1 and 2 is beyond the scope of this study. The choice should be based on factors broader than sediment issues.

9) A bulking factor of 0.025 should be used for hydraulic design.

Appendices 1-6 are contained in *Sediment Issues in the Amole Basin, Appendices* which is included in the SA report *Amole Arroyo-Westgate Dam Drainage Management Plan, Technical Appendix.*

HYDROLOGIC ANALYSES
AHYMO Summary Output

Alternate A - No Build (Exist)
Alternate B - Improvement of Structures (Alt_b.new)
Alternate C - Detention above I-40 (Alt_c.old)
Alternate F - Use of Playa #2 (Alt-f.dat)
Alternate G1 - Diversion, West to East in I-40 (Alt_g.dat)
Alternate G2 - Diversion, West to East, above I-40 (Alt_g2.dat)
Alternate G3 - Detention/Diversion above I-40 (Alt_g3.dat)
Alternate H - Detention/Diversion to West Bluff Outfall (Alt_h.dat)

APPENDIX B

ALT-A

AHYMO SUMMARY TABLE (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992 RUN DATE (MON/DAY/YR) =07/15/1992

INPUT FILE = exist USER NO.= SCANLNNM.101

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
RAINFALL TYPE= 2										RAIN24= 2.590
COMPUTE NM HYD	418.00	-	1	1.49581	413.18	29.451	.36917	1.800	.432	PER IMP= .00
COMPUTE NM HYD	417.00	-	2	.13909	30.33	2.715	.36600	1.850	.341	PER IMP= .00
ADD HYD	417.10	1& 2	3	1.63490	443.31	32.166	.36890	1.800	.424	
ROUTE RESERVOIR	417.01	3	4	1.63490	19.42	4.575	.05247	3.950	.019	AC-FT= 28.933
ROUTE	417.20	4	5	1.63490	15.94	4.575	.05247	4.700	.015	
COMPUTE NM HYD	419.00	-	1	.19715	63.16	3.859	.36706	1.700	.501	PER IMP= .00
COMPUTE NM HYD	420.00	-	2	.18889	59.00	4.025	.39953	1.750	.488	PER IMP= .00
ADD HYD	419.10	1& 2	3	.38604	121.16	7.884	.38295	1.700	.490	
ADD HYD	420.10	3& 5	4	2.02094	121.16	12.460	.11560	1.700	.094	
ROUTE	420.20	4	5	2.02094	29.48	12.458	.11559	2.400	.023	
COMPUTE NM HYD	416.00	-	1	.86541	191.92	16.893	.36600	1.900	.347	PER IMP= .00
ROUTE	416.10	1	2	.86541	82.19	16.876	.36564	2.350	.148	
ADD HYD	416.20	2& 5	3	2.88635	111.64	29.334	.19056	2.350	.060	
COMPUTE NM HYD	415.00	-	1	.15228	73.28	2.973	.36600	1.600	.752	PER IMP= .00
ROUTE RESERVOIR	415.01	1	2	.15228	.01	.012	.00151	7.500	.000	AC-FT= 2.970
COMPUTE NM HYD	414.00	-	1	.11235	31.26	2.193	.36600	1.750	.435	PER IMP= .00
ADD HYD	414.10	2& 1	4	.26463	31.27	2.205	.15626	1.750	.185	
ROUTE RESERVOIR	414.01	4	2	.26463	.01	.012	.00088	11.800	.000	AC-FT= 2.193
ROUTE	414.30	2	1	.26463	.01	.012	.00088	11.800	.000	
COMPUTE NM HYD	411.00	-	2	.29891	106.28	5.835	.36600	1.700	.556	PER IMP= .00
ADD HYD	411.10	1& 2	4	.56354	106.29	5.847	.19454	1.700	.295	
ROUTE	411.20	4	1	.56354	95.03	5.847	.19454	1.800	.263	
COMPUTE NM HYD	412.00	-	2	1.18559	252.44	23.143	.36600	1.900	.333	PER IMP= .00
ADD HYD	412.10	1& 2	4	1.74913	340.57	28.990	.31076	1.850	.304	
ADD HYD	412.20	4& 3	1	4.63548	405.19	58.324	.23591	1.900	.137	
ROUTE	412.30	1	5	4.63548	185.32	58.212	.23546	2.600	.062	
COMPUTE NM HYD	424.00	-	1	.33534	115.13	6.565	.36706	1.700	.536	PER IMP= .00
ROUTE RESERVOIR	424.01	1	2	.33534	20.93	5.567	.31126	2.400	.098	AC-FT= 4.467
COMPUTE NM HYD	421.00	-	1	.33184	104.91	6.478	.36600	1.750	.494	PER IMP= .00
ADD HYD	421.10	1& 2	3	.66718	110.46	12.044	.33848	1.750	.259	
ROUTE	421.20	3	1	.66718	85.04	12.044	.33847	1.900	.199	
COMPUTE NM HYD	422.00	-	2	.14367	42.18	2.804	.36600	1.700	.459	PER IMP= .00
ADD HYD	422.10	1& 2	3	.81085	121.37	14.848	.34335	1.850	.234	
ROUTE	422.20	3	1	.81085	74.23	14.848	.34335	2.150	.143	
COMPUTE NM HYD	423.00	-	2	.05985	10.69	1.168	.36600	1.900	.279	PER IMP= .00
ADD HYD	423.10	1& 2	3	.87070	83.67	16.016	.34490	2.100	.150	
ROUTE	423.20	3	1	.87070	39.77	15.956	.34359	3.300	.071	
COMPUTE NM HYD	413.00	-	2	1.00011	232.27	19.522	.36600	1.850	.363	PER IMP= .00
ADD HYD	413.10	1& 2	3	1.87081	237.35	35.478	.35557	1.900	.198	
ROUTE	413.20	3	1	1.87081	168.21	35.467	.35546	2.200	.140	
COMPUTE NM HYD	410.00	-	2	1.38956	346.65	27.124	.36600	1.800	.390	PER IMP= .00
ADD HYD	410.10	1& 2	3	3.26037	463.39	62.591	.35995	1.900	.222	
ADD HYD	410.20	3& 5	4	7.89585	565.38	120.803	.28687	2.000	.112	
ROUTE RESERVOIR	410.01	4	1	7.89585	551.03	111.747	.26536	2.100	.109	AC-FT= 14.962
ROUTE	410.30	1	2	7.89585	372.42	111.710	.26527	2.700	.074	
COMPUTE NM HYD	409.00	-	1	.46618	157.84	9.126	.36706	1.700	.529	PER IMP= .00
ROUTE	409.10	1	3	.46618	35.06	9.059	.36434	2.150	.118	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	408.00	-	1	1.38633	331.57	27.113	.36671	1.850	.374	PER IMP= .00
ADD HYD	408.10	1& 3	4	1.85251	358.05	36.172	.36611	1.850	.302	
ADD HYD	408.20	4& 2	5	9.74836	501.98	147.882	.28444	2.450	.080	
ROUTE	408.30	5	1	9.74836	474.01	147.868	.28441	2.700	.076	
COMPUTE NM HYD	403.00	-	2	.48341	138.19	9.472	.36741	1.750	.447	PER IMP= .00
ADD HYD	403.10	1& 2	3	10.23177	493.84	157.341	.28833	2.650	.075	
ROUTE	403.20	3	5	10.23177	492.50	157.324	.28830	2.700	.075	
COMPUTE NM HYD	406.00	-	1	.05788	18.50	1.235	.40004	1.700	.500	PER IMP= .50
DIVIDE HYD	406.10	1	2	.05788	18.50	1.235	.40004	1.700	.500	
	406.20	AND	3	.00000	.00	.000	.00000	-.050	.000	
ROUTE	406.30	3	1	.00000	.00	.000	.00000	-.050	.000	
COMPUTE NM HYD	407.00	-	2	.06012	26.82	1.174	.36600	1.600	.697	PER IMP= .00
ROUTE RESERVOIR	407.01	2	3	.06012	.23	.032	.01005	4.250	.006	AC-FT= 1.153
ROUTE	407.10	3	2	.06012	.06	.031	.00971	5.500	.002	
COMPUTE NM HYD	404.00	-	3	.22811	62.90	4.653	.38245	1.800	.431	PER IMP= .60
ADD HYD	404.10	1& 2	4	.06012	.06	.031	.00971	5.500	.002	
ADD HYD	404.20	3& 4	7	.28823	62.90	4.684	.30470	1.800	.341	
DIVIDE HYD	404.10	7	2	.26365	46.00	4.284	.30470	1.600	.273	
	404.20	AND	3	.02458	16.90	.399	.30470	1.800	1.074	
DIVIDE HYD	404.20	2	1	.13182	23.00	2.142	.30470	1.600	.273	
	404.30	AND	4	.13182	23.00	2.142	.30470	1.600	.273	
ROUTE	404.40	1	2	.13182	23.20	2.142	.30470	1.650	.275	
ROUTE	404.40	4	1	.13182	23.20	2.142	.30470	1.650	.275	
ADD HYD	404.50	1& 2	7	.26365	46.41	4.284	.30470	1.650	.275	
ROUTE	404.60	3	1	.02458	7.69	.400	.30501	1.900	.489	
COMPUTE NM HYD	405.00	-	2	.28007	85.25	5.467	.36600	1.750	.476	PER IMP= .00
ROUTE	405.10	2	3	.28007	32.85	5.466	.36592	2.100	.183	
ADD HYD	405.20	3& 1	3	.30465	38.44	5.866	.36100	2.000	.197	
COMPUTE NM HYD	402.00	-	2	.21249	71.69	4.608	.40662	1.700	.527	PER IMP= 1.50
ADD HYD	402.10	2& 3	4	.51714	95.05	10.474	.37974	1.850	.287	
ROUTE	402.20	4	2	.51714	93.85	10.474	.37974	1.900	.284	
COMPUTE NM HYD	401.00	-	3	.14474	45.06	2.833	.36706	1.700	.486	PER IMP= .00
ADD HYD	401.10	5& 2	4	10.74891	527.71	167.798	.29270	2.650	.077	
ADD HYD	401.20	4& 3	5	10.89365	532.83	170.632	.29369	2.650	.076	
COMPUTE NM HYD	303.00	-	1	.00790	4.51	.549	1.30216	2.200	.893	PER IMP= 29.50
ADD HYD	303.10	1& 7	2	.27155	49.82	4.833	.33371	2.000	.287	
DIVIDE HYD	303.20	2	1	.26602	46.00	4.735	.33371	1.600	.270	
	303.30	AND	6	.00553	3.82	.098	.33371	2.000	1.080	
DIVIDE HYD	303.40	1	2	.13301	23.00	2.367	.33371	1.600	.270	
	303.40	AND	3	.13301	23.00	2.367	.33371	1.600	.270	
ROUTE	303.50	2	1	.13301	23.10	2.367	.33371	1.650	.271	
ROUTE	303.60	3	2	.13301	23.10	2.367	.33371	1.650	.271	
ADD HYD	303.70	1& 2	3	.26602	46.20	4.735	.33371	1.650	.271	
COMPUTE NM HYD	302.00	-	1	.01116	8.33	.700	1.17653	1.900	1.167	PER IMP= 21.00
ADD HYD	302.10	1& 3	2	.27718	54.31	5.435	.36764	1.950	.306	
DIVIDE HYD	302.20	2	1	.26125	46.00	5.122	.36764	1.600	.275	
	302.30	AND	8	.01593	8.31	.312	.36764	1.950	.815	
DIVIDE HYD	302.40	2	2	.13859	27.16	2.717	.36764	1.950	.306	
	302.40	AND	3	.13859	27.16	2.717	.36764	1.950	.306	
ROUTE	302.40	2	4	.13859	27.18	2.717	.36764	1.850	.306	
ROUTE	302.50	3	1	.13859	27.18	2.717	.36764	1.850	.306	
ADD HYD	302.60	4& 1	3	.27718	54.37	5.435	.36764	1.850	.306	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	301.00	-	1	.00593	6.69	.456	1.44258	1.700	1.763	PER IMP= 39.00
ROUTE	301.20	1	2	.00593	6.66	.456	1.44259	1.700	1.755	
ADD HYD	301.30	2& 3	7	.28311	60.15	5.891	.39015	1.850	.332	
COMPUTE NM HYD	300.00	-	2	.00603	11.07	.383	1.18983	1.500	2.867	PER IMP= 21.90
ADD HYD	300.10	8& 2	1	.02196	11.29	.695	.59340	1.600	.804	
ROUTE	300.20	1	2	.02196	11.19	.695	.59344	1.650	.796	
COMPUTE NM HYD	304.00	-	1	.00347	6.84	.265	1.42927	1.500	3.078	PER IMP= 38.10
ROUTE	304.20	1	3	.00347	6.76	.265	1.42942	1.500	3.044	
ADD HYD	304.30	2& 3	8	.02543	17.76	.959	.70745	1.500	1.091	
COMPUTE NM HYD	305.00	-	9	.00402	7.31	.298	1.38937	1.500	2.843	PER IMP= 35.40
ROUTE RESERVOIR	401.01	5	1	10.89365	529.60	170.630	.29369	2.750	.076	AC-FT= 8.924
ROUTE	401.80	1	2	10.89365	529.81	170.629	.29368	2.750	.076	
COMPUTE NM HYD	307.00	-	4	.01650	18.38	1.197	1.35981	1.700	1.741	PER IMP= 33.40
ADD HYD	307.10	6& 4	1	.02203	20.18	1.295	1.10224	1.750	1.432	
ROUTE	307.20	1	3	.02203	19.70	1.295	1.10228	1.750	1.397	
ADD HYD	307.30	3& 2	1	10.91568	531.47	171.924	.29532	2.750	.076	
COMPUTE NM HYD	315.00	-	2	.00836	14.06	.408	.91492	1.500	2.627	PER IMP= 3.30
ROUTE RESERVOIR	315.01	2	3	.00836	.01	.032	.07131	3.500	.003	AC-FT= .397
ROUTE	315.10	3	2	.00836	.01	.032	.07106	3.600	.003	
ADD HYD	315.20	1& 2	3	10.92404	531.48	171.956	.29514	2.750	.076	
COMPUTE NM HYD	312.00	-	1	.03437	61.74	2.059	1.12332	1.500	2.807	PER IMP= 17.40
DIVIDE HYD	312.10	1	2	.01719	30.87	1.030	1.12331	1.500	2.807	
	312.20	AND	4	.01719	30.87	1.030	1.12331	1.500	2.807	
ROUTE	312.30	2	5	.01719	29.65	1.030	1.12335	1.550	2.696	
ADD HYD	312.40	3& 5	1	10.94123	531.91	172.985	.29645	2.750	.076	
COMPUTE NM HYD	314.00	-	3	.01914	32.58	.973	.95334	1.500	2.659	PER IMP= 5.90
ADD HYD	314.10	1& 3	2	10.96037	532.18	173.958	.29759	2.750	.076	
ROUTE RESERVOIR	401.01	2	1	10.96037	484.20	173.953	.29758	3.200	.069	AC-FT= 10.629
ROUTE	314.90	1	2	10.96037	484.26	173.950	.29758	3.200	.069	
COMPUTE NM HYD	306.00	-	1	.01532	14.71	.972	1.18983	1.750	1.500	PER IMP= 21.90
ROUTE	306.10	1	3	.01532	14.71	.972	1.18983	1.750	1.501	
ROUTE	306.20	3	1	.01532	13.29	.972	1.18983	1.850	1.355	
COMPUTE NM HYD	310.00	-	3	.00981	17.85	.609	1.16323	1.500	2.843	PER IMP= 20.10
ADD HYD	310.10	3& 1	5	.02513	20.09	1.581	1.17940	1.500	1.249	
ROUTE	310.20	5	1	.02513	20.06	1.581	1.17944	1.550	1.247	
ADD HYD	310.30	1& 2	3	10.98550	485.27	175.530	.29959	3.200	.069	
ROUTE	310.40	4	5	.01719	30.77	1.030	1.12335	1.500	2.797	
ADD HYD	310.50	5& 3	1	11.00268	485.42	176.560	.30088	3.200	.069	
COMPUTE NM HYD	313.00	-	2	.00787	14.34	.490	1.16766	1.500	2.847	PER IMP= 20.40
ADD HYD	313.10	1& 2	3	11.01055	485.48	177.050	.30150	3.200	.069	
ROUTE RESERVOIR	401.01	3	1	11.01055	465.70	177.050	.30150	3.550	.066	AC-FT= 6.207
COMPUTE NM HYD	309.00	-	3	.00803	6.32	.529	1.23565	1.900	1.231	PER IMP= 25.00
COMPUTE NM HYD	308.00	-	4	.00915	9.43	.732	1.50022	1.800	1.610	PER IMP= 42.90
ADD HYD	308.10	3& 4	2	.01718	15.43	1.261	1.37646	1.850	1.403	
ADD HYD	308.20	1& 2	10	11.02773	466.54	178.311	.30317	3.550	.066	
COMPUTE NM HYD	311.00	-	11	.00602	6.13	.494	1.54013	1.800	1.590	PER IMP= 45.60
ROUTE	301.10	7	1	.28311	31.13	5.888	.38994	2.300	.172	
ROUTE	304.10	8	2	.02543	7.07	.959	.70743	2.050	.435	
ROUTE	305.10	9	3	.00402	2.34	.298	1.38947	1.700	.911	
ADD HYD	301.20	1& 2	4	.30854	36.06	6.847	.41610	2.150	.183	
ADD HYD	301.30	3& 4	1	.31256	37.84	7.145	.42862	2.150	.189	
COMPUTE NM HYD	145.00	-	2	.12312	49.08	3.008	.45814	1.700	.623	PER IMP= 2.00

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	145.10	1& 2	3	.43568	67.46	10.153	.43696	1.800	.242	
ROUTE	145.20	3	1	.43568	66.98	10.153	.43694	1.850	.240	
COMPUTE NM HYD	143.00	-	2	.09431	32.23	1.841	.36600	1.650	.534	PER IMP= .00
COMPUTE NM HYD	144.00	-	3	.02602	18.94	.723	.52074	1.600	1.138	PER IMP= .00
ADD HYD	143.10	1& 2	4	.52999	95.26	11.994	.42432	1.750	.281	
ADD HYD	143.20	3& 4	1	.55601	107.26	12.717	.42883	1.700	.301	
ROUTE	143.30	1	2	.55601	105.10	12.716	.42881	1.800	.295	
COMPUTE NM HYD	141.00	-	1	.03868	21.03	.755	.36600	1.550	.849	PER IMP= .00
ADD HYD	141.10	1& 2	3	.59469	115.65	13.471	.42472	1.750	.304	
COMPUTE NM HYD	140.00	-	1	.09638	31.39	1.881	.36600	1.700	.509	PER IMP= .00
ADD HYD	140.10	1& 3	2	.69107	145.71	15.352	.41653	1.750	.329	
ROUTE	140.20	2	1	.69107	124.39	15.350	.41647	1.850	.281	
COMPUTE NM HYD	139.00	-	2	.02145	12.68	.419	.36600	1.550	.924	PER IMP= .00
ADD HYD	139.10	1& 2	3	.71252	127.86	15.768	.41495	1.850	.280	
ROUTE	139.20	3	1	.71252	115.11	15.768	.41493	2.000	.252	
COMPUTE NM HYD	138.00	-	2	.16332	72.31	3.188	.36600	1.600	.692	PER IMP= .00
ADD HYD	138.10	2& 1	3	.87584	138.80	18.956	.40580	1.950	.248	
ROUTE	138.20	3	1	.87584	115.75	18.954	.40578	2.150	.207	
COMPUTE NM HYD	129.00	-	2	.39080	179.44	7.738	.37128	1.600	.717	PER IMP= .00
ADD HYD	129.10	1& 2	3	1.26664	216.12	26.693	.39513	1.650	.267	
COMPUTE NM HYD	136.00	-	1	.08130	28.36	1.587	.36600	1.650	.545	PER IMP= .00
COMPUTE NM HYD	135.00	-	2	.05923	22.47	1.156	.36600	1.650	.593	PER IMP= .00
ADD HYD	135.10	1& 2	4	.14053	50.83	2.743	.36600	1.650	.565	
ROUTE RESERVOIR	135.01	4	1	.14053	36.65	1.832	.24438	1.850	.407	AC-FT= 1.131
ROUTE	135.20	1	2	.14053	10.85	1.831	.24429	2.250	.121	
COMPUTE NM HYD	130.00	-	1	.20469	66.07	3.996	.36600	1.700	.504	PER IMP= .00
ADD HYD	130.10	1& 2	4	.34522	66.13	5.827	.31646	1.700	.299	
ROUTE	130.20	4	2	.34522	41.66	5.826	.31645	2.050	.189	
COMPUTE NM HYD	125.00	-	1	.03679	17.68	.729	.37128	1.600	.751	PER IMP= .00
ADD HYD	125.10	1& 2	4	.38201	46.12	6.555	.32173	1.950	.189	
ADD HYD	125.20	3& 4	1	1.64865	252.43	33.248	.37813	1.650	.239	
COMPUTE NM HYD	124.00	-	2	.04092	14.91	.810	.37128	1.650	.569	PER IMP= .00
ADD HYD	124.10	2& 1	3	1.68957	267.34	34.058	.37796	1.650	.247	
ROUTE	124.20	3	1	1.68957	267.08	34.058	.37796	1.700	.247	
COMPUTE NM HYD	123.00	-	2	.02504	19.18	.536	.40171	1.500	1.197	PER IMP= .00
COMPUTE NM HYD	122.00	-	3	.13622	52.99	2.853	.39267	1.650	.608	PER IMP= .00
ADD HYD	123.10	1& 2	4	1.71461	275.26	34.594	.37830	1.700	.251	
ADD HYD	123.20	3& 4	1	1.85083	327.18	37.447	.37936	1.700	.276	
ROUTE	123.30	1	2	1.85083	332.39	37.447	.37936	1.700	.281	
COMPUTE NM HYD	121.00	-	1	.02100	16.72	.466	.41597	1.500	1.244	PER IMP= .00
ADD HYD	121.10	1& 2	3	1.87183	339.47	37.913	.37977	1.700	.283	
ROUTE	121.20	3	1	1.87183	341.96	37.913	.37977	1.700	.285	
COMPUTE NM HYD	120.00	-	2	.01176	9.09	.254	.40499	1.500	1.208	PER IMP= .00
COMPUTE NM HYD	119.00	-	3	.03895	23.75	.838	.40353	1.550	.953	PER IMP= .00
ADD HYD	119.10	2& 3	4	.05071	32.37	1.092	.40387	1.550	.997	
ROUTE	119.20	4	2	.05071	22.88	1.092	.40389	1.650	.705	
COMPUTE NM HYD	115.00	-	3	.03760	24.44	.753	.37552	1.500	1.016	PER IMP= .00
ROUTE	115.10	3	4	.03760	24.44	.753	.37555	1.550	1.016	
COMPUTE NM HYD	112.00	-	3	.04603	33.65	.946	.38533	1.500	1.142	PER IMP= .00
ADD HYD	112.10	1& 2	5	1.92254	364.56	39.005	.38040	1.700	.296	
ADD HYD	112.20	3& 5	2	1.96857	379.06	39.951	.38052	1.700	.301	
ADD HYD	112.30	4& 2	1	2.00617	391.52	40.704	.38043	1.700	.305	

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ROUTE	311.40	11	2	.00602	4.64	.494	1.54011	2.000	1.205	
COMPUTE NM HYD	149.00	-	3	.03482	25.84	.786	.42337	1.500	1.160	PER IMP= 2.90
ADD HYD	311.10	2& 3	4	.04084	26.10	1.281	.58795	1.500	.999	
DIVIDE HYD	311.20	4	2	.01389	8.88	.435	.58795	1.500	.999	
	311.30	AND	3	.02695	17.23	.845	.58795	1.500	.999	
DIVIDE HYD	311.20	3	4	.01348	8.61	.423	.58793	1.500	.999	
	311.20	AND	5	.01348	8.61	.423	.58793	1.500	.999	
ROUTE	311.20	2	3	.01389	8.67	.435	.58794	1.500	.975	
ROUTE	311.20	4	2	.01348	8.41	.423	.58794	1.500	.975	
ROUTE	311.20	5	4	.01348	8.41	.423	.58794	1.500	.975	
ADD HYD	311.30	2& 3	5	.02736	17.08	.858	.58789	1.500	.975	
ADD HYD	311.40	5& 4	2	.04084	25.49	1.280	.58789	1.500	.975	
ROUTE	311.30	2	3	.04084	12.32	1.281	.58790	1.700	.471	
COMPUTE NM HYD	148.00	-	2	.01588	11.52	.342	.40359	1.500	1.134	PER IMP= 1.90
ROUTE	148.10	2	4	.01588	11.25	.342	.40364	1.500	1.107	
ROUTE	148.20	4	2	.01588	3.53	.342	.40362	1.700	.348	
COMPUTE NM HYD	147.00	-	4	.00565	4.25	.130	.43128	1.500	1.175	PER IMP= 3.30
ROUTE	147.10	4	5	.00565	4.16	.130	.43144	1.500	1.150	
ROUTE	147.20	5	4	.00565	1.37	.130	.43143	1.700	.380	
COMPUTE NM HYD	146.00	-	5	.05976	38.28	2.320	.72800	1.650	1.001	PER IMP= 17.80
ADD HYD	146.10	2& 3	6	.05672	15.85	1.622	.53626	1.700	.437	
ADD HYD	146.20	4& 6	2	.06237	17.22	1.752	.52673	1.700	.431	
ADD HYD	146.30	5& 2	3	.12213	55.15	4.072	.62521	1.650	.706	
COMPUTE NM HYD	154.00	-	2	.01947	36.74	1.756	1.69138	1.500	2.948	PER IMP= 67.00
ROUTE	154.10	2	4	.01947	19.68	1.756	1.69141	1.600	1.579	
COMPUTE NM HYD	153.00	-	2	.00646	2.88	.126	.36600	1.600	.696	PER IMP= .00
ROUTE	153.10	2	5	.00646	1.43	.126	.36616	1.850	.346	
COMPUTE NM HYD	152.00	-	2	.07224	111.44	5.392	1.39957	1.550	2.410	PER IMP= 46.40
ADD HYD	152.10	2& 4	6	.09171	128.74	7.149	1.46151	1.550	2.193	
ADD HYD	152.20	5& 6	2	.09817	129.33	7.275	1.38943	1.550	2.058	
ROUTE	152.30	2	5	.09817	128.72	7.275	1.38944	1.550	2.049	
ADD HYD	152.40	3& 5	2	.22030	177.49	11.347	.96576	1.600	1.259	
ROUTE	152.30	10	3	11.02773	465.98	178.297	.30315	3.650	.066	
COMPUTE NM HYD	150.00	-	4	.03482	72.23	3.369	1.81421	1.500	3.241	PER IMP= 65.90
ROUTE	150.10	4	5	.03482	52.41	3.369	1.81422	1.600	2.352	
COMPUTE NM HYD	142.00	-	4	.12769	81.16	2.977	.43713	1.550	.993	PER IMP= 3.40
ADD HYD	142.20	3& 4	6	11.15542	466.65	181.274	.30468	3.650	.065	
ADD HYD	142.30	5& 6	3	11.19024	467.33	184.643	.30938	3.650	.065	
ROUTE RESERVOIR	142.01	3	4	11.19024	467.32	179.408	.30061	3.650	.065	AC-FT= 6.773
ROUTE	142.40	4	3	11.19024	467.23	179.397	.30059	3.700	.065	
COMPUTE NM HYD	137.00	-	4	.08668	42.29	1.692	.36600	1.550	.762	PER IMP= .00
ADD HYD	137.10	3& 4	5	11.27692	467.77	181.089	.30109	3.700	.065	
COMPUTE NM HYD	134.00	-	4	.04029	23.85	.786	.36600	1.550	.925	PER IMP= .00
ADD HYD	134.10	4& 2	6	.26059	198.87	12.134	.87303	1.600	1.192	
ADD HYD	134.20	6& 5	2	11.53751	473.03	193.223	.31401	3.650	.064	
ROUTE	134.30	2	3	11.53751	473.03	193.217	.31400	3.650	.064	
COMPUTE NM HYD	132.00	-	2	.02692	19.15	.540	.37588	1.500	1.112	PER IMP= .00
COMPUTE NM HYD	133.00	-	4	.03939	24.60	.790	.37588	1.550	.976	PER IMP= .00
ADD HYD	133.10	2& 3	5	11.56443	473.09	193.757	.31415	3.650	.064	
ADD HYD	133.20	4& 5	2	11.60382	473.24	194.547	.31436	3.650	.064	
ROUTE	133.30	2	3	11.60382	473.22	194.538	.31434	3.700	.064	
COMPUTE NM HYD	151.00	-	2	.02907	20.52	.581	.37482	1.500	1.103	PER IMP= .00

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ROUTE	151.10	2	4	.02907	14.16	.581	.37485	1.600	.761	
COMPUTE NM HYD	131.00	-	2	.05707	33.52	1.129	.37093	1.550	.918	PER IMP= .00
ADD HYD	131.10	2& 3	5	11.66089	473.45	195.667	.31462	3.700	.063	
ADD HYD	131.20	4& 5	2	11.68996	473.54	196.248	.31477	3.700	.063	
ROUTE	131.30	2	3	11.68996	473.45	196.238	.31475	3.700	.063	
COMPUTE NM HYD	127.00	-	2	.04370	32.06	.901	.38656	1.500	1.146	PER IMP= .00
ADD HYD	127.10	2& 3	4	11.73366	473.55	197.139	.31502	3.700	.063	
ROUTE	127.20	4	2	11.73366	473.58	197.133	.31501	3.750	.063	
COMPUTE NM HYD	128.00	-	3	.07690	47.04	1.507	.36741	1.550	.956	PER IMP= .00
ROUTE	128.10	3	4	.07690	43.92	1.507	.36742	1.600	.892	
COMPUTE NM HYD	126.00	-	3	.07448	42.13	1.483	.37340	1.550	.884	PER IMP= .00
ADD HYD	126.10	3& 4	5	.15138	85.36	2.990	.37036	1.550	.881	
ROUTE	126.20	5	3	.15138	75.53	2.990	.37037	1.650	.780	
ADD HYD	126.30	2& 3	4	11.88504	474.24	200.123	.31572	3.750	.062	
COMPUTE NM HYD	118.00	-	2	.06353	52.00	1.559	.46012	1.500	1.279	PER IMP= .00
ADD HYD	118.10	2& 4	3	11.94857	474.39	201.682	.31648	3.750	.062	
ROUTE	118.20	3	2	11.94857	474.38	201.677	.31648	3.750	.062	
COMPUTE NM HYD	116.00	-	3	.01678	13.51	.376	.42003	1.500	1.258	PER IMP= .00
COMPUTE NM HYD	117.00	-	4	.01804	18.41	.500	.51942	1.500	1.595	PER IMP= .00
COMPUTE NM HYD	114.00	-	5	.01552	16.03	.434	.52472	1.500	1.613	PER IMP= .00
ADD HYD	114.10	2& 3	6	11.96535	474.41	202.053	.31662	3.750	.062	
ADD HYD	114.20	4& 6	2	11.98339	474.44	202.552	.31693	3.750	.062	
ADD HYD	114.30	5& 2	3	11.99891	474.46	202.987	.31720	3.750	.062	
ROUTE	114.40	3	2	11.99891	474.46	202.981	.31719	3.800	.062	
COMPUTE NM HYD	113.00	-	5	.01992	18.14	.497	.46821	1.500	1.423	PER IMP= .00
ADD HYD	113.10	5& 2	4	12.01883	474.48	203.478	.31744	3.800	.062	
ADD HYD	112.10	1& 4	3	14.02500	795.03	244.182	.32645	1.750	.089	
ROUTE	112.20	3	1	14.02500	806.55	244.177	.32644	1.750	.090	
COMPUTE NM HYD	111.00	-	2	.00906	8.37	.229	.47429	1.500	1.443	PER IMP= .00
ADD HYD	111.10	1& 2	3	14.03406	809.01	244.406	.32654	1.750	.090	
ROUTE	111.20	3	1	14.03406	813.50	244.401	.32653	1.750	.091	
COMPUTE NM HYD	110.00	-	2	.04352	41.15	1.126	.48494	1.500	1.477	PER IMP= .00
ADD HYD	110.10	1& 2	3	14.07758	825.53	245.527	.32702	1.750	.092	
ROUTE	110.20	3	1	14.07758	825.60	245.524	.32701	1.750	.092	
COMPUTE NM HYD	109.00	-	2	.02638	26.77	.727	.51677	1.500	1.585	PER IMP= .00
COMPUTE NM HYD	108.00	-	3	.00781	8.62	.232	.55786	1.500	1.724	PER IMP= .00
ADD HYD	109.10	1& 2	4	14.10396	833.29	246.251	.32737	1.750	.092	
ADD HYD	109.20	3& 4	1	14.11177	835.73	246.483	.32750	1.750	.093	
ROUTE	109.30	1	2	14.11177	835.54	246.479	.32749	1.800	.093	
COMPUTE NM HYD	107.00	-	1	.02163	21.41	.583	.50536	1.500	1.546	PER IMP= .00
ADD HYD	107.10	1& 2	3	14.13340	839.92	247.062	.32776	1.800	.093	
ROUTE	107.20	3	1	14.13340	850.86	247.056	.32776	1.800	.094	
COMPUTE NM HYD	106.00	-	2	.04128	42.90	1.162	.52782	1.500	1.624	PER IMP= .00
ADD HYD	106.10	1& 2	3	14.17468	859.43	248.218	.32834	1.800	.095	
ROUTE	106.20	3	1	14.17468	864.40	248.214	.32833	1.800	.095	
COMPUTE NM HYD	105.00	-	2	.02584	27.62	.746	.54165	1.500	1.670	PER IMP= .00
COMPUTE NM HYD	104.00	-	3	.01579	17.42	.470	.55786	1.500	1.724	PER IMP= .00
ADD HYD	104.10	2& 3	4	.04163	45.04	1.216	.54780	1.500	1.691	
ADD HYD	104.20	1& 4	2	14.21631	873.32	249.430	.32897	1.800	.096	
ROUTE	104.30	2	1	14.21631	885.50	249.426	.32897	1.800	.097	
COMPUTE NM HYD	103.00	-	2	.02997	30.91	.838	.52428	1.500	1.612	PER IMP= .00
ADD HYD	103.10	1& 2	3	14.24628	891.69	250.264	.32938	1.800	.098	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	103.20	3	1	14.24628	838.11	250.253	.32937	1.850	.092	
COMPUTE NM HYD	101.00	-	2	.08444	81.67	2.219	.49273	1.500	1.511	PER IMP= .00
COMPUTE NM HYD	102.00	-	3	.02692	24.43	.670	.46693	1.500	1.418	PER IMP= .00
ADD HYD	101.10	1& 2	4	14.33072	850.12	252.472	.33033	1.850	.093	
ADD HYD	101.20	3& 4	10	14.35764	853.86	253.143	.33059	1.850	.093	
COMPUTE NM HYD	509.00	-	4	.04047	15.61	.790	.36600	1.600	.603	PER IMP= .00
ROUTE RESERVOIR	509.01	4	5	.04047	11.46	.493	.22836	1.800	.442	AC-FT= .357
ROUTE	509.10	5	4	.04047	.94	.490	.22721	2.950	.036	
COMPUTE NM HYD	508.00	-	5	.13308	27.03	2.598	.36600	1.850	.317	PER IMP= .00
ADD HYD	508.10	4& 5	6	.17355	27.48	3.088	.33364	1.900	.247	
ROUTE	508.20	6	4	.17355	27.48	3.088	.33364	1.900	.247	
ROUTE	508.30	4	5	.17355	17.51	3.088	.33360	2.350	.158	
COMPUTE NM HYD	506.00	-	4	.68388	180.46	13.401	.36741	1.800	.412	PER IMP= .00
ROUTE	506.10	4	6	.68388	180.20	13.401	.36741	1.800	.412	
ROUTE	506.20	6	4	.68388	115.98	13.401	.36741	2.100	.265	
COMPUTE NM HYD	507.00	-	6	.72551	222.91	14.468	.37392	1.750	.480	PER IMP= .40
ADD HYD	507.10	4& 5	7	.85743	131.86	16.488	.36056	2.100	.240	
ADD HYD	507.20	6& 7	4	1.58294	303.31	30.957	.36668	1.850	.299	
ROUTE	507.30	4	6	1.58294	104.24	30.951	.36662	2.550	.103	
ROUTE	507.40	6	5	1.58294	100.91	30.951	.36661	2.850	.100	
COMPUTE NM HYD	505.00	-	4	.57826	193.63	11.593	.37589	1.700	.523	PER IMP= .50
ROUTE	505.10	4	6	.57826	192.75	11.593	.37589	1.750	.521	
ROUTE	505.20	6	4	.57826	101.88	11.593	.37589	2.000	.275	
ADD HYD	505.30	4& 5	6	2.16120	167.33	42.543	.36909	2.350	.121	
COMPUTE NM HYD	503.00	-	4	.10759	29.43	2.210	.38521	1.750	.427	PER IMP= .90
ROUTE	503.10	4	5	.10759	21.51	2.210	.38521	2.000	.312	
ADD HYD	503.20	6& 5	4	2.26879	184.30	44.754	.36986	2.300	.127	
COMPUTE NM HYD	502.00	-	5	.09216	37.90	1.979	.40266	1.650	.643	PER IMP= 1.80
ROUTE RESERVOIR	502.01	5	6	.09216	.01	.013	.00258	24.400	.000	AC-FT= 1.969
ROUTE	502.10	6	5	.09216	.01	.013	.00258	24.400	.000	
ADD HYD	502.20	5& 4	6	2.36095	184.30	44.766	.35552	2.300	.122	
COMPUTE NM HYD	501.00	-	4	.02172	15.46	.436	.37623	1.500	1.112	PER IMP= .00
ROUTE RESERVOIR	501.01	4	5	.02172	.01	.015	.01262	4.700	.000	AC-FT= .434
ROUTE	501.10	5	4	.02172	.01	.015	.01262	4.700	.000	
ADD HYD	501.20	4& 6	5	2.38267	184.31	44.781	.35240	2.300	.121	
COMPUTE NM HYD	504.00	-	4	.89619	214.30	18.439	.38579	1.850	.374	PER IMP= 1.00
ADD HYD	504.10	4& 5	1	3.27886	362.91	63.220	.36152	1.950	.173	
COMPUTE NM HYD	500.00	-	4	.00628	10.44	.295	.88092	1.500	2.598	PER IMP= 1.00
ADD HYD	504.20	4& 1	6	3.28514	364.21	63.515	.36251	1.950	.173	
COMPUTE NM HYD	316.00	-	1	.02386	40.80	1.232	.96813	1.500	2.672	PER IMP= 6.90
ROUTE RESERVOIR	316.01	1	3	.02386	23.84	.907	.71246	1.650	1.561	AC-FT= .540
ROUTE	316.10	3	1	.02386	22.77	.907	.71244	1.700	1.491	
COMPUTE NM HYD	325.00	-	2	.00553	10.47	.381	1.29329	1.500	2.957	PER IMP= 28.90
ADD HYD	325.10	1& 2	3	.02939	27.72	1.288	.82172	1.650	1.474	
DIVIDE HYD	325.20	3	1	.01470	13.86	.644	.82172	1.650	1.474	
	325.30	AND	2	.01470	13.86	.644	.82172	1.650	1.474	
ROUTE	325.40	2	3	.01470	13.76	.644	.82171	1.700	1.463	
ADD HYD	325.50	3& 6	4	3.29983	371.16	64.159	.36456	1.950	.176	
DIVIDE HYD	325.60	4	3	1.64992	185.58	32.079	.36456	1.950	.176	
	325.60	AND	6	1.64992	185.58	32.079	.36456	1.950	.176	
ROUTE	325.70	6	4	1.64992	185.61	32.079	.36456	1.950	.176	
ROUTE	325.70	3	6	1.64992	185.61	32.079	.36456	1.950	.176	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	325.80	6& 4	2	3.29983	371.22	64.159	.36456	1.950	.176	
COMPUTE NM HYD	324.00	-	3	.01196	11.98	.611	.95778	1.650	1.564	PER IMP= 6.20
ROUTE	324.10	1	4	.01470	10.85	.644	.82164	1.800	1.154	
ADD HYD	324.20	3& 4	1	.02666	21.84	1.255	.88270	1.750	1.281	
ADD HYD	324.30	1& 2	3	3.32649	386.64	65.413	.36871	1.950	.182	
DIVIDE HYD	324.40	3	1	1.66324	193.32	32.707	.36871	1.950	.182	
	324.40	AND	2	1.66324	193.32	32.707	.36871	1.950	.182	
ROUTE	324.50	1	3	1.66324	193.42	32.707	.36871	1.950	.182	
ROUTE	324.50	2	1	1.66324	193.42	32.707	.36871	1.950	.182	
ADD HYD	324.60	3& 1	2	3.32649	386.85	65.413	.36871	1.950	.182	
ROUTE	324.50	2	1	3.32649	383.91	65.413	.36870	2.000	.180	
COMPUTE NM HYD	323.00	-	2	.00343	6.47	.234	1.27851	1.500	2.947	PER IMP= 27.90
ROUTE	323.10	2	3	.00343	3.15	.234	1.27865	1.650	1.436	
ADD HYD	323.20	1& 3	2	3.32992	385.80	65.647	.36964	2.000	.181	
COMPUTE NM HYD	321.00	-	1	.06053	102.74	3.054	.94595	1.500	2.652	PER IMP= 5.40
ADD HYD	321.10	2& 1	3	3.39045	396.78	68.700	.37993	2.000	.183	
COMPUTE NM HYD	322.00	-	4	.09103	125.58	4.327	.89127	1.550	2.156	PER IMP= 1.70
ADD HYD	322.10	3& 4	2	3.48148	421.57	73.027	.39330	1.950	.189	
ROUTE	322.20	2	1	3.48148	421.32	73.027	.39330	1.950	.189	
COMPUTE NM HYD	320.00	-	4	.00482	9.75	.392	1.52535	1.500	3.160	PER IMP= 44.60
ADD HYD	320.10	1& 4	12	3.48630	423.30	73.419	.39486	1.950	.190	
COMPUTE NM HYD	225.00	-	1	.02082	13.79	.415	.37392	1.500	1.035	PER IMP= .40
ROUTE	225.10	1	2	.02082	13.96	.415	.37394	1.550	1.048	
COMPUTE NM HYD	223.00	-	1	.01050	7.26	.205	.36600	1.500	1.080	PER IMP= .00
ROUTE RESERVOIR	223.01	1	3	.01050	.01	.018	.03220	4.250	.001	AC-FT= .203
DIVIDE HYD	223.10	3	1	.00525	.00	.009	.03220	4.250	.001	
	223.20	AND	4	.00525	.00	.009	.03220	4.250	.001	
ROUTE	223.30	4	3	.00525	.00	.009	.03220	4.250	.001	
ADD HYD	223.40	3& 2	5	.02607	13.96	.424	.30506	1.550	.837	
ROUTE	223.50	1	2	.00525	.00	.009	.03220	4.250	.001	
COMPUTE NM HYD	224.00	-	4	.02225	15.49	.437	.36846	1.500	1.088	PER IMP= .00
ADD HYD	224.10	4& 5	1	.04832	28.67	.861	.33426	1.550	.927	
ROUTE	322.20	12	3	3.48630	424.12	73.419	.39486	1.950	.190	
COMPUTE NM HYD	226.00	-	4	.01463	12.07	.364	.46701	1.500	1.290	PER IMP= 3.30
ADD HYD	226.10	3& 4	4	3.50093	425.55	73.784	.39516	1.950	.190	
ROUTE RESERVOIR	226.01	4	6	3.50093	425.24	71.673	.38386	1.950	.190	AC-FT= 2.803
ADD HYD	226.20	6& 1	3	3.54925	428.87	72.535	.38319	1.950	.189	
ROUTE	226.30	3	4	3.54925	427.59	72.534	.38318	2.000	.188	
ADD HYD	226.40	2& 4	5	3.55450	427.59	72.543	.38267	2.000	.188	
COMPUTE NM HYD	222.00	-	4	.08660	54.56	1.888	.40879	1.550	.984	PER IMP= .10
ADD HYD	222.10	5& 4	2	3.64110	436.39	74.431	.38329	1.950	.187	
COMPUTE NM HYD	221.00	-	4	.06353	52.45	1.455	.42930	1.500	1.290	PER IMP= .00
ADD HYD	221.10	2& 4	1	3.70463	441.63	75.886	.38408	1.950	.186	
ROUTE	221.20	1	2	3.70463	439.81	75.885	.38407	2.000	.185	
COMPUTE NM HYD	220.00	-	1	.05896	51.12	1.409	.44808	1.500	1.355	PER IMP= .00
ADD HYD	220.10	1& 2	3	3.76359	444.26	77.294	.38507	2.000	.184	
COMPUTE NM HYD	219.00	-	1	.07179	67.16	1.834	.47892	1.500	1.462	PER IMP= .00
ADD HYD	219.10	1& 3	2	3.83538	449.99	79.127	.38683	2.000	.183	
ROUTE	219.20	2	3	3.83538	449.04	79.127	.38683	2.050	.183	
COMPUTE NM HYD	218.00	-	4	.05788	40.00	1.130	.36600	1.500	1.080	PER IMP= .00
ADD HYD	218.10	3& 4	1	3.89326	452.35	80.257	.38652	2.050	.182	
COMPUTE NM HYD	216.00	-	4	.01310	12.53	.342	.48970	1.500	1.494	PER IMP= .00

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	216.10	4	2	.01310	9.97	.342	.48980	1.600	1.189	
COMPUTE NM HYD	217.00	-	3	.02827	19.54	.552	.36600	1.500	1.080	PER IMP= .00
ADD HYD	217.10	3& 2	4	.04137	27.98	.894	.40519	1.550	1.057	
COMPUTE NM HYD	215.00	-	3	.02934	23.04	.643	.41083	1.500	1.227	PER IMP= .00
ADD HYD	215.10	3& 4	2	.07071	49.87	1.537	.40753	1.500	1.102	
ADD HYD	215.20	1& 2	3	3.96397	457.74	81.793	.38689	2.000	.180	
ROUTE	215.30	3	1	3.96397	457.47	81.793	.38689	2.050	.180	
COMPUTE NM HYD	214.00	-	4	.03392	28.70	.794	.43865	1.500	1.322	PER IMP= .00
ADD HYD	214.10	4& 1	2	3.99789	459.72	82.587	.38733	2.050	.180	
COMPUTE NM HYD	211.00	-	1	.02593	24.19	.662	.47892	1.500	1.458	PER IMP= .00
COMPUTE NM HYD	212.00	-	3	.02755	26.98	.735	.50056	1.500	1.530	PER IMP= .00
ADD HYD	212.10	1& 3	4	.05348	51.17	1.398	.49006	1.500	1.495	
ROUTE	212.20	4	1	.05348	50.30	1.398	.49009	1.550	1.470	
COMPUTE NM HYD	213.00	-	3	.00817	6.26	.175	.40171	1.500	1.197	PER IMP= .00
ADD HYD	213.10	3& 1	4	.06165	56.24	1.573	.47836	1.550	1.425	
ADD HYD	213.20	2& 4	1	4.05954	464.79	84.159	.38871	2.050	.179	
ROUTE	213.40	1	2	4.05954	464.95	84.159	.38871	2.050	.179	
COMPUTE NM HYD	210.00	-	1	.04379	42.88	1.169	.50056	1.500	1.530	PER IMP= .00
ADD HYD	210.10	1& 2	3	4.10333	468.17	85.328	.38990	2.050	.178	
COMPUTE NM HYD	209.00	-	1	.01777	19.15	.517	.54557	1.500	1.684	PER IMP= .00
COMPUTE NM HYD	207.00	-	2	.01669	17.15	.465	.52251	1.500	1.606	PER IMP= .00
ADD HYD	207.10	1& 2	4	.03446	36.30	.982	.53440	1.500	1.646	
ROUTE	207.20	4	1	.03446	35.65	.982	.53444	1.550	1.616	
COMPUTE NM HYD	208.00	-	2	.00314	2.60	.072	.42930	1.500	1.292	PER IMP= .00
ADD HYD	208.10	1& 2	4	.03760	38.11	1.054	.52564	1.550	1.584	
ADD HYD	208.20	4& 3	1	4.14093	471.38	86.382	.39114	2.050	.178	
ROUTE	208.30	1	2	4.14093	471.20	86.382	.39113	2.050	.178	
COMPUTE NM HYD	206.00	-	5	.01983	18.50	.507	.47892	1.500	1.458	PER IMP= .00
COMPUTE NM HYD	205.00	-	1	.01974	22.29	.600	.57023	1.500	1.764	PER IMP= .00
COMPUTE NM HYD	204.00	-	3	.00763	8.62	.232	.57023	1.500	1.765	PER IMP= .00
ADD HYD	204.10	1& 3	4	.02737	30.91	.832	.57023	1.500	1.764	
ROUTE	204.20	4	1	.02737	29.06	.832	.57029	1.550	1.659	
COMPUTE NM HYD	203.00	-	3	.00960	9.63	.262	.51150	1.500	1.568	PER IMP= .00
ADD HYD	203.10	1& 3	4	.03697	38.11	1.094	.55500	1.550	1.610	
ADD HYD	203.20	4& 5	1	.05680	55.55	1.601	.52844	1.550	1.528	
ROUTE	203.30	1	3	.05680	52.07	1.601	.52845	1.600	1.432	
COMPUTE NM HYD	202.00	-	1	.03805	31.53	.874	.43087	1.500	1.295	PER IMP= .00
ADD HYD	202.10	1& 2	4	4.17898	473.69	87.256	.39150	2.050	.177	
ADD HYD	202.20	4& 3	1	4.23578	479.39	88.857	.39333	2.050	.177	
ROUTE	202.30	1	2	4.23578	478.81	88.856	.39333	2.050	.177	
COMPUTE NM HYD	201.00	-	1	.03518	29.67	.843	.44910	1.500	1.318	PER IMP= 1.00
COMPUTE NM HYD	200.00	-	3	.05438	71.28	1.996	.68804	1.500	2.048	PER IMP= 2.00
ADD HYD	200.10	1& 2	4	4.27096	481.28	89.699	.39379	2.050	.176	
ADD HYD	200.20	3& 4	12	4.32534	486.76	91.695	.39749	2.050	.176	
ADD HYD	200.30	12&10	1	18.68298	1312.73	344.837	.34607	1.900	.110	
ROUTE RESERVOIR	200.03	1	2	18.68298	70.81	312.271	.31339	10.900	.006	AC-FT= 267.707
ROUTE RESERVOIR	200.03	1	2	18.68298	73.27	322.992	.32415	10.800	.006	AC-FT= 265.790
FINISH										

AHYMO SUMMARY TABLE (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992 RUN DATE (MON/DAY/YR) =07/20/1992

INPUT FILE = alt_b.new USER NO.= SCANLNNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= .00
RAINFALL TYPE= 2										RAIN24= 2.590
COMPUTE NM HYD	418.00	-	1	1.49581	1644.29	117.752	1.47602	1.700	1.718	PER IMP= 48.00
COMPUTE NM HYD	417.00	-	2	.13909	133.30	10.949	1.47602	1.800	1.497	PER IMP= 48.00
ADD HYD	417.10	1& 2	3	1.63490	1769.44	128.701	1.47602	1.700	1.691	
ROUTE RESERVOIR	417.01	3	4	1.63490	1769.44	128.701	1.47602	1.700	1.691	
ROUTE	417.20	4	5	1.63490	1693.14	128.701	1.47602	1.750	1.618	
COMPUTE NM HYD	419.00	-	1	.19715	222.09	15.520	1.47602	1.700	1.760	PER IMP= 48.00
COMPUTE NM HYD	420.00	-	2	.18889	202.68	14.870	1.47602	1.700	1.677	PER IMP= 48.00
ADD HYD	419.10	1& 2	3	.38604	424.77	30.389	1.47602	1.700	1.719	
ADD HYD	420.10	3& 5	4	2.02094	2105.54	159.091	1.47602	1.750	1.628	
ROUTE	420.20	4	5	2.02094	1628.36	159.088	1.47600	1.900	1.259	
COMPUTE NM HYD	416.00	-	1	.86541	841.70	68.126	1.47602	1.750	1.520	PER IMP= 48.00
ROUTE	416.10	1	2	.86541	714.22	68.126	1.47602	1.900	1.290	
ADD HYD	416.20	2& 5	3	2.88635	2342.58	227.214	1.47601	1.900	1.268	
COMPUTE NM HYD	415.00	-	1	.15228	239.40	11.988	1.47602	1.550	2.456	PER IMP= 48.00
ROUTE RESERVOIR	415.01	1	2	.15228	239.40	11.988	1.47602	1.550	2.456	
COMPUTE NM HYD	414.00	-	1	.11235	127.24	8.844	1.47602	1.700	1.770	PER IMP= 48.00
ADD HYD	414.10	2& 1	4	.26463	336.05	20.832	1.47602	1.600	1.984	
ROUTE RESERVOIR	414.01	4	2	.26463	336.05	20.832	1.47602	1.600	1.984	
ROUTE	414.30	2	1	.26463	250.59	20.832	1.47602	1.750	1.480	
COMPUTE NM HYD	411.00	-	2	.29891	374.66	23.531	1.47602	1.650	1.958	PER IMP= 48.00
ADD HYD	411.10	1& 2	4	.56354	609.62	44.362	1.47602	1.650	1.690	
ROUTE	411.20	4	1	.56354	607.97	44.363	1.47602	1.700	1.686	
COMPUTE NM HYD	412.00	-	2	1.18559	1168.31	93.331	1.47602	1.750	1.540	PER IMP= 48.00
ADD HYD	412.10	1& 2	4	1.74913	1749.43	137.694	1.47602	1.750	1.563	
ADD HYD	412.20	4& 3	1	4.63548	3861.08	364.908	1.47601	1.850	1.301	
ROUTE	412.30	1	5	4.63548	3543.09	364.901	1.47599	1.950	1.194	
COMPUTE NM HYD	424.00	-	1	.33534	407.14	26.398	1.47602	1.650	1.897	PER IMP= 48.00
ROUTE RESERVOIR	424.01	1	2	.33534	407.14	26.398	1.47602	1.650	1.897	
COMPUTE NM HYD	421.00	-	1	.33184	390.04	26.123	1.47602	1.650	1.837	PER IMP= 48.00
ADD HYD	421.10	1& 2	3	.66718	797.19	52.521	1.47602	1.650	1.867	
ROUTE	421.20	3	1	.66718	789.08	52.521	1.47602	1.650	1.848	
COMPUTE NM HYD	422.00	-	2	.14367	157.66	11.310	1.47602	1.700	1.715	PER IMP= 48.00
ADD HYD	422.10	1& 2	3	.81085	940.63	63.831	1.47602	1.650	1.813	
ROUTE	422.20	3	1	.81085	919.93	63.831	1.47602	1.700	1.773	
COMPUTE NM HYD	423.00	-	2	.05985	50.33	4.711	1.47602	1.900	1.314	PER IMP= 48.00
ADD HYD	423.10	1& 2	3	.87070	959.04	68.543	1.47602	1.700	1.721	
ROUTE	423.20	3	1	.87070	820.49	68.542	1.47602	1.800	1.472	
COMPUTE NM HYD	413.00	-	2	1.00011	1047.73	78.730	1.47602	1.700	1.637	PER IMP= 48.00
ADD HYD	413.10	1& 2	3	1.87081	1834.87	147.273	1.47602	1.750	1.532	
ROUTE	413.20	3	1	1.87081	1802.57	147.272	1.47602	1.800	1.506	
COMPUTE NM HYD	410.00	-	2	1.38956	1491.73	109.388	1.47602	1.700	1.677	PER IMP= 48.00
ADD HYD	410.10	1& 2	3	3.26037	3224.80	256.660	1.47602	1.750	1.545	
ADD HYD	410.20	3& 5	4	7.89585	6286.56	621.562	1.47600	1.850	1.244	
ROUTE RESERVOIR	410.01	4	1	7.89585	6286.56	621.562	1.47600	1.850	1.244	
ROUTE	410.30	1	2	7.89585	5839.40	621.546	1.47596	2.150	1.156	
COMPUTE NM HYD	409.00	-	1	.46618	587.81	36.698	1.47602	1.650	1.970	PER IMP= 48.00
ROUTE	409.10	1	3	.46618	441.89	36.698	1.47602	1.750	1.481	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	408.00	-	1	1.38633	1471.52	109.134	1.47602	1.700	1.659	PER IMP= 48.00
ADD HYD	408.10	1& 3	4	1.85251	1896.23	145.832	1.47602	1.750	1.599	
ADD HYD	408.20	4& 2	5	9.74836	7086.33	767.379	1.47598	1.950	1.136	
ROUTE	408.30	5	1	9.74836	6838.26	767.357	1.47594	2.050	1.096	
COMPUTE NM HYD	403.00	-	2	.48341	570.41	40.515	1.57147	1.700	1.844	PER IMP= 53.70
ADD HYD	403.10	1& 2	3	10.23177	7107.35	807.873	1.48045	2.050	1.085	
ROUTE	403.20	3	5	10.23177	7096.19	807.867	1.48044	2.050	1.084	
COMPUTE NM HYD	406.00	-	1	.05788	84.47	6.173	1.99976	1.700	2.280	PER IMP= 78.40
DIVIDE HYD	406.10	1	2	.05785	84.00	6.170	1.99975	1.650	2.269	
	406.20	AND	3	.00003	.47	.003	1.99975	1.700	22.845	
ROUTE	406.30	3	1	.00003	.21	.004	2.24014	1.750	10.036	
COMPUTE NM HYD	407.00	-	2	.06012	95.32	4.733	1.47602	1.550	2.477	PER IMP= 48.00
ROUTE RESERVOIR	407.01	2	3	.06012	95.32	4.733	1.47602	1.550	2.477	
ROUTE	407.10	3	2	.06012	48.89	4.733	1.47603	1.700	1.271	
COMPUTE NM HYD	404.00	-	3	.22811	308.70	25.148	2.06712	1.700	2.115	PER IMP= 83.00
ADD HYD	404.10	1& 2	4	.06015	49.08	4.737	1.47642	1.700	1.275	
ADD HYD	404.20	3& 4	7	.28826	357.78	29.885	1.94385	1.700	1.939	
DIVIDE HYD	404.10	7	2	.14283	46.00	14.807	1.94386	1.400	.503	
	404.20	AND	3	.14543	311.78	15.078	1.94385	1.700	3.350	
DIVIDE HYD	404.20	2	1	.07141	23.00	7.404	1.94386	1.400	.503	
	404.30	AND	4	.07141	23.00	7.404	1.94386	1.400	.503	
ROUTE	404.40	1	2	.07141	23.20	7.404	1.94386	1.450	.508	
ROUTE	404.40	4	1	.07141	23.20	7.404	1.94386	1.450	.508	
ADD HYD	404.50	1& 2	7	.14283	46.40	14.807	1.94385	1.450	.508	
ROUTE	404.60	3	1	.14543	272.80	15.078	1.94391	1.800	2.931	
COMPUTE NM HYD	405.00	-	2	.28007	350.74	26.569	1.77874	1.700	1.957	PER IMP= 66.00
ROUTE	405.10	2	3	.28007	298.65	26.569	1.77874	1.800	1.666	
ADD HYD	405.20	3& 1	3	.42550	571.45	41.647	1.83519	1.800	2.098	
COMPUTE NM HYD	402.00	-	2	.21249	309.48	23.213	2.04827	1.650	2.276	PER IMP= 81.70
ADD HYD	402.10	2& 3	4	.63799	834.94	64.860	1.90616	1.800	2.045	
ROUTE	402.20	4	2	.63799	835.66	64.860	1.90616	1.800	2.047	
COMPUTE NM HYD	401.00	-	3	.14474	219.87	16.322	2.11433	1.650	2.374	PER IMP= 86.00
ADD HYD	401.10	5& 2	4	10.86976	7707.53	872.726	1.50542	2.050	1.108	
ADD HYD	401.20	4& 3	5	11.01450	7810.59	889.048	1.51343	2.050	1.108	
COMPUTE NM HYD	303.00	-	1	.00790	4.51	.549	1.30216	2.200	.893	PER IMP= 29.50
ADD HYD	303.10	1& 7	2	.15073	50.52	15.356	1.91021	2.150	.524	
DIVIDE HYD	303.20	2	1	.14752	46.00	15.029	1.91021	1.450	.487	
	303.30	AND	6	.00321	4.52	.327	1.91021	2.150	2.203	
DIVIDE HYD	303.40	1	2	.07376	23.00	7.515	1.91021	1.450	.487	
	303.40	AND	3	.07376	23.00	7.515	1.91021	1.450	.487	
ROUTE	303.50	2	1	.07376	23.19	7.515	1.91022	1.450	.491	
ROUTE	303.60	3	2	.07376	23.19	7.515	1.91022	1.450	.491	
ADD HYD	303.70	1& 2	3	.14752	46.39	15.029	1.91021	1.450	.491	
COMPUTE NM HYD	302.00	-	1	.01116	8.33	.700	1.17653	1.900	1.167	PER IMP= 21.00
ADD HYD	302.10	1& 3	2	.15868	54.33	15.729	1.85860	1.950	.535	
DIVIDE HYD	302.20	2	1	.15335	46.00	15.201	1.85860	1.400	.469	
	302.30	AND	8	.00533	8.33	.529	1.85860	1.950	2.440	
DIVIDE HYD	302.40	1	2	.07667	23.00	7.600	1.85860	1.400	.469	
	302.40	AND	3	.07667	23.00	7.600	1.85860	1.400	.469	
ROUTE	302.40	2	4	.07667	23.24	7.600	1.85861	1.450	.474	
ROUTE	302.50	3	1	.07667	23.24	7.600	1.85861	1.450	.474	
ADD HYD	302.60	4& 1	3	.15335	46.49	15.201	1.85860	1.450	.474	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	301.00	-	1	.00593	6.69	.456	1.44258	1.700	1.763	PER IMP= 39.00
ROUTE	301.20	1	2	.00593	6.68	.456	1.44259	1.750	1.760	
ADD HYD	301.30	2& 3	7	.15928	52.83	15.657	1.84311	1.750	.518	
COMPUTE NM HYD	300.00	-	2	.00603	11.07	.383	1.18983	1.500	2.867	PER IMP= 21.90
ADD HYD	300.10	8& 2	1	.01136	12.57	.911	1.50364	1.550	1.729	
ROUTE	300.20	1	2	.01136	12.46	.911	1.50371	1.550	1.713	
COMPUTE NM HYD	304.00	-	1	.00347	6.84	.265	1.42927	1.500	3.078	PER IMP= 38.10
ROUTE	304.20	1	3	.00347	6.69	.265	1.42942	1.500	3.014	
ADD HYD	304.30	2& 3	8	.01483	18.96	1.176	1.48623	1.500	1.997	
COMPUTE NM HYD	305.00	-	9	.00402	7.31	.298	1.38937	1.500	2.843	PER IMP= 35.40
ROUTE RESERVOIR	401.02	5	1	11.01450	7771.34	889.047	1.51343	2.050	1.102	AC-FT= 36.333
ROUTE	401.80	1	2	11.01450	7772.29	889.046	1.51342	2.100	1.103	
COMPUTE NM HYD	307.00	-	4	.01650	18.38	1.197	1.35981	1.700	1.741	PER IMP= 33.40
ADD HYD	307.10	6& 4	1	.01971	20.06	1.523	1.44935	1.750	1.590	
ROUTE	307.20	1	3	.01971	19.71	1.523	1.44939	1.750	1.563	
ADD HYD	307.30	3& 2	1	11.03421	7785.47	890.569	1.51331	2.100	1.102	
COMPUTE NM HYD	315.00	-	2	.00836	14.06	.408	.91492	1.500	2.627	PER IMP= 3.30
ROUTE RESERVOIR	315.01	2	3	.00836	14.06	.408	.91492	1.500	2.627	
ROUTE	315.10	3	2	.00836	12.19	.408	.91500	1.550	2.277	
ADD HYD	315.20	1& 2	3	11.04257	7787.11	890.978	1.51286	2.100	1.102	
COMPUTE NM HYD	312.00	-	1	.03437	61.74	2.059	1.12332	1.500	2.807	PER IMP= 17.40
DIVIDE HYD	312.10	1	2	.01719	30.87	1.030	1.12331	1.500	2.807	
	312.20	AND	4	.01719	30.87	1.030	1.12331	1.500	2.807	
ROUTE	312.30	2	5	.01719	29.65	1.030	1.12335	1.550	2.696	
ADD HYD	312.40	3& 5	1	11.05976	7791.04	892.007	1.51225	2.100	1.101	
COMPUTE NM HYD	314.00	-	3	.01914	32.58	.973	.95334	1.500	2.659	PER IMP= 5.90
ADD HYD	314.10	2& 1	1	11.07694	7793.76	893.037	1.51165	2.100	1.099	
ADD HYD	314.20	1& 3	2	11.09608	7796.06	894.009	1.51068	2.100	1.098	
ROUTE RESERVOIR	401.02	2	1	11.09608	7782.49	894.009	1.51068	2.100	1.096	AC-FT= 24.946
ROUTE	314.90	1	2	11.09608	7774.90	894.006	1.51068	2.100	1.095	
COMPUTE NM HYD	306.00	-	1	.01532	14.71	.972	1.18983	1.750	1.500	PER IMP= 21.90
ROUTE	306.10	1	3	.01532	14.71	.972	1.18983	1.750	1.501	
ROUTE	306.20	3	1	.01532	13.29	.972	1.18983	1.850	1.355	
COMPUTE NM HYD	310.00	-	3	.00981	17.85	.609	1.16323	1.500	2.843	PER IMP= 20.10
ADD HYD	310.10	3& 1	5	.02513	20.09	1.581	1.17940	1.500	1.249	
ROUTE	310.20	5	1	.02513	20.06	1.581	1.17944	1.550	1.247	
ADD HYD	310.30	1& 2	3	11.12121	7786.53	895.586	1.50993	2.100	1.094	
ROUTE	310.40	4	5	.01719	30.77	1.030	1.12335	1.500	2.797	
ADD HYD	310.50	5& 3	1	11.13840	7789.80	896.616	1.50933	2.100	1.093	
COMPUTE NM HYD	313.00	-	2	.00787	14.34	.490	1.16766	1.500	2.847	PER IMP= 20.40
ADD HYD	313.10	1& 2	3	11.14627	7791.13	897.106	1.50909	2.100	1.092	
ROUTE RESERVOIR	401.03	3	1	11.14627	7787.03	897.107	1.50909	2.150	1.092	AC-FT= 15.275
COMPUTE NM HYD	309.00	-	3	.00803	6.32	.529	1.23565	1.900	1.231	PER IMP= 25.00
COMPUTE NM HYD	308.00	-	4	.00915	9.43	.732	1.50022	1.800	1.610	PER IMP= 42.90
ADD HYD	308.10	3& 4	2	.01718	15.43	1.261	1.37646	1.850	1.403	
ADD HYD	308.20	1& 2	10	11.16345	7796.88	898.367	1.50889	2.150	1.091	
COMPUTE NM HYD	311.00	-	11	.00602	6.13	.494	1.54013	1.800	1.590	PER IMP= 45.60
ROUTE	301.10	7	1	.15928	48.42	15.657	1.84312	2.150	.475	
ROUTE	304.10	8	2	.01483	13.09	1.176	1.48628	1.800	1.379	
ROUTE	305.10	9	3	.00402	6.00	.298	1.38947	1.600	2.333	
ADD HYD	301.20	1& 2	4	.17411	60.15	16.833	1.81271	2.000	.540	
ADD HYD	301.30	3& 4	1	.17813	62.17	17.130	1.80316	1.950	.545	

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COMPUTE NM HYD	145.00	-	2	.12312	171.80	12.479	1.90041	1.700	2.180	PER IMP= 71.60
ADD HYD	145.10	1& 2	3	.30125	228.91	29.609	1.84290	1.700	1.187	
ROUTE	145.20	3	1	.30125	229.44	29.609	1.84291	1.700	1.190	
COMPUTE NM HYD	143.00	-	2	.09431	114.64	7.424	1.47602	1.650	1.899	PER IMP= 48.00
COMPUTE NM HYD	144.00	-	3	.02602	46.58	2.211	1.59314	1.550	2.797	PER IMP= 50.40
ADD HYD	143.10	1& 2	4	.39556	340.58	37.034	1.75543	1.700	1.345	
ADD HYD	143.20	3& 4	1	.42158	370.80	39.244	1.74541	1.650	1.374	
ROUTE	143.30	1	2	.42158	370.98	39.244	1.74541	1.700	1.375	
COMPUTE NM HYD	141.00	-	1	.03868	68.81	3.045	1.47602	1.500	2.780	PER IMP= 48.00
ADD HYD	141.10	1& 2	3	.46026	409.64	42.289	1.72277	1.650	1.391	
COMPUTE NM HYD	140.00	-	1	.09638	116.14	7.587	1.47602	1.650	1.883	PER IMP= 48.00
ADD HYD	140.10	1& 3	2	.55664	525.78	49.876	1.68005	1.650	1.476	
ROUTE	140.20	2	1	.55664	520.69	49.876	1.68005	1.700	1.462	
COMPUTE NM HYD	139.00	-	2	.02145	40.24	1.689	1.47602	1.500	2.932	PER IMP= 48.00
ADD HYD	139.10	1& 2	3	.57809	542.12	51.565	1.67248	1.650	1.465	
ROUTE	139.20	3	1	.57809	539.24	51.565	1.67248	1.700	1.458	
COMPUTE NM HYD	138.00	-	2	.16332	241.11	12.857	1.47602	1.550	2.307	PER IMP= 48.00
ADD HYD	138.10	2& 1	3	.74141	734.71	64.422	1.62920	1.650	1.548	
ROUTE	138.20	3	1	.74141	687.31	64.422	1.62920	1.750	1.448	
COMPUTE NM HYD	129.00	-	2	.39080	533.07	30.764	1.47602	1.600	2.131	PER IMP= 48.00
ADD HYD	129.10	1& 2	3	1.13221	1138.40	95.186	1.57633	1.650	1.571	
COMPUTE NM HYD	136.00	-	1	.08130	105.43	6.400	1.47602	1.600	2.026	PER IMP= 48.00
COMPUTE NM HYD	135.00	-	2	.05923	82.98	4.663	1.47602	1.600	2.189	PER IMP= 48.00
ADD HYD	135.10	1& 2	4	.14053	188.41	11.063	1.47602	1.600	2.095	
ROUTE RESERVOIR	135.01	4	1	.14053	188.41	11.063	1.47602	1.600	2.095	
ROUTE	135.20	1	2	.14053	159.00	11.063	1.47602	1.700	1.768	
COMPUTE NM HYD	130.00	-	1	.20469	234.33	16.113	1.47602	1.700	1.789	PER IMP= 48.00
ADD HYD	130.10	1& 2	4	.34522	393.33	27.176	1.47602	1.700	1.780	
ROUTE	130.20	4	2	.34522	367.82	27.176	1.47602	1.750	1.665	
COMPUTE NM HYD	125.00	-	1	.03679	59.17	2.896	1.47602	1.550	2.513	PER IMP= 48.00
ADD HYD	125.10	1& 2	4	.38201	398.20	30.072	1.47602	1.750	1.629	
ADD HYD	125.20	3& 4	1	1.51422	1519.08	125.258	1.55102	1.700	1.568	
COMPUTE NM HYD	124.00	-	2	.04092	54.28	3.221	1.47602	1.600	2.073	PER IMP= 48.00
ADD HYD	124.10	2& 1	3	1.55514	1567.30	128.479	1.54905	1.700	1.575	
ROUTE	124.20	3	1	1.55514	1568.25	128.479	1.54905	1.700	1.576	
COMPUTE NM HYD	123.00	-	2	.02504	47.07	1.971	1.47602	1.500	2.937	PER IMP= 48.00
COMPUTE NM HYD	122.00	-	3	.13622	176.04	10.723	1.47602	1.600	2.019	PER IMP= 48.00
ADD HYD	123.10	1& 2	4	1.58018	1588.65	130.451	1.54789	1.700	1.571	
ADD HYD	123.20	3& 4	1	1.71640	1749.44	141.174	1.54219	1.700	1.593	
ROUTE	123.30	1	2	1.71640	1748.87	141.174	1.54219	1.700	1.592	
COMPUTE NM HYD	121.00	-	1	.02100	37.31	1.523	1.35959	1.500	2.776	PER IMP= 42.30
ADD HYD	121.10	1& 2	3	1.73740	1764.93	142.697	1.53998	1.700	1.587	
ROUTE	121.20	3	1	1.73740	1749.13	142.697	1.53998	1.750	1.573	
COMPUTE NM HYD	120.00	-	2	.01176	20.45	.774	1.23454	1.500	2.717	PER IMP= 32.20
COMPUTE NM HYD	119.00	-	3	.03895	66.44	3.120	1.50216	1.500	2.665	PER IMP= 49.40
ADD HYD	119.10	2& 3	4	.05071	86.89	3.895	1.44008	1.500	2.677	
ROUTE	119.20	4	2	.05071	72.77	3.895	1.44010	1.600	2.242	
COMPUTE NM HYD	115.00	-	3	.03760	58.34	1.862	.92856	1.500	2.425	PER IMP= 12.60
ROUTE	115.10	3	4	.03760	56.57	1.862	.92857	1.550	2.351	
COMPUTE NM HYD	112.00	-	3	.04603	70.64	2.228	.90771	1.500	2.398	PER IMP= 11.50
ADD HYD	112.10	1& 2	5	1.78811	1797.49	146.591	1.53715	1.750	1.571	
ADD HYD	112.20	3& 5	2	1.83414	1819.75	148.820	1.52135	1.750	1.550	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	112.30	4& 2	1	1.87174	1841.88	150.682	1.50944	1.750	1.538	
ROUTE	311.40	11	2	.00602	5.75	.494	1.54012	1.900	1.493	
COMPUTE NM HYD	149.00	-	3	.03482	80.72	3.905	2.10292	1.500	3.622	PER IMP= 85.10
ADD HYD	311.10	2& 3	4	.04084	81.56	4.400	2.01994	1.500	3.121	
DIVIDE HYD	311.20	4	2	.01389	27.73	1.496	2.01993	1.500	3.121	
	311.30	AND	3	.02695	53.83	2.904	2.01993	1.500	3.121	
DIVIDE HYD	311.20	3	4	.01348	26.92	1.452	2.01992	1.500	3.121	
	311.20	AND	5	.01348	26.92	1.452	2.01992	1.500	3.121	
ROUTE	311.20	2	3	.01389	27.75	1.496	2.01994	1.500	3.123	
ROUTE	311.20	4	2	.01348	26.94	1.452	2.01994	1.500	3.123	
ROUTE	311.20	5	4	.01348	26.94	1.452	2.01994	1.500	3.123	
ADD HYD	311.30	2& 3	5	.02736	54.69	2.948	2.01988	1.500	3.123	
ADD HYD	311.40	5& 4	2	.04084	81.63	4.400	2.01989	1.500	3.123	
ROUTE	311.30	2	3	.04084	51.64	4.400	2.01994	1.600	1.976	
COMPUTE NM HYD	148.00	-	2	.01588	29.86	1.250	1.47602	1.500	2.938	PER IMP= 48.00
ROUTE	148.10	2	4	.01588	29.68	1.250	1.47605	1.500	2.920	
ROUTE	148.20	4	2	.01588	18.16	1.250	1.47605	1.650	1.787	
COMPUTE NM HYD	147.00	-	4	.00565	10.63	.445	1.47602	1.500	2.940	PER IMP= 48.00
ROUTE	147.10	4	5	.00565	10.55	.445	1.47612	1.500	2.918	
ROUTE	147.20	5	4	.00565	7.03	.445	1.47612	1.600	1.945	
COMPUTE NM HYD	146.00	-	5	.05976	89.05	5.203	1.63233	1.600	2.328	PER IMP= 56.00
ADD HYD	146.10	2& 3	6	.05672	69.57	5.650	1.86764	1.600	1.916	
ADD HYD	146.20	4& 6	2	.06237	76.60	6.095	1.83217	1.600	1.919	
ADD HYD	146.30	5& 2	3	.12213	165.65	11.297	1.73438	1.600	2.119	
COMPUTE NM HYD	154.00	-	2	.01947	47.50	2.378	2.29015	1.500	3.812	PER IMP= 96.70
ROUTE	154.10	2	4	.01947	28.64	2.378	2.29017	1.600	2.299	
COMPUTE NM HYD	153.00	-	2	.00646	13.62	.751	2.18001	1.550	3.294	PER IMP= 90.00
ROUTE	153.10	2	5	.00646	8.70	.751	2.18006	1.700	2.103	
COMPUTE NM HYD	152.00	-	2	.07224	92.49	5.936	1.54059	1.650	2.000	PER IMP= 54.70
ADD HYD	152.10	2& 4	6	.09171	120.81	8.314	1.69971	1.600	2.058	
ADD HYD	152.20	5& 6	2	.09817	129.30	9.065	1.73131	1.650	2.058	
ROUTE	152.30	2	5	.09817	130.41	9.065	1.73132	1.650	2.076	
ADD HYD	152.40	3& 5	2	.22030	291.53	20.362	1.73301	1.600	2.068	
ROUTE	152.30	10	3	11.16345	7764.80	898.356	1.50887	2.150	1.087	
COMPUTE NM HYD	150.00	-	4	.03482	76.58	3.445	1.85529	1.500	3.436	PER IMP= 67.20
ROUTE	150.10	4	5	.03482	63.52	3.445	1.85531	1.550	2.850	
COMPUTE NM HYD	142.00	-	4	.12769	241.18	11.395	1.67331	1.500	2.951	PER IMP= 58.80
ADD HYD	142.20	3& 4	6	11.29114	7796.40	909.751	1.51073	2.150	1.079	
ADD HYD	142.30	5& 6	3	11.32596	7810.71	913.197	1.51179	2.150	1.078	
ROUTE RESERVOIR	142.01	3	4	11.32596	7810.71	913.197	1.51179	2.150	1.078	
ROUTE	142.40	4	3	11.32596	7800.67	913.185	1.51177	2.200	1.076	
COMPUTE NM HYD	137.00	-	4	.08668	140.39	6.824	1.47602	1.550	2.531	PER IMP= 48.00
ADD HYD	137.10	3& 4	5	11.41264	7818.09	920.009	1.51150	2.200	1.070	
COMPUTE NM HYD	134.00	-	4	.04029	73.65	3.172	1.47602	1.500	2.856	PER IMP= 48.00
ADD HYD	134.10	4& 2	6	.26059	345.78	23.533	1.69328	1.600	2.073	
ADD HYD	134.20	6& 5	2	11.67323	7916.61	943.541	1.51555	2.200	1.060	
ROUTE	134.30	2	3	11.67323	7914.93	943.535	1.51554	2.200	1.059	
COMPUTE NM HYD	132.00	-	2	.02692	50.61	2.119	1.47602	1.500	2.937	PER IMP= 48.00
COMPUTE NM HYD	133.00	-	4	.03939	73.22	3.101	1.47602	1.500	2.904	PER IMP= 48.00
ADD HYD	133.10	2& 3	5	11.70015	7918.68	945.654	1.51545	2.200	1.058	
ADD HYD	133.20	4& 5	2	11.73954	7924.33	948.755	1.51532	2.200	1.055	
ROUTE	133.30	2	3	11.73954	7903.33	948.743	1.51530	2.250	1.052	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	151.00	-	2	.02907	55.87	2.436	1.57151	1.500	3.003	PER IMP= 55.00
ROUTE	151.10	2	4	.02907	44.32	2.436	1.57153	1.550	2.382	
COMPUTE NM HYD	131.00	-	2	.05707	94.06	3.677	1.20806	1.500	2.575	PER IMP= 30.80
ADD HYD	131.10	2& 3	5	11.79661	7909.08	952.420	1.51381	2.250	1.048	
ADD HYD	131.20	4& 5	2	11.82568	7915.55	954.856	1.51396	2.250	1.046	
ROUTE	131.30	2	3	11.82568	7915.58	954.841	1.51393	2.250	1.046	
COMPUTE NM HYD	127.00	-	2	.04370	76.32	2.928	1.25649	1.500	2.729	PER IMP= 33.90
ADD HYD	127.10	2& 3	4	11.86938	7919.80	957.770	1.51298	2.250	1.043	
ROUTE	127.20	4	2	11.86938	7912.12	957.762	1.51297	2.250	1.042	
COMPUTE NM HYD	128.00	-	3	.07690	142.99	6.081	1.48263	1.500	2.905	PER IMP= 48.00
ROUTE	128.10	3	4	.07690	138.75	6.081	1.48263	1.550	2.819	
COMPUTE NM HYD	126.00	-	3	.07448	119.49	5.257	1.32353	1.500	2.507	PER IMP= 37.70
ADD HYD	126.10	3& 4	5	.15138	257.84	11.338	1.40435	1.550	2.661	
ROUTE	126.20	5	3	.15138	263.35	11.338	1.40436	1.550	2.718	
ADD HYD	126.30	2& 3	4	12.02076	7940.23	969.099	1.51160	2.250	1.032	
COMPUTE NM HYD	118.00	-	2	.06353	100.10	3.303	.97493	1.500	2.462	PER IMP= 15.80
ADD HYD	118.10	2& 4	3	12.08429	7944.96	972.403	1.50878	2.250	1.027	
ROUTE	118.20	3	2	12.08429	7932.69	972.394	1.50877	2.300	1.026	
COMPUTE NM HYD	116.00	-	3	.01678	24.73	.722	.80642	1.500	2.303	PER IMP= 5.00
COMPUTE NM HYD	117.00	-	4	.01804	26.81	.795	.82674	1.500	2.322	PER IMP= 6.30
COMPUTE NM HYD	114.00	-	5	.01552	25.42	.890	1.07503	1.500	2.559	PER IMP= 22.20
ADD HYD	114.10	2& 3	6	12.10107	7933.58	973.115	1.50779	2.300	1.024	
ADD HYD	114.20	4& 6	2	12.11911	7934.56	973.909	1.50678	2.300	1.023	
ADD HYD	114.30	5& 2	3	12.13463	7935.65	974.799	1.50623	2.300	1.022	
ROUTE	114.40	3	2	12.13463	7942.38	974.791	1.50621	2.300	1.023	
COMPUTE NM HYD	113.00	-	5	.01992	30.16	.928	.87335	1.500	2.366	PER IMP= 9.30
ADD HYD	113.10	5& 2	4	12.15455	7943.52	975.719	1.50518	2.300	1.021	
ADD HYD	112.10	1& 4	3	14.02629	8624.20	1126.401	1.50575	2.250	.961	
ROUTE	112.20	3	1	14.02629	8621.73	1126.391	1.50573	2.250	.960	
COMPUTE NM HYD	111.00	-	2	.00906	13.36	.390	.80642	1.500	2.304	PER IMP= 5.00
ADD HYD	111.10	1& 2	3	14.03535	8622.29	1126.781	1.50528	2.250	.960	
ROUTE	111.20	3	1	14.03535	8609.24	1126.774	1.50527	2.250	.958	
COMPUTE NM HYD	110.00	-	2	.04352	69.41	2.338	1.00721	1.500	2.492	PER IMP= 17.90
ADD HYD	110.10	1& 2	3	14.07887	8612.59	1129.111	1.50373	2.250	.956	
ROUTE	110.20	3	1	14.07887	8614.62	1129.105	1.50372	2.300	.956	
COMPUTE NM HYD	109.00	-	2	.02638	39.94	1.229	.87335	1.500	2.365	PER IMP= 9.30
COMPUTE NM HYD	108.00	-	3	.00781	11.61	.344	.82674	1.500	2.323	PER IMP= 6.30
ADD HYD	109.10	1& 2	4	14.10525	8616.14	1130.334	1.50254	2.300	.954	
ADD HYD	109.20	3& 4	1	14.11306	8616.56	1130.678	1.50217	2.300	.954	
ROUTE	109.30	1	2	14.11306	8619.63	1130.671	1.50216	2.300	.954	
COMPUTE NM HYD	107.00	-	1	.02163	31.87	.930	.80642	1.500	2.302	PER IMP= 5.00
ADD HYD	107.10	1& 2	3	14.13469	8620.77	1131.602	1.50110	2.300	.953	
ROUTE	107.20	3	1	14.13469	8620.09	1131.591	1.50108	2.300	.953	
COMPUTE NM HYD	106.00	-	2	.04128	62.49	1.923	.87335	1.500	2.365	PER IMP= 9.30
ADD HYD	106.10	1& 2	3	14.17597	8622.45	1133.515	1.49926	2.300	.950	
ROUTE	106.20	3	1	14.17597	8619.90	1133.504	1.49924	2.300	.950	
COMPUTE NM HYD	105.00	-	2	.02584	39.12	1.204	.87335	1.500	2.365	PER IMP= 9.30
COMPUTE NM HYD	104.00	-	3	.01579	25.19	.848	1.00721	1.500	2.493	PER IMP= 17.90
ADD HYD	104.10	2& 3	4	.04163	64.31	2.052	.92411	1.500	2.414	
ADD HYD	104.20	1& 4	2	14.21760	8622.42	1135.556	1.49756	2.300	.948	
ROUTE	104.30	2	1	14.21760	8619.45	1135.546	1.49754	2.300	.947	
COMPUTE NM HYD	103.00	-	2	.02997	44.52	1.321	.82674	1.500	2.321	PER IMP= 6.30

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	103.10	1& 2	3	14.24757	8621.08	1136.867	1.49613	2.300	.945	
ROUTE	103.20	3	1	14.24757	8610.15	1136.837	1.49609	2.350	.944	
COMPUTE NM HYD	101.00	-	2	.08444	138.39	4.717	1.04735	1.500	2.561	PER IMP= 19.30
COMPUTE NM HYD	102.00	-	3	.02692	42.94	1.446	1.00721	1.500	2.492	PER IMP= 17.90
ADD HYD	101.10	1& 2	4	14.33201	8615.12	1141.553	1.49345	2.350	.939	
ADD HYD	101.20	3& 4	10	14.35893	8616.67	1143.001	1.49254	2.350	.938	
COMPUTE NM HYD	509.00	-	4	.04047	58.84	3.186	1.47602	1.550	2.272	PER IMP= 48.00
ROUTE RESERVOIR	509.01	4	5	.04047	58.84	3.186	1.47602	1.550	2.272	
ROUTE	509.10	5	4	.04047	33.47	3.186	1.47603	1.750	1.292	
COMPUTE NM HYD	508.00	-	5	.13308	119.53	11.488	1.61853	1.900	1.403	PER IMP= 56.40
ADD HYD	508.10	4& 5	6	.17355	150.19	14.673	1.58529	1.850	1.352	
ROUTE	508.20	6	4	.17355	149.92	14.674	1.58530	1.850	1.350	
ROUTE	508.30	4	5	.17355	119.06	14.673	1.58529	2.100	1.072	
COMPUTE NM HYD	506.00	-	4	.68388	736.59	57.989	1.58990	1.750	1.683	PER IMP= 54.70
ROUTE	506.10	4	6	.68388	737.37	57.989	1.58990	1.750	1.685	
ROUTE	506.20	6	4	.68388	718.32	57.989	1.58990	1.800	1.641	
COMPUTE NM HYD	507.00	-	6	.72551	840.26	61.196	1.58155	1.700	1.810	PER IMP= 54.20
ADD HYD	507.10	4& 5	7	.85743	790.85	72.663	1.58897	1.800	1.441	
ADD HYD	507.20	6& 7	4	1.58294	1568.62	133.859	1.58557	1.750	1.548	
ROUTE	507.30	4	6	1.58294	1273.57	133.858	1.58555	1.900	1.257	
ROUTE	507.40	6	5	1.58294	1240.85	133.857	1.58554	2.000	1.225	
COMPUTE NM HYD	505.00	-	4	.57826	725.04	50.018	1.62181	1.650	1.959	PER IMP= 56.60
ROUTE	505.10	4	6	.57826	721.06	50.018	1.62181	1.650	1.948	
ROUTE	505.20	6	4	.57826	634.85	50.018	1.62181	1.750	1.715	
ADD HYD	505.30	4& 5	6	2.16120	1733.05	183.875	1.59525	1.950	1.253	
COMPUTE NM HYD	503.00	-	4	.10759	131.59	10.295	1.79418	1.700	1.911	PER IMP= 66.80
ROUTE	503.10	4	5	.10759	120.26	10.295	1.79418	1.800	1.747	
ADD HYD	503.20	6& 5	4	2.26879	1843.43	194.170	1.60468	1.900	1.270	
COMPUTE NM HYD	502.00	-	5	.09216	167.84	10.462	2.12858	1.600	2.846	PER IMP= 86.60
ROUTE RESERVOIR	502.01	5	6	.09216	167.84	10.462	2.12858	1.600	2.846	
ROUTE	502.10	6	5	.09216	155.91	10.462	2.12859	1.650	2.643	
ADD HYD	502.20	5& 4	6	2.36095	1931.92	204.632	1.62513	1.900	1.279	
COMPUTE NM HYD	501.00	-	4	.02172	49.96	2.413	2.08333	1.500	3.594	PER IMP= 84.20
ROUTE RESERVOIR	501.01	4	5	.02172	49.96	2.413	2.08333	1.500	3.594	
ROUTE	501.10	5	4	.02172	39.22	2.413	2.08335	1.550	2.821	
ADD HYD	501.20	4& 6	5	2.38267	1950.42	207.046	1.62931	1.900	1.279	
COMPUTE NM HYD	504.00	-	4	.89619	990.58	79.275	1.65858	1.750	1.727	PER IMP= 58.90
ADD HYD	504.10	4& 5	1	3.27886	2809.67	286.320	1.63731	1.850	1.339	
COMPUTE NM HYD	500.00	-	4	.00628	14.46	.697	2.08150	1.500	3.597	PER IMP= 84.00
ADD HYD	504.20	4& 1	6	3.28514	2814.14	287.017	1.63816	1.850	1.338	
COMPUTE NM HYD	316.00	-	1	.02386	40.80	1.232	.96813	1.500	2.672	PER IMP= 6.90
ROUTE RESERVOIR	316.01	1	3	.02386	40.80	1.232	.96813	1.500	2.672	
ROUTE	316.10	3	1	.02386	40.27	1.232	.96815	1.500	2.637	
COMPUTE NM HYD	325.00	-	2	.00553	10.47	.381	1.29329	1.500	2.957	PER IMP= 28.90
ADD HYD	325.10	1& 2	3	.02939	50.73	1.613	1.02929	1.500	2.697	
DIVIDE HYD	325.20	3	1	.01470	25.37	.807	1.02929	1.500	2.697	
	325.30	AND	2	.01470	25.37	.807	1.02929	1.500	2.697	
ROUTE	325.40	2	3	.01470	19.52	.807	1.02935	1.600	2.076	
ADD HYD	325.50	3& 6	4	3.29983	2823.51	287.824	1.63545	1.850	1.337	
DIVIDE HYD	325.60	4	3	1.64992	1411.76	143.912	1.63545	1.850	1.337	
	325.60	AND	6	1.64992	1411.76	143.912	1.63545	1.850	1.337	
ROUTE	325.70	6	4	1.64992	1417.17	143.912	1.63545	1.850	1.342	

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ROUTE	325.70	3	6	1.64992	1417.17	143.912	1.63545	1.850	1.342	
ADD HYD	325.80	6& 4	2	3.29983	2834.33	287.824	1.63545	1.850	1.342	
COMPUTE NM HYD	324.00	-	3	.01196	12.92	.611	.95778	1.650	1.687	PER IMP= 6.20
ROUTE	324.10	1	4	.01470	18.51	.807	1.02935	1.600	1.968	
ADD HYD	324.20	3& 4	1	.02666	30.99	1.418	.99719	1.600	1.817	
ADD HYD	324.30	1& 2	3	3.32649	2852.24	289.242	1.63033	1.850	1.340	
DIVIDE HYD	324.40	3	1	1.66324	1426.12	144.621	1.63033	1.850	1.340	
	324.40	AND	2	1.66324	1426.12	144.621	1.63033	1.850	1.340	
ROUTE	324.50	1	3	1.66324	1413.49	144.621	1.63033	1.850	1.328	
ROUTE	324.50	2	1	1.66324	1413.49	144.621	1.63033	1.850	1.328	
ADD HYD	324.60	3& 1	2	3.32649	2826.99	289.241	1.63033	1.850	1.328	
ROUTE	324.50	2	1	3.32649	2814.42	289.241	1.63033	1.900	1.322	
COMPUTE NM HYD	323.00	-	2	.00343	6.47	.234	1.27851	1.500	2.947	PER IMP= 27.90
ROUTE	323.10	2	3	.00343	3.15	.234	1.27865	1.650	1.436	
ADD HYD	323.20	1& 3	2	3.32992	2816.68	289.475	1.62997	1.900	1.322	
COMPUTE NM HYD	321.00	-	1	.06053	142.01	6.942	2.15045	1.500	3.666	PER IMP= 88.20
ADD HYD	321.10	2& 1	3	3.39045	2857.06	296.417	1.63926	1.900	1.317	
COMPUTE NM HYD	322.00	-	4	.09103	188.35	10.210	2.10298	1.550	3.233	PER IMP= 85.30
ADD HYD	322.10	3& 4	2	3.48148	2920.66	306.627	1.65138	1.900	1.311	
ROUTE	322.20	2	1	3.48148	2914.91	306.627	1.65138	1.900	1.308	
COMPUTE NM HYD	320.00	-	4	.00482	9.75	.392	1.52535	1.500	3.160	PER IMP= 44.60
ADD HYD	320.10	1& 4	12	3.48630	2917.18	307.019	1.65121	1.900	1.307	
COMPUTE NM HYD	225.00	-	1	.02082	48.58	2.366	2.13075	1.500	3.646	PER IMP= 87.00
ROUTE	225.10	1	2	.02082	47.09	2.366	2.13077	1.500	3.534	
COMPUTE NM HYD	223.00	-	1	.01050	24.85	1.221	2.18000	1.500	3.698	PER IMP= 90.00
ROUTE RESERVOIR	223.01	1	3	.01050	24.85	1.221	2.18000	1.500	3.698	
DIVIDE HYD	223.10	3	1	.00525	12.43	.610	2.17997	1.500	3.698	
	223.20	AND	4	.00525	12.43	.610	2.17997	1.500	3.698	
ROUTE	223.30	4	3	.00525	9.11	.610	2.18009	1.600	2.710	
ADD HYD	223.40	3& 2	5	.02607	54.96	2.976	2.14065	1.550	3.294	
ROUTE	223.50	1	2	.00525	7.47	.610	2.18009	1.650	2.225	
COMPUTE NM HYD	224.00	-	4	.02225	52.26	2.556	2.15373	1.500	3.670	PER IMP= 88.40
ADD HYD	224.10	4& 5	1	.04832	106.85	5.532	2.14667	1.500	3.455	
ROUTE	322.20	12	3	3.48630	2924.99	307.019	1.65121	1.900	1.311	
COMPUTE NM HYD	226.00	-	4	.01463	33.76	1.632	2.09135	1.500	3.605	PER IMP= 84.60
ADD HYD	226.10	3& 4	4	3.50093	2934.46	308.651	1.65305	1.900	1.310	
ROUTE RESERVOIR	226.01	4	6	3.50093	2934.46	308.651	1.65305	1.900	1.310	
ADD HYD	226.20	6& 1	3	3.54925	2969.04	314.182	1.65977	1.900	1.307	
ROUTE	226.30	3	4	3.54925	2958.36	314.182	1.65976	1.950	1.302	
ADD HYD	226.40	2& 4	5	3.55450	2963.34	314.792	1.66053	1.950	1.303	
COMPUTE NM HYD	222.00	-	4	.08660	175.98	9.149	1.98087	1.500	3.175	PER IMP= 77.80
ADD HYD	222.10	5& 4	2	3.64110	3014.39	323.941	1.66815	1.950	1.294	
COMPUTE NM HYD	221.00	-	4	.06353	135.30	6.172	1.82172	1.500	3.328	PER IMP= 68.00
ADD HYD	221.10	2& 4	1	3.70463	3046.19	330.114	1.67078	1.950	1.285	
ROUTE	221.20	1	2	3.70463	3050.37	330.113	1.67078	1.950	1.287	
COMPUTE NM HYD	220.00	-	1	.05896	110.83	4.641	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	220.10	1& 2	3	3.76359	3073.32	334.754	1.66773	1.950	1.276	
COMPUTE NM HYD	219.00	-	1	.07179	134.88	5.651	1.47602	1.500	2.936	PER IMP= 48.00
ADD HYD	219.10	1& 3	2	3.83538	3101.27	340.406	1.66414	1.950	1.263	
ROUTE	219.20	2	3	3.83538	3093.08	340.405	1.66414	1.950	1.260	
COMPUTE NM HYD	218.00	-	4	.05788	108.80	4.556	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	218.10	3& 4	1	3.89326	3115.61	344.961	1.66134	1.950	1.250	

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COMPUTE NM HYD	216.00	-	4	.01310	24.63	1.031	1.47602	1.500	2.938	PER IMP= 48.00
ROUTE	216.10	4	2	.01310	21.56	1.031	1.47606	1.550	2.572	
COMPUTE NM HYD	217.00	-	3	.02827	53.14	2.225	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	217.10	3& 2	4	.04137	72.22	3.257	1.47601	1.500	2.728	
COMPUTE NM HYD	215.00	-	3	.02934	55.16	2.310	1.47603	1.500	2.937	PER IMP= 48.00
ADD HYD	215.10	3& 4	2	.07071	127.37	5.566	1.47601	1.500	2.815	
ADD HYD	215.20	1& 2	3	3.96397	3144.11	350.528	1.65803	1.950	1.239	
ROUTE	215.30	3	1	3.96397	3138.29	350.527	1.65803	2.000	1.237	
COMPUTE NM HYD	214.00	-	4	.03392	63.76	2.670	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	214.10	4& 1	2	3.99789	3150.21	353.197	1.65649	2.000	1.231	
COMPUTE NM HYD	211.00	-	1	.02593	48.75	2.041	1.47603	1.500	2.937	PER IMP= 48.00
COMPUTE NM HYD	212.00	-	3	.02755	51.79	2.169	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	212.10	1& 3	4	.05348	100.54	4.210	1.47601	1.500	2.937	
ROUTE	212.20	4	1	.05348	95.56	4.210	1.47604	1.550	2.792	
COMPUTE NM HYD	213.00	-	3	.00817	15.37	.643	1.47602	1.500	2.939	PER IMP= 48.00
ADD HYD	213.10	3& 1	4	.06165	109.21	4.853	1.47602	1.550	2.768	
ADD HYD	213.20	2& 4	1	4.05954	3174.58	358.051	1.65375	1.950	1.222	
ROUTE	213.40	1	2	4.05954	3181.28	358.050	1.65375	2.000	1.224	
COMPUTE NM HYD	210.00	-	1	.04379	82.31	3.447	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	210.10	1& 2	3	4.10333	3196.67	361.497	1.65185	2.000	1.217	
COMPUTE NM HYD	209.00	-	1	.01777	33.41	1.399	1.47602	1.500	2.938	PER IMP= 48.00
COMPUTE NM HYD	207.00	-	2	.01669	25.97	.923	1.03733	1.500	2.432	PER IMP= 23.00
ADD HYD	207.10	1& 2	4	.03446	59.39	2.322	1.26353	1.500	2.693	
ROUTE	207.20	4	1	.03446	58.13	2.322	1.26356	1.550	2.636	
COMPUTE NM HYD	208.00	-	2	.00314	5.91	.247	1.47602	1.500	2.943	PER IMP= 48.00
ADD HYD	208.10	1& 2	4	.03760	63.38	2.569	1.28127	1.550	2.634	
ADD HYD	208.20	4& 3	1	4.14093	3208.82	364.067	1.64848	2.000	1.211	
ROUTE	208.30	1	2	4.14093	3213.24	364.066	1.64848	2.000	1.212	
COMPUTE NM HYD	206.00	-	5	.01983	24.24	.710	.67138	1.500	1.910	PER IMP= 5.00
COMPUTE NM HYD	205.00	-	1	.01974	24.13	.707	.67138	1.500	1.910	PER IMP= 5.00
COMPUTE NM HYD	204.00	-	3	.00763	9.33	.273	.67138	1.500	1.912	PER IMP= 5.00
ADD HYD	204.10	1& 3	4	.02737	33.47	.980	.67136	1.500	1.910	
ROUTE	204.20	4	1	.02737	29.55	.980	.67139	1.550	1.687	
COMPUTE NM HYD	203.00	-	3	.00960	11.74	.344	.67138	1.500	1.911	PER IMP= 5.00
ADD HYD	203.10	1& 3	4	.03697	40.40	1.324	.67136	1.550	1.707	
ADD HYD	203.20	4& 5	1	.05680	62.78	2.034	.67136	1.550	1.727	
ROUTE	203.30	1	3	.05680	64.97	2.034	.67138	1.550	1.787	
COMPUTE NM HYD	202.00	-	1	.03805	78.80	3.515	1.73215	1.500	3.236	PER IMP= 62.50
ADD HYD	202.10	1& 2	4	4.17898	3229.50	367.581	1.64924	2.000	1.207	
ADD HYD	202.20	4& 3	1	4.23578	3238.70	369.615	1.63613	2.000	1.195	
ROUTE	202.30	1	2	4.23578	3235.41	369.614	1.63613	2.000	1.193	
COMPUTE NM HYD	201.00	-	1	.03518	54.85	1.771	.94383	1.500	2.436	PER IMP= 13.70
COMPUTE NM HYD	200.00	-	3	.05438	92.37	2.988	1.03032	1.500	2.654	PER IMP= 14.00
ADD HYD	200.10	1& 2	4	4.27096	3241.93	371.385	1.63042	2.000	1.186	
ADD HYD	200.20	3& 4	12	4.32534	3253.15	374.373	1.62288	2.000	1.175	
ADD HYD	200.30	12&10	1	18.68427	11014.43	1517.374	1.52271	2.250	.921	
ROUTE RESERVOIR	200.03	1	2	18.68427	9307.33	1285.250	1.28977	2.600	.778	AC-FT= 556.383
ROUTE RESERVOIR	200.03	1	2	18.68427	86.75	416.121	.41759	25.000	.007	AC-FT= 1338.083
ROUTE RESERVOIR	200.03	1	2	18.68427	82.13	385.753	.38711	25.100	.007	AC-FT= 1351.465
ROUTE RESERVOIR	200.03	1	2	18.68427	383.99	1517.490	1.52283	5.400	.032	AC-FT= 1101.391
ROUTE RESERVOIR	200.03	1	2	18.68427	361.03	1331.711	1.33640	5.500	.030	AC-FT= 1122.236
FINISH										

Used.

AHYMO SUMMARY TABLE (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992 RUN DATE (MON/DAY/YR) =07/20/1992

INPUT FILE = alt_c.old USER NO.= SCANLNNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	PAGE = 1
START										TIME=	.00
RAINFALL TYPE= 2										RAIN24=	2.590
COMPUTE NM HYD	418.00	-	1	1.49581	1644.29	117.752	1.47602	1.700	1.718	PER IMP=	48.00
COMPUTE NM HYD	417.00	-	2	.13909	133.30	10.949	1.47602	1.800	1.497	PER IMP=	48.00
ADD HYD	417.10	1& 2	3	1.63490	1769.44	128.701	1.47602	1.700	1.691		
ROUTE RESERVOIR	417.01	3	4	1.63490	1769.44	128.701	1.47602	1.700	1.691		
ROUTE	417.20	4	5	1.63490	1737.42	128.701	1.47602	1.750	1.660		
COMPUTE NM HYD	419.00	-	1	.19715	222.09	15.520	1.47602	1.700	1.760	PER IMP=	48.00
COMPUTE NM HYD	420.00	-	2	.18889	202.68	14.870	1.47602	1.700	1.677	PER IMP=	48.00
ADD HYD	419.10	1& 2	3	.38604	424.77	30.389	1.47602	1.700	1.719		
ADD HYD	420.10	3& 5	4	2.02094	2149.82	159.091	1.47602	1.750	1.662		
ROUTE	420.20	4	5	2.02094	1843.64	159.091	1.47602	1.850	1.425		
COMPUTE NM HYD	416.00	-	1	.86541	841.70	68.126	1.47602	1.750	1.520	PER IMP=	48.00
ROUTE	416.10	1	2	.86541	768.93	68.126	1.47602	1.850	1.388		
ADD HYD	416.20	2& 5	3	2.88635	2612.57	227.217	1.47602	1.850	1.414		
COMPUTE NM HYD	415.00	-	1	.15228	239.40	11.988	1.47602	1.550	2.456	PER IMP=	48.00
ROUTE RESERVOIR	415.01	1	2	.15228	239.40	11.988	1.47602	1.550	2.456		
COMPUTE NM HYD	414.00	-	1	.11235	127.24	8.844	1.47602	1.700	1.770	PER IMP=	48.00
ADD HYD	414.10	2& 1	4	.26463	336.05	20.832	1.47602	1.600	1.984		
ROUTE RESERVOIR	414.01	4	2	.26463	336.05	20.832	1.47602	1.600	1.984		
ROUTE	414.30	2	1	.26463	280.78	20.832	1.47602	1.700	1.658		
COMPUTE NM HYD	411.00	-	2	.29891	374.66	23.531	1.47602	1.650	1.958	PER IMP=	48.00
ADD HYD	411.10	1& 2	4	.56354	649.16	44.363	1.47602	1.650	1.800		
ROUTE	411.20	4	1	.56354	645.19	44.363	1.47602	1.650	1.789		
COMPUTE NM HYD	412.00	-	2	1.18559	1168.31	93.331	1.47602	1.750	1.540	PER IMP=	48.00
ADD HYD	412.10	1& 2	4	1.74913	1771.63	137.694	1.47602	1.700	1.583		
ADD HYD	412.20	4& 3	1	4.63548	4227.94	364.911	1.47602	1.800	1.425		
ROUTE	412.30	1	5	4.63548	4037.37	364.911	1.47602	1.900	1.361		
COMPUTE NM HYD	424.00	-	1	.33534	407.14	26.398	1.47602	1.650	1.897	PER IMP=	48.00
ROUTE RESERVOIR	424.01	1	2	.33534	407.14	26.398	1.47602	1.650	1.897		
COMPUTE NM HYD	421.00	-	1	.33184	390.04	26.123	1.47602	1.650	1.837	PER IMP=	48.00
ADD HYD	421.10	1& 2	3	.66718	797.19	52.521	1.47602	1.650	1.867		
ROUTE	421.20	3	1	.66718	793.53	52.521	1.47602	1.650	1.858		
COMPUTE NM HYD	422.00	-	2	.14367	157.66	11.310	1.47602	1.700	1.715	PER IMP=	48.00
ADD HYD	422.10	1& 2	3	.81085	945.08	63.831	1.47602	1.650	1.821		
ROUTE	422.20	3	1	.81085	933.27	63.831	1.47602	1.700	1.798		
COMPUTE NM HYD	423.00	-	2	.05985	50.33	4.711	1.47602	1.900	1.314	PER IMP=	48.00
ADD HYD	423.10	1& 2	3	.87070	972.38	68.542	1.47602	1.700	1.745		
ROUTE	423.20	3	1	.87070	891.83	68.542	1.47602	1.750	1.600		
COMPUTE NM HYD	413.00	-	2	1.00011	1047.73	78.730	1.47602	1.700	1.637	PER IMP=	48.00
ADD HYD	413.10	1& 2	3	1.87081	1934.23	147.272	1.47602	1.750	1.615		
ROUTE	413.20	3	1	1.87081	1913.33	147.272	1.47602	1.750	1.598		
COMPUTE NM HYD	410.00	-	2	1.38956	1491.73	109.388	1.47602	1.700	1.677	PER IMP=	48.00
ADD HYD	410.10	1& 2	3	3.26037	3378.77	256.660	1.47602	1.750	1.619		
ADD HYD	410.20	3& 5	4	7.89585	7045.48	621.571	1.47602	1.850	1.394		
ROUTE RESERVOIR	410.01	4	1	7.89585	7045.48	621.571	1.47602	1.850	1.394		
ROUTE	410.30	1	2	7.89585	6896.84	621.569	1.47602	1.900	1.365		
COMPUTE NM HYD	409.00	-	1	.46618	587.81	36.698	1.47602	1.650	1.970	PER IMP=	48.00
ROUTE	409.10	1	3	.46618	495.65	36.698	1.47602	1.750	1.661		

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	408.00	-	1	1.38633	1471.52	109.134	1.47602	1.700	1.659	PER IMP= 48.00
ADD HYD	408.10	1& 3	4	1.85251	1961.88	145.832	1.47602	1.700	1.655	
ADD HYD	408.20	4& 2	5	9.74836	8520.96	767.402	1.47602	1.850	1.366	
ROUTE	408.30	5	1	9.74836	8336.82	767.401	1.47602	1.900	1.336	
COMPUTE NM HYD	403.00	-	2	.48341	570.41	40.515	1.57147	1.700	1.844	PER IMP= 53.70
ADD HYD	403.10	1& 2	3	10.23177	8725.17	807.916	1.48053	1.900	1.332	
ROUTE	403.20	3	5	10.23177	8694.02	807.916	1.48053	1.900	1.328	
COMPUTE NM HYD	406.00	-	1	.05788	84.47	6.173	1.99976	1.700	2.280	PER IMP= 78.40
DIVIDE HYD	406.10	1	2	.05785	84.00	6.170	1.99975	1.650	2.269	
	406.20	AND	3	.00003	.47	.003	1.99975	1.700	22.845	
ROUTE	406.30	3	1	.00003	.26	.004	2.24014	1.700	12.521	
COMPUTE NM HYD	407.00	-	2	.06012	95.32	4.733	1.47602	1.550	2.477	PER IMP= 48.00
ROUTE RESERVOIR	407.01	2	3	.06012	95.32	4.733	1.47602	1.550	2.477	
ROUTE	407.10	3	2	.06012	56.13	4.733	1.47603	1.700	1.459	
COMPUTE NM HYD	404.00	-	3	.22811	308.70	25.148	2.06712	1.700	2.115	PER IMP= 83.00
ADD HYD	404.10	1& 2	4	.06015	56.39	4.737	1.47642	1.700	1.465	
ADD HYD	404.20	3& 4	7	.28826	365.09	29.885	1.94386	1.700	1.979	
DIVIDE HYD	404.10	7	2	.14025	46.00	14.541	1.94386	1.400	.512	
	404.20	AND	3	.14801	319.09	15.344	1.94385	1.700	3.369	
DIVIDE HYD	404.20	2	1	.07013	23.00	7.270	1.94386	1.400	.512	
	404.30	AND	4	.07013	23.00	7.270	1.94386	1.400	.512	
ROUTE	404.40	1	2	.07013	23.14	7.270	1.94386	1.450	.516	
ROUTE	404.40	4	1	.07013	23.14	7.270	1.94386	1.450	.516	
ADD HYD	404.50	1& 2	7	.14025	46.28	14.541	1.94385	1.450	.516	
ROUTE	404.60	3	1	.14801	300.12	15.345	1.94391	1.800	3.168	
COMPUTE NM HYD	405.00	-	2	.28007	350.74	26.569	1.77874	1.700	1.957	PER IMP= 66.00
ROUTE	405.10	2	3	.28007	321.83	26.569	1.77874	1.800	1.795	
ADD HYD	405.20	3& 1	3	.42808	621.94	41.914	1.83585	1.800	2.270	
COMPUTE NM HYD	402.00	-	2	.21249	309.48	23.213	2.04827	1.650	2.276	PER IMP= 81.70
ADD HYD	402.10	2& 3	4	.64057	902.63	65.126	1.90631	1.750	2.202	
ROUTE	402.20	4	2	.64057	897.28	65.126	1.90631	1.750	2.189	
COMPUTE NM HYD	401.00	-	3	.14474	219.87	16.322	2.11433	1.650	2.374	PER IMP= 86.00
ADD HYD	401.10	5& 2	4	10.87234	9485.63	873.042	1.50561	1.900	1.363	
ADD HYD	401.20	4& 3	5	11.01708	9629.65	889.364	1.51361	1.900	1.366	
COMPUTE NM HYD	303.00	-	1	.00790	4.51	.549	1.30216	2.200	.893	PER IMP= 29.50
ADD HYD	303.10	1& 7	2	.14815	50.51	15.089	1.90962	2.150	.533	
DIVIDE HYD	303.20	2	1	.14504	46.00	14.772	1.90962	1.450	.496	
	303.30	AND	6	.00311	4.51	.317	1.90962	2.150	2.265	
DIVIDE HYD	303.40	1	2	.07252	23.00	7.386	1.90962	1.450	.496	
	303.40	AND	3	.07252	23.00	7.386	1.90962	1.450	.496	
ROUTE	303.50	2	1	.07252	23.15	7.386	1.90963	1.450	.499	
ROUTE	303.60	3	2	.07252	23.15	7.386	1.90963	1.450	.499	
ADD HYD	303.70	1& 2	3	.14504	46.30	14.772	1.90962	1.450	.499	
COMPUTE NM HYD	302.00	-	1	.01116	8.33	.700	1.17653	1.900	1.167	PER IMP= 21.00
ADD HYD	302.10	1& 3	2	.15620	54.30	15.473	1.85724	1.950	.543	
DIVIDE HYD	302.20	2	1	.15091	46.00	14.948	1.85724	1.400	.476	
	302.30	AND	8	.00530	8.30	.525	1.85724	1.950	2.449	
DIVIDE HYD	302.40	1	2	.07545	23.00	7.474	1.85724	1.400	.476	
	302.40	AND	3	.07545	23.00	7.474	1.85724	1.400	.476	
ROUTE	302.40	2	4	.07545	23.18	7.474	1.85725	1.450	.480	
ROUTE	302.50	3	1	.07545	23.18	7.474	1.85725	1.450	.480	
ADD HYD	302.60	4& 1	3	.15091	46.36	14.948	1.85724	1.450	.480	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	301.00	-	1	.00593	6.69	.456	1.44258	1.700	1.763	PER IMP= 39.00
ROUTE	301.20	1	2	.00593	6.66	.456	1.44259	1.700	1.755	
ADD HYD	301.30	2& 3	7	.15684	52.76	15.404	1.84156	1.750	.526	
COMPUTE NM HYD	300.00	-	2	.00603	11.07	.383	1.18983	1.500	2.867	PER IMP= 21.90
ADD HYD	300.10	8& 2	1	.01133	12.51	.907	1.50197	1.550	1.726	
ROUTE	300.20	1	2	.01133	12.48	.908	1.50204	1.550	1.721	
COMPUTE NM HYD	304.00	-	1	.00347	6.84	.265	1.42927	1.500	3.078	PER IMP= 38.10
ROUTE	304.20	1	3	.00347	6.76	.265	1.42942	1.500	3.044	
ADD HYD	304.30	2& 3	8	.01480	19.10	1.172	1.48492	1.500	2.017	
COMPUTE NM HYD	305.00	-	9	.00402	7.31	.298	1.38937	1.500	2.843	PER IMP= 35.40
ROUTE RESERVOIR	401.01	5	1	11.01708	9577.71	889.268	1.51345	1.950	1.358	AC-FT= 93.439
ROUTE	401.80	1	2	11.01708	9799.78	889.265	1.51344	1.900	1.390	
COMPUTE NM HYD	307.00	-	4	.01650	18.38	1.197	1.35981	1.700	1.741	PER IMP= 33.40
ADD HYD	307.10	6& 4	1	.01961	20.01	1.513	1.44698	1.750	1.594	
ROUTE	307.20	1	3	.01961	19.71	1.513	1.44701	1.750	1.571	
ADD HYD	307.30	3& 2	1	11.03669	9817.41	890.778	1.51332	1.900	1.390	
COMPUTE NM HYD	315.00	-	2	.00836	14.06	.408	.91492	1.500	2.627	PER IMP= 3.30
ROUTE RESERVOIR	315.01	2	3	.00836	14.06	.408	.91492	1.500	2.627	
ROUTE	315.10	3	2	.00836	12.19	.408	.91500	1.550	2.277	
ADD HYD	315.20	1& 2	3	11.04505	9821.04	891.186	1.51287	1.900	1.389	
COMPUTE NM HYD	312.00	-	1	.03437	61.74	2.059	1.12332	1.500	2.807	PER IMP= 17.40
DIVIDE HYD	312.10	1	2	.01719	30.87	1.030	1.12331	1.500	2.807	
	312.20	AND	4	.01719	30.87	1.030	1.12331	1.500	2.807	
ROUTE	312.30	2	5	.01719	29.65	1.030	1.12335	1.550	2.696	
ADD HYD	312.40	3& 5	1	11.06223	9828.82	892.216	1.51227	1.900	1.388	
COMPUTE NM HYD	314.00	-	3	.01914	32.58	.973	.95334	1.500	2.659	PER IMP= 5.90
ADD HYD	314.10	1& 3	2	11.08137	9834.33	893.188	1.51130	1.900	1.387	
ROUTE RESERVOIR	401.02	2	1	11.08137	9324.83	893.180	1.51129	2.000	1.315	AC-FT= 43.067
ROUTE	314.90	1	2	11.08137	9313.03	893.173	1.51128	2.000	1.313	
COMPUTE NM HYD	306.00	-	1	.01532	14.71	.972	1.18983	1.750	1.500	PER IMP= 21.90
ROUTE	306.10	1	3	.01532	14.71	.972	1.18983	1.750	1.501	
ROUTE	306.20	3	1	.01532	13.29	.972	1.18983	1.850	1.355	
COMPUTE NM HYD	310.00	-	3	.00981	17.85	.609	1.16323	1.500	2.843	PER IMP= 20.10
ADD HYD	310.10	3& 1	5	.02513	20.09	1.581	1.17940	1.500	1.249	
ROUTE	310.20	5	1	.02513	20.06	1.581	1.17944	1.550	1.247	
ADD HYD	310.30	1& 2	3	11.10650	9327.45	894.755	1.51053	2.000	1.312	
ROUTE	310.40	4	5	.01719	30.77	1.030	1.12335	1.500	2.797	
ADD HYD	310.50	5& 3	1	11.12369	9332.19	895.784	1.50993	2.000	1.311	
COMPUTE NM HYD	313.00	-	2	.00787	14.34	.490	1.16766	1.500	2.847	PER IMP= 20.40
ADD HYD	313.10	1& 2	3	11.13156	9334.16	896.275	1.50969	2.000	1.310	
ROUTE RESERVOIR	401.03	3	1	11.13156	2225.50	896.274	1.50968	2.800	.312	AC-FT= 350.461
COMPUTE NM HYD	309.00	-	3	.00803	6.32	.529	1.23565	1.900	1.231	PER IMP= 25.00
COMPUTE NM HYD	308.00	-	4	.00915	9.43	.732	1.50022	1.800	1.610	PER IMP= 42.90
ADD HYD	308.10	3& 4	2	.01718	15.43	1.261	1.37646	1.850	1.403	
ADD HYD	308.20	1& 2	10	11.14874	2227.54	897.536	1.50948	2.800	.312	
COMPUTE NM HYD	311.00	-	11	.00602	6.13	.494	1.54013	1.800	1.590	PER IMP= 45.60
ROUTE	301.10	7	1	.15684	50.01	15.404	1.84157	2.000	.498	
ROUTE	304.10	8	2	.01480	14.88	1.172	1.48502	1.650	1.572	
ROUTE	305.10	9	3	.00402	6.53	.298	1.38947	1.550	2.540	
ADD HYD	301.20	1& 2	4	.17163	62.77	16.576	1.81082	1.900	.571	
ADD HYD	301.30	3& 4	1	.17565	65.18	16.874	1.80117	1.850	.580	
COMPUTE NM HYD	145.00	-	2	.12312	171.80	12.479	1.90041	1.700	2.180	PER IMP= 71.60

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	145.10	1& 2	3	.29877	235.69	29.353	1.84206	1.700	1.233	
ROUTE	145.20	3	1	.29877	236.50	29.353	1.84207	1.700	1.237	
COMPUTE NM HYD	143.00	-	2	.09431	114.64	7.424	1.47602	1.650	1.899	PER IMP= 48.00
COMPUTE NM HYD	144.00	-	3	.02602	46.58	2.211	1.59314	1.550	2.797	PER IMP= 50.40
ADD HYD	143.10	1& 2	4	.39308	347.63	36.777	1.75424	1.700	1.382	
ADD HYD	143.20	3& 4	1	.41910	380.69	38.988	1.74424	1.650	1.419	
ROUTE	143.30	1	2	.41910	378.63	38.988	1.74424	1.700	1.412	
COMPUTE NM HYD	141.00	-	1	.03868	68.81	3.045	1.47602	1.500	2.780	PER IMP= 48.00
ADD HYD	141.10	1& 2	3	.45778	420.39	42.033	1.72158	1.650	1.435	
COMPUTE NM HYD	140.00	-	1	.09638	116.14	7.587	1.47602	1.650	1.883	PER IMP= 48.00
ADD HYD	140.10	1& 3	2	.55416	536.54	49.620	1.67887	1.650	1.513	
ROUTE	140.20	2	1	.55416	535.53	49.620	1.67887	1.650	1.510	
COMPUTE NM HYD	139.00	-	2	.02145	40.24	1.689	1.47602	1.500	2.932	PER IMP= 48.00
ADD HYD	139.10	1& 2	3	.57561	557.39	51.308	1.67131	1.650	1.513	
ROUTE	139.20	3	1	.57561	553.27	51.308	1.67131	1.700	1.502	
COMPUTE NM HYD	138.00	-	2	.16332	241.11	12.857	1.47602	1.550	2.307	PER IMP= 48.00
ADD HYD	138.10	2& 1	3	.73893	762.75	64.165	1.62815	1.650	1.613	
ROUTE	138.20	3	1	.73893	744.24	64.165	1.62815	1.700	1.574	
COMPUTE NM HYD	129.00	-	2	.39080	533.07	30.764	1.47602	1.600	2.131	PER IMP= 48.00
ADD HYD	129.10	1& 2	3	1.12973	1238.38	94.929	1.57552	1.650	1.713	
COMPUTE NM HYD	136.00	-	1	.08130	105.43	6.400	1.47602	1.600	2.026	PER IMP= 48.00
COMPUTE NM HYD	135.00	-	2	.05923	82.98	4.663	1.47602	1.600	2.189	PER IMP= 48.00
ADD HYD	135.10	1& 2	4	.14053	188.41	11.063	1.47602	1.600	2.095	
ROUTE RESERVOIR	135.01	4	1	.14053	188.41	11.063	1.47602	1.600	2.095	
ROUTE	135.20	1	2	.14053	170.91	11.063	1.47602	1.700	1.900	
COMPUTE NM HYD	130.00	-	1	.20469	234.33	16.113	1.47602	1.700	1.789	PER IMP= 48.00
ADD HYD	130.10	1& 2	4	.34522	405.25	27.176	1.47602	1.700	1.834	
ROUTE	130.20	4	2	.34522	393.27	27.176	1.47602	1.750	1.780	
COMPUTE NM HYD	125.00	-	1	.03679	59.17	2.896	1.47602	1.550	2.513	PER IMP= 48.00
ADD HYD	125.10	1& 2	4	.38201	427.41	30.072	1.47602	1.700	1.748	
ADD HYD	125.20	3& 4	1	1.51174	1635.08	125.001	1.55038	1.650	1.690	
COMPUTE NM HYD	124.00	-	2	.04092	54.28	3.221	1.47602	1.600	2.073	PER IMP= 48.00
ADD HYD	124.10	2& 1	3	1.55266	1688.29	128.223	1.54842	1.650	1.699	
ROUTE	124.20	3	1	1.55266	1687.09	128.223	1.54842	1.700	1.698	
COMPUTE NM HYD	123.00	-	2	.02504	47.07	1.971	1.47602	1.500	2.937	PER IMP= 48.00
COMPUTE NM HYD	122.00	-	3	.13622	176.04	10.723	1.47602	1.600	2.019	PER IMP= 48.00
ADD HYD	123.10	1& 2	4	1.57770	1707.49	130.194	1.54727	1.700	1.691	
ADD HYD	123.20	3& 4	1	1.71392	1879.71	140.917	1.54161	1.650	1.714	
ROUTE	123.30	1	2	1.71392	1884.23	140.917	1.54161	1.700	1.718	
COMPUTE NM HYD	121.00	-	1	.02100	37.31	1.523	1.35959	1.500	2.776	PER IMP= 42.30
ADD HYD	121.10	1& 2	3	1.73492	1900.30	142.440	1.53940	1.700	1.711	
ROUTE	121.20	3	1	1.73492	1910.11	142.440	1.53940	1.700	1.720	
COMPUTE NM HYD	120.00	-	2	.01176	20.45	.774	1.23454	1.500	2.717	PER IMP= 32.20
COMPUTE NM HYD	119.00	-	3	.03895	66.44	3.120	1.50216	1.500	2.665	PER IMP= 49.40
ADD HYD	119.10	2& 3	4	.05071	86.89	3.895	1.44008	1.500	2.677	
ROUTE	119.20	4	2	.05071	75.80	3.895	1.44010	1.600	2.335	
COMPUTE NM HYD	115.00	-	3	.03760	58.34	1.862	.92856	1.500	2.425	PER IMP= 12.60
ROUTE	115.10	3	4	.03760	55.95	1.862	.92857	1.550	2.325	
COMPUTE NM HYD	112.00	-	3	.04603	70.64	2.228	.90771	1.500	2.398	PER IMP= 11.50
ADD HYD	112.10	1& 2	5	1.78563	1967.55	146.335	1.53658	1.700	1.722	
ADD HYD	112.20	3& 5	2	1.83166	1996.82	148.563	1.52078	1.700	1.703	
ADD HYD	112.30	4& 2	1	1.86926	2024.21	150.425	1.50887	1.700	1.692	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	311.40	11	2	.00602	5.95	.494	1.54012	1.850	1.544	
COMPUTE NM HYD	149.00	-	3	.03482	80.72	3.905	2.10292	1.500	3.622	PER IMP= 85.10
ADD HYD	311.10	2& 3	4	.04084	81.76	4.400	2.01994	1.500	3.128	
DIVIDE HYD	311.20	4	2	.01389	27.80	1.496	2.01994	1.500	3.128	
	311.30	AND	3	.02695	53.96	2.904	2.01994	1.500	3.128	
DIVIDE HYD	311.20	3	4	.01348	26.98	1.452	2.01993	1.500	3.128	
	311.20	AND	5	.01348	26.98	1.452	2.01993	1.500	3.128	
ROUTE	311.20	2	3	.01389	27.82	1.496	2.01994	1.500	3.130	
ROUTE	311.20	4	2	.01348	27.00	1.452	2.01994	1.500	3.130	
ROUTE	311.20	5	4	.01348	27.00	1.452	2.01994	1.500	3.130	
ADD HYD	311.30	2& 3	5	.02736	54.82	2.948	2.01988	1.500	3.130	
ADD HYD	311.40	5& 4	2	.04084	81.81	4.400	2.01989	1.500	3.130	
ROUTE	311.30	2	3	.04084	59.11	4.400	2.01994	1.600	2.262	
COMPUTE NM HYD	148.00	-	2	.01588	29.86	1.250	1.47602	1.500	2.938	PER IMP= 48.00
ROUTE	148.10	2	4	.01588	29.68	1.250	1.47605	1.500	2.920	
ROUTE	148.20	4	2	.01588	21.82	1.250	1.47605	1.600	2.147	
COMPUTE NM HYD	147.00	-	4	.00565	10.63	.445	1.47602	1.500	2.940	PER IMP= 48.00
ROUTE	147.10	4	5	.00565	10.55	.445	1.47612	1.500	2.918	
ROUTE	147.20	5	4	.00565	8.22	.445	1.47612	1.600	2.274	
COMPUTE NM HYD	146.00	-	5	.05976	89.05	5.203	1.63233	1.600	2.328	PER IMP= 56.00
ADD HYD	146.10	2& 3	6	.05672	80.94	5.650	1.86764	1.600	2.230	
ADD HYD	146.20	4& 6	2	.06237	89.16	6.095	1.83216	1.600	2.234	
ADD HYD	146.30	5& 2	3	.12213	178.21	11.297	1.73438	1.600	2.280	
COMPUTE NM HYD	154.00	-	2	.01947	47.50	2.378	2.29015	1.500	3.812	PER IMP= 96.70
ROUTE	154.10	2	4	.01947	34.19	2.378	2.29017	1.600	2.744	
COMPUTE NM HYD	153.00	-	2	.00646	13.62	.751	2.18001	1.550	3.294	PER IMP= 90.00
ROUTE	153.10	2	5	.00646	10.33	.751	2.18006	1.650	2.498	
COMPUTE NM HYD	152.00	-	2	.07224	92.49	5.936	1.54059	1.650	2.000	PER IMP= 54.70
ADD HYD	152.10	2& 4	6	.09171	126.36	8.314	1.69971	1.600	2.153	
ADD HYD	152.20	5& 6	2	.09817	136.49	9.065	1.73131	1.600	2.172	
ROUTE	152.30	2	5	.09817	138.13	9.065	1.73132	1.650	2.199	
ADD HYD	152.40	3& 5	2	.22030	315.66	20.362	1.73301	1.600	2.239	
ROUTE	152.30	10	3	11.14874	2227.59	897.522	1.50946	2.800	.312	
COMPUTE NM HYD	150.00	-	4	.03482	76.58	3.445	1.85529	1.500	3.436	PER IMP= 67.20
ROUTE	150.10	4	5	.03482	67.32	3.445	1.85530	1.550	3.021	
COMPUTE NM HYD	142.00	-	4	.12769	241.18	11.395	1.67331	1.500	2.951	PER IMP= 58.80
ADD HYD	142.20	3& 4	6	11.27643	2232.78	908.918	1.51131	2.800	.309	
ADD HYD	142.30	5& 6	3	11.31125	2234.29	912.363	1.51237	2.800	.309	
ROUTE RESERVOIR	142.01	3	4	11.31125	2234.29	912.363	1.51237	2.800	.309	
ROUTE	142.40	4	3	11.31125	2233.84	912.351	1.51235	2.800	.309	
COMPUTE NM HYD	137.00	-	4	.08668	140.39	6.824	1.47602	1.550	2.531	PER IMP= 48.00
ADD HYD	137.10	3& 4	5	11.39793	2237.70	919.174	1.51207	2.800	.307	
COMPUTE NM HYD	134.00	-	4	.04029	73.65	3.172	1.47602	1.500	2.856	PER IMP= 48.00
ADD HYD	134.10	4& 2	6	.26059	369.92	23.533	1.69328	1.600	2.218	
ADD HYD	134.20	6& 5	2	11.65852	2255.53	942.709	1.51613	2.800	.302	
ROUTE	134.30	2	3	11.65852	2255.54	942.702	1.51612	2.800	.302	
COMPUTE NM HYD	132.00	-	2	.02692	50.61	2.119	1.47602	1.500	2.937	PER IMP= 48.00
COMPUTE NM HYD	133.00	-	4	.03939	73.22	3.101	1.47602	1.500	2.904	PER IMP= 48.00
ADD HYD	133.10	2& 3	5	11.68544	2256.36	944.820	1.51602	2.800	.302	
ADD HYD	133.20	4& 5	2	11.72483	2257.60	947.921	1.51589	2.800	.301	
ROUTE	133.30	2	3	11.72483	2257.18	947.911	1.51587	2.800	.301	
COMPUTE NM HYD	151.00	-	2	.02907	55.87	2.436	1.57151	1.500	3.003	PER IMP= 55.00

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	151.10	2	4	.02907	48.27	2.436	1.57153	1.550	2.595	
COMPUTE NM HYD	131.00	-	2	.05707	94.06	3.677	1.20806	1.500	2.575	PER IMP= 30.80
ADD HYD	131.10	2& 3	5	11.78190	2258.68	951.588	1.51438	2.800	.300	
ADD HYD	131.20	4& 5	2	11.81097	2259.79	954.024	1.51452	2.800	.299	
ROUTE	131.30	2	3	11.81097	2259.85	954.012	1.51450	2.850	.299	
COMPUTE NM HYD	127.00	-	2	.04370	76.32	2.928	1.25649	1.500	2.729	PER IMP= 33.90
ADD HYD	127.10	2& 3	4	11.85467	2260.85	956.940	1.51355	2.850	.298	
ROUTE	127.20	4	2	11.85467	2261.15	956.933	1.51354	2.850	.298	
COMPUTE NM HYD	128.00	-	3	.07690	142.99	6.081	1.48263	1.500	2.905	PER IMP= 48.00
ROUTE	128.10	3	4	.07690	140.84	6.081	1.48263	1.550	2.862	
COMPUTE NM HYD	126.00	-	3	.07448	119.49	5.257	1.32353	1.500	2.507	PER IMP= 37.70
ADD HYD	126.10	3& 4	5	.15138	260.02	11.338	1.40435	1.500	2.684	
ROUTE	126.20	5	3	.15138	269.54	11.338	1.40435	1.550	2.782	
ADD HYD	126.30	2& 3	4	12.00605	2266.23	968.272	1.51216	2.850	.295	
COMPUTE NM HYD	118.00	-	2	.06353	100.10	3.303	.97493	1.500	2.462	PER IMP= 15.80
ADD HYD	118.10	2& 4	3	12.06958	2267.24	971.573	1.50933	2.850	.294	
ROUTE	118.20	3	2	12.06958	2267.51	971.567	1.50932	2.850	.294	
COMPUTE NM HYD	116.00	-	3	.01678	24.73	.722	.80642	1.500	2.303	PER IMP= 5.00
COMPUTE NM HYD	117.00	-	4	.01804	26.81	.795	.82674	1.500	2.322	PER IMP= 6.30
COMPUTE NM HYD	114.00	-	5	.01552	25.42	.890	1.07503	1.500	2.559	PER IMP= 22.20
ADD HYD	114.10	2& 3	6	12.08636	2267.71	972.289	1.50835	2.850	.293	
ADD HYD	114.20	4& 6	2	12.10440	2267.92	973.083	1.50733	2.850	.293	
ADD HYD	114.30	5& 2	3	12.11992	2268.20	973.974	1.50678	2.850	.292	
ROUTE	114.40	3	2	12.11992	2268.35	973.966	1.50676	2.850	.292	
COMPUTE NM HYD	113.00	-	5	.01992	30.16	.928	.87335	1.500	2.366	PER IMP= 9.30
ADD HYD	113.10	5& 2	4	12.13984	2268.61	974.894	1.50572	2.850	.292	
ADD HYD	112.10	1& 4	3	14.00910	3427.30	1125.318	1.50614	1.650	.382	
ROUTE	112.20	3	1	14.00910	3428.21	1125.313	1.50614	1.650	.382	
COMPUTE NM HYD	111.00	-	2	.00906	13.36	.390	.80642	1.500	2.304	PER IMP= 5.00
ADD HYD	111.10	1& 2	3	14.01816	3435.51	1125.702	1.50568	1.650	.383	
ROUTE	111.20	3	1	14.01816	3433.17	1125.696	1.50568	1.650	.383	
COMPUTE NM HYD	110.00	-	2	.04352	69.41	2.338	1.00721	1.500	2.492	PER IMP= 17.90
ADD HYD	110.10	1& 2	3	14.06168	3470.98	1128.034	1.50413	1.650	.386	
ROUTE	110.20	3	1	14.06168	3467.92	1128.030	1.50413	1.650	.385	
COMPUTE NM HYD	109.00	-	2	.02638	39.94	1.229	.87335	1.500	2.365	PER IMP= 9.30
COMPUTE NM HYD	108.00	-	3	.00781	11.61	.344	.82674	1.500	2.323	PER IMP= 6.30
ADD HYD	109.10	1& 2	4	14.08806	3489.73	1129.258	1.50295	1.650	.387	
ADD HYD	109.20	3& 4	1	14.09587	3496.07	1129.603	1.50257	1.650	.388	
ROUTE	109.30	1	2	14.09587	3489.54	1129.597	1.50256	1.650	.387	
COMPUTE NM HYD	107.00	-	1	.02163	31.87	.930	.80642	1.500	2.302	PER IMP= 5.00
ADD HYD	107.10	1& 2	3	14.11750	3506.97	1130.528	1.50150	1.650	.388	
ROUTE	107.20	3	1	14.11750	3510.65	1130.520	1.50149	1.700	.389	
COMPUTE NM HYD	106.00	-	2	.04128	62.49	1.923	.87335	1.500	2.365	PER IMP= 9.30
ADD HYD	106.10	1& 2	3	14.15878	3536.45	1132.443	1.49966	1.700	.390	
ROUTE	106.20	3	1	14.15878	3554.89	1132.436	1.49965	1.700	.392	
COMPUTE NM HYD	105.00	-	2	.02584	39.12	1.204	.87335	1.500	2.365	PER IMP= 9.30
COMPUTE NM HYD	104.00	-	3	.01579	25.19	.848	1.00721	1.500	2.493	PER IMP= 17.90
ADD HYD	104.10	2& 3	4	.04163	64.31	2.052	.92411	1.500	2.414	
ADD HYD	104.20	1& 4	2	14.20041	3581.58	1134.488	1.49796	1.700	.394	
ROUTE	104.30	2	1	14.20041	3596.15	1134.481	1.49795	1.700	.396	
COMPUTE NM HYD	103.00	-	2	.02997	44.52	1.321	.82674	1.500	2.321	PER IMP= 6.30
ADD HYD	103.10	1& 2	3	14.23038	3614.44	1135.803	1.49654	1.700	.397	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	103.20	3	1	14.23038	3644.67	1135.782	1.49651	1.700	.400	
COMPUTE NM HYD	101.00	-	2	.08444	138.39	4.717	1.04735	1.500	2.561	PER IMP= 19.30
COMPUTE NM HYD	102.00	-	3	.02692	42.94	1.446	1.00721	1.500	2.492	PER IMP= 17.90
ADD HYD	101.10	1& 2	4	14.31482	3702.66	1140.499	1.49386	1.700	.404	
ADD HYD	101.20	3& 4	10	14.34174	3720.62	1141.946	1.49295	1.700	.405	
COMPUTE NM HYD	509.00	-	4	.04047	58.84	3.186	1.47602	1.550	2.272	PER IMP= 48.00
ROUTE RESERVOIR	509.01	4	5	.04047	58.84	3.186	1.47602	1.550	2.272	
ROUTE	509.10	5	4	.04047	39.59	3.186	1.47603	1.700	1.529	
COMPUTE NM HYD	508.00	-	5	.13308	119.53	11.488	1.61853	1.900	1.403	PER IMP= 56.40
ADD HYD	508.10	4& 5	6	.17355	154.23	14.673	1.58529	1.850	1.389	
ROUTE	508.20	6	4	.17355	154.11	14.673	1.58530	1.850	1.387	
ROUTE	508.30	4	5	.17355	132.48	14.673	1.58530	2.000	1.193	
COMPUTE NM HYD	506.00	-	4	.68388	736.59	57.989	1.58990	1.750	1.683	PER IMP= 54.70
ROUTE	506.10	4	6	.68388	737.37	57.989	1.58990	1.750	1.685	
ROUTE	506.20	6	4	.68388	728.17	57.989	1.58990	1.800	1.664	
COMPUTE NM HYD	507.00	-	6	.72551	840.26	61.196	1.58155	1.700	1.810	PER IMP= 54.20
ADD HYD	507.10	4& 5	7	.85743	823.17	72.663	1.58897	1.800	1.500	
ADD HYD	507.20	6& 7	4	1.58294	1610.39	133.859	1.58557	1.750	1.590	
ROUTE	507.30	4	6	1.58294	1425.15	133.859	1.58556	1.850	1.407	
ROUTE	507.40	6	5	1.58294	1406.26	133.859	1.58556	1.900	1.388	
COMPUTE NM HYD	505.00	-	4	.57826	725.04	50.018	1.62181	1.650	1.959	PER IMP= 56.60
ROUTE	505.10	4	6	.57826	721.06	50.018	1.62181	1.650	1.948	
ROUTE	505.20	6	4	.57826	678.11	50.018	1.62181	1.750	1.832	
ADD HYD	505.30	4& 5	6	2.16120	1966.67	183.876	1.59526	1.850	1.422	
COMPUTE NM HYD	503.00	-	4	.10759	131.59	10.295	1.79418	1.700	1.911	PER IMP= 66.80
ROUTE	503.10	4	5	.10759	125.86	10.295	1.79418	1.800	1.828	
ADD HYD	503.20	6& 5	4	2.26879	2089.02	194.172	1.60470	1.850	1.439	
COMPUTE NM HYD	502.00	-	5	.09216	167.84	10.462	2.12858	1.600	2.846	PER IMP= 86.60
ROUTE RESERVOIR	502.01	5	6	.09216	167.84	10.462	2.12858	1.600	2.846	
ROUTE	502.10	6	5	.09216	161.28	10.462	2.12858	1.650	2.734	
ADD HYD	502.20	5& 4	6	2.36095	2185.98	204.634	1.62515	1.850	1.447	
COMPUTE NM HYD	501.00	-	4	.02172	49.96	2.413	2.08333	1.500	3.594	PER IMP= 84.20
ROUTE RESERVOIR	501.01	4	5	.02172	49.96	2.413	2.08333	1.500	3.594	
ROUTE	501.10	5	4	.02172	42.52	2.413	2.08335	1.550	3.059	
ADD HYD	501.20	4& 6	5	2.38267	2205.33	207.047	1.62932	1.850	1.446	
COMPUTE NM HYD	504.00	-	4	.89619	990.58	79.275	1.65858	1.750	1.727	PER IMP= 58.90
ADD HYD	504.10	4& 5	1	3.27886	3122.53	286.322	1.63732	1.800	1.488	
COMPUTE NM HYD	500.00	-	4	.00628	14.46	.697	2.08150	1.500	3.597	PER IMP= 84.00
ADD HYD	504.20	4& 1	6	3.28514	3127.50	287.019	1.63817	1.800	1.488	
COMPUTE NM HYD	316.00	-	1	.02386	40.80	1.232	.96813	1.500	2.672	PER IMP= 6.90
ROUTE RESERVOIR	316.01	1	3	.02386	40.80	1.232	.96813	1.500	2.672	
ROUTE	316.10	3	1	.02386	40.27	1.232	.96815	1.500	2.637	
COMPUTE NM HYD	325.00	-	2	.00553	10.47	.381	1.29329	1.500	2.957	PER IMP= 28.90
ADD HYD	325.10	1& 2	3	.02939	50.73	1.613	1.02929	1.500	2.697	
DIVIDE HYD	325.20	3	1	.01470	25.37	.807	1.02929	1.500	2.697	
	325.30	AND	2	.01470	25.37	.807	1.02929	1.500	2.697	
ROUTE	325.40	2	3	.01470	21.68	.807	1.02935	1.550	2.305	
ADD HYD	325.50	3& 6	4	3.29983	3137.24	287.826	1.63545	1.800	1.486	
ROUTE RESERVOIR	325.70	4	2	3.29983	1725.73	287.826	1.63546	2.250	.817	AC-FT= 74.736
COMPUTE NM HYD	324.00	-	3	.01196	12.92	.611	.95778	1.650	1.687	PER IMP= 6.20
ROUTE	324.10	1	4	.01470	18.51	.807	1.02935	1.600	1.968	
ADD HYD	324.20	3& 4	1	.02666	30.99	1.418	.99719	1.600	1.817	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	324.30	1& 2	2	3.32649	1730.20	289.244	1.63034	2.250	.813	
ROUTE	324.50	2	1	3.32649	1728.33	289.244	1.63035	2.250	.812	
COMPUTE NM HYD	323.00	-	2	.00343	6.47	.234	1.27851	1.500	2.947	PER IMP= 27.90
ROUTE	323.10	2	3	.00343	3.15	.234	1.27865	1.650	1.436	
ADD HYD	323.20	1& 3	2	3.32992	1729.36	289.478	1.62998	2.250	.811	
COMPUTE NM HYD	321.00	-	1	.06053	142.01	6.942	2.15045	1.500	3.666	PER IMP= 88.20
ADD HYD	321.10	2& 1	3	3.39045	1739.26	296.420	1.63927	2.250	.802	
COMPUTE NM HYD	322.00	-	4	.09103	188.35	10.210	2.10298	1.550	3.233	PER IMP= 85.30
ADD HYD	322.10	3& 4	2	3.48148	1758.22	306.630	1.65140	2.250	.789	
ROUTE	322.20	2	1	3.48148	1758.46	306.630	1.65140	2.250	.789	
COMPUTE NM HYD	320.00	-	4	.00482	9.75	.392	1.52535	1.500	3.160	PER IMP= 44.60
ADD HYD	320.10	1& 4	12	3.48630	1759.00	307.022	1.65122	2.250	.788	
COMPUTE NM HYD	225.00	-	1	.02082	48.58	2.366	2.13075	1.500	3.646	PER IMP= 87.00
ROUTE	225.10	1	2	.02082	47.28	2.366	2.13077	1.500	3.548	
COMPUTE NM HYD	223.00	-	1	.01050	24.85	1.221	2.18000	1.500	3.698	PER IMP= 90.00
ROUTE RESERVOIR	223.01	1	3	.01050	24.85	1.221	2.18000	1.500	3.698	
DIVIDE HYD	223.10	3	1	.00525	12.43	.610	2.17997	1.500	3.698	
	223.20	AND	4	.00525	12.43	.610	2.17997	1.500	3.698	
ROUTE	223.30	4	3	.00525	10.35	.610	2.18009	1.550	3.079	
ADD HYD	223.40	3& 2	5	.02607	56.44	2.976	2.14065	1.500	3.383	
ROUTE	223.50	1	2	.00525	9.00	.610	2.18009	1.600	2.678	
COMPUTE NM HYD	224.00	-	4	.02225	52.26	2.556	2.15373	1.500	3.670	PER IMP= 88.40
ADD HYD	224.10	4& 5	1	.04832	108.70	5.532	2.14667	1.500	3.515	
ROUTE	322.20	12	3	3.48630	1759.30	307.022	1.65122	2.250	.788	
COMPUTE NM HYD	226.00	-	4	.01463	33.76	1.632	2.09135	1.500	3.605	PER IMP= 84.60
ADD HYD	226.10	3& 4	4	3.50093	1761.63	308.654	1.65306	2.250	.786	
ROUTE RESERVOIR	226.01	4	6	3.50093	1761.63	308.654	1.65306	2.250	.786	
ADD HYD	226.20	6& 1	3	3.54925	1771.55	314.186	1.65978	2.200	.780	
ROUTE	226.30	3	4	3.54925	1771.46	314.186	1.65978	2.200	.780	
ADD HYD	226.40	2& 4	5	3.55450	1773.76	314.796	1.66055	2.200	.780	
COMPUTE NM HYD	222.00	-	4	.08660	175.98	9.149	1.98087	1.500	3.175	PER IMP= 77.80
ADD HYD	222.10	5& 4	2	3.64110	1797.48	323.945	1.66817	2.150	.771	
COMPUTE NM HYD	221.00	-	4	.06353	135.30	6.172	1.82172	1.500	3.328	PER IMP= 68.00
ADD HYD	221.10	2& 4	1	3.70463	1812.06	330.118	1.67080	2.150	.764	
ROUTE	221.20	1	2	3.70463	1813.47	330.118	1.67080	2.150	.765	
COMPUTE NM HYD	220.00	-	1	.05896	110.83	4.641	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	220.10	1& 2	3	3.76359	1824.21	334.759	1.66775	2.150	.757	
COMPUTE NM HYD	219.00	-	1	.07179	134.88	5.651	1.47602	1.500	2.936	PER IMP= 48.00
ADD HYD	219.10	1& 3	2	3.83538	1837.78	340.411	1.66416	2.100	.749	
ROUTE	219.20	2	3	3.83538	1839.71	340.411	1.66416	2.150	.749	
COMPUTE NM HYD	218.00	-	4	.05788	108.80	4.556	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	218.10	3& 4	1	3.89326	1850.26	344.967	1.66137	2.150	.743	
COMPUTE NM HYD	216.00	-	4	.01310	24.63	1.031	1.47602	1.500	2.938	PER IMP= 48.00
ROUTE	216.10	4	2	.01310	22.81	1.031	1.47606	1.550	2.721	
COMPUTE NM HYD	217.00	-	3	.02827	53.14	2.225	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	217.10	3& 2	4	.04137	74.50	3.257	1.47601	1.500	2.814	
COMPUTE NM HYD	215.00	-	3	.02934	55.16	2.310	1.47603	1.500	2.937	PER IMP= 48.00
ADD HYD	215.10	3& 4	2	.07071	129.66	5.566	1.47601	1.500	2.865	
ADD HYD	215.20	1& 2	3	3.96397	1864.82	350.533	1.65806	2.100	.735	
ROUTE	215.30	3	1	3.96397	1866.27	350.533	1.65806	2.150	.736	
COMPUTE NM HYD	214.00	-	4	.03392	63.76	2.670	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	214.10	4& 1	2	3.99789	1872.45	353.203	1.65651	2.150	.732	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	211.00	-	1	.02593	48.75	2.041	1.47603	1.500	2.937	PER IMP= 48.00
COMPUTE NM HYD	212.00	-	3	.02755	51.79	2.169	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	212.10	1& 3	4	.05348	100.54	4.210	1.47601	1.500	2.937	
ROUTE	212.20	4	1	.05348	98.18	4.210	1.47604	1.550	2.868	
COMPUTE NM HYD	213.00	-	3	.00817	15.37	.643	1.47602	1.500	2.939	PER IMP= 48.00
ADD HYD	213.10	3& 1	4	.06165	112.05	4.853	1.47602	1.500	2.840	
ADD HYD	213.20	2& 4	1	4.05954	1888.82	358.056	1.65377	2.100	.727	
ROUTE	213.40	1	2	4.05954	1889.19	358.056	1.65377	2.150	.727	
COMPUTE NM HYD	210.00	-	1	.04379	82.31	3.447	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	210.10	1& 2	3	4.10333	1898.18	361.503	1.65187	2.100	.723	
COMPUTE NM HYD	209.00	-	1	.01777	33.41	1.399	1.47602	1.500	2.938	PER IMP= 48.00
COMPUTE NM HYD	207.00	-	2	.01669	25.97	.923	1.03733	1.500	2.432	PER IMP= 23.00
ADD HYD	207.10	1& 2	4	.03446	59.39	2.322	1.26353	1.500	2.693	
ROUTE	207.20	4	1	.03446	56.93	2.322	1.26356	1.500	2.581	
COMPUTE NM HYD	208.00	-	2	.00314	5.91	.247	1.47602	1.500	2.943	PER IMP= 48.00
ADD HYD	208.10	1& 2	4	.03760	62.84	2.569	1.28127	1.500	2.611	
ADD HYD	208.20	4& 3	1	4.14093	1907.00	364.073	1.64851	2.100	.720	
ROUTE	208.30	1	2	4.14093	1907.61	364.073	1.64851	2.150	.720	
COMPUTE NM HYD	206.00	-	5	.01983	24.24	.710	.67138	1.500	1.910	PER IMP= 5.00
COMPUTE NM HYD	205.00	-	1	.01974	24.13	.707	.67138	1.500	1.910	PER IMP= 5.00
COMPUTE NM HYD	204.00	-	3	.00763	9.33	.273	.67138	1.500	1.912	PER IMP= 5.00
ADD HYD	204.10	1& 3	4	.02737	33.47	.980	.67136	1.500	1.910	
ROUTE	204.20	4	1	.02737	31.19	.980	.67139	1.550	1.780	
COMPUTE NM HYD	203.00	-	3	.00960	11.74	.344	.67138	1.500	1.911	PER IMP= 5.00
ADD HYD	203.10	1& 3	4	.03697	42.03	1.324	.67136	1.550	1.776	
ADD HYD	203.20	4& 5	1	.05680	64.42	2.034	.67136	1.550	1.772	
ROUTE	203.30	1	3	.05680	66.31	2.034	.67137	1.550	1.824	
COMPUTE NM HYD	202.00	-	1	.03805	78.80	3.515	1.73215	1.500	3.236	PER IMP= 62.50
ADD HYD	202.10	1& 2	4	4.17898	1915.86	367.588	1.64927	2.150	.716	
ADD HYD	202.20	4& 3	1	4.23578	1920.97	369.622	1.63616	2.150	.709	
ROUTE	202.30	1	2	4.23578	1923.92	369.622	1.63616	2.150	.710	
COMPUTE NM HYD	201.00	-	1	.03518	54.85	1.771	.94383	1.500	2.436	PER IMP= 13.70
COMPUTE NM HYD	200.00	-	3	.05438	92.37	2.988	1.03032	1.500	2.654	PER IMP= 14.00
ADD HYD	200.10	1& 2	4	4.27096	1927.61	371.392	1.63045	2.150	.705	
ADD HYD	200.20	3& 4	12	4.32534	1933.64	374.381	1.62291	2.150	.699	
ADD HYD	200.30	12&10	1	18.66708	5317.52	1516.328	1.52306	1.650	.445	
ROUTE RESERVOIR	200.03	1	2	18.66708	3640.54	1332.836	1.33876	3.100	.305	AC-FT= 477.102
ROUTE RESERVOIR	200.03	1	2	18.66708	87.76	419.061	.42092	25.100	.007	AC-FT= 1334.817
ROUTE RESERVOIR	200.03	1	2	18.66708	82.15	382.189	.38389	25.300	.007	AC-FT= 1352.523
FINISH										

AHYMO SUMMARY TABLE (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992 RUN DATE (MON/DAY/YR) =07/20/1992

INPUT FILE = alt-f.dat USER NO.= SCANLNNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START	0.0 HRS									
RAINFALL TYPE= 2										RAIN24= 2.660
COMPUTE NM HYD	418.00	-	1	1.49581	1872.81	125.528	1.57350	1.700	1.956	PER IMP= 48.00
COMPUTE NM HYD	417.00	-	2	.13909	150.05	11.672	1.57350	1.800	1.686	PER IMP= 48.00
ADD HYD	417.10	1& 2	3	1.63490	2012.23	137.200	1.57350	1.700	1.923	
ROUTE RESERVOIR	417.01	3	4	1.63490	2012.23	137.200	1.57350	1.700	1.923	
ROUTE	417.20	4	5	1.63490	1496.86	137.200	1.57350	1.850	1.431	
COMPUTE NM HYD	419.00	-	1	.19715	250.88	16.545	1.57350	1.700	1.988	PER IMP= 48.00
COMPUTE NM HYD	420.00	-	2	.18889	228.37	15.852	1.57350	1.700	1.889	PER IMP= 48.00
ADD HYD	419.10	1& 2	3	.38604	479.25	32.396	1.57349	1.700	1.940	
ADD HYD	420.10	3& 5	4	2.02094	1890.08	169.597	1.57350	1.850	1.461	
ROUTE	420.20	4	5	2.02094	824.66	169.447	1.57210	2.250	.638	
COMPUTE NM HYD	416.00	-	1	.86541	957.80	72.625	1.57350	1.750	1.729	PER IMP= 48.00
ROUTE	416.10	1	2	.86541	440.70	72.472	1.57019	2.150	.796	
ADD HYD	416.20	2& 5	3	2.88635	1260.58	241.919	1.57153	2.200	.682	
COMPUTE NM HYD	415.00	-	1	.15228	269.08	12.779	1.57350	1.550	2.761	PER IMP= 48.00
ROUTE RESERVOIR	415.01	1	2	.15228	269.08	12.779	1.57350	1.550	2.761	
COMPUTE NM HYD	414.00	-	1	.11235	142.83	9.428	1.57350	1.700	1.986	PER IMP= 48.00
ADD HYD	414.10	2& 1	4	.26463	377.00	22.208	1.57349	1.600	2.226	
ROUTE RESERVOIR	414.01	4	2	.26463	377.00	22.208	1.57349	1.600	2.226	
ROUTE	414.30	2	1	.26463	168.23	22.182	1.57165	1.900	.993	
COMPUTE NM HYD	411.00	-	2	.29891	426.42	25.084	1.57350	1.650	2.229	PER IMP= 48.00
ADD HYD	411.10	1& 2	4	.56354	545.66	47.266	1.57263	1.650	1.513	
ROUTE	411.20	4	1	.56354	523.52	47.263	1.57251	1.750	1.452	
COMPUTE NM HYD	412.00	-	2	1.18559	1330.28	99.495	1.57350	1.750	1.753	PER IMP= 48.00
ADD HYD	412.10	1& 2	4	1.74913	1853.80	146.757	1.57318	1.750	1.656	
ADD HYD	412.20	4& 3	4	4.63548	2479.45	388.676	1.57215	1.900	.836	
COMPUTE NM HYD	602.00	-	2	1.16549	2400.16	97.808	1.57350	1.500	3.218	PER IMP= 48.00
ROUTE	412.30	4	5	4.63548	2117.87	379.161	1.53366	2.000	.714	
ADD HYD	412.30	5& 2	5	5.80097	2642.96	476.861	1.54132	1.550	.712	
ROUTE RESERVOIR	412.03	5	1	5.80097	134.20	277.545	.89709	7.050	.036	AC-FT= 341.724
ROUTE	412.40	1	5	5.80097	133.16	265.942	.85958	9.150	.036	
COMPUTE NM HYD	424.00	-	1	.33534	463.50	28.142	1.57350	1.650	2.160	PER IMP= 48.00
ROUTE RESERVOIR	424.01	1	2	.33534	463.50	28.142	1.57350	1.650	2.160	
COMPUTE NM HYD	421.00	-	1	.33184	443.53	27.848	1.57350	1.650	2.088	PER IMP= 48.00
ADD HYD	421.10	1& 2	3	.66718	907.02	55.990	1.57350	1.650	2.124	
ROUTE	421.20	3	1	.66718	745.82	55.989	1.57349	1.750	1.747	
COMPUTE NM HYD	422.00	-	2	.14367	177.15	12.057	1.57350	1.700	1.927	PER IMP= 48.00
ADD HYD	422.10	1& 2	3	.81085	920.11	68.046	1.57349	1.700	1.773	
ROUTE	422.20	3	1	.81085	535.63	68.015	1.57276	1.900	1.032	
COMPUTE NM HYD	423.00	-	2	.05985	56.31	5.023	1.57350	1.900	1.470	PER IMP= 48.00
ADD HYD	423.10	1& 2	3	.87070	591.94	73.037	1.57281	1.900	1.062	
ROUTE	423.20	3	1	.87070	284.70	72.607	1.56355	2.500	.511	
COMPUTE NM HYD	413.00	-	2	1.00011	1191.16	83.929	1.57350	1.700	1.861	PER IMP= 48.00
ADD HYD	413.10	1& 2	3	1.87081	1236.88	156.536	1.56887	1.750	1.033	
ROUTE	413.20	3	1	1.87081	959.96	156.346	1.56696	1.950	.802	
COMPUTE NM HYD	410.00	-	2	1.38956	1697.81	116.612	1.57350	1.700	1.909	PER IMP= 48.00
ADD HYD	410.10	1& 2	3	3.26037	2444.42	272.957	1.56975	1.800	1.171	
ADD HYD	410.20	3& 5	4	9.06134	2444.42	538.900	1.11511	1.800	.422	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE RESERVOIR	410.01	4	1	9.06134	2444.42	538.900	1.11511	1.800	.422	
ROUTE	410.30	1	2	9.06134	1792.74	532.530	1.10193	2.050	.309	
COMPUTE NM HYD	409.00	-	1	.46618	669.79	39.122	1.57350	1.650	2.245	PER IMP= 48.00
ROUTE	409.10	1	3	.46618	181.47	38.806	1.56078	2.050	.608	
COMPUTE NM HYD	408.00	-	1	1.38633	1674.02	116.341	1.57350	1.700	1.887	PER IMP= 48.00
ADD HYD	408.10	1& 3	4	1.85251	1799.38	155.146	1.57030	1.750	1.518	
ADD HYD	408.20	4& 2	5	10.91385	3153.08	687.677	1.18143	1.850	.451	
ROUTE	408.30	5	1	10.91385	2772.38	685.668	1.17798	2.050	.397	
COMPUTE NM HYD	403.00	-	2	.48341	648.72	42.989	1.66741	1.700	2.097	PER IMP= 53.70
ADD HYD	403.10	1& 2	3	11.39726	3076.77	728.656	1.19874	2.050	.422	
ROUTE	403.20	3	5	11.39726	3050.09	727.389	1.19665	2.100	.418	
COMPUTE NM HYD	406.00	-	1	.05788	93.75	6.453	2.09027	1.700	2.531	PER IMP= 78.40
DIVIDE HYD	406.10	1	2	.05698	84.00	6.352	2.09026	1.600	2.304	
	406.20	AND	3	.00090	9.75	.101	2.09026	1.700	16.895	
ROUTE	406.30	3	1	.00090	1.86	.101	2.09885	1.750	3.224	
COMPUTE NM HYD	407.00	-	2	.06012	106.50	5.045	1.57350	1.550	2.768	PER IMP= 48.00
ROUTE RESERVOIR	407.01	2	3	.06012	106.50	5.045	1.57350	1.550	2.768	
ROUTE	407.10	3	2	.06012	30.32	5.036	1.57052	1.850	.788	
COMPUTE NM HYD	404.00	-	3	.22811	345.30	26.223	2.15542	1.700	2.365	PER IMP= 83.00
ADD HYD	404.10	1& 2	4	.06102	31.81	5.137	1.57832	1.850	.814	
ADD HYD	404.20	3& 4	7	.28913	375.63	31.359	2.03362	1.750	2.030	
DIVIDE HYD	404.10	7	2	.14025	46.00	15.211	2.03362	1.400	.512	
	404.20	AND	3	.14889	329.63	16.148	2.03362	1.750	3.459	
DIVIDE HYD	404.20	2	1	.07012	23.00	7.606	2.03362	1.400	.512	
	404.30	AND	4	.07012	23.00	7.606	2.03362	1.400	.512	
ROUTE	404.40	1	2	.07012	23.64	7.606	2.03361	1.450	.527	
ROUTE	404.40	4	1	.07012	23.64	7.606	2.03361	1.450	.527	
ADD HYD	404.50	1& 2	7	.14025	47.29	15.211	2.03361	1.450	.527	
ROUTE	404.60	3	1	.14889	272.73	16.148	2.03367	1.850	2.862	
COMPUTE NM HYD	405.00	-	2	.28007	395.97	27.954	1.87144	1.700	2.209	PER IMP= 66.00
ROUTE	405.10	2	3	.28007	187.73	27.904	1.86811	2.000	1.047	
ADD HYD	405.20	3& 1	3	.42896	449.33	44.052	1.92557	1.900	1.637	
COMPUTE NM HYD	402.00	-	2	.21249	346.29	24.221	2.13725	1.700	2.546	PER IMP= 81.70
ADD HYD	402.10	2& 3	4	.64145	709.73	68.273	1.99569	1.800	1.729	
ROUTE	402.20	4	2	.64145	662.49	68.271	1.99561	1.950	1.614	
COMPUTE NM HYD	401.00	-	3	.14474	244.79	16.995	2.20159	1.650	2.643	PER IMP= 86.00
ADD HYD	401.10	5& 2	4	12.03871	3665.22	795.660	1.23922	2.050	.476	
ADD HYD	401.20	4& 3	5	12.18345	3780.17	812.654	1.25065	2.050	.485	
COMPUTE NM HYD	303.00	-	1	.00790	5.00	.597	1.41615	2.200	.989	PER IMP= 29.50
ADD HYD	303.10	1& 7	2	.14815	51.08	15.808	2.00068	2.150	.539	
DIVIDE HYD	303.20	2	1	.14461	46.00	15.431	2.00068	1.450	.497	
	303.30	AND	6	.00353	5.08	.377	2.00068	2.150	2.248	
DIVIDE HYD	303.40	1	2	.07231	23.00	7.715	2.00068	1.450	.497	
	303.40	AND	3	.07231	23.00	7.715	2.00068	1.450	.497	
ROUTE	303.50	2	1	.07231	23.57	7.715	2.00067	1.450	.509	
ROUTE	303.60	3	2	.07231	23.57	7.715	2.00067	1.450	.509	
ADD HYD	303.70	1& 2	3	.14461	47.14	15.430	2.00067	1.450	.509	
COMPUTE NM HYD	302.00	-	1	.01116	9.21	.770	1.29424	1.900	1.289	PER IMP= 21.00
ADD HYD	302.10	1& 3	2	.15577	55.40	16.201	1.95006	1.950	.556	
DIVIDE HYD	302.20	2	1	.15000	46.00	15.601	1.95006	1.450	.479	
	302.30	AND	8	.00577	9.40	.600	1.95006	1.950	2.545	
DIVIDE HYD	302.40	1	2	.07500	23.00	7.800	1.95006	1.450	.479	
	302.40	AND	3	.07500	23.00	7.800	1.95006	1.450	.479	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	302.40	2	4	.07500	23.74	7.800	1.95005	1.450	.495	
ROUTE	302.50	3	1	.07500	23.74	7.800	1.95005	1.450	.495	
ADD HYD	302.60	4& 1	3	.15000	47.49	15.601	1.95005	1.450	.495	
COMPUTE NM HYD	301.00	-	1	.00593	7.36	.491	1.55240	1.700	1.940	PER IMP= 39.00
ROUTE	301.20	1	2	.00593	7.35	.491	1.55241	1.750	1.936	
ADD HYD	301.30	2& 3	7	.15593	53.75	16.092	1.93492	1.750	.539	
COMPUTE NM HYD	300.00	-	2	.00603	12.22	.420	1.30715	1.500	3.167	PER IMP= 21.90
ADD HYD	300.10	8& 2	1	.01180	14.28	1.020	1.62145	1.550	1.891	
ROUTE	300.20	1	2	.01180	13.78	1.020	1.62152	1.550	1.824	
COMPUTE NM HYD	304.00	-	1	.00347	7.56	.285	1.53949	1.500	3.405	PER IMP= 38.10
ROUTE	304.20	1	3	.00347	7.47	.285	1.53964	1.500	3.362	
ADD HYD	304.30	2& 3	8	.01527	20.63	1.305	1.60281	1.550	2.111	
COMPUTE NM HYD	305.00	-	9	.00402	8.06	.322	1.50077	1.500	3.132	PER IMP= 35.40
ROUTE RESERVOIR	401.01	5	1	12.18345	3704.42	812.616	1.25059	2.150	.475	AC-FT= 11.559
ROUTE	401.80	1	2	12.18345	3707.34	812.406	1.25027	2.150	.475	
COMPUTE NM HYD	307.00	-	4	.01650	20.25	1.295	1.47208	1.700	1.917	PER IMP= 33.40
ADD HYD	307.10	6& 4	1	.02003	22.45	1.673	1.56531	1.750	1.751	
ROUTE	307.20	1	3	.02003	21.71	1.673	1.56534	1.750	1.693	
ADD HYD	307.30	3& 2	1	12.20348	3721.22	814.078	1.25079	2.150	.476	
COMPUTE NM HYD	315.00	-	2	.00836	15.50	.464	1.04040	1.500	2.896	PER IMP= 3.30
ROUTE RESERVOIR	315.01	2	3	.00836	15.50	.464	1.04040	1.500	2.896	
ROUTE	315.10	3	2	.00836	13.74	.464	1.04048	1.550	2.569	
ADD HYD	315.20	1& 2	3	12.21184	3722.95	814.542	1.25064	2.150	.476	
COMPUTE NM HYD	312.00	-	1	.03437	68.16	2.278	1.24262	1.500	3.098	PER IMP= 17.40
DIVIDE HYD	312.10	1	2	.01719	34.08	1.139	1.24261	1.500	3.098	
	312.20	AND	4	.01719	34.08	1.139	1.24261	1.500	3.098	
ROUTE	312.30	2	5	.01719	32.97	1.139	1.24264	1.550	2.997	
ADD HYD	312.40	3& 5	1	12.22903	3726.92	815.681	1.25063	2.150	.476	
COMPUTE NM HYD	314.00	-	3	.01914	35.92	1.100	1.07768	1.500	2.932	PER IMP= 5.90
ADD HYD	314.10	1& 3	2	12.24817	3729.26	816.782	1.25036	2.150	.476	
ROUTE RESERVOIR	401.02	2	1	12.24817	3659.56	816.677	1.25020	2.250	.467	AC-FT= 13.905
ROUTE	314.90	1	2	12.24817	3661.37	816.386	1.24976	2.250	.467	
COMPUTE NM HYD	306.00	-	1	.01532	16.22	1.068	1.30715	1.750	1.655	PER IMP= 21.90
ROUTE	306.10	1	3	.01532	16.23	1.068	1.30715	1.750	1.655	
ROUTE	306.20	3	1	.01532	14.66	1.068	1.30715	1.850	1.496	
COMPUTE NM HYD	310.00	-	3	.00981	19.71	.670	1.28134	1.500	3.139	PER IMP= 20.10
ADD HYD	310.10	3& 1	5	.02513	21.91	1.738	1.29703	1.500	1.362	
ROUTE	310.20	5	1	.02513	22.16	1.738	1.29706	1.550	1.378	
ADD HYD	310.30	1& 2	3	12.27330	3670.50	818.124	1.24985	2.250	.467	
ROUTE	310.40	4	5	.01719	33.91	1.139	1.24264	1.500	3.084	
ADD HYD	310.50	5& 3	1	12.29048	3672.48	819.263	1.24984	2.250	.467	
COMPUTE NM HYD	313.00	-	2	.00787	15.84	.540	1.28564	1.500	3.144	PER IMP= 20.40
ADD HYD	313.10	1& 2	3	12.29835	3673.26	819.803	1.24987	2.250	.467	
ROUTE RESERVOIR	401.03	3	1	12.29835	3600.01	819.798	1.24986	2.350	.457	AC-FT= 13.288
COMPUTE NM HYD	309.00	-	3	.00803	7.00	.579	1.35161	1.900	1.361	PER IMP= 25.00
COMPUTE NM HYD	308.00	-	4	.00915	10.41	.785	1.60833	1.800	1.778	PER IMP= 42.90
ADD HYD	308.10	3& 4	2	.01718	17.06	1.364	1.48825	1.850	1.552	
ADD HYD	308.20	1& 2	10	12.31553	3607.07	821.162	1.25019	2.350	.458	
COMPUTE NM HYD	311.00	-	11	.00602	6.75	.529	1.64705	1.800	1.753	PER IMP= 45.60
ROUTE	301.10	7	1	.15593	40.49	16.029	1.92732	2.900	.406	
ROUTE	304.10	8	2	.01527	8.32	1.305	1.60277	2.100	.851	
ROUTE	305.10	9	3	.00402	2.66	.322	1.50086	1.750	1.033	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	301.20	1& 2	4	.17120	44.96	17.334	1.89838	2.850	.410	
ADD HYD	301.30	3& 4	1	.17522	45.92	17.655	1.88925	2.850	.409	
COMPUTE NM HYD	145.00	-	2	.12312	191.40	13.093	1.99392	1.700	2.429	PER IMP= 71.60
ADD HYD	145.10	1& 2	3	.29834	214.19	30.748	1.93244	1.700	1.122	
ROUTE	145.20	3	1	.29834	211.22	30.742	1.93206	1.700	1.106	
COMPUTE NM HYD	143.00	-	2	.09431	128.30	7.914	1.57350	1.650	2.126	PER IMP= 48.00
COMPUTE NM HYD	144.00	-	3	.02602	51.69	2.354	1.69638	1.550	3.104	PER IMP= 50.40
ADD HYD	143.10	1& 2	4	.39265	336.16	38.657	1.84594	1.700	1.338	
ADD HYD	143.20	3& 4	1	.41867	366.95	41.011	1.83664	1.700	1.369	
ROUTE	143.30	1	2	.41867	360.26	41.004	1.83636	1.750	1.345	
COMPUTE NM HYD	141.00	-	1	.03868	76.80	3.246	1.57350	1.500	3.103	PER IMP= 48.00
ADD HYD	141.10	1& 2	3	.45735	397.45	44.250	1.81413	1.700	1.358	
COMPUTE NM HYD	140.00	-	1	.09638	129.96	8.088	1.57350	1.650	2.107	PER IMP= 48.00
ADD HYD	140.10	1& 3	2	.55373	524.73	52.339	1.77225	1.700	1.481	
ROUTE	140.20	2	1	.55373	443.15	52.317	1.77151	1.800	1.250	
COMPUTE NM HYD	139.00	-	2	.02145	45.00	1.800	1.57350	1.500	3.278	PER IMP= 48.00
ADD HYD	139.10	1& 2	3	.57518	457.41	54.117	1.76412	1.800	1.243	
ROUTE	139.20	3	1	.57518	430.65	54.106	1.76378	1.900	1.170	
COMPUTE NM HYD	138.00	-	2	.16332	270.67	13.706	1.57350	1.550	2.590	PER IMP= 48.00
ADD HYD	138.10	2& 1	3	.73850	544.13	67.812	1.72170	1.850	1.151	
ROUTE	138.20	3	1	.73850	502.88	67.796	1.72129	1.950	1.064	
COMPUTE NM HYD	129.00	-	2	.39080	606.30	32.796	1.57350	1.600	2.424	PER IMP= 48.00
ADD HYD	129.10	1& 2	3	1.12930	846.87	100.592	1.67014	1.650	1.172	
COMPUTE NM HYD	136.00	-	1	.08130	117.65	6.823	1.57350	1.600	2.261	PER IMP= 48.00
COMPUTE NM HYD	135.00	-	2	.05923	92.74	4.971	1.57350	1.600	2.447	PER IMP= 48.00
ADD HYD	135.10	1& 2	4	.14053	210.39	11.793	1.57349	1.600	2.339	
ROUTE RESERVOIR	135.01	4	1	.14053	210.39	11.793	1.57349	1.600	2.339	
ROUTE	135.20	1	2	.14053	94.30	11.790	1.57303	1.900	1.049	
COMPUTE NM HYD	130.00	-	1	.20469	265.09	17.178	1.57350	1.700	2.024	PER IMP= 48.00
ADD HYD	130.10	1& 2	4	.34522	342.64	28.967	1.57331	1.700	1.551	
ROUTE	130.20	4	2	.34522	281.96	28.966	1.57324	1.850	1.276	
COMPUTE NM HYD	125.00	-	1	.03679	66.14	3.087	1.57350	1.550	2.809	PER IMP= 48.00
ADD HYD	125.10	1& 2	4	.38201	307.04	32.054	1.57327	1.850	1.256	
ADD HYD	125.20	3& 4	1	1.51131	1117.94	132.645	1.64566	1.800	1.156	
COMPUTE NM HYD	124.00	-	2	.04092	60.54	3.434	1.57350	1.600	2.311	PER IMP= 48.00
ADD HYD	124.10	2& 1	3	1.55223	1162.46	136.079	1.64375	1.750	1.170	
ROUTE	124.20	3	1	1.55223	1161.82	136.075	1.64370	1.800	1.170	
COMPUTE NM HYD	123.00	-	2	.02504	52.64	2.101	1.57350	1.500	3.285	PER IMP= 48.00
COMPUTE NM HYD	122.00	-	3	.13622	197.25	11.432	1.57350	1.600	2.263	PER IMP= 48.00
ADD HYD	123.10	1& 2	4	1.57727	1179.07	138.176	1.64259	1.750	1.168	
ADD HYD	123.20	3& 4	1	1.71349	1343.80	149.608	1.63709	1.700	1.225	
ROUTE	123.30	1	2	1.71349	1329.04	149.605	1.63706	1.800	1.212	
COMPUTE NM HYD	121.00	-	1	.02100	41.74	1.629	1.45481	1.500	3.106	PER IMP= 42.30
ADD HYD	121.10	1& 2	3	1.73449	1341.85	151.234	1.63485	1.800	1.209	
ROUTE	121.20	3	1	1.73449	1346.81	151.233	1.63484	1.800	1.213	
COMPUTE NM HYD	120.00	-	2	.01176	22.89	.839	1.33817	1.500	3.042	PER IMP= 32.20
COMPUTE NM HYD	119.00	-	3	.03895	74.01	3.323	1.59952	1.500	2.969	PER IMP= 49.40
ADD HYD	119.10	2& 3	4	.05071	96.91	4.162	1.53890	1.500	2.986	
ROUTE	119.20	4	2	.05071	72.57	4.162	1.53891	1.600	2.236	
COMPUTE NM HYD	115.00	-	3	.03760	65.43	2.085	1.03956	1.500	2.719	PER IMP= 12.60
ROUTE	115.10	3	4	.03760	65.38	2.085	1.03958	1.500	2.717	
COMPUTE NM HYD	112.00	-	3	.04603	79.27	2.501	1.01863	1.500	2.691	PER IMP= 11.50

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	112.10	1& 2	5	1.78520	1398.29	155.395	1.63211	1.800	1.224	
ADD HYD	112.20	3& 5	2	1.83123	1419.78	157.896	1.61669	1.800	1.211	
ADD HYD	112.30	4& 2	1	1.86883	1437.77	159.980	1.60508	1.800	1.202	
ROUTE	311.40	11	2	.00602	5.19	.529	1.64703	2.000	1.346	
COMPUTE NM HYD	149.00	-	3	.03482	89.77	4.068	2.19075	1.500	4.028	PER IMP= 85.10
ADD HYD	311.10	2& 3	4	.04084	89.96	4.597	2.11057	1.500	3.442	
DIVIDE HYD	311.20	4	2	.01389	30.59	1.563	2.11057	1.500	3.442	
	311.30	AND	3	.02695	59.38	3.034	2.11057	1.500	3.442	
DIVIDE HYD	311.20	3	4	.01348	29.69	1.517	2.11056	1.500	3.442	
	311.20	AND	5	.01348	29.69	1.517	2.11056	1.500	3.442	
ROUTE	311.20	2	3	.01389	30.66	1.563	2.11057	1.500	3.450	
ROUTE	311.20	4	2	.01348	29.74	1.517	2.11057	1.500	3.448	
ROUTE	311.20	5	4	.01348	29.74	1.517	2.11057	1.500	3.448	
ADD HYD	311.30	2& 3	5	.02736	60.40	3.080	2.11051	1.500	3.449	
ADD HYD	311.40	5& 4	2	.04084	90.13	4.597	2.11051	1.500	3.448	
ROUTE	311.30	2	3	.04084	55.97	4.597	2.11056	1.600	2.141	
COMPUTE NM HYD	148.00	-	2	.01588	33.39	1.333	1.57350	1.500	3.286	PER IMP= 48.00
ROUTE	148.10	2	4	.01588	33.17	1.333	1.57353	1.500	3.264	
ROUTE	148.20	4	2	.01588	13.57	1.332	1.57313	1.700	1.335	
COMPUTE NM HYD	147.00	-	4	.00565	11.89	.474	1.57350	1.500	3.288	PER IMP= 48.00
ROUTE	147.10	4	5	.00565	11.83	.474	1.57359	1.500	3.271	
ROUTE	147.20	5	4	.00565	4.99	.474	1.57350	1.700	1.379	
COMPUTE NM HYD	146.00	-	5	.05976	99.09	5.512	1.72957	1.600	2.591	PER IMP= 56.00
ADD HYD	146.10	2& 3	6	.05672	68.55	5.929	1.96008	1.600	1.888	
ADD HYD	146.20	4& 6	2	.06237	73.19	6.403	1.92504	1.600	1.834	
ADD HYD	146.30	5& 2	3	.12213	172.28	11.916	1.82939	1.600	2.204	
COMPUTE NM HYD	154.00	-	2	.01947	52.79	2.465	2.37421	1.500	4.236	PER IMP= 96.70
ROUTE	154.10	2	4	.01947	31.58	2.465	2.37423	1.600	2.535	
COMPUTE NM HYD	153.00	-	2	.00646	15.14	.781	2.26606	1.550	3.661	PER IMP= 90.00
ROUTE	153.10	2	5	.00646	6.90	.781	2.26612	1.750	1.670	
COMPUTE NM HYD	152.00	-	2	.07224	103.82	6.278	1.62956	1.650	2.245	PER IMP= 54.70
ADD HYD	152.10	2& 4	6	.09171	134.58	8.744	1.78764	1.600	2.293	
ADD HYD	152.20	5& 6	2	.09817	140.81	9.524	1.81912	1.650	2.241	
ROUTE	152.30	2	5	.09817	142.44	9.524	1.81913	1.650	2.267	
ADD HYD	152.40	3& 5	2	.22030	310.30	21.440	1.82481	1.650	2.201	
ROUTE	152.30	10	3	12.31553	3595.68	819.396	1.24750	2.400	.456	
COMPUTE NM HYD	150.00	-	4	.03482	84.93	3.626	1.95249	1.500	3.811	PER IMP= 67.20
ROUTE	150.10	4	5	.03482	61.05	3.626	1.95250	1.600	2.740	
COMPUTE NM HYD	142.00	-	4	.12769	269.42	12.048	1.76912	1.500	3.297	PER IMP= 58.80
ADD HYD	142.20	3& 4	6	12.44322	3609.63	831.444	1.25286	2.350	.453	
ADD HYD	142.30	5& 6	3	12.47804	3617.81	835.071	1.25481	2.350	.453	
ROUTE RESERVOIR	142.01	3	4	12.47804	3617.81	835.071	1.25481	2.350	.453	
ROUTE	142.40	4	3	12.47804	3614.47	834.274	1.25361	2.400	.453	
COMPUTE NM HYD	137.00	-	4	.08668	157.25	7.274	1.57350	1.550	2.835	PER IMP= 48.00
ADD HYD	137.10	3& 4	5	12.56472	3624.09	841.549	1.25582	2.400	.451	
COMPUTE NM HYD	134.00	-	4	.04029	82.28	3.381	1.57350	1.500	3.191	PER IMP= 48.00
ADD HYD	134.10	4& 2	6	.26059	371.15	24.821	1.78596	1.600	2.225	
ADD HYD	134.20	6& 5	2	12.82531	3684.51	866.369	1.26659	2.400	.449	
ROUTE	134.30	2	3	12.82531	3685.32	865.868	1.26586	2.400	.449	
COMPUTE NM HYD	132.00	-	2	.02692	56.60	2.259	1.57350	1.500	3.285	PER IMP= 48.00
COMPUTE NM HYD	133.00	-	4	.03939	81.85	3.306	1.57350	1.500	3.247	PER IMP= 48.00
ADD HYD	133.10	2& 3	5	12.85223	3687.42	868.127	1.26650	2.400	.448	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	133.20	4& 5	2	12.89162	3690.59	871.432	1.26744	2.400	.447	
ROUTE	133.30	2	3	12.89162	3689.40	870.587	1.26621	2.400	.447	
COMPUTE NM HYD	151.00	-	2	.02907	62.38	2.579	1.66330	1.500	3.353	PER IMP= 55.00
ROUTE	151.10	2	4	.02907	49.30	2.579	1.66332	1.550	2.650	
COMPUTE NM HYD	131.00	-	2	.05707	105.16	3.993	1.31185	1.500	2.879	PER IMP= 30.80
ADD HYD	131.10	2& 3	5	12.94869	3693.53	874.581	1.26641	2.400	.446	
ADD HYD	131.20	4& 5	2	12.97776	3698.07	877.160	1.26730	2.400	.445	
ROUTE	131.30	2	3	12.97776	3693.81	876.574	1.26646	2.450	.445	
COMPUTE NM HYD	127.00	-	2	.04370	85.46	3.168	1.35916	1.500	3.056	PER IMP= 33.90
ADD HYD	127.10	2& 3	4	13.02146	3696.39	879.741	1.26677	2.450	.444	
ROUTE	127.20	4	2	13.02146	3696.65	879.151	1.26592	2.450	.444	
COMPUTE NM HYD	128.00	-	3	.07690	159.88	6.483	1.58068	1.500	3.248	PER IMP= 48.00
ROUTE	128.10	3	4	.07690	158.11	6.483	1.58068	1.550	3.212	
COMPUTE NM HYD	126.00	-	3	.07448	133.69	5.662	1.42541	1.550	2.805	PER IMP= 37.70
ADD HYD	126.10	3& 4	5	.15138	291.80	12.145	1.50428	1.550	3.012	
ROUTE	126.20	5	3	.15138	290.62	12.145	1.50429	1.550	3.000	
ADD HYD	126.30	2& 3	4	13.17284	3712.80	891.296	1.26866	2.450	.440	
COMPUTE NM HYD	118.00	-	2	.06353	112.29	3.674	1.08419	1.500	2.762	PER IMP= 15.80
ADD HYD	118.10	2& 4	3	13.23637	3715.83	894.970	1.26777	2.450	.439	
ROUTE	118.20	3	2	13.23637	3715.25	894.502	1.26711	2.450	.439	
COMPUTE NM HYD	116.00	-	3	.01678	27.77	.823	.92000	1.500	2.586	PER IMP= 5.00
COMPUTE NM HYD	117.00	-	4	.01804	30.10	.904	.93979	1.500	2.607	PER IMP= 6.30
COMPUTE NM HYD	114.00	-	5	.01552	28.49	.978	1.18201	1.500	2.868	PER IMP= 22.20
ADD HYD	114.10	2& 3	6	13.25315	3715.94	895.327	1.26667	2.450	.438	
ADD HYD	114.20	4& 6	2	13.27119	3716.69	896.230	1.26622	2.450	.438	
ADD HYD	114.30	5& 2	3	13.28671	3717.49	897.209	1.26613	2.450	.437	
ROUTE	114.40	3	2	13.28671	3716.68	896.593	1.26526	2.450	.437	
COMPUTE NM HYD	113.00	-	5	.01992	33.85	1.047	.98515	1.500	2.655	PER IMP= 9.30
ADD HYD	113.10	5& 2	4	13.30663	3717.55	897.640	1.26484	2.450	.437	
ADD HYD	112.10	1& 4	3	15.17546	4353.45	1057.620	1.30674	2.250	.448	
ROUTE	112.20	3	1	15.17546	4355.75	1057.170	1.30618	2.250	.448	
COMPUTE NM HYD	111.00	-	2	.00906	15.00	.445	.92000	1.500	2.587	PER IMP= 5.00
ADD HYD	111.10	1& 2	3	15.18452	4356.42	1057.614	1.30595	2.250	.448	
ROUTE	111.20	3	1	15.18452	4359.27	1057.271	1.30553	2.250	.449	
COMPUTE NM HYD	110.00	-	2	.04352	77.84	2.590	1.11568	1.500	2.795	PER IMP= 17.90
ADD HYD	110.10	1& 2	3	15.22804	4363.12	1059.860	1.30499	2.250	.448	
ROUTE	110.20	3	1	15.22804	4364.56	1059.548	1.30460	2.250	.448	
COMPUTE NM HYD	109.00	-	2	.02638	44.83	1.386	.98515	1.500	2.655	PER IMP= 9.30
COMPUTE NM HYD	108.00	-	3	.00781	13.04	.391	.93979	1.500	2.608	PER IMP= 6.30
ADD HYD	109.10	1& 2	4	15.25442	4366.63	1060.934	1.30405	2.250	.447	
ADD HYD	109.20	3& 4	1	15.26223	4367.21	1061.326	1.30386	2.250	.447	
ROUTE	109.30	1	2	15.26223	4366.65	1060.929	1.30338	2.250	.447	
COMPUTE NM HYD	107.00	-	1	.02163	35.79	1.061	.92000	1.500	2.585	PER IMP= 5.00
ADD HYD	107.10	1& 2	3	15.28386	4368.23	1061.992	1.30283	2.250	.447	
ROUTE	107.20	3	1	15.28386	4370.24	1061.410	1.30212	2.300	.447	
COMPUTE NM HYD	106.00	-	2	.04128	70.14	2.169	.98515	1.500	2.655	PER IMP= 9.30
ADD HYD	106.10	1& 2	3	15.32514	4373.01	1063.580	1.30127	2.300	.446	
ROUTE	106.20	3	1	15.32514	4374.97	1063.116	1.30070	2.300	.446	
COMPUTE NM HYD	105.00	-	2	.02584	43.91	1.358	.98515	1.500	2.655	PER IMP= 9.30
COMPUTE NM HYD	104.00	-	3	.01579	28.25	.940	1.11568	1.500	2.796	PER IMP= 17.90
ADD HYD	104.10	2& 3	4	.04163	72.16	2.297	1.03465	1.500	2.708	
ADD HYD	104.20	1& 4	2	15.36677	4377.90	1065.413	1.29998	2.300	.445	

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ROUTE	104.30	2	1	15.36677	4378.74	1065.059	1.29955	2.300	.445	
COMPUTE NM HYD	103.00	-	2	.02997	49.99	1.502	.93979	1.500	2.606	PER IMP= 6.30
ADD HYD	103.10	1& 2	3	15.39674	4380.67	1066.563	1.29885	2.300	.445	
ROUTE	103.20	3	1	15.39674	4376.18	1065.460	1.29751	2.350	.444	
COMPUTE NM HYD	101.00	-	2	.08444	155.06	5.213	1.15761	1.500	2.869	PER IMP= 19.30
COMPUTE NM HYD	102.00	-	3	.02692	48.15	1.602	1.11568	1.500	2.795	PER IMP= 17.90
ADD HYD	101.10	1& 2	4	15.48118	4381.83	1070.673	1.29674	2.350	.442	
ADD HYD	101.20	3& 4	10	15.50810	4383.59	1072.275	1.29643	2.350	.442	
COMPUTE NM HYD	509.00	-	4	.04047	65.81	3.396	1.57350	1.600	2.541	PER IMP= 48.00
ROUTE RESERVOIR	509.01	4	5	.04047	65.81	3.396	1.57350	1.600	2.541	
ROUTE	509.10	5	4	.04047	10.00	3.369	1.56079	2.050	.386	
COMPUTE NM HYD	508.00	-	5	.13308	133.97	12.165	1.71390	1.900	1.573	PER IMP= 56.40
ADD HYD	508.10	4& 5	6	.17355	143.72	15.533	1.67820	1.900	1.294	
ROUTE	508.20	6	4	.17355	143.75	15.533	1.67818	1.900	1.294	
ROUTE	508.30	4	5	.17355	85.55	15.529	1.67773	2.300	.770	
COMPUTE NM HYD	506.00	-	4	.68388	837.40	61.485	1.68573	1.750	1.913	PER IMP= 54.70
ROUTE	506.10	4	6	.68388	837.85	61.485	1.68573	1.750	1.914	
ROUTE	506.20	6	4	.68388	589.18	61.481	1.68563	1.950	1.346	
COMPUTE NM HYD	507.00	-	6	.72551	954.83	64.909	1.67751	1.700	2.056	PER IMP= 54.20
ADD HYD	507.10	4& 5	7	.85743	650.95	77.010	1.68403	1.950	1.186	
ADD HYD	507.20	6& 7	4	1.58294	1401.97	141.920	1.68105	1.800	1.384	
ROUTE	507.30	4	6	1.58294	601.41	141.412	1.67503	2.300	.594	
ROUTE	507.40	6	5	1.58294	577.83	141.372	1.67455	2.500	.570	
COMPUTE NM HYD	505.00	-	4	.57826	822.12	52.957	1.71713	1.650	2.221	PER IMP= 56.60
ROUTE	505.10	4	6	.57826	817.05	52.957	1.71713	1.700	2.208	
ROUTE	505.20	6	4	.57826	579.07	52.957	1.71713	1.850	1.565	
ADD HYD	505.30	4& 5	6	2.16120	875.79	194.329	1.68594	2.200	.633	
COMPUTE NM HYD	503.00	-	4	.10759	146.82	10.827	1.88681	1.750	2.132	PER IMP= 66.80
ROUTE	503.10	4	5	.10759	121.70	10.827	1.88682	1.850	1.767	
ADD HYD	503.20	6& 5	4	2.26879	957.20	205.156	1.69547	2.100	.659	
COMPUTE NM HYD	502.00	-	5	.09216	186.66	10.893	2.21613	1.600	3.165	PER IMP= 86.60
ROUTE RESERVOIR	502.01	5	6	.09216	186.66	10.893	2.21613	1.600	3.165	
ROUTE	502.10	6	5	.09216	159.02	10.893	2.21613	1.700	2.696	
ADD HYD	502.20	5& 4	6	2.36095	1036.10	216.048	1.71579	2.000	.686	
COMPUTE NM HYD	501.00	-	4	.02172	55.59	2.515	2.17101	1.500	3.999	PER IMP= 84.20
ROUTE RESERVOIR	501.01	4	5	.02172	55.59	2.515	2.17101	1.500	3.999	
ROUTE	501.10	5	4	.02172	33.51	2.515	2.17103	1.600	2.411	
ADD HYD	501.20	4& 6	5	2.38267	1056.23	218.563	1.71994	2.000	.693	
COMPUTE NM HYD	504.00	-	4	.89619	1124.16	83.793	1.75311	1.750	1.960	PER IMP= 58.90
ADD HYD	504.10	4& 5	1	3.27886	2059.41	302.356	1.72901	1.800	.981	
COMPUTE NM HYD	500.00	-	4	.00628	16.08	.727	2.16935	1.500	4.002	PER IMP= 84.00
ADD HYD	504.20	4& 1	6	3.28514	2065.00	303.083	1.72985	1.800	.982	
COMPUTE NM HYD	316.00	-	1	.02386	44.99	1.390	1.09203	1.500	2.946	PER IMP= 6.90
ROUTE RESERVOIR	316.01	1	3	.02386	44.99	1.390	1.09203	1.500	2.946	
ROUTE	316.10	3	1	.02386	44.25	1.390	1.09205	1.500	2.898	
COMPUTE NM HYD	325.00	-	2	.00553	11.57	.415	1.40754	1.500	3.269	PER IMP= 28.90
ADD HYD	325.10	1& 2	3	.02939	55.82	1.805	1.15138	1.500	2.968	
DIVIDE HYD	325.20	3	1	.01470	27.91	.902	1.15138	1.500	2.968	
	325.30	AND	2	.01470	27.91	.902	1.15138	1.500	2.968	
ROUTE	325.40	2	3	.01470	27.30	.902	1.15143	1.550	2.903	
ADD HYD	325.50	3& 6	4	3.29983	2074.05	303.985	1.72727	1.800	.982	
DIVIDE HYD	325.60	4	3	1.64992	1037.02	151.992	1.72727	1.800	.982	
	325.60	AND	6	1.64992	1037.02	151.992	1.72727	1.800	.982	

*STORE RATING CURVE RC=1 VS NO=1

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	325.70	6	4	1.64992	1035.49	151.992	1.72727	1.800	.981	
ROUTE	325.70	3	6	1.64992	1035.49	151.992	1.72727	1.800	.981	
ADD HYD	325.80	6& 4	2	3.29983	2070.98	303.984	1.72727	1.800	.981	
COMPUTE NM HYD	324.00	-	3	.01196	14.22	.690	1.08199	1.650	1.858	PER IMP= 6.20
ROUTE	324.10	1	4	.01470	20.95	.902	1.15143	1.600	2.228	
ADD HYD	324.20	3& 4	1	.02666	34.55	1.593	1.12023	1.600	2.025	
ADD HYD	324.30	1& 2	3	3.32649	2094.53	305.577	1.72241	1.800	.984	
DIVIDE HYD	324.40	3	1	1.66324	1047.27	152.788	1.72241	1.800	.984	
	324.40	AND	2	1.66324	1047.27	152.788	1.72241	1.800	.984	
*STORE RATING CURVE	RC=1 VS NO=1									
ROUTE	324.50	1	3	1.66324	1045.65	152.788	1.72240	1.800	.982	
ROUTE	324.50	2	1	1.66324	1045.65	152.788	1.72240	1.800	.982	
ADD HYD	324.60	3& 1	2	3.32649	2091.30	305.575	1.72240	1.800	.982	
ROUTE	324.50	2	1	3.32649	2084.51	305.545	1.72223	1.850	.979	
COMPUTE NM HYD	323.00	-	2	.00343	7.15	.255	1.39320	1.500	3.256	PER IMP= 27.90
ROUTE	323.10	2	3	.00343	3.53	.255	1.39334	1.650	1.607	
ADD HYD	323.20	1& 3	2	3.32992	2087.33	305.800	1.72189	1.850	.979	
COMPUTE NM HYD	321.00	-	1	.06053	157.93	7.222	2.23704	1.500	4.077	PER IMP= 88.20
ADD HYD	321.10	2& 1	3	3.39045	2137.33	313.022	1.73109	1.850	.985	
COMPUTE NM HYD	322.00	-	4	.09103	209.83	10.635	2.19046	1.550	3.602	PER IMP= 85.30
ADD HYD	322.10	3& 4	2	3.48148	2216.16	323.656	1.74310	1.850	.995	
*STORE RATING CURVE	RC=1 VS NO=1									
ROUTE	322.20	2	1	3.48148	2216.46	323.656	1.74310	1.850	.995	
COMPUTE NM HYD	320.00	-	4	.00482	10.79	.420	1.63271	1.500	3.497	PER IMP= 44.60
ADD HYD	320.10	1& 4	12	3.48630	2219.51	324.076	1.74294	1.850	.995	
COMPUTE NM HYD	225.00	-	1	.02082	54.04	2.463	2.21770	1.500	4.055	PER IMP= 87.00
ROUTE	225.10	1	2	.02082	52.71	2.463	2.21773	1.500	3.956	
COMPUTE NM HYD	223.00	-	1	.01050	27.63	1.269	2.26606	1.500	4.112	PER IMP= 90.00
ROUTE RESERVOIR	223.01	1	3	.01050	27.63	1.269	2.26606	1.500	4.112	
DIVIDE HYD	223.10	3	1	.00525	13.82	.634	2.26603	1.500	4.112	
	223.20	AND	4	.00525	13.82	.634	2.26603	1.500	4.112	
ROUTE	223.30	4	3	.00525	8.95	.635	2.26614	1.600	2.664	
ADD HYD	223.40	3& 2	5	.02607	59.56	3.097	2.22743	1.500	3.570	
ROUTE	223.50	1	2	.00525	7.18	.635	2.26614	1.650	2.137	
COMPUTE NM HYD	224.00	-	4	.02225	58.12	2.658	2.24027	1.500	4.081	PER IMP= 88.40
ADD HYD	224.10	4& 5	1	.04832	117.68	5.755	2.23333	1.500	3.805	
ROUTE	322.20	12	3	3.48630	2221.53	324.056	1.74284	1.850	.996	
COMPUTE NM HYD	226.00	-	4	.01463	37.55	1.700	2.17902	1.500	4.011	PER IMP= 84.60
ADD HYD	226.10	3& 4	4	3.50093	2233.30	325.756	1.74466	1.850	.997	
ROUTE RESERVOIR	226.01	4	6	3.50093	2233.30	325.756	1.74466	1.850	.997	
ADD HYD	226.20	6& 1	3	3.54925	2276.04	331.512	1.75131	1.850	1.002	
ROUTE	226.30	3	4	3.54925	2273.04	331.488	1.75118	1.850	1.001	
ADD HYD	226.40	2& 4	5	3.55450	2279.35	332.123	1.75195	1.850	1.002	
COMPUTE NM HYD	222.00	-	4	.08660	195.76	9.564	2.07067	1.500	3.532	PER IMP= 77.80
ADD HYD	222.10	5& 4	2	3.64110	2349.81	341.686	1.75953	1.850	1.008	
COMPUTE NM HYD	221.00	-	4	.06353	150.76	6.487	1.91459	1.500	3.708	PER IMP= 68.00
ADD HYD	221.10	2& 4	1	3.70463	2394.68	348.173	1.76219	1.850	1.010	
ROUTE	221.20	1	2	3.70463	2384.00	348.125	1.76194	1.900	1.005	
COMPUTE NM HYD	220.00	-	1	.05896	123.94	4.948	1.57350	1.500	3.285	PER IMP= 48.00
ADD HYD	220.10	1& 2	3	3.76359	2413.65	353.073	1.75899	1.900	1.002	
COMPUTE NM HYD	219.00	-	1	.07179	150.92	6.025	1.57350	1.500	3.285	PER IMP= 48.00
ADD HYD	219.10	1& 3	2	3.83538	2449.75	359.098	1.75552	1.900	.998	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	219.20	2	3	3.83538	2445.56	359.061	1.75534	1.900	.996	
COMPUTE NM HYD	218.00	-	4	.05788	121.67	4.857	1.57350	1.500	3.285	PER IMP= 48.00
ADD HYD	218.10	3& 4	1	3.89326	2474.67	363.919	1.75264	1.900	.993	
COMPUTE NM HYD	216.00	-	4	.01310	27.55	1.099	1.57350	1.500	3.286	PER IMP= 48.00
ROUTE	216.10	4	2	.01310	21.84	1.099	1.57354	1.550	2.605	
COMPUTE NM HYD	217.00	-	3	.02827	59.43	2.372	1.57350	1.500	3.285	PER IMP= 48.00
ADD HYD	217.10	3& 2	4	.04137	77.87	3.472	1.57348	1.500	2.941	
COMPUTE NM HYD	215.00	-	3	.02934	61.68	2.462	1.57350	1.500	3.285	PER IMP= 48.00
ADD HYD	215.10	3& 4	2	.07071	139.55	5.934	1.57349	1.500	3.084	
ADD HYD	215.20	1& 2	3	3.96397	2512.60	369.853	1.74944	1.900	.990	
ROUTE	215.30	3	1	3.96397	2507.80	369.833	1.74935	1.900	.989	
COMPUTE NM HYD	214.00	-	4	.03392	71.31	2.847	1.57350	1.500	3.285	PER IMP= 48.00
ADD HYD	214.10	4& 1	2	3.99789	2524.86	372.680	1.74786	1.900	.987	
COMPUTE NM HYD	211.00	-	1	.02593	54.51	2.176	1.57350	1.500	3.285	PER IMP= 48.00
COMPUTE NM HYD	212.00	-	3	.02755	57.92	2.312	1.57350	1.500	3.285	PER IMP= 48.00
ADD HYD	212.10	1& 3	4	.05348	112.44	4.488	1.57349	1.500	3.285	
ROUTE	212.20	4	1	.05348	107.47	4.488	1.57352	1.550	3.140	
COMPUTE NM HYD	213.00	-	3	.00817	17.19	.686	1.57350	1.500	3.287	PER IMP= 48.00
ADD HYD	213.10	3& 1	4	.06165	122.92	5.174	1.57350	1.500	3.115	
ADD HYD	213.20	2& 4	1	4.05954	2557.96	377.853	1.74521	1.900	.985	
ROUTE	213.40	1	2	4.05954	2558.96	377.839	1.74514	1.950	.985	
COMPUTE NM HYD	210.00	-	1	.04379	92.05	3.675	1.57350	1.500	3.285	PER IMP= 48.00
ADD HYD	210.10	1& 2	3	4.10333	2578.52	381.513	1.74331	1.950	.982	
COMPUTE NM HYD	209.00	-	1	.01777	37.36	1.491	1.57350	1.500	3.285	PER IMP= 48.00
COMPUTE NM HYD	207.00	-	2	.01669	29.19	1.013	1.13769	1.500	2.733	PER IMP= 23.00
ADD HYD	207.10	1& 2	4	.03446	66.56	2.504	1.36240	1.500	3.018	
ROUTE	207.20	4	1	.03446	65.02	2.504	1.36243	1.500	2.948	
COMPUTE NM HYD	208.00	-	2	.00314	6.61	.264	1.57350	1.500	3.291	PER IMP= 48.00
ADD HYD	208.10	1& 2	4	.03760	71.63	2.767	1.38003	1.500	2.977	
ADD HYD	208.20	4& 3	1	4.14093	2593.37	384.281	1.74001	1.950	.979	
ROUTE	208.30	1	2	4.14093	2602.61	384.256	1.73990	1.950	.982	
COMPUTE NM HYD	206.00	-	5	.01983	27.53	.812	.76800	1.500	2.169	PER IMP= 5.00
COMPUTE NM HYD	205.00	-	1	.01974	27.41	.809	.76800	1.500	2.169	PER IMP= 5.00
COMPUTE NM HYD	204.00	-	3	.00763	10.60	.313	.76800	1.500	2.171	PER IMP= 5.00
ADD HYD	204.10	1& 3	4	.02737	38.01	1.121	.76798	1.500	2.170	
ROUTE	204.20	4	1	.02737	35.79	1.121	.76801	1.550	2.043	
COMPUTE NM HYD	203.00	-	3	.00960	13.33	.393	.76800	1.500	2.170	PER IMP= 5.00
ADD HYD	203.10	1& 3	4	.03697	48.28	1.514	.76798	1.550	2.041	
ADD HYD	203.20	4& 5	1	.05680	74.07	2.326	.76798	1.550	2.038	
ROUTE	203.30	1	3	.05680	73.34	2.327	.76800	1.550	2.017	
COMPUTE NM HYD	202.00	-	1	.03805	87.86	3.707	1.82672	1.500	3.608	PER IMP= 62.50
ADD HYD	202.10	1& 2	4	4.17898	2623.03	387.963	1.74069	1.950	.981	
ADD HYD	202.20	4& 3	1	4.23578	2636.68	390.289	1.72765	1.950	.973	
ROUTE	202.30	1	2	4.23578	2634.72	390.263	1.72753	1.950	.972	
COMPUTE NM HYD	201.00	-	1	.03518	61.53	1.978	1.05411	1.500	2.733	PER IMP= 13.70
COMPUTE NM HYD	200.00	-	3	.05438	102.49	3.329	1.14770	1.500	2.945	PER IMP= 14.00
ADD HYD	200.10	1& 2	4	4.27096	2644.03	392.241	1.72198	1.950	.967	
ADD HYD	200.20	3& 4	12	4.32534	2661.20	395.569	1.71476	1.950	.961	
ADD HYD	200.30	12&10	1	19.83344	6485.75	1467.843	1.38766	2.150	.511	
ROUTE RESERVOIR	200.03	1	2	19.83344	4987.11	1268.379	1.19909	2.800	.393	AC-FT= 485.611
ROUTE RESERVOIR	200.03	1	2	19.83344	86.40	413.179	.39061	29.900	.007	AC-FT= 1267.501
ROUTE RESERVOIR	200.03	1	2	19.83344	87.30	416.355	.39361	29.900	.007	AC-FT= 1265.816

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE RESERVOIR	200.03	1	2	19.83344	81.04	376.106	.35556	29.900	.006	AC-FT= 1287.926
FINISH										

AHYMO SUMMARY TABLE (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992 RUN DATE (MON/DAY/YR) =07/20/1992

INPUT FILE = alt_g USER NO.= SCANLNNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= .00
RAINFALL TYPE= 2										RAIN24= 2.590
COMPUTE NM HYD	418.00	-	1	1.49581	1644.29	117.752	1.47602	1.700	1.718	PER IMP= 48.00
COMPUTE NM HYD	417.00	-	2	.13909	133.30	10.949	1.47602	1.800	1.497	PER IMP= 48.00
ADD HYD	417.10	1& 2	3	1.63490	1769.44	128.701	1.47602	1.700	1.691	
ROUTE RESERVOIR	417.01	3	4	1.63490	1769.44	128.701	1.47602	1.700	1.691	
ROUTE	417.20	4	5	1.63490	1737.42	128.701	1.47602	1.750	1.660	
COMPUTE NM HYD	419.00	-	1	.19715	222.09	15.520	1.47602	1.700	1.760	PER IMP= 48.00
COMPUTE NM HYD	420.00	-	2	.18889	202.68	14.870	1.47602	1.700	1.677	PER IMP= 48.00
ADD HYD	419.10	1& 2	3	.38604	424.77	30.389	1.47602	1.700	1.719	
ADD HYD	420.10	3& 5	4	2.02094	2149.82	159.091	1.47602	1.750	1.662	
ROUTE	420.20	4	5	2.02094	1843.64	159.091	1.47602	1.850	1.425	
COMPUTE NM HYD	416.00	-	1	.86541	841.70	68.126	1.47602	1.750	1.520	PER IMP= 48.00
ROUTE	416.10	1	2	.86541	768.93	68.126	1.47602	1.850	1.388	
ADD HYD	416.20	2& 5	3	2.88635	2612.57	227.217	1.47602	1.850	1.414	
COMPUTE NM HYD	415.00	-	1	.15228	239.40	11.988	1.47602	1.550	2.456	PER IMP= 48.00
ROUTE RESERVOIR	415.01	1	2	.15228	239.40	11.988	1.47602	1.550	2.456	
COMPUTE NM HYD	414.00	-	1	.11235	127.24	8.844	1.47602	1.700	1.770	PER IMP= 48.00
ADD HYD	414.10	2& 1	4	.26463	336.05	20.832	1.47602	1.600	1.984	
ROUTE RESERVOIR	414.01	4	2	.26463	336.05	20.832	1.47602	1.600	1.984	
ROUTE	414.30	2	1	.26463	280.78	20.832	1.47602	1.700	1.658	
COMPUTE NM HYD	411.00	-	2	.29891	374.66	23.531	1.47602	1.650	1.958	PER IMP= 48.00
ADD HYD	411.10	1& 2	4	.56354	649.16	44.363	1.47602	1.650	1.800	
ROUTE	411.20	4	1	.56354	645.19	44.363	1.47602	1.650	1.789	
COMPUTE NM HYD	412.00	-	2	1.18559	1168.31	93.331	1.47602	1.750	1.540	PER IMP= 48.00
ADD HYD	412.10	1& 2	4	1.74913	1771.63	137.694	1.47602	1.700	1.583	
ADD HYD	412.20	4& 3	1	4.63548	4227.94	364.911	1.47602	1.800	1.425	
ROUTE	412.30	1	5	4.63548	4037.37	364.911	1.47602	1.900	1.361	
COMPUTE NM HYD	424.00	-	1	.33534	407.14	26.398	1.47602	1.650	1.897	PER IMP= 48.00
ROUTE RESERVOIR	424.01	1	2	.33534	407.14	26.398	1.47602	1.650	1.897	
COMPUTE NM HYD	421.00	-	1	.33184	390.04	26.123	1.47602	1.650	1.837	PER IMP= 48.00
ADD HYD	421.10	1& 2	3	.66718	797.19	52.521	1.47602	1.650	1.867	
ROUTE	421.20	3	1	.66718	793.53	52.521	1.47602	1.650	1.858	
COMPUTE NM HYD	422.00	-	2	.14367	157.66	11.310	1.47602	1.700	1.715	PER IMP= 48.00
ADD HYD	422.10	1& 2	3	.81085	945.08	63.831	1.47602	1.650	1.821	
ROUTE	422.20	3	1	.81085	933.27	63.831	1.47602	1.700	1.798	
COMPUTE NM HYD	423.00	-	2	.05985	50.33	4.711	1.47602	1.900	1.314	PER IMP= 48.00
ADD HYD	423.10	1& 2	3	.87070	972.38	68.542	1.47602	1.700	1.745	
ROUTE	423.20	3	1	.87070	891.83	68.542	1.47602	1.750	1.600	
COMPUTE NM HYD	413.00	-	2	1.00011	1047.73	78.730	1.47602	1.700	1.637	PER IMP= 48.00
ADD HYD	413.10	1& 2	3	1.87081	1934.23	147.272	1.47602	1.750	1.615	
ROUTE	413.20	3	1	1.87081	1913.33	147.272	1.47602	1.750	1.598	
COMPUTE NM HYD	410.00	-	2	1.38956	1491.73	109.388	1.47602	1.700	1.677	PER IMP= 48.00
ADD HYD	410.10	1& 2	3	3.26037	3378.77	256.660	1.47602	1.750	1.619	
ADD HYD	410.20	3& 5	4	7.89585	7045.48	621.571	1.47602	1.850	1.394	
ROUTE RESERVOIR	410.01	4	1	7.89585	7045.48	621.571	1.47602	1.850	1.394	
ROUTE	410.30	1	2	7.89585	6896.84	621.569	1.47602	1.900	1.365	
COMPUTE NM HYD	409.00	-	1	.46618	587.81	36.698	1.47602	1.650	1.970	PER IMP= 48.00
ROUTE	409.10	1	3	.46618	495.65	36.698	1.47602	1.750	1.661	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	408.00	-	1	1.38633	1471.52	109.134	1.47602	1.700	1.659	PER IMP= 48.00
ADD HYD	408.10	1& 3	4	1.85251	1961.88	145.832	1.47602	1.700	1.655	
ADD HYD	408.20	4& 2	5	9.74836	8520.96	767.402	1.47602	1.850	1.366	
ROUTE	408.30	5	1	9.74836	8336.82	767.401	1.47602	1.900	1.336	
COMPUTE NM HYD	403.00	-	2	.48341	570.41	40.515	1.57147	1.700	1.844	PER IMP= 53.70
ADD HYD	403.10	1& 2	3	10.23177	8725.17	807.916	1.48053	1.900	1.332	
ROUTE	403.20	3	5	10.23177	8694.02	807.916	1.48053	1.900	1.328	
COMPUTE NM HYD	406.00	-	1	.05788	84.47	6.173	1.99976	1.700	2.280	PER IMP= 78.40
DIVIDE HYD	406.10	1	2	.05785	84.00	6.170	1.99975	1.650	2.269	
	406.20	AND	3	.00003	.47	.003	1.99975	1.700	22.845	
ROUTE	406.30	3	1	.00003	.26	.004	2.24014	1.700	12.521	
COMPUTE NM HYD	407.00	-	2	.06012	95.32	4.733	1.47602	1.550	2.477	PER IMP= 48.00
ROUTE RESERVOIR	407.01	2	3	.06012	95.32	4.733	1.47602	1.550	2.477	
ROUTE	407.10	3	2	.06012	56.13	4.733	1.47603	1.700	1.459	
COMPUTE NM HYD	404.00	-	3	.22811	308.70	25.148	2.06712	1.700	2.115	PER IMP= 83.00
ADD HYD	404.10	1& 2	4	.06015	56.39	4.737	1.47642	1.700	1.465	
ADD HYD	404.20	3& 4	7	.28826	365.09	29.885	1.94386	1.700	1.979	
DIVIDE HYD	404.10	7	2	.14025	46.00	14.541	1.94386	1.400	.512	
	404.20	AND	3	.14801	319.09	15.344	1.94385	1.700	3.369	
DIVIDE HYD	404.20	2	1	.07013	23.00	7.270	1.94386	1.400	.512	
	404.30	AND	4	.07013	23.00	7.270	1.94386	1.400	.512	
ROUTE	404.40	1	2	.07013	23.14	7.270	1.94386	1.450	.516	
ROUTE	404.40	4	1	.07013	23.14	7.270	1.94386	1.450	.516	
ADD HYD	404.50	1& 2	7	.14025	46.28	14.541	1.94385	1.450	.516	
ROUTE	404.60	3	1	.14801	300.12	15.345	1.94391	1.800	3.168	
COMPUTE NM HYD	405.00	-	2	.28007	350.74	26.569	1.77874	1.700	1.957	PER IMP= 66.00
ROUTE	405.10	2	3	.28007	321.83	26.569	1.77874	1.800	1.795	
ADD HYD	405.20	3& 1	3	.42808	621.94	41.914	1.83585	1.800	2.270	
COMPUTE NM HYD	402.00	-	2	.21249	309.48	23.213	2.04827	1.650	2.276	PER IMP= 81.70
ADD HYD	402.10	2& 3	4	.64057	902.63	65.126	1.90631	1.750	2.202	
ROUTE	402.20	4	2	.64057	897.28	65.126	1.90631	1.750	2.189	
COMPUTE NM HYD	401.00	-	3	.14474	219.87	16.322	2.11433	1.650	2.374	PER IMP= 86.00
ADD HYD	401.10	5& 2	4	10.87234	9485.63	873.042	1.50561	1.900	1.363	
ADD HYD	401.20	4& 3	5	11.01708	9629.65	889.364	1.51361	1.900	1.366	
COMPUTE NM HYD	303.00	-	1	.00790	4.51	.549	1.30216	2.200	.893	PER IMP= 29.50
ADD HYD	303.10	1& 7	2	.14815	50.51	15.089	1.90962	2.150	.533	
DIVIDE HYD	303.20	2	1	.14504	46.00	14.772	1.90962	1.450	.496	
	303.30	AND	6	.00311	4.51	.317	1.90962	2.150	2.265	
DIVIDE HYD	303.40	1	2	.07252	23.00	7.386	1.90962	1.450	.496	
	303.40	AND	3	.07252	23.00	7.386	1.90962	1.450	.496	
ROUTE	303.50	2	1	.07252	23.15	7.386	1.90963	1.450	.499	
ROUTE	303.60	3	2	.07252	23.15	7.386	1.90963	1.450	.499	
ADD HYD	303.70	1& 2	3	.14504	46.30	14.772	1.90962	1.450	.499	
COMPUTE NM HYD	302.00	-	1	.01116	8.33	.700	1.17653	1.900	1.167	PER IMP= 21.00
ADD HYD	302.10	1& 3	2	.15620	54.30	15.473	1.85724	1.950	.543	
DIVIDE HYD	302.20	2	1	.15091	46.00	14.948	1.85724	1.400	.476	
	302.30	AND	8	.00530	8.30	.525	1.85724	1.950	2.449	
DIVIDE HYD	302.40	1	2	.07545	23.00	7.474	1.85724	1.400	.476	
	302.40	AND	3	.07545	23.00	7.474	1.85724	1.400	.476	
ROUTE	302.40	2	4	.07545	23.18	7.474	1.85725	1.450	.480	
ROUTE	302.50	3	1	.07545	23.18	7.474	1.85725	1.450	.480	
ADD HYD	302.60	4& 1	3	.15091	46.36	14.948	1.85724	1.450	.480	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	301.00	-	1	.00593	6.69	.456	1.44258	1.700	1.763	PER IMP= 39.00
ROUTE	301.20	1	2	.00593	6.66	.456	1.44259	1.700	1.755	
ADD HYD	301.30	2& 3	7	.15684	52.76	15.404	1.84156	1.750	.526	
COMPUTE NM HYD	300.00	-	2	.00603	11.07	.383	1.18983	1.500	2.867	PER IMP= 21.90
ADD HYD	300.10	8& 2	1	.01133	12.51	.907	1.50197	1.550	1.726	
ROUTE	300.20	1	2	.01133	12.48	.908	1.50204	1.550	1.721	
COMPUTE NM HYD	304.00	-	1	.00347	6.84	.265	1.42927	1.500	3.078	PER IMP= 38.10
ROUTE	304.20	1	3	.00347	6.76	.265	1.42942	1.500	3.044	
ADD HYD	304.30	2& 3	8	.01480	19.10	1.172	1.48492	1.500	2.017	
COMPUTE NM HYD	305.00	-	9	.00402	7.31	.298	1.38937	1.500	2.843	PER IMP= 35.40
ROUTE RESERVOIR	401.01	5	1	11.01708	9753.49	889.364	1.51361	1.900	1.383	AC-FT= 13.595
ROUTE	401.80	1	2	11.01708	9650.67	889.364	1.51361	1.950	1.369	
COMPUTE NM HYD	307.00	-	4	.01650	18.38	1.197	1.35981	1.700	1.741	PER IMP= 33.40
ADD HYD	307.10	6& 4	1	.01961	20.01	1.513	1.44698	1.750	1.594	
ROUTE	307.20	1	3	.01961	19.71	1.513	1.44701	1.750	1.571	
ADD HYD	307.30	3& 2	1	11.03669	9667.07	890.877	1.51349	1.950	1.369	
COMPUTE NM HYD	315.00	-	2	.00836	14.06	.408	.91492	1.500	2.627	PER IMP= 3.30
ROUTE RESERVOIR	315.01	2	3	.00836	14.06	.408	.91492	1.500	2.627	
ROUTE	315.10	3	2	.00836	12.19	.408	.91500	1.550	2.277	
ADD HYD	315.20	1& 2	3	11.04505	9670.09	891.286	1.51304	1.950	1.368	
COMPUTE NM HYD	312.00	-	1	.03437	61.74	2.059	1.12332	1.500	2.807	PER IMP= 17.40
DIVIDE HYD	312.10	1	2	.01719	30.87	1.030	1.12331	1.500	2.807	
	312.20	AND	4	.01719	30.87	1.030	1.12331	1.500	2.807	
ROUTE	312.30	2	5	.01719	29.65	1.030	1.12335	1.550	2.696	
ADD HYD	312.40	3& 5	1	11.06223	9676.73	892.316	1.51244	1.950	1.367	
COMPUTE NM HYD	314.00	-	3	.01914	32.58	.973	.95334	1.500	2.659	PER IMP= 5.90
ADD HYD	314.10	1& 3	2	11.08137	9681.13	893.288	1.51147	1.950	1.365	
ROUTE	308.30	2	19	11.08137	9618.99	893.287	1.51147	1.950	1.356	
COMPUTE NM HYD	306.00	-	1	.01532	14.71	.972	1.18983	1.750	1.500	PER IMP= 21.90
ROUTE	306.10	1	3	.01532	14.71	.972	1.18983	1.750	1.501	
ROUTE	306.20	3	1	.01532	13.29	.972	1.18983	1.850	1.355	
COMPUTE NM HYD	310.00	-	3	.00981	17.85	.609	1.16323	1.500	2.843	PER IMP= 20.10
ADD HYD	310.10	3& 1	5	.02513	20.09	1.581	1.17940	1.500	1.249	
ROUTE	310.20	5	1	.02513	20.06	1.581	1.17944	1.550	1.247	
ROUTE	310.40	4	5	.01719	30.77	1.030	1.12335	1.500	2.797	
ADD HYD	310.50	1& 5	1	.04232	50.54	2.610	1.15662	1.500	1.866	
COMPUTE NM HYD	313.00	-	2	.00787	14.34	.490	1.16766	1.500	2.847	PER IMP= 20.40
ADD HYD	313.10	1& 2	3	.05019	64.88	3.100	1.15834	1.500	2.020	
ROUTE RESERVOIR	401.03	3	1	.05019	58.22	3.100	1.15835	1.550	1.813	AC-FT= .159
COMPUTE NM HYD	309.00	-	3	.00803	6.32	.529	1.23565	1.900	1.231	PER IMP= 25.00
COMPUTE NM HYD	308.00	-	4	.00915	9.43	.732	1.50022	1.800	1.610	PER IMP= 42.90
ADD HYD	308.10	3& 4	2	.01718	15.43	1.261	1.37646	1.850	1.403	
ADD HYD	308.20	1& 2	10	.06737	66.77	4.362	1.21397	1.600	1.549	
COMPUTE NM HYD	311.00	-	11	.00602	6.13	.494	1.54013	1.800	1.590	PER IMP= 45.60
ROUTE	301.10	7	1	.15684	50.01	15.404	1.84157	2.000	.498	
ROUTE	304.10	8	2	.01480	14.88	1.172	1.48502	1.650	1.572	
ROUTE	305.10	9	3	.00402	6.53	.298	1.38947	1.550	2.540	
ADD HYD	301.20	1& 2	4	.17163	62.77	16.576	1.81082	1.900	.571	
ADD HYD	301.30	3& 4	1	.17565	65.18	16.874	1.80117	1.850	.580	
COMPUTE NM HYD	145.00	-	2	.12312	171.80	12.479	1.90041	1.700	2.180	PER IMP= 71.60
ADD HYD	145.10	1& 2	3	.29877	235.69	29.353	1.84206	1.700	1.233	
ROUTE	145.20	3	1	.29877	236.50	29.353	1.84207	1.700	1.237	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	143.00	-	2	.09431	114.64	7.424	1.47602	1.650	1.899	PER IMP= 48.00
COMPUTE NM HYD	144.00	-	3	.02602	46.58	2.211	1.59314	1.550	2.797	PER IMP= 50.40
ADD HYD	143.10	1& 2	4	.39308	347.63	36.777	1.75424	1.700	1.382	
ADD HYD	143.20	3& 4	1	.41910	380.69	38.988	1.74424	1.650	1.419	
ROUTE	143.30	1	2	.41910	378.63	38.988	1.74424	1.700	1.412	
COMPUTE NM HYD	141.00	-	1	.03868	68.81	3.045	1.47602	1.500	2.780	PER IMP= 48.00
ADD HYD	141.10	1& 2	3	.45778	420.39	42.033	1.72158	1.650	1.435	
COMPUTE NM HYD	140.00	-	1	.09638	116.14	7.587	1.47602	1.650	1.883	PER IMP= 48.00
ADD HYD	140.10	1& 3	2	.55416	536.54	49.620	1.67887	1.650	1.513	
ROUTE	140.20	2	1	.55416	535.53	49.620	1.67887	1.650	1.510	
COMPUTE NM HYD	139.00	-	2	.02145	40.24	1.689	1.47602	1.500	2.932	PER IMP= 48.00
ADD HYD	139.10	1& 2	3	.57561	557.39	51.308	1.67131	1.650	1.513	
ROUTE	139.20	3	1	.57561	553.27	51.308	1.67131	1.700	1.502	
COMPUTE NM HYD	138.00	-	2	.16332	241.11	12.857	1.47602	1.550	2.307	PER IMP= 48.00
ADD HYD	138.10	2& 1	3	.73893	762.75	64.165	1.62815	1.650	1.613	
ROUTE	138.20	3	1	.73893	744.24	64.165	1.62815	1.700	1.574	
COMPUTE NM HYD	129.00	-	2	.39080	533.07	30.764	1.47602	1.600	2.131	PER IMP= 48.00
ADD HYD	129.10	1& 2	3	1.12973	1238.38	94.929	1.57552	1.650	1.713	
COMPUTE NM HYD	136.00	-	1	.08130	105.43	6.400	1.47602	1.600	2.026	PER IMP= 48.00
COMPUTE NM HYD	135.00	-	2	.05923	82.98	4.663	1.47602	1.600	2.189	PER IMP= 48.00
ADD HYD	135.10	1& 2	4	.14053	188.41	11.063	1.47602	1.600	2.095	
ROUTE RESERVOIR	135.01	4	1	.14053	188.41	11.063	1.47602	1.600	2.095	
ROUTE	135.20	1	2	.14053	170.91	11.063	1.47602	1.700	1.900	
COMPUTE NM HYD	130.00	-	1	.20469	234.33	16.113	1.47602	1.700	1.789	PER IMP= 48.00
ADD HYD	130.10	1& 2	4	.34522	405.25	27.176	1.47602	1.700	1.834	
ROUTE	130.20	4	2	.34522	393.27	27.176	1.47602	1.750	1.780	
COMPUTE NM HYD	125.00	-	1	.03679	59.17	2.896	1.47602	1.550	2.513	PER IMP= 48.00
ADD HYD	125.10	1& 2	4	.38201	427.41	30.072	1.47602	1.700	1.748	
ADD HYD	125.20	3& 4	1	1.51174	1635.08	125.001	1.55038	1.650	1.690	
COMPUTE NM HYD	124.00	-	2	.04092	54.28	3.221	1.47602	1.600	2.073	PER IMP= 48.00
ADD HYD	124.10	2& 1	3	1.55266	1688.29	128.223	1.54842	1.650	1.699	
ROUTE	124.20	3	1	1.55266	1687.09	128.223	1.54842	1.700	1.698	
COMPUTE NM HYD	123.00	-	2	.02504	47.07	1.971	1.47602	1.500	2.937	PER IMP= 48.00
COMPUTE NM HYD	122.00	-	3	.13622	176.04	10.723	1.47602	1.600	2.019	PER IMP= 48.00
ADD HYD	123.10	1& 2	4	1.57770	1707.49	130.194	1.54727	1.700	1.691	
ADD HYD	123.20	3& 4	1	1.71392	1879.71	140.917	1.54161	1.650	1.714	
ROUTE	123.30	1	2	1.71392	1884.23	140.917	1.54161	1.700	1.718	
COMPUTE NM HYD	121.00	-	1	.02100	37.31	1.523	1.35959	1.500	2.776	PER IMP= 42.30
ADD HYD	121.10	1& 2	3	1.73492	1900.30	142.440	1.53940	1.700	1.711	
ROUTE	121.20	3	1	1.73492	1910.11	142.440	1.53940	1.700	1.720	
COMPUTE NM HYD	120.00	-	2	.01176	20.45	.774	1.23454	1.500	2.717	PER IMP= 32.20
COMPUTE NM HYD	119.00	-	3	.03895	66.44	3.120	1.50216	1.500	2.665	PER IMP= 49.40
ADD HYD	119.10	2& 3	4	.05071	86.89	3.895	1.44008	1.500	2.677	
ROUTE	119.20	4	2	.05071	75.80	3.895	1.44010	1.600	2.335	
COMPUTE NM HYD	115.00	-	3	.03760	58.34	1.862	.92856	1.500	2.425	PER IMP= 12.60
ROUTE	115.10	3	4	.03760	55.95	1.862	.92857	1.550	2.325	
COMPUTE NM HYD	112.00	-	3	.04603	70.64	2.228	.90771	1.500	2.398	PER IMP= 11.50
ADD HYD	112.10	1& 2	5	1.78563	1967.55	146.335	1.53658	1.700	1.722	
ADD HYD	112.20	3& 5	2	1.83166	1996.82	148.563	1.52078	1.700	1.703	
ADD HYD	112.30	4& 2	1	1.86926	2024.21	150.425	1.50887	1.700	1.692	
ROUTE	311.40	11	2	.00602	5.95	.494	1.54012	1.850	1.544	
COMPUTE NM HYD	149.00	-	3	.03482	80.72	3.905	2.10292	1.500	3.622	PER IMP= 85.10

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	311.10	2& 3	4	.04084	81.76	4.400	2.01994	1.500	3.128	
DIVIDE HYD	311.20	4	2	.01389	27.80	1.496	2.01994	1.500	3.128	
	311.30	AND	3	.02695	53.96	2.904	2.01994	1.500	3.128	
DIVIDE HYD	311.20	3	4	.01348	26.98	1.452	2.01993	1.500	3.128	
	311.20	AND	5	.01348	26.98	1.452	2.01993	1.500	3.128	
ROUTE	311.20	2	3	.01389	27.73	1.496	2.01994	1.500	3.120	
ROUTE	311.20	4	2	.01348	26.92	1.452	2.01994	1.500	3.121	
ROUTE	311.20	5	4	.01348	26.92	1.452	2.01994	1.500	3.121	
ADD HYD	311.30	2& 3	5	.02736	54.65	2.948	2.01989	1.500	3.120	
ADD HYD	311.40	5& 4	2	.04084	81.56	4.400	2.01989	1.500	3.120	
ROUTE	311.30	2	3	.04084	59.04	4.400	2.01994	1.600	2.259	
COMPUTE NM HYD	148.00	-	2	.01588	29.86	1.250	1.47602	1.500	2.938	PER IMP= 48.00
ROUTE	148.10	2	4	.01588	29.93	1.250	1.47605	1.500	2.945	
ROUTE	148.20	4	2	.01588	21.83	1.250	1.47605	1.600	2.147	
COMPUTE NM HYD	147.00	-	4	.00565	10.63	.445	1.47602	1.500	2.940	PER IMP= 48.00
ROUTE	147.10	4	5	.00565	10.61	.445	1.47612	1.500	2.935	
ROUTE	147.20	5	4	.00565	8.25	.445	1.47612	1.600	2.281	
COMPUTE NM HYD	146.00	-	5	.05976	89.05	5.203	1.63233	1.600	2.328	PER IMP= 56.00
ADD HYD	146.10	2& 3	6	.05672	80.87	5.650	1.86764	1.600	2.228	
ADD HYD	146.20	4& 6	2	.06237	89.12	6.095	1.83216	1.600	2.233	
ADD HYD	146.30	5& 2	3	.12213	178.17	11.297	1.73438	1.600	2.279	
COMPUTE NM HYD	154.00	-	2	.01947	47.50	2.378	2.29015	1.500	3.812	PER IMP= 96.70
ROUTE	154.10	2	4	.01947	34.19	2.378	2.29017	1.600	2.744	
COMPUTE NM HYD	153.00	-	2	.00646	13.62	.751	2.18001	1.550	3.294	PER IMP= 90.00
ROUTE	153.10	2	5	.00646	10.33	.751	2.18006	1.650	2.498	
COMPUTE NM HYD	152.00	-	2	.07224	92.49	5.936	1.54059	1.650	2.000	PER IMP= 54.70
ADD HYD	152.10	2& 4	6	.09171	126.36	8.314	1.69971	1.600	2.153	
ADD HYD	152.20	5& 6	2	.09817	136.49	9.065	1.73131	1.600	2.172	
ROUTE	152.30	2	5	.09817	138.13	9.065	1.73132	1.650	2.199	
ADD HYD	152.40	3& 5	2	.22030	315.62	20.362	1.73301	1.600	2.239	
ROUTE	152.30	10	3	.06737	59.23	4.362	1.21398	1.700	1.374	
COMPUTE NM HYD	150.00	-	4	.03482	76.58	3.445	1.85529	1.500	3.436	PER IMP= 67.20
ROUTE	150.10	4	5	.03482	67.32	3.445	1.85530	1.550	3.021	
COMPUTE NM HYD	142.00	-	4	.12769	241.18	11.395	1.67331	1.500	2.951	PER IMP= 58.80
ADD HYD	142.20	3& 4	6	.19506	274.31	15.757	1.51467	1.550	2.197	
ADD HYD	142.30	5& 6	3	.22988	341.64	19.202	1.56626	1.550	2.322	
ROUTE RESERVOIR	142.01	3	4	.22988	341.64	19.202	1.56626	1.550	2.322	
ROUTE	142.40	4	3	.22988	335.78	19.202	1.56627	1.550	2.282	
COMPUTE NM HYD	137.00	-	4	.08668	140.39	6.824	1.47602	1.550	2.531	PER IMP= 48.00
ADD HYD	137.10	3& 4	5	.31656	476.18	26.026	1.54155	1.550	2.350	
COMPUTE NM HYD	134.00	-	4	.04029	73.65	3.172	1.47602	1.500	2.856	PER IMP= 48.00
ADD HYD	134.10	4& 2	6	.26059	369.88	23.533	1.69328	1.600	2.218	
ADD HYD	134.20	6& 5	2	.57715	830.46	49.559	1.61006	1.550	2.248	
ROUTE	134.30	2	3	.57715	838.42	49.559	1.61006	1.600	2.270	
COMPUTE NM HYD	132.00	-	2	.02692	50.61	2.119	1.47602	1.500	2.937	PER IMP= 48.00
COMPUTE NM HYD	133.00	-	4	.03939	73.22	3.101	1.47602	1.500	2.904	PER IMP= 48.00
ADD HYD	133.10	2& 3	5	.60407	873.58	51.678	1.60408	1.600	2.260	
ADD HYD	133.20	4& 5	2	.64346	928.14	54.779	1.59625	1.550	2.254	
ROUTE	133.30	2	3	.64346	942.78	54.779	1.59625	1.600	2.289	
COMPUTE NM HYD	151.00	-	2	.02907	55.87	2.436	1.57151	1.500	3.003	PER IMP= 55.00
ROUTE	151.10	2	4	.02907	48.27	2.436	1.57153	1.550	2.595	
COMPUTE NM HYD	131.00	-	2	.05707	94.06	3.677	1.20806	1.500	2.575	PER IMP= 30.80

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	131.10	2& 3	5	.70053	1014.22	58.456	1.56462	1.600	2.262	
ADD HYD	131.20	4& 5	2	.72960	1059.83	60.893	1.56489	1.600	2.270	
ROUTE	131.30	2	3	.72960	1066.59	60.893	1.56490	1.600	2.284	
COMPUTE NM HYD	127.00	-	2	.04370	76.32	2.928	1.25649	1.500	2.729	PER IMP= 33.90
ADD HYD	127.10	2& 3	4	.77330	1120.21	63.821	1.54747	1.600	2.263	
ROUTE	127.20	4	2	.77330	1121.34	63.821	1.54747	1.600	2.266	
COMPUTE NM HYD	128.00	-	3	.07690	142.99	6.081	1.48263	1.500	2.905	PER IMP= 48.00
ROUTE	128.10	3	4	.07690	140.84	6.081	1.48263	1.550	2.862	
COMPUTE NM HYD	126.00	-	3	.07448	119.49	5.257	1.32353	1.500	2.507	PER IMP= 37.70
ADD HYD	126.10	3& 4	5	.15138	260.02	11.338	1.40435	1.500	2.684	
ROUTE	126.20	5	3	.15138	269.54	11.338	1.40435	1.550	2.782	
ADD HYD	126.30	2& 3	4	.92468	1352.55	75.159	1.52403	1.600	2.286	
COMPUTE NM HYD	118.00	-	2	.06353	100.10	3.303	.97493	1.500	2.462	PER IMP= 15.80
ADD HYD	118.10	2& 4	3	.98821	1424.02	78.463	1.48873	1.600	2.252	
ROUTE	118.20	3	2	.98821	1434.16	78.463	1.48873	1.600	2.268	
COMPUTE NM HYD	116.00	-	3	.01678	24.73	.722	.80642	1.500	2.303	PER IMP= 5.00
COMPUTE NM HYD	117.00	-	4	.01804	26.81	.795	.82674	1.500	2.322	PER IMP= 6.30
COMPUTE NM HYD	114.00	-	5	.01552	25.42	.890	1.07503	1.500	2.559	PER IMP= 22.20
ADD HYD	114.10	2& 3	6	1.00499	1452.01	79.184	1.47734	1.600	2.258	
ADD HYD	114.20	4& 6	2	1.02303	1471.34	79.980	1.46587	1.600	2.247	
ADD HYD	114.30	5& 2	3	1.03855	1489.37	80.870	1.46003	1.600	2.241	
ROUTE	114.40	3	2	1.03855	1495.76	80.870	1.46003	1.600	2.250	
COMPUTE NM HYD	113.00	-	5	.01992	30.16	.928	.87335	1.500	2.366	PER IMP= 9.30
ADD HYD	113.10	5& 2	4	1.05847	1517.43	81.797	1.44899	1.600	2.240	
ADD HYD	112.10	1& 4	3	2.92773	3399.87	232.223	1.48722	1.650	1.814	
ROUTE	112.20	3	1	2.92773	3402.59	232.223	1.48722	1.650	1.816	
COMPUTE NM HYD	111.00	-	2	.00906	13.36	.390	.80642	1.500	2.304	PER IMP= 5.00
ADD HYD	111.10	1& 2	3	2.93679	3409.90	232.612	1.48512	1.650	1.814	
ROUTE	111.20	3	1	2.93679	3409.30	232.612	1.48512	1.650	1.814	
COMPUTE NM HYD	110.00	-	2	.04352	69.41	2.338	1.00721	1.500	2.492	PER IMP= 17.90
ADD HYD	110.10	1& 2	3	2.98031	3447.10	234.950	1.47814	1.650	1.807	
ROUTE	110.20	3	1	2.98031	3445.17	234.950	1.47814	1.650	1.806	
COMPUTE NM HYD	109.00	-	2	.02638	39.94	1.229	.87335	1.500	2.365	PER IMP= 9.30
COMPUTE NM HYD	108.00	-	3	.00781	11.61	.344	.82674	1.500	2.323	PER IMP= 6.30
ADD HYD	109.10	1& 2	4	3.00669	3466.98	236.179	1.47283	1.650	1.802	
ADD HYD	109.20	3& 4	1	3.01450	3473.32	236.523	1.47116	1.650	1.800	
ROUTE	109.30	1	2	3.01450	3468.11	236.523	1.47116	1.650	1.798	
COMPUTE NM HYD	107.00	-	1	.02163	31.87	.930	.80642	1.500	2.302	PER IMP= 5.00
ADD HYD	107.10	1& 2	3	3.03613	3485.53	237.453	1.46642	1.650	1.794	
ROUTE	107.20	3	1	3.03613	3478.11	237.453	1.46642	1.650	1.790	
COMPUTE NM HYD	106.00	-	2	.04128	62.49	1.923	.87335	1.500	2.365	PER IMP= 9.30
ADD HYD	106.10	1& 2	3	3.07741	3512.24	239.376	1.45847	1.650	1.783	
ROUTE	106.20	3	1	3.07741	3521.39	239.376	1.45847	1.700	1.788	
COMPUTE NM HYD	105.00	-	2	.02584	39.12	1.204	.87335	1.500	2.365	PER IMP= 9.30
COMPUTE NM HYD	104.00	-	3	.01579	25.19	.848	1.00721	1.500	2.493	PER IMP= 17.90
ADD HYD	104.10	2& 3	4	.04163	64.31	2.052	.92411	1.500	2.414	
ADD HYD	104.20	1& 4	2	3.11904	3548.08	241.428	1.45134	1.700	1.777	
ROUTE	104.30	2	1	3.11904	3564.61	241.428	1.45134	1.700	1.786	
COMPUTE NM HYD	103.00	-	2	.02997	44.52	1.321	.82674	1.500	2.321	PER IMP= 6.30
ADD HYD	103.10	1& 2	3	3.14901	3582.91	242.749	1.44539	1.700	1.778	
ROUTE	103.20	3	1	3.14901	3617.56	242.749	1.44539	1.700	1.795	
COMPUTE NM HYD	101.00	-	2	.08444	138.39	4.717	1.04735	1.500	2.561	PER IMP= 19.30

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	102.00	-	3	.02692	42.94	1.446	1.00721	1.500	2.492	PER IMP= 17.90
ADD HYD	101.10	1& 2	4	3.23345	3675.55	247.466	1.43499	1.700	1.776	
ADD HYD	101.20	3& 4	10	3.26037	3693.52	248.912	1.43146	1.700	1.770	
COMPUTE NM HYD	509.00	-	4	.04047	58.84	3.186	1.47602	1.550	2.272	PER IMP= 48.00
ROUTE RESERVOIR	509.01	4	5	.04047	58.84	3.186	1.47602	1.550	2.272	
ROUTE	509.10	5	4	.04047	39.59	3.186	1.47603	1.700	1.529	
COMPUTE NM HYD	508.00	-	5	.13308	119.53	11.488	1.61853	1.900	1.403	PER IMP= 56.40
ADD HYD	508.10	4& 5	6	.17355	154.23	14.673	1.58529	1.850	1.389	
ROUTE	508.20	6	4	.17355	154.18	14.674	1.58530	1.850	1.388	
ROUTE	508.30	4	5	.17355	132.54	14.674	1.58530	2.000	1.193	
COMPUTE NM HYD	506.00	-	4	.68388	736.59	57.989	1.58990	1.750	1.683	PER IMP= 54.70
ROUTE	506.10	4	6	.68388	737.45	57.989	1.58990	1.750	1.685	
ROUTE	506.20	6	4	.68388	727.34	57.989	1.58990	1.800	1.662	
COMPUTE NM HYD	507.00	-	6	.72551	840.26	61.196	1.58155	1.700	1.810	PER IMP= 54.20
ADD HYD	507.10	4& 5	7	.85743	823.43	72.663	1.58897	1.800	1.501	
ADD HYD	507.20	6& 7	4	1.58294	1613.74	133.859	1.58557	1.750	1.593	
ROUTE	507.30	4	6	1.58294	1428.19	133.859	1.58556	1.850	1.410	
ROUTE	507.40	6	5	1.58294	1409.06	133.859	1.58556	1.900	1.391	
COMPUTE NM HYD	505.00	-	4	.57826	725.04	50.018	1.62181	1.650	1.959	PER IMP= 56.60
ROUTE	505.10	4	6	.57826	722.31	50.018	1.62181	1.650	1.952	
ROUTE	505.20	6	4	.57826	677.89	50.018	1.62181	1.750	1.832	
ADD HYD	505.30	4& 5	6	2.16120	1969.86	183.876	1.59526	1.850	1.424	
COMPUTE NM HYD	503.00	-	4	.10759	131.59	10.295	1.79418	1.700	1.911	PER IMP= 66.80
ROUTE	503.10	4	5	.10759	125.86	10.295	1.79418	1.800	1.828	
ADD HYD	503.20	6& 5	4	2.26879	2092.21	194.172	1.60470	1.850	1.441	
COMPUTE NM HYD	502.00	-	5	.09216	167.84	10.462	2.12858	1.600	2.846	PER IMP= 86.60
ROUTE RESERVOIR	502.01	5	6	.09216	167.84	10.462	2.12858	1.600	2.846	
ROUTE	502.10	6	5	.09216	161.28	10.462	2.12858	1.650	2.734	
ADD HYD	502.20	5& 4	6	2.36095	2189.17	204.634	1.62515	1.850	1.449	
COMPUTE NM HYD	501.00	-	4	.02172	49.96	2.413	2.08333	1.500	3.594	PER IMP= 84.20
ROUTE RESERVOIR	501.01	4	5	.02172	49.96	2.413	2.08333	1.500	3.594	
ROUTE	501.10	5	4	.02172	42.52	2.413	2.08335	1.550	3.059	
ADD HYD	501.20	4& 6	5	2.38267	2208.52	207.047	1.62932	1.850	1.448	
COMPUTE NM HYD	504.00	-	4	.89619	990.58	79.275	1.65858	1.750	1.727	PER IMP= 58.90
ADD HYD	504.10	4& 5	1	3.27886	3128.69	286.322	1.63732	1.800	1.491	
COMPUTE NM HYD	500.00	-	4	.00628	14.46	.697	2.08150	1.500	3.597	PER IMP= 84.00
ADD HYD	504.20	4& 1	6	3.28514	3133.66	287.019	1.63817	1.800	1.490	
COMPUTE NM HYD	316.00	-	1	.02386	40.80	1.232	.96813	1.500	2.672	PER IMP= 6.90
ROUTE RESERVOIR	316.01	1	3	.02386	40.80	1.232	.96813	1.500	2.672	
ROUTE	316.10	3	1	.02386	40.50	1.232	.96815	1.500	2.652	
COMPUTE NM HYD	325.00	-	2	.00553	10.47	.381	1.29329	1.500	2.957	PER IMP= 28.90
ADD HYD	325.10	1& 2	3	.02939	50.97	1.613	1.02929	1.500	2.710	
DIVIDE HYD	325.20	3	1	.01470	25.48	.807	1.02929	1.500	2.710	
	325.30	AND	2	.01470	25.48	.807	1.02929	1.500	2.710	
ROUTE	325.40	2	3	.01470	21.77	.807	1.02934	1.550	2.315	
ADD HYD	325.50	3& 6	4	3.29983	3143.31	287.826	1.63545	1.800	1.488	
DIVIDE HYD	325.60	4	3	1.64992	1571.66	143.913	1.63545	1.800	1.488	
	325.60	AND	6	1.64992	1571.66	143.913	1.63545	1.800	1.488	
*STORE RATING CURVE	RC=1 VS NO=1									
ROUTE	325.70	6	4	1.64992	1577.41	143.913	1.63545	1.800	1.494	
ROUTE	325.70	3	6	1.64992	1577.41	143.913	1.63545	1.800	1.494	
ADD HYD	325.80	6& 4	2	3.29983	3154.81	287.826	1.63545	1.800	1.494	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	324.00	-	3	.01196	12.92	.611	.95778	1.650	1.687	PER IMP= 6.20
ROUTE	324.10	1	4	.01470	18.50	.807	1.02935	1.600	1.967	
ADD HYD	324.20	3& 4	1	.02666	30.98	1.418	.99719	1.600	1.816	
ADD HYD	324.30	1& 2	3	3.32649	3175.54	289.243	1.63034	1.800	1.492	
ADD HYD	324.50	3&19	4	14.40786	12566.43	1182.530	1.53891	1.900	1.363	
DIVIDE HYD	324.50	4	1	7.20393	6283.22	591.265	1.53891	1.900	1.363	
	324.60	AND	3	7.20393	6283.22	591.265	1.53891	1.900	1.363	
*STORE RATING CURVE	RC=1 VS NO=1									
ROUTE	324.70	3	5	7.20393	6271.56	591.265	1.53891	1.900	1.360	
ROUTE	324.80	1	4	7.20393	6271.56	591.265	1.53891	1.900	1.360	
ADD HYD	324.10	4& 5	1	14.40786	12543.12	1182.531	1.53891	1.900	1.360	
ROUTE	324.50	1	4	14.40786	12486.24	1182.529	1.53891	1.950	1.354	
COMPUTE NM HYD	323.00	-	2	.00343	6.47	.234	1.27851	1.500	2.947	PER IMP= 27.90
ROUTE	323.10	2	3	.00343	3.15	.234	1.27865	1.650	1.436	
ADD HYD	323.20	4& 3	2	14.41129	12488.31	1182.762	1.53885	1.950	1.354	
COMPUTE NM HYD	321.00	-	1	.06053	142.01	6.942	2.15045	1.500	3.666	PER IMP= 88.20
ADD HYD	321.10	2& 1	3	14.47182	12525.09	1189.704	1.54141	1.950	1.352	
COMPUTE NM HYD	322.00	-	4	.09103	188.35	10.210	2.10298	1.550	3.233	PER IMP= 85.30
ADD HYD	322.10	3& 4	2	14.56285	12583.09	1199.914	1.54492	1.950	1.350	
ROUTE	322.20	2	1	14.56285	12586.00	1199.914	1.54492	1.950	1.350	
COMPUTE NM HYD	320.00	-	4	.00482	9.75	.392	1.52535	1.500	3.160	PER IMP= 44.60
ADD HYD	320.10	1& 4	12	14.56767	12587.99	1200.307	1.54491	1.950	1.350	
COMPUTE NM HYD	225.00	-	1	.02082	48.58	2.366	2.13075	1.500	3.646	PER IMP= 87.00
ROUTE	225.10	1	2	.02082	47.28	2.366	2.13077	1.500	3.548	
COMPUTE NM HYD	223.00	-	1	.01050	24.85	1.221	2.18000	1.500	3.698	PER IMP= 90.00
ROUTE RESERVOIR	223.01	1	3	.01050	24.85	1.221	2.18000	1.500	3.698	
DIVIDE HYD	223.10	3	1	.00525	12.43	.610	2.17997	1.500	3.698	
	223.20	AND	4	.00525	12.43	.610	2.17997	1.500	3.698	
ROUTE	223.30	4	3	.00525	10.35	.610	2.18009	1.550	3.079	
ADD HYD	223.40	3& 2	5	.02607	56.44	2.976	2.14065	1.500	3.383	
ROUTE	223.50	1	2	.00525	9.00	.610	2.18009	1.600	2.678	
COMPUTE NM HYD	224.00	-	4	.02225	52.26	2.556	2.15373	1.500	3.670	PER IMP= 88.40
ADD HYD	224.10	4& 5	1	.04832	108.70	5.532	2.14667	1.500	3.515	
ROUTE	322.20	12	3	14.56767	12564.26	1200.309	1.54491	1.950	1.348	
COMPUTE NM HYD	226.00	-	4	.01463	33.76	1.632	2.09135	1.500	3.605	PER IMP= 84.60
ADD HYD	226.10	3& 4	4	14.58230	12572.88	1201.939	1.54546	1.950	1.347	
ROUTE RESERVOIR	226.01	4	6	14.58230	12572.88	1201.939	1.54546	1.950	1.347	
ADD HYD	226.20	6& 1	3	14.63062	12603.37	1207.471	1.54744	1.950	1.346	
ROUTE	226.30	3	4	14.63062	12562.63	1207.468	1.54744	2.000	1.342	
ADD HYD	226.40	2& 4	5	14.63587	12566.66	1208.081	1.54767	2.000	1.342	
COMPUTE NM HYD	222.00	-	4	.08660	175.98	9.149	1.98087	1.500	3.175	PER IMP= 77.80
ADD HYD	222.10	5& 4	2	14.72247	12613.28	1217.228	1.55022	2.000	1.339	
COMPUTE NM HYD	221.00	-	4	.06353	135.30	6.172	1.82172	1.500	3.328	PER IMP= 68.00
ADD HYD	221.10	2& 4	1	14.78600	12642.16	1223.402	1.55138	2.000	1.336	
ROUTE	221.20	1	2	14.78600	12658.67	1223.402	1.55139	2.000	1.338	
COMPUTE NM HYD	220.00	-	1	.05896	110.83	4.641	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	220.10	1& 2	3	14.84496	12679.39	1228.042	1.55108	2.000	1.335	
COMPUTE NM HYD	219.00	-	1	.07179	134.88	5.651	1.47602	1.500	2.936	PER IMP= 48.00
ADD HYD	219.10	1& 3	2	14.91675	12704.62	1233.694	1.55072	2.000	1.331	
ROUTE	219.20	2	3	14.91675	12681.50	1233.693	1.55072	2.000	1.328	
COMPUTE NM HYD	218.00	-	4	.05788	108.80	4.556	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	218.10	3& 4	1	14.97463	12701.84	1238.250	1.55043	2.000	1.325	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	216.00	-	4	.01310	24.63	1.031	1.47602	1.500	2.938	PER IMP= 48.00
ROUTE	216.10	4	2	.01310	22.81	1.031	1.47606	1.550	2.721	
COMPUTE NM HYD	217.00	-	3	.02827	53.14	2.225	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	217.10	3& 2	4	.04137	74.50	3.257	1.47601	1.500	2.814	
COMPUTE NM HYD	215.00	-	3	.02934	55.16	2.310	1.47603	1.500	2.937	PER IMP= 48.00
ADD HYD	215.10	3& 4	2	.07071	129.66	5.566	1.47601	1.500	2.865	
ADD HYD	215.20	1& 2	3	15.04534	12727.11	1243.816	1.55008	2.000	1.322	
ROUTE	215.30	3	1	15.04534	12689.62	1243.814	1.55008	2.000	1.318	
COMPUTE NM HYD	214.00	-	4	.03392	63.76	2.670	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	214.10	4& 1	2	15.07926	12701.53	1246.485	1.54992	2.000	1.316	
COMPUTE NM HYD	211.00	-	1	.02593	48.75	2.041	1.47603	1.500	2.937	PER IMP= 48.00
COMPUTE NM HYD	212.00	-	3	.02755	51.79	2.169	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	212.10	1& 3	4	.05348	100.54	4.210	1.47601	1.500	2.937	
ROUTE	212.20	4	1	.05348	98.18	4.210	1.47604	1.550	2.868	
COMPUTE NM HYD	213.00	-	3	.00817	15.37	.643	1.47602	1.500	2.939	PER IMP= 48.00
ADD HYD	213.10	3& 1	4	.06165	112.05	4.853	1.47602	1.500	2.840	
ADD HYD	213.20	2& 4	1	15.14091	12725.29	1251.338	1.54962	2.000	1.313	
ROUTE	213.40	1	2	15.14091	12730.61	1251.338	1.54961	2.050	1.314	
COMPUTE NM HYD	210.00	-	1	.04379	82.31	3.447	1.47602	1.500	2.937	PER IMP= 48.00
ADD HYD	210.10	1& 2	3	15.18470	12744.34	1254.785	1.54940	2.050	1.311	
COMPUTE NM HYD	209.00	-	1	.01777	33.41	1.399	1.47602	1.500	2.938	PER IMP= 48.00
COMPUTE NM HYD	207.00	-	2	.01669	25.97	.923	1.03733	1.500	2.432	PER IMP= 23.00
ADD HYD	207.10	1& 2	4	.03446	59.39	2.322	1.26353	1.500	2.693	
ROUTE	207.20	4	1	.03446	56.93	2.322	1.26356	1.500	2.581	
COMPUTE NM HYD	208.00	-	2	.00314	5.91	.247	1.47602	1.500	2.943	PER IMP= 48.00
ADD HYD	208.10	1& 2	4	.03760	62.84	2.569	1.28127	1.500	2.611	
ADD HYD	208.20	4& 3	1	15.22230	12754.79	1257.354	1.54874	2.050	1.309	
ROUTE	208.30	1	2	15.22230	12765.39	1257.355	1.54874	2.050	1.310	
COMPUTE NM HYD	206.00	-	5	.01983	24.24	.710	.67138	1.500	1.910	PER IMP= 5.00
COMPUTE NM HYD	205.00	-	1	.01974	24.13	.707	.67138	1.500	1.910	PER IMP= 5.00
COMPUTE NM HYD	204.00	-	3	.00763	9.33	.273	.67138	1.500	1.912	PER IMP= 5.00
ADD HYD	204.10	1& 3	4	.02737	33.47	.980	.67136	1.500	1.910	
ROUTE	204.20	4	1	.02737	31.19	.980	.67139	1.550	1.780	
COMPUTE NM HYD	203.00	-	3	.00960	11.74	.344	.67138	1.500	1.911	PER IMP= 5.00
ADD HYD	203.10	1& 3	4	.03697	42.03	1.324	.67136	1.550	1.776	
ADD HYD	203.20	4& 5	1	.05680	64.42	2.034	.67136	1.550	1.772	
ROUTE	203.30	1	3	.05680	66.31	2.034	.67137	1.550	1.824	
COMPUTE NM HYD	202.00	-	1	.03805	78.80	3.515	1.73215	1.500	3.236	PER IMP= 62.50
ADD HYD	202.10	1& 2	4	15.26035	12779.92	1260.869	1.54920	2.050	1.309	
ADD HYD	202.20	4& 3	1	15.31715	12786.80	1262.904	1.54594	2.050	1.304	
ROUTE	202.30	1	2	15.31715	12778.32	1262.903	1.54594	2.050	1.304	
COMPUTE NM HYD	201.00	-	1	.03518	54.85	1.771	.94383	1.500	2.436	PER IMP= 13.70
COMPUTE NM HYD	200.00	-	3	.05438	92.37	2.988	1.03032	1.500	2.654	PER IMP= 14.00
ADD HYD	200.10	1& 2	4	15.35233	12783.99	1264.675	1.54456	2.050	1.301	
ADD HYD	200.20	3& 4	12	15.40671	12793.50	1267.661	1.54275	2.050	1.297	
ADD HYD	200.30	12&10	1	18.66708	14600.43	1516.571	1.52331	2.000	1.222	
ROUTE RESERVOIR	200.03	1	2	18.66708	11021.56	1289.109	1.29484	2.300	.923	AC-FT= 571.281
ROUTE RESERVOIR	200.03	1	2	18.66708	86.77	416.741	.41859	24.800	.007	AC-FT= 1341.738
ROUTE RESERVOIR	200.03	1	2	18.66708	82.19	386.663	.38838	24.900	.007	AC-FT= 1354.657
ROUTE RESERVOIR	200.03	1	2	18.66708	384.12	1516.677	1.52341	5.000	.032	AC-FT= 1113.205
ROUTE RESERVOIR	200.03	1	2	18.66708	362.08	1333.552	1.33948	5.100	.030	AC-FT= 1131.137
FINISH										

AHYMO SUMMARY TABLE (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992 RUN DATE (MON/DAY/YR) =07/20/1992

INPUT FILE = alt-g2.dat USER NO.= SCANLNNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
										PAGE = 1
START										TIME= .00
RAINFALL TYPE= 2										RAIN24= 2.590
COMPUTE NM HYD	418.00	-	1	1.49581	1641.99	117.731	1.47575	1.680	1.715	PER IMP= 48.00
COMPUTE NM HYD	417.00	-	2	.13909	133.51	10.947	1.47576	1.760	1.500	PER IMP= 48.00
ADD HYD	417.10	1& 2	3	1.63490	1765.99	128.678	1.47575	1.680	1.688	
ROUTE RESERVOIR	417.01	3	4	1.63490	1765.99	128.678	1.47575	1.680	1.688	
ROUTE	417.20	4	5	1.63490	1320.73	128.678	1.47576	1.840	1.262	
COMPUTE NM HYD	419.00	-	1	.19715	222.10	15.517	1.47575	1.680	1.760	PER IMP= 48.00
COMPUTE NM HYD	420.00	-	2	.18889	202.07	14.867	1.47576	1.680	1.672	PER IMP= 48.00
ADD HYD	419.10	1& 2	3	.38604	424.17	30.384	1.47575	1.680	1.717	
ADD HYD	420.10	3& 5	4	2.02094	1661.45	159.062	1.47575	1.840	1.285	
ROUTE	420.20	4	5	2.02094	717.28	159.062	1.47575	2.240	.555	
COMPUTE NM HYD	416.00	-	1	.86541	840.86	68.114	1.47575	1.760	1.518	PER IMP= 48.00
ROUTE	416.10	1	2	.86541	386.92	68.114	1.47575	2.160	.699	
ADD HYD	416.20	2& 5	3	2.88635	1094.42	227.175	1.47575	2.240	.592	
COMPUTE NM HYD	415.00	-	1	.15228	238.20	11.985	1.47575	1.520	2.444	PER IMP= 48.00
ROUTE RESERVOIR	415.01	1	2	.15228	238.20	11.985	1.47575	1.520	2.444	
COMPUTE NM HYD	414.00	-	1	.11235	127.24	8.843	1.47576	1.680	1.770	PER IMP= 48.00
ADD HYD	414.10	2& 1	4	.26463	330.92	20.828	1.47575	1.600	1.954	
ROUTE RESERVOIR	414.01	4	2	.26463	330.92	20.828	1.47575	1.600	1.954	
ROUTE	414.30	2	1	.26463	149.09	20.828	1.47575	1.840	.880	
COMPUTE NM HYD	411.00	-	2	.29891	374.79	23.526	1.47575	1.600	1.959	PER IMP= 48.00
ADD HYD	411.10	1& 2	4	.56354	476.81	44.354	1.47575	1.680	1.322	
ROUTE	411.20	4	1	.56354	464.38	44.354	1.47575	1.680	1.288	
COMPUTE NM HYD	412.00	-	2	1.18559	1163.31	93.314	1.47576	1.760	1.533	PER IMP= 48.00
ADD HYD	412.10	1& 2	4	1.74913	1622.82	137.668	1.47575	1.760	1.450	
ADD HYD	412.20	4& 3	1	4.63548	2138.19	364.844	1.47575	1.840	.721	
ROUTE	412.30	1	5	4.63548	1219.30	364.844	1.47575	2.480	.411	
COMPUTE NM HYD	424.00	-	1	.33534	399.63	26.394	1.47576	1.600	1.862	PER IMP= 48.00
ROUTE RESERVOIR	424.01	1	2	.33534	399.63	26.394	1.47576	1.600	1.862	
COMPUTE NM HYD	421.00	-	1	.33184	384.26	26.118	1.47575	1.680	1.809	PER IMP= 48.00
ADD HYD	421.10	1& 2	3	.66718	777.71	52.512	1.47575	1.680	1.821	
ROUTE	421.20	3	1	.66718	656.38	52.512	1.47576	1.680	1.537	
COMPUTE NM HYD	422.00	-	2	.14367	157.35	11.308	1.47576	1.680	1.711	PER IMP= 48.00
ADD HYD	422.10	1& 2	3	.81085	813.73	63.819	1.47575	1.680	1.568	
ROUTE	422.20	3	1	.81085	476.95	63.819	1.47575	1.920	.919	
COMPUTE NM HYD	423.00	-	2	.05985	50.32	4.711	1.47575	1.840	1.314	PER IMP= 48.00
ADD HYD	423.10	1& 2	3	.87070	526.33	68.530	1.47575	1.920	.945	
ROUTE	423.20	3	1	.87070	252.39	68.528	1.47572	2.480	.453	
COMPUTE NM HYD	413.00	-	2	1.00011	1043.89	78.716	1.47575	1.680	1.631	PER IMP= 48.00
ADD HYD	413.10	1& 2	3	1.87081	1071.27	147.244	1.47574	1.760	.895	
ROUTE	413.20	3	1	1.87081	850.31	147.243	1.47573	1.920	.710	
COMPUTE NM HYD	410.00	-	2	1.38956	1488.08	109.368	1.47575	1.680	1.673	PER IMP= 48.00
ADD HYD	410.10	1& 2	3	3.26037	2153.97	256.611	1.47574	1.760	1.032	
ADD HYD	410.20	3& 5	4	7.89585	2669.14	621.455	1.47575	1.840	.528	
ROUTE RESERVOIR	410.01	4	1	7.89585	2669.14	621.455	1.47575	1.840	.528	
ROUTE	410.30	1	2	7.89585	2289.13	621.454	1.47575	2.240	.453	
COMPUTE NM HYD	409.00	-	1	.46618	591.09	36.692	1.47576	1.600	1.981	PER IMP= 48.00
ROUTE	409.10	1	3	.46618	159.38	36.684	1.47544	2.000	.534	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	408.00	-	1	1.38633	1467.45	109.114	1.47575	1.680	1.654	PER IMP= 48.00
ADD HYD	408.10	1& 3	4	1.85251	1569.20	145.798	1.47568	1.680	1.324	
ADD HYD	408.20	4& 2	5	9.74836	3155.75	767.252	1.47573	2.000	.506	
ROUTE	408.30	5	1	9.74836	2960.92	767.251	1.47573	2.160	.475	
COMPUTE NM HYD	403.00	-	2	.48341	570.95	40.513	1.57139	1.680	1.845	PER IMP= 53.70
ADD HYD	403.10	1& 2	3	10.23177	3159.53	807.764	1.48025	2.160	.482	
ROUTE	408.30	3	19	10.23177	3122.44	807.762	1.48025	2.240	.477	
COMPUTE NM HYD	406.00	-	1	.05788	84.69	6.177	2.00096	1.680	2.286	PER IMP= 78.40
DIVIDE HYD	406.10	1	2	.05784	84.00	6.172	2.00095	1.680	2.269	
	406.20	AND	3	.00004	.69	.005	2.00095	1.680	25.220	
ROUTE	406.30	3	1	.00004	.08	.005	2.29173	1.760	2.969	
COMPUTE NM HYD	407.00	-	2	.06012	94.92	4.732	1.47575	1.520	2.467	PER IMP= 48.00
ROUTE RESERVOIR	407.01	2	3	.06012	94.92	4.732	1.47575	1.520	2.467	
ROUTE	407.10	3	2	.06012	27.01	4.732	1.47576	1.840	.702	
COMPUTE NM HYD	404.00	-	3	.22811	307.78	25.162	2.06826	1.680	2.108	PER IMP= 83.00
ADD HYD	404.10	1& 2	4	.06016	27.08	4.737	1.47626	1.840	.703	
ADD HYD	404.20	3& 4	7	.28827	332.19	29.899	1.94471	1.680	1.801	
DIVIDE HYD	404.10	7	2	.15275	46.00	15.843	1.94471	1.440	.471	
	404.20	AND	3	.13552	286.19	14.056	1.94471	1.680	3.300	
DIVIDE HYD	404.20	2	1	.07637	23.00	7.921	1.94471	1.440	.471	
	404.30	AND	4	.07637	23.00	7.921	1.94471	1.440	.471	
ROUTE	404.40	1	2	.07637	23.42	7.921	1.94469	1.440	.479	
ROUTE	404.40	4	1	.07637	23.42	7.921	1.94469	1.440	.479	
ADD HYD	404.50	1& 2	7	.15275	46.84	15.843	1.94468	1.440	.479	
ROUTE	404.60	3	1	.13552	239.38	14.057	1.94480	1.840	2.760	
COMPUTE NM HYD	405.00	-	2	.28007	350.29	26.575	1.77912	1.680	1.954	PER IMP= 66.00
ROUTE	405.10	2	3	.28007	168.15	26.575	1.77912	2.000	.938	
ADD HYD	405.20	3& 1	3	.41559	395.91	40.631	1.83314	1.920	1.489	
COMPUTE NM HYD	402.00	-	2	.21249	309.94	23.227	2.04956	1.680	2.279	PER IMP= 81.70
ADD HYD	402.10	2& 3	4	.62808	623.45	63.859	1.90636	1.760	1.551	
ROUTE	402.20	4	2	.62808	588.43	63.859	1.90636	1.920	1.464	
COMPUTE NM HYD	401.00	-	3	.14474	218.69	16.329	2.11536	1.680	2.361	PER IMP= 86.00
ADD HYD	401.20	2& 3	5	.77282	721.47	80.188	1.94550	1.840	1.459	
COMPUTE NM HYD	303.00	-	1	.00790	4.49	.548	1.29955	2.160	.889	PER IMP= 29.50
ADD HYD	303.10	1& 7	2	.16065	50.72	16.390	1.91295	2.240	.493	
DIVIDE HYD	303.20	2	1	.15740	46.00	16.059	1.91295	1.440	.457	
	303.30	AND	6	.00325	4.72	.331	1.91295	2.240	2.271	
DIVIDE HYD	303.40	1	2	.07870	23.00	8.029	1.91295	1.440	.457	
	303.40	AND	3	.07870	23.00	8.029	1.91295	1.440	.457	
ROUTE	303.50	2	1	.07870	23.30	8.030	1.91296	1.440	.462	
ROUTE	303.60	3	2	.07870	23.30	8.030	1.91296	1.440	.462	
ADD HYD	303.70	1& 2	3	.15740	46.59	16.059	1.91295	1.440	.462	
COMPUTE NM HYD	302.00	-	1	.01116	8.25	.698	1.17347	1.920	1.156	PER IMP= 21.00
ADD HYD	302.10	1& 3	2	.16856	54.63	16.757	1.86398	1.920	.506	
DIVIDE HYD	302.20	2	1	.16327	46.00	16.231	1.86398	1.440	.440	
	302.30	AND	8	.00529	8.63	.526	1.86398	1.920	2.547	
DIVIDE HYD	302.40	1	2	.08164	23.00	8.116	1.86398	1.440	.440	
	302.40	AND	3	.08164	23.00	8.116	1.86398	1.440	.440	
ROUTE	302.40	2	4	.08164	23.42	8.116	1.86400	1.440	.448	
ROUTE	302.50	3	1	.08164	23.42	8.116	1.86400	1.440	.448	
ADD HYD	302.60	4& 1	3	.16327	46.84	16.231	1.86398	1.440	.448	
COMPUTE NM HYD	301.00	-	1	.00593	6.65	.456	1.44047	1.680	1.753	PER IMP= 39.00

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ROUTE	301.20	1	2	.00593	6.63	.456	1.44057	1.680	1.746	
ADD HYD	301.30	2& 3	7	.16920	53.06	16.687	1.84914	1.760	.490	
COMPUTE NM HYD	300.00	-	2	.00603	10.40	.382	1.18682	1.520	2.694	PER IMP= 21.90
ADD HYD	300.10	8& 2	1	.01132	11.68	.908	1.50335	1.520	1.612	
ROUTE	300.20	1	2	.01132	11.91	.908	1.50346	1.520	1.643	
COMPUTE NM HYD	304.00	-	1	.00347	6.41	.264	1.42712	1.520	2.884	PER IMP= 38.10
ROUTE	304.20	1	3	.00347	6.50	.264	1.42740	1.520	2.926	
ADD HYD	304.30	2& 3	8	.01479	18.41	1.172	1.48546	1.520	1.944	
COMPUTE NM HYD	305.00	-	9	.00402	7.27	.297	1.38707	1.520	2.824	PER IMP= 35.40
ROUTE RESERVOIR	401.01	5	1	.77282	674.31	80.188	1.94550	2.000	1.363	AC-FT= 3.973
ROUTE	401.80	1	2	.77282	673.63	80.188	1.94550	2.000	1.362	
COMPUTE NM HYD	307.00	-	4	.01650	18.30	1.195	1.35741	1.680	1.733	PER IMP= 33.40
ADD HYD	307.10	6& 4	1	.01975	20.03	1.526	1.44870	1.760	1.585	
ROUTE	307.20	1	3	.01975	19.79	1.526	1.44876	1.760	1.566	
ADD HYD	307.30	3& 2	1	.79257	688.50	81.714	1.93312	2.000	1.357	
COMPUTE NM HYD	315.00	-	2	.00836	13.25	.406	.91092	1.520	2.476	PER IMP= 3.30
ROUTE RESERVOIR	315.01	2	3	.00836	13.25	.406	.91092	1.520	2.476	
ROUTE	315.10	3	2	.00836	11.28	.406	.91103	1.600	2.108	
ADD HYD	315.20	1& 2	3	.80093	690.79	82.120	1.92245	2.000	1.348	
COMPUTE NM HYD	312.00	-	1	.03437	58.05	2.053	1.12007	1.520	2.639	PER IMP= 17.40
DIVIDE HYD	312.10	1	2	.01719	29.03	1.027	1.12006	1.520	2.639	
	312.20	AND	4	.01719	29.03	1.027	1.12006	1.520	2.639	
ROUTE	312.30	2	5	.01719	28.37	1.027	1.12013	1.520	2.580	
ADD HYD	312.40	3& 5	1	.81811	696.04	83.146	1.90560	2.000	1.329	
COMPUTE NM HYD	314.00	-	3	.01914	30.69	.969	.94949	1.520	2.506	PER IMP= 5.90
ADD HYD	314.10	1& 3	2	.83725	699.29	84.116	1.88374	2.000	1.305	
ROUTE RESERVOIR	401.02	2	1	.83725	617.14	84.116	1.88374	2.240	1.152	AC-FT= 9.712
ROUTE	314.90	1	2	.83725	617.02	84.116	1.88374	2.240	1.151	
COMPUTE NM HYD	306.00	-	1	.01532	14.55	.970	1.18682	1.760	1.484	PER IMP= 21.90
ROUTE	306.10	1	3	.01532	14.57	.970	1.18685	1.760	1.486	
ROUTE	306.20	3	1	.01532	13.24	.970	1.18685	1.840	1.350	
COMPUTE NM HYD	310.00	-	3	.00981	16.77	.607	1.16012	1.520	2.672	PER IMP= 20.10
ADD HYD	310.10	3& 1	5	.02513	20.15	1.577	1.17636	1.520	1.253	
ROUTE	310.20	5	1	.02513	20.39	1.577	1.17641	1.520	1.268	
ADD HYD	310.30	1& 2	3	.86238	624.69	85.692	1.86312	2.240	1.132	
ROUTE	310.40	4	5	.01719	31.67	1.027	1.12013	1.520	2.879	
ADD HYD	310.50	5& 3	1	.87957	626.28	86.719	1.84861	2.240	1.113	
COMPUTE NM HYD	313.00	-	2	.00787	13.48	.489	1.16457	1.520	2.675	PER IMP= 20.40
ADD HYD	313.10	1& 2	3	.88744	626.92	87.208	1.84254	2.240	1.104	
ROUTE RESERVOIR	401.03	3	1	.88744	593.01	87.208	1.84254	2.480	1.044	AC-FT= 5.406
COMPUTE NM HYD	309.00	-	3	.00803	6.26	.528	1.23280	1.840	1.219	PER IMP= 25.00
COMPUTE NM HYD	308.00	-	4	.00915	9.40	.731	1.49832	1.760	1.604	PER IMP= 42.90
ADD HYD	308.10	3& 4	2	.01718	15.35	1.259	1.37412	1.840	1.396	
ADD HYD	308.20	1& 2	10	.90462	597.14	88.467	1.83365	2.400	1.031	
COMPUTE NM HYD	311.00	-	11	.00602	6.05	.494	1.53837	1.760	1.572	PER IMP= 45.60
ROUTE	301.10	7	1	.16920	40.63	16.687	1.84914	2.880	.375	
ROUTE	304.10	8	2	.01479	7.25	1.172	1.48562	2.080	.766	
ROUTE	305.10	9	3	.00402	2.33	.297	1.38730	1.680	.905	
ADD HYD	301.20	1& 2	4	.18399	44.71	17.859	1.81989	2.800	.380	
ADD HYD	301.30	3& 4	1	.18801	45.61	18.156	1.81063	2.800	.379	
COMPUTE NM HYD	145.00	-	2	.12312	172.12	12.483	1.90111	1.680	2.184	PER IMP= 71.60
ADD HYD	145.10	1& 2	3	.31113	196.07	30.639	1.84643	1.680	.985	

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ROUTE	145.20	3	1	.31113	194.10	30.639	1.84643	1.680	.975	
COMPUTE NM HYD	143.00	-	2	.09431	111.64	7.423	1.47576	1.600	1.850	PER IMP= 48.00
COMPUTE NM HYD	144.00	-	3	.02602	47.22	2.210	1.59263	1.520	2.835	PER IMP= 50.40
ADD HYD	143.10	1& 2	4	.40544	305.68	38.062	1.76021	1.680	1.178	
ADD HYD	143.20	3& 4	1	.43146	333.28	40.272	1.75010	1.680	1.207	
ROUTE	143.30	1	2	.43146	325.32	40.272	1.75010	1.680	1.178	
COMPUTE NM HYD	141.00	-	1	.03868	67.94	3.044	1.47575	1.520	2.744	PER IMP= 48.00
ADD HYD	141.10	1& 2	3	.47014	359.49	43.317	1.72753	1.680	1.195	
COMPUTE NM HYD	140.00	-	1	.09638	113.68	7.586	1.47575	1.680	1.843	PER IMP= 48.00
ADD HYD	140.10	1& 3	2	.56652	473.17	50.902	1.68470	1.680	1.305	
ROUTE	140.20	2	1	.56652	398.95	50.902	1.68470	1.760	1.100	
COMPUTE NM HYD	139.00	-	2	.02145	37.94	1.688	1.47576	1.520	2.764	PER IMP= 48.00
ADD HYD	139.10	1& 2	3	.58797	412.15	52.591	1.67707	1.760	1.095	
ROUTE	139.20	3	1	.58797	389.42	52.591	1.67707	1.920	1.035	
COMPUTE NM HYD	138.00	-	2	.16332	235.75	12.854	1.47576	1.520	2.255	PER IMP= 48.00
ADD HYD	138.10	2& 1	3	.75129	489.46	65.445	1.63331	1.840	1.018	
ROUTE	138.20	3	1	.75129	452.97	65.445	1.63331	1.920	.942	
COMPUTE NM HYD	129.00	-	2	.39080	529.21	30.759	1.47575	1.600	2.116	PER IMP= 48.00
ADD HYD	129.10	1& 2	3	1.14209	743.48	96.204	1.57939	1.680	1.017	
COMPUTE NM HYD	136.00	-	1	.08130	106.34	6.399	1.47575	1.600	2.044	PER IMP= 48.00
COMPUTE NM HYD	135.00	-	2	.05923	82.14	4.662	1.47575	1.600	2.167	PER IMP= 48.00
ADD HYD	135.10	1& 2	4	.14053	188.49	11.061	1.47575	1.600	2.096	
ROUTE RESERVOIR	135.01	4	1	.14053	188.49	11.061	1.47575	1.600	2.096	
ROUTE	135.20	1	2	.14053	83.88	11.061	1.47576	1.840	.933	
COMPUTE NM HYD	130.00	-	1	.20469	234.61	16.111	1.47575	1.680	1.791	PER IMP= 48.00
ADD HYD	130.10	1& 2	4	.34522	302.92	27.171	1.47575	1.680	1.371	
ROUTE	130.20	4	2	.34522	252.07	27.171	1.47575	1.840	1.141	
COMPUTE NM HYD	125.00	-	1	.03679	59.19	2.896	1.47575	1.520	2.514	PER IMP= 48.00
ADD HYD	125.10	1& 2	4	.38201	273.36	30.067	1.47575	1.840	1.118	
ADD HYD	125.20	3& 4	1	1.52410	981.05	126.270	1.55342	1.760	1.006	
COMPUTE NM HYD	124.00	-	2	.04092	54.49	3.221	1.47575	1.600	2.081	PER IMP= 48.00
ADD HYD	124.10	2& 1	3	1.56502	1019.66	129.491	1.55138	1.760	1.018	
ROUTE	124.20	3	1	1.56502	1022.34	129.491	1.55138	1.760	1.021	
COMPUTE NM HYD	123.00	-	2	.02504	44.28	1.971	1.47575	1.520	2.763	PER IMP= 48.00
COMPUTE NM HYD	122.00	-	3	.13622	177.56	10.721	1.47575	1.600	2.037	PER IMP= 48.00
ADD HYD	123.10	1& 2	4	1.59006	1037.71	131.462	1.55019	1.760	1.020	
ADD HYD	123.20	3& 4	1	1.72628	1181.01	142.183	1.54432	1.680	1.069	
ROUTE	123.30	1	2	1.72628	1188.55	142.183	1.54432	1.680	1.076	
COMPUTE NM HYD	121.00	-	1	.02100	35.08	1.521	1.35794	1.520	2.610	PER IMP= 42.30
ADD HYD	121.10	1& 2	3	1.74728	1204.78	143.704	1.54208	1.680	1.077	
ROUTE	121.20	3	1	1.74728	1202.93	143.704	1.54208	1.680	1.076	
COMPUTE NM HYD	120.00	-	2	.01176	19.36	.775	1.23541	1.520	2.572	PER IMP= 32.20
COMPUTE NM HYD	119.00	-	3	.03895	67.94	3.120	1.50214	1.520	2.725	PER IMP= 49.40
ADD HYD	119.10	2& 3	4	.05071	87.29	3.895	1.44027	1.520	2.690	
ROUTE	119.20	4	2	.05071	64.06	3.895	1.44030	1.600	1.974	
COMPUTE NM HYD	115.00	-	3	.03760	55.71	1.866	.93031	1.520	2.315	PER IMP= 12.60
ROUTE	115.10	3	4	.03760	56.04	1.866	.93034	1.520	2.329	
COMPUTE NM HYD	112.00	-	3	.04603	67.47	2.232	.90927	1.520	2.290	PER IMP= 11.50
ADD HYD	112.10	1& 2	5	1.79799	1261.39	147.599	1.53921	1.680	1.096	
ADD HYD	112.20	3& 5	2	1.84402	1291.24	149.831	1.52348	1.680	1.094	
ADD HYD	112.30	4& 2	1	1.88162	1316.12	151.697	1.51163	1.680	1.093	
ROUTE	311.40	11	2	.00602	4.67	.494	1.53844	2.000	1.212	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	149.00	-	3	.03482	75.36	3.908	2.10416	1.520	3.382	PER IMP= 85.10
ADD HYD	311.10	2& 3	4	.04084	75.77	4.401	2.02073	1.520	2.899	
DIVIDE HYD	311.20	4	2	.01389	25.76	1.496	2.02073	1.520	2.899	
	311.30	AND	3	.02695	50.01	2.905	2.02073	1.520	2.899	
DIVIDE HYD	311.20	3	4	.01348	25.00	1.452	2.02071	1.520	2.899	
	311.20	AND	5	.01348	25.00	1.452	2.02071	1.520	2.899	
ROUTE	311.20	2	3	.01389	26.34	1.496	2.02075	1.520	2.964	
ROUTE	311.20	4	2	.01348	25.57	1.452	2.02075	1.520	2.964	
ROUTE	311.20	5	4	.01348	25.57	1.452	2.02075	1.520	2.964	
ADD HYD	311.30	2& 3	5	.02736	51.90	2.949	2.02067	1.520	2.964	
ADD HYD	311.40	5& 4	2	.04084	77.47	4.401	2.02067	1.520	2.964	
ROUTE	311.30	2	3	.04084	51.02	4.401	2.02069	1.600	1.952	
COMPUTE NM HYD	148.00	-	2	.01588	28.08	1.250	1.47575	1.520	2.763	PER IMP= 48.00
ROUTE	148.10	2	4	.01588	28.73	1.250	1.47581	1.520	2.827	
ROUTE	148.20	4	2	.01588	12.19	1.250	1.47582	1.680	1.199	
COMPUTE NM HYD	147.00	-	4	.00565	10.00	.445	1.47575	1.520	2.765	PER IMP= 48.00
ROUTE	147.10	4	5	.00565	10.09	.445	1.47592	1.520	2.791	
ROUTE	147.20	5	4	.00565	4.45	.445	1.47592	1.680	1.232	
COMPUTE NM HYD	146.00	-	5	.05976	88.79	5.207	1.63382	1.600	2.322	PER IMP= 56.00
ADD HYD	146.10	2& 3	6	.05672	62.56	5.651	1.86808	1.600	1.723	
ADD HYD	146.20	4& 6	2	.06237	66.83	6.096	1.83253	1.600	1.674	
ADD HYD	146.30	5& 2	3	.12213	155.62	11.303	1.73529	1.600	1.991	
COMPUTE NM HYD	154.00	-	2	.01947	44.25	2.379	2.29126	1.520	3.551	PER IMP= 96.70
ROUTE	154.10	2	4	.01947	28.62	2.379	2.29132	1.600	2.296	
COMPUTE NM HYD	153.00	-	2	.00646	13.86	.751	2.18106	1.520	3.353	PER IMP= 90.00
ROUTE	153.10	2	5	.00646	6.29	.751	2.18119	1.760	1.522	
COMPUTE NM HYD	152.00	-	2	.07224	93.07	5.927	1.53848	1.600	2.013	PER IMP= 54.70
ADD HYD	152.10	2& 4	6	.09171	121.68	8.307	1.69830	1.600	2.073	
ADD HYD	152.20	5& 6	2	.09817	127.47	9.058	1.73006	1.600	2.029	
ROUTE	152.30	2	5	.09817	126.43	9.058	1.73007	1.600	2.012	
ADD HYD	152.40	3& 5	2	.22030	282.05	20.361	1.73296	1.600	2.000	
ROUTE	152.30	10	3	.90462	597.28	88.467	1.83365	2.480	1.032	
COMPUTE NM HYD	150.00	-	4	.03482	71.55	3.445	1.85494	1.520	3.211	PER IMP= 67.20
ROUTE	150.10	4	5	.03482	54.00	3.445	1.85496	1.600	2.423	
COMPUTE NM HYD	142.00	-	4	.12769	241.09	11.404	1.67451	1.520	2.950	PER IMP= 58.80
ADD HYD	142.20	3& 4	6	1.03231	607.03	99.870	1.81396	2.480	.919	
ADD HYD	142.30	5& 6	3	1.06713	611.72	103.315	1.81530	2.400	.896	
ROUTE RESERVOIR	142.01	3	4	1.06713	611.72	103.315	1.81530	2.400	.896	
ROUTE	142.40	4	3	1.06713	610.80	103.315	1.81530	2.480	.894	
COMPUTE NM HYD	137.00	-	4	.08668	140.98	6.822	1.47575	1.520	2.541	PER IMP= 48.00
ADD HYD	137.10	3& 4	5	1.15381	617.94	110.137	1.78979	2.480	.837	
COMPUTE NM HYD	134.00	-	4	.04029	71.20	3.171	1.47575	1.520	2.761	PER IMP= 48.00
ADD HYD	134.10	4& 2	6	.26059	331.75	23.532	1.69320	1.600	1.989	
ADD HYD	134.20	6& 5	2	1.41440	803.27	133.670	1.77199	1.600	.887	
ROUTE	134.30	2	3	1.41440	828.59	133.670	1.77199	1.600	.915	
COMPUTE NM HYD	132.00	-	2	.02692	47.60	2.119	1.47576	1.520	2.763	PER IMP= 48.00
COMPUTE NM HYD	133.00	-	4	.03939	69.69	3.100	1.47576	1.520	2.764	PER IMP= 48.00
ADD HYD	133.10	2& 3	5	1.44132	860.64	135.788	1.76646	1.600	.933	
ADD HYD	133.20	4& 5	2	1.48071	908.26	138.889	1.75873	1.600	.958	
ROUTE	133.30	2	3	1.48071	918.85	138.889	1.75873	1.600	.970	
COMPUTE NM HYD	151.00	-	2	.02907	52.36	2.435	1.57028	1.520	2.815	PER IMP= 55.00
ROUTE	151.10	2	4	.02907	42.18	2.435	1.57031	1.600	2.267	

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COMPUTE NM HYD	131.00	-	2	.05707	92.14	3.679	1.20869	1.520	2.523	PER IMP= 30.80
ADD HYD	131.10	2& 3	5	1.53778	984.51	142.568	1.73831	1.600	1.000	
ADD HYD	131.20	4& 5	2	1.56685	1026.69	145.002	1.73520	1.600	1.024	
ROUTE	131.30	2	3	1.56685	989.42	145.002	1.73519	1.680	.987	
COMPUTE NM HYD	127.00	-	2	.04370	72.16	2.930	1.25697	1.520	2.580	PER IMP= 33.90
ADD HYD	127.10	2& 3	4	1.61055	1022.45	147.932	1.72222	1.680	.992	
ROUTE	127.20	4	2	1.61055	1056.09	147.932	1.72222	1.680	1.025	
COMPUTE NM HYD	128.00	-	3	.07690	136.82	6.082	1.48284	1.520	2.780	PER IMP= 48.00
ROUTE	128.10	3	4	.07690	142.33	6.082	1.48286	1.520	2.892	
COMPUTE NM HYD	126.00	-	3	.07448	122.47	5.261	1.32435	1.520	2.569	PER IMP= 37.70
ADD HYD	126.10	3& 4	5	.15138	264.80	11.342	1.40486	1.520	2.733	
ROUTE	126.20	5	3	.15138	246.83	11.342	1.40487	1.600	2.548	
ADD HYD	126.30	2& 3	4	1.76193	1224.99	159.274	1.69495	1.680	1.086	
COMPUTE NM HYD	118.00	-	2	.06353	95.41	3.308	.97631	1.520	2.347	PER IMP= 15.80
ADD HYD	118.10	2& 4	3	1.82546	1267.51	162.582	1.66994	1.680	1.085	
ROUTE	118.20	3	2	1.82546	1304.09	162.582	1.66994	1.680	1.116	
COMPUTE NM HYD	116.00	-	3	.01678	23.70	.723	.80829	1.520	2.207	PER IMP= 5.00
COMPUTE NM HYD	117.00	-	4	.01804	25.67	.797	.82855	1.520	2.224	PER IMP= 6.30
COMPUTE NM HYD	114.00	-	5	.01552	24.15	.891	1.07614	1.520	2.431	PER IMP= 22.20
ADD HYD	114.10	2& 3	6	1.84224	1314.45	163.305	1.66209	1.680	1.115	
ADD HYD	114.20	4& 6	2	1.86028	1325.70	164.102	1.65401	1.680	1.113	
ADD HYD	114.30	5& 2	3	1.87580	1336.57	164.993	1.64923	1.680	1.113	
ROUTE	114.40	3	2	1.87580	1369.23	164.993	1.64923	1.680	1.141	
COMPUTE NM HYD	113.00	-	5	.01992	28.84	.930	.87501	1.520	2.262	PER IMP= 9.30
ADD HYD	113.10	5& 2	4	1.89572	1381.94	165.923	1.64109	1.680	1.139	
ADD HYD	112.10	1& 4	3	3.77734	2698.06	317.620	1.57660	1.680	1.116	
ROUTE	112.20	3	1	3.77734	2756.10	317.620	1.57660	1.680	1.140	
COMPUTE NM HYD	111.00	-	2	.00906	12.80	.391	.80829	1.520	2.208	PER IMP= 5.00
ADD HYD	111.10	1& 2	3	3.78640	2761.70	318.010	1.57476	1.680	1.140	
ROUTE	111.20	3	1	3.78640	2688.04	318.010	1.57476	1.680	1.109	
COMPUTE NM HYD	110.00	-	2	.04352	66.08	2.341	1.00847	1.520	2.373	PER IMP= 17.90
ADD HYD	110.10	1& 2	3	3.82992	2717.60	320.351	1.56833	1.680	1.109	
ROUTE	110.20	3	1	3.82992	2717.61	320.351	1.56833	1.760	1.109	
COMPUTE NM HYD	109.00	-	2	.02638	38.19	1.231	.87501	1.520	2.262	PER IMP= 9.30
COMPUTE NM HYD	108.00	-	3	.00781	11.12	.345	.82855	1.520	2.225	PER IMP= 6.30
ADD HYD	109.10	1& 2	4	3.85630	2728.45	321.582	1.56359	1.760	1.106	
ADD HYD	109.20	3& 4	1	3.86411	2731.54	321.927	1.56210	1.760	1.105	
ROUTE	109.30	1	2	3.86411	2764.09	321.927	1.56210	1.760	1.118	
COMPUTE NM HYD	107.00	-	1	.02163	30.55	.932	.80829	1.520	2.207	PER IMP= 5.00
ADD HYD	107.10	1& 2	3	3.88574	2772.50	322.859	1.55790	1.760	1.115	
ROUTE	107.20	3	1	3.88574	2810.20	322.860	1.55791	1.760	1.130	
COMPUTE NM HYD	106.00	-	2	.04128	59.75	1.926	.87501	1.520	2.262	PER IMP= 9.30
ADD HYD	106.10	1& 2	3	3.92702	2827.17	324.786	1.55073	1.760	1.125	
ROUTE	106.20	3	1	3.92702	2876.15	324.786	1.55073	1.760	1.144	
COMPUTE NM HYD	105.00	-	2	.02584	37.41	1.206	.87501	1.520	2.262	PER IMP= 9.30
COMPUTE NM HYD	104.00	-	3	.01579	23.98	.849	1.00847	1.520	2.373	PER IMP= 17.90
ADD HYD	104.10	2& 3	4	.04163	61.39	2.055	.92561	1.520	2.304	
ADD HYD	104.20	1& 4	2	3.96865	2893.98	326.841	1.54417	1.760	1.139	
ROUTE	104.30	2	1	3.96865	2976.58	326.841	1.54417	1.760	1.172	
COMPUTE NM HYD	103.00	-	2	.02997	42.64	1.324	.82855	1.520	2.223	PER IMP= 6.30
ADD HYD	103.10	1& 2	3	3.99862	2988.44	328.165	1.53881	1.760	1.168	
ROUTE	103.20	3	1	3.99862	3086.81	328.165	1.53880	1.760	1.206	

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ROUTE	325.70	3	6	6.76580	2187.53	547.803	1.51812	2.160	.505	
ADD HYD	325.80	6& 4	2	13.53160	4375.06	1095.606	1.51812	2.160	.505	
COMPUTE NM HYD	324.00	-	3	.01196	12.69	.608	.95394	1.600	1.658	PER IMP= 6.20
ROUTE	324.10	1	4	.01470	18.40	.804	1.02581	1.600	1.956	
ADD HYD	324.20	3& 4	1	.02666	31.09	1.412	.99350	1.600	1.822	
ADD HYD	324.30	1& 2	3	13.55826	4380.83	1097.018	1.51709	2.160	.505	
DIVIDE HYD	324.40	3	1	6.77913	2190.42	548.509	1.51709	2.160	.505	
	324.40	AND	2	6.77913	2190.42	548.509	1.51709	2.160	.505	
*STORE RATING CURVE	RC=1 VS NO=1									
ROUTE	324.70	1	5	6.77913	2190.53	548.509	1.51709	2.160	.505	
ROUTE	324.80	2	4	6.77913	2190.53	548.509	1.51709	2.160	.505	
ADD HYD	324.11	4& 5	2	13.55826	4381.06	1097.018	1.51709	2.160	.505	
ROUTE	324.50	2	1	13.55826	4369.44	1097.017	1.51709	2.240	.504	
COMPUTE NM HYD	323.00	-	2	.00343	6.07	.233	1.27582	1.520	2.766	PER IMP= 27.90
ROUTE	323.10	2	3	.00343	3.14	.233	1.27612	1.600	1.432	
ADD HYD	323.20	1& 3	2	13.56169	4370.47	1097.251	1.51703	2.240	.504	
COMPUTE NM HYD	321.00	-	1	.06053	132.47	6.946	2.15149	1.520	3.419	PER IMP= 88.20
ADD HYD	321.10	2& 1	3	13.62222	4380.06	1104.197	1.51985	2.240	.502	
COMPUTE NM HYD	322.00	-	4	.09103	193.76	10.215	2.10402	1.520	3.326	PER IMP= 85.30
ADD HYD	322.10	3& 4	2	13.71325	4401.77	1114.412	1.52372	2.160	.502	
ROUTE	322.20	2	1	13.71325	4401.79	1114.411	1.52372	2.160	.502	
COMPUTE NM HYD	320.00	-	4	.00482	9.13	.392	1.52354	1.520	2.959	PER IMP= 44.60
ADD HYD	320.10	1& 4	12	13.71807	4402.53	1114.802	1.52372	2.160	.501	
COMPUTE NM HYD	225.00	-	1	.02082	45.33	2.367	2.13178	1.520	3.402	PER IMP= 87.00
ROUTE	225.10	1	2	.02082	47.16	2.367	2.13183	1.520	3.539	
COMPUTE NM HYD	223.00	-	1	.01050	23.17	1.221	2.18106	1.520	3.448	PER IMP= 90.00
ROUTE RESERVOIR	223.01	1	3	.01050	23.17	1.221	2.18106	1.520	3.448	
DIVIDE HYD	223.10	3	1	.00525	11.59	.611	2.18103	1.520	3.448	
	223.20	AND	4	.00525	11.59	.611	2.18103	1.520	3.448	
ROUTE	223.30	4	3	.00525	8.08	.611	2.18128	1.600	2.405	
ADD HYD	223.40	3& 2	5	.02607	54.33	2.978	2.14171	1.520	3.257	
ROUTE	223.50	1	2	.00525	6.46	.611	2.18128	1.680	1.923	
COMPUTE NM HYD	224.00	-	4	.02225	48.74	2.557	2.15478	1.520	3.423	PER IMP= 88.40
ADD HYD	224.10	4& 5	1	.04832	103.08	5.535	2.14772	1.520	3.333	
ROUTE	322.20	12	3	13.71807	4405.45	1114.802	1.52372	2.240	.502	
COMPUTE NM HYD	226.00	-	4	.01463	31.51	1.633	2.09236	1.520	3.365	PER IMP= 84.60
ADD HYD	226.10	3& 4	4	13.73270	4407.70	1116.435	1.52433	2.240	.502	
ROUTE RESERVOIR	226.01	4	6	13.73270	4407.70	1116.435	1.52433	2.240	.502	
ADD HYD	226.20	6& 1	3	13.78102	4417.18	1121.970	1.52652	2.240	.501	
ROUTE	226.30	3	4	13.78102	4423.44	1121.968	1.52651	2.240	.502	
ADD HYD	226.40	2& 4	5	13.78627	4426.36	1122.579	1.52676	2.240	.502	
COMPUTE NM HYD	222.00	-	4	.08660	179.15	9.154	1.98192	1.520	3.232	PER IMP= 77.80
ADD HYD	222.10	5& 4	2	13.87287	4442.27	1131.732	1.52960	2.240	.500	
COMPUTE NM HYD	221.00	-	4	.06353	126.77	6.176	1.82281	1.520	3.118	PER IMP= 68.00
ADD HYD	221.10	2& 4	1	13.93640	4450.82	1137.909	1.53094	2.240	.499	
ROUTE	221.20	1	2	13.93640	4439.86	1137.908	1.53094	2.240	.498	
COMPUTE NM HYD	220.00	-	1	.05896	104.25	4.641	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	220.10	1& 2	3	13.99536	4446.36	1142.549	1.53071	2.240	.496	
COMPUTE NM HYD	219.00	-	1	.07179	126.88	5.650	1.47576	1.520	2.761	PER IMP= 48.00
ADD HYD	219.10	1& 3	2	14.06715	4454.28	1148.199	1.53043	2.240	.495	
ROUTE	219.20	2	3	14.06715	4449.31	1148.199	1.53043	2.240	.494	
COMPUTE NM HYD	218.00	-	4	.05788	102.34	4.556	1.47575	1.520	2.763	PER IMP= 48.00

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ADD HYD	218.10	3& 4	1	14.12503	4455.69	1152.755	1.53020	2.240	.493	
COMPUTE NM HYD	216.00	-	4	.01310	23.17	1.031	1.47575	1.520	2.764	PER IMP= 48.00
ROUTE	216.10	4	2	.01310	19.08	1.031	1.47584	1.600	2.276	
COMPUTE NM HYD	217.00	-	3	.02827	49.99	2.225	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	217.10	3& 2	4	.04137	68.57	3.256	1.47575	1.520	2.590	
COMPUTE NM HYD	215.00	-	3	.02934	51.88	2.309	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	215.10	3& 4	2	.07071	120.46	5.565	1.47575	1.520	2.662	
ADD HYD	215.20	1& 2	3	14.19574	4464.40	1158.319	1.52993	2.240	.491	
ROUTE	215.30	3	1	14.19574	4466.61	1158.319	1.52993	2.320	.492	
COMPUTE NM HYD	214.00	-	4	.03392	59.98	2.670	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	214.10	4& 1	2	14.22966	4469.55	1160.990	1.52980	2.320	.491	
COMPUTE NM HYD	211.00	-	1	.02593	45.85	2.041	1.47575	1.520	2.763	PER IMP= 48.00
COMPUTE NM HYD	212.00	-	3	.02755	48.72	2.168	1.47576	1.520	2.763	PER IMP= 48.00
ADD HYD	212.10	1& 3	4	.05348	94.57	4.209	1.47574	1.520	2.763	
ROUTE	212.20	4	1	.05348	98.28	4.209	1.47579	1.520	2.871	
COMPUTE NM HYD	213.00	-	3	.00817	14.45	.643	1.47575	1.520	2.764	PER IMP= 48.00
ADD HYD	213.10	3& 1	4	.06165	112.74	4.852	1.47577	1.520	2.857	
ADD HYD	213.20	2& 4	1	14.29131	4475.64	1165.841	1.52957	2.320	.489	
ROUTE	213.40	1	2	14.29131	4479.00	1165.841	1.52957	2.320	.490	
COMPUTE NM HYD	210.00	-	1	.04379	77.43	3.447	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	210.10	1& 2	3	14.33510	4482.80	1169.287	1.52940	2.320	.489	
COMPUTE NM HYD	209.00	-	1	.01777	31.43	1.399	1.47576	1.520	2.763	PER IMP= 48.00
COMPUTE NM HYD	207.00	-	2	.01669	24.57	.921	1.03500	1.520	2.300	PER IMP= 23.00
ADD HYD	207.10	1& 2	4	.03446	56.00	2.320	1.26227	1.520	2.539	
ROUTE	207.20	4	1	.03446	59.20	2.320	1.26231	1.520	2.684	
COMPUTE NM HYD	208.00	-	2	.00314	5.56	.247	1.47576	1.520	2.768	PER IMP= 48.00
ADD HYD	208.10	1& 2	4	.03760	64.76	2.567	1.28009	1.520	2.691	
ADD HYD	208.20	4& 3	1	14.37270	4486.03	1171.855	1.52875	2.320	.488	
ROUTE	208.30	1	2	14.37270	4490.08	1171.855	1.52875	2.320	.488	
COMPUTE NM HYD	206.00	-	5	.01983	23.15	.705	.66638	1.520	1.824	PER IMP= 5.00
COMPUTE NM HYD	205.00	-	1	.01974	23.05	.702	.66638	1.520	1.824	PER IMP= 5.00
COMPUTE NM HYD	204.00	-	3	.00763	8.91	.271	.66638	1.520	1.825	PER IMP= 5.00
ADD HYD	204.10	1& 3	4	.02737	31.96	.973	.66636	1.520	1.824	
ROUTE	204.20	4	1	.02737	30.61	.973	.66641	1.520	1.748	
COMPUTE NM HYD	203.00	-	3	.00960	11.21	.341	.66638	1.520	1.825	PER IMP= 5.00
ADD HYD	203.10	1& 3	4	.03697	41.83	1.314	.66636	1.520	1.768	
ADD HYD	203.20	4& 5	1	.05680	64.98	2.019	.66636	1.520	1.787	
ROUTE	203.30	1	3	.05680	59.80	2.019	.66638	1.600	1.645	
COMPUTE NM HYD	202.00	-	1	.03805	73.93	3.517	1.73325	1.520	3.036	PER IMP= 62.50
ADD HYD	202.10	1& 2	4	14.41075	4493.91	1175.373	1.52929	2.320	.487	
ADD HYD	202.20	4& 3	1	14.46755	4497.07	1177.391	1.52590	2.320	.486	
ROUTE	202.30	1	2	14.46755	4498.65	1177.390	1.52590	2.320	.486	
COMPUTE NM HYD	201.00	-	1	.03518	52.33	1.774	.94541	1.520	2.324	PER IMP= 13.70
COMPUTE NM HYD	200.00	-	3	.05438	87.41	2.985	1.02924	1.520	2.512	PER IMP= 14.00
ADD HYD	200.10	1& 2	4	14.50273	4500.61	1179.163	1.52449	2.320	.485	
ADD HYD	200.20	3& 4	12	14.55711	4503.72	1182.148	1.52264	2.320	.483	
ADD HYD	200.30	12&10	1	18.66709	6292.38	1516.488	1.52322	2.160	.527	
ROUTE RESERVOIR	200.03	1	2	18.66709	4629.29	1501.901	1.50857	2.880	.387	AC-FT= 483.350
ROUTE RESERVOIR	200.03	1	2	18.66709	86.69	667.910	.67088	25.440	.007	AC-FT= 1325.108
ROUTE RESERVOIR	200.03	1	2	18.66709	87.68	673.358	.67635	25.440	.007	AC-FT= 1323.407
ROUTE RESERVOIR	200.03	1	2	18.66709	81.94	608.120	.61082	25.600	.007	AC-FT= 1340.612

FINISH

AHYMO SUMMARY TABLE (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992 RUN DATE (MON/DAY/YR) =07/20/1992

INPUT FILE = alt-g3.dat USER NO.= SCANLNNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= .00
RAINFALL TYPE= 2										RAIN24= 2.590
COMPUTE NM HYD	418.00	-	1	1.49581	1641.99	117.731	1.47575	1.680	1.715	PER IMP= 48.00
COMPUTE NM HYD	417.00	-	2	.13909	133.51	10.947	1.47576	1.760	1.500	PER IMP= 48.00
ADD HYD	417.10	1& 2	3	1.63490	1765.99	128.678	1.47575	1.680	1.688	
ROUTE RESERVOIR	417.01	3	4	1.63490	1765.99	128.678	1.47575	1.680	1.688	
ROUTE	417.20	4	5	1.63490	1320.73	128.678	1.47576	1.840	1.262	
COMPUTE NM HYD	419.00	-	1	.19715	222.10	15.517	1.47575	1.680	1.760	PER IMP= 48.00
COMPUTE NM HYD	420.00	-	2	.18889	202.07	14.867	1.47576	1.680	1.672	PER IMP= 48.00
ADD HYD	419.10	1& 2	3	.38604	424.17	30.384	1.47575	1.680	1.717	
ADD HYD	420.10	3& 5	4	2.02094	1661.45	159.062	1.47575	1.840	1.285	
ROUTE	420.20	4	5	2.02094	717.28	159.062	1.47575	2.240	.555	
COMPUTE NM HYD	416.00	-	1	.86541	840.86	68.114	1.47575	1.760	1.518	PER IMP= 48.00
ROUTE	416.10	1	2	.86541	386.92	68.114	1.47575	2.160	.699	
ADD HYD	416.20	2& 5	3	2.88635	1094.42	227.175	1.47575	2.240	.592	
COMPUTE NM HYD	415.00	-	1	.15228	238.20	11.985	1.47575	1.520	2.444	PER IMP= 48.00
ROUTE RESERVOIR	415.01	1	2	.15228	238.20	11.985	1.47575	1.520	2.444	
COMPUTE NM HYD	414.00	-	1	.11235	127.24	8.843	1.47576	1.680	1.770	PER IMP= 48.00
ADD HYD	414.10	2& 1	4	.26463	330.92	20.828	1.47575	1.600	1.954	
ROUTE RESERVOIR	414.01	4	2	.26463	330.92	20.828	1.47575	1.600	1.954	
ROUTE	414.30	2	1	.26463	149.09	20.828	1.47575	1.840	.880	
COMPUTE NM HYD	411.00	-	2	.29891	374.79	23.526	1.47575	1.600	1.959	PER IMP= 48.00
ADD HYD	411.10	1& 2	4	.56354	476.81	44.354	1.47575	1.680	1.322	
ROUTE	411.20	4	1	.56354	464.38	44.354	1.47575	1.680	1.288	
COMPUTE NM HYD	412.00	-	2	1.18559	1163.31	93.314	1.47576	1.760	1.533	PER IMP= 48.00
ADD HYD	412.10	1& 2	4	1.74913	1622.82	137.668	1.47575	1.760	1.450	
ADD HYD	412.20	4& 3	1	4.63548	2138.19	364.844	1.47575	1.840	.721	
ROUTE	412.30	1	5	4.63548	1219.30	364.844	1.47575	2.480	.411	
COMPUTE NM HYD	424.00	-	1	.33534	399.63	26.394	1.47576	1.600	1.862	PER IMP= 48.00
ROUTE RESERVOIR	424.01	1	2	.33534	399.63	26.394	1.47576	1.600	1.862	
COMPUTE NM HYD	421.00	-	1	.33184	384.26	26.118	1.47575	1.680	1.809	PER IMP= 48.00
ADD HYD	421.10	1& 2	3	.66718	777.71	52.512	1.47575	1.680	1.821	
ROUTE	421.20	3	1	.66718	656.38	52.512	1.47576	1.680	1.537	
COMPUTE NM HYD	422.00	-	2	.14367	157.35	11.308	1.47576	1.680	1.711	PER IMP= 48.00
ADD HYD	422.10	1& 2	3	.81085	813.73	63.819	1.47575	1.680	1.568	
ROUTE	422.20	3	1	.81085	476.95	63.819	1.47575	1.920	.919	
COMPUTE NM HYD	423.00	-	2	.05985	50.32	4.711	1.47575	1.840	1.314	PER IMP= 48.00
ADD HYD	423.10	1& 2	3	.87070	526.33	68.530	1.47575	1.920	.945	
ROUTE	423.20	3	1	.87070	252.39	68.528	1.47572	2.480	.453	
COMPUTE NM HYD	413.00	-	2	1.00011	1043.89	78.716	1.47575	1.680	1.631	PER IMP= 48.00
ADD HYD	413.10	1& 2	3	1.87081	1071.27	147.244	1.47574	1.760	.895	
ROUTE	413.20	3	1	1.87081	850.31	147.243	1.47573	1.920	.710	
COMPUTE NM HYD	410.00	-	2	1.38956	1488.08	109.368	1.47575	1.680	1.673	PER IMP= 48.00
ADD HYD	410.10	1& 2	3	3.26037	2153.97	256.611	1.47574	1.760	1.032	
ADD HYD	410.20	3& 5	4	7.89585	2669.14	621.455	1.47575	1.840	.528	
ROUTE RESERVOIR	410.01	4	1	7.89585	2669.14	621.455	1.47575	1.840	.528	
ROUTE	410.30	1	2	7.89585	2289.13	621.454	1.47575	2.240	.453	
COMPUTE NM HYD	409.00	-	1	.46618	591.09	36.692	1.47576	1.600	1.981	PER IMP= 48.00
ROUTE	409.10	1	3	.46618	159.38	36.684	1.47544	2.000	.534	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	408.00	-	1	1.38633	1467.45	109.114	1.47575	1.680	1.654	PER IMP= 48.00
ADD HYD	408.10	1& 3	4	1.85251	1569.20	145.798	1.47568	1.680	1.324	
ADD HYD	408.20	4& 2	2	9.74836	3155.75	767.252	1.47573	2.000	.506	
ROUTE RESERVOIR	410.01	2	5	9.74836	237.33	741.830	1.42684	8.000	.038	AC-FT= 503.183
ROUTE	408.30	5	1	9.74836	237.31	740.188	1.42368	8.240	.038	
COMPUTE NM HYD	403.00	-	2	.48341	570.95	40.513	1.57139	1.680	1.845	PER IMP= 53.70
ADD HYD	403.10	1& 2	3	10.23177	610.69	780.701	1.43066	1.680	.093	
ROUTE	408.30	3	19	10.23177	533.46	779.022	1.42758	1.760	.081	
COMPUTE NM HYD	406.00	-	1	.05788	84.69	6.177	2.00096	1.680	2.286	PER IMP= 78.40
DIVIDE HYD	406.10	1	2	.05784	84.00	6.172	2.00095	1.680	2.269	
	406.20	AND	3	.00004	.69	.005	2.00095	1.680	25.220	
ROUTE	406.30	3	1	.00004	.08	.005	2.29173	1.760	2.969	
COMPUTE NM HYD	407.00	-	2	.06012	94.92	4.732	1.47575	1.520	2.467	PER IMP= 48.00
ROUTE RESERVOIR	407.01	2	3	.06012	94.92	4.732	1.47575	1.520	2.467	
ROUTE	407.10	3	2	.06012	27.01	4.732	1.47576	1.840	.702	
COMPUTE NM HYD	404.00	-	3	.22811	307.78	25.162	2.06826	1.680	2.108	PER IMP= 83.00
ADD HYD	404.10	1& 2	4	.06016	27.08	4.737	1.47626	1.840	.703	
ADD HYD	404.20	3& 4	7	.28827	332.19	29.899	1.94471	1.680	1.801	
DIVIDE HYD	404.10	7	2	.15275	46.00	15.843	1.94471	1.440	.471	
	404.20	AND	3	.13552	286.19	14.056	1.94471	1.680	3.300	
DIVIDE HYD	404.20	2	1	.07637	23.00	7.921	1.94471	1.440	.471	
	404.30	AND	4	.07637	23.00	7.921	1.94471	1.440	.471	
ROUTE	404.40	1	2	.07637	23.42	7.921	1.94469	1.440	.479	
ROUTE	404.40	4	1	.07637	23.42	7.921	1.94469	1.440	.479	
ADD HYD	404.50	1& 2	7	.15275	46.84	15.843	1.94468	1.440	.479	
ROUTE	404.60	3	1	.13552	239.38	14.057	1.94480	1.840	2.760	
COMPUTE NM HYD	405.00	-	2	.28007	350.29	26.575	1.77912	1.680	1.954	PER IMP= 66.00
ROUTE	405.10	2	3	.28007	168.15	26.575	1.77912	2.000	.938	
ADD HYD	405.20	3& 1	3	.41559	395.91	40.631	1.83314	1.920	1.489	
COMPUTE NM HYD	402.00	-	2	.21249	309.94	23.227	2.04956	1.680	2.279	PER IMP= 81.70
ADD HYD	402.10	2& 3	4	.62808	623.45	63.859	1.90636	1.760	1.551	
ROUTE	402.20	4	2	.62808	588.43	63.859	1.90636	1.920	1.464	
COMPUTE NM HYD	401.00	-	3	.14474	218.69	16.329	2.11536	1.680	2.361	PER IMP= 86.00
ADD HYD	401.20	2& 3	5	.77282	721.47	80.188	1.94550	1.840	1.459	
COMPUTE NM HYD	303.00	-	1	.00790	4.49	.548	1.29955	2.160	.889	PER IMP= 29.50
ADD HYD	303.10	1& 7	2	.16065	50.72	16.390	1.91295	2.240	.493	
DIVIDE HYD	303.20	2	1	.15740	46.00	16.059	1.91295	1.440	.457	
	303.30	AND	6	.00325	4.72	.331	1.91295	2.240	2.271	
DIVIDE HYD	303.40	1	2	.07870	23.00	8.029	1.91295	1.440	.457	
	303.40	AND	3	.07870	23.00	8.029	1.91295	1.440	.457	
ROUTE	303.50	2	1	.07870	23.30	8.030	1.91296	1.440	.462	
ROUTE	303.60	3	2	.07870	23.30	8.030	1.91296	1.440	.462	
ADD HYD	303.70	1& 2	3	.15740	46.59	16.059	1.91295	1.440	.462	
COMPUTE NM HYD	302.00	-	1	.01116	8.25	.698	1.17347	1.920	1.156	PER IMP= 21.00
ADD HYD	302.10	1& 3	2	.16856	54.63	16.757	1.86398	1.920	.506	
DIVIDE HYD	302.20	2	1	.16327	46.00	16.231	1.86398	1.440	.440	
	302.30	AND	8	.00529	8.63	.526	1.86398	1.920	2.547	
DIVIDE HYD	302.40	1	2	.08164	23.00	8.116	1.86398	1.440	.440	
	302.40	AND	3	.08164	23.00	8.116	1.86398	1.440	.440	
ROUTE	302.40	2	4	.08164	23.42	8.116	1.86400	1.440	.448	
ROUTE	302.50	3	1	.08164	23.42	8.116	1.86400	1.440	.448	
ADD HYD	302.60	4& 1	3	.16327	46.84	16.231	1.86398	1.440	.448	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	301.00	-	1	.00593	6.65	.456	1.44047	1.680	1.753	PER IMP= 39.00
ROUTE	301.20	1	2	.00593	6.63	.456	1.44057	1.680	1.746	
ADD HYD	301.30	2& 3	7	.16920	53.06	16.687	1.84914	1.760	.490	
COMPUTE NM HYD	300.00	-	2	.00603	10.40	.382	1.18682	1.520	2.694	PER IMP= 21.90
ADD HYD	300.10	8& 2	1	.01132	11.68	.908	1.50335	1.520	1.612	
ROUTE	300.20	1	2	.01132	11.91	.908	1.50346	1.520	1.643	
COMPUTE NM HYD	304.00	-	1	.00347	6.41	.264	1.42712	1.520	2.884	PER IMP= 38.10
ROUTE	304.20	1	3	.00347	6.50	.264	1.42740	1.520	2.926	
ADD HYD	304.30	2& 3	8	.01479	18.41	1.172	1.48546	1.520	1.944	
COMPUTE NM HYD	305.00	-	9	.00402	7.27	.297	1.38707	1.520	2.824	PER IMP= 35.40
ROUTE RESERVOIR	401.01	5	1	.77282	674.31	80.188	1.94550	2.000	1.363	AC-FT= 3.973
ROUTE	401.80	1	2	.77282	673.63	80.188	1.94550	2.000	1.362	
COMPUTE NM HYD	307.00	-	4	.01650	18.30	1.195	1.35741	1.680	1.733	PER IMP= 33.40
ADD HYD	307.10	6& 4	1	.01975	20.03	1.526	1.44870	1.760	1.585	
ROUTE	307.20	1	3	.01975	19.79	1.526	1.44876	1.760	1.566	
ADD HYD	307.30	3& 2	1	.79257	688.50	81.714	1.93312	2.000	1.357	
COMPUTE NM HYD	315.00	-	2	.00836	13.25	.406	.91092	1.520	2.476	PER IMP= 3.30
ROUTE RESERVOIR	315.01	2	3	.00836	13.25	.406	.91092	1.520	2.476	
ROUTE	315.10	3	2	.00836	11.28	.406	.91103	1.600	2.108	
ADD HYD	315.20	1& 2	3	.80093	690.79	82.120	1.92245	2.000	1.348	
COMPUTE NM HYD	312.00	-	1	.03437	58.05	2.053	1.12007	1.520	2.639	PER IMP= 17.40
DIVIDE HYD	312.10	1	2	.01719	29.03	1.027	1.12006	1.520	2.639	
	312.20	AND	4	.01719	29.03	1.027	1.12006	1.520	2.639	
ROUTE	312.30	2	5	.01719	28.37	1.027	1.12013	1.520	2.580	
ADD HYD	312.40	3& 5	1	.81811	696.04	83.146	1.90560	2.000	1.329	
COMPUTE NM HYD	314.00	-	3	.01914	30.69	.969	.94949	1.520	2.506	PER IMP= 5.90
ADD HYD	314.10	1& 3	2	.83725	699.29	84.116	1.88374	2.000	1.305	
ROUTE RESERVOIR	401.02	2	1	.83725	617.14	84.116	1.88374	2.240	1.152	AC-FT= 9.712
ROUTE	314.90	1	2	.83725	617.02	84.116	1.88374	2.240	1.151	
COMPUTE NM HYD	306.00	-	1	.01532	14.55	.970	1.18682	1.760	1.484	PER IMP= 21.90
ROUTE	306.10	1	3	.01532	14.57	.970	1.18685	1.760	1.486	
ROUTE	306.20	3	1	.01532	13.24	.970	1.18685	1.840	1.350	
COMPUTE NM HYD	310.00	-	3	.00981	16.77	.607	1.16012	1.520	2.672	PER IMP= 20.10
ADD HYD	310.10	3& 1	5	.02513	20.15	1.577	1.17636	1.520	1.253	
ROUTE	310.20	5	1	.02513	20.39	1.577	1.17641	1.520	1.268	
ADD HYD	310.30	1& 2	3	.86238	624.69	85.692	1.86312	2.240	1.132	
ROUTE	310.40	4	5	.01719	31.67	1.027	1.12013	1.520	2.879	
ADD HYD	310.50	5& 3	1	.87957	626.28	86.719	1.84861	2.240	1.113	
COMPUTE NM HYD	313.00	-	2	.00787	13.48	.489	1.16457	1.520	2.675	PER IMP= 20.40
ADD HYD	313.10	1& 2	3	.88744	626.92	87.208	1.84254	2.240	1.104	
ROUTE RESERVOIR	401.03	3	1	.88744	593.01	87.208	1.84254	2.480	1.044	AC-FT= 5.406
COMPUTE NM HYD	309.00	-	3	.00803	6.26	.528	1.23280	1.840	1.219	PER IMP= 25.00
COMPUTE NM HYD	308.00	-	4	.00915	9.40	.731	1.49832	1.760	1.604	PER IMP= 42.90
ADD HYD	308.10	3& 4	2	.01718	15.35	1.259	1.37412	1.840	1.396	
ADD HYD	308.20	1& 2	10	.90462	597.14	88.467	1.83365	2.400	1.031	
COMPUTE NM HYD	311.00	-	11	.00602	6.05	.494	1.53837	1.760	1.572	PER IMP= 45.60
ROUTE	301.10	7	1	.16920	40.63	16.687	1.84914	2.880	.375	
ROUTE	304.10	8	2	.01479	7.25	1.172	1.48562	2.080	.766	
ROUTE	305.10	9	3	.00402	2.33	.297	1.38730	1.680	.905	
ADD HYD	301.20	1& 2	4	.18399	44.71	17.859	1.81989	2.800	.380	
ADD HYD	301.30	3& 4	1	.18801	45.61	18.156	1.81063	2.800	.379	
COMPUTE NM HYD	145.00	-	2	.12312	172.12	12.483	1.90111	1.680	2.184	PER IMP= 71.60

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	145.10	1& 2	3	.31113	196.07	30.639	1.84643	1.680	.985	
ROUTE	145.20	3	1	.31113	194.10	30.639	1.84643	1.680	.975	
COMPUTE NM HYD	143.00	-	2	.09431	111.64	7.423	1.47576	1.600	1.850	PER IMP= 48.00
COMPUTE NM HYD	144.00	-	3	.02602	47.22	2.210	1.59263	1.520	2.835	PER IMP= 50.40
ADD HYD	143.10	1& 2	4	.40544	305.68	38.062	1.76021	1.680	1.178	
ADD HYD	143.20	3& 4	1	.43146	333.28	40.272	1.75010	1.680	1.207	
ROUTE	143.30	1	2	.43146	325.32	40.272	1.75010	1.680	1.178	
COMPUTE NM HYD	141.00	-	1	.03868	67.94	3.044	1.47575	1.520	2.744	PER IMP= 48.00
ADD HYD	141.10	1& 2	3	.47014	359.49	43.317	1.72753	1.680	1.195	
COMPUTE NM HYD	140.00	-	1	.09638	113.68	7.586	1.47575	1.680	1.843	PER IMP= 48.00
ADD HYD	140.10	1& 3	2	.56652	473.17	50.902	1.68470	1.680	1.305	
ROUTE	140.20	2	1	.56652	398.95	50.902	1.68470	1.760	1.100	
COMPUTE NM HYD	139.00	-	2	.02145	37.94	1.688	1.47576	1.520	2.764	PER IMP= 48.00
ADD HYD	139.10	1& 2	3	.58797	412.15	52.591	1.67707	1.760	1.095	
ROUTE	139.20	3	1	.58797	389.42	52.591	1.67707	1.920	1.035	
COMPUTE NM HYD	138.00	-	2	.16332	235.75	12.854	1.47576	1.520	2.255	PER IMP= 48.00
ADD HYD	138.10	2& 1	3	.75129	489.46	65.445	1.63331	1.840	1.018	
ROUTE	138.20	3	1	.75129	452.97	65.445	1.63331	1.920	.942	
COMPUTE NM HYD	129.00	-	2	.39080	529.21	30.759	1.47575	1.600	2.116	PER IMP= 48.00
ADD HYD	129.10	1& 2	3	1.14209	743.48	96.204	1.57939	1.680	1.017	
COMPUTE NM HYD	136.00	-	1	.08130	106.34	6.399	1.47575	1.600	2.044	PER IMP= 48.00
COMPUTE NM HYD	135.00	-	2	.05923	82.14	4.662	1.47575	1.600	2.167	PER IMP= 48.00
ADD HYD	135.10	1& 2	4	.14053	188.49	11.061	1.47575	1.600	2.096	
ROUTE RESERVOIR	135.01	4	1	.14053	188.49	11.061	1.47575	1.600	2.096	
ROUTE	135.20	1	2	.14053	83.88	11.061	1.47576	1.840	.933	
COMPUTE NM HYD	130.00	-	1	.20469	234.61	16.111	1.47575	1.680	1.791	PER IMP= 48.00
ADD HYD	130.10	1& 2	4	.34522	302.92	27.171	1.47575	1.680	1.371	
ROUTE	130.20	4	2	.34522	252.07	27.171	1.47575	1.840	1.141	
COMPUTE NM HYD	125.00	-	1	.03679	59.19	2.896	1.47575	1.520	2.514	PER IMP= 48.00
ADD HYD	125.10	1& 2	4	.38201	273.36	30.067	1.47575	1.840	1.118	
ADD HYD	125.20	3& 4	1	1.52410	981.05	126.270	1.55342	1.760	1.006	
COMPUTE NM HYD	124.00	-	2	.04092	54.49	3.221	1.47575	1.600	2.081	PER IMP= 48.00
ADD HYD	124.10	2& 1	3	1.56502	1019.66	129.491	1.55138	1.760	1.018	
ROUTE	124.20	3	1	1.56502	1022.34	129.491	1.55138	1.760	1.021	
COMPUTE NM HYD	123.00	-	2	.02504	44.28	1.971	1.47575	1.520	2.763	PER IMP= 48.00
COMPUTE NM HYD	122.00	-	3	.13622	177.56	10.721	1.47575	1.600	2.037	PER IMP= 48.00
ADD HYD	123.10	1& 2	4	1.59006	1037.71	131.462	1.55019	1.760	1.020	
ADD HYD	123.20	3& 4	1	1.72628	1181.01	142.183	1.54432	1.680	1.069	
ROUTE	123.30	1	2	1.72628	1188.55	142.183	1.54432	1.680	1.076	
COMPUTE NM HYD	121.00	-	1	.02100	35.08	1.521	1.35794	1.520	2.610	PER IMP= 42.30
ADD HYD	121.10	1& 2	3	1.74728	1204.78	143.704	1.54208	1.680	1.077	
ROUTE	121.20	3	1	1.74728	1202.93	143.704	1.54208	1.680	1.076	
COMPUTE NM HYD	120.00	-	2	.01176	19.36	.775	1.23541	1.520	2.572	PER IMP= 32.20
COMPUTE NM HYD	119.00	-	3	.03895	67.94	3.120	1.50214	1.520	2.725	PER IMP= 49.40
ADD HYD	119.10	2& 3	4	.05071	87.29	3.895	1.44027	1.520	2.690	
ROUTE	119.20	4	2	.05071	64.06	3.895	1.44030	1.600	1.974	
COMPUTE NM HYD	115.00	-	3	.03760	55.71	1.866	.93031	1.520	2.315	PER IMP= 12.60
ROUTE	115.10	3	4	.03760	56.04	1.866	.93034	1.520	2.329	
COMPUTE NM HYD	112.00	-	3	.04603	67.47	2.232	.90927	1.520	2.290	PER IMP= 11.50
ADD HYD	112.10	1& 2	5	1.79799	1261.39	147.599	1.53921	1.680	1.096	
ADD HYD	112.20	3& 5	2	1.84402	1291.24	149.831	1.52348	1.680	1.094	
ADD HYD	112.30	4& 2	1	1.88162	1316.12	151.697	1.51163	1.680	1.093	

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ROUTE	311.40	11	2	.00602	4.67	.494	1.53844	2.000	1.212	
COMPUTE NM HYD	149.00	-	3	.03482	75.36	3.908	2.10416	1.520	3.382	PER IMP= 85.10
ADD HYD	311.10	2& 3	4	.04084	75.77	4.401	2.02073	1.520	2.899	
DIVIDE HYD	311.20	4	2	.01389	25.76	1.496	2.02073	1.520	2.899	
	311.30	AND	3	.02695	50.01	2.905	2.02073	1.520	2.899	
DIVIDE HYD	311.20	3	4	.01348	25.00	1.452	2.02071	1.520	2.899	
	311.20	AND	5	.01348	25.00	1.452	2.02071	1.520	2.899	
ROUTE	311.20	2	3	.01389	26.34	1.496	2.02075	1.520	2.964	
ROUTE	311.20	4	2	.01348	25.57	1.452	2.02075	1.520	2.964	
ROUTE	311.20	5	4	.01348	25.57	1.452	2.02075	1.520	2.964	
ADD HYD	311.30	2& 3	5	.02736	51.90	2.949	2.02067	1.520	2.964	
ADD HYD	311.40	5& 4	2	.04084	77.47	4.401	2.02067	1.520	2.964	
ROUTE	311.30	2	3	.04084	51.02	4.401	2.02069	1.600	1.952	
COMPUTE NM HYD	148.00	-	2	.01588	28.08	1.250	1.47575	1.520	2.763	PER IMP= 48.00
ROUTE	148.10	2	4	.01588	28.73	1.250	1.47581	1.520	2.827	
ROUTE	148.20	4	2	.01588	12.19	1.250	1.47582	1.680	1.199	
COMPUTE NM HYD	147.00	-	4	.00565	10.00	.445	1.47575	1.520	2.765	PER IMP= 48.00
ROUTE	147.10	4	5	.00565	10.09	.445	1.47592	1.520	2.791	
ROUTE	147.20	5	4	.00565	4.45	.445	1.47592	1.680	1.232	
COMPUTE NM HYD	146.00	-	5	.05976	88.79	5.207	1.63382	1.600	2.322	PER IMP= 56.00
ADD HYD	146.10	2& 3	6	.05672	62.56	5.651	1.86808	1.600	1.723	
ADD HYD	146.20	4& 6	2	.06237	66.83	6.096	1.83253	1.600	1.674	
ADD HYD	146.30	5& 2	3	.12213	155.62	11.303	1.73529	1.600	1.991	
COMPUTE NM HYD	154.00	-	2	.01947	44.25	2.379	2.29126	1.520	3.551	PER IMP= 96.70
ROUTE	154.10	2	4	.01947	28.62	2.379	2.29132	1.600	2.296	
COMPUTE NM HYD	153.00	-	2	.00646	13.86	.751	2.18106	1.520	3.353	PER IMP= 90.00
ROUTE	153.10	2	5	.00646	6.29	.751	2.18119	1.760	1.522	
COMPUTE NM HYD	152.00	-	2	.07224	93.07	5.927	1.53848	1.600	2.013	PER IMP= 54.70
ADD HYD	152.10	2& 4	6	.09171	121.68	8.307	1.69830	1.600	2.073	
ADD HYD	152.20	5& 6	2	.09817	127.47	9.058	1.73006	1.600	2.029	
ROUTE	152.30	2	5	.09817	126.43	9.058	1.73007	1.600	2.012	
ADD HYD	152.40	3& 5	2	.22030	282.05	20.361	1.73296	1.600	2.000	
ROUTE	152.30	10	3	.90462	597.28	88.467	1.83365	2.480	1.032	
COMPUTE NM HYD	150.00	-	4	.03482	71.55	3.445	1.85494	1.520	3.211	PER IMP= 67.20
ROUTE	150.10	4	5	.03482	54.00	3.445	1.85496	1.600	2.423	
COMPUTE NM HYD	142.00	-	4	.12769	241.09	11.404	1.67451	1.520	2.950	PER IMP= 58.80
ADD HYD	142.20	3& 4	6	1.03231	607.03	99.870	1.81396	2.480	.919	
ADD HYD	142.30	5& 6	3	1.06713	611.72	103.315	1.81530	2.400	.896	
ROUTE RESERVOIR	142.01	3	4	1.06713	611.72	103.315	1.81530	2.400	.896	
ROUTE	142.40	4	3	1.06713	610.80	103.315	1.81530	2.480	.894	
COMPUTE NM HYD	137.00	-	4	.08668	140.98	6.822	1.47575	1.520	2.541	PER IMP= 48.00
ADD HYD	137.10	3& 4	5	1.15381	617.94	110.137	1.78979	2.480	.837	
COMPUTE NM HYD	134.00	-	4	.04029	71.20	3.171	1.47575	1.520	2.761	PER IMP= 48.00
ADD HYD	134.10	4& 2	6	.26059	331.75	23.532	1.69320	1.600	1.989	
ADD HYD	134.20	6& 5	2	1.41440	803.27	133.670	1.77199	1.600	.887	
ROUTE	134.30	2	3	1.41440	828.59	133.670	1.77199	1.600	.915	
COMPUTE NM HYD	132.00	-	2	.02692	47.60	2.119	1.47576	1.520	2.763	PER IMP= 48.00
COMPUTE NM HYD	133.00	-	4	.03939	69.69	3.100	1.47576	1.520	2.764	PER IMP= 48.00
ADD HYD	133.10	2& 3	5	1.44132	860.64	135.788	1.76646	1.600	.933	
ADD HYD	133.20	4& 5	2	1.48071	908.26	138.889	1.75873	1.600	.958	
ROUTE	133.30	2	3	1.48071	918.85	138.889	1.75873	1.600	.970	
COMPUTE NM HYD	151.00	-	2	.02907	52.36	2.435	1.57028	1.520	2.815	PER IMP= 55.00

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ROUTE	151.10	2	4	.02907	42.18	2.435	1.57031	1.600	2.267	
COMPUTE NM HYD	131.00	-	2	.05707	92.14	3.679	1.20869	1.520	2.523	PER IMP= 30.80
ADD HYD	131.10	2& 3	5	1.53778	984.51	142.568	1.73831	1.600	1.000	
ADD HYD	131.20	4& 5	2	1.56685	1026.69	145.002	1.73520	1.600	1.024	
ROUTE	131.30	2	3	1.56685	989.42	145.002	1.73519	1.680	.987	
COMPUTE NM HYD	127.00	-	2	.04370	72.16	2.930	1.25697	1.520	2.580	PER IMP= 33.90
ADD HYD	127.10	2& 3	4	1.61055	1022.45	147.932	1.72222	1.680	.992	
ROUTE	127.20	4	2	1.61055	1056.09	147.932	1.72222	1.680	1.025	
COMPUTE NM HYD	128.00	-	3	.07690	136.82	6.082	1.48284	1.520	2.780	PER IMP= 48.00
ROUTE	128.10	3	4	.07690	142.33	6.082	1.48286	1.520	2.892	
COMPUTE NM HYD	126.00	-	3	.07448	122.47	5.261	1.32435	1.520	2.569	PER IMP= 37.70
ADD HYD	126.10	3& 4	5	.15138	264.80	11.342	1.40486	1.520	2.733	
ROUTE	126.20	5	3	.15138	246.83	11.342	1.40487	1.600	2.548	
ADD HYD	126.30	2& 3	4	1.76193	1224.99	159.274	1.69495	1.680	1.086	
COMPUTE NM HYD	118.00	-	2	.06353	95.41	3.308	.97631	1.520	2.347	PER IMP= 15.80
ADD HYD	118.10	2& 4	3	1.82546	1267.51	162.582	1.66994	1.680	1.085	
ROUTE	118.20	3	2	1.82546	1304.09	162.582	1.66994	1.680	1.116	
COMPUTE NM HYD	116.00	-	3	.01678	23.70	.723	.80829	1.520	2.207	PER IMP= 5.00
COMPUTE NM HYD	117.00	-	4	.01804	25.67	.797	.82855	1.520	2.224	PER IMP= 6.30
COMPUTE NM HYD	114.00	-	5	.01552	24.15	.891	1.07614	1.520	2.431	PER IMP= 22.20
ADD HYD	114.10	2& 3	6	1.84224	1314.45	163.305	1.66209	1.680	1.115	
ADD HYD	114.20	4& 6	2	1.86028	1325.70	164.102	1.65401	1.680	1.113	
ADD HYD	114.30	5& 2	3	1.87580	1336.57	164.993	1.64923	1.680	1.113	
ROUTE	114.40	3	2	1.87580	1369.23	164.993	1.64923	1.680	1.141	
COMPUTE NM HYD	113.00	-	5	.01992	28.84	.930	.87501	1.520	2.262	PER IMP= 9.30
ADD HYD	113.10	5& 2	4	1.89572	1381.94	165.923	1.64109	1.680	1.139	
ADD HYD	112.10	1& 4	3	3.77734	2698.06	317.620	1.57660	1.680	1.116	
ROUTE	112.20	3	1	3.77734	2756.10	317.620	1.57660	1.680	1.140	
COMPUTE NM HYD	111.00	-	2	.00906	12.80	.391	.80829	1.520	2.208	PER IMP= 5.00
ADD HYD	111.10	1& 2	3	3.78640	2761.70	318.010	1.57476	1.680	1.140	
ROUTE	111.20	3	1	3.78640	2688.04	318.010	1.57476	1.680	1.109	
COMPUTE NM HYD	110.00	-	2	.04352	66.08	2.341	1.00847	1.520	2.373	PER IMP= 17.90
ADD HYD	110.10	1& 2	3	3.82992	2717.60	320.351	1.56833	1.680	1.109	
ROUTE	110.20	3	1	3.82992	2717.61	320.351	1.56833	1.760	1.109	
COMPUTE NM HYD	109.00	-	2	.02638	38.19	1.231	.87501	1.520	2.262	PER IMP= 9.30
COMPUTE NM HYD	108.00	-	3	.00781	11.12	.345	.82855	1.520	2.225	PER IMP= 6.30
ADD HYD	109.10	1& 2	4	3.85630	2728.45	321.582	1.56359	1.760	1.106	
ADD HYD	109.20	3& 4	1	3.86411	2731.54	321.927	1.56210	1.760	1.105	
ROUTE	109.30	1	2	3.86411	2764.09	321.927	1.56210	1.760	1.118	
COMPUTE NM HYD	107.00	-	1	.02163	30.55	.932	.80829	1.520	2.207	PER IMP= 5.00
ADD HYD	107.10	1& 2	3	3.88574	2772.50	322.859	1.55790	1.760	1.115	
ROUTE	107.20	3	1	3.88574	2810.20	322.860	1.55791	1.760	1.130	
COMPUTE NM HYD	106.00	-	2	.04128	59.75	1.926	.87501	1.520	2.262	PER IMP= 9.30
ADD HYD	106.10	1& 2	3	3.92702	2827.17	324.786	1.55073	1.760	1.125	
ROUTE	106.20	3	1	3.92702	2876.15	324.786	1.55073	1.760	1.144	
COMPUTE NM HYD	105.00	-	2	.02584	37.41	1.206	.87501	1.520	2.262	PER IMP= 9.30
COMPUTE NM HYD	104.00	-	3	.01579	23.98	.849	1.00847	1.520	2.373	PER IMP= 17.90
ADD HYD	104.10	2& 3	4	.04163	61.39	2.055	.92561	1.520	2.304	
ADD HYD	104.20	1& 4	2	3.96865	2893.98	326.841	1.54417	1.760	1.139	
ROUTE	104.30	2	1	3.96865	2976.58	326.841	1.54417	1.760	1.172	
COMPUTE NM HYD	103.00	-	2	.02997	42.64	1.324	.82855	1.520	2.223	PER IMP= 6.30
ADD HYD	103.10	1& 2	3	3.99862	2988.44	328.165	1.53881	1.760	1.168	

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ROUTE	103.20	3	1	3.99862	3086.81	328.165	1.53880	1.760	1.206	
COMPUTE NM HYD	101.00	-	2	.08444	131.87	4.727	1.04962	1.520	2.440	PER IMP= 19.30
COMPUTE NM HYD	102.00	-	3	.02692	40.88	1.448	1.00847	1.520	2.373	PER IMP= 17.90
ADD HYD	101.10	1& 2	4	4.08306	3127.08	332.892	1.52869	1.760	1.197	
ADD HYD	101.20	3& 4	10	4.10998	3139.36	334.340	1.52528	1.760	1.193	
COMPUTE NM HYD	509.00	-	4	.04047	57.26	3.185	1.47575	1.520	2.211	PER IMP= 48.00
ROUTE RESERVOIR	509.01	4	5	.04047	57.26	3.185	1.47575	1.520	2.211	
ROUTE	509.10	5	4	.04047	8.50	3.185	1.47559	2.000	.328	
COMPUTE NM HYD	508.00	-	5	.13308	119.19	11.489	1.61866	1.840	1.399	PER IMP= 56.40
ADD HYD	508.10	4& 5	6	.17355	127.01	14.673	1.58529	1.840	1.143	
ROUTE	508.20	6	4	.17355	126.46	14.673	1.58529	1.840	1.139	
ROUTE	508.30	4	5	.17355	76.44	14.673	1.58528	2.320	.688	
COMPUTE NM HYD	506.00	-	4	.68388	725.90	57.992	1.58997	1.760	1.658	PER IMP= 54.70
ROUTE	506.10	4	6	.68388	727.13	57.992	1.58997	1.760	1.661	
ROUTE	506.20	6	4	.68388	522.98	57.992	1.58997	1.920	1.195	
COMPUTE NM HYD	507.00	-	6	.72551	839.54	61.198	1.58160	1.680	1.808	PER IMP= 54.20
ADD HYD	507.10	4& 5	7	.85743	577.66	72.665	1.58902	1.920	1.053	
ADD HYD	507.20	6& 7	4	1.58294	1238.30	133.863	1.58562	1.760	1.222	
ROUTE	507.30	4	6	1.58294	534.73	133.861	1.58559	2.320	.528	
ROUTE	507.40	6	5	1.58294	514.85	133.861	1.58559	2.480	.508	
COMPUTE NM HYD	505.00	-	4	.57826	713.96	50.022	1.62194	1.680	1.929	PER IMP= 56.60
ROUTE	505.10	4	6	.57826	720.74	50.022	1.62195	1.680	1.948	
ROUTE	505.20	6	4	.57826	517.77	50.022	1.62195	1.840	1.399	
ADD HYD	505.30	4& 5	6	2.16120	775.17	183.883	1.59532	2.160	.560	
COMPUTE NM HYD	503.00	-	4	.10759	131.14	10.298	1.79473	1.680	1.904	PER IMP= 66.80
ADD HYD	503.19	19& 4	4	10.33936	662.16	789.320	1.43140	1.760	.100	
ROUTE	503.10	4	5	10.33936	628.05	787.684	1.42843	1.840	.095	
ADD HYD	503.20	6& 5	4	12.50056	1348.11	971.567	1.45729	1.920	.169	
COMPUTE NM HYD	502.00	-	5	.09216	165.53	10.469	2.12990	1.600	2.806	PER IMP= 86.60
ROUTE RESERVOIR	502.01	5	6	.09216	165.53	10.469	2.12990	1.600	2.806	
ROUTE	502.10	6	5	.09216	140.69	10.469	2.12990	1.680	2.385	
ADD HYD	502.20	5& 4	6	12.59272	1435.31	982.036	1.46221	1.920	.178	
COMPUTE NM HYD	501.00	-	4	.02172	46.63	2.414	2.08424	1.520	3.355	PER IMP= 84.20
ROUTE RESERVOIR	501.01	4	5	.02172	46.63	2.414	2.08424	1.520	3.355	
ROUTE	501.10	5	4	.02172	30.16	2.414	2.08429	1.600	2.170	
ADD HYD	501.20	4& 6	5	12.61444	1455.43	984.451	1.46328	1.920	.180	
COMPUTE NM HYD	504.00	-	4	.89619	977.60	79.278	1.65865	1.760	1.704	PER IMP= 58.90
ADD HYD	504.10	4& 5	1	13.51063	2320.58	1063.729	1.47624	1.840	.268	
COMPUTE NM HYD	500.00	-	4	.00628	13.50	.698	2.08251	1.520	3.358	PER IMP= 84.00
ADD HYD	504.20	4& 1	6	13.51691	2324.99	1064.427	1.47652	1.840	.269	
COMPUTE NM HYD	316.00	-	1	.02386	38.44	1.227	.96432	1.520	2.517	PER IMP= 6.90
ROUTE RESERVOIR	316.01	1	3	.02386	38.44	1.227	.96432	1.520	2.517	
ROUTE	316.10	3	1	.02386	39.63	1.227	.96437	1.520	2.595	
COMPUTE NM HYD	325.00	-	2	.00553	9.82	.381	1.29066	1.520	2.775	PER IMP= 28.90
ADD HYD	325.10	1& 2	3	.02939	49.45	1.608	1.02571	1.520	2.629	
DIVIDE HYD	325.20	3	1	.01470	24.73	.804	1.02571	1.520	2.629	
	325.30	AND	2	.01470	24.73	.804	1.02571	1.520	2.629	
ROUTE	325.40	2	3	.01470	24.80	.804	1.02581	1.520	2.637	
ADD HYD	325.50	3& 6	4	13.53160	2330.99	1065.230	1.47603	1.840	.269	
DIVIDE HYD	325.60	4	3	6.76580	1165.49	532.615	1.47603	1.840	.269	
	325.60	AND	6	6.76580	1165.49	532.615	1.47603	1.840	.269	

*STORE RATING CURVE RC=1 VS NO=1

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	325.70	6	4	6.76580	1165.42	532.597	1.47598	1.840	.269	
ROUTE	325.70	3	6	6.76580	1165.42	532.597	1.47598	1.840	.269	
ADD HYD	325.80	6& 4	2	13.53160	2330.84	1065.194	1.47598	1.840	.269	
COMPUTE NM HYD	324.00	-	3	.01196	12.69	.608	.95394	1.600	1.658	PER IMP= 6.20
ROUTE	324.10	1	4	.01470	18.40	.804	1.02581	1.600	1.956	
ADD HYD	324.20	3& 4	1	.02666	31.09	1.412	.99350	1.600	1.822	
ADD HYD	324.30	1& 2	3	13.55826	2348.38	1066.606	1.47503	1.840	.271	
DIVIDE HYD	324.40	3	1	6.77913	1174.19	533.303	1.47503	1.840	.271	
	324.40	AND	2	6.77913	1174.19	533.303	1.47503	1.840	.271	
*STORE RATING CURVE	RC=1 VS NO=1									
ROUTE	324.70	1	5	6.77913	1173.61	533.286	1.47499	1.840	.271	
ROUTE	324.80	2	4	6.77913	1173.61	533.286	1.47499	1.840	.271	
ADD HYD	324.11	4& 5	2	13.55826	2347.22	1066.572	1.47499	1.840	.271	
ROUTE	324.50	2	1	13.55826	2354.35	1065.677	1.47375	1.840	.271	
COMPUTE NM HYD	323.00	-	2	.00343	6.07	.233	1.27582	1.520	2.766	PER IMP= 27.90
ROUTE	323.10	2	3	.00343	3.14	.233	1.27612	1.600	1.432	
ADD HYD	323.20	1& 3	2	13.56169	2356.81	1065.911	1.47370	1.840	.272	
COMPUTE NM HYD	321.00	-	1	.06053	132.47	6.946	2.15149	1.520	3.419	PER IMP= 88.20
ADD HYD	321.10	2& 1	3	13.62222	2400.76	1072.856	1.47671	1.840	.275	
COMPUTE NM HYD	322.00	-	4	.09103	193.76	10.215	2.10402	1.520	3.326	PER IMP= 85.30
ADD HYD	322.10	3& 4	2	13.71325	2470.22	1083.071	1.48087	1.840	.281	
ROUTE	322.20	2	1	13.71325	2470.53	1083.060	1.48086	1.840	.281	
COMPUTE NM HYD	320.00	-	4	.00482	9.13	.392	1.52354	1.520	2.959	PER IMP= 44.60
ADD HYD	320.10	1& 4	12	13.71807	2473.09	1083.452	1.48087	1.840	.282	
COMPUTE NM HYD	225.00	-	1	.02082	45.33	2.367	2.13178	1.520	3.402	PER IMP= 87.00
ROUTE	225.10	1	2	.02082	47.16	2.367	2.13183	1.520	3.539	
COMPUTE NM HYD	223.00	-	1	.01050	23.17	1.221	2.18106	1.520	3.448	PER IMP= 90.00
ROUTE RESERVOIR	223.01	1	3	.01050	23.17	1.221	2.18106	1.520	3.448	
DIVIDE HYD	223.10	3	1	.00525	11.59	.611	2.18103	1.520	3.448	
	223.20	AND	4	.00525	11.59	.611	2.18103	1.520	3.448	
ROUTE	223.30	4	3	.00525	8.08	.611	2.18128	1.600	2.405	
ADD HYD	223.40	3& 2	5	.02607	54.33	2.978	2.14171	1.520	3.257	
ROUTE	223.50	1	2	.00525	6.46	.611	2.18128	1.680	1.923	
COMPUTE NM HYD	224.00	-	4	.02225	48.74	2.557	2.15478	1.520	3.423	PER IMP= 88.40
ADD HYD	224.10	4& 5	1	.04832	103.08	5.535	2.14772	1.520	3.333	
ROUTE	322.20	12	3	13.71807	2470.41	1083.118	1.48042	1.840	.281	
COMPUTE NM HYD	226.00	-	4	.01463	31.51	1.633	2.09236	1.520	3.365	PER IMP= 84.60
ADD HYD	226.10	3& 4	4	13.73270	2480.73	1084.751	1.48107	1.840	.282	
ROUTE RESERVOIR	226.01	4	6	13.73270	2480.73	1084.751	1.48107	1.840	.282	
ADD HYD	226.20	6& 1	3	13.78102	2518.33	1090.286	1.48341	1.840	.286	
ROUTE	226.30	3	4	13.78102	2506.97	1089.725	1.48264	1.920	.284	
ADD HYD	226.40	2& 4	5	13.78627	2512.12	1090.336	1.48291	1.920	.285	
COMPUTE NM HYD	222.00	-	4	.08660	179.15	9.154	1.98192	1.520	3.232	PER IMP= 77.80
ADD HYD	222.10	5& 4	2	13.87287	2564.59	1099.490	1.48603	1.920	.289	
COMPUTE NM HYD	221.00	-	4	.06353	126.77	6.176	1.82281	1.520	3.118	PER IMP= 68.00
ADD HYD	221.10	2& 4	1	13.93640	2597.28	1105.666	1.48756	1.920	.291	
ROUTE	221.20	1	2	13.93640	2596.90	1105.015	1.48668	1.920	.291	
COMPUTE NM HYD	220.00	-	1	.05896	104.25	4.641	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	220.10	1& 2	3	13.99536	2620.50	1109.656	1.48664	1.920	.293	
COMPUTE NM HYD	219.00	-	1	.07179	126.88	5.650	1.47576	1.520	2.761	PER IMP= 48.00
ADD HYD	219.10	1& 3	2	14.06715	2649.25	1115.306	1.48658	1.920	.294	
ROUTE	219.20	2	3	14.06715	2640.54	1114.277	1.48521	2.000	.293	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	218.00	-	4	.05788	102.34	4.556	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	218.10	3& 4	1	14.12503	2660.21	1118.833	1.48517	2.000	.294	
COMPUTE NM HYD	216.00	-	4	.01310	23.17	1.031	1.47575	1.520	2.764	PER IMP= 48.00
ROUTE	216.10	4	2	.01310	19.08	1.031	1.47584	1.600	2.276	
COMPUTE NM HYD	217.00	-	3	.02827	49.99	2.225	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	217.10	3& 2	4	.04137	68.57	3.256	1.47575	1.520	2.590	
COMPUTE NM HYD	215.00	-	3	.02934	51.88	2.309	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	215.10	3& 4	2	.07071	120.46	5.565	1.47575	1.520	2.662	
ADD HYD	215.20	1& 2	3	14.19574	2685.44	1124.398	1.48513	2.000	.296	
ROUTE	215.30	3	1	14.19574	2702.99	1123.895	1.48446	2.000	.298	
COMPUTE NM HYD	214.00	-	4	.03392	59.98	2.670	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	214.10	4& 1	2	14.22966	2714.52	1126.564	1.48444	2.000	.298	
COMPUTE NM HYD	211.00	-	1	.02593	45.85	2.041	1.47575	1.520	2.763	PER IMP= 48.00
COMPUTE NM HYD	212.00	-	3	.02755	48.72	2.168	1.47576	1.520	2.763	PER IMP= 48.00
ADD HYD	212.10	1& 3	4	.05348	94.57	4.209	1.47574	1.520	2.763	
ROUTE	212.20	4	1	.05348	98.28	4.209	1.47579	1.520	2.871	
COMPUTE NM HYD	213.00	-	3	.00817	14.45	.643	1.47575	1.520	2.764	PER IMP= 48.00
ADD HYD	213.10	3& 1	4	.06165	112.74	4.852	1.47577	1.520	2.857	
ADD HYD	213.20	2& 4	1	14.29131	2736.87	1131.417	1.48440	2.000	.299	
ROUTE	213.40	1	2	14.29131	2748.09	1131.108	1.48400	2.000	.300	
COMPUTE NM HYD	210.00	-	1	.04379	77.43	3.447	1.47575	1.520	2.763	PER IMP= 48.00
ADD HYD	210.10	1& 2	3	14.33510	2762.97	1134.554	1.48397	2.000	.301	
COMPUTE NM HYD	209.00	-	1	.01777	31.43	1.399	1.47576	1.520	2.763	PER IMP= 48.00
COMPUTE NM HYD	207.00	-	2	.01669	24.57	.921	1.03500	1.520	2.300	PER IMP= 23.00
ADD HYD	207.10	1& 2	4	.03446	56.00	2.320	1.26227	1.520	2.539	
ROUTE	207.20	4	1	.03446	59.20	2.320	1.26231	1.520	2.684	
COMPUTE NM HYD	208.00	-	2	.00314	5.56	.247	1.47576	1.520	2.768	PER IMP= 48.00
ADD HYD	208.10	1& 2	4	.03760	64.76	2.567	1.28009	1.520	2.691	
ADD HYD	208.20	4& 3	1	14.37270	2774.19	1137.121	1.48344	2.000	.302	
ROUTE	208.30	1	2	14.37270	2785.60	1136.508	1.48264	2.000	.303	
COMPUTE NM HYD	206.00	-	5	.01983	23.15	.705	.66638	1.520	1.824	PER IMP= 5.00
COMPUTE NM HYD	205.00	-	1	.01974	23.05	.702	.66638	1.520	1.824	PER IMP= 5.00
COMPUTE NM HYD	204.00	-	3	.00763	8.91	.271	.66638	1.520	1.825	PER IMP= 5.00
ADD HYD	204.10	1& 3	4	.02737	31.96	.973	.66636	1.520	1.824	
ROUTE	204.20	4	1	.02737	30.61	.973	.66641	1.520	1.748	
COMPUTE NM HYD	203.00	-	3	.00960	11.21	.341	.66638	1.520	1.825	PER IMP= 5.00
ADD HYD	203.10	1& 3	4	.03697	41.83	1.314	.66636	1.520	1.768	
ADD HYD	203.20	4& 5	1	.05680	64.98	2.019	.66636	1.520	1.787	
ROUTE	203.30	1	3	.05680	59.80	2.019	.66638	1.600	1.645	
COMPUTE NM HYD	202.00	-	1	.03805	73.93	3.517	1.73325	1.520	3.036	PER IMP= 62.50
ADD HYD	202.10	1& 2	4	14.41075	2801.35	1140.025	1.48330	2.000	.304	
ADD HYD	202.20	4& 3	1	14.46755	2809.81	1142.044	1.48009	2.000	.303	
ROUTE	202.30	1	2	14.46755	2823.40	1141.320	1.47916	2.000	.305	
COMPUTE NM HYD	201.00	-	1	.03518	52.33	1.774	.94541	1.520	2.324	PER IMP= 13.70
COMPUTE NM HYD	200.00	-	3	.05438	87.41	2.985	1.02924	1.520	2.512	PER IMP= 14.00
ADD HYD	200.10	1& 2	4	14.50273	2829.66	1143.094	1.47786	2.000	.305	
ADD HYD	200.20	3& 4	12	14.55711	2840.30	1146.079	1.47618	2.000	.305	
ADD HYD	200.30	12&10	1	18.66709	5265.10	1480.419	1.48699	1.840	.441	
ROUTE RESERVOIR	200.03	1	2	18.66709	963.58	1095.851	1.10072	3.840	.081	AC-FT= 459.005
ROUTE RESERVOIR	200.03	1	2	18.66709	85.88	322.504	.32394	47.920	.007	AC-FT= 1158.018
ROUTE RESERVOIR	200.03	1	2	18.66709	86.57	325.080	.32652	47.920	.007	AC-FT= 1155.324
ROUTE RESERVOIR	200.03	1	2	18.66709	79.52	280.719	.28197	47.920	.007	AC-FT= 1199.663
FINISH										

AHYMO SUMMARY TABLE (AHYMO991) - AMAFCA VERSION OF HYMO - SEPTEMBER, 1991 RUN DATE (MON/DAY/YR) =11/10/1992

INPUT FILE = alt-h.dat USER NO.= SCANLNNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
RAINFALL TYPE= 2										RAIN24= 2.590
COMPUTE NM HYD	418.00	-	1	1.49581	1436.00	117.391	1.47149	1.500	1.500	PER IMP= 48.00
COMPUTE NM HYD	417.00	-	2	.13909	126.68	10.916	1.47149	1.750	1.423	PER IMP= 48.00
ADD HYD	417.10	1& 2	3	1.63490	1524.42	128.306	1.47149	1.500	1.457	
ROUTE RESERVOIR	417.01	3	4	1.63490	1524.42	128.306	1.47149	1.500	1.457	
ROUTE	417.20	4	5	1.63490	1199.18	128.307	1.47150	1.750	1.146	
COMPUTE NM HYD	419.00	-	1	.19715	198.81	15.472	1.47149	1.500	1.576	PER IMP= 48.00
COMPUTE NM HYD	420.00	-	2	.18889	168.12	14.824	1.47149	1.500	1.391	PER IMP= 48.00
ADD HYD	419.10	1& 2	3	.38604	366.93	30.296	1.47149	1.500	1.485	
ADD HYD	420.10	3& 5	4	2.02094	1532.43	158.603	1.47149	1.750	1.185	
ROUTE	420.20	4	5	2.02094	750.30	158.603	1.47150	2.250	.580	
COMPUTE NM HYD	416.00	-	1	.86541	780.81	67.917	1.47149	1.750	1.410	PER IMP= 48.00
ROUTE	416.10	1	2	.86541	389.94	67.917	1.47150	2.000	.704	
ADD HYD	416.20	2& 5	3	2.88635	1122.52	226.520	1.47149	2.250	.608	
COMPUTE NM HYD	415.00	-	1	.15228	235.16	11.951	1.47149	1.500	2.413	PER IMP= 48.00
ROUTE RESERVOIR	415.01	1	2	.15228	235.16	11.951	1.47149	1.500	2.413	
COMPUTE NM HYD	414.00	-	1	.11235	113.50	8.817	1.47149	1.500	1.578	PER IMP= 48.00
ADD HYD	414.10	2& 1	4	.26463	348.66	20.768	1.47149	1.500	2.059	
ROUTE RESERVOIR	414.01	4	2	.26463	348.66	20.768	1.47149	1.500	2.059	
ROUTE	414.30	2	1	.26463	147.50	20.768	1.47151	2.000	.871	
COMPUTE NM HYD	411.00	-	2	.29891	374.30	23.458	1.47149	1.500	1.957	PER IMP= 48.00
ADD HYD	411.10	1& 2	4	.56354	427.24	44.226	1.47149	1.500	1.185	
ROUTE	411.20	4	1	.56354	502.94	44.227	1.47150	1.750	1.394	
COMPUTE NM HYD	412.00	-	2	1.18559	1068.70	93.045	1.47149	1.750	1.408	PER IMP= 48.00
ADD HYD	412.10	1& 2	4	1.74913	1571.64	137.271	1.47149	1.750	1.404	
ADD HYD	412.20	4& 3	1	4.63548	2100.23	363.791	1.47150	1.750	.708	
ROUTE	412.30	1	5	4.63548	1223.82	363.791	1.47149	2.500	.413	
COMPUTE NM HYD	424.00	-	1	.33534	396.08	26.317	1.47149	1.500	1.846	PER IMP= 48.00
ROUTE RESERVOIR	424.01	1	2	.33534	396.08	26.317	1.47149	1.500	1.846	
COMPUTE NM HYD	421.00	-	1	.33184	371.45	26.043	1.47149	1.500	1.749	PER IMP= 48.00
ADD HYD	421.10	1& 2	3	.66718	767.53	52.360	1.47149	1.500	1.798	
ROUTE	421.20	3	1	.66718	672.68	52.360	1.47150	1.750	1.575	
COMPUTE NM HYD	422.00	-	2	.14367	134.01	11.275	1.47149	1.500	1.457	PER IMP= 48.00
ADD HYD	422.10	1& 2	3	.81085	797.65	63.635	1.47149	1.750	1.537	
ROUTE	422.20	3	1	.81085	490.54	63.635	1.47150	2.000	.945	
COMPUTE NM HYD	423.00	-	2	.05985	49.76	4.697	1.47149	1.750	1.299	PER IMP= 48.00
ADD HYD	423.10	1& 2	3	.87070	530.33	68.332	1.47149	2.000	.952	
ROUTE	423.20	3	1	.87070	265.89	68.332	1.47150	2.500	.477	
COMPUTE NM HYD	413.00	-	2	1.00011	881.20	78.488	1.47149	1.750	1.377	PER IMP= 48.00
ADD HYD	413.10	1& 2	3	1.87081	939.47	146.821	1.47149	1.750	.785	
ROUTE	413.20	3	1	1.87081	847.40	146.821	1.47149	2.000	.708	
COMPUTE NM HYD	410.00	-	2	1.38956	1259.51	109.052	1.47149	1.500	1.416	PER IMP= 48.00
ADD HYD	410.10	1& 2	3	3.26037	1976.25	255.873	1.47149	1.750	.947	
ADD HYD	410.20	3& 5	4	7.89585	2521.22	619.664	1.47149	1.750	.499	
ROUTE RESERVOIR	410.01	4	1	7.89585	2521.22	619.664	1.47149	1.750	.499	
ROUTE	410.30	1	2	7.89585	2323.48	619.664	1.47149	2.250	.460	
COMPUTE NM HYD	409.00	-	1	.46618	591.89	36.586	1.47149	1.500	1.984	PER IMP= 48.00
ROUTE	409.10	1	3	.46618	165.17	36.586	1.47150	2.000	.554	
COMPUTE NM HYD	408.00	-	1	1.38633	1224.84	108.799	1.47149	1.500	1.380	PER IMP= 48.00

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	408.10	1& 3	4	1.85251	1350.72	145.384	1.47149	1.750	1.139	
ADD HYD	408.20	4& 2	2	9.74836	3108.37	765.048	1.47149	2.000	.498	
ROUTE RESERVOIR	410.01	2	5	9.74836	237.13	765.048	1.47149	7.750	.038	AC-FT= 501.615
ROUTE	408.30	5	1	9.74836	237.11	765.047	1.47149	8.000	.038	
COMPUTE NM HYD	403.00	-	2	.48341	523.74	40.418	1.56769	1.500	1.693	PER IMP= 53.70
ADD HYD	403.10	1& 2	3	10.23177	555.46	805.465	1.47604	1.500	.085	
ROUTE	408.30	3	19	10.23177	586.20	805.466	1.47604	1.750	.090	
COMPUTE NM HYD	406.00	-	1	.05788	77.58	6.173	1.99983	1.500	2.094	PER IMP= 78.40
DIVIDE HYD	406.10	1	2	.05788	77.58	6.173	1.99982	1.500	2.094	
	406.20	AND	3	.00000	.00	.000	.00000	-.250	.000	
ROUTE	406.30	3	1	.00000	.00	.000	.00000	-.250	.000	
COMPUTE NM HYD	407.00	-	2	.06012	93.09	4.718	1.47149	1.500	2.419	PER IMP= 48.00
ROUTE RESERVOIR	407.01	2	3	.06012	93.09	4.718	1.47149	1.500	2.419	
ROUTE	407.10	3	2	.06012	26.87	4.719	1.47160	2.000	.698	
COMPUTE NM HYD	404.00	-	3	.22811	261.58	25.152	2.06746	1.750	1.792	PER IMP= 83.00
ADD HYD	404.10	1& 2	4	.06012	26.87	4.718	1.47153	2.000	.698	
ADD HYD	404.20	3& 4	7	.28823	287.86	29.871	1.94315	1.750	1.561	
DIVIDE HYD	404.10	7	2	.15544	46.00	16.109	1.94315	1.500	.462	
	404.20	AND	3	.13279	241.86	13.762	1.94315	1.750	2.846	
DIVIDE HYD	404.20	2	1	.07772	23.00	8.054	1.94315	1.500	.462	
	404.30	AND	4	.07772	23.00	8.054	1.94315	1.500	.462	
ROUTE	404.40	1	2	.07772	23.20	8.054	1.94317	1.500	.466	
ROUTE	404.40	4	1	.07772	23.20	8.054	1.94317	1.500	.466	
ADD HYD	404.50	1& 2	7	.15544	46.40	16.109	1.94313	1.500	.466	
ROUTE	404.60	3	1	.13279	228.82	13.764	1.94344	1.750	2.692	
COMPUTE NM HYD	405.00	-	2	.28007	302.36	26.538	1.77665	1.500	1.687	PER IMP= 66.00
ROUTE	405.10	2	3	.28007	171.64	26.538	1.77666	2.000	.958	
ADD HYD	405.20	3& 1	3	.41286	382.95	40.302	1.83029	2.000	1.449	
COMPUTE NM HYD	402.00	-	2	.21249	286.45	23.216	2.04861	1.500	2.106	PER IMP= 81.70
ADD HYD	402.10	2& 3	4	.62535	592.95	63.518	1.90447	1.750	1.482	
ROUTE	402.20	4	2	.62535	524.86	63.518	1.90448	1.750	1.311	
COMPUTE NM HYD	401.00	-	3	.14474	204.64	16.326	2.11488	1.500	2.209	PER IMP= 86.00
ADD HYD	401.20	2& 3	5	.77009	681.39	79.844	1.94402	1.750	1.383	
COMPUTE NM HYD	303.00	-	1	.00790	4.35	.546	1.29590	2.000	.859	PER IMP= 29.50
ADD HYD	303.10	1& 7	2	.16334	50.68	16.655	1.91182	2.000	.485	
DIVIDE HYD	303.20	2	1	.16018	46.00	16.332	1.91182	1.500	.449	
	303.30	AND	6	.00316	4.68	.322	1.91182	2.000	2.314	
DIVIDE HYD	303.40	1	2	.08009	23.00	8.166	1.91182	1.500	.449	
	303.40	AND	3	.08009	23.00	8.166	1.91182	1.500	.449	
ROUTE	303.50	2	1	.08009	23.19	8.166	1.91186	1.500	.452	
ROUTE	303.60	3	2	.08009	23.19	8.166	1.91186	1.500	.452	
ADD HYD	303.70	1& 2	3	.16018	46.37	16.332	1.91182	1.500	.452	
COMPUTE NM HYD	302.00	-	1	.01116	8.15	.696	1.16926	1.750	1.142	PER IMP= 21.00
ADD HYD	302.10	1& 3	2	.17134	53.83	17.028	1.86345	1.750	.491	
DIVIDE HYD	302.20	2	1	.16607	46.00	16.505	1.86345	1.500	.433	
	302.30	AND	8	.00527	7.83	.523	1.86345	1.750	2.322	
DIVIDE HYD	302.40	1	2	.08304	23.00	8.252	1.86345	1.500	.433	
	302.40	AND	3	.08304	23:00	8.252	1.86345	1.500	.433	
ROUTE	302.40	2	4	.08304	23.36	8.253	1.86349	1.500	.440	
ROUTE	302.50	3	1	.08304	23.36	8.253	1.86349	1.500	.440	
ADD HYD	302.60	4& 1	3	.16607	46.72	16.505	1.86345	1.500	.440	
COMPUTE NM HYD	301.00	-	1	.00593	5.60	.455	1.43744	1.750	1.476	PER IMP= 39.00

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	301.20	1	2	.00593	5.88	.455	1.43804	1.750	1.549	
ADD HYD	301.30	2& 3	7	.17200	51.92	16.959	1.84876	1.500	.472	
COMPUTE NM HYD	300.00	-	2	.00603	9.55	.380	1.18267	1.500	2.474	PER IMP= 21.90
ADD HYD	300.10	8& 2	1	.01130	13.44	.904	1.50003	1.500	1.859	
ROUTE	300.20	1	2	.01130	12.41	.904	1.50088	1.500	1.716	
COMPUTE NM HYD	304.00	-	1	.00347	5.84	.264	1.42403	1.500	2.628	PER IMP= 38.10
ROUTE	304.20	1	3	.00347	5.39	.264	1.42670	1.500	2.426	
ADD HYD	304.30	2& 3	8	.01477	17.80	1.168	1.48293	1.500	1.883	
COMPUTE NM HYD	305.00	-	9	.00402	6.72	.297	1.38380	1.500	2.613	PER IMP= 35.40
ROUTE RESERVOIR	401.01	5	1	.77009	630.69	79.844	1.94402	2.000	1.280	AC-FT= 9.504
ROUTE	401.80	1	2	.77009	609.49	79.844	1.94402	2.000	1.237	
COMPUTE NM HYD	307.00	-	4	.01650	15.53	1.192	1.35401	1.500	1.471	PER IMP= 33.40
ADD HYD	307.10	6& 4	1	.01966	17.31	1.514	1.44361	1.750	1.376	
ROUTE	307.20	1	3	.01966	19.09	1.514	1.44379	1.750	1.517	
ADD HYD	307.30	3& 2	1	.78975	622.38	81.357	1.93156	2.000	1.231	
COMPUTE NM HYD	315.00	-	2	.00836	12.30	.404	.90555	1.500	2.299	PER IMP= 3.30
ROUTE RESERVOIR	315.01	2	3	.00836	12.30	.404	.90555	1.500	2.299	
ROUTE	315.10	3	2	.00836	8.57	.404	.90688	1.750	1.602	
ADD HYD	315.20	1& 2	3	.79811	624.17	81.762	1.92082	2.000	1.222	
COMPUTE NM HYD	312.00	-	1	.03437	53.44	2.045	1.11562	1.500	2.430	PER IMP= 17.40
DIVIDE HYD	312.10	1	2	.01719	26.72	1.023	1.11562	1.500	2.430	
	312.20	AND	4	.01719	26.72	1.023	1.11562	1.500	2.430	
ROUTE	312.30	2	5	.01719	18.90	1.023	1.11601	1.750	1.718	
ADD HYD	312.40	3& 5	1	.81530	627.37	82.784	1.90385	2.000	1.202	
COMPUTE NM HYD	314.00	-	3	.01914	28.45	.964	.94429	1.500	2.322	PER IMP= 5.90
ADD HYD	314.10	1& 3	2	.83444	630.85	83.748	1.88184	2.000	1.181	
ROUTE RESERVOIR	401.02	2	1	.83444	501.34	83.748	1.88184	2.250	.939	AC-FT= 11.366
ROUTE	314.90	1	2	.83444	500.62	83.748	1.88185	2.250	.937	
COMPUTE NM HYD	306.00	-	1	.01532	13.28	.966	1.18267	1.750	1.355	PER IMP= 21.90
ROUTE	306.10	1	3	.01532	13.63	.967	1.18293	1.750	1.390	
ROUTE	306.20	3	1	.01532	12.61	.967	1.18293	1.750	1.286	
COMPUTE NM HYD	310.00	-	3	.00981	15.42	.605	1.15585	1.500	2.456	PER IMP= 20.10
ADD HYD	310.10	3& 1	5	.02513	21.47	1.571	1.17220	1.500	1.335	
ROUTE	310.20	5	1	.02513	23.47	1.571	1.17235	1.750	1.459	
ADD HYD	310.30	1& 2	3	.85957	509.56	85.319	1.86110	2.250	.926	
ROUTE	310.40	4	5	.01719	21.49	1.023	1.11601	1.500	1.954	
ADD HYD	310.50	5& 3	1	.87675	513.22	86.342	1.84649	2.250	.915	
COMPUTE NM HYD	313.00	-	2	.00787	12.39	.487	1.16032	1.500	2.459	PER IMP= 20.40
ADD HYD	313.10	1& 2	3	.88462	513.95	86.829	1.84038	2.250	.908	
ROUTE RESERVOIR	401.03	3	1	.88462	469.77	86.829	1.84038	2.750	.830	AC-FT= 6.362
COMPUTE NM HYD	309.00	-	3	.00803	6.25	.526	1.22885	1.750	1.216	PER IMP= 25.00
COMPUTE NM HYD	308.00	-	4	.00915	9.10	.730	1.49554	1.750	1.554	PER IMP= 42.90
ADD HYD	308.10	3& 4	2	.01718	15.35	1.256	1.37078	1.750	1.396	
ADD HYD	308.20	1& 2	10	.90180	471.59	88.085	1.83144	2.750	.817	
COMPUTE NM HYD	311.00	-	11	.00602	6.02	.493	1.53577	1.750	1.562	PER IMP= 45.60
ROUTE	301.10	7	1	.17200	41.33	16.960	1.84880	2.750	.375	
ROUTE	304.10	8	2	.01477	7.54	1.168	1.48345	2.000	.797	
ROUTE	305.10	9	3	.00402	2.31	.297	1.38464	1.750	.898	
ADD HYD	301.20	1& 2	4	.18677	45.58	18.128	1.81987	2.500	.381	
ADD HYD	301.30	3& 4	1	.19079	46.82	18.425	1.81069	2.500	.383	
COMPUTE NM HYD	145.00	-	2	.12312	156.35	12.474	1.89968	1.500	1.984	PER IMP= 71.60
ADD HYD	145.10	1& 2	3	.31391	172.59	30.899	1.84559	1.500	.859	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	145.20	3	1	.31391	191.58	30.899	1.84560	1.750	.954	
COMPUTE NM HYD	143.00	-	2	.09431	109.90	7.401	1.47150	1.500	1.821	PER IMP= 48.00
COMPUTE NM HYD	144.00	-	3	.02602	44.91	2.205	1.58880	1.500	2.697	PER IMP= 50.40
ADD HYD	143.10	1& 2	4	.40822	266.98	38.300	1.75916	1.750	1.022	
ADD HYD	143.20	3& 4	1	.43424	291.43	40.505	1.74895	1.500	1.049	
ROUTE	143.30	1	2	.43424	347.64	40.505	1.74896	1.750	1.251	
COMPUTE NM HYD	141.00	-	1	.03868	61.58	3.036	1.47149	1.500	2.488	PER IMP= 48.00
ADD HYD	141.10	1& 2	3	.47292	372.06	43.540	1.72626	1.750	1.229	
COMPUTE NM HYD	140.00	-	1	.09638	110.73	7.564	1.47149	1.500	1.795	PER IMP= 48.00
ADD HYD	140.10	1& 3	2	.56930	449.74	51.104	1.68313	1.750	1.234	
ROUTE	140.20	2	1	.56930	432.90	51.104	1.68313	1.750	1.188	
COMPUTE NM HYD	139.00	-	2	.02145	34.06	1.683	1.47149	1.500	2.481	PER IMP= 48.00
ADD HYD	139.10	1& 2	3	.59075	446.75	52.788	1.67544	1.750	1.182	
ROUTE	139.20	3	1	.59075	435.49	52.788	1.67545	2.000	1.152	
COMPUTE NM HYD	138.00	-	2	.16332	245.64	12.817	1.47149	1.500	2.350	PER IMP= 48.00
ADD HYD	138.10	2& 1	3	.75407	494.78	65.605	1.63127	2.000	1.025	
ROUTE	138.20	3	1	.75407	488.77	65.605	1.63127	2.000	1.013	
COMPUTE NM HYD	129.00	-	2	.39080	542.31	30.670	1.47149	1.500	2.168	PER IMP= 48.00
ADD HYD	129.10	1& 2	3	1.14487	660.35	96.275	1.57673	1.500	.901	
COMPUTE NM HYD	136.00	-	1	.08130	106.40	6.380	1.47149	1.500	2.045	PER IMP= 48.00
COMPUTE NM HYD	135.00	-	2	.05923	84.30	4.648	1.47149	1.500	2.224	PER IMP= 48.00
ADD HYD	135.10	1& 2	4	.14053	190.70	11.029	1.47149	1.500	2.120	
ROUTE RESERVOIR	135.01	4	1	.14053	190.70	11.029	1.47149	1.500	2.120	
ROUTE	135.20	1	2	.14053	82.85	11.029	1.47152	1.750	.921	
COMPUTE NM HYD	130.00	-	1	.20469	217.50	16.064	1.47149	1.500	1.660	PER IMP= 48.00
ADD HYD	130.10	1& 2	4	.34522	253.46	27.093	1.47150	1.750	1.147	
ROUTE	130.20	4	2	.34522	230.28	27.093	1.47151	2.000	1.042	
COMPUTE NM HYD	125.00	-	1	.03679	57.25	2.887	1.47149	1.500	2.431	PER IMP= 48.00
ADD HYD	125.10	1& 2	4	.38201	243.48	29.980	1.47150	2.000	.996	
ADD HYD	125.20	3& 4	1	1.52688	880.36	126.255	1.55040	2.000	.901	
COMPUTE NM HYD	124.00	-	2	.04092	54.79	3.211	1.47149	1.500	2.092	PER IMP= 48.00
ADD HYD	124.10	2& 1	3	1.56780	896.67	129.466	1.54834	1.750	.894	
ROUTE	124.20	3	1	1.56780	1104.76	129.466	1.54834	1.750	1.101	
COMPUTE NM HYD	123.00	-	2	.02504	39.75	1.965	1.47149	1.500	2.480	PER IMP= 48.00
COMPUTE NM HYD	122.00	-	3	.13622	177.81	10.691	1.47149	1.500	2.040	PER IMP= 48.00
ADD HYD	123.10	1& 2	4	1.59284	1120.95	131.431	1.54713	1.750	1.100	
ADD HYD	123.20	3& 4	1	1.72906	1222.31	142.122	1.54117	1.750	1.105	
ROUTE	123.30	1	2	1.72906	1345.59	142.122	1.54118	1.750	1.216	
COMPUTE NM HYD	121.00	-	1	.02100	31.53	1.513	1.35109	1.500	2.346	PER IMP= 42.30
ADD HYD	121.10	1& 2	3	1.75006	1357.87	143.635	1.53889	1.750	1.212	
ROUTE	121.20	3	1	1.75006	1386.49	143.635	1.53889	1.750	1.238	
COMPUTE NM HYD	120.00	-	2	.01176	17.44	.771	1.22938	1.500	2.317	PER IMP= 32.20
COMPUTE NM HYD	119.00	-	3	.03895	62.32	3.112	1.49799	1.500	2.500	PER IMP= 49.40
ADD HYD	119.10	2& 3	4	.05071	79.76	3.883	1.43568	1.500	2.458	
ROUTE	119.20	4	2	.05071	54.96	3.883	1.43582	1.750	1.693	
COMPUTE NM HYD	115.00	-	3	.03760	50.49	1.849	.92215	1.500	2.098	PER IMP= 12.60
ROUTE	115.10	3	4	.03760	49.99	1.850	.92243	1.500	2.077	
COMPUTE NM HYD	112.00	-	3	.04603	61.17	2.212	.90102	1.500	2.077	PER IMP= 11.50
ADD HYD	112.10	1& 2	5	1.80077	1441.45	147.518	1.53599	1.750	1.251	
ADD HYD	112.20	3& 5	2	1.84680	1461.47	149.730	1.52016	1.750	1.236	
ADD HYD	112.30	4& 2	1	1.88440	1479.05	151.580	1.50824	1.750	1.226	
ROUTE	311.40	11	2	.00602	4.79	.493	1.53630	2.000	1.243	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	149.00	-	3	.03482	67.16	3.906	2.10356	1.500	3.014	PER IMP= 85.10
ADD HYD	311.10	2& 3	4	.04084	68.03	4.400	2.01987	1.500	2.603	
DIVIDE HYD	311.20	4	2	.01389	23.13	1.496	2.01987	1.500	2.603	
	311.30	AND	3	.02695	44.90	2.904	2.01987	1.500	2.603	
DIVIDE HYD	311.20	3	4	.01348	22.45	1.452	2.01985	1.500	2.603	
	311.20	AND	5	.01348	22.45	1.452	2.01985	1.500	2.603	
ROUTE	311.20	2	3	.01389	21.71	1.496	2.02006	1.500	2.443	
ROUTE	311.20	4	2	.01348	21.06	1.452	2.02006	1.500	2.441	
ROUTE	311.20	5	4	.01348	21.06	1.452	2.02006	1.500	2.441	
ADD HYD	311.30	2& 3	5	.02736	42.77	2.948	2.01982	1.500	2.442	
ADD HYD	311.40	5& 4	2	.04084	63.82	4.399	2.01981	1.500	2.442	
ROUTE	311.30	2	3	.04084	49.24	4.400	2.02011	1.750	1.884	
COMPUTE NM HYD	148.00	-	2	.01588	25.21	1.246	1.47149	1.500	2.481	PER IMP= 48.00
ROUTE	148.10	2	4	.01588	23.44	1.247	1.47183	1.500	2.307	
ROUTE	148.20	4	2	.01588	11.31	1.247	1.47189	1.750	1.113	
COMPUTE NM HYD	147.00	-	4	.00565	8.97	.443	1.47149	1.500	2.482	PER IMP= 48.00
ROUTE	147.10	4	5	.00565	8.55	.444	1.47256	1.500	2.366	
ROUTE	147.20	5	4	.00565	4.35	.444	1.47271	1.750	1.204	
COMPUTE NM HYD	146.00	-	5	.05976	90.26	5.196	1.63018	1.500	2.360	PER IMP= 56.00
ADD HYD	146.10	2& 3	6	.05672	60.55	5.646	1.86651	1.750	1.668	
ADD HYD	146.20	4& 6	2	.06237	64.90	6.090	1.83079	1.750	1.626	
ADD HYD	146.30	5& 2	3	.12213	118.48	11.286	1.73263	1.500	1.516	
COMPUTE NM HYD	154.00	-	2	.01947	39.36	2.380	2.29188	1.500	3.159	PER IMP= 96.70
ROUTE	154.10	2	4	.01947	25.47	2.380	2.29210	1.750	2.044	
COMPUTE NM HYD	153.00	-	2	.00646	12.82	.751	2.18099	1.500	3.100	PER IMP= 90.00
ROUTE	153.10	2	5	.00646	6.48	.752	2.18192	1.750	1.567	
COMPUTE NM HYD	152.00	-	2	.07224	92.60	5.893	1.52965	1.500	2.003	PER IMP= 54.70
ADD HYD	152.10	2& 4	6	.09171	106.12	8.273	1.69148	1.500	1.808	
ADD HYD	152.20	5& 6	2	.09817	110.05	9.025	1.72372	1.500	1.752	
ROUTE	152.30	2	5	.09817	108.38	9.025	1.72380	1.750	1.725	
ADD HYD	152.40	3& 5	2	.22030	219.57	20.311	1.72868	1.750	1.557	
ROUTE	152.30	10	3	.90180	473.45	88.085	1.83144	2.750	.820	
COMPUTE NM HYD	150.00	-	4	.03482	64.32	3.441	1.85287	1.500	2.886	PER IMP= 67.20
ROUTE	150.10	4	5	.03482	46.07	3.441	1.85302	1.750	2.067	
COMPUTE NM HYD	142.00	-	4	.12769	219.00	11.381	1.67119	1.500	2.680	PER IMP= 58.80
ADD HYD	142.20	3& 4	6	1.02949	479.05	99.466	1.81156	2.750	.727	
ADD HYD	142.30	5& 6	3	1.06431	481.21	102.907	1.81291	2.750	.706	
ROUTE RESERVOIR	142.01	3	4	1.06431	481.21	102.907	1.81291	2.750	.706	
ROUTE	142.40	4	3	1.06431	483.39	102.907	1.81292	2.750	.710	
COMPUTE NM HYD	137.00	-	4	.08668	135.21	6.803	1.47149	1.500	2.437	PER IMP= 48.00
ADD HYD	137.10	3& 4	5	1.15099	490.03	109.709	1.78720	2.250	.665	
COMPUTE NM HYD	134.00	-	4	.04029	64.09	3.162	1.47149	1.500	2.486	PER IMP= 48.00
ADD HYD	134.10	4& 2	6	.26059	275.06	23.473	1.68891	1.500	1.649	
ADD HYD	134.20	6& 5	2	1.41158	720.50	133.182	1.76906	1.750	.798	
ROUTE	134.30	2	3	1.41158	854.20	133.182	1.76906	1.750	.946	
COMPUTE NM HYD	132.00	-	2	.02692	42.74	2.113	1.47149	1.500	2.480	PER IMP= 48.00
COMPUTE NM HYD	133.00	-	4	.03939	62.59	3.091	1.47149	1.500	2.483	PER IMP= 48.00
ADD HYD	133.10	2& 3	5	1.43850	871.60	135.295	1.76349	1.750	.947	
ADD HYD	133.20	4& 5	2	1.47789	896.91	138.386	1.75570	1.750	.948	
ROUTE	133.30	2	3	1.47789	985.54	138.386	1.75571	1.750	1.042	
COMPUTE NM HYD	151.00	-	2	.02907	46.92	2.426	1.56458	1.500	2.522	PER IMP= 55.00
ROUTE	151.10	2	4	.02907	33.66	2.426	1.56470	1.750	1.809	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	131.00	-	2	.05707	83.77	3.660	1.20254	1.500	2.293	PER IMP= 30.80
ADD HYD	131.10	2& 3	5	1.53496	1016.14	142.046	1.73514	1.750	1.034	
ADD HYD	131.20	4& 5	2	1.56403	1049.80	144.472	1.73197	1.750	1.049	
ROUTE	131.30	2	3	1.56403	1042.09	144.472	1.73197	1.750	1.041	
COMPUTE NM HYD	127.00	-	2	.04370	65.00	2.916	1.25116	1.500	2.324	PER IMP= 33.90
ADD HYD	127.10	2& 3	4	1.60773	1066.76	147.388	1.71890	1.750	1.037	
ROUTE	127.20	4	2	1.60773	1043.16	147.388	1.71890	1.750	1.014	
COMPUTE NM HYD	128.00	-	3	.07690	123.01	6.064	1.47852	1.500	2.499	PER IMP= 48.00
ROUTE	128.10	3	4	.07690	99.19	6.064	1.47864	1.500	2.015	
COMPUTE NM HYD	126.00	-	3	.07448	113.27	5.239	1.31890	1.500	2.376	PER IMP= 37.70
ADD HYD	126.10	3& 4	5	.15138	212.46	11.303	1.40002	1.500	2.193	
ROUTE	126.20	5	3	.15138	184.66	11.303	1.40005	1.750	1.906	
ADD HYD	126.30	2& 3	4	1.75911	1227.82	158.691	1.69146	1.750	1.091	
COMPUTE NM HYD	118.00	-	2	.06353	86.38	3.282	.96853	1.500	2.125	PER IMP= 15.80
ADD HYD	118.10	2& 4	3	1.82264	1257.05	161.973	1.66626	1.750	1.078	
ROUTE	118.20	3	2	1.82264	1264.04	161.973	1.66626	1.750	1.084	
COMPUTE NM HYD	116.00	-	3	.01678	21.53	.715	.79933	1.500	2.005	PER IMP= 5.00
COMPUTE NM HYD	117.00	-	4	.01804	23.32	.789	.81973	1.500	2.019	PER IMP= 6.30
COMPUTE NM HYD	114.00	-	5	.01552	21.82	.885	1.06904	1.500	2.197	PER IMP= 22.20
ADD HYD	114.10	2& 3	6	1.83942	1270.71	162.688	1.65835	1.750	1.079	
ADD HYD	114.20	4& 6	2	1.85746	1278.01	163.477	1.65021	1.750	1.075	
ADD HYD	114.30	5& 2	3	1.87298	1285.74	164.362	1.64539	1.750	1.073	
ROUTE	114.40	3	2	1.87298	1240.78	164.362	1.64539	1.750	1.035	
COMPUTE NM HYD	113.00	-	5	.01992	26.17	.921	.86652	1.500	2.052	PER IMP= 9.30
ADD HYD	113.10	5& 2	4	1.89290	1249.19	165.282	1.63719	1.750	1.031	
ADD HYD	112.10	1& 4	3	3.77730	2728.24	316.862	1.57286	1.750	1.129	
ROUTE	112.20	3	1	3.77730	2835.17	316.862	1.57286	1.750	1.173	
COMPUTE NM HYD	111.00	-	2	.00906	11.63	.386	.79933	1.500	2.006	PER IMP= 5.00
ADD HYD	111.10	1& 2	3	3.78636	2838.78	317.248	1.57101	1.750	1.171	
ROUTE	111.20	3	1	3.78636	2824.35	317.248	1.57101	1.750	1.166	
COMPUTE NM HYD	110.00	-	2	.04352	59.79	2.323	1.00091	1.500	2.147	PER IMP= 17.90
ADD HYD	110.10	1& 2	3	3.82988	2844.88	319.572	1.56453	1.750	1.161	
ROUTE	110.20	3	1	3.82988	2823.98	319.572	1.56453	1.750	1.152	
COMPUTE NM HYD	109.00	-	2	.02638	34.65	1.219	.86652	1.500	2.052	PER IMP= 9.30
COMPUTE NM HYD	108.00	-	3	.00781	10.10	.341	.81973	1.500	2.021	PER IMP= 6.30
ADD HYD	109.10	1& 2	4	3.85626	2835.12	320.790	1.55975	1.750	1.149	
ADD HYD	109.20	3& 4	1	3.86407	2838.28	321.132	1.55826	1.750	1.148	
ROUTE	109.30	1	2	3.86407	2761.76	321.132	1.55826	1.750	1.117	
COMPUTE NM HYD	107.00	-	1	.02163	27.75	.922	.79933	1.500	2.005	PER IMP= 5.00
ADD HYD	107.10	1& 2	3	3.88570	2770.35	322.054	1.55403	1.750	1.114	
ROUTE	107.20	3	1	3.88570	2781.61	322.054	1.55404	2.000	1.119	
COMPUTE NM HYD	106.00	-	2	.04128	54.21	1.908	.86652	1.500	2.052	PER IMP= 9.30
ADD HYD	106.10	1& 2	3	3.92698	2788.71	323.962	1.54681	2.000	1.110	
ROUTE	106.20	3	1	3.92698	3022.26	323.962	1.54681	2.000	1.203	
COMPUTE NM HYD	105.00	-	2	.02584	33.94	1.194	.86652	1.500	2.052	PER IMP= 9.30
COMPUTE NM HYD	104.00	-	3	.01579	21.70	.843	1.00091	1.500	2.148	PER IMP= 17.90
ADD HYD	104.10	2& 3	4	.04163	55.64	2.037	.91748	1.500	2.088	
ADD HYD	104.20	1& 4	2	3.96861	3030:10	325.999	1.54021	2.000	1.193	
ROUTE	104.30	2	1	3.96861	3236.12	325.999	1.54021	2.000	1.274	
COMPUTE NM HYD	103.00	-	2	.02997	38.73	1.310	.81973	1.500	2.019	PER IMP= 6.30
ADD HYD	103.10	1& 2	3	3.99858	3240.83	327.309	1.53481	2.000	1.266	
ROUTE	103.20	3	1	3.99858	3549.64	327.309	1.53481	2.000	1.387	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	101.00	-	2	.08444	119.29	4.693	1.04208	1.500	2.207	PER IMP= 19.30
COMPUTE NM HYD	102.00	-	3	.02692	36.99	1.437	1.00091	1.500	2.147	PER IMP= 17.90
ADD HYD	101.10	1& 2	4	4.08302	3568.61	332.002	1.52462	2.000	1.366	
ADD HYD	101.20	3& 4	10	4.10994	3574.39	333.439	1.52119	2.000	1.359	
COMPUTE NM HYD	509.00	-	4	.04047	60.46	3.176	1.47149	1.500	2.334	PER IMP= 48.00
ROUTE RESERVOIR	509.01	4	5	.04047	60.46	3.176	1.47149	1.500	2.334	
ROUTE	509.10	5	4	.04047	8.53	3.176	1.47165	2.000	.329	
COMPUTE NM HYD	508.00	-	5	.13308	117.95	11.464	1.61522	1.750	1.385	PER IMP= 56.40
ADD HYD	508.10	4& 5	6	.17355	125.00	14.640	1.58170	1.750	1.125	
ROUTE	508.20	6	4	.17355	119.41	14.640	1.58172	1.750	1.075	
ROUTE	508.30	4	5	.17355	75.38	14.640	1.58172	2.250	.679	
COMPUTE NM HYD	506.00	-	4	.68388	645.51	57.860	1.58636	1.750	1.475	PER IMP= 54.70
ROUTE	506.10	4	6	.68388	659.53	57.860	1.58636	1.750	1.507	
ROUTE	506.20	6	4	.68388	515.16	57.861	1.58637	2.000	1.177	
COMPUTE NM HYD	507.00	-	6	.72551	737.56	61.057	1.57794	1.500	1.588	PER IMP= 54.20
ADD HYD	507.10	4& 5	7	.85743	581.89	72.501	1.58542	2.000	1.060	
ADD HYD	507.20	6& 7	4	1.58294	1142.08	133.557	1.58199	1.750	1.127	
ROUTE	507.30	4	6	1.58294	545.88	133.557	1.58199	2.250	.539	
ROUTE	507.40	6	5	1.58294	530.01	133.557	1.58199	2.500	.523	
COMPUTE NM HYD	505.00	-	4	.57826	690.17	49.916	1.61853	1.500	1.865	PER IMP= 56.60
ROUTE	505.10	4	6	.57826	.07	.366	.01187	79.250	.000	
ROUTE	505.20	6	4	.57826	.06	.363	.01178	84.500	.000	
ADD HYD	505.30	4& 5	6	2.16120	530.01	133.920	1.16186	2.500	.383	
COMPUTE NM HYD	503.00	-	4	.10759	111.59	10.285	1.79232	1.750	1.621	PER IMP= 66.80
ADD HYD	503.19	19& 4	4	10.33936	697.79	815.750	1.47933	1.750	.105	
ROUTE	503.10	4	5	10.33936	654.86	815.750	1.47933	2.000	.099	
ADD HYD	503.20	6& 5	4	12.50056	979.93	949.671	1.42444	2.000	.122	
COMPUTE NM HYD	502.00	-	5	.09216	170.00	10.467	2.12944	1.500	2.882	PER IMP= 86.60
ROUTE RESERVOIR	502.01	5	6	.09216	170.00	10.467	2.12944	1.500	2.882	
ROUTE	502.10	6	5	.09216	129.83	10.467	2.12949	1.750	2.201	
ADD HYD	502.20	5& 4	6	12.59272	1047.96	960.137	1.42960	2.000	.130	
COMPUTE NM HYD	501.00	-	4	.02172	41.57	2.414	2.08359	1.500	2.990	PER IMP= 84.20
ROUTE RESERVOIR	501.01	4	5	.02172	41.57	2.414	2.08359	1.500	2.990	
ROUTE	501.10	5	4	.02172	27.61	2.414	2.08378	1.750	1.986	
ADD HYD	501.20	4& 6	5	12.61444	1066.49	962.551	1.43073	2.000	.132	
COMPUTE NM HYD	504.00	-	4	.89619	873.96	79.126	1.65548	1.750	1.524	PER IMP= 58.90
ADD HYD	504.10	4& 5	1	13.51063	1731.70	1041.677	1.44564	1.750	.200	
ROUTE RESERVOIR	504.99	1	19	13.51063	307.48	1041.651	1.44560	7.750	.036	AC-FT= 185.706
ROUTE	504.99	19	18	13.51063	307.51	1041.652	1.44560	7.750	.036	
*STORE HYD	ID=1	HYD NO=601	DT=0.2	HRS DA=0.1638	SQ MI					
COMPUTE NM HYD	500.00	-	6	.00628	12.03	.697	2.08182	1.500	2.993	PER IMP= 84.00
COMPUTE NM HYD	316.00	-	1	.02386	35.61	1.221	.95919	1.500	2.332	PER IMP= 6.90
ROUTE RESERVOIR	316.01	1	3	.02386	35.61	1.221	.95919	1.500	2.332	
ROUTE	316.10	3	1	.02386	31.41	1.221	.95934	1.500	2.057	
COMPUTE NM HYD	325.00	-	2	.00553	8.99	.380	1.28696	1.500	2.540	PER IMP= 28.90
ADD HYD	325.10	1& 2	3	.02939	40.40	1.600	1.02086	1.500	2.148	
DIVIDE HYD	325.20	3	1	.01470	20.20	.800	1.02086	1.500	2.148	
	325.30	AND	2	.01470	20.20	.800	1.02086	1.500	2.148	
ROUTE	325.40	2	3	.01470	17.81	.801	1.02208	1.500	1.894	
ADD HYD	325.50	3& 6	4	.02098	29.84	1.498	1.33920	1.500	2.223	
DIVIDE HYD	325.60	4	3	.01049	14.92	.749	1.33920	1.500	2.223	
	325.60	AND	6	.01049	14.92	.749	1.33920	1.500	2.223	

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ROUTE	325.70	6	4	.01049	14.24	.749	1.33940	1.500	2.121	
ROUTE	325.70	3	6	.01049	14.24	.749	1.33940	1.500	2.121	
ADD HYD	325.80	6& 4	2	.02098	28.48	1.498	1.33913	1.500	2.121	
COMPUTE NM HYD	324.00	-	3	.01196	12.99	.605	.94876	1.500	1.697	PER IMP= 6.20
ROUTE	324.10	1	4	.01470	15.38	.801	1.02208	1.750	1.635	
ADD HYD	324.20	3& 4	1	.02666	23.46	1.406	.98903	1.750	1.375	
ADD HYD	324.30	1& 2	3	.04763	50.99	2.904	1.14320	1.500	1.673	
DIVIDE HYD	324.40	3	1	.02382	25.50	1.452	1.14320	1.500	1.673	
	324.40	AND	2	.02382	25.50	1.452	1.14320	1.500	1.673	
ROUTE	324.70	1	5	.02382	24.36	1.452	1.14344	1.500	1.599	
ROUTE	324.80	2	4	.02382	24.36	1.452	1.14344	1.500	1.599	
ADD HYD	324.11	4& 5	2	.04763	48.73	2.904	1.14328	1.500	1.599	
ROUTE	324.50	2	1	.04763	46.32	2.905	1.14345	1.750	1.519	
COMPUTE NM HYD	323.00	-	2	.00343	5.56	.233	1.27206	1.500	2.532	PER IMP= 27.90
ROUTE	323.10	2	3	.00343	3.08	.233	1.27402	1.750	1.401	
ADD HYD	323.20	1& 3	2	.05106	49.39	3.137	1.15208	1.750	1.512	
COMPUTE NM HYD	321.00	-	1	.06053	118.00	6.945	2.15124	1.500	3.046	PER IMP= 88.20
ADD HYD	321.10	2& 1	3	.11159	143.27	10.082	1.69406	1.500	2.006	
COMPUTE NM HYD	322.00	-	4	.09103	176.31	10.212	2.10346	1.500	3.026	PER IMP= 85.30
ADD HYD	322.10	3& 4	2	.20262	319.58	20.294	1.87799	1.500	2.464	
ROUTE	322.20	2	1	.20262	313.91	20.294	1.87801	1.500	2.421	
COMPUTE NM HYD	320.00	-	4	.00482	8.29	.391	1.52087	1.500	2.687	PER IMP= 44.60
ADD HYD	320.10	1& 4	12	.20744	322.20	20.685	1.86969	1.500	2.427	
COMPUTE NM HYD	225.00	-	1	.02082	40.39	2.367	2.13141	1.500	3.031	PER IMP= 87.00
ROUTE	225.10	1	2	.02082	35.15	2.367	2.13160	1.500	2.638	
COMPUTE NM HYD	223.00	-	1	.01050	20.64	1.221	2.18099	1.500	3.071	PER IMP= 90.00
ROUTE RESERVOIR	223.01	1	3	.01050	20.64	1.221	2.18099	1.500	3.071	
DIVIDE HYD	223.10	3	1	.00525	10.32	.611	2.18096	1.500	3.071	
	223.20	AND	4	.00525	10.32	.611	2.18096	1.500	3.071	
ROUTE	223.30	4	3	.00525	7.21	.611	2.18162	1.750	2.146	
ADD HYD	223.40	3& 2	5	.02607	40.34	2.977	2.14139	1.500	2.418	
ROUTE	223.50	1	2	.00525	6.19	.611	2.18163	1.750	1.842	
COMPUTE NM HYD	224.00	-	4	.02225	43.42	2.557	2.15455	1.500	3.049	PER IMP= 88.40
ADD HYD	224.10	4& 5	1	.04832	83.76	5.534	2.14744	1.500	2.708	
ROUTE	322.20	12	3	.20744	285.40	20.686	1.86971	1.750	2.150	
COMPUTE NM HYD	226.00	-	4	.01463	28.08	1.632	2.09174	1.500	2.999	PER IMP= 84.60
ADD HYD	226.10	3& 4	4	.22207	298.60	22.317	1.88432	1.750	2.101	
ROUTE RESERVOIR	226.01	4	6	.22207	298.60	22.317	1.88432	1.750	2.101	
ADD HYD	226.20	6& 1	3	.27039	374.17	27.852	1.93134	1.500	2.162	
ROUTE	226.30	3	4	.27039	444.82	27.852	1.93136	1.750	2.570	
ADD HYD	226.40	2& 4	5	.27564	451.01	28.462	1.93610	1.750	2.557	
COMPUTE NM HYD	222.00	-	4	.08660	162.17	9.148	1.98058	1.500	2.926	PER IMP= 77.80
ADD HYD	222.10	5& 4	2	.36224	523.01	37.610	1.94673	1.750	2.256	
COMPUTE NM HYD	221.00	-	4	.06353	113.32	6.168	1.82046	1.500	2.787	PER IMP= 68.00
ADD HYD	221.10	2& 4	1	.42577	573.53	43.778	1.92789	1.750	2.105	
ROUTE	221.20	1	2	.42577	674.25	43.778	1.92790	1.750	2.474	
COMPUTE NM HYD	220.00	-	1	.05896	93.59	4.627	1.47149	1.500	2.480	PER IMP= 48.00
ADD HYD	220.10	1& 2	3	.48473	712.36	48.405	1.87238	1.750	2.296	
COMPUTE NM HYD	219.00	-	1	.07179	113.94	5.634	1.47149	1.500	2.480	PER IMP= 48.00
ADD HYD	219.10	1& 3	2	.55652	758.75	54.039	1.82066	1.750	2.130	
ROUTE	219.20	2	3	.55652	847.81	54.039	1.82067	1.750	2.380	
COMPUTE NM HYD	218.00	-	4	.05788	91.87	4.542	1.47149	1.500	2.480	PER IMP= 48.00

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	218.10	3& 4	1	.61440	885.21	58.582	1.78777	1.750	2.251	
COMPUTE NM HYD	216.00	-	4	.01310	20.80	1.028	1.47149	1.500	2.481	PER IMP= 48.00
ROUTE	216.10	4	2	.01310	14.86	1.028	1.47183	1.750	1.773	
COMPUTE NM HYD	217.00	-	3	.02827	44.88	2.219	1.47149	1.500	2.480	PER IMP= 48.00
ADD HYD	217.10	3& 2	4	.04137	58.17	3.247	1.47151	1.500	2.197	
COMPUTE NM HYD	215.00	-	3	.02934	46.58	2.303	1.47149	1.500	2.480	PER IMP= 48.00
ADD HYD	215.10	3& 4	2	.07071	104.75	5.549	1.47149	1.500	2.315	
ADD HYD	215.20	1& 2	3	.68511	937.31	64.131	1.75513	1.750	2.138	
ROUTE	215.30	3	1	.68511	987.80	64.131	1.75513	1.750	2.253	
COMPUTE NM HYD	214.00	-	4	.03392	53.85	2.662	1.47149	1.500	2.480	PER IMP= 48.00
ADD HYD	214.10	4& 1	2	.71903	1009.73	66.793	1.74175	1.750	2.194	
COMPUTE NM HYD	211.00	-	1	.02593	41.16	2.035	1.47149	1.500	2.480	PER IMP= 48.00
COMPUTE NM HYD	212.00	-	3	.02755	43.74	2.162	1.47149	1.500	2.480	PER IMP= 48.00
ADD HYD	212.10	1& 3	4	.05348	84.90	4.197	1.47148	1.500	2.480	
ROUTE	212.20	4	1	.05348	65.69	4.198	1.47183	1.500	1.919	
COMPUTE NM HYD	213.00	-	3	.00817	12.98	.641	1.47150	1.500	2.482	PER IMP= 48.00
ADD HYD	213.10	3& 1	4	.06165	78.67	4.839	1.47172	1.500	1.994	
ADD HYD	213.20	2& 4	1	.78068	1076.77	71.632	1.72042	1.750	2.155	
ROUTE	213.40	1	2	.78068	1135.66	71.632	1.72043	1.750	2.273	
COMPUTE NM HYD	210.00	-	1	.04379	69.51	3.437	1.47149	1.500	2.480	PER IMP= 48.00
ADD HYD	210.10	1& 2	3	.82447	1163.96	75.069	1.70720	1.750	2.206	
COMPUTE NM HYD	209.00	-	1	.01777	28.21	1.395	1.47149	1.500	2.481	PER IMP= 48.00
COMPUTE NM HYD	207.00	-	2	.01669	22.20	.914	1.02639	1.500	2.079	PER IMP= 23.00
ADD HYD	207.10	1& 2	4	.03446	50.42	2.308	1.25589	1.500	2.286	
ROUTE	207.20	4	1	.03446	41.34	2.309	1.25608	1.500	1.875	
COMPUTE NM HYD	208.00	-	2	.00314	4.99	.246	1.47149	1.500	2.485	PER IMP= 48.00
ADD HYD	208.10	1& 2	4	.03760	46.34	2.555	1.27396	1.500	1.926	
ADD HYD	208.20	4& 3	1	.86207	1198.55	77.623	1.68831	1.750	2.172	
ROUTE	208.30	1	2	.86207	1229.27	77.623	1.68831	1.750	2.228	
COMPUTE NM HYD	206.00	-	5	.01983	21.07	.686	.64833	1.500	1.660	PER IMP= 5.00
COMPUTE NM HYD	205.00	-	1	.01974	20.98	.683	.64833	1.500	1.660	PER IMP= 5.00
COMPUTE NM HYD	204.00	-	3	.00763	8.11	.264	.64833	1.500	1.661	PER IMP= 5.00
ADD HYD	204.10	1& 3	4	.02737	29.09	.946	.64830	1.500	1.661	
ROUTE	204.20	4	1	.02737	22.58	.947	.64857	1.500	1.289	
COMPUTE NM HYD	203.00	-	3	.00960	10.21	.332	.64833	1.500	1.661	PER IMP= 5.00
ADD HYD	203.10	1& 3	4	.03697	32.79	1.278	.64839	1.500	1.386	
ADD HYD	203.20	4& 5	1	.05680	53.86	1.964	.64836	1.500	1.482	
ROUTE	203.30	1	3	.05680	39.06	1.964	.64844	1.750	1.075	
COMPUTE NM HYD	202.00	-	1	.03805	66.15	3.511	1.73033	1.500	2.717	PER IMP= 62.50
ADD HYD	202.10	1& 2	4	.90012	1258.17	81.135	1.69008	1.750	2.184	
ADD HYD	202.20	4& 3	1	.95692	1297.23	83.099	1.62825	1.750	2.118	
ROUTE	202.30	1	2	.95692	1119.50	83.099	1.62825	1.750	1.828	
COMPUTE NM HYD	201.00	-	1	.03518	47.41	1.759	.93738	1.500	2.106	PER IMP= 13.70
COMPUTE NM HYD	200.00	-	3	.05438	80.11	2.965	1.02224	1.500	2.302	PER IMP= 14.00
ADD HYD	200.10	1& 2	4	.99210	1135.31	84.858	1.60375	1.750	1.788	
ADD HYD	200.20	3& 4	12	1.04648	1163.81	87.822	1.57353	1.750	1.738	
ADD HYD	200.30	12&10	1	5.15642	4671.02	421.261	1.53181	2.000	1.415	
ROUTE RESERVOIR	200.03	1	2	5.15642	74.97	421.130	1.53133	8.000	.023	AC-FT= 316.026
ROUTE RESERVOIR	200.03	1	2	5.15642	583838.40	595886.900	2166.79000	299.500	176.915	AC-FT=*********
ROUTE RESERVOIR	200.03	1	2	5.15642	74.97	421.042	1.53101	8.000	.023	AC-FT= 316.029
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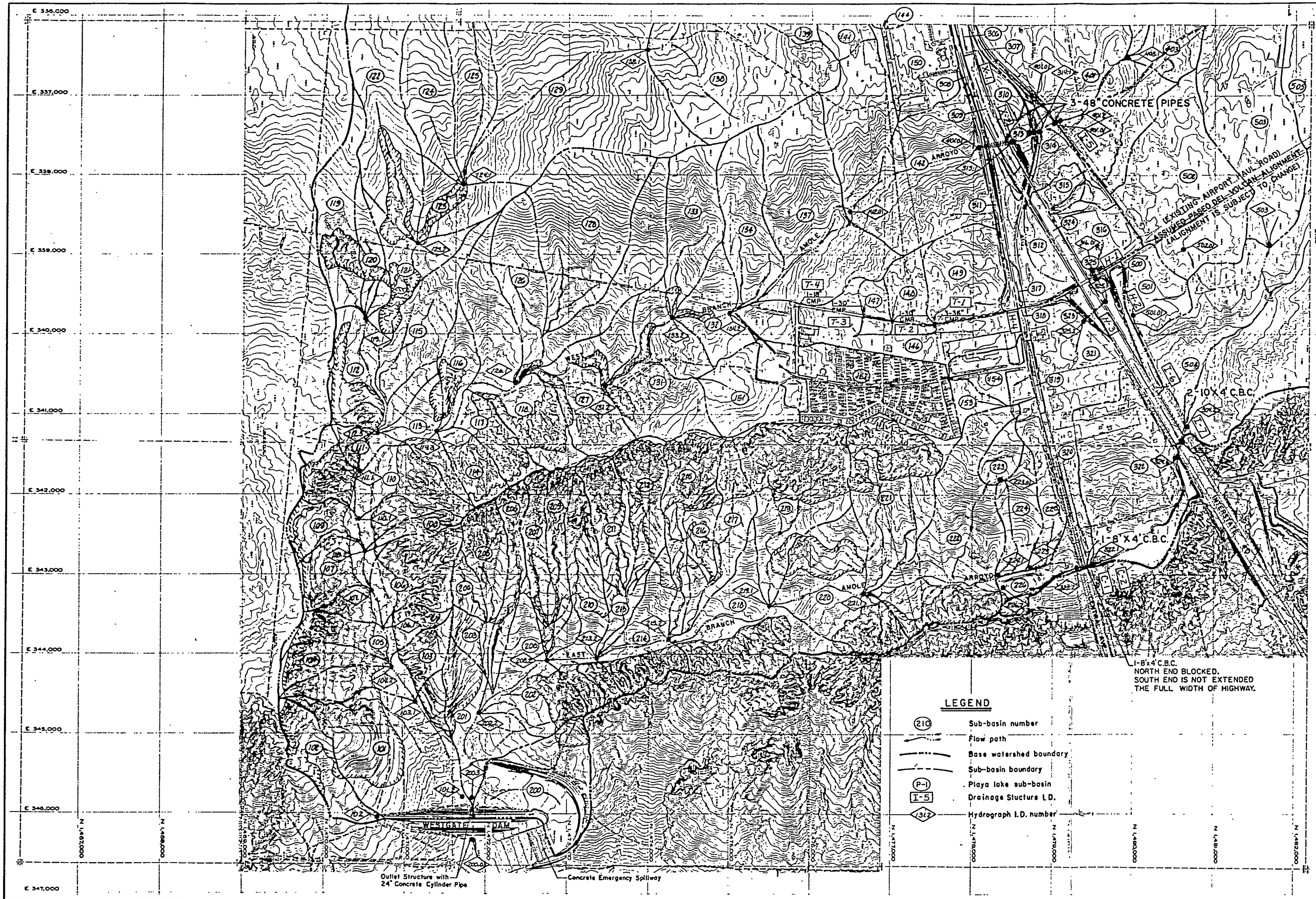


LEGEND

- HORIZONTAL CONTROL POINT
- HORIZONTAL CONTROL POINT / VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT
- ANALYTICALLY DERIVED CONTROL POINT
- ESTABLISHED SECTION CORNER
- PROJECTED SECTION CORNER
- MUNICIPAL BOUNDARY LINE
- PROJECTED SECTION LINE
- ESTABLISHED SECTION LINE
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSION CONTOUR
- SPOT ELEVATION
- PAVED ROAD
- DIRT ROAD
- CULVERT
- FENCE
- POWER POLE
- BUILDING
- VISUALLY PROJECTED CONTOUR (NOT COMPILED)

SHEET INDEX

NOTES:

1) The Map Complies With National Map Accuracy Standards.

2) Field Survey For The Topographic Base Mapping Performed by the City of Albuquerque with Field Surveys for the Orthophotos Performed by Surveying Control, Inc. Using GPS Methods.

3) Topographic Base Mapping Constructed from Aerial Photography Exposed on May 21, 1992 for the Orthophoto Base Mapping Scanned from Aerial Photography Exposed on February 20, 19

4) Stereocompilation, Final Drafting, and Photographic Reproductions Performed by Bohannan-Huston, Inc., Albuquerque New Mexico.

5) 2000' Grid Based on the New Mexico State Plane Coordinate System, Central Zone.

6) The Topographic Detail for Zone Atlas Numbers D-6,7; M-5,6; and N-6 was First Drafted from Base Mapping Produced in 1988 by Bohannan-Huston, Inc.

Ground Distance = Grid Distance .999662233

SCALE IN FEET

500 0 500

SCALE: 1" = 500' (1:6000)
CONTOUR INTERVAL 2'

ALBUQUERQUE / SANTA FE
BOAN LON & ASSOCIATES
SURVEYING AND ENGINEERING

TOPOGRAPHIC BASE MAP
FOR
AMOLE ARROYO - WESTGATE DAM

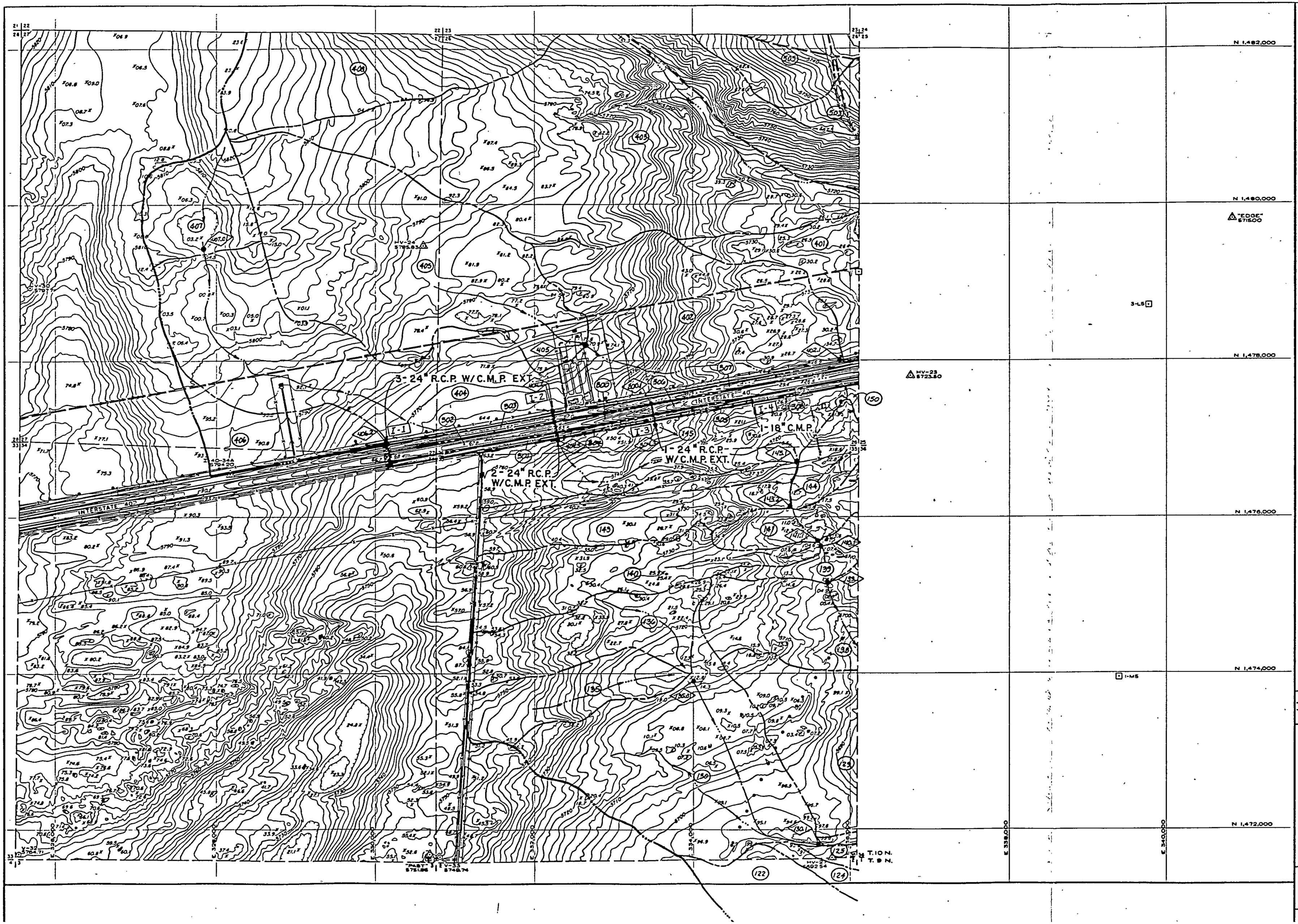
DRAINAGE MANAGEMENT PLAN

BERNALILLO COUNTY
NEW MEXICO

ZONE ATLAS NUMBERS: L-5,7 M-5,7 N-6,7

Albuquerque Metropolitan Arroyo Flood Control Authority

Suite [illegible] N.E.
Albuquerque, N.M.
(505) 366-2550



LEGEND

- HORIZONTAL CONTROL POINT
- HORIZONTAL/VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT
- ANALYTICALLY DERIVED CONTROL POINT
- ESTABLISHED SECTION CORNER
- PROJECTED SECTION CORNER
- MUNICIPAL BOUNDARY LINE
- PROJECTED SECTION LINE
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- INTERMEDIATE CONTOUR
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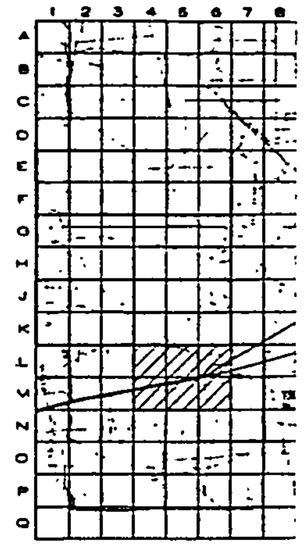

NOTES:

1) This Map Complies With National Map Accuracy Standards.

2) Field Surveys For The Topographic Base Mapping Performed by the City of Albuquerque with Field Surveys for the Orthophoto Performed by Surveying Consul Inc. Using GPS Methods.

3) Topographic Base Mapping Constructed from Aerial Photography Exposed on May 21 1992; with the Orthophoto Base Mapping Scanned from Aerial Photography Exposed on February 20, 1991

4) Stereoscopic, Final Drafting, and Photographic Reproductions Performed by Thomas R. Mann & Associates, Inc., Albuquerque, New Mexico.

5) 2000' Grid Based on the New Mexico State Plane Coordinate System, Central Zone.

6) The Topographic Detail for Zone Atlas Numbers G-4,H-4,J-4, and K-4 was Final Drafted from Base Mapping Produced in 1990 by Bohannan-Huston, Inc.

N

Δ CK = -00° 19' 08"

Ground Distance = Grid Distance / .999662233

SCALE IN FEET

300 0 300

SCALE: 1" = 300' (1:6000)

CONTOUR INTERVAL 2'

AUGMENTED / SUPPLIED BY

SCANLON & ASSOCIATE

TOPOGRAPHIC BASE MAP

FOR

AMOLE ARROYO - WESTGATE DAM

DRAINAGE MANAGEMENT PLAN

BERNALILLO COUNTY

NEW MEXICO

ZONE ATLAS NUMBERS: L-4,5,6 M-4,5,6

Albuquerque Metropolitan Arroyo Flood Control Authority

Sheet 5

LEGEND

- HORIZONTAL CONTROL POINT
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT
- ANALYTICALLY DERIVED CONTROL POINT
- ESTABLISHED SECTION CORNER
- PROJECTED SECTION CORNER
- MUNICIPAL BOUNDARY LINE
- PROJECTED SECTION LINE
- ESTABLISHED SECTION LINE
- 5810 INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSION CONTOUR
- X26.3 SPOT ELEVATION
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- DIRT ROAD
- CULVERT
- FENCE
- POWER POLE
- BUILDING
- VISUALLY PROJECTED CONTOUR (NOT COMPILED)

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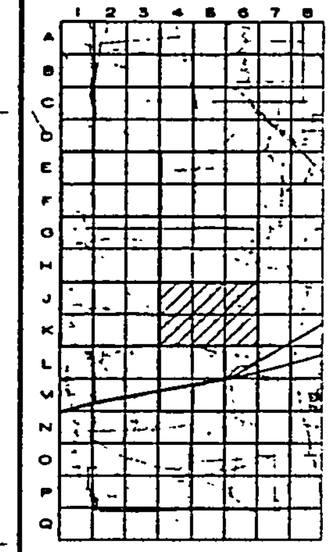


NOTES:

1) This Map Complies With National Map Accuracy Standards.

2) Field Surveys For The Topographic Base Mapping Performed by the City of Albuquerque, with Field Surveys for the Orthophoto Performed by Surveying Control, Inc. Using GPS Methods.

3) Topographic Base Mapping Constructed from Aerial Photography Exposed on May 21 1996; with the Orthophoto Base Mapping Scanned from Aerial Photography Exposed on February 20, 1991

4) Stereocompilation, Final Drafting, and Photographic Reproductions Performed by Thomas A. Mann & Associates, Inc., Albuquerque, New Mexico.

5) 2000' Grid Based on the New Mexico State Plane Coordinate System, Central Zone.

6) The Topographic Detail for Zone Atlas Numbers G-4, H-4, J-4, and K-4 was Field Drafted from Base Mapping Produced in 1986 by Bohannan-Huston, Inc.

N

$\Delta\alpha = -00° 20' 43''$

$$\text{Ground Distance} = \frac{\text{Grid Distance}}{.999662233}$$

SCALE IN FEET

500 0 500

SCALE: 1"=500' (1:6000)
CONTOUR INTERVAL 2' & 5'

ALBUQUERQUE / SANTA FE
SCANLON & ASSOCIATES
CONSULTING ENGINEERS

TOPOGRAPHIC BASE MAP
FOR
AMOLE ARROYO - WESTGATE DAM

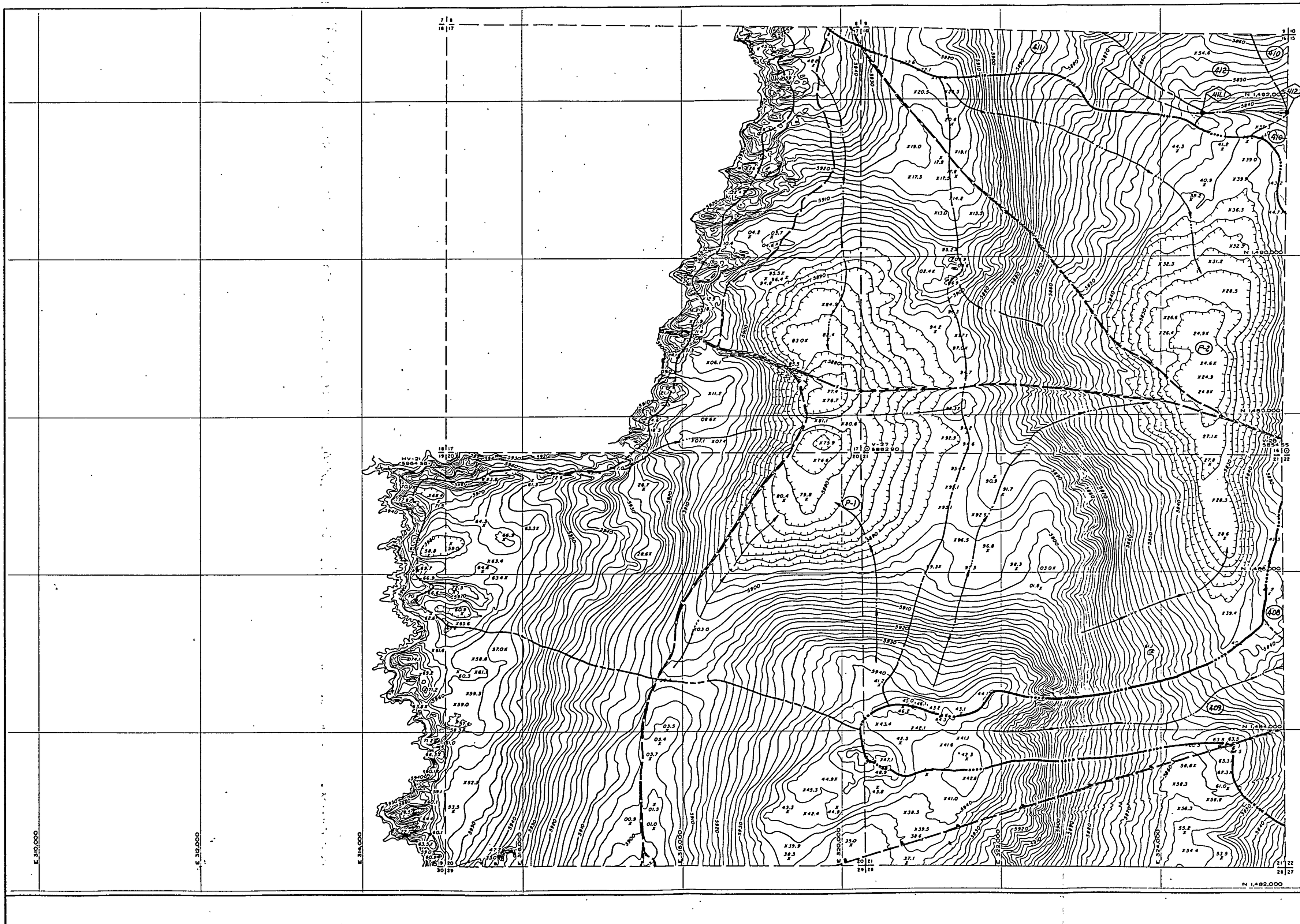
DRAINAGE MANAGEMENT PLAN

BERNALILLO COUNTY
NEW MEXICO

ZONE ATLAS NUMBERS: J-4,5,6 K-4,5,6

Albuquerque Metropolitan Arroyo Flood Control Authority

Sheet 6



LEGEND

- HORIZONTAL CONTROL POINT
- HORIZONTAL/VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT
- ANALYTICALLY DERIVED CONTROL POINT
- ESTABLISHED SECTION CORNER
- PROJECTED SECTION CORNER
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- PROJECTED SECTION LINE
- ESTABLISHED SECTION LINE
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- DIRT ROAD
- CULVERT
- FENCE
- POWER POLE
- BUILDING
- VISUALLY PROJECTED CONTOUR (NOT COMPILED)

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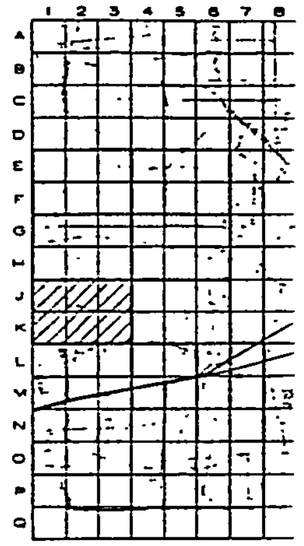

NOTES:

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2) Field Surveys For The Topographic Base Mapping Performed by the City of Albuquerque, with Field Surveys for the Orthophotos Performed by Surveying Consist, Inc. Using GPS Methods.

3) Topographic Base Mapping Constructed from Aerial Photography Exposed on May 21,1992, with the Orthophoto Base Mapping Scanned from Aerial Photography Exposed on February 28, 199

4) Stereocompilation, Final Drafting, and Photographic Reproductions Performed by Thomas R. Mann & Associates, Inc., Albuquerque New Mexico.

5) XXXX Grid Based on the New Mexico State Plane Coordinate System, Central Zone.

6) The Topographic Detail for Zone Atlas Numbers B-2,H-2,J-2 and 3,K-2 was Final Drafted from Base Mapping Produced in 1990 by Bohannan-Huston, Inc.

-N-

$\Delta \alpha = -00° 19' 09''$

Ground Distance = $\frac{\text{Grid Distance}}{.999662233}$

SCALE IN FEET

500 0 500

SCALE: 1" = 500' (1:6000)

CONTOUR INTERVAL 2'

ALBUQUERQUE / SANTA FE

SCANLON & ASSOCIATE

CONSULTING ENGINEERS

TOPOGRAPHIC BASE MAP

FOR

AMOLE ARROYO - WESTGATE DAM

DRAINAGE MANAGEMENT PLAN

BERNALILLO COUNTY

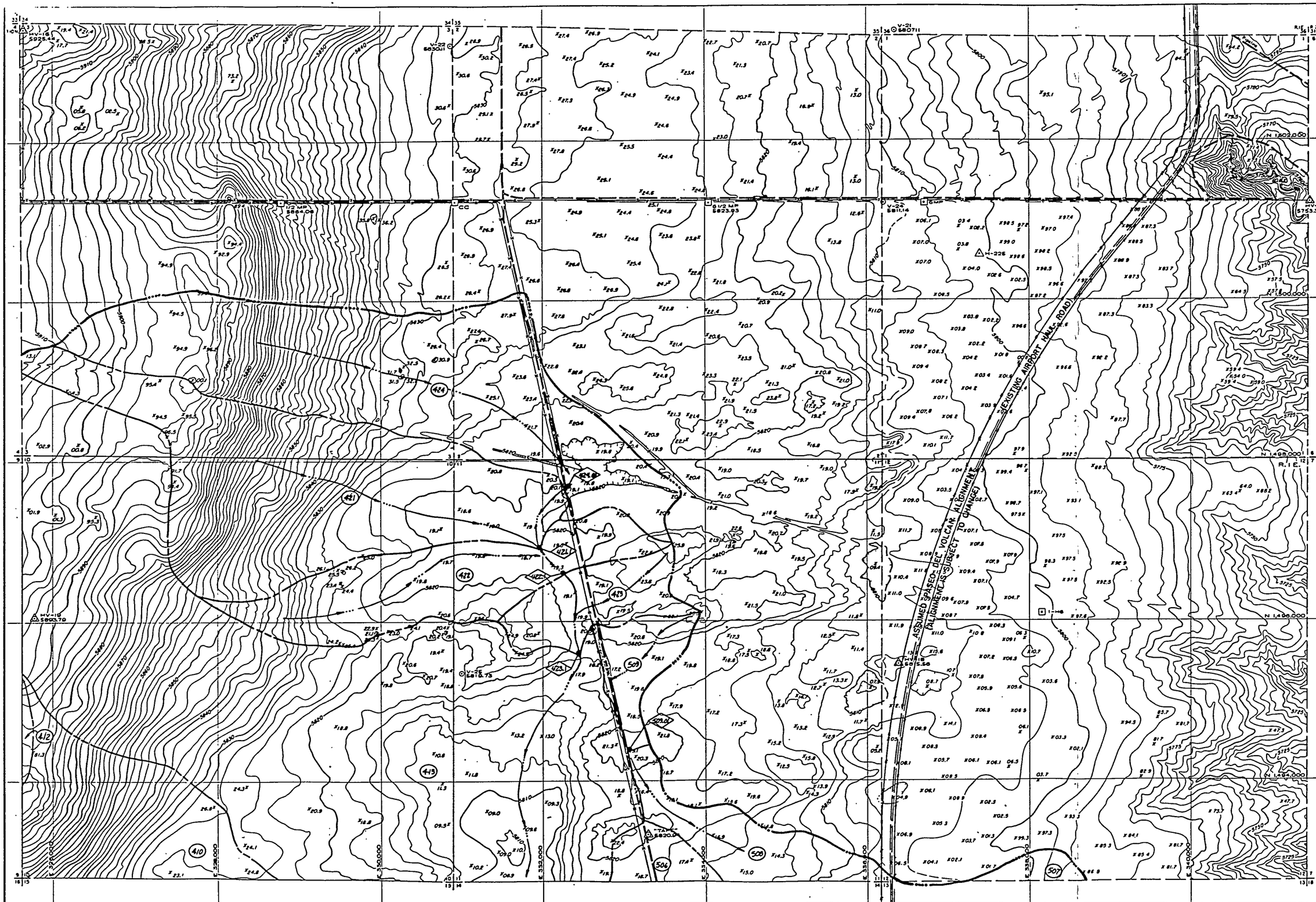
NEW MEXICO

ZONE ATLAS NUMBERS: J-1,2,3 K-1,2,3

Albuquerque Metropolitan Arroyo Flood Control Authority

2600 Prospect N.E.
Albuquerque, N.M. 87
(505) 884-2174

Sheet 7



NOTE: Topo predates airport haul road.

LEGEND

- HORIZONTAL CONTROL POINT
- HORIZONTAL & VERTICAL CONTROL POINT
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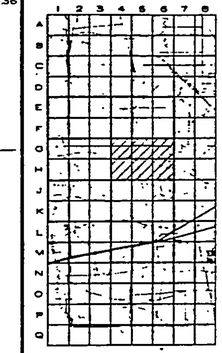
SHEET INDEX



NOTES:

1) This Map Complies With National Map Accuracy Standards.

2) Field Surveys For The Topographic Base Mapping Performed by the City of Albuquerque, with Field Surveys for the Orthophotos Performed by Surveying Control, Inc. Using GPS Methods.

3) Topographic Base Mapping Constructed from Aerial Photography Exposed on May 21, 1992, with the Orthophoto Base Mapping Scanned from Aerial Photography Exposed on February 20, 1991.

4) Stereocompilation; Final Drafting, and Photographic Reproductions Performed by Thomas R. Mann & Associates, Inc., Albuquerque, New Mexico.

5) 2000' Grid Based on the New Mexico State Plane Coordinate System, Central Zone.

6) The Topographic Detail for Zone Atlas Numbers G-4, H-4, G-5, and G-6 was First Drafted from Base Mapping Produced in 1980 by Bohannan-Huston, Inc.

-N-

Δ CK = -00° 19' 13"

Ground Distance = Grid Distance / .999662233

SCALE IN FEET

500 0 500

SCALE: 1" = 500' (1: 6000)

CONTOUR INTERVAL 2' & 5'

ALBUQUERQUE / SANTA FE

SCANLON & ASSOCIATES

TOPOGRAPHIC BASE MAP

FOR

AMOLE ARROYO - WESTGATE DAM

DRAINAGE MANAGEMENT PLAN

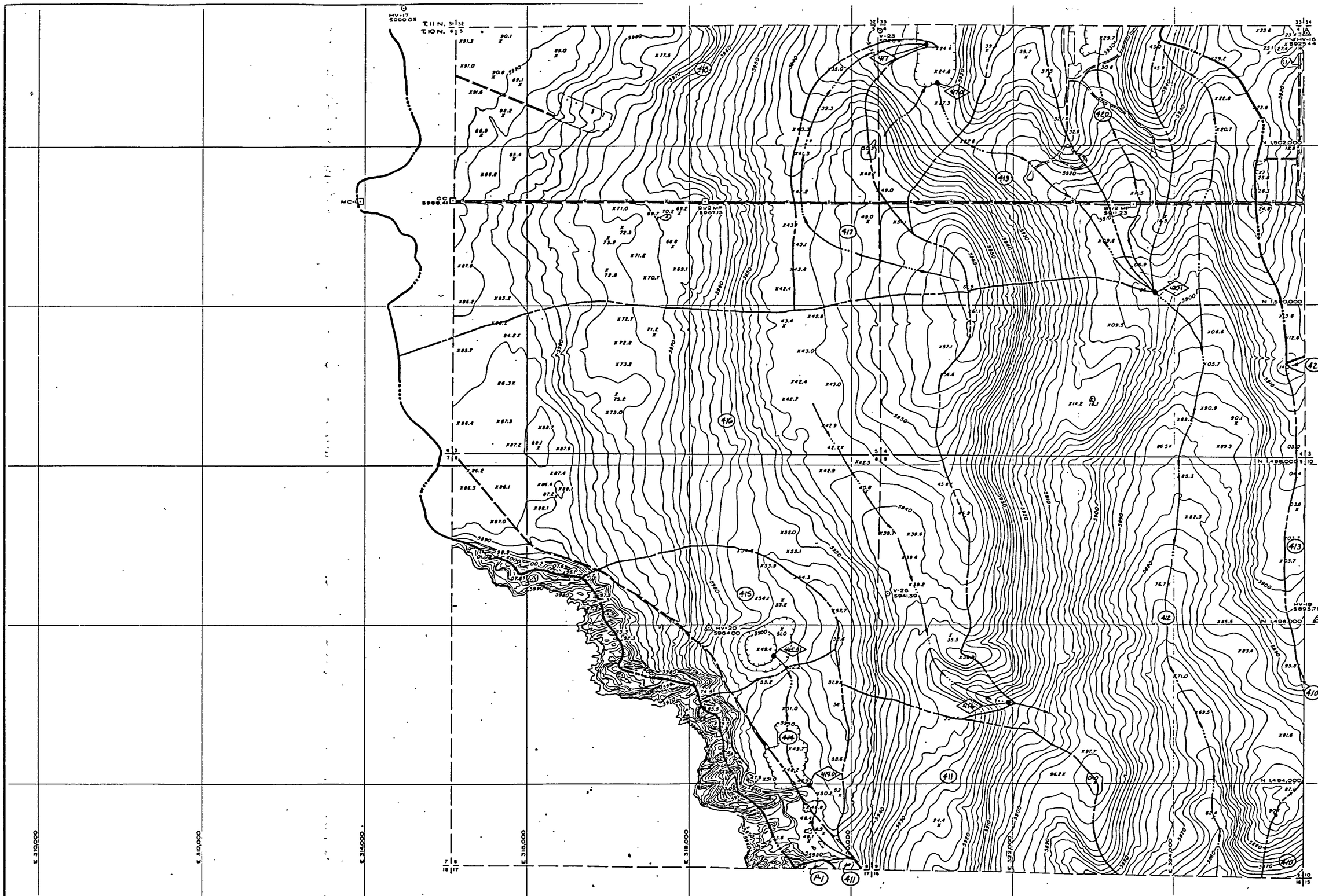
BERNALILLO COUNTY

NEW MEXICO

ZONE ATLAS NUMBERS: G-4,5,6 H-4,5,6

Albuquerque Metropolitan Arroyo Flood Control Authority

Sheet 8



LEGEND

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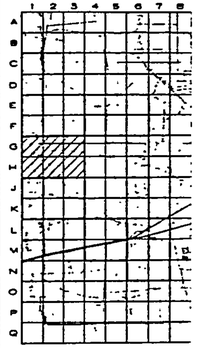
SHEET INDEX



NOTES:

1) This Map Complies With National Map Accuracy Standards.
2) Field Surveys For The Topographic Base Mapping Performed by the City of Albuquerque, with Field Surveys for the Drainage Plan Performed by Surveying Central, Inc. Using GPS Methods.
3) Topographic Base Mapping Constructed from Aerial Photography Exposed on May 21, 1992, with the Orthophoto Base Mapping Scanned from Aerial Photography Exposed on February 26, 1991.
4) Scanscomplation, Final Drafting, and Photographic Reproductions Performed by Thomas R. Morris & Associates, Inc., Albuquerque, New Mexico.
5) XXXX Grid Based on the New Mexico State Plane Coordinate System, Central Zone.
6) The Topographic Detail for Zone Atlas Numbers G-2 H-2,3,4, and K-4 was First Drafted from Base Mapping Produced in 1980 by Benavidez-Huston, Inc.

-N-

Δ CK = -00° 20' 44"

Ground Distance = Grid Distance / .999662233

SCALE IN FEET

500 0 500

SCALE: 1" = 500' (1:6000)

CONTOUR INTERVAL 2'

ALBUQUERQUE / SANTA FE

SCANLON & ASSOCIATE

CONSULTING ENGINEERS

TOPOGRAPHIC BASE MAP

FOR

AMOLE ARROYO - WESTGATE DAM

DRAINAGE MANAGEMENT PLAN

BERNALILLO COUNTY

NEW MEXICO

ZONE ATLAS NUMBERS: G-1,2,3 H-1,2,3

Albuquerque Metropolitan Arroyo Flood Control Authority

Sheet 9

A LIMITED ENVIRONMENTAL ANALYSIS OF THE AMOLE ARROYO WATERSHED

June 1991

MARRON TASCHEK KNIGHT INC

APPENDIX C

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I SUMMARY OF POTENTIAL IMPACTS

A. Potential Impacts on Geology and Paleontology

The greatest potential geological impact of future projects requiring surface disturbance, in this study area, will be upon paleontological resources. The greatest likelihood of encountering significant paleontological remains will be in the Ceja Formation in the area just west of the existing Westgate Dam and extending northward to Interstate 40. It is recommended that a paleontological survey of this portion of the study area be undertaken before any future construction or related surface disturbance begins.

B. Potential Impacts on Archaeology

Portions of the study area have been subject to past archaeological surveys. From these data, three areas have been identified as having a known or potential archaeological site. These are the escarpment along the west edge of Ceja Mesa above the Rio Puerco (the extreme western edge of the study area), the area from Westgate dam westward for approximately two miles and north to Interstate 40, and the area adjacent to the actual drainage of Amole Arroyo. Since future projects are likely to occur within the drainage of Amole Arroyo and in the area around Westgate Dam, it is quite likely that there could be impacts to archaeological sites. Any action that requires surface disturbance within the study area should be proceeded by a Class III (100% coverage) ground survey.

C. Impacts on Wildlife - Raptors and Migratory Birds

Although many raptor species frequent the project area (eg. red tail hawk, kestral) only the burrowing owl is known to consistently nest within the grassland habitat types of this area. Although there are no known observations of burrowing owls in the study area, they have been recorded in several locations, with similar habitats, just to the north of the Amole Arroyo Drainage near Paradise Hills and Rio Rancho. It is quite likely that they could occur at future project sites, and therefore these sites should be surveyed before any surface disturbance occurs to ascertain if the owl is present.

Some habitat for small mammals and reptiles will be destroyed by future projects requiring surface disturbance. It is also possible that some small mammals and/or reptiles will be destroyed in these construction processes.

D. Potential Impacts to Endangered or Sensitive Species

There is a potential for the occurrence of two state endangered plant species within the study area. These are the grama grass cactus and the dune unicorn plant. Most of the study area is not suitable habitat for grama grass cactus; however, the Grama grass/snakeweed plant association in the eastern portion of the study area does afford suitable habitat. Dune unicorn plant could occur in the deep sandy areas above the western escarpment of Ceja Mesa. This is at the extreme western edge of the study area. Any action within this area that would require surface disturbance should be proceeded by an endangered plant survey. Two state sensitive plant species could also be found within the study area. These are the cyanic milkvetch and the La Jolla Prairie Clover. The cyanic milkvetch has been documented to occur below the western escarpment of Ceja Mesa. It could occur at the extreme western edge of the study area. La Jolla Prairie clover has been documented to occur along the right-of-way of Interstate 40 from the top of Nine Mile Hill to the Rio Puerco Valley. This species seems to tolerate disturbance, and in some cases increase in disturbed habitats. Although it could occur throughout the study area, it is not likely to be adversely impacted by the activities that may result from this study.

Several state and federal endangered animal species such as the bald eagle, whooping crane and peregrine falcon may fly over the study area. There is no indication that any of these species utilize the study area on a regular or seasonal basis.

E. Potential Impacts of Impaired Properties

There are two identified World War II era bombing targets within the study area. Either of these sites could contain unexploded bombs. Several recently constructed facilities such as the Soil Amendment Plant and the Double Eagle II Airport could contain substances considered pollutants (eg. aviation fuel, fertilizer). There may be old business locations along Central Avenue that could have suffered impairment from past uses.

II PROJECT AREA AFFECTED ENVIRONMENT

A Regional Setting

The Amole Arroyo study area is situated in central New Mexico, between the drainages of the Rio Grande and the Rio Puerco. It extends from the western edge of Ceja Mesa near the City of Albuquerque's Shooting Range Park eastward to the volcanos just west of Albuquerque, and southward to just south of Interstate 40. The entirety of this area is located in the geologic depression known as the Albuquerque Basin and falls under the range of the Mexican Highlands portion of the Basin and Range Province. The study area typically consists of flat sandy areas and rolling hills cut by deep walled arroyos. Typically the vegetation is composed of perennial grasses and forbes in some areas, interspersed with scattered juniper. The overall visual aspect is savanna like. Panoramas of the Sandia and Jemez mountains line the east and northern horizons. The climate is semi-arid, averaging between 8-10 inches of rainfall annually.

Human activities in this area extend back into the Paleo period (10,000 Before Present). Currently, the region supports a variety of industries. These include ranching, mining, and tourism. Human pressures on the environment are increasing throughout the region. The greater metropolitan area of Albuquerque lies immediately to the east. Growing populations in Albuquerque have fired the current development on Ceja Mesa (locally termed "West Mesa").

B Geology and Paleontology

The Amole Arroyo drainage lies just west of the geographic center of the Albuquerque Basin. This basin is about 102 miles long, 25-40 miles wide, and covers an area of 4,300 square miles. The basin is filled with gravels, sands, sandstones and mudstones that reach a thickness of up to 12,000 feet. Albuquerque, and its greenbelt of cottonwood forests and agricultural lands are a direct result of this basin topography. Prior to the Tertiary period, the Rio Grande Country may have had the aspects of the Colorado Plateau. The development of the Rio Grande trough led to the formation of a string of closed basins along what is now the Rio Grande Drainage. Eventually, these basins defined the drainage of the Rio Grande, and exposed the mesas on the east and west side of the river. The deposition of these fluvial materials began as early as the Miocene and continued up through the Pleistocene. The entirety of Ceja Mesa, and portions of the Puerco valley are composed of these fluvial materials. The resulting geology beneath Amole Arroyo is principally of sedimentary beds of varying composition, which reach a thickness in excess of 12,000 feet, in their entirety.

1. Stratigraphy and Surficial Geology

The surface geology and much of the immediate subsurface stratigraphy of the Amole Arroyo are of two types. The first is bulk sediments that have filled the Albuquerque Basin in the past and have no direct relationship to recent landforms (ie. Santa Fe Group strata). The second is floodplain deposits, terraces, dunes, alluvial fans, caliche blankets, basaltic flows and gravel piedmonts. All of these are of recent origin and are directly related to present landforms. The first several thousand feet of pre-pleistocene bulk deposits that fill the Albuquerque Basin are primarily of the Miocene and Pliocene Origin. The vast majority of this material can be assigned to the Santa Fe Formation. Within the project area two segments of the Santa Fe Formation have been identified. These are the Santa Fe Formation Undivided and the Ceja Member.

The strata portions of the Santa Fe Formation Undivided include a broad aggregation of temporally variable sandstones, mudstones and siltstones. These rocks occur at the base of the escarpment on the western edge of the study area. These include facies deposited by river action, by alluvial action, by playa deposition and by eolian means. All of these beds are highly erodable. They are grayish-pink sand, clay and mudstones.

The Ceja Member is composed primarily of sandstones and conglomerates. It underlies most of the project area and consists of interbedded pinkish-gray, sandy-pebble gravel and gravelly sand up to 250 feet thick. This unit is exposed along the eastern and western margins of the study area and in small fault blocks on the surface of the Mesa. There are often large deposits of gravel present throughout the member. Much of this member is believed to be of alluvial origin with source material derived from the Jemez Mountains to the north.

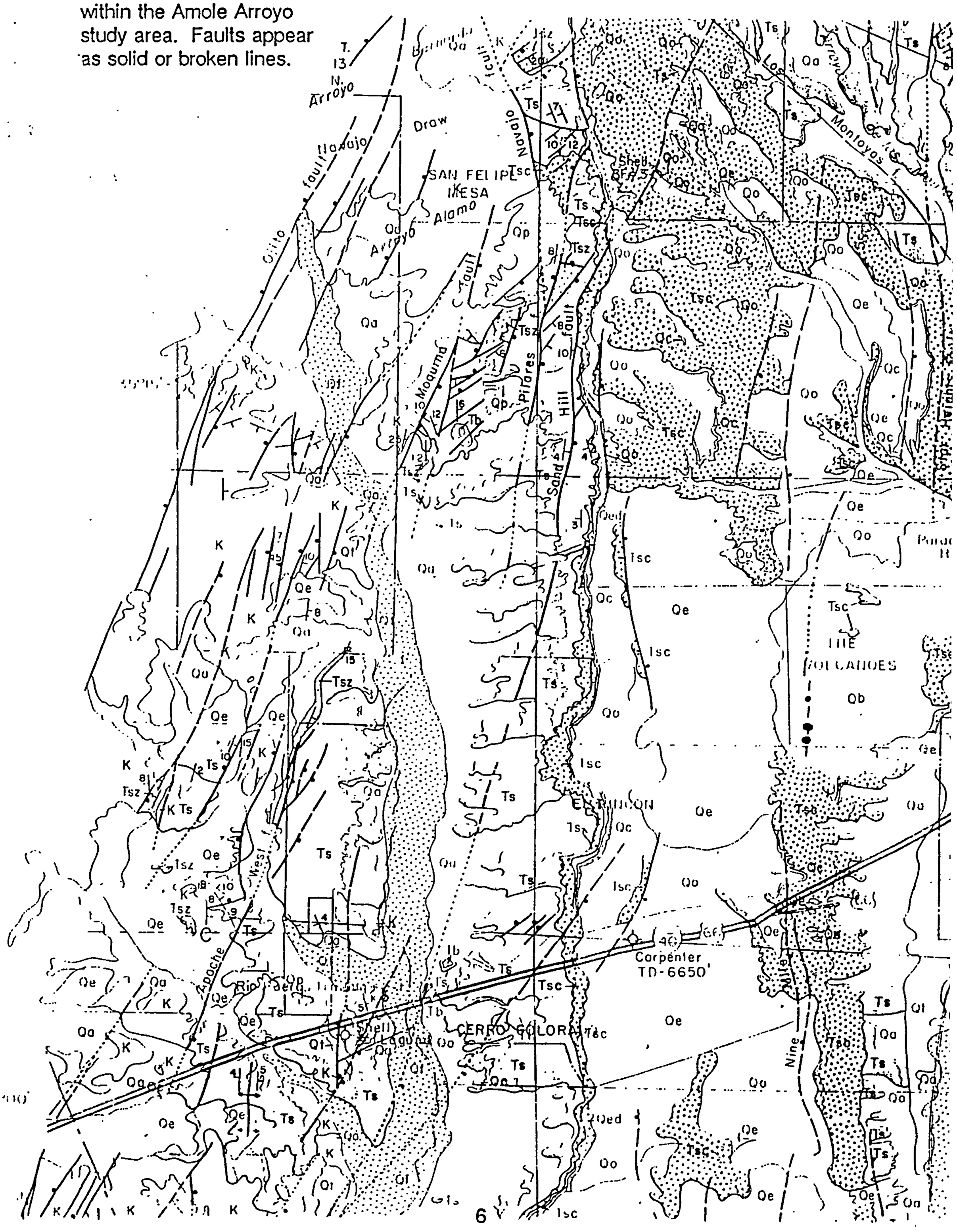
The more recent Pleistocene and Holocene deposits within the Amole Arroyo drainage are represented by alluvium from arroyos, eolian sand dunes, gravel terraces, gravel piedmonts and caliche. The arroyo alluvium, eolian sands and caliche are of much more recent origin. Many of these deposits produce highly active soils (soils easily subject to sediment transport and deposition) and are subject to severe erosion. These strata include Quaternary calcrete which develops on steep slopes; Quaternary gravels which overlie much of the mesa surface; Quaternary eolian deposits which consist of sheet sands and areas of sand-dune development, and Quaternary alluvium which covers some areas of the Mesa.

The Albuquerque volcanoes lie just to the east of the study area. These formations consist of basalts and basaltic cinders with small eruptive centers. They were deposited during Pleistocene (190,000 years BP) volcanic activity related to the Rio Grande Rift.

2. Subsurface Structure and Features

The subsurface geology of the Amole Arroyo is partially defined. The data for this figure comes from several deep wells that have been drilled on and around Ceja Mesa. Portions of the Santa Fe Group extend to a depth of 6000 feet below the surface of Ceja Mesa. Underlying these basin deposits is bedrock composed of Cretaceous and Jurrasic Strata. A variety of faults have been identified in the Albuquerque Basin. A number of north-trending faults occur along Ceja Mesa from just south of Belen to north of the Albuquerque volcanic field (Map 1). On the west side of the mesa there are a number of faults in the Santa Fe formation that have affinities with the Rio Puerco fault belt. Although the exact origin of these faults is uncertain, they are probably related to activities in the formation of the Rio Grande Rift Zone, and volcanic activities associated with the Rift Zone. The Rio Grande Rift is an active earthquake belt. In the last 100 years the Rio Grande Rift has experienced several hundred earthquakes. However, none of these have exceeded magnitude 5 and most rarely exceed magnitude 3 on the Richter scale.

MAP 1. Geological faults within the Amole Arroyo study area. Faults appear as solid or broken lines.



3. Paleontological Potential of the Study Area

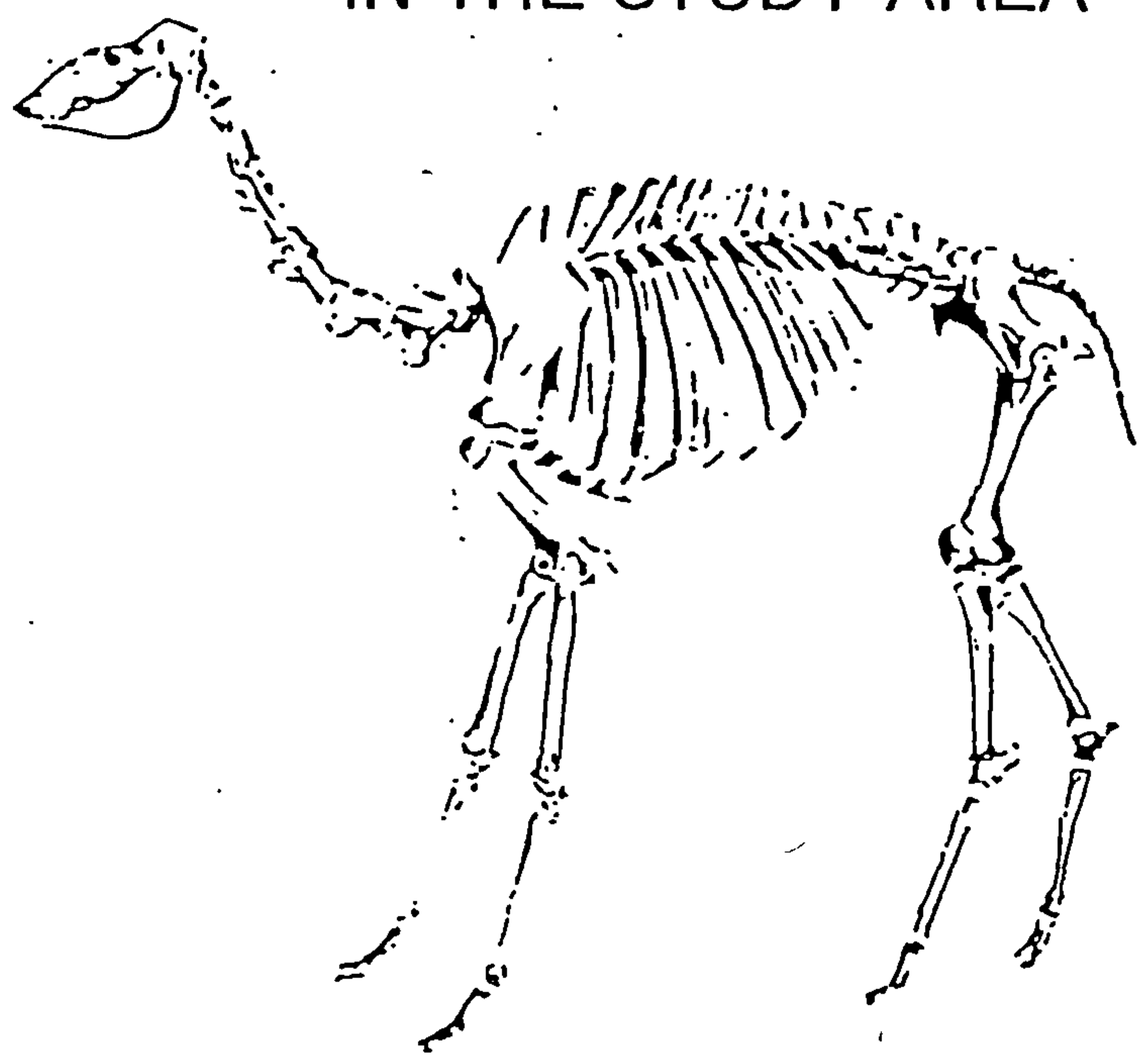
Although fossils could conceivably be found in any of the sedimentary rocks in the study area, only the Ceja Member of the Santa Fe Formation has yielded significant fossil remains in the past. No vertebrate fossils have yet been documented within the study area, but numerous examples of petrified wood have been found in the area west and north of Westgate Dam, and along the western escarpment of Ceja Mesa.

Significant fossils are found elsewhere in the Albuquerque area, particularly in the Tijeras Arroyo area, at Cerro de Los Lunas volcano, and at the Isleta Indian Pueblo Reservation. These fossils include horses (Equus simplicidens), rabbits (Hypolagus), gaint marmots (Paenemarmota), gophers (Geomys) and unidentified small mammals, birds and turtles. More recently, a complete skull of a small rodent was discovered in the Rio Rancho area, and a nearly complete juvenile camel was found on the east side of Albuquerque. Most of the large animal remains have come from pumicaceous rocks on the east side of Albuquerque. West and south of Albuquerque fossils seem to be more uncommon. However, in any excavation in the Ceja Member it is possible that vertebrate remains will be encountered and care should be exercised. Figure 1 is an example of the type of fossil mammals that could be found in the study area.

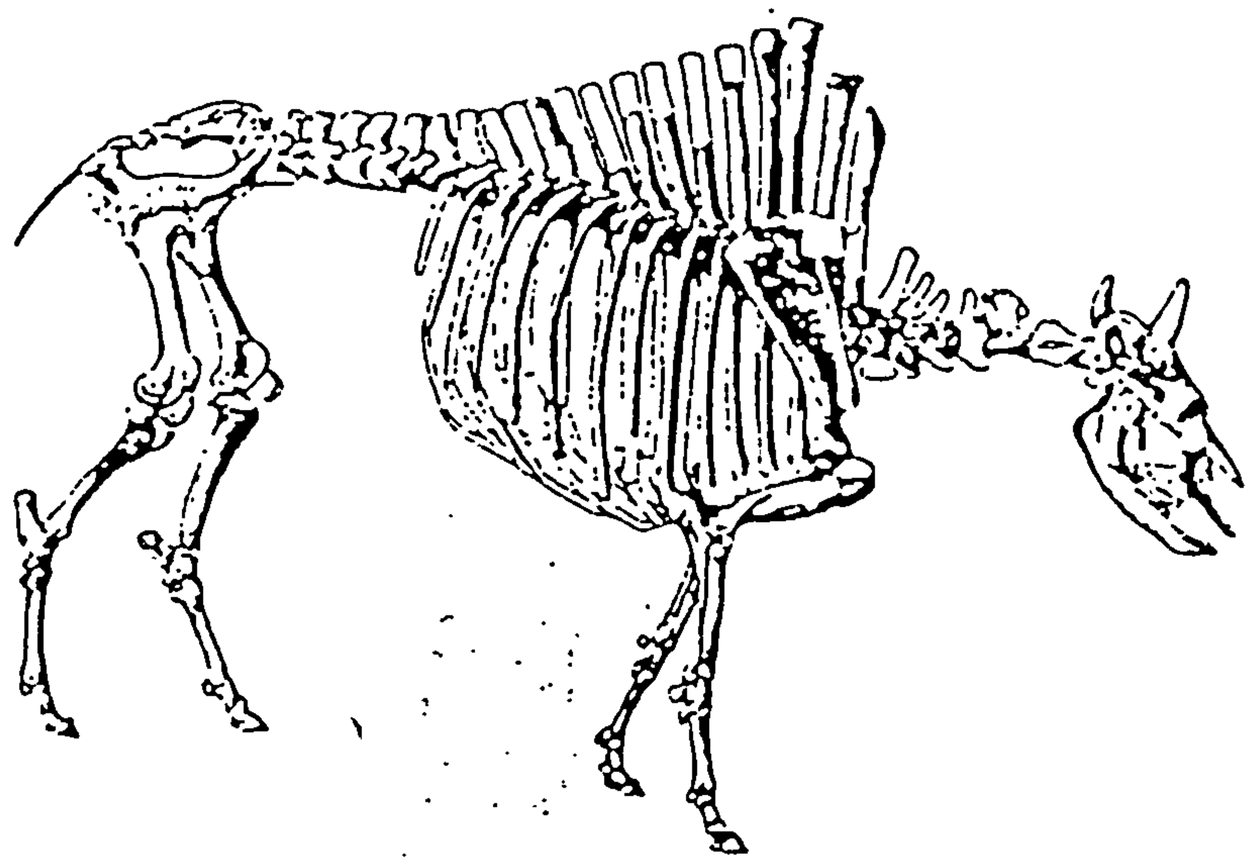
4. Potential Impacts on Geology and Paleontology

The greatest likely geological impact of future projects requiring surface disturbance will be upon potential paleontological resources. The greatest likelihood of encountering significant paleontological remains will be in the Ceja Formation in the area just west of the existing Westgate Dam and extending northward to Interstate 40. It is recommended that a paleontological survey of this portion of the project area be undertaken before construction begins.

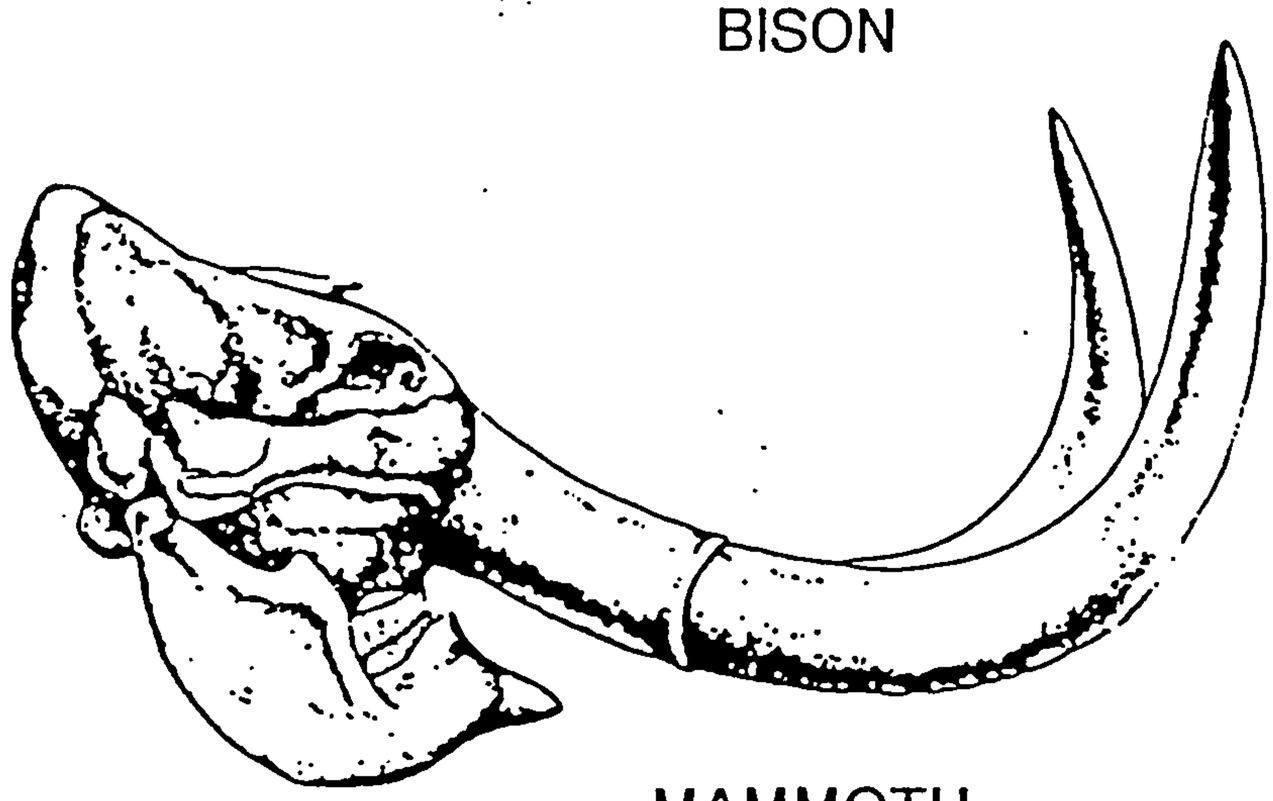
FOSSIL MAMMALS THAT COULD BE FOUND IN THE STUDY AREA



CAMELOPS



BISON



MAMMOTH

FIGURE 1

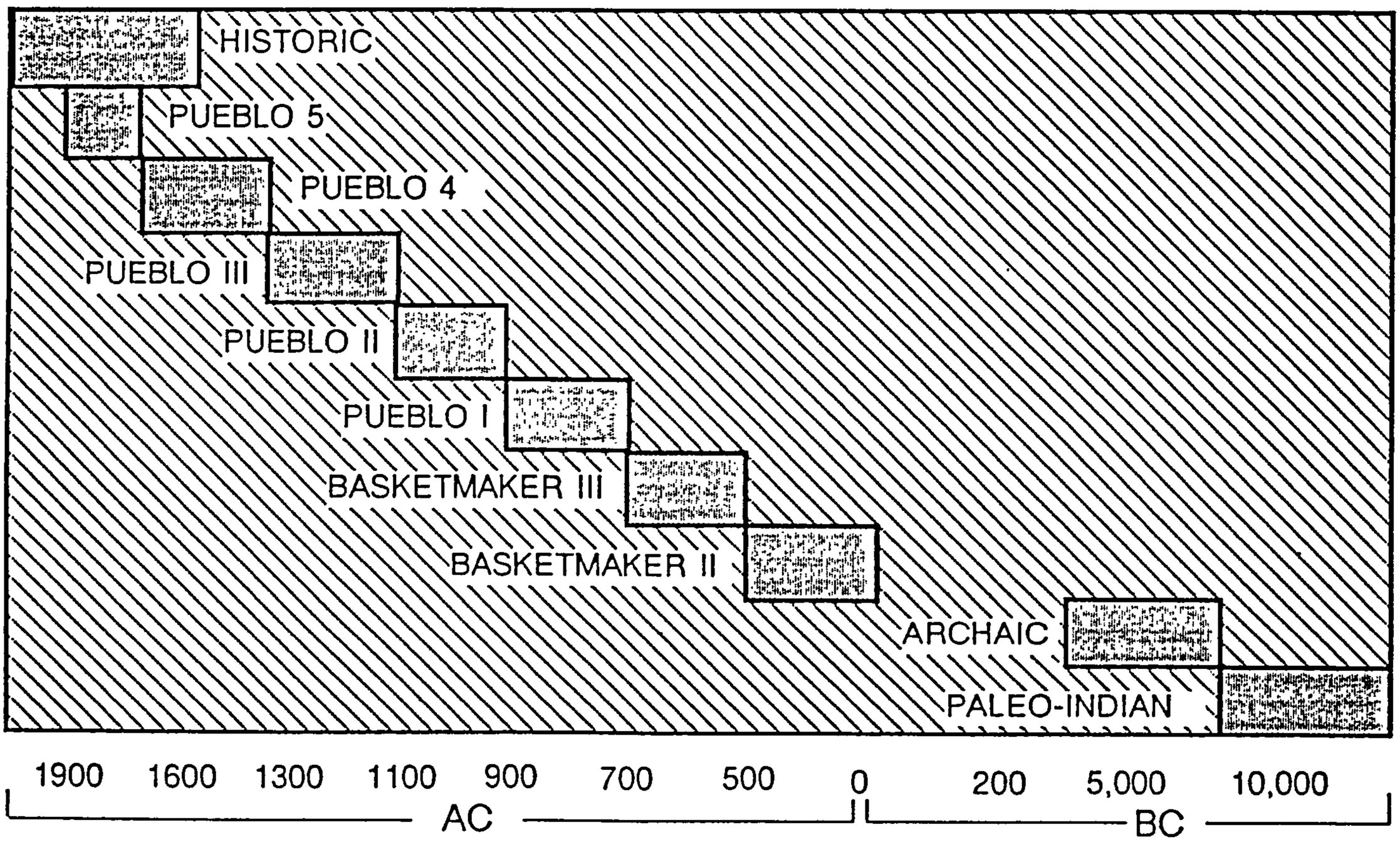
C ARCHAEOLOGY

1. Resource Inventory

A Class I Cultural Resources Inventory was conducted for the Amole Arroyo watershed in southwest Albuquerque. The inventory consisted of a literature review of known or reported archaeological sites within an area of approximately 50 square miles (over 30,000 acres). Within this area, at least nine on-the-ground archaeological surveys have taken place in the past 25 years. Most of these surveys have occurred in the past 10 years as a result of development activities on the West Mesa. Information was obtained by consulting maps and reports located at the Archaeological Records Management System, Laboratory of Anthropology at the Museum of New Mexico.

The study area contains 75 recorded archaeological sites. Brief site descriptions are summarized by survey area in Figure 2. Virtually every major time period in the local cultural chronology is represented in the study area. These time periods include PaleoIndian, Archaic, Basketmaker, early Pueblo, late Pueblo, historic Pueblo, historic, and World War II era sites (Table 1). Many of the sites are considered to be multicomponent, which mean they were reoccupied or that more than one time period is represented. The 75 sites represent 96 cultural components which are summarized as follows:

TABLE 1



The great preponderance of sites assigned to the Archaic category is no doubt a result of difficulty in determining the age or cultural affiliation of lithic scatters with no diagnostic artifacts. Certainly puebloan lithic reduction sites with no ceramic materials can be confused with preceramic lithic sites. In addition, sites located on lithic sources such as gravel outcrops have probably been reused over long periods of time by a number of different groups. Although a precise age determination of many sites is not possible, there are several clear-cut patterns to the prehistoric and historic human use of the Amole Arroyo watershed area.

First, the use has been long-term and covers a great span of time. Paleo Indian sites are relatively rare but the study area contains at least two topographic situations that have been found to contain these earliest sites (playa lake beds and deflated old surfaces where soils have been blown away leaving artifacts sitting on the surface). Second, the use has been sustained rather than sporadic. This is demonstrated by the presence of sites from practically every major cultural time period. Even with the paucity of sites containing diagnostic artifacts, there was a nearly uninterrupted past utilization of the watershed area. Third, the use of the area has been relatively heavy throughout the past. High site densities are noted in several parts of the watershed, notably the rim of the Rio Puerco escarpment, along the main course of the Amole Arroyo, and on the edge of the "Ceja" escarpment that forms the west edge of the Rio Grande floodplain. Fourth, the watershed contains several distinct zones that offered valuable resources to past groups. These include the lithic sources or gravel outcrops of the Rio Puerco escarpment and the Ceja, the drainage courses of the arroyo itself, the associated rich habitat areas along and surrounding the arroyo, and the specialized habitats such as the playa lakes or dunal areas. Each of these patterns will be discussed in more detail below.

The Amole Arroyo watershed has several unique qualities that have contributed to the long-term and comparatively intensive past human use of the area. It is the first major drainage course south of the West Mesa volcanic escarpment that does not cross the escarpment. It does, however, drain significantly large areas on top of the West Mesa and is the only watershed immediately west of the volcanoes. In the process, the Amole drains old stabilized surfaces near the ceja and includes several large playa lake areas. As has been pointed out, such areas are rare for the presence and exposure of Paleo Indian and early Archaic sites. In addition, the headwaters of the Amole begin near a large embankment of the Rio Puerco escarpment known as "El Rincon." Past groups could have traveled between the Rio Grande and Rio Puerco valleys by following the Amole and they would have encountered numerous useful plant and animal habitats as well as lithic raw material sources. Perhaps only the Pajarito Arroyo to the south and the Boca Negra and Calabacillas Arroyos to the north may have offered similar opportunities.

The geographic and fluvial characteristics of the Amole Arroyo certainly contributed to its sustained human usage over a long period of time. Archaic and Puebloan sites attest to this continued use as a resource area. Playa lakes and exposed old surfaces add to these characteristics because of the presence of Paleo Indian sites. It should be noted that Judge's (1973) survey of Paleo Indian sites most certainly included portions of the Amole watershed around the playas and southwest of the volcanoes. Campbell and Ellis' early work (1952) on preceramic sites of the Atrisco Phase also certainly occurred within the study area.

The Amole Arroyo watershed has not been extensively surveyed in archaeological terms. Perhaps 10% or less of the area has been formally investigated. Even so, 75 sites with 96 cultural components have been recorded. This suggests that at least 750 archaeological sites may exist within the watershed. A moderate site density of 20 sites per section of land would yield an estimated total number of sites approaching 1000 or more. Certain areas have been utilized so heavily that there is a nearly continuous site density. These areas include the rim of the Rio Puerco escarpment and the edge of the ceja, where site densities exceed one site per 10 acres. In addition, high site densities around the volcanoes and along the West Mesa volcanic escarpment could contribute to site densities in the eastern portion of the watershed.

The pattern of site locations offers some indication of the resources that were utilized in the past. The playa lakes, when they contained standing water, would have provided a valuable water source that would have attracted animals from miles around on the mesa top. Prehistoric hunters were certain to have exploited this situation to their advantage. The Rio Puerco escarpment contains abundant fine lithic materials, not the least important of which was fossilized wood. The escarpment also provided an excellent overlook into the Rio Puerco Valley, and herds of game could have been seen from a great distance. Dunal habitats along the rim of the Puerco escarpment and slightly to the east may have contained localized useful plant and animal species. The same may be said for the drainageway of the Amole Arroyo itself, which probably supported small exploitable plant and animal communities. Finally, the edge of the Ceja provided lithic raw materials and an overview of the Rio Grande similar to that described for the Rio Puerco escarpment and valley. Lithic materials may have been of a slightly lower quality and quantity, but the prehistoric use of the material sources was none the less very intensive.

In summary, the Amole Arroyo watershed contains numerous important archaeological sites spanning a long period of time. Figure 2 is a table of these sites as they appear on the project maps. It is one of the few study areas of its kind that can be shown to have had such sustained and widespread past human uses. Since much of the watershed has not been formally surveyed, and since site densities are high and include rare Paleo Indian sites, it is recommended that all ground-disturbing activities be surveyed in advance. Due to the potential for buried early sites, it is recommended that monitoring of ground-disturbing activities take place for all projects, even when no surface archaeological materials are found.

2. Potential Impacts on Archaeology

Portions of the study area have been subject to past archaeological inventory. From this data, three areas have been identified as having known or potential for archaeological sites. These are the escarpment along the west edge of Ceja Mesa above the Puerco River (the extreme western edge of the study area), the area from Westgate dam westward for approximately two miles and north to Interstate 40, and the area adjacent to the actual drainage of amole arroyo. Since future projects are likely to happen within the drainage or Amole Arroyo and in the area around Westgate Dam, then it is quite likely that there could be impacts to archaeological sites.

FIGURE 2

Reinhart (1968) Dissertation— 6 sites in study area		
BB-12	lithic scatter; fire-cracked rock; stone tools	late Archaic/ Basketmaker 2
BB-13	lithic scatter; fire-cracked rock; groundstone; charcoal stains; stone tools	Basketmaker 2
BB-16	lithic scatter	Archaic?
BB-17	lithic scatter	Basketmaker 2
BB-18	lithic scatter	Basketmaker 2
BB-19	lithic scatter	Archaic?

Johnson (1976) West Mesa Airport— 22 sites in study area		
LA 45559	lithic scatter; groundstone; ceramics	Archaic?/P 3
LA 45560	lithic scatter	Archaic?
LA 45561	lithic/ceramic scatter	Archaic?/P 4
LA 45562	lithic scatter; groundstone	Archaic?
LA 45563	lithic scatter	Archaic?
LA 45564	lithic scatter; hearth; groundstone	Archaic?
LA 45565	lithic scatter/quarry	Archaic?
LA 45566	lithic scatter; groundstone, charcoal stains, ceramics	Archaic?/P 5
LA 45567	lithic scatter; groundstone; hearth; modern trash	Archaic?/ Recent
LA 45568	lithic scatter/quarry; ceramics	Archaic?/P 4
LA 45569	large lithic scatter/quarry; hearths; stone tools; groundstone; ceramics	Archaic?/ BM 3-P 1
LA 45570	lithic scatter; fire-cracked rock; groundstone	Archaic?
LA 45571	lithic scatter; groundstone; ceramics	Archaic?/P 2
LA 45572	lithic scatter; groundstone; fire-cracked rock	Archaic?
LA 45573	lithic scatter; groundstone; fire-cracked rock	Archaic?/P 3
LA 45574	lithic scatter; modern trash	Archaic?/Hist

Johnson (1976) continued—

LA 45575	lithic scatter; hearths; groundstone; ceramics	Archaic?/ P 2/P 4
LA 45576	lithic scatter; groundstone	Archaic?
LA 45577	lithic scatter; groundstone	Archaic?
LA 45578	lithic scatter	Archaic?
ENM 10361	lithic scatter; groundstone; ceramics	Archaic?/P 4
ENM 10364	lithic scatter; fire-cracked rock	PaleoIndian?/ Archaic?

Rodgers (1980A,1981) West Mesa Airport— 4 sites in study area

LA 27592	large lithic scatter	Archaic?
LA 27593	probable shrine	P 4?/Hist
LA 27594	2 rock wall corrals; 2 rock piles	early 20th C
LA 71199	Volcano Ranch; late 1940's-early 1950's ranch owned by Bond family; habitations; boxcar; water tanks; well; reservoir; corrals (Rodgers 1981)	20th C

Rodgers and Neal (1981) Shooting Range— 15 sites in study area

LA 45529	lithic scatter	Archaic?
LA 45530	(BB-3) lithic scatter; hearths; partially excavated: possible structure, hearth, stone tools, groundstone, lithics	Basketmaker 2
LA 45531	(BB-12?) lithic scatter; stone tools	late Archaic
LA 45532	lithic scatter; stone tools; ceramics historic trash	late Archaic/ Pueblo 4/WW II
LA 45533	lithic scatter; hearth; fire-cracked rock; ceramics	Basketmaker 3?
LA 45534	lithic scatter/quarry	Archaic?
LA 45535	lithic scatter; hearths; fire-cracked rock	prehistoric
LA 45536	lithic/ceramic scatter	Pueblo 4

Rodgers and Neal (1981) continued—

LA 45537	lithic/ceramic scatter	prehistoric
LA 45538	lithic scatter	late Archaic?
LA 45544	historic trash	World War II
LA 45545	lithic/ceramic scatter	Pueblo 2
LA 45546	lithic scatter	prehistoric
LA 45556	military debris/bombing range	World War II
LA 45558	lithic scatter; hearth; groundstone; fire-cracked rock	late Archaic?

Rodgers (1983) Southern Volcanoes— 1 site in study area

LA 45282	lithic/ceramic scatter; 40 petroglyphs; 2 sheep pens; reservoir	P 4/20th C

Schmader (1987) Tierra West Estates— 12 sites in study area

LA 66420	lithic scatter, fire-cracked rock, ground stone	Archaic
LA 66421	dispersed lithic scatter, cores	prehist/Arch?
LA 66422	lithic scatter, cores, ground stone, stone tool	prehist/Arch?
LA 66423	very dense lithic scatter, cores, hammerstones	prehist/Arch?
LA 66424	moderately dense lithic scatter, stone tool	prehist/Arch?
LA 66425	dense lithic scatter, cores, one ceramic sherd	Arch?/P2-P3
LA 66426	dispersed lithic scatter, hammerstones	prehist/Arch?
LA 66427	lithic/ceramic scatter, groundstone, stone tools	Arch?/P2-P3
LA 66428	lithic scatter, 100+ flakes, cores, hammerstones	prehist/Arch?
LA 66429	small lithic scatters	prehist/Arch?
LA 66430	lithic scatter, 100+ flakes in two areas	prehist/Arch?
LA 66431	lithic scatter; ash stains/hearths-- three areas	prob Archaic

Cella (1987) Double Eagle II Airport West— 3 sites in study area		
LA 45569	lithic scatter; tools	PaleoIndian
LA 61081	lithic scatter	Paleo?/Archaic
LA 61082	lithic scatter	prob Archaic

Marshall (1989) Rio Bravo/Paseo del Volcan— 12 sites in study area		
LA 73288	lithic scatter; stone ring	Archaic?/hist?
LA 73289	lithic/ceramic scatter; cobbles, hearth	P2-P3
LA 73290	lithic scatter in two areas	prob Archaic
LA 73291	lithic scatter; two hearths	prob Archaic
LA 73292	lithic scatter; fire-cracked rock	prehist/Archaic?
LA 73293	lithic scatter; two hearths, fire-cracked rock	prob Archaic
LA 73294	lithic scatter; one hearth	prob Archaic
LA 73295	lithic scatter	prob Archaic
LA 73296	lithic scatter; two conc fire-cracked rock	prob Archaic
LA 73297	lithic/ceramic scatter; fire-cracked rock	Archaic?/P2-P3
LA 73298	lithic scatter; one hearth, fire-cracked rock	prob Archaic
LA 73299	lithic/ceramic scatter; possible structure	Pueblo 3

D Vegetation

1. Plant Species

There are two types of plant associations present in the study area: the desert grassland and the juniper woodland along the western escarpment of Ceja Mesa. There is a subtle transition in vegetation from grasslands and shrubs to juniper trees, moving in an east/west direction from the mesa top to the slopes of the Rio Puerco escarpment. Approximately 160 common plant species can be expected in the Amole Arroyo drainage. Many arid land species are intermittent and their presence is dependent upon moisture and temperature. In particularly wet years the number of plant species within the corridor could climb to over 200. Figure 3 is a listing of the expected and documented plant species along the route.

Figure 3

HYPOTHETICAL AND ACTUAL COMMON PLANT SPECIES IN THE AMOLE ARROYO DRAINAGE

*Species actually documented in the study area

	SCIENTIFIC NAME	COMMON NAME
*	Juniperus monosperma	One-seed juniper
*	Ephedra torreyana	Mormon tea
*	Ephedra trifurca	Mormon tea
*	Hilaria jamesii	Galleta grass
	Hordeum jubatum	Foxtail barley
*	Agropyron smithii	Western wheatgrass
	Argopyron trachycaulum	Slender wheatgrass
	Scleropogon brevifolius	Burro grass
	Enneapogon desvauxii	Spike pappus grass
*	Sitanion hystrix	Squirreltail
*	Munroa squarrosa	False buffalo grass
	Chloris verticillata	Windmill grass
*	Chloris virgata	Feathery finger grass
	Bouteloua curtipendula	Side-oats grama
	Bouteloua barbata	Six-weeks grama
*	Bouteloua eriopoda	Black grama
*	Bouteloua gracilis	Blue grama

*	Bouteloua hirsuta	Hairy grama
	Aristida glauca	Riverchon three-awn
	Aristida adsensionis	Six-weeks three-awn
*	Aristida fendleriana	Fendler three-awn
*	Aristida longiseta	Red three-awn
*	Oryzopsis hymenoides	Indian ricegrass
*	Cenchrus echinatus	Sandbur
	Stipa scribneri	Scribner needlegrass
*	Muhlenbergia arenicola	Sand muhly
	Muhlenbergia pauciflora	New Mexican muhly
*	Muhlenbergia torreyi	Ring muhly
	Muhlenbergia asperifolia	Scratchgrass
*	Sporobolus contractus	Spike dropseed
*	Sporobolus flexuosus	Mesa dropseed
*	Sporobolus cryptandrus	Sand dropseed
*	Sporobolus airoides	Alkali sacaton
*	Sorobolus wrightii	Wright's dropseed
*	Tridens pulchellus	Fluff grass
	Tridens pilosus	Hairy gridens
	Eragrostis pilosa	India lovegrass
*	Eragrostis cilianensis	Stink grass
*	Setaria macrostachya	Plains bristle grass
	Panicum capillare	Witchgrass
	Sorghum halepense	Johnson grass
	Echinochloa crusgalli var. mitis	Barnyard grass
	Yucca baccata	Banana yucca
*	Yucca glauca	Soapweed yucca
	Phoradendron juniperinum	Juniper mistletoe
*	Eriogonum wrightii	Wright's wild buckwheat
	Eriogonum polycladon	Sorrel wild buckwheat
*	Rumex hymenosepalus	Canaigre
*	Polygonum aviculare	Knotweed
*	Eurotia lanata	Winterfat
*	Atriplex canescens	Four-wing saltbush
*	Kochia scoparia	Summer cypress
	Chenopodium album	Lamb's quarters
	Chenopodium fremontii	Fremont goosefoot
*	Salsola kali	Tumbleweed
	Chenopodium incanum	Goosefoot
	Amaranthus powellii	Pigweed
	Amaranthus retroflexus	Pigweed

*	Tidestromia lanuginosa	tidestromia
	Mirabilis multiflora	Four-o'clock
	Mirabilis oxybaphoides	Four-o'clock
	Oxybaphus linearis var. linearis	Oxybaphus
*	Portulaca oleracea	Common purslane
*	Descurainia sophia	Tansy mustard
*	Dithyrea wislizenii	Spectacle pod
	Sisymbrium altissium	Tumble mustard
*	Polanisia trachysperma	Clammy weed
	Fallugia paradoxa	Apache plume
	Astragalus cyaneus	Cyanic milkvetch
	Astragalus ceramicus	Painted milkvetch
	Astragalus kentrophyta var. neomexicana	Spiny leafed milkvetch
*	Astragalus missouriensis	Missouri milkvetch
	Astragalus lonchocarpus	Rush milkvetch
*	Astragalus lentiginosus	Milkvetch
	Astragalus mollissimus	Wooly milkvetch
	Dalea formosa	Feather indigobush
*	Dalea scoparia	Dalea
*	Phaseolus acutifolius	Tepary bean
*	Parryella filifolia	Dune broom
	Hoffmanseggia jamesii	Rush pea
*	Melilotus officinalis	Yellow sweet clover
	Melilotus albus	White sweet clover
	Linum lewisii	Western blue flax
	Tribulus terrestris	Goathead
*	Croton texensis	Doveweed
*	Euphorbia fendleri	Spurge
	Rhus trilobata	Skunk bush
	Sphaeralcea grossulariaefolia	Globe mallow var. pedata
*	Sphaeralcea coccinea	Red globe mallow
*	Sphaeralcea incana	Globe mallow
	Plantago purshii	Plantage
*	Mentzelia pumila var. multiflora	Stickleaf
	Echinocereus triglocidiatus	Hedgehog cactus
*	Opuntia imbricata	Cholla
	Opuntia ereniceae	Prickly peak
*	Opuntia phaeacantha var. discata	Engelmann prickly pear
*	Opuntia clavata	Dagger cholla
	Pediocactus papyracanthus	Grama Grass Cactus
	Mammillaria wrightii	Wright's fishhook cactus
	Coryphantha vivipara var. arizonica	Pinchshion cactus

	Asclepias asperula	Antelope horns
	Asclepias subverticillata	Poison milkweed
*	Lappula redowskii	Stickweed
	Verbena bracteata	Vervain
	Verbena wrightii	Vervain
	Verbena macdougalii	Vervain
*	Verbena bipinnatifida	Vervain
*	Marrubium vulgare	Horehound
	Datura meteloides	Indian apple
*	Lycium palidum	Wolfberry
*	Solanum elaeagnifolium	Horse nettle
	Cryptantha fulvocanescens	Cryptantha
*	Cryptantha jamesii	Cryptantha
	Penstemon barbatus	Scarlet beardtongue
	Penstemon jamesii	Beardtongue
	Castilleja integra	Paintbrush
	Orobanche multiflora	Cancer root
*	Cucurbita foetidissima	Buffalo gourd
	Proboscidea ludoviciana	Devils claw
	Proboscidea sabulosa	Dune unicorn plant
	Tragopogon dubius	Goat's beard
*	Artemisia filifolia	Sand sagebrush
	Artemisia ludoviciana var albula	Wormwood
*	Artemisia dracunculoides	False tarragon
*	Thelesperma megapotamicum	Hopi tea
	Cirsium neomexicanum	New Mexican thistle
*	Leucelene ericoides	White daisy
	Pectis angustifolia	Lemon weed
	Bahia dissecta	Yellow ragweed
*	Senecio longilobus	Threadleaf groundsel
	Grindelia aphanactis	Gum weed
*	Baileya multiradiata	Goldenweed
	Dicranocarpus parviflora	Bitterweed
*	Chrysothmanus nauseosus	Rabbitbrush
	Haplopappus heterophyllus	Rayless goldenrod
*	Haplopappus spinulosus subsp. spinulosus	
*	Haplopappus spinulosus subsp. astralis	
	Chrysopsis villosa	Hairy golden aster
	Zinnia grandiflora	Rocky Mountain zinnia
*	Melampodium leucanthum	Plains blackfoot
	Baileya multiradiata	Desert marigold

	Viquiera dantata	Goldeneye
*	Guterrezia microcephla	Small snakeweed
*	Gutierreizia sarothrae	Snakeweed
*	Helianthus petiolaris	Sunflower
	Helianthus annus	Sunflower
*	Hymenopappus filifolius	Dogbane
	Psilostrophe tagetina	Wood's paper daisy
	Hymenoxys argentea	Bitterweed
	Gaillardia pinnatifida	Blanketflower
*	Franseria acanthicarpa	Bur weed
	Berlandiera lyrata	Globeweed

The flora within the study area exhibits influences from the Great Basin Desert, the Rocky Mountains, the Chihuahuan Desert and the Great Plains. Typical plant species occurring in the area include grasses such as Blue and Black grama, Indian ricegrass, Galleta, Dropseed, Bush and Ring muhly, Sacation, and Broom snakeweed. Wildflowers include Desert zinnia, Globe mallow, Bush Penstemon, Purple astor, Butterfly weed, and Chamisa. Shrubs include Fourwing saltbush, Sand sagebrush, Winterfat, Mormon Tea, Broom dalea, Yucca, and Cholla cactus. Heavier vegetation, including small shrubs and trees, occurs along the arroyos the slopes of the escarpment. Shorter grass plants tend to populate the mesa top. The western area of the mesa top has a more desert like character, containing Yucca, Cholla, and small cactii interspersed with grasses.

2. Plant Communities

The classification of vegetation is a highly debated topic. A wide variety of approaches are available to classify and define vegetation associations. Perhaps one of the most recognized of these is that presented by Brown and Lowe in 1982. Within the framework of the Brown and Lowe System, all of the vegetation in the study area falls into Grassland Vegetation Association being represented by elements of the Mesa/Desert Grassland Associations. Community designations have been derived to fit the flora of the area. Eight communities have been identified within the study area. Many of these are composed of the same basic species but vary in their relative proportions of these species. They have been broken out in this treatment to address the microhabitat preferences of endangered plants such as grama grass cactus. For example, grama grass cactus may occur in the Bouteloua-Gutierrezia community, but is unlikely to occur in the Sporobolus-Gutierrezia-Bouteloua community. The difference between these two is that the latter has a much sandier soil with sparse cover of grama grass. Neither the soil type nor the cover is conducive to grama grass habitat.

Grasslands in the study area are represented by the Mesa/Desert Grassland Associations. This association is best represented by the Dropseed (Sporobolus) Series. These include an admixture of perennial bunch grasses and shrubs that usually occur on sandy soils. Four community types were defined within this series. There were also two grama grass community types, an arroyo community (composed of sage and desert willow), and a slope community composed of snake weed and three awn grass)

Grama Grass Series

BOGUSP Bouteloua-Gutierrezia-Sporobolus

This community is codominated by blue grama. Disturbed areas have high levels of snakeweed and dropseed. The soil is sandy but often somewhat coarse. Coverage is generally quite high.

BBGU Bouteloua-Gutierrezia

This community is dominated by blue grama, which often occur in near pure stands. It differs from BOGUSP in that dropseed is less common. The soils are sandy, but often locally coarse. It provides some of the best habitat for grama grass cactus within the study area.

Dropseed Series

Four dropseed communities are present within the study area. These areas vary from the grama grass communities only in their percent of coverage of dropseed grasses as opposed to grama grasses. Grama grass occurs in most of the locations of the dropseed series; however, the dropseeds are abundant enough to become the dominant elements in the community.

SPBOGU Sprorbolus-Bouteloua-Gutierrezia

This community is dominated by dropseed and blue grama, interspersed with snakeweed. It differs from the grama grass communities only in the percentage of dropseed to blue grama and the relative scarcity of black grama. This community is common throughout the central portion of the study area. The soils are sandy and often highly eroded.

SPARGU Sporobolus-Artemesia-Gutierrezia

This community is dominated by dropseed, intermixed with sagebrush and snakeweed. It occurs primarily on sandy soils on the mesa tops west of Amole Arroyo and south of Interstate 40.

SPAR Sporobolus-Artemesia

This community is dominated by dropseed, with a high density of sagebrush. Snakeweed and yucca are also common in some areas of this community. It occurs primarily on slopes and hillsides east of Amole Arroyo and south of I-40.

SPPS Sporobolus-Psorothamnus

This community is dominated by dropseed intermixed with broom dalea. It occurs on sandy hilltops and ridgetops in the southern portion of Amole Arroyo just northwest of Westgate Dam. There are many archaeological sites within this community type.

3. Potential Impacts to Vegetation

It is likely that the project activities will create surface disturbance that will result in loss of vegetation. However, none of the plant communities within the study area are rare or unusual.

E WILDLIFE

1. List of Species

Approximately 200 vertebrate animal species can be expected to occur within the study area. This includes 45 mammals, 123 birds, 4 amphibians and 28 reptiles. The vast majority of the mammals, amphibians and reptiles would be permanent residents on site with limited mobility. Many of the birds are only occasional visitors to the site or fly over the area during migration. Some of the more common animal species inhabiting the area include coyotes, jackrabbits, desert cottontails, skunks, a variety of small rodents, porcupines, and prairie dogs. Occasionally, Sonoran Pronghorn antelope may be spotted foraging in the area. Common reptiles include the Prairie rattlesnake, Sonoran gopher snake, Bullnose snake, Coachtail and Whiptail lizard, Horned lizard, and a variety of other lizards. Common bird species in this area include Hawks, Turkey vultures,

Ravens, Crows, Western meadowlarks, Horned meadowlarks, Jays, Juncos, Hermit thrushes, as well as a large variety of songbird species. Figure 4 is a list of mammals and birds which potentially occur within the study area. Figure 5 is a list of potential reptiles and amphibians in the study area.

Figure 4

Mammals and Bird Species Potentially Occurring Within the Amole Arroyo Study Area

MAMMALS

Little Brown Myotis	Myotis lucifugus
Fringed Myotis	Myotis thysanodes
Long-legged Myotis	Myotis volans
Small-footee Myotis	Myotis leibii
Silver-haired Bat	Lasionycteris noctivagans
Big Brown Bat	Eptesicus fuscus
Hoary Bat	Lasiurus cinereus
Townsend's Big-eared Bat	Plecotus townsendii
Pallid Bat	Antrozous pallidus
Mexican Free-tailed Bat	Tadarida brasiliensis
Desert Cottontail	Sylvilagus audoboni
Black-tailed Jackrabbit	Lepus californicus
Colorado Chipmunk	Eutamias quadriuittatus
Texas Antelope Squirrel	Ammospermophilus interpres
Spotted Ground Squirrel	Spermophilus spilosoma
Botta's Pocket Gopher	Thomomys bottae
Silky Pocket Mouse	Perognathus flavus
Hispid Pocket Mouse	Perognathus hispidus
Ord's Kangaroo Rat	Dipodomys ordii
Banner-tailed Kangaroo Rat	Dipodomys spectabilis
Merriam's Kangaroo Rat	Dipolomys merriami
Western Harvest Mouse	Reithrodontomys megalotis
Deer Mouse	Peromyscus maniculatus
White-footed Mouse	Peromyscus leucopus
Brush Mosue	Peromyscus boylii
Pinyon Mouse	Peromyscus truei
Rock Mouse	Peromyscus difficilis
Northern Grasshopper Mouse	Onychomys leucogaster
Southern Plains Woodrat	Neotoma micropus
White-throated Woodrat	Neotoma albigula
Mexican Vole	Microtus mexicanus

House Mouse	Mus musculus
Porcupine	Erethizon dorsatum
Coyote	Canis latrans
Kit Fox	Vulpes macrotis
Gray Fox	Urocyon cinereoargenteus
Ringtail	Bassiariscus astutus
Raccoon	Procyon lotor
Long-tailed Weasel	Mustela frenata
Badger	Tasidea taxus
Western Spotted Skunk	Spilogale gracilis
Striped Skunk	Mephitis mephitis
Mountain Lion	Felis concolor
Bobcat	Lynx rufus
Mule Deer	Odocoileus hemoinus

BIRDS

Turkey vulture	Cathartes aura
Goshawk	Accipiter gentilis
Sharp-shinned Hawk	Accipiter striatus
Cooper's Hawk	Accipiter cooperii
Red-tailed Hawk	Buteo jamaicensis
Swainson's Hawk	Buteo swainsoni
Ferruginous Hawk	Buteo regalis
Rough-legged Hawk	Buteo lagopus
Bald Eagle	Haliaeetus leucocephalus
Golden Eagle	Aquila chrysaetos
Marsh Hawk	Circus cynaeus
Prairie Falcon	Falco mexicanus
Peregrine Falcon	Falco peregrinus
Merlin	Falco columbarius
American Kestrel	Falco sparverius
Scaled Quail	Callipepla squamata
Mourning Dove	Zenaida macroura
Roadrunner	Geococcyx calfiornianus
Barn Owl	Tyto alba
Screech Owl	Otus asio
Great Horned Owl	Bubo virginianus
Pygmy Owl	Glaucidium gnoma
Burrowing Owl	Speotyto cunicularia
Long-eared Owl	Asio otus
Common Nighthawk	Chordeiles minor

White-throated Swift	Aeronautes saxatalis
Black-chinned Hummingbird	Archilochus alexandri
Broad-tailed Hummingbird	Selasphorus platycercus
Rufous Hummingbird	Selasphorus rufus
Calliope Hummingbird	Stellula calliope
Common Flicker	Colaptes auratus
Lewis' Wookpecker	Asyndesmus lewisi
Yellow-bellied Sapsucker	Sphyrapicus varius
Williamson's Sapsucker	Sphyrapicus thyroideas
Hairy Woodpecker	Dendrocopos villosus
Downy Woodpecker	Dendrocopos pubescens
Ladder-backed Woodpecker	Dendrocopos scalaris
Western Kingbird	Tyrannus verticalis
Cassin's Kingbird	Tyrannus vociferans
Ash-throated Flycatcher	Myiarchus cinerascens
Say's Phoebe	Sayornis saya
Western Flycatcher	Empidonax difficilis
Western Wood Pewee	Contopus sordidulus
Horned Lark	Eremophila alprestris
Violet-green Swallow	Tachycineta thalassina
Barn Swallow	Hirundo rustica
Rough-winged Swallow	Stelgidopterys ruficollis
Cliff Swallow	Petrochelidon pyrrhonota
Steller's Jay	Cyanocitta stelleri
Scrub Jay	Apherlocoma coerulescens
Common Raven	Corvus corax
Common Crow	Corvus brachyrhyncos
Pinyon Jay	Gymnorhinus cyanocephalus
Clark's Nutcracker	Nucifraga columbiana
Mountain Chickadee	Parus gambeli
Plain Titmouse	Parus inornatus
Common Bushtit	Psaltriparus minimus
White-breasted Nuthatch	Sitta carolinensis
Red-breasted Nuthatch	Sitta canadensis
Pygmy Nuthatch	Sitta pygmaea
Brown Creeper	Certhia familiaris
Hosue Wren	Troglodytes aedon
Bewick's Wren	Thyromanes bewickii
Canyon Wren	Catherpes mexicanus
Rock Wren	Salpinctes obsoletus
Mockingbird	Mimus polyglottos
Crissal Thrasher	Oreoscoptes montanus

American Robin	Turdus migratorius
Hermit Thrush	Catharus guttatus
Western Bluebird	Sialia mexicanus
Mountain Bluebird	Sialia currucoides
Townsend's Solitaire	Myadestes townsendi
Blue-gray Gnatcatcher	Polioptila caerulea
Ruby-crowned Kinglet	Regulus calendula
Cedar Waxwing	Bombycilla cedrorum
Bohemian Waxwing	Bombycilla garrulus
Loggerhead Shrike	Lanius ludovicianus
Northern Shrike	Lanius excubitor
Starling	Sturnus vulgaris
Solitary Vireo	Vireo solitarius
Warbline Vireo	Vireo gilvus
Orange-cornwed Warbler	Vermivora Celata
Virginia's Warbler	Vermivora virginiae
Yellow Warbler	Dendroica petechia
Yellow-rumped (Audobon's) Warbler	Dendroica coronata
Black-throated Gray Warbler	Dendroica nigrescens
Townsend's Warbler	Dendroica townsendi
Wilson's Warbler	Wilsonia pusilla
House Sparrow	Passer domesticus
Western Meadowlark	Sturnella neglecta
Scott's Oriole	Icterus parisorum
Northern (Bullock's) Oriole	Icterus galbula
Brown-headed Cowbird	Molothrus ater
Western Tanager	Piranga ludoviciana
Hepatic Tanager	Piranga flava
Black-headed Grosbeak	Pheucticus melanocephalus
Blue Grosbeak	Passerina cyanca
Lazuli Bunting	Passerina amoena
Evening Grosbeak	Hesperiphona vespertina
Cassin's Finch	Carpodacus cassinii
House Finch	Carpodacus mexicanus
Lesser Golfinch	Spinus psaltria
Red Crossbill	Loxia curvirostra
Green-tailed Towhee	Chlorura chlorura
Rufous-sided Towhee	Pipilo erythropthalmus
Brown Towhee	Pipilo fuscus
Lark Bunting	Calamospiza melanocorys
Savannah Sparrow	Passerculus sandwichensis

Vesper Sparrow	Pooecetes gramineus
Lark Sparrow	Chondestes grammacus
Rufous-crowned Spartow	Aimophila ruficeps
Black-throated Spartow	Amphispiza bilineata
Sage Sparrow	Amphispiza belli
Gray-headed Junco	Junco caniceps
Dark-eyed (Oregon) Junco	Junco hyemalis
Chipping Sparrow	Spizella passerina
Brewer's Sparrow	Spizella breweri
Black-chinned Sparrow	Spizella atrogularis
White-crowned Sparrow	Zonotrichia leucophrys
White-throated Sparrow	Zonotrichia albicollis
Fox Sparrow	Passerella iliaca
Lincoln's Sparrow	Melospiza lincolnii
Song Sparrow	Melospiza melodia

FIGURE 5

Reptiles and Amphibians Potentially Occurring Within the Amole Arroyo Study Area

AMPHIBIANS

Tiger Salamander	Ambystoma tigrinum
Western Spadefoot	Scaphiopus hammondi
Central Plains Spadefoot	Scaphiopus bombifrons
Great Plains Toad	Bufo cognatus

REPTILES

Western Box Turtle	Terrapene ornata
Lesser Earless Lizard	Holbrookia maculata
Collared Lizard	Crotaphytus collaris
Eastern Fence Lizard	Sceloporus undulatus
Side-blotched Lizard	Uta stansburiana
Short-horned Lizard	Phrynosoma douglassi
Texas Horned Lizard	Phrynosoma cornutum
Great Plains Skink	Eumeces obsoletus
Many-lined Skink	Eumeces multivirgatus
Little Striped Whiptail	Cnemidophorus inornatus
Plateau Whiptail	Cnemidophorus velox
Chihuahua Whiptail	Cnemidophorus exsanquis
Checkered Whiptail	Cnemidophorus tesselatus
Western Hog-nosed Snake	Heterodon masicus
Striped Whipsnake	Masticophis taeniatus
Coachwhip	Masticophis flagellum
Mountail Patch-nosed Snake	Salvadora grahamiae
Bullsnake	Pituophis melanoleucus
Sonoran Kingsnake	Lampropeltis getulus splendida
Painted Desert Glossy Snake	Arizona elegans philipi
Texas Long-nosed Snake	Rhinocheilus lecontei tessellatus
Black-necked Garter Snake	Thamnophis cyrtopsis
Western Terrestrial Garter Snake	Thamnophis elegans
Plains Black-headed Snake	Tantilla nigriceps
Texas Night Snake	Hypsiglena torquata texana
Western Diamondback Rattlesnake	Crotalus atrox
Prairie Rattlesnake	Crotalus viridis
Black-tailed Rattlesnake	Crotalus molossus

2. Impacts on Wildlife - Raptors and Migratory Birds

Although many raptor species frequent the study area (eg. red tail hawk, kestral), only the burrowing owl is known to consistently nest within the grassland habitat types of this area. Although there are no known observations of burrowing owls in the study area, they have been recorded in several locations, with similar habitats, just to the north of the Amole Arroyo Drainage near Paradise Hills and Rio Rancho. It is quite likely that they could occur within theat proposed project area; therefore, these sites should be surveyed to ascertain if the owl is present.

F ENDANGERED SPECIES

Currently, a myriad of designations and categories surround rare plants and animals in New Mexico. In addition to the federal Endangered Species Act, the state maintains a separate plant and animal endangered species act, as well as a state sensitive list. Also, many federal agencies maintain their own separate sensitive species list and several area's of the Indian tribes maintain separate endangered species lists. The study will address the federal endangered species list, the state endangered plant and animal lists and the state sensitive list. Field inspection of the habitat indicated potential habitat or actual presence of six plants and four animals that appear on the aforementioned lists. Figure 6 lists these species and their current legal status.

Several of these species such as grama grass cactus (Pediocactus papyracanthus), the cyanic milkvetch (Astragalus cyaneus), La Jolla Prairie clover (Dalea scariosa) and the spiny leaf milkvetch (Astragalus kentrophyta var. neomexicana) have already been documented on Ceja Mesa in past studies. Although species such as Bald Eagle and Whooping Crane are not likely to occur on site, there is a high potential for flyover and incidental occurrence in the area.

FIGURE 6

POTENTIAL RARE, THREATENED, ENDANGERED, SENSITIVE SPECIES WITHIN THE AMOLE ARROYO STUDY AREA

SPECIES	FEDERAL	STATE
PLANTS:		
Pediocactus papyracanthus	Category 2 Candidate	Endangered
Probosciea sabulosa	–	Endangered
Astragalus cyaneus	–	Sensitive
Astragalus kentrophyta var. neomexicana	–	Sensitive
* Dalea scariosa	–	Sensitive
ANIMALS:		
Black footed ferret	Endangered	Endangered
Bald Eagle	Endangered	Endangered
Peregrine Falcon	Endangered	Endangered
Whooping Crane	Endangered	Endangered

*Species that have been documented in the study area

1. Plant Species

Grama Grass Cactus (Pediocactus papyracanthus)

Grama grass cactus is found throughout central New Mexico in a range extending from the Ghost Ranch area near Chama, southward to the Alkali Lake Region of Otero County near Dell City Texas. Its easternmost documented distribution is near Moriatry but it is quite likely that it could extend out to Santa Rosa, New

Mexico. Its western range is documented to Holbrook, Arizona. Normally, it is found in grama grass grassland with rather coarse sandy soils derived from granitic or basaltic sources; however, recent discoveries have documented occurrences on gypsum, akali lakes, and soils derived from rhyolite. It has not been identified on sandstone or limestone soils. This species is currently on the NM State Endangered Plant Species List. It is also a Category 2 candidate species on the Federal List; however, certain plant communities and soil associations are more likely to support this species. None of the study area is prime habitat for this species, but some of the plant communities provide marginal habitat. Within the Amole Arroyo study area, Grama Grass cactus is most likely to occur on the BOGU (Bouteloua/Guterrezia) association. This association is restricted to the southeast quadrant of the study area just east of the road to the Double Eagle Airport.

Dune Unicorn Plant (Proboscidea sabulosa)

The dune unicorn plant is currently listed as a State Endangered Plant Species and a Category 2 Federal Candidate. This species was first described from the Trans-Pecos area of Texas. In recent years its range in the eastern plains has been extended north to Clovis. In 1979 it was collected at the Sevillita Wildlife Refuge north of Socorro. It has never been reported as far north as Albuquerque, but some of the sandier portions of the study area provide suitable habitat for this species. This species normally requires deep sandy areas, usually in small dunes. A series of low dunes run along the top of the escarpment on the west side of Ceja Mesa. This area is located along the extreme western edge of the study boundary.

Cyanic Milkvetch (Astragalus cyaneus)

The cyanic milkvetch currently has no legal protection, but is listed on the New Mexico Sensitive Plant Species List. This designation is primarily one that indicates that this species is of biological interest. Its habitat is quite similar to grama grass cactus. It is normally in juniper or pinyon-juniper woodland. Cyanic Milkvetch could occur along the western edge of the project area, along the escarpment above the Rio Puerco River.

Spiny-leaf Milkvetch (Astragalus kentrophyta var. neomexicana)

The spiny-leaf milkvetch is also on the state sensitive list. It is widespread throughout central New Mexico, but is endemic to the state. It normally occurs on sandy soils that are moderately disturbed. It has not been located in the study area, but has been found to the northeast near the Sandoval County dump in Rio Rancho. If it occurs in the study area it will most likely be on the slopes and bluffs of the escarpment on the west side of the this area.

La Jolla Prairie Clover (Dalea scariosa)

The La Jolla Prairie clover is found abundantly throughout sandy areas along the Rio Grande drainages of central New Mexico; however, its entire range extends from the area around Cochiti southward to Elephant Butte. It is currently on the state sensitive list. La Jolla Prairie clover is found in the area around the escarpment and along the edges of I-40. It is often associated with disturbed habitat and can be used in revegetation of such areas.

2. Animal Species

Black footed ferret (Mustela nigripes)

The black footed ferret has not been reported in New Mexico in over 40 years. It is listed as both a state and federal endangered species. It was thought to be extinct until new populations were located in Wyoming in the early 80's. Although the lifezone within the study area is correct for ferrets, prairie dogs are very scarce. No substantial prairie dogs populations were identified in the study area. Black footed ferrets require prairie dogs for survival, without prairie dogs along the route, it is unlikely that ferrets will be present.

Bald Eagle (Haliaeetus leucocephalus)

The bald eagle is currently listed as endangered by both Federal and State Government . Although the Amole Arroyo study area is not bald eagle habitat, the birds do frequent the Rio Grande Corridor. One bald eagle was recently cited on the east side of Rio Rancho. It is possible that bald eagles could fly over the study area but future projects resulting in ground disturbance are unlikely to have any effect on them.

Peregrine Falcon (Falco peregrinus)

The Peregrine Falcon is listed as Endangered on both the State and Federal Endangered Species lists. Although this species has not been documented from Ceja Mesa it is quite possible that it could occur in the area.

Whooping Crane (Grus americana)

The whooping Crane is listed as Endangered on both the Federal and State Endangered Species Lists. This species is normally requires cultivated fields or wetland environments; however, the Rio Grande valley is the major flyway for the population that winters at Bosque del Apach e. In their annual migrations they have been known to circle over Corrales and even up over Rio Rancho. It is possible that they could fly over the study area; however, future projects involving surface disturbance should have no impact upon whooping cranes.

3. Potential Impacts to Endangered or Sensitive Species

There is a potential for the occurrence of two state endangered plant species within the study area. These are the grama grass cactus and the dune unicorn plant. Most of the study area is not suitable habitat for grama grass cactus; however, the BOGU plant association in the eastern portion of the study area does afford suitable habitat. Dune unicorn plant could occur in the deep sandy areas above the western escarpment of Ceja Mesa. This is at the extreme western edge of the study area.

Two state sensitive plant species could also be found within the study area. These are the cyanic milkvetch and the La Jolla Prairie Clover. The cyanic milkvetch has been documented to occur below the western escarpment of Ceja Mesa. It could occur at the extreme western edge of the study area. La Jolla Prairie clover has been documented to occur along the right-of-way of Interstate 40 from the top of Nine Mile Hill to the Puerco Valley. This species seems to tolerate disturbance, and in some cases increase in disturbed habitats. Although it could occur throughout the study area, the proposed activities will not adversely impact it.

Several state and federal endangered animal species such as the bald eagle, whooping crane and peregrine falcon may fly over the study area. There is no indication that any of these species utilize the study area on a regular or seasonal basis.

G. IMPAIRED PROPERTIES AND OTHER AREAS OF CONCERN

1. Historic Land Use

There is no indication of substantial development within the study area prior to 1980. Since that time, the City of Albuquerque has developed a Soil Amendment Facility, an airport and a shooting range park. The Soil Amendment Facility has the potential to generate pollutants that may come under the jurisdiction of the NPDES. The airport maintains fuel facilities and storage tanks. Such facilities come under the jurisdiction of Underground Storage Tank regulations. There have been a variety of small businesses along Central Avenue near Westgate Heights. Some of these properties could have suffered impairment from past uses.

In 1942 the Department of Defense contracted for the construction of day and night bombing targets west of Albuquerque. These targets were utilized by the bombardiers school which had been created at Kirtland Air Force Base during World War II. By the end of 1942 the bombing range covered 2,450 square miles and consisted of twenty-seven targets, several simulated cities, warships and other military targets. The bombardier school remained active throughout WW II. Ultimately, the school graduated 5,058 bombardier students. The number of bombs dropped within the study area is unknown. But review of archival photographs indicated more than a hundred bomb craters near just one of the targets. Two of these target zones have been identified within the study area. One of these is located just north of the Double Eagle Airport, the other is adjacent to the east side of Shooting Range Park. Both of these sites have shrapnel on the surface indicating that explosive charges were detonated at the sites.

2. Potential Impacts of Impaired Properties

There are two identified WWII bombing targets within the study area. Either of these sites could contain unexploded bombs. Several recently constructed facilities such as the Soil Amendment Plant and the Double Eagle Airport could contain substances considered pollutants (eg. aviation fuel, fertilizer). There may be old business locations along Central Avenue that could have suffered impairment from past uses.

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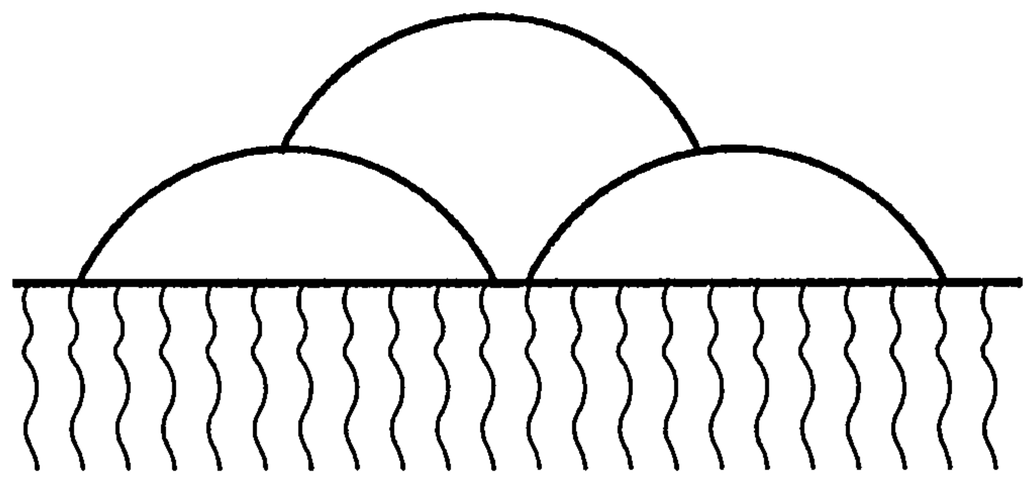
LITERATURE REVIEW



AMOLE ARROYO WESTGATE DAM

DRAINAGE MANAGEMENT PLAN

SCANLON & ASSOCIATES INC.

CONSULTING ENGINEERS

Job No. 91101

MAY, 1991

Time: 12:38:24
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Drawing File: [redacted]T-REVW
Directory: C:\A-CAD\91101\

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

March 29, 1994

File

Debra Vaughan-Cleff, P.E.
6212 Torreon NE
Albuquerque, NM 87109

DMP

RE: DRAFT AMOLE ARROYO-WESTGATE DAM DRAINAGE MANAGEMENT PLAN

Dear Ms. Vaughan-Cleff:

The following are comments by the City Hydrology staff for the referenced Drainage Management Plan. We appreciate the opportunity to offer review comments on this very important study.

1. Section 3.1 contains a table indicating map production by Zone Atlas. However it is unclear as to the meaning of the symbol indications in the table.

2. Section 3.6.4 lists some general conclusions regarding sediment transport. Contained in the list of conclusions is an indication that sediment influx to the Westgate Dam will <u>increase</u>, while information contained in the report in later sections on tables would indicate that the actual sediment delivered to Westgate Dam would <u>decrease</u>. This seems to be in conflict.

3. Section 4.8 lists some of the information used in the Hydrologic Analysis. Indication is that 141 individual sub-basins were identified and used to estimate runoff. This seems to be a very large number of sub-basins for land areas that are relatively consistent in existing and future conditions. If all 141 sub-basins were used in routing flows, will that technique produce consistent and reliable results for predicting total runoff?

4. Section 5.2.1 indicates the assumption on land uses and the percentages of the A through D land treatments. Developed condition land treatments in Table 7 indicate an impervious percentage of 48%. In an effort to control increases in future runoff, runoff flows and volumes could be significantly reduced through efforts to reduce the percentage assumed.

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5. Many of the alternatives proposed in the report involve utilizing the Westgate Dam and additional detention facilities upstream. The majority of these assumptions or options result in detention times that are in excess of State Engineer requirements. Since water rights will be an issue, a discussion of the possibility of State approval of longer detention times may be appropriate. The longer detention impoundment times may also create a problem of back to back precipitation events and the limited storage that may be available to provide system detention for the second rainfall event.

6. Alternate D as proposed would require local detention as development proceeds in order to attenuate increases in flow rates and volumes. Since development usually occurs in small phases scattered throughout the entire Amole drainage basin, temporary retention facilities may be necessary in order to accomodate that development pattern. This situation is fairly typical in developments as indicated later in the report. With localized retention and detention facilities being potentially required as development proceeds, alternative D may become a reality simply because the method of accomplishing development in the basin. It would seem that there may be some advantage to utilizing the temporary facilities as permanent installations, thus, utilizing a more cost effective approach compared with planned temporary facilities.

   Realizing that we will be facing storm water quality regulations in the future, alternate D may also provide implementation of appropriate Best Management Practices for future water quality concerns.

7. Alternate H as proposed would divert much of the Amole basin to the Westbluff Outfall system. Prior to this option being finalized as the best alternative, the Westbluff Outfall system needs to be analyzed in depth to assure downstream capacity.

8. Section 7 deals with comparison criteria and numerical ranking system. The ranking for flow and volume reductions would seem to apply to the Westgate facility as opposed to any new proposed facility and therefore should be qualified to read "reduction in peak flow rates for the Westgate Dam", and likewise, "reduction in volume of runoff in the Westgate Dam".

9. Table 11, page 69, Section 8, provides an estimated cost of improvements for alternates C, G3, and H. The cost estimate for alternate H does not include the cost of construction of any of the Westbluff Outfall facilities below 98th Avenue. It would seem that in order to have alternative cost comparisons, since alternate C and G3 are costs representative of complete drainage systems, alternate H should therefore also include a complete drainage system and therefore include the cost of the Westbluff Outfall extension from Coors Road to 98th Avenue. The estimated cost for alternate H as shown is not representative of a complete system.

In summary, it would appear that major concerns are as follows:

* Reservoir draindown times that may impact the ability of facilities to handle back-to-back storms.
* Flow capacity of the downstream facilities that are in place for the Westbluff Outfall system.
* Water quality criteria that the City may necessarily be required to address through Management Practices.
* Alternate D should be considered more seriously to best accomplish development in the basin. This alternate can be combined with other alternates to provide better basin development planning, and possible economic benefits for future improvements.

The City appreciates the opportunity to comment and should you have any questions please contact me at 768-3654.

Sincerely,

Loren D. Meinz

Loren D. Meinz, P.E.
PWD/Hydrology Division

LDM/dl/8422

c: Dan Hogan, Manager, PWD/Hydrology Division
Larry Blair, Exec. Engineer, AMAFCA
File

CITY OF ALBUQUERQUE
P.O. BOX 1293
ALBUQUERQUE, NEW MEXICO 87103

PUBLIC WORKS DEPARTMENT

T E L E C O P I E R C O V E R S H E E T

TO: DEBBIE VAUGHAN - CIEEC

LOCATION: CITY ABQ / STATE NM

FAX NUMBER: 1828/1215

PAGES (INCLUDING FAX SHEET): 4

FROM: Loren Meinz

LOCATION: City of Albuquerque

FAX NUMBER: 505/768/3629

DATE AND TIME: 3/30/94, 7:30am

ACTIVITY NUMBER:
(This is necesary for billing purposes) ANACE ARROYO STUDY

WPADM1:163

MEMORANDUM

TO: Mr. Jonathan Moore, Associate Planner, Planning Division, City of Albuquerque
Mr. Loren Hiens, Associate Planner, Open Space Division, City of Albuquerque
Rae Van Hoven, Acting Drainage Engineer, NMSH&TD
Mr. Wayne Preskar, Technical Services Engineer, NMSH&TD
Mr. Steve Miller, Bernalillo Co. Public Works Dept.
Mr. Jerry Widdison, Public Works Department, City of Albuquerque
Mr. Sayeed Afsbar, District 3, NMSH&TD
Mr. Joe Luehring, City of Albuquerque, Public Works Dept.
Mr. Leroy Chavez, Project Engineer, Westland Development
Mr. Ron Bohannan, Tierra West Development
Mr. R. J. Schaeffer, American R.V. Mobil Home Park
Mr. Jonathan Feld, Outdoor Entertainment Complex
Mr. Jack Westman, Tierra West Partners
Mr. Richard Andrews, Genesis Links Group, LTD.
Mr. Dan Hogan, Division Manager, Hydrology Development Division, City of Albuquerque
Mr. Bob Foglesong, Bernalilo Co. Surface Water Hydrologist
Mr. Gilbert Aldaz, City/County Floodplain Administrator
Mr. Don Lopez, New Mexico State Engineer's Office

FROM: Clifford E. Anderson, P.E. & L.S.
Drainage Engineer, AMAFCA

DATE: June 5, 1991

RE: Amole Arroyo-Westgate Dam Drainage Management Plan

Enclosed is a copy of the literature review report for the Amole Arroyo-Westgate Dam Drainage Management Plan. This report is a first step in the ongoing process to create a new Drainage Management Plan for the area which drains to AMAFCA's Westgate Dam. We would welcome comments or additional information that might be used to supplement this literature review. We would appreciate receiving any comments you have by June 21, 1991, so we can incorporate them in the next phase of the project. We will be soliciting comments throughout the development of the Plan, and welcome your input now and in the future.

CEA:ij

enclosure

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

Literature Review
Amole Arroyo - Westgate Dam
Drainage Management Plan

T A B L E O F C O N T E N T S

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I. INTRODUCTION

On January 28, 1991, the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) authorized Scanlon & Associates, Inc. to proceed on the Amole Arroyo - Westgate Dam Drainage Management Plan Revision. The purpose of the Drainage Management Plan Revision is to study the options on the Amole Arroyo and tributary arroyos which drain to AMAFCA's Westgate Dam, specifically with regard to the stormwater runoff created by development of the upstream basin. The area covered is the Amole Watershed upstream of the Westgate Dam.

The first step of studying the watershed consists of a literature review. The literature review is the topic of this report.

New mapping for the area has been acquired and will be used to define the watershed boundaries and sub-basin boundaries. A hydrologic model will then be developed. The model will analyze existing and future conditions for different frequency storms. Recommendations for the basin will be based on the model, environmental analysis, sediment analysis, and on this literature review. The results of the model will also be used to revise floodplain maps where necessary.

II. DESCRIPTION OF AREA

The Amole Arroyo is located on the west side of Albuquerque and extends in one form or another from the Amole Detention Dam northwesterly to Westgate Dam, thence west and north to a point well north of Interstate 40. This drainage plan is restricted to the area upstream of Westgate Dam. The arroyo has two branches which flow into Westgate Dam. The arroyo is referred to as the Amole Arroyo downstream of Interstate 40. The natural watercourses upstream of the Interstate are unnamed. The

watershed's limits are approximately defined by the Rio Puerco Drainage Divide to the far west, the Ladera Drainage Basin to the north and east, the Amole Drainage Basin (below the dam, sometimes called the Hubbell Lake Watershed) to the east, and an unnamed watershed which flows to Isleta Pueblo lands to the south and west. Figure 1 shows the watershed and its adjacent areas. This study will involve only that area contributing flow to the Westgate Dam plus a portion of the Ladera Watershed near the Double Eagle II Airport which might contribute flow to the Westgate Dam in the future.

III. EXISTING PLANS

Albuquerque/Bernalillo County Comprehensive Plan

This plan was completed in 1988 and consists of broad development policies for the entire county of Bernalillo. Plans which more specifically address the Amole-Westgate area would be supporting plans of the Comprehensive Plan.

A potential Urban Center is shown north of the Amole Arroyo and east of Westgate Heights on the Comprehensive Plan. An urban center is defined as "a concentration of contiguous land uses that include high density residential and which contain the highest intensities and building mass in the metropolitan area; characterized by convenient mass transit, pedestrian and other amenities helping to provide a unique sense of place; and so designated by the City for special action designed to facilitate policy effectiveness." The urban center is too far from the Westgate Dam to have much impact on this study; however, transportation links to the urban center should be considered as development takes place in the watershed.

An Open Space Network map is included in the plan. According to this map, a small portion of the watershed (just northeast of the I-40/Central Interchange) is classified as Major Public Open Space. This area has been hatched on Figure 2. Also included in the report is a Generalized Land Use Map. This map has red shading, indicating Commercial Use, northeast of the I-40/Central Interchange. The area is privately owned.

Facility Plan for Arroyos

The Albuquerque City Council and the Bernalillo County Commission adopted the Facility Plan for Arroyos February 3, 1986. In the plan, the Amole Arroyo is classified as a Major Open Space Link. The Facility Plan reviews the arroyo south of Central Avenue, only. This area is designated primarily Developing Urban by the Comprehensive Plan. Major Open Space Links are scheduled for the development of arroyo corridor plans which will locate recreational trails forming continuous east/west linkages between peripheral Major Public Open Space. As stated in the plan, barriers such as major streets may require crossing structures placed at strategic locations to provide continuity to the trail system. The channel treatments within Major Open Space Links may vary. The native landscaping of rights-of-way and/or easements associated with trails will comprise the unifying element along these arroyo corridors.

Amole Arroyo Corridor Plan

This document is being prepared by City of Albuquerque Advance Planning staff. The plan has been reviewed by various agencies and in several months will be presented to the Albuquerque City Council and Bernalillo County Commission for adoption. The Corridor Plan covers the Amole Arroyo downstream of the Westgate Dam and therefore has little impact on the Amole-Westgate Drainage Management Plan. The Corridor Plan recommends natural

treatments for the arroyo downstream of the dam. The report's only statement dealing with the area upstream of the dam recommends that a prudent line be established if proven to be feasible by this Drainage Management Plan. The plan suggests an outlook park on top of the drainage divide. This park will have very little impact on existing drainage conditions.

Northwest Area Plan

Volumes I and II of this plan were revised in 1989. The plan will not be adopted until Volume III has been completed. This plan encompasses the Westgate Dam Watershed that is north of Central Avenue. The plan identifies three major drainage units in its study area: (1) upper reaches which consist of the uplands of the mesa, (2) lower reaches which consist of the mesa slopes, and (3) flood-plains of the Rio Puerco and Rio Grande valleys. The Westgate Dam watershed occupies the uplands of the mesa. According to this plan:

> "Range depressions dominate the mesa. They direct surface water from the edges of the top toward their centers. Although flash flood hazard is slight, depressions collect and spread water out, flooding large areas for short periods. Drainage of the mesa generally follows the south-southeast slope of the mesa."

The uplands of the mesa are often called the Ceja Mesa (or Llano de Albuquerque). All soils are of the Madurez-Wink Association.

The plan identifies the Westland Corporation as the major property owner in the area. The plan includes population projections for the year 2010. All increased populations are shown east of the Paseo del Volcan corridor.

Southwest Area Plan

The Bernalillo County Commission adopted the Southwest Area Plan in 1987. The Albuquerque City Council adopted the plan in 1988.

This plan encompasses the Westgate Dam Watershed that is south of Central Avenue. As in the Northwest Area Plan, the Westgate Dam Watershed lies on the Ceja Mesa with the exception of the dam and its immediate area which lies on the Mesa slopes.

At the time the plan was developed, the Westgate Dam watershed area was zoned as rural agricultural (A-1). Since that time some of the areas next to Central have been rezoned as commercial (C-1) and light industrial (M-1). The plan presents several alternative land use scenarios for the future: the Trend Scenario, the Comprehensive Plan Scenario, and the Modified Comprehensive Plan Scenario. The plan concludes that the Trend Scenario, a "no action" plan, is not an acceptable method of land use development. Residential development will be the predominant use of developed land within the plan area. The plan establishes a framework for growth and development to occur primarily in accordance with the Comprehensive Plan.

The Drainage Management section of the report notes that "as development occurs, stabilized channel treatment may be necessary." The report states that a naturalistic appearance should be retained while stabilizing the channel. The report makes no specific drainage recommendations for the Westgate Dam or the area upstream of the dam. Southwest Area Plan Drainage Policies include the following:

* All future development shall be required to limit the level of water runoff so as not to exceed the capacity of downstream facilities.

* As development occurs and stabilization of arroyo channels become necessary, the channel treatments used shall be as

naturalistic in appearance as possible, to blend in with the surrounding environment, especially in the area below Rio Bravo Boulevard.

IV. EXISTING HYDROLOGIC EVALUATIONS

Drainage Management Plan - Western Albuquerque Metropolitan Area

William Matotan & Associates completed this study in 1975. It investigated drainage management for a large portion of the west side of Albuquerque. The report includes hydrology, geology and groundwater resources, soil characteristics, and a brief environmental assessment. The report proposed the Westgate Dam. Matotan began design on the dam later in 1975.

Hydrologic criteria was developed specifically for the plan using various methods. Intensity-frequency-duration curves were developed using procedures outlined in Weather Bureau Technical Paper No. 40 and the Denver Criteria Manual for Urban Storm Drainage. The Snyder synthetic unit hydrograph method and the Tatum flood routing method (accounting for prismatic channel storage) were used in a computer model. The 6-hour rainfall depths for the PMP and 100-year storms were 15 inches and 1.91 inches, respectively. Infiltration values varied from 0.5 to 1.0 inches per hour during the first hour of the storm. Initial loss values varied from 0.1 to 0.3 inches total for the storm. The developed rainfall-runoff relationships were verified with a comparison to the 1955 Lower Embudo storm, 1963 Embudo Arroyo storm, and the 1963 Hahn Arroyo storm. It should be noted that all of these storms occurred on the east side of Albuquerque.

Far Northwest Drainage Management Plan

Bohannan-Huston, Inc. completed the final report for this plan in March, 1986. Watershed basins included in the study are the

Mariposa, Boca Negra, San Antonio, Ladera, and Westgate Dam. The purpose of the study was to define "broad" guidelines for the far northwest area.

The report identifies two major playas in the Westgate Dam watershed totalling a storage volume of 2610 acre-feet. These natural depressions retain runoff and have no natural outfall. This study assumes that the playa watersheds and any outflow that may occur in the future will not contribute significantly to the peak 100-year flows in the existing downstream system. The report suggests a playa management policy: "...possibility of restricting development around the playas should be investigated...if development is allowed to occur...the playas should be protected..." No specific recommendations are made as to how the playas should be protected.

As analyzed, during a developed, free-discharge condition, the report concluded that the Westgate Dam reservoir does not have an adequate volume to store the incoming flows. Furthermore, the crossings on I-40 do not have enough capacity to convey the incoming upstream flows. The report states that "the economics of constructing detention facilities at I-40 or throughout the watershed, controlling runoff to specific cfs/acre rates, or even upgrading the structures at I-40 and the Westgate Dam should be investigated as development occurs in this watershed."

Hydrologic criteria used in this plan was the same as that used in the Albuquerque Master Drainage Study (AMDS) with the exception of a modified rainfall distribution which reaches over 95% of the total depth in 30 minutes. The 100-year rainfall amount of 2.2" was reduced to 2.13" based on an areal reduction factor of 0.97. A 58% impervious area was used throughout the basin. Individual sub-basin values for time to peak varied from 0.44 to 0.98 hours. The total 100-year developed condition flowrate into the dam was computed at 3120 cfs. This is based on

using the maximum hydraulic capacity of the existing structures under I-40. The total flowrate upstream of the crossings is 9370 cfs but the crossings are reported to convey only 1110 cfs.

V. EXISTING DEVELOPMENTS

Tierra West Mobile Home Park

This site is located approximately 2000 feet south of the west Central ramps to I-40. Phase I of this development, completed in 1988, is in the northern half of the site. Phase II is currently in the planning stages. A temporary stilling basin collects the runoff from Phase I. The drainage report for the mobile home park describes a 2.1 acre-foot pond with a peak discharge of 21 cubic feet per second. An earthen channel carries the outflow from the stilling basin to the Amole Arroyo. Developers plan to remove the basin as Phase II is completed. The drainage report states "the additional 67 cfs will be discharged prior to the peak flow of the 100-year storm." Concrete channels will carry runoff from the site to the Amole Arroyo. As Phase II plans are approved, they will be incorporated into the hydrologic model. If plans are not approved in time to incorporate into the model, assumptions will be made as directed by AMAFCA.

The sanitary sewer from the Mobile Home Park crosses underneath the Amole Arroyo in several locations, runs along the southern portion of the dam, and ties into a line at Westgate Heights.

American R.V. Park

This recreational vehicle park is located west of Tierra West Mobile Home Park and just south of the Interstate. The site includes a small pond that detains less than one acre-foot of runoff.

Others

Various land owners have small developed areas near the I-40/Central Interchange. These areas include mobile home sales, truck yards, and even a small restaurant.

VI. EXISTING FLOOD CONTROL IMPROVEMENTS

Westgate Dam

The Westgate Detention Dam, maintained by AMAFCA, is an earth fill structure, including sedimentation area, and operating and emergency spillways, for the purpose of flood control. William Matotan & Associates designed the dam to detain the 100-year flood waters and associated sediment. Additional data, as listed on the hydrology sheet from the "as built" drawings, is noted below:

Maximum height above foundation:	48 feet
Length:	2095 feet
Maximum width at base:	280 feet
Crest width:	15 feet
Slope upstream face:	3:1
Slope downstream face:	2.5:1
Elevation at crest of dam:	5411.0
Elevation at spillway crest:	5398.9
Elevation of bottom tower outlet:	5368.0
Elevation of flow line of outlet conduit:	5366.2
Freeboard:	0.30 feet
Width of spillway:	400 feet
Discharge capacity of spillway at elev 5410.7:	46360 cfs
Outlet conduit:	24" C.C.P.
Outlet conduit capacity:	80 cfs

Evacuation time:	78 hours
100-year storm contributing area:	7.28 square miles
PMP contributing area:	18.30 square miles

100-year storm data:

west branch Amole peak flowrate:	1475 cfs
west branch Amole volume:	214 acre feet
west branch Amole sediment volume:	40 acre feet
east branch Amole peak flowrate:	943 cfs
east branch Amole volume:	133 acre feet
east branch Amole sediment volume:	29 acre feet

The east and west branch Amole flows are additive for a combined peak flowrate of 2418 cfs.

The 100-year and PMP contributing areas differ because of high initial abstractions, depression losses, and the assumption that the future West Mesa Airport would control runoff within the airport area. The West Mesa Airport was built further north than anticipated and is now called the Double Eagle II Airport.

I-40 and Central crossings

There are two major drainage Interstate crossings in the watershed. The crossings were built in the 1960's and were apparently designed for the 50-year storm. They are maintained by the New Mexico State Highway and Transportation Department. One crossing, at the I-40/Central Interchange, consists of three 48" diameter pipes. The entrances to these pipes are partially filled with debris and sediment and therefore do not operate under full efficiency. The other major crossing is a double barrel 10' wide by 4' high box culvert, located on the eastern edge of the basin. The Far Northwest Drainage Management Plan reported the hydraulic capacities of the structures to be 465 cfs and 1040 cfs, respectively. The top of the road elevation was

used as the maximum headwater depth for the computed capacities. The Far Northwest Drainage Management Plan computed the 1040 cfs assuming a double barrel 14' x 4' concrete box culvert. The culvert is placed at a 45 degree skew so that the entrance measures 14' along the skew but 10' perpendicular to the box culvert walls. Therefore the actual capacity of the double barrel box culvert is approximately 70% less than that reported.

VII. PROPOSED DEVELOPMENTS

Approximate location of proposed developments are shown on Figure 2.

Paseo del Volcan

The location study report for the Paseo del Volcan is divided into that portion north of I-40 and that portion south of I-40. Gannett Fleming West, Inc. completed the report for the southern portion in October, 1990. The portion of the corridor located in the Westgate watershed contains only one alignment alternate. The report states that "volumes of flow and flow patterns within watersheds would be preserved as nearly as possible." Crossing structures would be provided for existing arroyos. Sheet flow would be concentrated and passed under the roadway via culverts. The existing I-40/Central Interchange will be modified to also serve as the Paseo del Volcan Interchange. Several alternates are presented to modify the interchange. The recommended alternative consists of on/off ramps from I-40 to Paseo del Volcan within the existing interchange. The ramps would not affect the existing crossing structures on I-40.

Avid Engineering is just beginning a study for that portion of Paseo del Volcan north of the Interstate under contract with the

New Mexico State Highway and Transportation Department. We anticipate ongoing communication with Avid to insure that the recommendations made in the Drainage Management Plan will coincide with the plans for Paseo del Volcan.

Outdoor Entertainment Complex

The proposed facility is planned at the northeast corner of the existing I-40/Central Interchange. The main attraction of the facility is an amphitheater.

The Conceptual Grading & Drainage Plan for the Outdoor Entertainment Complex is currently in a review and approval stage. "The design concept is to allow the public roads and commercial lots free discharge after development. To accomplish this, the runoff from most of the 80 acre site, the public road and the commercial tracts will be routed through a single detention pond located on the site. By using this pond, flows downstream will be maintained at or below historic levels." The report states the development will increase the net volume of runoff tributary to the Westgate Dam by 7.8 acre feet; however, the time-volume relationships at the dam are not affected. If approved, the plan will be incorporated into the future conditions hydrologic model.

Others

The Westland Corporation is the largest landowner in the area. They are currently working on several projects within the basin:

* Nine Mile Hill Truck Plaza, 100 acres at the northwest corner of I-40 and Paseo Del Volcan.

* Amole Golf Course and Residential Development, west of

Westgate Dam along and within the 100-year floodplain up to the extension of Paseo Del Volcan.

* Paseo Del Volcan Industrial Corridor, along both sides of Paseo Del Volcan from I-40 to the Double Eagle II Airport.

As more information is available on these developments, it will be considered in the Drainage Management Plan as appropriate.

VIII. SUMMARY OF SPECIAL CONSIDERATIONS FOR HYDROLOGIC MODEL

The hydrologic model will use the most recent criteria as developed by the Development Process Manual Steering Committee. The existing and future conditions models will be analyzed for the 2-, 10-, and 100-year storms. The existing conditions model will include all fully approved plans. The future conditions model will incorporate land use scenarios as outlined in the Comprehensive Plan with any supplements as directed by AMAFCA.

It is anticipated that the results of the models will reveal drainage problems under existing or future/developed conditions. The future conditions model will be modified with various alternates to solve the drainage problems. Alternates will include but not be limited to the following:

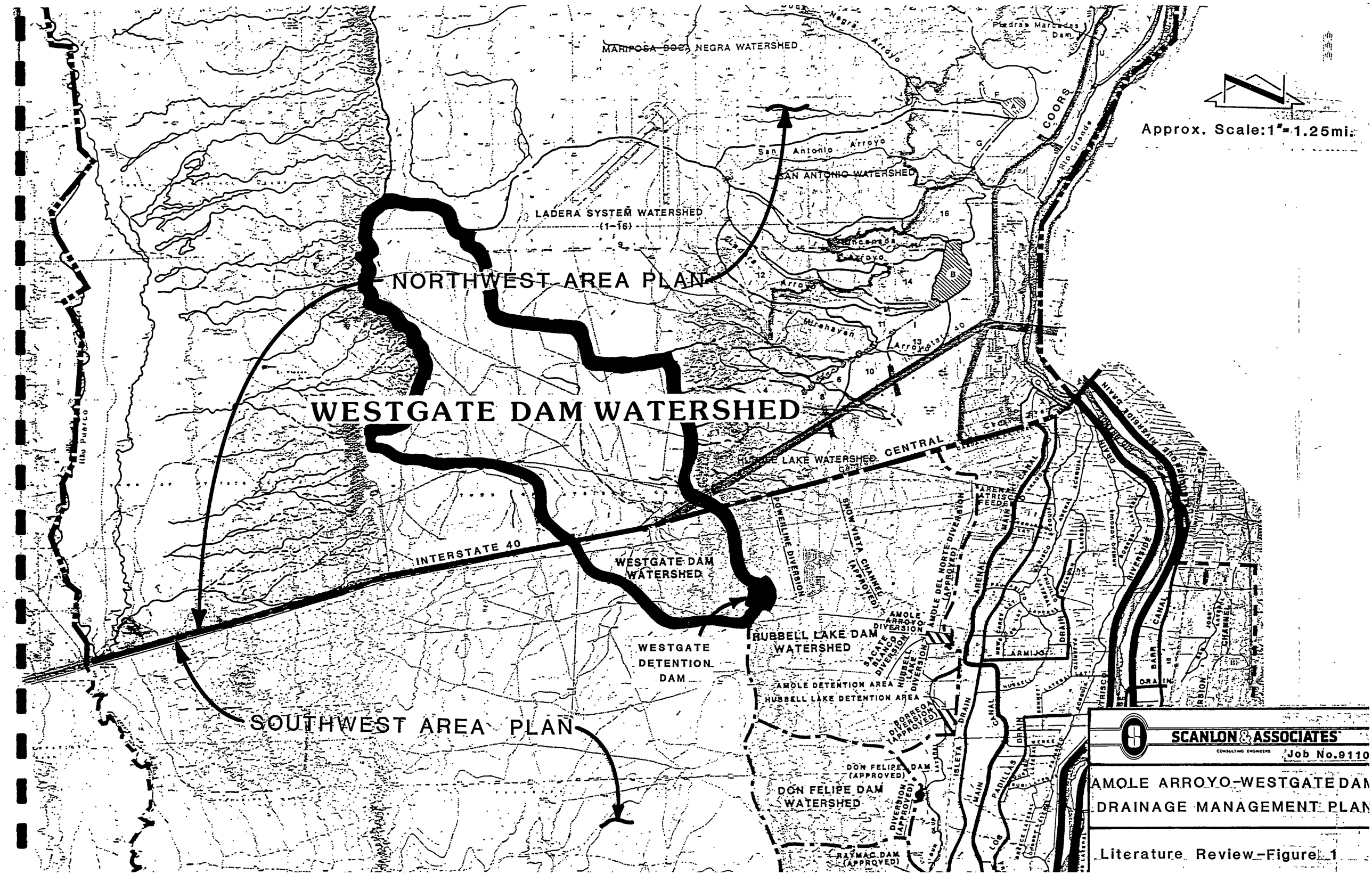
* improvements to existing crossing structures and/or to Westgate Dam.

* establish cfs/acre limits on new developments.

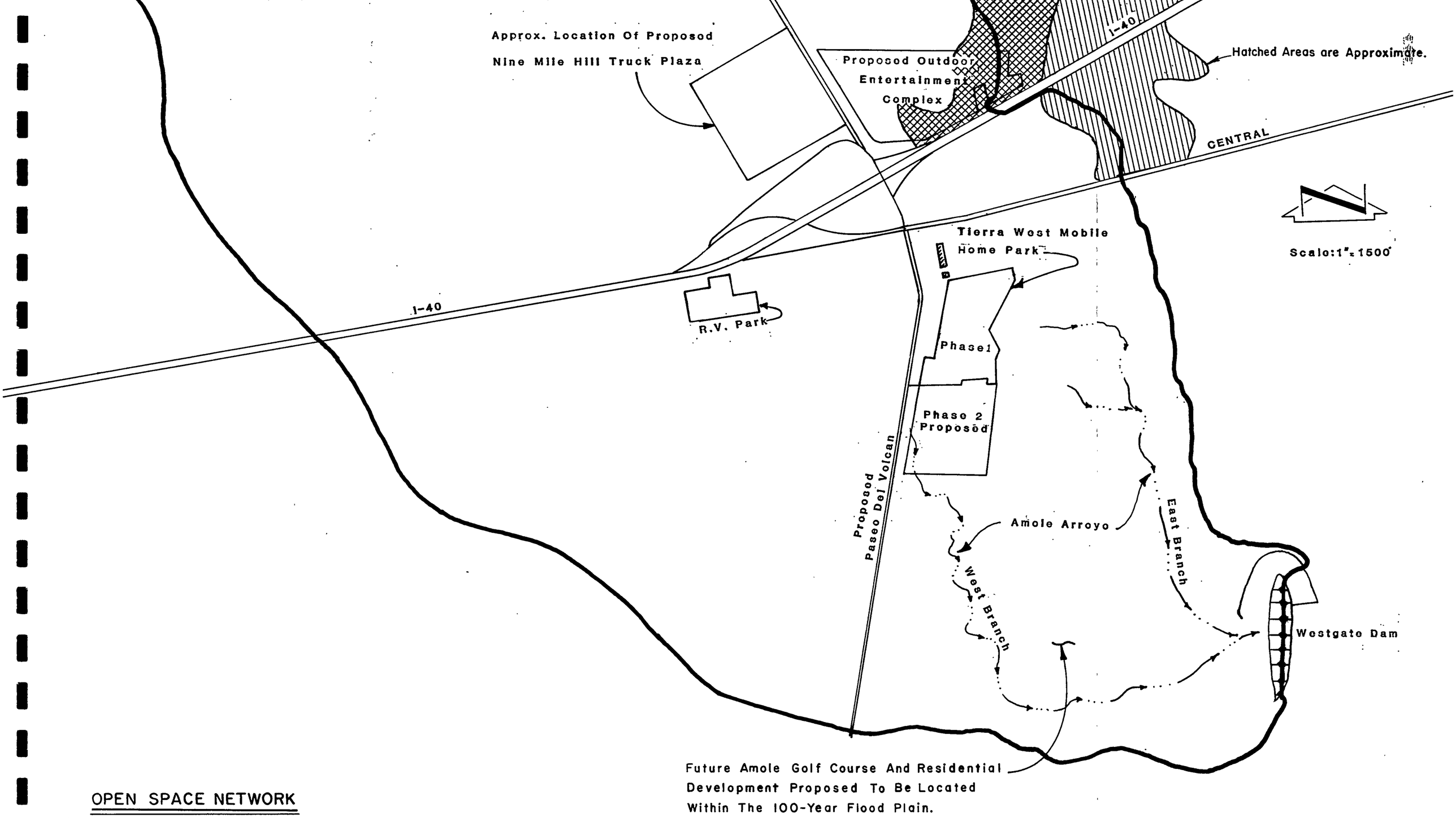
* new detention facility (or facilities).

As alternates are implemented in the model, the possibility of diverting flow from the Double Eagle II Airport area will be investigated. This would help relieve the Ladera Watershed which

prior analysis has shown to have insufficient downstream capacity for developed flows.



Literature Review-Figure 1



OPEN SPACE NETWORK

MAJOR PUBLIC OPEN SPACE

EASEMENT AREA

From "ALBUQUERQUE/BERNALILLO COUNTY COMPREHENSIVE PLAN"

Literature Review-Figure 2