WATERMAN WASH HYDROLOGY

Upper and Lower Watershed

FLOOD CONTROL DISTRICT of Maricopa County

December 1991

STANLEY CONSULTANTS
Phoenix, Arizona

VOLUME 2 OF 2

WATERMAN WASH HYDROLOGY

Upper and Lower Watershed

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FLOOD CONTROL DISTRICT of Maricopa County

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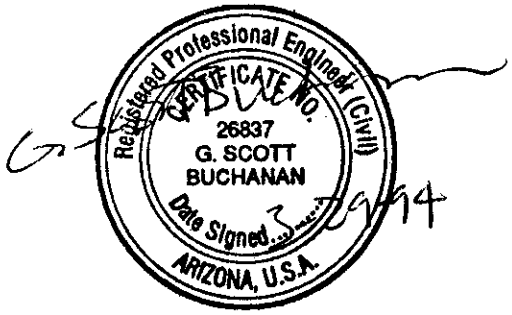

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1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this study is to estimate 100-year discharges along Waterman Wash from its confluence with the Gila River upstream to the Southern Pacific Railroad. These discharge estimates are used in the management and regulation of development in the associated floodplain areas.

There have been a number of other hydrology studies of Waterman Wash over the years. These studies, their objectives and outcomes are briefly summarized in later sections of this report. Estimated 100-year flow rates have ranged from a low of 7,800 cfs to a high of 33,600 cfs.

The objective of this study is to consider the previous hydrology where applicable and create a comprehensive rainfall-runoff model. This model will:

- Cover the entire watershed in detail
- Estimate discharges at a greater number of tributary and channel concentration points than previously
- Consider precipitation and hydrograph routing losses according to current procedures and concepts
- Result in discharge estimates that are in line with observed flows

1.2 Background and Authority

This study was performed by Stanley Consultants for the Flood Control District of Maricopa County (FCD). The initial study effort began in July, 1989 under FCD contract 88-55. This was a combined hydrology and hydraulic Flood Insurance Study (FIS) for the upper watershed only. After initial review of the study by the FCD, the Federal Emergency Management Agency (FEMA) and the Arizona Department of Water Resources (ADWR), revisions were suggested in hydrology methods which would adjust estimated discharges to be more consistent with the observed gauge record at the Gila River and with the FCD's observations of recent flows.

An amendment (referred to as Change Order No. 1) was made to the original contract and approved by the FCD Board of Directors in June, 1991. This amendment consisted of two parts. Part 1 revised the hydrology and accordingly, the hydraulics of the upper watershed FIS. Part 2 takes the revised hydrology from the upper watershed and adds to it hydrology from the lower watershed using the same methodologies. The end result of Part 2, then, is this report which covers revised hydrology for the entire watershed.

1.3 Coordination

Scoping and coordination meetings for Parts 1 and 2 of Change Order No. 1 have been held at FCD offices on October 12, 1990 and January 17, June 17, July 11, and October 10, 1991. These meetings were held to discuss work schedules, study methods, hydrology assumptions and available information and to review preliminary study results from the upper watershed.

Topography for the East and West Prongs of Waterman Wash and the Southern Pacific Railroad was provided by Cooper Aerial of Phoenix based on coverage limits established by Stanley Consultants and the FCD. Ground control for the aerial mapping was established by Stanley Consultants' field crews. This topography, in addition to being used to delineate upper basin floodplains, was also used to develop stage-storage-discharge relationships for the Southern Pacific Railroad culverts and to develop HEC-1 hydrograph routing cross sections for the upper watershed.

As mentioned previously, in addition to review by the FCD, Waterman Wash hydrology has also been reviewed by ADWR and FEMA. Comments from FEMA regarding the upper watershed FIS are pending.

2.0 AREA STUDIED

2.1 Scope of Study

This hydrology study covers the total contributing area of Waterman Wash, both the upper and lower watersheds. The hydrology for the upper watershed in this study is identical to the hydrology in the Waterman Wash Upper Watershed FIS. The upper watershed actually consists of two branches or "prongs" of Waterman Wash referred to as the East and West Prongs. Their confluence is located approximately 15 river miles upstream from the confluence with the Gila River. In this study, the confluence of East and West Prongs is considered the lower limit of the upper watershed.

The upper watershed is traversed by a section of the Southern Pacific Railroad. This railroad is generally situated on a raised earth embankment with numerous cross culverts. A total of 46 railroad culverts are located in this study area. Their affect on peak flows was evaluated as part of this study.

The lower watershed consists primarily of a single main channel beginning at the East and West Prong confluence and extending downstream to the Gila River. The Waterman Wash confluence with the Gila River is located about 2 miles downstream of Tuthill Road. A United States Geological Survey (USGS) recording stage gauge is located on Waterman Wash approximately 2 miles upstream from the Gila River. Annual peak discharge data is available for the period 1964 to 1978, 1980 to 1989.

This data has been analyzed by the USGS. The results of this analysis were considered when developing the hydrology model for Waterman Wash.

Based on direction from the FCD, only the 100-year return frequency was evaluated in this study.

2.2 Description of Study Area

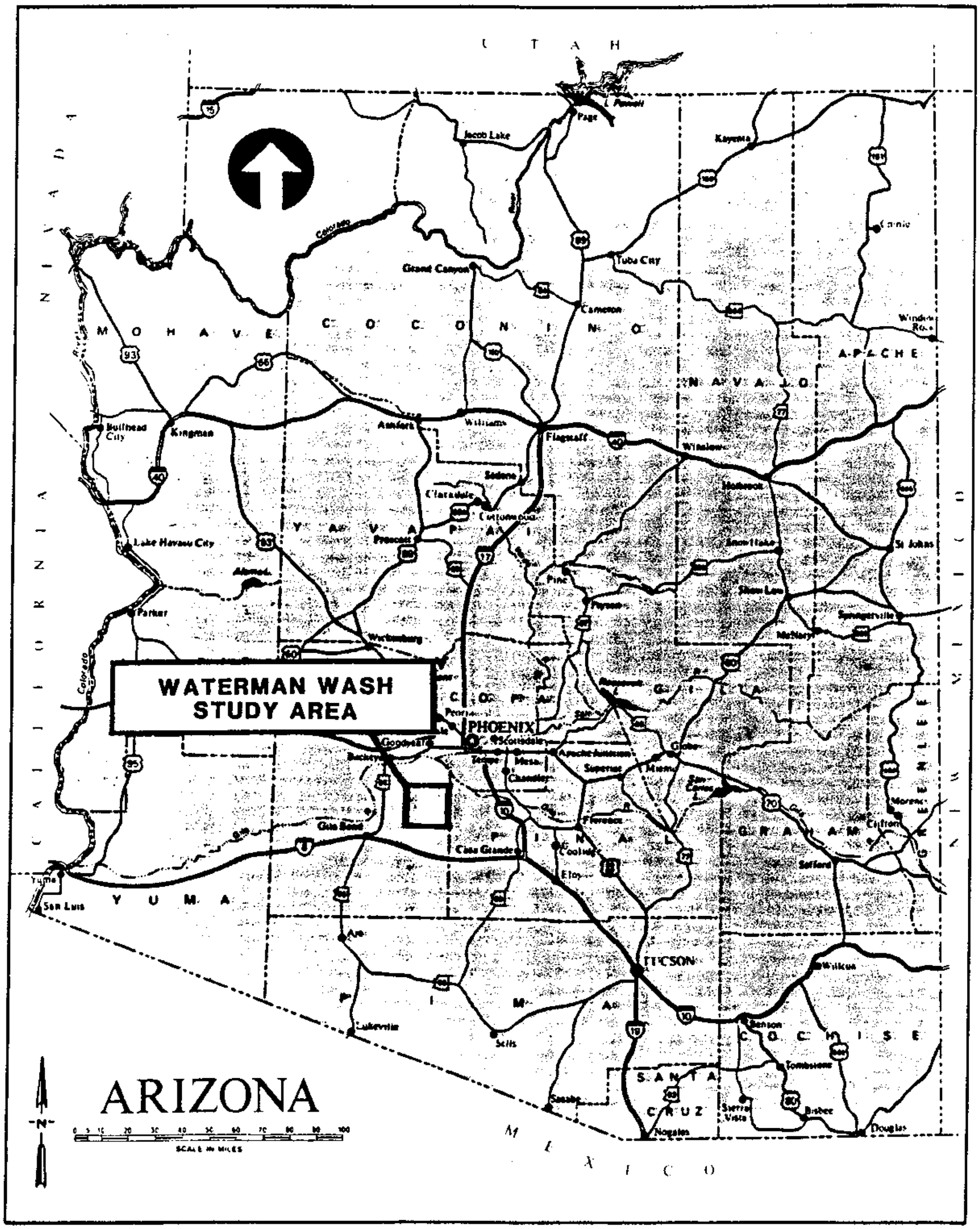
The study area is located about 45 miles southwest of Phoenix, Arizona in a sparsely populated area of unincorporated Maricopa County and the Town of Goodyear. Waterman Wash drains an area known as Rainbow Valley. The small community of Mobile is located within the study area. It consists primarily of an elementary school and numerous scattered residences. It is located along the north side of the Southern Pacific Railroad near 99th Avenue.

Agricultural activity is found predominantly in the lower watershed. Irrigated agricultural fields, cattle feed lots and other associated land uses are located on the lower slopes of the lower watershed adjacent to the main channel of Waterman Wash. Agricultural fields comprise about 25 or 30 square miles of land area but only about 10 percent of this is in active use today. The rest has been fallow for several years and appears to be gradually reverting to its former desert condition.

Most local roadways are unpaved with dip crossings at washes. State Highway 238 traverses the study area running parallel to and north of the Southern Pacific Railroad in the upper watershed. Drainage facilities for State Highway 238 consist primarily of dip or ford crossings except at the West Prong of Waterman Wash where there is a concrete bridge structure. Rainbow Valley Road is a two lane, paved county road in the lower watershed. It has a concrete bridge crossing at Waterman Wash. An El Paso Natural Gas pipeline traverses the study area from northwest to southeast. This is a buried high pressure pipeline with little or no above ground features. It has no significant affect on drainage in the study area.

The upper study area is beginning to experience some additional commercial/industrial activity. Currently under development are a training airport and a sanitary landfill. This may result in some increase in population and residential construction in the area. The study area south of the railroad is essentially uninhabited natural desert.

FIGURE 1


WATERMAN WASH
STUDY AREA
ARIZONA
PHOENIX
TUCSON
SCALE IN MILES
U T A H
M O H A V E
C O C O N I N O
N A V A J O
A P A C H E
Y U M A
C O C H I S E
S A N T A
C R U Z
M E X I C O
Kingman
Flagstaff
Winslow
Holbrook
Williams
Prescott
Wickenburg
Grand Canyon
Tuba City
Page
Jacob Lake
Kayenta
Lake Havasu City
Parker
Yuma
San Luis
Gila Bend
Casa Grande
Coolidge
Florence
Superior
Globe
Payson
Show Low
Snowflake
Springerville
St. Johns
Safford
Willcox
Benson
Tombstone
Bisbee
Douglas
Nogales
Sells
Lukeville
Ajo
Scottsdale
Tempe
Mesa
Chandler
Sedona
Cottonwood
Clarkdale
Camp Verde
Cameron
Eloy
Clifton
Morenci
Sierra Vista
Sasabe
Bullhead City
Colorado

The study area is situated in a semi-arid climatic zone characterized by hot summers and mild winters. Average annual precipitation is between six and nine inches. The study watershed is subject to three primary wet seasons. The first season, during the winter months, is characterized by Pacific storms producing widespread, generally low intensity showers. The second season, during the summer months, is characterized by thunderstorms produced by during the summer months, is characterized by thunderstorms produced by moist air from the Gulf of Mexico. The third season, from late summer to fall, is characterized by rain produced from tropical thunderstorms arising in the Pacific. Generally, the summer thunderstorms produce the greatest rainfall amounts and intensities.

The upper extent of the Waterman Wash drainage basin is located in the Maricopa Mountains east of Gila Bend. From there it drains northwesterly through Rainbow Valley to the Gila River. Cumulative contributing drainage areas are as follows:

To Southern Pacific Railroad	97 sq. mi.
To confluence of East and West Prongs	247 sq. mi.
To Gila River	434 sq. mi.

Elevations in the study area range from a low of about 850 feet at the Gila River to about 1,125 feet at the confluence of East and West Prongs to over 4,000 feet in the Estrella Mountains which form the eastern limits of the study area. The Maricopa Mountains, which form the west and south limits of the study area, peak at elevations ranging from 2,500 to 3,000 feet. Slopes range from a minimum of about 0.25% in the lower, flatter portions of the study area to well over 10% in the surrounding mountains. The predominant slope in the areas between the mountain fronts and Waterman Wash is on the order of 1%.

A wide range of soils occur in the study area. Soils in the lower elevations are characterized as generally deep, fine textured alluviums and those in the upper elevations are generally shallow and rocky. Some bedrock outcrops occur throughout the study area but primarily in the upper elevations. These outcrops are the primary component of impervious surface in the study area. Because of its low intensity, current land use has relatively little affect on the rainfall-runoff process. Soils in the lower elevations are generally unconsolidated and subject to erosion, transport and deposition.

Natural vegetation in the study area consists of a variety of arid desert grass, brush and trees including creosote, cat claw, salt bush and brittle bush; palo verde, mesquite and ironwood trees, saguaro and a variety of other cacti. Agricultural land use only accounts for a small portion of the study area. Crop cover in the upper watershed was considered insignificant in this study. It is estimated that only about 2,000 acres of crop cover remains in the lower watershed. Crops consist primarily of cotton.

Runoff originating in the surrounding mountains flows out onto adjoining lower drainage slopes. It then travels, generally several miles, before reaching the Southern Pacific Railroad or Waterman Wash. The surrounding mountains comprise only about 10% of the total contributing area. The bulk of the runoff in the study area comes from the lower slopes themselves. The lower slopes are characterized by braided meandering wash systems. Wash channels vary in size but are typically shallow and not very wide. Concentrations of trees and brush are typically found along these washes.

The East Prong of Waterman Wash is a valley-entrenched water course with overbanks that rise more or less continuously up and away from the main channel. There is typically a single dominant main channel although some portions of the study reach contain multiple channels. Washes from the adjoining drainage slopes enter the East Prong from both sides and it continuously gains contributing area in the downstream direction.

The Southern Pacific Railroad is on a more or less continuous downhill grade from west to east cutting diagonally across one of the lower drainage slopes. Cross culverts are placed at major washes. A diversion channel exists along the upstream side of a significant portion of the railroad study reach. This channel picks up flow from minor washes between culverts and also carries overflow from one culvert to the next one down slope thus interconnecting the culverts into groups or systems. This channel is not continuous along the entire study reach.

Typically, the West Prong is made up of several wash channels with sometimes no dominant main channel. The West Prong is similar in nature to the East Prong although portions of its study reach do not have the same pronounced valley-entrenched cross section configuration. The West Prong generally has a steeper grade along its channel than the East Prong. None of the West Prong's channels permanently diverge from its floodplain.

Waterman Wash downstream of the East and West Prong Confluence is generally a single channel. Portions of it upstream of Rainbow Valley Road have been recently channelized to a fairly uniform trapezoidal section.

2.3 Principal Flood Problems

Low-lying areas along Waterman Wash and its East and West Prongs are subject to flooding. Channel flow depths during extreme events can range from 6 to 12 feet and flow velocities can range from 5 to 10 feet per second. Overbank areas adjacent to the channels are subject to overflow and erosion potential.

Areas along the upstream side of the Southern Pacific Railroad are subject to some ponding and diverted flow along the raised embankment. The average maximum ponding depth is on the order of 3 feet. The possibility of overtopping of the railroad embankment was considered in this study but does not appear likely.

2.4 Flood Protection Measures

No significant flood protection facilities exist nor are any flood control projects planned for the study area. There are a number of minor localized diversion channels and dikes evident in the study area. Primarily, this type of activity consists of training diversions for roadway and railroad culverts. Or, it is associated with agricultural activities to protect cultivated fields and irrigation facilities or collect runoff to livestock water tanks.

Generally, the larger diversion channels in the lower watershed have been considered in establishing watershed sub-boundaries and in hydrograph routing. In the upper watershed, the Southern Pacific Railroad affects flow patterns and peak flows. These items are discussed in more detail in the Technical Analysis section of this report.

3.0 OTHER STUDIES

3.1 USGS - Methods for Estimating Magnitude and Frequency of Floods in Arizona

This USGS publication was prepared for the Arizona Department of Transportation (ADOT) in September 1978 and presents a number of methods to estimate flow rates. At the time of the report, there were 12 years of gage record. The maximum discharge recorded in that period was 6,300 cfs on September 3, 1967.

The estimated 100-year peak discharge based on a frequency distribution analysis of the 12 years of record was 11,800 cfs. Using the regional regression analysis in this publication for un-gaged watersheds results in an estimated 100-year peak discharge of 22,800 cfs based on a total contributing area of 434 square miles. A third estimate from this publication is a weighted average of values from frequency distributions and values from regression equations. This estimated discharge is 16,400 cfs.

These results demonstrate a one order-of-magnitude spread in estimated flow rates. The frequency distribution estimate of 11,800 cfs is based on a relatively short period of record and may be questionable because of this.

At the other end of the spread is the regression estimate of 22,800 cfs. This estimate seems reasonable but there may be some inherent accuracy limitations with regard to standard statistical error and typically extreme time and spacial variability of annual peak discharges in Arizona. Also, as mentioned in that report, there may be some

questions regarding applicability of regression analysis if there is any significant affect of storage, diversion or land use on flood discharges.

3.2 Harris-Toups Approximate Flood Insurance Study

An approximate FIS was done by Harris-Toups Engineers for FEMA in January, 1979. It included approximate hydrology and hydraulics for a number of different watercourses in Maricopa County, including Waterman Wash. The study reach started at Section 30, Township 1 South, Range 2 West approximately 2.5 miles above the Gila River confluence. It then proceeded upstream along the main channel to the confluence of East and West Prongs, then went up the West Prong to Section 28, Township 4 South, Range 1 West (upstream limit corresponds to the El Paso Natural Gas Pipeline). The East Prong was not included in the study.

Peak flows were estimated at the upstream and downstream limits using the SCS Method Part II from ADOT's "Hydrologic Design for Highway Drainage in Arizona". Hydrology results and supporting calculations were not included in this approximate FIS and are not available.

3.3 Cella-Barr FIS

In 1988, a Flood Insurance Study was completed for FEMA by Cella-Barr and Associates (CBA). Its primary objective was to delineate the Waterman Wash floodplain in the lower watershed. In support of this effort, a hydrology model for the entire watershed was needed. Hydrology and hydraulics for this study were based on HEC-1 and HEC-2 respectively. This FIS superseded most of the earlier approximate delineation done by Harris-Toups Engineers.

The Cella-Barr FIS estimated 100-year discharges only. It considered the possibility that the Southern Pacific Railroad may have some affect on hydrograph peaks and times but concluded that this would be minimal with regard to the lower watershed. It used the SCS dimensionless unit hydrograph option of HEC-1 along with SCS curve number loss rates based on hydrologic soil groups and estimated vegetation cover type and density. Times of concentration were based on the SCS Upland Method. The total watershed was divided into 18 sub-basins.

An SCS synthetic Type II 24-hour rainfall distribution was used and the point precipitation of 4.40 inches was reduced by a basin-wide average aerial reduction factor of 0.905. Hydrograph routing was accomplished using the normal depth storage routing option of HEC-1 along the main channel of Waterman Wash based on cross sections derived from floodplain mapping. There was no infiltration/percolation loss associated with any of the hydrograph routing.

Estimated 100-year flow rates were 23,200 cfs at the confluence of East and West Prongs and 33,600 cfs at the Waterman Wash confluence with the Gila River.

3.4 Dibble State Route 238 Study

A drainage study was done by Dibble and Associates in 1987 for ADOT in support of design on the (then) proposed State Route 238. This study estimated 50-year discharges contributing to the culverts under the Southern Pacific Railroad utilizing the SCS Part I and Part II methods from ADOT's "Hydrologic Design for Highway Drainage in Arizona". This study recognizes the possibility of flow diversions and ponding along the railroad but does not assume that this would affect hydrograph peaks and times. The results of this study were used in the design of ford crossings and the West Prong bridge.

3.5 USGS Streamflow Statistical Analysis

In 1989, the USGS, in cooperation with ADWR and FCD, prepared a report titled "Basin Characteristics and Streamflow Statistics in Arizona as of 1989". This study applies the frequency distribution methods of the USGS "Guidelines for Determining Flood Flow Frequency, Bulletin 17B" to 25 years of gage records on Waterman Wash. This 25 years of record includes the 12 years collected from 1964 to 1978 which had been analyzed in the 1978 study discussed in Section 3.1.

The 1978 study had estimated the 100-year discharge at 11,800 cfs. However, with 25 years of records, this estimate is 7,800 cfs. The 1989 study contains a footnote that the reliability of results are uncertain and potential errors are large.

3.6 Stanley Consultants' Upper Basin FIS

As mentioned in the introduction, the Upper Basin FIS was done in conjunction with this report. Hydrology is identical between the two reports.

4.0 TECHNICAL ANALYSIS

4.1 Hydrology Model

The Corps of Engineer's HEC-1 computer hydrograph program version 4.0, September 1990, was used to evaluate hydrology at various concentration points along Waterman Wash and along the Southern Pacific Railroad. Currently, under the FCD's Hydrologic Design Manual, the Clark Unit Hydrograph model would be preferred. However, the Soil Conservation Service Dimensionless Unit Hydrograph model was originally chosen when the study began in 1989 and will be continued as such.

As mentioned previously, the Southern Pacific Railroad is considered to have an impact on hydrograph peaks and times. It was included as a number of storage routing steps in the HEC-1 runoff model. In the upper watershed, because of the

sparse intensity, none of the existing land uses was assumed to have any significant affect on the rainfall-runoff process. However, in the lower watershed, the existing agricultural land use has been considered in estimating rainfall losses.

4.2 Drainage Sub-Basins

Drainage basin and sub-basin boundaries were delineated based on a combination of USGS quadrangle maps, aerial photographs, aerial topography and field reconnaissance. Square mile areas of each sub-basin were estimated with the use of a digital planimeter. Originally, a separate sub-basin was delineated for each of the 46 drainage culverts under the railroad. This was later modified to streamline efforts and HEC-1 output by grouping culverts into systems. Groupings of culverts were established based primarily on hydraulic interconnection via the existing channel which is prevalent over most of the upstream side of the railroad embankment. However, the culvert grouping concept also applies where culverts are not interconnected by a diversion channel.

In the lower watershed, there are a number of significant diversion channel systems that have been constructed to protect agricultural improvements. Channels having a depth on the order of 3 feet and top width of 25 feet or greater were generally considered when establishing sub-basin boundaries. These channels may have had no formal design or receive any regular maintenance but appear relatively functional none-the-less.

Drainage sub-basins 740 and 830 were created in the lower watershed to segregate the drainage from a significant portion of steep mountain front. Hydrographs from these sub-basins are routed across the adjacent lower drainage slopes to Waterman Wash. A total of 44 drainage sub-basins were used in the HEC-1 model; 21 in the upper watershed and 23 in the lower.

4.3 Southern Pacific Railroad

The individual elevation discharge relationships for each culvert were summed to establish a single relationship for each group of culverts. Each culvert has its own datum beginning at its invert and increasing in one foot increments. Thus, each culvert in the group has an equal weight in terms of elevation head. Based on field reconnaissance, debris clogging does not appear to be a significant occurrence in the railroad culverts so no clogging factor assumption was used in culvert hydraulics. Capacities were estimated based on a combination of normal depth calculations and inlet control nomographs from "Hydraulic Engineering Circulars 5 and 10" and the "Handbook of Concrete Culvert Pipe Hydraulics", depending on the type of culvert and depth. The maximum assumed depth at all inlets was 7 feet.

The depth-area relationship required by HEC-1 for each group of culverts was estimated from the aerial topography assuming a triangular cross section with a maximum depth of 7 feet. This depth was projected up-slope and the intersect limits with existing ground were delineated. The area between the intersect limits and the railroad tracks was planimetered and the intermediate areas at 1 foot increments from 0 to 7 feet in depth were calculated proportionately.

4.4 Flow Splits

In the lower watershed, drainage from sub-basin 800 splits in different directions as it approaches the area near the El Paso Natural Gas pipeline. This is due in part to natural flow patterns and in part to man made diversion. An earth levee has been constructed just south of the gas pipeline to divert runoff to a livestock water tank just north of the pipeline. There was no detailed topography available for this area. Based on field inspection, aerial photographs and hydrologic judgement, it was estimated that about 50 percent of the total flow from sub-basin 800 would be diverted to the water tank. The remaining 50 percent would split with half going to sub-basin 900 and the other half going to sub-basin 950.

4.5 Precipitation

The 100-year 24 hour rainfall was estimated using precipitation data from the NOAA Atlas 2, Precipitation Frequency Atlas of the Western United States, Volume VIII, Arizona. The procedure is based on the "Hydrologic Design for Highway Drainage in Arizona" drainage manual. The resulting 100-year, 24-hour point precipitation value was 4.40 inches. Because of the size of the overall contributing drainage basin, aerial reduction factors were used. These were based on the NOAA publication "Depth-Area Ratios in the Semi-Arid Southwest United States" and input using the JD record in HEC-1.

The rainfall distribution used in this study is the SCS Type II synthetic distribution for 24-hour storm duration. This is input in HEC-1 as a cumulative distribution using the PC record at a 15-minute time interval.

4.6 Precipitation Losses

Rainfall losses were estimated based on the initial plus uniform loss rate option in HEC-1. The required input parameters are based on Tables 4.1 and 4.3 in the Flood Control District's "Hydrologic Design Manual". The initial and uniform losses are based on soil texture classifications which are derived from Soil Conservation Service soil surveys. Initial losses are selected assuming "normal" land values as opposed to "dry" to reflect the possibility of antecedent moisture in the watershed. Surface retention loss in the upper watershed assumes either the natural desert and rangeland

or the hillslope values. The amount of agricultural land was not considered significant enough to affect the rainfall-runoff relationship except in the lower watershed.

The percent impervious input for HEC-1 was derived as a portion of the estimated rock outcrop, if any, for each sub-basin. Rock outcrop area was estimated based primarily on soil surveys and aerial photographs. Estimating what portion of the outcrop would actually be used in the HEC-1 model as impervious was based on judgement with consideration to the outcrop extent and location. Only that portion which, in theory, would be hydraulically connected to a runoff conveyance was used. The final estimated impervious area was subtracted from the total sub-basin area when weighing loss coefficients for the remaining soils. Sensitivity analysis showed that a large increase in percent impervious over the chosen values results in a relatively small increase in peak flows.

4.7 Lag Times, Computation Interval and Routing Steps

Times of concentration and lag times were based on Soil Conservation Service methodologies. Times of concentration are estimated based on flow length, slope and ground cover/land use characteristics using Figure 15.2, Upland Method, "Soil Conservation Service National Engineering Handbook, Chapter 4, Hydrology". Lag time is 0.6 times the time of concentration. Sub-basins with more than one predominant slope were broken into sub-reaches with separate times calculated for each.

The computation time interval used in HEC-1 was first estimated based on a rule of thumb 13% of the average time of concentration for all of the sub-basins. This time interval proves too long, however, and a number of warning messages result advising a reduction in the computation interval. An interval of 10 minutes was assumed. This eliminates most of the warning messages without a significant affect on flow rates. Hydrographs where the remaining messages occur were evaluated to ensure reasonable results.

The number of routing steps for channel reaches were estimated using the reach length divided by an average flow velocity of five feet per second divided by the computation time interval of 10 minutes. The assumed flow velocity of 5 feet per second was derived from a review of calculated HEC-2 and normal depth velocities.

4.8 Hydrograph Routing

Hydrograph routing through downstream channel reaches is accomplished using the normal depth storage routing option of HEC-1. This routing, when done across the lower drainage slopes, is based on a theoretical cross section having a typically shallow channel and wide flat overbanks. This is intended to represent a typical section of drainage slope subject to a combination of concentrated flow and shallow overflow within the input limitations of HEC-1. Normal depth hydraulics of the typical section

show a range of average flow velocity and depth that appear reasonable for the intended use.

Channel routing down the East and West Prongs of Waterman Wash is based on cross sections and Manning roughness coefficients derived directly from HEC-2 cross sections for the appropriate reach. An assumed infiltration/percolation loss of 10 cfs per wetted acre is used on all storage routing done in the HEC-1 model. This applies to both channel routing and railroad reservoir routing. Response runs using rates ranging from 5 to 20 cfs per wetted acre indicate that the HEC-1 model is not particularly sensitive to changes in the percolation rate.

Hydrograph routing down the main channel from the confluence of East and West Prongs to the Gila River is based on HEC-1 cross sections taken from the Cella-Barr FIS. Some of these sections were modified in the vertical direction to contain flow. Manning's roughness coefficients from the Cella-Barr FIS were also modified slightly to be consistent with the upper basin. The recent channelization of Waterman Wash upstream of Rainbow Valley Road mentioned earlier may not be reflected in the Cella-Barr topography. This possibility was not investigated. It was assumed to not affect hydrograph routing significantly either way.

5.0 RESULTS AND CONCLUSIONS

The estimated 100-year peak discharge from this study at the Gila River is 20,000 cfs and at the East and West Prong confluence is 13,200 cfs. The following table summarizes estimated flow rates at various points of concentration.

TABLE 1

SUMMARY OF FLOWS

Location	Drainage Area (Sq.Mi.)	100-year Flow (CFS)	100-year Flow (CSM)
Sub-basin 990	0.90	400	440
Sub-basin 830	5.50	10,100	1,840
Sub-basin D	11.06	1,540	140
Sub-basin F	60.10	2,970	50
Waterman Wash West Prong near Southern Pacific R.R.	1.0	400	400

TABLE 1 (Cont'd.)

Location	Drainage Area (Sq.Mi.)	100-year Flow (CFS)	100-year Flow (CSM)
Waterman Wash West Prong at El Paso Natural Gas pipeline	53	4,000	75
Waterman Wash West Prong just upstream of confluence with East Prong	68	4,800	71
Waterman Wash East Prong near Southern Pacific Railroad	60	2,700	45
Waterman Wash East Prong at 99th Avenue Alignment	85	2,900	34
Waterman Wash East Prong at 115th Avenue alignment	116	4,500	39
Waterman Wash East Prong just upstream of confluence with West Prong	179	9,000	50
Waterman Wash just below confluence of East and West Prongs (downstream limit of upper watershed)	247	13,200	53
Waterman Wash near 163rd Avenue and Riggs Road	300	15,500	52
Waterman Wash at Rainbow Valley Road	362	17,200	48
Waterman Wash at Ray Road	430	20,000	47
Waterman Wash at Gila River	434	20,000	46

These results indicate a significant spread in both peak flows and peak flows per unit of contributing area (csm, or cubic feet per second square mile). The smallest sub-basin (sub-basin 990) produces 440 csm. Sub-basin 830 which is a steep, relatively impervious mountain front produces 1,840 csm with a peak flow of 10,100 cfs. Much of this peak is attenuated as it flows across the adjoining lower drainage slope. The West Prong peak flow of 4,800 cfs is only about half that of the East Prong but

the West Prong produces about 40 percent greater flow in terms of csm because of its generally steeper slope and more efficient shape and response. Most of the peak flow from this study area is produced by the upper watershed.

As mentioned in the technical section, rainfall is assumed to be centered on the watershed. Aerial reduction is assumed because of the size of the contributing area and only the 100-year event is included in the final analysis. Also considered, though, were less than 100-year storm totals and the possibility of the storm occurring over only part of the overall watershed to see whether the rainfall-runoff model would give reasonable results.

An intermediate HEC-1 model was run for the entire watershed using a 24-hour storm total of 1.50 inches (as opposed to the 100-year storm total of 4.40 inches) along with the aerial reduction. All else equal, this model resulted in a peak flow of 240 cfs at the East and West Prong confluence and 670 cfs at the Gila River. For a number of sub-basins, this storm is not intense enough to even produce runoff.

Another intermediate HEC-1 model was run to evaluate the effects of channel storage and infiltration/percolation loss on hydrograph attenuation. A peak flow of 6,050 cfs was generated from the upper watershed only using a rainfall of 3.00 inches. This flow was then routed through the lower reach of Waterman Wash both with and without the contribution of local runoff from the lower watershed. The peak flow at the Gila confluence with local contribution was 8,150 cfs or a gain of about 2,100 cfs. Without local contribution, the peak attenuates to 5,300 cfs, a loss of 750 cfs.

These results seem to indicate a number of things. Relatively speaking, precipitation and transmission losses in the rainfall-runoff model are significant for the lesser rainfall amounts and intensities. This is reflected by the relatively low csm results for the upper and total watersheds. This condition also appears to be supported by the gage record of actual flow peaks which are relatively modest for a watershed of this size. Precipitation must be significant in aerial extent, depth and intensity to overcome the losses that occur in this study area. Unfortunately, there are no rainfall records to go along with the flow gage records, so calibration of the rainfall-runoff model and a more precise comparison of estimated to observed flows is not possible.

The estimated peak discharges from this study are less than those from the Cella-Barr FIS. The two studies use essentially the same point precipitation, distribution and duration, total contributing area, SCS dimensionless unit hydrograph and sub-basin lag time methods. The primary differences occur in the modeling of the Southern Pacific Railroad, the recognition of infiltration/percolation losses in hydrograph routing, the use of soil textures in estimating precipitation losses instead of hydrologic soil groups and SCS curve numbers and in the estimation of precipitation aerial reduction.

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APPENDIX B

HYDROLOGY SUMMARY AND HEC-1

WATERMAN WASH HYDROLOGY
UPPER WATERSHED

TABLE 2 - APPENDIX B

SUMMARY OF BASIC SUB-BASIN DATA

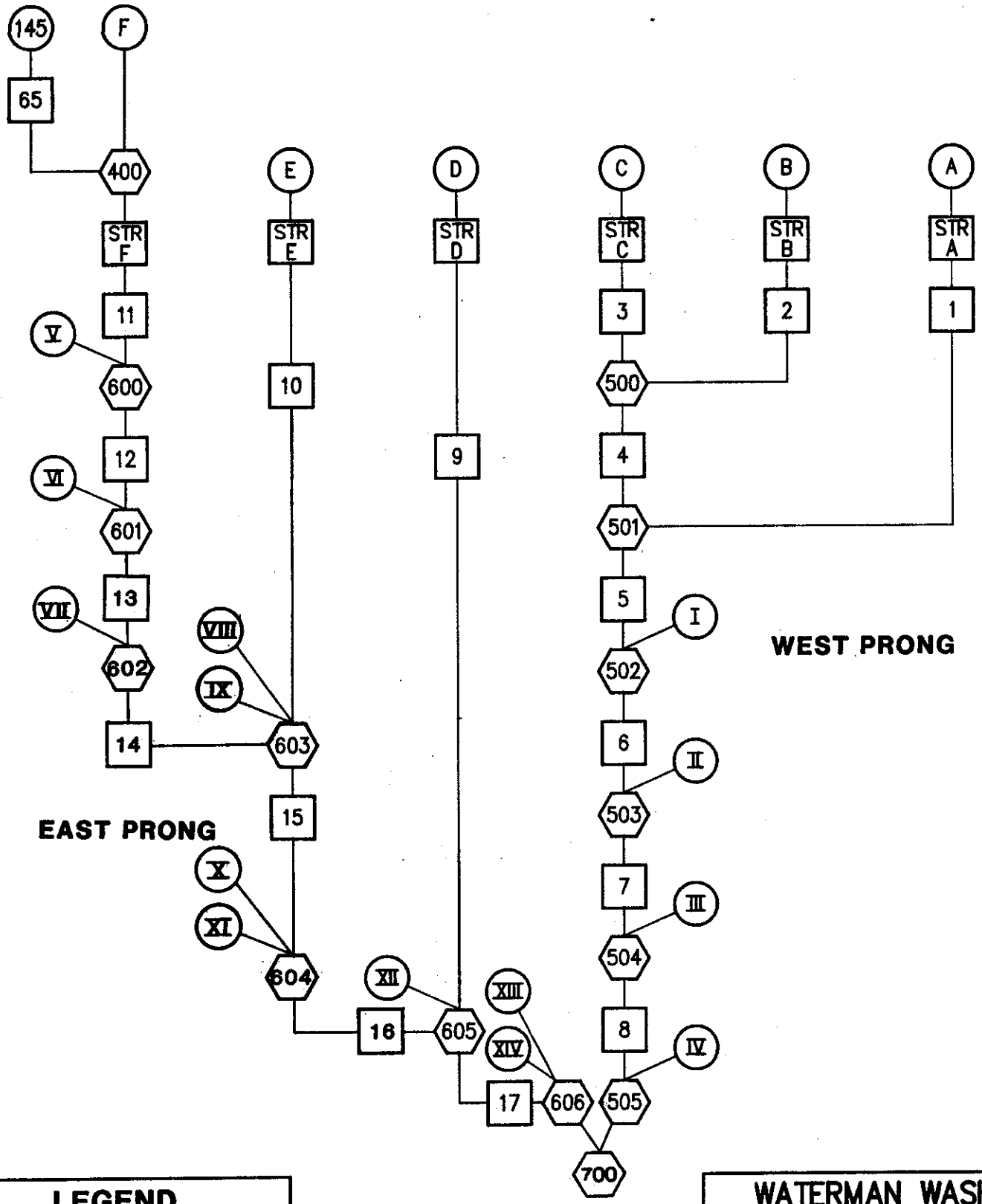
Drainage Sub-Basin	Drainage Area (Sq Mi)	Lag Time (Hrs)	Initial Rainfall Loss (Inches)	Uniform Rainfall Loss (In/Hr)	Percent Impervious
A	2.78	1.97	0.94	0.39	--
B	6.87	2.61	0.96	0.38	--
C	1.09	2.20	0.98	0.30	4
D	11.06	5.25	0.96	0.38	2
E	2.72	3.26	0.95	0.40	1
F	60.10	13.18	0.95	0.38	3
145	12.83	4.55	0.87	0.31	10
I	32.21	8.23	0.95	0.37	1
II	7.10	3.17	0.95	0.37	--
III	7.02	4.94	0.95	0.39	--
IV	10.54	9.11	0.95	0.39	--
V	2.45	2.58	0.95	0.40	--
VI	7.60	5.19	0.96	0.38	2
VII	4.08	5.40	0.95	0.40	1
VIII	10.07	3.94	0.97	0.36	5
IX	9.20	6.62	0.95	0.40	--
X	18.09	6.85	0.97	0.33	10
XI	4.78	4.62	0.96	0.39	2
XII	10.32	10.39	0.95	0.40	1
XIII	5.03	8.10	0.95	0.40	--
XIV	21.10	7.55	0.96	0.36	5

WATERMAN WASH HYDROLOGY
LOWER WATERSHED

TABLE 3 - APPENDIX B

SUMMARY OF BASIC SUB-BASIN DATA

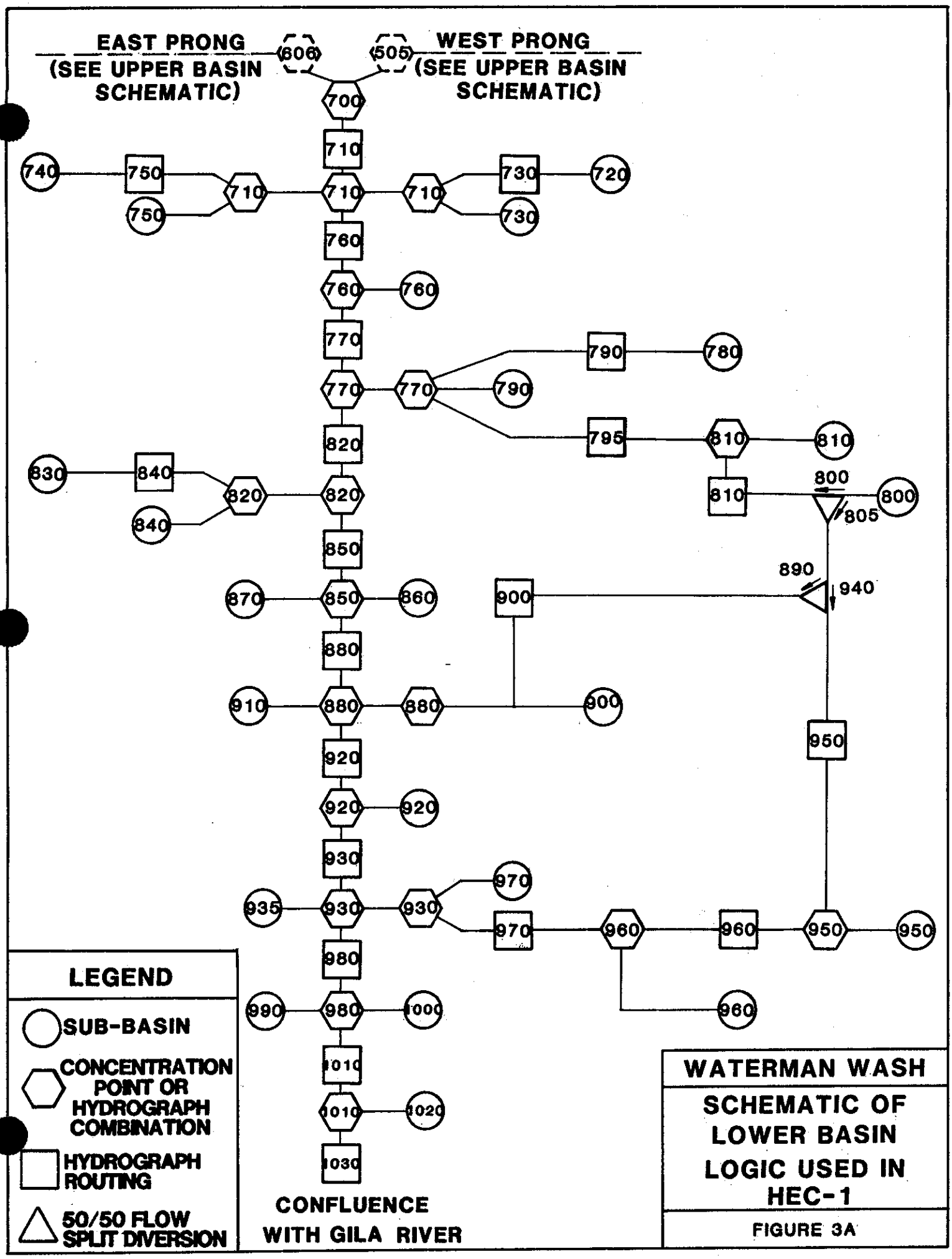
Drainage Sub-Basin	Drainage Area (Sq Mi)	Lag Time (Hrs)	Initial Rainfall Loss (Inches)	Uniform Rainfall Loss (In/Hr)	Percent Impervious
720	15.8	4.34	0.86	0.34	3
730	2.6	4.65	0.99	0.34	--
740	5.2	0.44	0.49	0.07	10
750	25.0	5.36	0.91	0.40	--
760	4.7	4.23	0.99	0.32	--
780	8.2	3.20	0.94	0.54	1
790	4.6	2.63	1.02	0.29	--
800	10.9	4.88	0.84	0.36	3
810	4.0	3.16	0.99	0.42	--
830	5.5	0.21	0.50	0.08	9
840	17.0	6.44	0.97	0.38	--
860	4.8	5.43	1.02	0.29	--
870	6.8	4.36	0.90	0.29	--
900	4.2	6.59	1.01	0.25	--
910	7.5	4.67	0.91	0.27	1
920	3.9	2.43	1.01	0.25	--
935	8.2	7.91	1.00	0.29	--
950	6.5	6.43	0.93	0.25	2
960	16.3	6.35	0.93	0.37	2
970	5.2	4.92	0.90	0.26	3
990	0.9	1.91	0.85	0.23	--
1000	3.8	0.86	0.94	0.23	--
1020	4.5	3.97	0.84	0.32	1



WATERMAN WASH

SCHEMATIC OF UPPER BASIN BASIN LOGIC USED IN HEC-1

FIGURE 2A


EAST PRONG
(SEE UPPER BASIN SCHEMATIC)
606
505
WEST PRONG
(SEE UPPER BASIN SCHEMATIC)
700
710
740
750
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1000
960
1010
1010
1020
1030
CONFLUENCE WITH GILA RIVER
LEGEND
SUB-BASIN
CONCENTRATION POINT OR HYDROGRAPH COMBINATION
HYDROGRAPH ROUTING
50/50 FLOW SPLIT DIVERSION
WATERMAN WASH
SCHEMATIC OF LOWER BASIN LOGIC USED IN HEC-1
FIGURE 3A

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*          SEPTEMBER 1990               *
*           VERSION 4.0                 *
*                                       *
*   RUN DATE  08/26/1991  TIME  15:26:22 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X       XXXXX   X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID
  2           ID        WATERMAN WASH HYDROLOGY - UPPER AND LOWER WATERSHEDS COMBINED
  3           ID        FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  4           ID        STANLEY CONSULTANTS INC        JOB# 10512
  5           ID        FILE NAME IS 10512T        DATE: 08/24/91
  6           ID
  7           ID        100YR - 24HR RAINFALL FROM NOAA ATLAS 2   DEPTH = 4.40"
  8           ID        DEPTH - AREA RELATIONSHIP FROM NOAA TM NWS HYDRO-40
  9           ID        SCS DIMENSIONLESS UNIT HYDROGRAPH
 10           ID        INITIAL AND UNIFORM LOSS BASED ON SOIL TEXTURE
 11           ID        TC BASED ON UPLAND METHOD (SCS NEH SECT 4, CHAPT 15)
 12           ID        LAG TIME = 0.6 * TC
 13           ID        PERCOLATION LOSS INCORPORATED WITH ALL STORAGE ROUTING
 14           ID
              *DIAGRAM
 15           IT      10                    200
 16           IO       4
 17           IN      15
 18           JD     4.4     0.1
 19           PC       0   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
 20           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
 21           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
 22           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
 23           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
 24           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
 25           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
 26           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
 27           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
 28           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
 29           JD    4.18      10
 30           JD    3.85      50
 31           JD    3.74     100
 32           JD    3.61     200
 33           JD    3.54     300
 34           JD    3.50     400
 35           JD    3.45     500

 36           KK   SUB A   RUNOFF FROM SUB-BASIN A
 37           BA    2.78
 38           LU    0.94    0.39
 39           UD    1.97
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 40          KK   STR A  ROUTE HYDROGRAPH SUB A THROUGH STRUCTURE A
 41          RS       2    STOR      -1
 42          RL                      10
 43          SA       0     8.5      17    25.5    34.1    42.6    51.1    59.6
 44          SE       0       1       2       3       4       5       6       7
 45          SQ       0     138     422     638     933    1218    1497    1846

 46          KK   RCH 1  ROUTE HYDROGRAPH STR A THROUGH REACH 1
 47          RS       9    FLOW      -1
 48          RL                      10
 49          RC    .070   0.035    .070   26000  0.0061
 50          RX     100     101     190     195     205     210     299     300
 51          RY      20      12      12      10      10      12      12      20
1                                        HEC-1 INPUT                                                    PAGE  2

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 52          KK   SUB B  RUNOFF FROM SUB-BASIN B
 53          BA    6.87
 54          LU    0.96    0.38
 55          UD    2.61

 56          KK   STR B  ROUTE HYDROGRAPH SUB B THROUGH STRUCTURE B
 57          RS       2    STOR      -1
 58          RL                      10
 59          SA       0    17.3    34.6    51.9    69.3    86.6   103.9   121.2
 60          SE       0       1       2       3       4       5       6       7
 61          SQ       0     290     766    1296    1756    2241    2723    3151

 62          KK   RCH 2  ROUTE HYDROGRAPH STR B THROUGH REACH 2
 63          RS       4    FLOW      -1
 64          RL                      10
 65          RC    .070   0.035    .070   11400  0.0063
 66          RX     100     101     190     195     205     210     299     300
 67          RY      20      12      12      10      10      12      12      20

 68          KK   SUB C  RUNOFF FROM SUB-BASIN C
 69          BA    1.09
 70          LU    0.98    0.30       4
 71          UD    2.20

 72          KK   STR C  ROUTE HYDROGRAPH SUB C THROUGH STRUCTURE C
 73          RS       1    STOR      -1
 74          RL                      10
 75          SA       0     0.6     1.1     1.7     2.3     2.9     3.4       4
 76          SE       0       1       2       3       4       5       6       7
 77          SQ       0      98     300     481     684     887    1078    1293

 78          KK   RCH 3  ROUTE HYDROGRAPH STR C THROUGH REACH 3
 79          RS       3    FLOW      -1
 80          RL                      10
 81          RC    .070   0.035    .070    6510  0.0061
 82          RX     100     101     190     195     205     210     299     300
 83          RY      20      12      12      10      10      12      12      20

 84          KK   CP500  COMBINE HYDROGRAPHS REACH 2 & REACH 3
 85          HC

 86          KK   RCH 4  ROUTE COMBINED HYDROGRAPH THROUGH REACH 4
 87          RS       3    FLOW      -1
 88          RL                      10
 89          RC    .070   0.035    .070    6510  0.0058
 90          RX     100     101     190     195     205     210     299     300
 91          RY      20      12      12      10      10      12      12      20

 92          KK   CP501  COMBINE HYDROGRAPHS REACH 1 & REACH 4
 93          HC
1                                        HEC-1 INPUT                                                    PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 94          KK   RCH 5  ROUTE HYDROGRAPH CP501 THROUGH REACH 5
 95          RS       3    STOR      -1
 96          RL                      10
 97          RC    .055    .045    .055    8500    .004
 98          RX       0     580     921     936    1012    1025    1554    2381
 99          RY  1336.5  1333.8  1330.9  1325.1  1326.6  1329.9  1333.4  1335.9
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100          KK   SUB I  RUNOFF FROM SUB-BASIN I
101          BA   32.21
102          LU    0.95    0.37       1
103          UD    8.23

104          KK   CP502  COMBINE HYDROGRAPHS REACH 5 & SUB I
105          HC

106          KK   RCH 6  ROUTE HYDROGRAPH CP502 THROUGH REACH 6
107          RS       6    FLOW      -1
108          RL                      10
109          RC    .055   0.045    .055   17000   0.006
110          RX       0    1804    2973    2985    3043    3060    3096    3218
111          RY  1263.5  1262.2  1258.5  1256.3  1256.3  1260.7  1262.6  1262.9

112          KK  SUB II  RUNOFF FROM SUB-BASIN II
113          BA    7.10
114          LU    0.95    0.37
115          UD    3.17

116          KK   CP503  COMBINE HYDROGRAPHS REACH 6 & SUB II
117          HC

118          KK   RCH 7  ROUTE HYDROGRAPH 503 THROUGH REACH 7
119          RS       3    FLOW      -1
120          RL                      10
121          RC    .055   0.045    .055    9000   0.004
122          RX       0     711     922     940     999    1016    1293    1738
123          RY  1195.3  1193.4  1192.3  1187.8  1186.9  1192.1  1193.2  1195.3

124          KK  SUBIII  RUNOFF FROM SUB-BASIN III
125          BA    7.02
126          LU    0.95    0.39
127          UD    4.94

128          KK   CP504  COMBINE HYDROGRAPHS REACH 7 & SUB III
129          HC

130          KK   RCH 8  ROUTE HYDROGRAPH CP504 THROUGH REACH 8
131          RS       4    FLOW      -1
132          RL                      10
133          RC    .055    .045    .055    9500   0.004
134          RX       0     700     736     760     879     921    1012    2810
135          RY  1160.5  1160.6  1160.1  1156.2  1156.6  1159.0  1161.0  1160.0
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

136          KK   SUBIV  RUNOFF FROM SUB-BASIN IV
137          BA   10.54
138          LU    0.95    0.39
139          UD    9.11

140          KK   CP505  COMBINE HYDROGRAPHS REACH 8 & SUB IV
141          HC

142          KK   SUB D  RUNOFF FROM SUB-BASIN D
143          BA   11.06
144          LU    0.96    0.38       2
145          UD    5.25

146          KK   STR D  ROUTE HYDROGRAPH SUB-D THROUGH STRUCTURE D
147          RS       2    STOR      -1
148          RL                      10
149          SA       0    11.1    22.2    33.3    44.5    55.6    66.7    77.8
150          SE       0       1       2       3       4       5       6       7
151          SQ       0     202     578    1025    1513    1988    2474    2816

152          KK   RCH 9  ROUTE HYDROGRAPH STR D THROUGH REACH 9
153          RS      16    FLOW      -1
154          RL                      10
155          RC    .070   0.035    .070   45200  0.0051
156          RX     100     101     190     195     205     210     299     300
157          RY      20      12      12      10      10      12      12      20

158          KK  SUB145  RUNOFF FROM SUB-BASIN 145
159          BA   12.83
160          LU    0.87    0.31      10
161          UD    4.55
```

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162          KK   RCH65  ROUTE HYDROGRAPH SUB145 THROUGH REACH 65
163          RS      11    FLOW      -1
164          RL                      10
165          RC    .070   0.035    .070   32600  0.0071
166          RX     100     101     190     195     205     210     299     300
167          RY      20      12      12      10      10      12      12      20

168          KK   SUB F  RUNOFF FROM SUB-BASIN F
169          BA    60.1
170          LU    0.95     .38       3
171          UD   13.18

172          KK   CP400  COMBINE HYDROGRAPHS SUBF AND RCH65
173          HC

174          KK   STR F  ROUTE HYDROGRAPH  CP400 THROUGH STRUCTURE F
175          RS       1    STOR      -1
176          RL                      10
177          SA       0    46.2    92.3   138.5   184.7   230.9     277   323.2
178          SE       0       1       2       3       4       5       6     7.0
179          SQ       0     675    1967    3362    4898    6353    7861    8615
1                                         HEC-1 INPUT                                                    PAGE  5

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


180          KK   RCH11  ROUTE HYDROGRAPH STR F THROUGH REACH 11
181          RS       5    FLOW      -1
182          RL                      10
183          RC    .070   0.035    .070   12400  0.0050
184          RX     100     101     190     195     205     210     299     300
185          RY      20      12      12      10      10      12      12      20

186          KK   SUB V  RUNOFF FROM SUB-BASIN V
187          BA    2.45
188          LU    0.95    0.40
189          UD    2.58

190          KK   CP600  COMBINE HYDROGRAPHS SUB V & RCH11
191          HC

192          KK   RCH12  ROUTE HYDROGRAPH CP600 THROUGH REACH 12
193          RS       2    FLOW      -1
194          RL                      10
195          RC    .055   0.045    .055    5400   0.003
196          RX       0     754    1102    1112    1126    1138    1342    2306
197          RY  1253.5  1249.5  1248.4  1244.0  1244.1  1247.8  1249.8  1255.0

198          KK   SUBVI  RUNOFF FROM SUB-BASIN VI
199          BA    7.60
200          LU    0.96    0.38       2
201          UD    5.19

202          KK   CP601  COMBINE HYDROGRAPHS RCH12 & SUB VI
203          HC

204          KK   RCH13  ROUTE HYDROGRAPH CP601 THROUGH REACH 13
205          RS       1    FLOW      -1
206          RL                      10
207          RC    .055   0.045    .055    2000   0.003
208          RX       0     459     960     976    1014    1025    1374    2432
209          RY  1241.6  1238.9  1237.7  1233.3  1233.6  1236.7  1237.9  1241.8

210          KK  SUBVII  RUNOFF FROM SUB-BASIN VII
211          BA    4.08
212          LU    0.95    0.40       1
213          UD     5.4

214          KK   CP602  COMBINE HYDROGRAPHS RCH13 & 601 & SUB VII
215          HC

216          KK   RCH14  ROUTE HYDROGRAPH CP602 THROUGH REACH 14
217          RS       4    FLOW      -1
218          RL                      10
219          RC    .055   0.045    .055   11100   0.003
220          RX       0    1194    1486    1503    1526    1532    1791    2510
221          RY  1220.3  1216.8  1215.5  1211.9  1211.8  1217.3  1217.4  1220.3
1                                         HEC-1 INPUT                                                    PAGE  6
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 222          KK  SBVIII  RUNOFF FROM SUB-BASIN VIII
 223          BA   10.07
 224          LU    0.97    0.36       5
 225          UD    3.94

 226          KK   SUBIX   RUNOFF FROM SUB-BASIN IX
 227          BA    9.20
 228          LU    0.95    0.40
 229          UD    6.62

 230          KK   SUB E  RUNOFF FROM SUB-BASIN E
 231          BA    2.72
 232          LU    0.95    0.40       1
 233          UD    3.26

 234          KK   STR E  ROUTE HYDROGRAPH SUB-E THROUGH STRUCTURE E
 235          RS       1    STOR      -1
 236          RL                     10
 237          SA       0     7.6    15.3    22.9    30.6    38.2    45.9    53.5
 238          SE       0       1       2       3       4       5       6       7
 239          SQ       0     243     740    1154    1622    2067    2472    2766

 240          KK   RCH10  ROUTE HYDROGRAPH STR E THROUGH REACH 10
 241          RS       8    FLOW      -1
 242          RL                     10
 243          RC    .070   0.035    .070   21500  0.0056
 244          RX     100     101     190     195     205     210     299     300
 245          RY      20      12      12      10      10      12      12      20

 246          KK   CP603  COMBINE HYDROGRAPHS RCH14 & SUB VIII & SUB IX & RCH10
 247          HC       4

 248          KK   RCH15  ROUTE HYDROGRAPH CP603 THROUGH REACH 15
 249          RS       4    FLOW      -1
 250          RL                     10
 251          RC    .055   0.045    .055   10400   0.003
 252          RX       0     227    1232    1239    1255    1266    1799    2061
 253          RY  1200.1  1195.8  1194.7  1189.5  1189.5  1194.4  1196.9  1198.3

 254          KK   SUB X  RUNOFF FROM SUB-BASIN X
 255          BA   18.09
 256          LU    0.97    0.33      10
 257          UD    6.85

 258          KK   SUBXI  RUNOFF FROM SUB-BASIN XI
 259          BA    4.78
 260          LU    0.96    0.39       2
 261          UD    4.62
```



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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 262          KK   CP604  COMBINE HYDROGRAPHS RCH15 & SUB X & SUB XI
 263          HC       3

 264          KK   RCH16  ROUTE HYDROGRAPH CP604 THROUGH REACH 16
 265          RS       3    FLOW      -1
 266          RL                     10
 267          RC    .055   0.045    .055    8200   0.003
 268          RX       0     478     966     976     994    1006    1381    1907
 269          RY  1181.2  1175.1  1173.3  1165.7  1165.7  1172.4  1175.8  1180.7

 270          KK  SUBXII  RUNOFF FROM SUB-BASIN XII
 271          BA   10.32
 272          LU    0.95    0.40       1
 273          UD   10.39

 274          KK   CP605  COMBINE HYDROGRAPHS RCH16 & SUB XII & RCH9
 275          HC       3

 276          KK   RCH17  ROUTE HYDROGRAPH CP605 THROUGH REACH 17
 277          RS       4    FLOW      -1
 278          RL                     10
 279          RC    .055   0.045    .055    9800   0.003
 280          RX       0    1401    1617    1637    1662    1694    1720    2801
 281          RY  1159.7  1153.3  1153.8  1147.1  1147.1  1151.8  1153.1  1158.6
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```
282          KK  SBXIII  RUNOFF FROM SUB-BASIN XIII
283          BA    5.03
284          LU    0.95    0.40
285          UD    8.10

286          KK  SUBXIV  RUNOFF FROM SUB-BASIN XIV
287          BA   21.10
288          LU    0.96    0.36       5
289          UD    7.55

290          KK   CP606  COMBINE HYDROGRAPHS RCH17 & SUB XIII & SUB IV
291          HC       3

292          KK   CP700  COMBINE HYDROGRAPHS CP606 & CP505
293          HC
294          KM
295          KM          ******************************************
296          KM          CP700 IS CONFLUENCE OF EAST AND WEST PRONGS
297          KM          AND IS THE LOWER LIMIT OF UPPER WATERSHED
298          KM          ******************************************
299          KM
300          HC

301          KK  RCH710  ROUTE HYDROGRAPH CP700 THROUGH REACH 710
302          RS       2    FLOW      -1
303          RL                      10
304          RC   0.055   0.045   0.055    6500  0.0026
305          RX    2767    3206    4047    4063    4115    4137    4339    4747
306          RY    1120    1114    1114    1103    1103    1111    1112    1120
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

307          KK  SUB720  RUNOFF FROM SUB-BASIN 720
308          BA    15.8
309          LU    0.86    0.34       3
310          UD    4.34

311          KK  RCH730  ROUTE HYDROGRAPH SUB720 THROUGH REACH 730
312          RS       7    FLOW      -1
313          RL                      10
314          RC    .070   0.035    .070   21500  0.0058
315          RX     100     101     190     195     205     210     299     300
316          RY      20      12      12      10      10      12      12      20

317          KK  SUB730  RUNOFF FROM SUB-BASIN 730
318          BA     2.6
319          LU    0.99    0.34
320          UD    4.65

321          KK   CP710  COMBINE HYDROGRAPHS RCH730 & SUB730
322          HC

323          KK  SUB740  RUNOFF FROM SUB-BASIN 740
324          BA     5.2
325          LU    0.49    0.07      10
326          UD    0.44

327          KK  RCH750  ROUTE HYDROGRAPH SUB740 THROUGH REACH 750
328          RS      13    FLOW      -1
329          RL                      10
330          RC    .070   0.035    .070   38600   0.013
331          RX     100     101     190     195     205     210     299     300
332          RY      20      12      12      10      10      12      12      20

333          KK  SUB750  RUNOFF FROM SUB-BASIN 750
334          BA    25.0
335          LU    0.91    0.40
336          UD    5.36

337          KK   CP710  COMBINE HYDROGRAPHS RCH750 & SUB750
338          HC

339          KK   CP710  COMBINE ALL HYDROGRAPHS ABOVE CP710
340          HC       3

341          KK  RCH760  ROUTE HYDROGRAPH CP710 THROUGH REACH 760
342          RS       2    FLOW      -1
```

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343          RL                      10
344          RC   0.055   0.045   0.055    6300  0.0027
345          RX    1772    3567    3599    3653    3681    3841    5268    5297
346          RY    1070    1065    1057    1057    1066    1065    1065    1070
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

347          KK  SUB760  RUNOFF FROM SUB-BASIN 760
348          BA     4.7
349          LU    0.99    0.32
350          UD    4.23

351          KK   CP760  COMBINE ALL HYDROGRAPHS ABOVE CP760
352          HC

353          KK  RCH770  ROUTE HYDROGRAPH CP760 THROUGH REACH 770
354          RS       5    FLOW      -1
355          RL                      10
356          RC   0.055   0.045   0.055   14600  0.0027
357          RX    1772    3567    3599    3653    3681    3841    5268    5297
358          RY    1070    1065    1057    1057    1066    1065    1065    1070

359          KK  SUB780  RUNOFF FROM SUB-BASIN 780
360          BA     8.2
361          LU    0.94    0.54       1
362          UD    3.20

363          KK  RCH790  ROUTE HYDROGRAPH SUB780 THROUGH REACH 790
364          RS       4    FLOW      -1
365          RL                      10
366          RC    .050   0.025    .050   11200  0.0071
367          RX     100     101     175     185     215     225     299     300
368          RY      20      13      13      10      10      13      13      20

369          KK  SUB800  RUNOFF FROM SUB-BASIN 800
370          BA    10.9
371          LU    0.84    0.36       3
372          UD    4.88

373          KK  DVT800  SPLIT HYDROGRAPH SUB800 50/50
374          DT  DVT805
375          DI       0     100    1000   10000
376          DQ       0      50     500    5000

377          KK  RCH810  ROUTE HYDROGRAPH DVT800 THROUGH REACH 810
378          RS       5    FLOW      -1
379          RL                      10
380          RC    .070   0.035    .070   16000  0.0069
381          RX     100     101     190     195     205     210     299     300
382          RY      20      12      12      10      10      12      12      20

383          KK  SUB810  RUNOFF FROM SUB-BASIN 810
384          BA     4.0
385          LU    0.99    0.42
386          UD    3.16
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

387          KK   CP810  COMBINE HYDROGRAPHS RCH810 & SUB810
388          HC

389          KK  RCH795  ROUTE HYDROGRAPH CP810 THROUGH REACH 795
390          RS       3    FLOW      -1
391          RL                      10
392          RC    .050   0.025    .050    8600  0.0056
393          RX     100     101     175     185     215     225     299     300
394          RY      20      13      13      10      10      13      13      20

395          KK  SUB790  RUNOFF FROM SUB-BASIN 790
396          BA     4.6
397          LU    1.02    0.29
398          UD    2.63

399          KK   CP770  COMBINE HYDROGRAPHS RCH790, RCH795 & SUB790
400          HC       3
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401          KK   CP770  COMBINE ALL HYDROGRAPHS ABOVE CP770
402          HC

403          KK  RCH820  ROUTE HYDROGRAPH CP770 THROUGH REACH 820
404          RS       2    FLOW      -1
405          RL                      10
406          RC   0.055   0.045   0.055    5500  0.0071
407          RX    2069    2933    3070    3135    3163    3226    3834    4251
408          RY    1000     994     987     988     994     993     993    1000

409          KK  SUB830  RUNOFF FROM SUB-BASIN 830
410          BA     5.5
411          LU    0.50    0.08       9
412          UD    0.21

413          KK  RCH840  ROUTE HYDROGRAPH SUB830 THROUGH REACH 840
414          RS      14    FLOW      -1
415          RL                      10
416          RC    .070   0.035    .070   42500  0.0069
417          RX     100     101     190     195     205     210     299     300
418          RY      20      12      12      10      10      12      12      20

419          KK  SUB840  RUNOFF FROM SUB-BASIN 840
420          BA    17.0
421          LU    0.97    0.38
422          UD    6.44

423          KK   CP820  COMBINE HYDROGRAPHS RCH840 & SUB840
424          HC

425          KK   CP820  COMBINE ALL HYDROGRAPHS ABOVE CP820
426          HC
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

427          KK  RCH850  ROUTE HYDROGRAPH CP820 THROUGH REACH 850
428          RS       3    FLOW      -1
429          RL                      10
430          RC   0.055   0.045   0.055    7600  0.0071
431          RX    2069    2933    3070    3135    3163    3226    3834    4251
432          RY    1000     994     987     988     994     993     993    1000

433          KK  SUB860  RUNOFF FROM SUB-BASIN 860
434          BA     4.8
435          LU    1.02    0.29
436          UD    5.42

437          KK  SUB870  RUNOFF FROM SUB-BASIN 870
438          BA     6.8
439          LU    0.90    0.29       1
440          UD    4.36

441          KK   CP850  COMBINE ALL HYDROGRAPHS ABOVE CP850
442          HC       3

443          KK  RCH880  ROUTE HYDROGRAPH CP850 THROUGH REACH 880
444          RS       2    FLOW      -1
445          RL                      10
446          RC   0.055   0.045   0.055    7000  0.0071
447          RX    2069    2933    3070    3135    3163    3226    3834    4251
448          RY    1000     994     987     988     994     993     993    1000

449          KK  DVT805  RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH
450          DR  DVT805

451          KK  DVT890  SPLIT RETRIEVED HYDROGRAPH 50/50
452          DT  DVT940
453          DI       0     100    1000   10000
454          DQ       0      50     500    5000

455          KK  RCH900  ROUTE HYDROGRAPH DVT890 THROUGH REACH 900
456          RS      11    FLOW      -1
457          RL                      10
458          RC    .070   0.035    .070   33200  0.0069
459          RX     100     101     190     195     205     210     299     300
460          RY      20      12      12      10      10      12      12      20

461          KK  SUB900  RUNOFF FROM SUB-BASIN 900
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462          BA     4.2
463          LU    1.01    0.25
464          UD    6.59

465          KK   CP880  COMBINE HYDROGRAPHS RCH900 & SUB900
466          HC
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

467          KK  SUB910  RUNOFF FROM SUB-BASIN 910
468          BA     7.5
469          LU    0.91    0.27       1
470          UD    4.67

471          KK   CP880  COMBINE ALL HYDROGRAPHS ABOVE CP880
472          HC       3

473          KK  RCH920  ROUTE HYDROGRAPH CP880 THROUGH REACH 920
474          RS       2    FLOW      -1
475          RL                     10
476          RC   0.055   0.045   0.055    7300  0.0071
477          RX    2069    2933    3070    3135    3163    3226    3834    4251
478          RY    1000     994     987     988     994     993     993    1000

479          KK  SUB920  RUNOFF FROM SUB-BASIN 920
480          BA     3.9
481          LU    1.01    0.25
482          UD    2.43

483          KK   CP920  COMBINE HYDROGRAPHS RCH920 & SUB920
484          HC

485          KK  RCH930  ROUTE HYDROGRAPH CP920 THROUGH REACH 930
486          RS       3    FLOW      -1
487          RL                     10
488          RC   0.055   0.045   0.055    7800  0.0071
489          RX    2069    2933    3070    3135    3163    3226    3834    4251
490          RY    1000     994     987     988     994     993     993    1000

491          KK  SUB935  RUNOFF FROM SUB-BASIN 935
492          BA     8.2
493          LU    1.00    0.29
494          UD    7.91

495          KK  DVT940  RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH
496          DR  DVT940

497          KK  RCH950  ROUTE HYDROGRAPH DVT940 THROUGH REACH 950
498          RS      10    FLOW      -1
499          RL                     10
500          RC    .070   0.035    .070   31000  0.0087
501          RX     100     101     190     195     205     210     299     300
502          RY      20      12      12      10      10      12      12      20

503          KK  SUB950  RUNOFF FROM SUB-BASIN 950
504          BA     6.5
505          LU    0.93    0.25       2
506          UD    6.43
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

507          KK   CP950  COMBINE HYDROGRAPHS RCH950 & SUB950
508          HC

509          KK  RCH960  ROUTE HYDROGRAPH CP950 THROUGH REACH 960
510          RS       1    FLOW      -1
511          RL                     10
512          RC    .070   0.035    .070    3000  0.0034
513          RX     100     101     175     185     215     225     299     300
514          RY      20      13      13      10      10      13      13      20

515          KK  SUB960  RUNOFF FROM SUB-BASIN 960
516          BA    16.3
517          LU    0.93    0.37       2
518          UD    6.35
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519          KK   CP960  COMBINE HYDROGRAPHS RCH960 & SUB960
520          HC

521          KK  RCH970  ROUTE HYDROGRAPH CP960 THROUGH REACH 970
522          RS       4    FLOW      -1
523          RL                     10
524          RC    .070   0.035    .070   11200  0.0062
525          RX     100     101     175     185     215     225     299     300
526          RY      20      13      13      10      10      13      13      20

527          KK  SUB970  RUNOFF FROM SUB-BASIN 970
528          BA     5.2
529          LU    0.90    0.26       3
530          UD    4.92

531          KK   CP930  COMBINE HYDROGRAPHS RCH970 & SUB970
532          HC

533          KK   CP930  COMBINE ALL HYDROGRAPHS ABOVE CP930
534          HC       3

535          KK  RCH980  ROUTE HYDROGRAPH CP930 THROUGH REACH 980
536          RS       2    FLOW      -1
537          RL                     10
538          RC   0.055   0.045   0.055    7300  0.0047
539          RX    2075    2373    2406    2556    2566    2752    3423    3440
540          RY     889     884     879     878     881     883     883     889

541          KK  SUB990  RUNOFF FROM SUB-BASIN 990
542          BA     0.9
543          LU    0.85    0.23       2
544          UD    1.91

545          KK  SB1000  RUNOFF FROM SUB-BASIN 1000
546          BA     3.8
547          LU    0.94    0.23       1
548          UD    0.86
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

549          KK   CP980  COMBINE ALL HYDROGRAPHS ABOVE CP980
550          HC       3

551          KK  RC1010  ROUTE HYDROGRAPH CP980 THROUGH REACH 1010
552          RS       2    FLOW      -1
553          RL                     10
554          RC   0.055   0.045   0.055    5000  0.0047
555          RX    2075    2373    2406    2556    2566    2752    3423    3440
556          RY     889     884     879     878     881     883     883     889

557          KK  SB1020  RUNOFF FROM SUB-BASIN 1020
558          BA     4.5
559          LU    0.84    0.32       2
560          UD    3.97

561          KK  CP1010  COMBINE HYDROGRAPHS RCH1010 & SUB1020
562          HC

563          KK  RC1030  ROUTE HYDROGRAPH CP1010 THROUGH REACH 1030
564          RS       2    FLOW      -1
565          RL                     10
566          RC   0.055   0.045   0.055    6500  0.0047
567          RX    2075    2373    2406    2556    2566    2752    3423    3440
568          RY     889     884     879     878     881     883     883     889
569          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   36      SUB A
               V
               V
   40      STR A
               V
               V
```

```
46      RCH 1
            .
            .
52          .       SUB B
            .           V
            .           V
            .       STR B
            .           V
            .           V
            .
62          .       RCH 2
            .           .
            .           .
68          .           .       SUB C
            .           .           V
            .           .           V
72          .           .       STR C
            .           .           V
            .           .           V
78          .           .       RCH 3
            .           .           .
            .           .           .
84          .       CP500............
            .           V
            .           V
86          .       RCH 4
            .           .
            .           .
92      CP501............
            V
            V
94      RCH 5
            .
            .
100         .       SUB I
            .           .
            .           .
104     CP502............
            V
            V
106     RCH 6
            .
            .
112         .      SUB II
            .           .
            .           .
116     CP503............
            V
            V
118     RCH 7
            .
            .
124         .      SUBIII
            .           .
            .           .
128     CP504............
            V
            V
130     RCH 8
            .
            .
136         .       SUBIV
            .           .
            .           .
140     CP505............
            .
            .
142         .       SUB D
            .           V
            .           V
146         .       STR D
            .           V
            .           V
152         .       RCH 9
            .           .
            .           .
158         .           .       SUB145
            .           .           V
            .           .           V
162         .           .       RCH65
            .           .           .
```

```
168          .          .          .
             .          .          .      SUB F
             .          .          .          .
             .          .          .          .
172          .          .      CP400.............
             .          .          V
             .          .          V
174          .          .      STR F
             .          .          V
             .          .          V
180          .          .      RCH11
             .          .          .
             .          .          .
186          .          .          .      SUB V
             .          .          .          .
             .          .          .          .
190          .          .      CP600.............
             .          .          V
             .          .          V
192          .          .      RCH12
             .          .          .
             .          .          .
198          .          .          .      SUBVI
             .          .          .          .
             .          .          .          .
202          .          .      CP601.............
             .          .          V
             .          .          V
204          .          .      RCH13
             .          .          .
             .          .          .
210          .          .          .     SUBVII
             .          .          .          .
             .          .          .          .
214          .          .      CP602.............
             .          .          V
             .          .          V
216          .          .      RCH14
             .          .          .
             .          .          .
222          .          .          .     SBVIII
             .          .          .          .
             .          .          .          .
226          .          .          .          .      SUBIX
             .          .          .          .          .
             .          .          .          .          .
230          .          .          .          .          .      SUB E
             .          .          .          .          .          V
             .          .          .          .          .          V
234          .          .          .          .          .      STR E
             .          .          .          .          .          V
             .          .          .          .          .          V
240          .          .          .          .          .      RCH10
             .          .          .          .          .          .
             .          .          .          .          .          .
246          .          .      CP603.................................
             .          .          V
             .          .          V
248          .          .      RCH15
             .          .          .
             .          .          .
254          .          .          .      SUB X
             .          .          .          .
             .          .          .          .
258          .          .          .          .      SUBXI
             .          .          .          .          .
             .          .          .          .          .
262          .          .      CP604......................
             .          .          V
             .          .          V
264          .          .      RCH16
             .          .          .
             .          .          .
270          .          .          .     SUBXII
             .          .          .          .
             .          .          .          .
274          .      CP605......................
             .          V
             .          V
276          .      RCH17
```

```
                .          .
                .          .
282             .          .      SBXIII
                .          .          .
                .          .          .
286             .          .          .      SUBXIV
                .          .          .          .
                .          .          .          .
290             .       CP606.........................
                .          .
                .          .
292          CP700............
                V
                V
301         RCH710
                .
                .
307             .      SUB720
                .          V
                .          V
311             .      RCH730
                .          .
                .          .
317             .          .      SUB730
                .          .          .
                .          .          .
321             .       CP710............
                .          .
                .          .
323             .          .      SUB740
                .          .          V
                .          .          V
327             .          .      RCH750
                .          .          .
                .          .          .
333             .          .          .      SUB750
                .          .          .          .
                .          .          .          .
337             .          .       CP710............
                .          .          .
                .          .          .
339          CP710.........................
                V
                V
341         RCH760
                .
                .
347             .      SUB760
                .          .
                .          .
351          CP760............
                V
                V
353         RCH770
                .
                .
359             .      SUB780
                .          V
                .          V
363             .      RCH790
                .          .
                .          .
369             .          .      SUB800
                .          .          .
                .          .          .
374             .          .          .-------> DVT805
373             .          .      DVT800
                .          .          V
                .          .          V
377             .          .      RCH810
                .          .          .
                .          .          .
383             .          .          .      SUB810
                .          .          .          .
                .          .          .          .
387             .          .       CP810............
                .          .          V
                .          .          V
389             .          .      RCH795
                .          .          .
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395          .          .          .
             .          .          .     SUB790
             .          .          .          .
             .          .          .          .
399          .       CP770.......................
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             .          .
401       CP770............
             V
             V
403      RCH820
             .
             .
409          .      SUB830
             .          V
             .          V
413          .      RCH840
             .          .
             .          .
419          .          .      SUB840
             .          .          .
             .          .          .
423          .       CP820............
             .          .
             .          .
425       CP820............
             V
             V
427      RCH850
             .
             .
433          .      SUB860
             .          .
             .          .
437          .          .      SUB870
             .          .          .
             .          .          .
441       CP850.......................
             V
             V
443      RCH880
             .
             .
450          .          .<-------  DVT805
449          .      DVT805
             .          .
             .          .
452          .          .------->  DVT940
451          .      DVT890
             .          V
             .          V
455          .      RCH900
             .          .
             .          .
461          .          .      SUB900
             .          .          .
             .          .          .
465          .       CP880............
             .          .
             .          .
467          .          .      SUB910
             .          .          .
             .          .          .
471       CP880.......................
             V
             V
473      RCH920
             .
             .
479          .      SUB920
             .          .
             .          .
483       CP920............
             V
             V
485      RCH930
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491          .      SUB935
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496          .          .          .<-------  DVT940
495          .          .     DVT940
             .          .          V
             .          .          V
497          .          .     RCH950
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503          .          .          .     SUB950
             .          .          .          .
             .          .          .          .
507          .          .      CP950............
             .          .          V
             .          .          V
509          .          .     RCH960
             .          .          .
             .          .          .
515          .          .          .     SUB960
             .          .          .          .
             .          .          .          .
519          .          .      CP960............
             .          .          V
             .          .          V
521          .          .     RCH970
             .          .          .
             .          .          .
527          .          .          .     SUB970
             .          .          .          .
             .          .          .          .
531          .          .      CP930............
             .          .          .
             .          .          .
533      CP930........................
             V
             V
535      RCH980
             .
             .
541          .     SUB990
             .          .
             .          .
             .          .     SB1000
             .          .          .
             .          .          .
549      CP980........................
             V
             V
551      RC1010
             .
             .
557          .     SB1020
             .          .
             .          .
561      CP1010............
             V
             V
563      RC1030
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  08/26/1991  TIME  15:26:22 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

WATERMAN WASH HYDROLOGY - UPPER AND LOWER WATERSHEDS COMBINED
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
STANLEY CONSULTANTS INC JOB# 10512
FILE NAME IS 10512T DATE: 08/24/91

100YR - 24HR RAINFALL FROM NOAA ATLAS 2 DEPTH = 4.40"

```
                    DEPTH - AREA RELATIONSHIP FROM NOAA TM NWS HYDRO-40
                    SCS DIMENSIONLESS UNIT HYDROGRAPH
                    INITIAL AND UNIFORM LOSS BASED ON SOIL TEXTURE
                    TC BASED ON UPLAND METHOD (SCS NEH SECT 4, CHAPT 15)
                    LAG TIME = 0.6 * TC
                    PERCOLATION LOSS INCORPORATED WITH ALL STORAGE ROUTING

16 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          4  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

17 IN        TIME DATA FOR INPUT TIME SERIES
                  JXMIN         15  TIME INTERVAL IN MINUTES
                 JXDATE     1   0  STARTING DATE
                 JXTIME          0  STARTING TIME

   IT        HYDROGRAPH TIME DATA
                   NMIN         10  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1   0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        200  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     2   0  ENDING DATE
                 NDTIME       0910  ENDING TIME
                  ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .17 HOURS
                 TOTAL TIME BASE   33.17 HOURS

      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

18 JD        INDEX STORM NO. 1
                  STRM        4.40  PRECIPITATION DEPTH
                  TRDA         .10  TRANSPOSITION DRAINAGE AREA

19 PI          PRECIPITATION PATTERN
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .01       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .02       .02       .07
                 .13       .18       .03       .02       .02       .02       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00

29 JD        INDEX STORM NO. 2
                  STRM        4.18  PRECIPITATION DEPTH
                  TRDA       10.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .01       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .02       .02       .07
                 .13       .18       .03       .02       .02       .02       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00
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30 JD INDEX STORM NO. 3

STRM 3.85 PRECIPITATION DEPTH
TRDA 50.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.02	.02	.07
.13	.18	.03	.02	.02	.02	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00						

31 JD INDEX STORM NO. 4

STRM 3.74 PRECIPITATION DEPTH
TRDA 100.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.02	.02	.07
.13	.18	.03	.02	.02	.02	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00						

32 JD INDEX STORM NO. 5

STRM 3.61 PRECIPITATION DEPTH
TRDA 200.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.02	.02	.07
.13	.18	.03	.02	.02	.02	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00						

33 JD INDEX STORM NO. 6

STRM 3.54 PRECIPITATION DEPTH
TRDA 300.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.02	.02	.07
.13	.18	.03	.02	.02	.02	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

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                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
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                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00

34 JD        INDEX STORM NO. 7
                STRM        3.50  PRECIPITATION DEPTH
                TRDA      400.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .02      .02      .07
                .13      .18      .03      .02      .02      .02      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00

35 JD        INDEX STORM NO. 8
                STRM        3.45  PRECIPITATION DEPTH
                TRDA      500.00  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .01      .01      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .02      .02      .07
                .13      .18      .03      .02      .02      .02      .01      .01      .01      .01
                .01      .01      .01      .01      .01      .01      .01      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00

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

          **************
          *            *
36 KK     *    SUB A   *        RUNOFF FROM SUB-BASIN A
          *            *
          **************

            SUBBASIN RUNOFF DATA

37 BA        SUBBASIN CHARACTERISTICS
                TAREA        2.78  SUBBASIN AREA

38 LU        UNIFORM LOSS RATE
                STRTL         .94  INITIAL LOSS
                CNSTL         .39  UNIFORM LOSS RATE
                RTIMP         .00  PERCENT IMPERVIOUS AREA

39 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG        1.97  LAG

                                          ***

                                     UNIT HYDROGRAPH
                                61 END-OF-PERIOD ORDINATES
          16.      48.      91.     144.     209.     294.     392.     483.     558.     613.
         645.     653.     651.     633.     600.     563.     521.     470.     412.     351.
         299.     262.     229.     200.     176.     157.     137.     121.     105.      92.
          81.      70.      62.      54.      47.      42.      36.      32.      28.      24.
          22.      19.      17.      14.      13.      11.      10.       9.       7.       7.
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          6.       5.       5.       4.       4.       3.       2.       2.       1.       1.
          0.

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

          **************
          *            *
40 KK     *    STR A   *       ROUTE HYDROGRAPH SUB A THROUGH STRUCTURE A
          *            *
          **************

             HYDROGRAPH ROUTING DATA

42 RL          ROUTING LOSSES
                    QLOSS        .00  INITIAL LOSS
                    CLOSS        .00  ADDITIONAL FRACTION LOST
                   PERCRT      10.00  CHANNEL PERCOLATION RATE
                   ELVINV        .00  INVERT ELEVATION

41 RS          STORAGE ROUTING
                    NSTPS          2  NUMBER OF SUBREACHES
                     ITYP       STOR  TYPE OF INITIAL CONDITION
                   RSVRIC      -1.00  INITIAL CONDITION
                        X        .00 WORKING R AND D COEFFICIENT

42 SA              AREA         .0      8.5     17.0     25.5     34.1     42.6     51.1     59.6

44 SE          ELEVATION       .00     1.00     2.00     3.00     4.00     5.00     6.00     7.00

45 SQ          DISCHARGE        0.     138.     422.     638.     933.    1218.    1497.    1846.

                                                          ***

                                          COMPUTED STORAGE-ELEVATION DATA

          STORAGE       .00     2.83    15.34    36.45    66.14   104.41   151.20   206.50
        ELEVATION       .00     1.00     2.00     3.00     4.00     5.00     6.00     7.00

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

          **************
          *            *
46 KK     *    RCH 1   *       ROUTE HYDROGRAPH STR A THROUGH REACH 1
          *            *
          **************

             HYDROGRAPH ROUTING DATA

48 RL          ROUTING LOSSES
                    QLOSS        .00  INITIAL LOSS
                    CLOSS        .00  ADDITIONAL FRACTION LOST
                   PERCRT      10.00  CHANNEL PERCOLATION RATE
                   ELVINV        .00  INVERT ELEVATION

47 RS          STORAGE ROUTING
                    NSTPS          9  NUMBER OF SUBREACHES
                     ITYP       FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC      -1.00  INITIAL CONDITION
                        X        .00 WORKING R AND D COEFFICIENT

49 RC          NORMAL DEPTH CHANNEL
                      ANL       .070  LEFT OVERBANK N-VALUE
                     ANCH       .035  MAIN CHANNEL N-VALUE
                      ANR       .070  RIGHT OVERBANK N-VALUE
                    RLNTH     26000.  REACH LENGTH
                      SEL      .0061  ENERGY SLOPE
                    ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
51 RY       ELEVATION     20.00    12.00    12.00    10.00    10.00    12.00    12.00    20.00
50 RX       DISTANCE     100.00   101.00   190.00   195.00   205.00   210.00   299.00   300.00

                                                          ***
```

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	3.55	7.94	13.14	30.35	92.58	154.85	217.16	279.51	341.91
OUTFLOW	.00	11.87	39.63	82.23	149.65	365.96	705.76	1144.95	1671.38	2277.02
ELEVATION	10.00	10.53	11.05	11.58	12.11	12.63	13.16	13.68	14.21	14.74
STORAGE	404.35	466.82	529.34	591.90	654.51	717.15	779.83	842.56	905.33	968.14
OUTFLOW	2955.93	3703.39	4515.57	5389.20	6321.46	7309.89	8352.30	9446.70	10591.32	11784.53
ELEVATION	15.26	15.79	16.32	16.84	17.37	17.89	18.42	18.95	19.47	20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 7310. TO 11785.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** ***

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              **************
              *            *
52 KK         *    SUB B   *      RUNOFF FROM SUB-BASIN B
              *            *
              **************

            SUBBASIN RUNOFF DATA

53 BA         SUBBASIN CHARACTERISTICS
                   TAREA        6.87  SUBBASIN AREA

54 LU         UNIFORM LOSS RATE
                   STRTL         .96  INITIAL LOSS
                   CNSTL         .38  UNIFORM LOSS RATE
                   RTIMP         .00  PERCENT IMPERVIOUS AREA

55 UD         SCS DIMENSIONLESS UNITGRAPH
                    TLAG        2.61  LAG
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***

UNIT HYDROGRAPH
80 END-OF-PERIOD ORDINATES

23.	57.	111.	176.	248.	340.	447.	569.	712.	850.
972.	1068.	1149.	1195.	1223.	1231.	1226.	1210.	1164.	1114.
1060.	999.	932.	856.	768.	679.	603.	539.	485.	439.
395.	357.	326.	298.	270.	245.	222.	199.	178.	163.
147.	132.	121.	109.	98.	89.	80.	72.	65.	59.
53.	48.	44.	40.	36.	33.	29.	26.	24.	22.
19.	18.	16.	15.	13.	12.	11.	10.	10.	9.
8.	7.	6.	5.	4.	4.	3.	2.	1.	1.

*** ***

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              **************
              *            *
56 KK         *    STR B   *      ROUTE HYDROGRAPH SUB B THROUGH STRUCTURE B
              *            *
              **************

            HYDROGRAPH ROUTING DATA

58 RL         ROUTING LOSSES
                   QLOSS         .00  INITIAL LOSS
                   CLOSS         .00  ADDITIONAL FRACTION LOST
                  PERCRT       10.00  CHANNEL PERCOLATION RATE
                  ELVINV         .00  INVERT ELEVATION

57 RS         STORAGE ROUTING
                  NSTPS           2  NUMBER OF SUBREACHES
                   ITYP        STOR  TYPE OF INITIAL CONDITION
                  RSVRIC       -1.00  INITIAL CONDITION
                       X         .00 WORKING R AND D COEFFICIENT

58 SA             AREA          .0      17.3      34.6      51.9      69.3      86.6     103.9     121.2
```

```
60 SE        ELEVATION        .00      1.00      2.00      3.00      4.00      5.00      6.00      7.00

61 SQ        DISCHARGE         0.      290.      766.     1296.     1756.     2241.     2723.     3151.

                                                          ***

                                        COMPUTED STORAGE-ELEVATION DATA

        STORAGE        .00      5.77     31.22     74.18    134.57    212.36    307.48    419.92
      ELEVATION        .00      1.00      2.00      3.00      4.00      5.00      6.00      7.00


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


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          *            *
62 KK     *    RCH 2   *       ROUTE HYDROGRAPH STR B THROUGH REACH 2
          *            *
          **************

             HYDROGRAPH ROUTING DATA

64 RL        ROUTING LOSSES
                   QLOSS        .00  INITIAL LOSS
                   CLOSS        .00  ADDITIONAL FRACTION LOST
                  PERCRT      10.00  CHANNEL PERCOLATION RATE
                  ELVINV        .00  INVERT ELEVATION

63 RS        STORAGE ROUTING
                   NSTPS          4  NUMBER OF SUBREACHES
                    ITYP       FLOW  TYPE OF INITIAL CONDITION
                  RSVRIC      -1.00  INITIAL CONDITION
                       X        .00 WORKING R AND D COEFFICIENT

65 RC        NORMAL DEPTH CHANNEL
                     ANL       .070  LEFT OVERBANK N-VALUE
                    ANCH       .035  MAIN CHANNEL N-VALUE
                     ANR       .070  RIGHT OVERBANK N-VALUE
                   RLNTH      11400.  REACH LENGTH
                     SEL      .0063  ENERGY SLOPE
                   ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                        CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
67 RY      ELEVATION    20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
66 RX      DISTANCE    100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                                          ***

                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE        .00      1.56      3.48      5.76     13.31     40.59     67.90     95.22    122.56    149.91
        OUTFLOW        .00     12.06     40.27     83.57    152.08    371.91    717.24   1163.56   1698.56   2314.05
      ELEVATION      10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

        STORAGE     177.29    204.68    232.10    259.53    286.98    314.44    341.93    369.43    396.95    424.49
        OUTFLOW    3003.99   3763.62   4589.00   5476.83   6424.25   7428.76   8488.11   9600.32  10763.55  11976.16
      ELEVATION      15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00


*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     6424. TO    11976.
           THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
           THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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


          **************
          *            *
KK        *    SUB C   *       RUNOFF FROM SUB-BASIN C
          *            *
          **************

             SUBBASIN RUNOFF DATA

69 BA        SUBBASIN CHARACTERISTICS
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                TAREA        1.09  SUBBASIN AREA

 70 LU      UNIFORM LOSS RATE
                STRTL         .98  INITIAL LOSS
                CNSTL         .30  UNIFORM LOSS RATE
                RTIMP        4.00  PERCENT IMPERVIOUS AREA

 71 UD      SCS DIMENSIONLESS UNITGRAPH
                 TLAG        2.20  LAG

                                          ***

                                     UNIT HYDROGRAPH
                                 68 END-OF-PERIOD ORDINATES
      5.     14.    27.    42.    62.    85.   113.   145.   173.   197.
    215.    225.   229.   230.   228.   219.   208.   196.   182.   166.
    148.    128.   111.    98.    86.    76.    68.    61.    55.    49.
     43.     38.    33.    30.    27.    24.    21.    19.    17.    15.
     13.     12.    10.     9.     8.     7.     6.     6.     5.     4.
      4.      3.     3.     3.     2.     2.     2.     2.     2.     1.
      1.      1.     1.     1.     1.     0.     0.     0.

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

          **************
          *            *
 72 KK    *     STR C  *      ROUTE HYDROGRAPH SUB C THROUGH STRUCTURE C
          *            *
          **************

            HYDROGRAPH ROUTING DATA

 74 RL      ROUTING LOSSES
                QLOSS         .00  INITIAL LOSS
                CLOSS         .00  ADDITIONAL FRACTION LOST
               PERCRT       10.00  CHANNEL PERCOLATION RATE
               ELVINV         .00  INVERT ELEVATION

 73 RS      STORAGE ROUTING
                NSTPS           1  NUMBER OF SUBREACHES
                 ITYP        STOR  TYPE OF INITIAL CONDITION
               RSVRIC       -1.00  INITIAL CONDITION
                    X         .00 WORKING R AND D COEFFICIENT

 74 SA          AREA          .0       .6      1.1      1.7      2.3      2.9      3.4      4.0

 76 SE      ELEVATION        .00     1.00     2.00     3.00     4.00     5.00     6.00     7.00

 77 SQ      DISCHARGE         0.      98.     300.     481.     684.     887.    1078.    1293.

                                          ***

                              COMPUTED STORAGE-ELEVATION DATA

        STORAGE       .00      .20     1.04     2.43     4.42     7.01    10.16    13.86
      ELEVATION       .00     1.00     2.00     3.00     4.00     5.00     6.00     7.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO      300.
              THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
              THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

          **************
          *            *
 78 KK    *     RCH 3  *      ROUTE HYDROGRAPH STR C THROUGH REACH 3
          *            *
          **************

            HYDROGRAPH ROUTING DATA

 80 RL      ROUTING LOSSES
                QLOSS         .00  INITIAL LOSS
                CLOSS         .00  ADDITIONAL FRACTION LOST
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                PERCRT       10.00  CHANNEL PERCOLATION RATE
                ELVINV         .00  INVERT ELEVATION

 79 RS        STORAGE ROUTING
                NSTPS           3  NUMBER OF SUBREACHES
                 ITYP        FLOW  TYPE OF INITIAL CONDITION
                RSVRIC       -1.00  INITIAL CONDITION
                     X         .00 WORKING R AND D COEFFICIENT

 81 RC        NORMAL DEPTH CHANNEL
                  ANL        .070  LEFT OVERBANK N-VALUE
                 ANCH        .035  MAIN CHANNEL N-VALUE
                  ANR        .070  RIGHT OVERBANK N-VALUE
                RLNTH       6510.  REACH LENGTH
                  SEL       .0061  ENERGY SLOPE
                ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 83 RY     ELEVATION    20.00    12.00    12.00    10.00    10.00    12.00    12.00    20.00
 82 RX     DISTANCE    100.00   101.00   190.00   195.00   205.00   210.00   299.00   300.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE       .00      .89     1.99     3.29     7.60    23.18    38.77    54.37    69.99    85.61
        OUTFLOW       .00    11.87    39.63    82.23   149.65   365.96   705.76  1144.95  1671.38  2277.02
      ELEVATION     10.00    10.53    11.05    11.58    12.11    12.63    13.16    13.68    14.21    14.74

        STORAGE    101.24   116.89   132.54   148.20   163.88   179.56   195.26   210.96   226.68   242.41
        OUTFLOW   2955.93  3703.39  4515.57  5389.20  6321.46  7309.89  8352.30  9446.70 10591.32 11784.53
      ELEVATION     15.26    15.79    16.32    16.84    17.37    17.89    18.42    18.95    19.47    20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     3703. TO    11785.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

          **************
          *            *
 84 KK    *     CP500  *       COMBINE HYDROGRAPHS REACH 2 & REACH 3
          *            *
          **************

 85 HC        HYDROGRAPH COMBINATION
                ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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

          **************
          *            *
 86 KK    *     RCH 4  *       ROUTE COMBINED HYDROGRAPH THROUGH REACH 4
          *            *
          **************

            HYDROGRAPH ROUTING DATA

 88 RL        ROUTING LOSSES
                QLOSS         .00  INITIAL LOSS
                CLOSS         .00  ADDITIONAL FRACTION LOST
                PERCRT      10.00  CHANNEL PERCOLATION RATE
                ELVINV        .00  INVERT ELEVATION

    RS        STORAGE ROUTING
                NSTPS           3  NUMBER OF SUBREACHES
                 ITYP        FLOW  TYPE OF INITIAL CONDITION
                RSVRIC       -1.00  INITIAL CONDITION
                     X         .00 WORKING R AND D COEFFICIENT
```

```
 89 RC          NORMAL DEPTH CHANNEL
                      ANL        .070  LEFT OVERBANK N-VALUE
                     ANCH        .035  MAIN CHANNEL N-VALUE
                      ANR        .070  RIGHT OVERBANK N-VALUE
                    RLNTH       6510.  REACH LENGTH
                      SEL       .0058  ENERGY SLOPE
                    ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 91 RY        ELEVATION    20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
 90 RX        DISTANCE    100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                                   ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00       .89      1.99      3.29      7.60     23.18     38.77     54.37     69.99     85.61
          OUTFLOW        .00     11.57     38.64     80.19    145.92    356.85    688.19   1116.44   1629.76   2220.32
        ELEVATION      10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

          STORAGE     101.24    116.89    132.54    148.20    163.88    179.56    195.26    210.96    226.68    242.41
          OUTFLOW    2882.32   3611.18   4403.13   5255.00   6164.05   7127.87   8144.32   9211.48  10327.60  11491.09
        ELEVATION      15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     3611. TO    11491.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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


          **************
          *            *
 92 KK    *     CP501  *       COMBINE HYDROGRAPHS REACH 1 & REACH 4
          *            *
          **************

 93 HC          HYDROGRAPH COMBINATION
                    ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                   ***


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


          **************
          *            *
 94 KK    *     RCH 5  *       ROUTE HYDROGRAPH CP501 THROUGH REACH 5
          *            *
          **************

             HYDROGRAPH ROUTING DATA

 96 RL          ROUTING LOSSES
                     QLOSS         .00  INITIAL LOSS
                     CLOSS         .00  ADDITIONAL FRACTION LOST
                    PERCRT       10.00  CHANNEL PERCOLATION RATE
                    ELVINV         .00  INVERT ELEVATION

 95 RS          STORAGE ROUTING
                    NSTPS           3  NUMBER OF SUBREACHES
                     ITYP        STOR  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

 97 RC          NORMAL DEPTH CHANNEL
                      ANL        .055  LEFT OVERBANK N-VALUE
                     ANCH        .045  MAIN CHANNEL N-VALUE
                      ANR        .055  RIGHT OVERBANK N-VALUE
                    RLNTH       8500.  REACH LENGTH
                      SEL       .0040  ENERGY SLOPE
                    ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
```

```
                    --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
99 RY     ELEVATION   1336.50   1333.80   1330.90   1325.10   1326.60   1329.90   1333.40   1335.90
98 RX     DISTANCE        .00    580.00    921.00    936.00   1012.00   1025.00   1554.00   2381.00
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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	1.87	7.48	16.42	26.23	36.50	47.23	58.41	70.06	87.33
OUTFLOW	.00	8.97	56.97	179.00	378.24	635.96	948.58	1314.10	1731.39	2248.59
ELEVATION	1325.10	1325.70	1326.30	1326.90	1327.50	1328.10	1328.70	1329.30	1329.90	1330.50
STORAGE	115.84	161.43	225.90	309.24	411.64	541.99	709.81	915.96	1160.43	1431.63
OUTFLOW	2917.45	3835.41	5082.23	6737.20	8821.36	11254.69	14487.93	18696.88	23998.86	31460.73
ELEVATION	1331.10	1331.70	1332.30	1332.90	1333.50	1334.10	1334.70	1335.30	1335.90	1336.50

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          **************
          *            *
100 KK    *    SUB I   *      RUNOFF FROM SUB-BASIN I
          *            *
          **************
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SUBBASIN RUNOFF DATA

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101 BA      SUBBASIN CHARACTERISTICS
                 TAREA       32.21  SUBBASIN AREA

102 LU      UNIFORM LOSS RATE
                 STRTL         .95  INITIAL LOSS
                 CNSTL         .37  UNIFORM LOSS RATE
                 RTIMP        1.00  PERCENT IMPERVIOUS AREA

103 UD      SCS DIMENSIONLESS UNITGRAPH
                 TLAG        8.23  LAG
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UNIT HYDROGRAPH
249 END-OF-PERIOD ORDINATES

11.	23.	34.	45.	56.	83.	109.	135.	162.	188.
222.	256.	289.	323.	357.	402.	447.	492.	537.	583.
643.	703.	763.	823.	884.	955.	1027.	1098.	1169.	1240.
1300.	1360.	1420.	1480.	1538.	1579.	1621.	1662.	1703.	1743.
1765.	1788.	1810.	1833.	1853.	1857.	1861.	1865.	1868.	1871.
1867.	1864.	1860.	1856.	1850.	1827.	1805.	1782.	1760.	1737.
1711.	1684.	1658.	1632.	1605.	1575.	1545.	1515.	1485.	1454.
1416.	1378.	1341.	1303.	1265.	1220.	1175.	1129.	1084.	1041.
1003.	966.	928.	891.	856.	829.	803.	777.	751.	725.
703.	680.	658.	635.	613.	595.	576.	557.	538.	521.
507.	493.	480.	466.	452.	439.	425.	411.	397.	384.
373.	362.	351.	339.	328.	317.	306.	294.	283.	273.
265.	258.	250.	243.	235.	228.	220.	213.	205.	199.
193.	187.	182.	176.	170.	165.	159.	153.	148.	143.
139.	134.	130.	126.	122.	118.	114.	110.	106.	102.
99.	96.	93.	91.	88.	85.	82.	79.	77.	74.
72.	70.	68.	66.	64.	62.	60.	58.	55.	54.
52.	51.	49.	48.	46.	45.	43.	42.	40.	39.
38.	37.	35.	34.	33.	32.	31.	30.	29.	28.
27.	26.	25.	25.	24.	23.	22.	22.	21.	20.
20.	19.	19.	19.	18.	18.	17.	17.	16.	16.
15.	15.	15.	14.	14.	13.	13.	12.	12.	11.
11.	10.	10.	10.	9.	9.	8.	8.	8.	7.
7.	7.	6.	6.	5.	5.	5.	4.	4.	4.
3.	3.	2.	2.	2.	1.	1.	1.	0.	

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          **************
          *            *
104 KK    *    CP502   *      COMBINE HYDROGRAPHS REACH 5 & SUB I
          *            *
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          **************

105 HC          HYDROGRAPH COMBINATION
                     ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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          *            *
106 KK    *     RCH 6  *       ROUTE HYDROGRAPH CP502 THROUGH REACH 6
          *            *
          **************

             HYDROGRAPH ROUTING DATA

108 RL          ROUTING LOSSES
                     QLOSS        .00  INITIAL LOSS
                     CLOSS        .00  ADDITIONAL FRACTION LOST
                    PERCRT      10.00  CHANNEL PERCOLATION RATE
                    ELVINV        .00  INVERT ELEVATION

107 RS          STORAGE ROUTING
                     NSTPS          6  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

109 RC          NORMAL DEPTH CHANNEL
                       ANL       .055  LEFT OVERBANK N-VALUE
                      ANCH       .045  MAIN CHANNEL N-VALUE
                       ANR       .055  RIGHT OVERBANK N-VALUE
                     RLNTH     17000.  REACH LENGTH
                       SEL      .0060  ENERGY SLOPE
                     ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
111 RY       ELEVATION   1263.50   1262.20   1258.50   1256.30   1256.30   1260.70   1262.60   1262.90
110 RX       DISTANCE        .00   1804.00   2973.00   2985.00   3043.00   3060.00   3096.00   3218.00

                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      8.84     18.20     28.08     38.48     49.41     61.19     85.23    127.19    187.07
          OUTFLOW        .00     29.80     95.61    190.05    310.60    456.04    628.01    857.39   1187.70   1658.15
        ELEVATION    1256.30   1256.68   1257.06   1257.44   1257.82   1258.19   1258.57   1258.95   1259.33   1259.71

          STORAGE     264.87    360.59    474.30    606.61    757.68    927.52   1121.65   1386.32   1743.41   2180.25
          OUTFLOW    2301.86   3148.61   4235.29   5595.92   7243.32   9202.78  10915.82  12751.08  15659.86  19627.03
        ELEVATION    1260.09   1260.47   1260.85   1261.23   1261.60   1261.98   1262.36   1262.74   1263.12   1263.50

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

          **************
          *            *
112 KK    *    SUB II  *       RUNOFF FROM SUB-BASIN II
          *            *
          **************

             SUBBASIN RUNOFF DATA

113 BA          SUBBASIN CHARACTERISTICS
                     TAREA       7.10  SUBBASIN AREA

114 LU          UNIFORM LOSS RATE
                     STRTL        .95  INITIAL LOSS
                     CNSTL        .37  UNIFORM LOSS RATE
                     RTIMP        .00  PERCENT IMPERVIOUS AREA

115 UD          SCS DIMENSIONLESS UNITGRAPH
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                TLAG        3.17  LAG

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                                              UNIT HYDROGRAPH
                                        97 END-OF-PERIOD ORDINATES
          16.      33.      71.     110.     159.     210.     275.     344.     430.     520.
         623.     721.     807.     885.     944.     993.    1026.    1046.    1052.    1052.
        1047.    1027.     995.     959.     921.     880.     837.     786.     732.     670.
         606.     549.     495.     454.     416.     383.     351.     323.     296.     276.
         257.     237.     217.     201.     185.     169.     153.     143.     132.     121.
         111.     103.      95.      87.      79.      73.      67.      61.      56.      52.
          48.      44.      41.      38.      35.      32.      29.      27.      25.      23.
          21.      19.      18.      16.      15.      14.      13.      12.      11.      10.
          10.       9.       8.       8.       7.       6.       6.       5.       5.       4.
           4.       3.       2.       2.       1.       1.       0.

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

          **************
          *            *
116 KK    *     CP503  *       COMBINE HYDROGRAPHS REACH 6 & SUB II
          *            *
          **************

117 HC          HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                    ***

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

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          *            *
KK        *     RCH 7  *       ROUTE HYDROGRAPH 503 THROUGH REACH 7
          *            *
          **************

            HYDROGRAPH ROUTING DATA

120 RL          ROUTING LOSSES
                     QLOSS         .00  INITIAL LOSS
                     CLOSS         .00  ADDITIONAL FRACTION LOST
                    PERCRT       10.00  CHANNEL PERCOLATION RATE
                    ELVINV         .00  INVERT ELEVATION

119 RS          STORAGE ROUTING
                     NSTPS           3  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

121 RC          NORMAL DEPTH CHANNEL
                       ANL        .055  LEFT OVERBANK N-VALUE
                      ANCH        .045  MAIN CHANNEL N-VALUE
                       ANR        .055  RIGHT OVERBANK N-VALUE
                     RLNTH       9000.  REACH LENGTH
                       SEL       .0040  ENERGY SLOPE
                     ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
123 RY       ELEVATION   1195.30   1193.40   1192.30   1187.80   1186.90   1192.10   1193.20   1195.30
122 RX       DISTANCE        .00    711.00    922.00    940.00    999.00   1016.00   1293.00   1738.00

                                                    ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE        .00      1.39      5.56     11.35     17.44     23.82     30.50     37.47     44.73     52.29
        OUTFLOW        .00      5.14     32.65    102.56    202.93    330.61    484.18    662.87    866.26   1094.17
      ELEVATION    1186.90   1187.34   1187.78   1188.23   1188.67   1189.11   1189.55   1189.99   1190.44   1190.88

        STORAGE      60.14     68.28     77.01     95.50    131.75    185.78    261.73    361.35    484.64    631.61
```

OUTFLOW	1346.58	1623.55	1930.31	2330.35	2882.52	3648.58	4695.60	6120.43	7989.88	10367.48
ELEVATION	1191.32	1191.76	1192.21	1192.65	1193.09	1193.53	1193.97	1194.42	1194.86	1195.30

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          *            *
124 KK    *   SUBIII   *      RUNOFF FROM SUB-BASIN III
          *            *
          **************

             SUBBASIN RUNOFF DATA

125 BA          SUBBASIN CHARACTERISTICS
                      TAREA        7.02  SUBBASIN AREA

126 LU          UNIFORM LOSS RATE
                      STRTL         .95  INITIAL LOSS
                      CNSTL         .39  UNIFORM LOSS RATE
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

127 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        4.94  LAG
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UNIT HYDROGRAPH
150 END-OF-PERIOD ORDINATES

7.	13.	20.	36.	51.	67.	87.	107.	127.	154.
181.	208.	243.	279.	315.	357.	399.	442.	478.	514.
550.	576.	600.	625.	640.	653.	667.	670.	673.	675.
673.	671.	669.	657.	644.	630.	615.	599.	583.	566.
548.	530.	509.	486.	464.	438.	411.	384.	361.	338.
316.	299.	283.	267.	253.	240.	226.	215.	203.	192.
183.	175.	167.	159.	150.	142.	135.	128.	122.	115.
108.	101.	96.	92.	87.	83.	78.	74.	70.	67.
63.	60.	57.	53.	50.	48.	46.	43.	41.	38.
36.	34.	33.	31.	29.	28.	26.	25.	24.	23.
21.	20.	19.	18.	17.	16.	16.	15.	14.	13.
12.	12.	11.	10.	10.	9.	9.	9.	8.	8.
7.	7.	7.	7.	6.	6.	6.	5.	5.	5.
5.	4.	4.	4.	4.	3.	3.	3.	3.	2.
2.	2.	2.	2.	1.	1.	1.	1.	0.	0.

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          **************
          *            *
128 KK    *    CP504   *      COMBINE HYDROGRAPHS REACH 7 & SUB III
          *            *
          **************

129 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
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          *            *
130 KK    *    RCH 8   *      ROUTE HYDROGRAPH CP504 THROUGH REACH 8
          *            *
          **************

             HYDROGRAPH ROUTING DATA

132 RL          ROUTING LOSSES
                      QLOSS         .00  INITIAL LOSS
                      CLOSS         .00  ADDITIONAL FRACTION LOST
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                PERCRT       10.00  CHANNEL PERCOLATION RATE
                ELVINV         .00  INVERT ELEVATION

131 RS        STORAGE ROUTING
                NSTPS           4  NUMBER OF SUBREACHES
                 ITYP        FLOW  TYPE OF INITIAL CONDITION
                RSVRIC       -1.00  INITIAL CONDITION
                     X         .00 WORKING R AND D COEFFICIENT

133 RC        NORMAL DEPTH CHANNEL
                  ANL        .055  LEFT OVERBANK N-VALUE
                 ANCH        .045  MAIN CHANNEL N-VALUE
                  ANR        .055  RIGHT OVERBANK N-VALUE
                RLNTH       9500.  REACH LENGTH
                  SEL       .0040  ENERGY SLOPE
                ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
135 RY      ELEVATION  1160.50  1160.60  1160.10  1156.20  1156.60  1159.00  1161.00  1160.00
134 RX      DISTANCE       .00   700.00   736.00   760.00   879.00   921.00  1012.00  2810.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE        .00      2.11      8.12     15.11     22.44     30.09     38.08     46.39     55.03     64.00
        OUTFLOW        .00      5.11     34.94     95.40    178.87    283.46    408.15    552.39    715.87    898.44
      ELEVATION    1156.20   1156.45   1156.71   1156.96   1157.21   1157.46   1157.72   1157.97   1158.22   1158.47

        STORAGE      73.30     82.93     93.06    103.90    115.46    127.74    152.46    203.75    311.81    453.92
        OUTFLOW    1100.06   1320.78   1581.71   1866.29   2173.97   2505.72   2875.30   3401.35   4212.29   5443.81
      ELEVATION    1158.73   1158.98   1159.23   1159.48   1159.74   1159.99   1160.24   1160.50   1160.75   1161.00


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          *            *
136 KK    *     SUBIV  *       RUNOFF FROM SUB-BASIN IV
          *            *
          **************

            SUBBASIN RUNOFF DATA

137 BA        SUBBASIN CHARACTERISTICS
                TAREA       10.54  SUBBASIN AREA

138 LU        UNIFORM LOSS RATE
                STRTL         .95  INITIAL LOSS
                CNSTL         .39  UNIFORM LOSS RATE
                RTIMP         .00  PERCENT IMPERVIOUS AREA

139 UD        SCS DIMENSIONLESS UNITGRAPH
                 TLAG        9.11  LAG

                                                  ***

                                   UNIT HYDROGRAPH
                                 275 END-OF-PERIOD ORDINATES
          3.      6.      9.     12.     15.     20.     27.     34.     41.     48.
         55.     64.     73.     82.     91.    100.    111.    123.    135.    147.
        159.    171.    187.    203.    219.    235.    251.    268.    287.    306.
        326.    345.    364.    380.    396.    412.    428.    444.    458.    469.
        481.    492.    503.    514.    520.    526.    532.    538.    544.    549.
        550.    551.    552.    553.    554.    553.    552.    551.    550.    549.
        546.    540.    534.    528.    522.    516.    509.    502.    495.    488.
        481.    474.    466.    458.    450.    442.    434.    424.    414.    404.
        394.    384.    373.    361.    349.    337.    325.    313.    303.    293.
        283.    273.    263.    253.    246.    239.    232.    225.    218.    212.
        206.    200.    194.    188.    182.    177.    172.    167.    162.    157.
        153.    149.    145.    142.    138.    134.    131.    127.    123.    120.
        116.    113.    110.    107.    104.    101.     98.     95.     92.     89.
         86.     83.     80.     78.     76.     74.     72.     70.     68.     66.
         64.     62.     60.     58.     57.     55.     54.     52.     51.     49.
         48.     46.     45.     43.     42.     41.     40.     39.     38.     37.
         35.     34.     33.     32.     31.     30.     29.     29.     28.     27.
```

26.	26.	25.	24.	23.	23.	22.	21.	21.	20.
20.	19.	19.	18.	17.	17.	16.	16.	15.	15.
15.	14.	14.	13.	13.	13.	12.	12.	12.	11.
11.	11.	10.	10.	10.	9.	9.	9.	8.	8.
8.	8.	8.	7.	7.	7.	7.	7.	6.	6.
6.	6.	6.	6.	6.	5.	5.	5.	5.	5.
5.	5.	5.	4.	4.	4.	4.	4.	4.	4.
4.	4.	3.	3.	3.	3.	3.	3.	3.	3.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.					

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              *            *
140 KK        *     CP505  *      COMBINE HYDROGRAPHS REACH 8 & SUB IV
              *            *
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141 HC            HYDROGRAPH COMBINATION
                       ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
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              *            *
142 KK        *     SUB D  *      RUNOFF FROM SUB-BASIN D
              *            *
              **************

                SUBBASIN RUNOFF DATA

143 BA            SUBBASIN CHARACTERISTICS
                       TAREA       11.06  SUBBASIN AREA

144 LU            UNIFORM LOSS RATE
                       STRTL         .96  INITIAL LOSS
                       CNSTL         .38  UNIFORM LOSS RATE
                       RTIMP        2.00  PERCENT IMPERVIOUS AREA

145 UD            SCS DIMENSIONLESS UNITGRAPH
                        TLAG        5.25  LAG
                                                                  ***
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UNIT HYDROGRAPH
160 END-OF-PERIOD ORDINATES

9.	19.	28.	48.	69.	91.	117.	145.	173.	205.
243.	280.	321.	371.	421.	471.	530.	590.	649.	701.
751.	801.	842.	877.	911.	939.	958.	977.	992.	995.
999.	1002.	999.	995.	992.	977.	958.	939.	918.	897.
875.	851.	826.	801.	775.	744.	712.	681.	644.	606.
568.	536.	505.	473.	448.	426.	404.	383.	364.	346.
327.	312.	296.	280.	269.	258.	246.	235.	223.	212.
202.	192.	183.	174.	164.	155.	146.	140.	133.	127.
121.	115.	108.	103.	99.	94.	89.	85.	80.	76.
72.	69.	65.	62.	59.	55.	53.	50.	48.	46.
43.	41.	39.	37.	36.	34.	32.	30.	29.	28.
26.	25.	24.	23.	21.	20.	19.	18.	17.	17.
16.	15.	14.	14.	13.	12.	12.	11.	11.	10.
10.	10.	9.	9.	8.	8.	8.	7.	7.	7.
6.	6.	5.	5.	5.	4.	4.	4.	3.	3.
3.	3.	2.	2.	2.	1.	1.	1.	0.	0.

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146 KK     *     STR D  *       ROUTE HYDROGRAPH SUB-D THROUGH STRUCTURE D
           *            *
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              HYDROGRAPH ROUTING DATA

RL              ROUTING LOSSES
                     QLOSS        .00  INITIAL LOSS
                     CLOSS        .00  ADDITIONAL FRACTION LOST
                    PERCRT      10.00  CHANNEL PERCOLATION RATE
                    ELVINV        .00  INVERT ELEVATION

147 RS          STORAGE ROUTING
                     NSTPS          2  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

148 SA               AREA         .0      11.1      22.2      33.3      44.5      55.6      66.7      77.8

150 SE          ELEVATION        .00      1.00      2.00      3.00      4.00      5.00      6.00      7.00

151 SQ          DISCHARGE         0.      202.      578.     1025.     1513.     1988.     2474.     2816.

                                                   ***

                                          COMPUTED STORAGE-ELEVATION DATA

          STORAGE        .00      3.70     20.03     47.60     86.36    136.31    197.37    269.55
        ELEVATION        .00      1.00      2.00      3.00      4.00      5.00      6.00      7.00


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           *            *
152 KK     *     RCH 9  *       ROUTE HYDROGRAPH STR D THROUGH REACH 9
           *            *
           **************

              HYDROGRAPH ROUTING DATA

154 RL          ROUTING LOSSES
                     QLOSS        .00  INITIAL LOSS
                     CLOSS        .00  ADDITIONAL FRACTION LOST
                    PERCRT      10.00  CHANNEL PERCOLATION RATE
                    ELVINV        .00  INVERT ELEVATION

153 RS          STORAGE ROUTING
                     NSTPS         16  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

155 RC          NORMAL DEPTH CHANNEL
                       ANL       .070  LEFT OVERBANK N-VALUE
                      ANCH       .035  MAIN CHANNEL N-VALUE
                       ANR       .070  RIGHT OVERBANK N-VALUE
                     RLNTH     45200.  REACH LENGTH
                       SEL      .0051  ENERGY SLOPE
                     ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
157 RY        ELEVATION     20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
156 RX        DISTANCE     100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                                   ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      6.18     13.80     22.85     52.76    160.94    269.20    377.53    485.93    594.40
          OUTFLOW        .00     10.85     36.23     75.19    136.83    334.62    645.33   1046.90   1528.25   2082.03
        ELEVATION      10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

          STORAGE     702.94    811.56    920.24   1029.00   1137.83   1246.74   1355.71   1464.76   1573.88   1683.07
          OUTFLOW    2702.80   3386.26   4128.88   4927.70   5780.13   6683.92   7637.06   8637.75   9684.35  10775.37
        ELEVATION      15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00
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*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     7637. TO    10775.
               THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
               THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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          *            *
158 KK    *   SUB145   *      RUNOFF FROM SUB-BASIN 145
          *            *
          **************

            SUBBASIN RUNOFF DATA

159 BA        SUBBASIN CHARACTERISTICS
                    TAREA       12.83  SUBBASIN AREA

160 LU        UNIFORM LOSS RATE
                    STRTL         .87  INITIAL LOSS
                    CNSTL         .31  UNIFORM LOSS RATE
                    RTIMP       10.00  PERCENT IMPERVIOUS AREA

161 UD        SCS DIMENSIONLESS UNITGRAPH
                     TLAG        4.55  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                         139 END-OF-PERIOD ORDINATES
          14.      29.      48.      81.     115.     153.     196.     239.     292.     350.
         408.     482.     559.     638.     729.     821.     907.     984.    1061.    1125.
        1178.    1231.    1266.    1295.    1324.    1329.    1334.    1337.    1332.    1327.
        1312.    1283.    1254.    1222.    1189.    1155.    1117.    1079.    1040.     991.
         943.     892.     835.     777.     724.     676.     628.     590.     557.     523.
         494.     465.     437.     413.     389.     368.     350.     332.     315.     297.
         280.     265.     250.     236.     221.     207.     194.     184.     175.     165.
         155.     146.     138.     131.     123.     116.     109.     102.      97.      92.
          86.      81.      76.      71.      68.      64.      61.      57.      53.      51.
          48.      45.      43.      40.      38.      36.      34.      32.      30.      28.
          27.      25.      24.      22.      21.      20.      19.      18.      17.      16.
          15.      14.      14.      13.      13.      12.      11.      11.      10.      10.
           9.       8.       8.       7.       7.       6.       6.       5.       5.       4.
           4.       3.       3.       2.       2.       1.       1.       0.       0.

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          *            *
162 KK    *    RCH65   *      ROUTE HYDROGRAPH SUB145 THROUGH REACH 65
          *            *
          **************

            HYDROGRAPH ROUTING DATA

164 RL        ROUTING LOSSES
                    QLOSS         .00  INITIAL LOSS
                    CLOSS         .00  ADDITIONAL FRACTION LOST
                   PERCRT       10.00  CHANNEL PERCOLATION RATE
                   ELVINV         .00  INVERT ELEVATION

163 RS        STORAGE ROUTING
                    NSTPS          11  NUMBER OF SUBREACHES
                     ITYP        FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC       -1.00  INITIAL CONDITION
                        X         .00 WORKING R AND D COEFFICIENT

165 RC        NORMAL DEPTH CHANNEL
                      ANL        .070  LEFT OVERBANK N-VALUE
                     ANCH        .035  MAIN CHANNEL N-VALUE
                      ANR        .070  RIGHT OVERBANK N-VALUE
                    RLNTH      32600.  REACH LENGTH
                      SEL       .0071  ENERGY SLOPE
```

ELMAX .0 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL		------- +	--- RIGHT OVERBANK ---		
167 RY	ELEVATION	20.00	12.00	12.00	10.00	10.00	12.00	12.00	20.00
RX	DISTANCE	100.00	101.00	190.00	195.00	205.00	210.00	299.00	300.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	4.46	9.95	16.48	38.05	116.08	194.16	272.29	350.47	428.70
OUTFLOW	.00	12.81	42.75	88.72	161.45	394.82	761.42	1235.23	1803.18	2456.58
ELEVATION	10.00	10.53	11.05	11.58	12.11	12.63	13.16	13.68	14.21	14.74
STORAGE	506.99	585.33	663.72	742.16	820.65	899.20	977.79	1056.44	1135.14	1213.89
OUTFLOW	3189.02	3995.44	4871.66	5814.18	6819.96	7886.33	9010.94	10191.65	11426.53	12713.83
ELEVATION	15.26	15.79	16.32	16.84	17.37	17.89	18.42	18.95	19.47	20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 6820. TO 12714.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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*            *
*    SUB F   *
*            *
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168 KK RUNOFF FROM SUB-BASIN F

SUBBASIN RUNOFF DATA

169 BA SUBBASIN CHARACTERISTICS

TAREA	60.10	SUBBASIN AREA

LU UNIFORM LOSS RATE

STRTL	.95	INITIAL LOSS
CNSTL	.38	UNIFORM LOSS RATE
RTIMP	.00	PERCENT IMPERVIOUS AREA

171 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	13.18	LAG

***

*** WARNING *** UNIT HYDROGRAPH TRUNCATED FROM 397 TO 300 INTERVALS

UNIT HYDROGRAPH
300 END-OF-PERIOD ORDINATES
VOLUME = 1.00

8.	17.	25.	33.	42.	50.	58.	67.	86.	106.
125.	144.	164.	183.	202.	222.	247.	272.	297.	322.
347.	372.	397.	423.	456.	489.	522.	555.	589.	622.
655.	690.	734.	779.	823.	867.	912.	956.	1000.	1046.
1099.	1151.	1204.	1257.	1309.	1362.	1414.	1465.	1509.	1553.
1598.	1642.	1686.	1730.	1775.	1815.	1845.	1876.	1906.	1937.
1967.	1998.	2028.	2054.	2070.	2087.	2104.	2120.	2137.	2153.
2170.	2181.	2184.	2187.	2190.	2193.	2195.	2198.	2201.	2201.
2199.	2196.	2193.	2190.	2187.	2185.	2182.	2173.	2156.	2140.
2123.	2106.	2090.	2073.	2057.	2039.	2019.	2000.	1980.	1961.
1942.	1922.	1903.	1882.	1860.	1838.	1816.	1793.	1771.	1749.
1727.	1702.	1674.	1646.	1619.	1591.	1563.	1536.	1508.	1477.
1444.	1410.	1377.	1344.	1311.	1277.	1244.	1215.	1187.	1159.
1132.	1104.	1076.	1049.	1021.	999.	980.	961.	941.	922.
902.	883.	864.	846.	830.	813.	797.	780.	763.	747.
730.	716.	702.	688.	674.	660.	647.	633.	619.	608.
598.	588.	578.	568.	558.	548.	537.	527.	517.	507.
497.	487.	477.	467.	457.	448.	440.	432.	423.	415.
407.	398.	390.	382.	374.	365.	357.	349.	340.	332.
324.	318.	313.	307.	302.	296.	291.	285.	279.	274.
268.	263.	257.	252.	246.	241.	235.	231.	227.	223.
219.	215.	210.	206.	202.	198.	194.	190.	185.	181.
177.	173.	169.	166.	163.	160.	157.	154.	151.	148.
145.	142.	139.	136.	133.	129.	126.	123.	121.	119.

```
116.    114.    112.    110.    108.    106.    104.    102.    100.    98.
 96.     94.     92.     89.     88.     86.     85.     83.     81.    80.
 78.     77.     75.     74.     72.     71.     69.     68.     66.    65.
 63.     62.     61.     60.     59.     58.     57.     56.     55.    53.
 52.     51.     50.     49.     48.     47.     46.     45.     44.    43.
 43.     42.     41.     40.     39.     38.     38.     37.     36.    35.

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          *            *
172 KK    *    CP400   *      COMBINE HYDROGRAPHS SUBF AND RCH65
          *            *
          **************

173 HC         HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                          ***

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          *            *
174 KK    *    STR F   *      ROUTE HYDROGRAPH  CP400 THROUGH STRUCTURE F
          *            *
          **************

             HYDROGRAPH ROUTING DATA

176 RL         ROUTING LOSSES
                    QLOSS        .00  INITIAL LOSS
                    CLOSS        .00  ADDITIONAL FRACTION LOST
                   PERCRT      10.00  CHANNEL PERCOLATION RATE
                   ELVINV        .00  INVERT ELEVATION

175 RS         STORAGE ROUTING
                    NSTPS          1  NUMBER OF SUBREACHES
                     ITYP       STOR  TYPE OF INITIAL CONDITION
                   RSVRIC      -1.00  INITIAL CONDITION
                        X        .00 WORKING R AND D COEFFICIENT

176 SA              AREA         .0     46.2     92.3    138.5    184.7    230.9    277.0    323.2

178 SE         ELEVATION        .00     1.00     2.00     3.00     4.00     5.00     6.00     7.00

179 SQ         DISCHARGE         0.     675.    1967.    3362.    4898.    6353.    7861.    8615.
                                                          ***

                                          COMPUTED STORAGE-ELEVATION DATA

        STORAGE        .00    15.40    83.33   197.96   359.00   566.37   819.97  1119.78
      ELEVATION        .00     1.00     2.00     3.00     4.00     5.00     6.00     7.00

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          *            *
180 KK    *    RCH11   *      ROUTE HYDROGRAPH STR F THROUGH REACH 11
          *            *
          **************

             HYDROGRAPH ROUTING DATA

182 RL         ROUTING LOSSES
                    QLOSS        .00  INITIAL LOSS
                    CLOSS        .00  ADDITIONAL FRACTION LOST
                   PERCRT      10.00  CHANNEL PERCOLATION RATE
                   ELVINV        .00  INVERT ELEVATION
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181 RS          STORAGE ROUTING
                     NSTPS          5  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

RC              NORMAL DEPTH CHANNEL
                       ANL       .070  LEFT OVERBANK N-VALUE
                      ANCH       .035  MAIN CHANNEL N-VALUE
                       ANR       .070  RIGHT OVERBANK N-VALUE
                     RLNTH      12400.  REACH LENGTH
                       SEL      .0050  ENERGY SLOPE
                     ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
185 RY        ELEVATION    20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
184 RX        DISTANCE    100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                                   ***

                                      COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.70      3.79      6.27     14.47     44.15     73.85    103.57    133.31    163.06
          OUTFLOW        .00     10.75     35.88     74.45    135.48    331.32    638.97   1036.59   1513.20   2061.52
        ELEVATION      10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

          STORAGE     192.84    222.64    252.46    282.29    312.15    342.03    371.92    401.84    431.77    461.73
          OUTFLOW    2676.17   3352.90   4088.20   4879.15   5723.18   6618.06   7561.81   8552.64   9588.93  10669.21
        ELEVATION      15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     5723. TO    10669.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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            *            *
186 KK      *    SUB V   *       RUNOFF FROM SUB-BASIN V
            *            *
            **************

               SUBBASIN RUNOFF DATA

187 BA          SUBBASIN CHARACTERISTICS
                     TAREA       2.45  SUBBASIN AREA

188 LU          UNIFORM LOSS RATE
                     STRTL        .95  INITIAL LOSS
                     CNSTL        .40  UNIFORM LOSS RATE
                     RTIMP        .00  PERCENT IMPERVIOUS AREA

189 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG       2.58  LAG

                                                   ***

                                                UNIT HYDROGRAPH
                                          79 END-OF-PERIOD ORDINATES
              8.       21.       41.       65.       91.      125.      165.      209.      262.      312.
            356.      389.      417.      434.      442.      444.      442.      433.      416.      397.
            377.      355.      329.      301.      268.      237.      209.      188.      169.      153.
            138.      124.      114.      104.       94.       85.       77.       68.       62.       56.
             51.       46.       41.       37.       33.       30.       27.       24.       22.       20.
             18.       16.       15.       13.       12.       11.       10.        9.        8.        7.
              7.        6.        5.        5.        5.        4.        4.        4.        3.        3.
              3.        2.        2.        2.        1.        1.        1.        1.        0.

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190 KK     *     CP600  *       COMBINE HYDROGRAPHS SUB V & RCH11
           *            *
           **************

191 HC          HYDROGRAPH COMBINATION
                     ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                  ***

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

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           *            *
192 KK     *     RCH12  *       ROUTE HYDROGRAPH CP600 THROUGH REACH 12
           *            *
           **************

              HYDROGRAPH ROUTING DATA

194 RL          ROUTING LOSSES
                     QLOSS        .00  INITIAL LOSS
                     CLOSS        .00  ADDITIONAL FRACTION LOST
                    PERCRT      10.00  CHANNEL PERCOLATION RATE
                    ELVINV        .00  INVERT ELEVATION

193 RS          STORAGE ROUTING
                     NSTPS          2  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

195 RC          NORMAL DEPTH CHANNEL
                       ANL       .055  LEFT OVERBANK N-VALUE
                      ANCH       .045  MAIN CHANNEL N-VALUE
                       ANR       .055  RIGHT OVERBANK N-VALUE
                     RLNTH      5400.  REACH LENGTH
                       SEL      .0030  ENERGY SLOPE
                     ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
197 RY       ELEVATION  1253.50   1249.50   1248.40   1244.00   1244.10   1247.80   1249.80   1255.00
196 RX       DISTANCE       .00    754.00   1102.00   1112.00   1126.00   1138.00   1342.00   2306.00
                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.01      2.34      3.89      5.68      7.69      9.93     12.79     20.38     43.01
          OUTFLOW        .00      9.05     32.36     68.34    117.27    179.84    256.85    355.17    509.15    825.95
        ELEVATION    1244.00   1244.58   1245.16   1245.74   1246.32   1246.89   1247.47   1248.05   1248.63   1249.21

          STORAGE      82.36    136.12    205.41    290.25    390.61    506.52    637.96    783.57    937.53   1099.20
          OUTFLOW    1446.96   2415.62   3844.93   5803.88   8359.62  11576.50  15516.16  20593.10  26726.11  33676.39
        ELEVATION    1249.79   1250.37   1250.95   1251.53   1252.11   1252.68   1253.26   1253.84   1254.42   1255.00

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           *            *
198 KK     *     SUBVI  *       RUNOFF FROM SUB-BASIN VI
           *            *
           **************

              SUBBASIN RUNOFF DATA

199 BA          SUBBASIN CHARACTERISTICS
                     TAREA       7.60  SUBBASIN AREA

200 LU          UNIFORM LOSS RATE
                     STRTL        .96  INITIAL LOSS
                     CNSTL        .38  UNIFORM LOSS RATE
                     RTIMP       2.00  PERCENT IMPERVIOUS AREA
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201 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG        5.19  LAG

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                                                UNIT HYDROGRAPH
                                          158 END-OF-PERIOD ORDINATES
                 7.      13.      20.      34.      49.      65.      83.     103.     123.     146.
               172.     198.     228.     263.     298.     335.     377.     418.     460.     495.
               530.     566.     591.     616.     640.     657.     670.     683.     690.     693.
               695.     695.     693.     691.     687.     673.     660.     647.     632.     616.
               601.     583.     566.     548.     528.     506.     484.     459.     433.     406.
               382.     360.     338.     317.     302.     286.     271.     258.     244.     231.
               220.     209.     198.     189.     181.     173.     165.     157.     149.     142.
               135.     128.     122.     115.     109.     102.      98.      93.      89.      84.
                80.      76.      72.      69.      65.      62.      59.      56.      53.      50.
                48.      45.      43.      41.      38.      37.      35.      33.      32.      30.
                28.      27.      26.      25.      23.      22.      21.      20.      19.      18.
                17.      16.      15.      15.      14.      13.      13.      12.      11.      11.
                10.      10.       9.       9.       8.       8.       8.       7.       7.       7.
                 6.       6.       6.       6.       5.       5.       5.       5.       4.       4.
                 4.       4.       3.       3.       3.       3.       2.       2.       2.       2.
                 2.       1.       1.       1.       1.       0.       0.       0.

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

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          *            *
202 KK    *     CP601  *       COMBINE HYDROGRAPHS RCH12 & SUB VI
          *            *
          **************

203 HC          HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                    ***

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

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          *            *
204 KK    *     RCH13  *       ROUTE HYDROGRAPH CP601 THROUGH REACH 13
          *            *
          **************

             HYDROGRAPH ROUTING DATA

206 RL          ROUTING LOSSES
                     QLOSS         .00  INITIAL LOSS
                     CLOSS         .00  ADDITIONAL FRACTION LOST
                    PERCRT       10.00  CHANNEL PERCOLATION RATE
                    ELVINV         .00  INVERT ELEVATION

205 RS          STORAGE ROUTING
                     NSTPS           1  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

207 RC          NORMAL DEPTH CHANNEL
                       ANL        .055  LEFT OVERBANK N-VALUE
                      ANCH        .045  MAIN CHANNEL N-VALUE
                       ANR        .055  RIGHT OVERBANK N-VALUE
                     RLNTH       2000.  REACH LENGTH
                       SEL       .0030  ENERGY SLOPE
                     ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
209 RY       ELEVATION   1241.60   1238.90   1237.70   1233.30   1233.60   1236.70   1237.90   1241.80
208 RX       DISTANCE        .00    459.00    960.00    976.00   1014.00   1025.00   1374.00   2432.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	.54	1.40	2.32	3.31	4.36	5.49	6.67	8.14	11.84
OUTFLOW	.00	9.32	43.34	96.23	166.22	252.66	355.33	474.23	614.85	814.12
ELEVATION	1233.30	1233.75	1234.19	1234.64	1235.09	1235.54	1235.98	1236.43	1236.88	1237.33
STORAGE	18.29	29.89	47.82	71.81	100.16	132.57	169.04	209.56	254.13	302.61
OUTFLOW	1120.06	1617.98	2399.40	3568.66	5168.47	7200.61	9695.19	12683.36	16196.25	20407.32
ELEVATION	1237.77	1238.22	1238.67	1239.12	1239.56	1240.01	1240.46	1240.91	1241.35	1241.80

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210 KK        *   SUBVII   *      RUNOFF FROM SUB-BASIN VII
              *            *
              **************

                 SUBBASIN RUNOFF DATA

211 BA              SUBBASIN CHARACTERISTICS
                          TAREA        4.08  SUBBASIN AREA

212 LU              UNIFORM LOSS RATE
                          STRTL         .95  INITIAL LOSS
                          CNSTL         .40  UNIFORM LOSS RATE
                          RTIMP        1.00  PERCENT IMPERVIOUS AREA

213 UD              SCS DIMENSIONLESS UNITGRAPH
                           TLAG        5.40  LAG
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UNIT HYDROGRAPH
164 END-OF-PERIOD ORDINATES

3.	7.	10.	16.	24.	32.	40.	50.	60.	70.
83.	96.	109.	126.	144.	161.	180.	201.	222.	242.
259.	277.	294.	306.	318.	330.	339.	345.	352.	356.
357.	358.	359.	358.	357.	356.	351.	344.	337.	330.
323.	315.	307.	298.	290.	281.	270.	259.	248.	236.
223.	210.	197.	186.	175.	165.	157.	150.	142.	135.
129.	122.	116.	110.	105.	100.	96.	92.	88.	84.
80.	76.	72.	69.	66.	63.	59.	56.	53.	51.
48.	46.	44.	42.	40.	38.	36.	34.	33.	31.
30.	28.	27.	25.	24.	23.	22.	21.	20.	19.
18.	17.	16.	15.	15.	14.	13.	13.	12.	12.
11.	10.	10.	9.	9.	9.	8.	8.	7.	7.
7.	6.	6.	6.	5.	5.	5.	5.	5.	4.
4.	4.	4.	4.	4.	3.	3.	3.	3.	3.
3.	3.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	0.	0.						

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              *            *
214 KK        *    CP602   *      COMBINE HYDROGRAPHS RCH13 & 601 & SUB VII
              *            *
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215 HC              HYDROGRAPH COMBINATION
                          ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
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          *            *
216 KK    *    RCH14   *      ROUTE HYDROGRAPH CP602 THROUGH REACH 14
          *            *
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            HYDROGRAPH ROUTING DATA

218 RL        ROUTING LOSSES
                   QLOSS        .00  INITIAL LOSS
                   CLOSS        .00  ADDITIONAL FRACTION LOST
                  PERCRT      10.00  CHANNEL PERCOLATION RATE
                  ELVINV        .00  INVERT ELEVATION

217 RS        STORAGE ROUTING
                   NSTPS          4  NUMBER OF SUBREACHES
                    ITYP       FLOW  TYPE OF INITIAL CONDITION
                  RSVRIC      -1.00  INITIAL CONDITION
                       X        .00 WORKING R AND D COEFFICIENT

219 RC        NORMAL DEPTH CHANNEL
                     ANL       .055  LEFT OVERBANK N-VALUE
                    ANCH       .045  MAIN CHANNEL N-VALUE
                     ANR       .055  RIGHT OVERBANK N-VALUE
                   RLNTH      11100.  REACH LENGTH
                     SEL      .0030  ENERGY SLOPE
                   ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
221 RY      ELEVATION   1220.30   1216.80   1215.50   1211.90   1211.80   1217.30   1217.40   1220.30
220 RX      DISTANCE        .00   1194.00   1486.00   1503.00   1526.00   1532.00   1791.00   2510.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      2.43      5.44      8.75     12.36     16.26     20.46     24.95     29.75     37.82
          OUTFLOW        .00      9.01     32.21     66.72    111.88    167.56    233.86    310.97    399.17    513.74
        ELEVATION    1211.80   1212.25   1212.69   1213.14   1213.59   1214.04   1214.48   1214.93   1215.38   1215.83

          STORAGE      57.00     87.69    131.91    212.51    333.44    484.41    665.43    876.49   1117.59   1388.75
          OUTFLOW     685.39    945.91   1310.72   1892.40   2843.37   4198.06   6006.23   8318.35  11183.48  14649.62
        ELEVATION    1216.27   1216.72   1217.17   1217.62   1218.06   1218.51   1218.96   1219.41   1219.85   1220.30


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          *            *
222 KK    *   SBVIII   *      RUNOFF FROM SUB-BASIN VIII
          *            *
          **************

            SUBBASIN RUNOFF DATA

223 BA        SUBBASIN CHARACTERISTICS
                  TAREA      10.07  SUBBASIN AREA

224 LU        UNIFORM LOSS RATE
                  STRTL        .97  INITIAL LOSS
                  CNSTL        .36  UNIFORM LOSS RATE
                  RTIMP       5.00  PERCENT IMPERVIOUS AREA

225 UD        SCS DIMENSIONLESS UNITGRAPH
                   TLAG       3.94  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                   120 END-OF-PERIOD ORDINATES
             15.      30.      57.      92.     129.     174.     219.     275.     335.     402.
            483.     563.     657.     752.     839.     920.     997.    1052.    1107.    1145.
           1175.    1198.    1203.    1208.    1205.    1200.    1184.    1154.    1123.    1088.
           1053.    1015.     975.     933.     883.     833.     775.     715.     658.     608.
            558.     522.     487.     455.     425.     396.     371.     346.     325.     307.
            289.     271.     252.     237.     222.     207.     192.     177.     167.     157.
            147.     137.     128.     120.     113.     105.      98.      91.      85.      80.
```

74.	69.	64.	61.	57.	53.	49.	46.	44.	41.
38.	35.	33.	31.	29.	27.	25.	24.	22.	21.
19.	18.	17.	16.	15.	14.	13.	12.	12.	11.
11.	10.	9.	9.	8.	8.	7.	6.	6.	5.
5.	4.	4.	3.	3.	2.	2.	1.	1.	0.

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              **************
              *            *
226 KK        *    SUBIX   *        RUNOFF FROM SUB-BASIN IX
              *            *
              **************

                 SUBBASIN RUNOFF DATA

227 BA             SUBBASIN CHARACTERISTICS
                        TAREA        9.20  SUBBASIN AREA

228 LU             UNIFORM LOSS RATE
                        STRTL         .95  INITIAL LOSS
                        CNSTL         .40  UNIFORM LOSS RATE
                        RTIMP         .00  PERCENT IMPERVIOUS AREA

229 UD             SCS DIMENSIONLESS UNITGRAPH
                         TLAG        6.62  LAG
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UNIT HYDROGRAPH
201 END-OF-PERIOD ORDINATES

5.	10.	15.	20.	31.	43.	54.	66.	80.	95.
110.	125.	144.	164.	184.	204.	230.	256.	282.	309.
339.	371.	402.	433.	460.	487.	513.	540.	559.	577.
595.	613.	625.	635.	645.	654.	658.	659.	661.	663.
662.	660.	658.	657.	649.	639.	629.	619.	608.	597.
585.	573.	561.	548.	534.	521.	506.	489.	473.	456.
438.	418.	398.	378.	361.	344.	328.	311.	298.	286.
275.	263.	253.	243.	233.	223.	214.	206.	198.	189.
182.	176.	170.	164.	158.	152.	146.	140.	135.	130.
125.	120.	115.	110.	105.	100.	96.	93.	89.	86.
83.	79.	76.	73.	70.	67.	65.	62.	60.	58.
55.	53.	50.	49.	47.	45.	43.	41.	39.	38.
36.	35.	34.	32.	31.	30.	29.	27.	26.	25.
24.	24.	23.	22.	21.	20.	19.	18.	18.	17.
16.	16.	15.	14.	14.	13.	13.	12.	12.	11.
11.	10.	10.	10.	9.	9.	9.	8.	8.	8.
7.	7.	7.	7.	6.	6.	6.	6.	6.	5.
5.	5.	5.	5.	4.	4.	4.	4.	4.	4.
3.	3.	3.	3.	3.	2.	2.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	1.	0.	0.
0.									

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              *            *
230 KK        *    SUB E   *        RUNOFF FROM SUB-BASIN E
              *            *
              **************

                 SUBBASIN RUNOFF DATA

231 BA             SUBBASIN CHARACTERISTICS
                        TAREA        2.72  SUBBASIN AREA

232 LU             UNIFORM LOSS RATE
                        STRTL         .95  INITIAL LOSS
                        CNSTL         .40  UNIFORM LOSS RATE
                        RTIMP        1.00  PERCENT IMPERVIOUS AREA

233 UD             SCS DIMENSIONLESS UNITGRAPH
                         TLAG        3.26  LAG
```

***

UNIT HYDROGRAPH
100 END-OF-PERIOD ORDINATES

6.	12.	25.	39.	57.	74.	98.	121.	152.	184.
221.	258.	290.	321.	343.	364.	377.	388.	391.	393.
391.	389.	378.	366.	353.	339.	324.	308.	289.	269.
246.	222.	202.	183.	168.	155.	143.	131.	121.	111.
104.	97.	89.	82.	76.	70.	64.	59.	54.	50.
47.	43.	40.	37.	34.	31.	28.	26.	24.	22.
20.	19.	17.	16.	15.	14.	13.	12.	11.	10.
9.	8.	8.	7.	7.	6.	6.	5.	5.	4.
4.	4.	4.	3.	3.	3.	3.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	0.	0.	0.

*** ***

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              **************
              *            *
234 KK        *    STR E   *      ROUTE HYDROGRAPH SUB-E THROUGH STRUCTURE E
              *            *
              **************

                 HYDROGRAPH ROUTING DATA

236 RL             ROUTING LOSSES
                        QLOSS        .00  INITIAL LOSS
                        CLOSS        .00  ADDITIONAL FRACTION LOST
                       PERCRT      10.00  CHANNEL PERCOLATION RATE
                       ELVINV        .00  INVERT ELEVATION

235 RS             STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       STOR  TYPE OF INITIAL CONDITION
                       RSVRIC      -1.00  INITIAL CONDITION
                            X        .00 WORKING R AND D COEFFICIENT

SA                      AREA         .0      7.6     15.3     22.9     30.6     38.2     45.9     53.5

238 SE             ELEVATION        .00     1.00     2.00     3.00     4.00     5.00     6.00     7.00

239 SQ             DISCHARGE         0.     243.     740.    1154.    1622.    2067.    2472.    2766.
```

***

COMPUTED STORAGE-ELEVATION DATA

STORAGE	.00	2.53	13.76	32.73	59.39	93.72	135.71	185.36
ELEVATION	.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00

*** ***

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              **************
              *            *
240 KK        *    RCH10   *      ROUTE HYDROGRAPH STR E THROUGH REACH 10
              *            *
              **************

                 HYDROGRAPH ROUTING DATA

242 RL             ROUTING LOSSES
                        QLOSS        .00  INITIAL LOSS
                        CLOSS        .00  ADDITIONAL FRACTION LOST
                       PERCRT      10.00  CHANNEL PERCOLATION RATE
                       ELVINV        .00  INVERT ELEVATION

241 RS             STORAGE ROUTING
                       NSTPS          8  NUMBER OF SUBREACHES
                        ITYP       FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC      -1.00  INITIAL CONDITION
                            X        .00 WORKING R AND D COEFFICIENT

243 RC             NORMAL DEPTH CHANNEL
                         ANL       .070  LEFT OVERBANK N-VALUE
```

```
                    ANCH        .035  MAIN CHANNEL N-VALUE
                     ANR        .070  RIGHT OVERBANK N-VALUE
                   RLNTH      21500.  REACH LENGTH
                     SEL       .0056  ENERGY SLOPE
                   ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                  CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
245 RY       ELEVATION    20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
244 RX       DISTANCE    100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                                  ***

                                  COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

         STORAGE        .00      2.94      6.56     10.87     25.09     76.55    128.05    179.58    231.14    282.73
         OUTFLOW        .00     11.37     37.97     78.79    143.38    350.64    676.22   1097.02   1601.42   2181.71
       ELEVATION      10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

         STORAGE     334.36    386.03    437.73    489.46    541.23    593.03    644.86    696.73    748.64    800.57
         OUTFLOW    2832.19   3548.37   4326.55   5163.61   6056.85   7003.90   8002.67   9051.27  10147.97  11291.23
       ELEVATION      15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     6057. TO    11291.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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


            **************
            *            *
246 KK      *     CP603  *       COMBINE HYDROGRAPHS RCH14 & SUB VIII & SUB IX & RCH10
            *            *
            **************

247 HC          HYDROGRAPH COMBINATION
                     ICOMP          4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***


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


            **************
            *            *
248 KK      *     RCH15  *       ROUTE HYDROGRAPH CP603 THROUGH REACH 15
            *            *
            **************

               HYDROGRAPH ROUTING DATA

250 RL          ROUTING LOSSES
                     QLOSS        .00  INITIAL LOSS
                     CLOSS        .00  ADDITIONAL FRACTION LOST
                    PERCRT      10.00  CHANNEL PERCOLATION RATE
                    ELVINV        .00  INVERT ELEVATION

249 RS          STORAGE ROUTING
                     NSTPS          4  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

251 RC          NORMAL DEPTH CHANNEL
                       ANL       .055  LEFT OVERBANK N-VALUE
                      ANCH       .045  MAIN CHANNEL N-VALUE
                       ANR       .055  RIGHT OVERBANK N-VALUE
                     RLNTH      10400.  REACH LENGTH
                       SEL      .0030  ENERGY SLOPE
                     ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                  CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
253 RY       ELEVATION  1200.10   1195.80   1194.70   1189.50   1189.50   1194.40   1196.90   1198.30
```

```
252 RX        DISTANCE        .00    227.00   1232.00   1239.00   1255.00   1266.00   1799.00   2061.00
                                                   ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      2.26      4.80      7.59     10.66     13.99     17.59     21.45     25.59     30.35
          OUTFLOW        .00     11.10     35.81     71.77    118.46    175.84    244.07    323.40    414.16    519.75
        ELEVATION    1189.50   1190.06   1190.62   1191.17   1191.73   1192.29   1192.85   1193.41   1193.96   1194.52

          STORAGE      61.86    173.59    353.07    555.06    776.29   1015.42   1272.02   1536.71   1805.33   2077.87
          OUTFLOW     720.35   1335.80   2783.24   5030.15   8010.15  11703.84  16184.96  21632.93  27762.86  34548.63
        ELEVATION    1195.08   1195.64   1196.19   1196.75   1197.31   1197.87   1198.43   1198.98   1199.54   1200.10


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


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          *            *
254 KK    *    SUB X   *        RUNOFF FROM SUB-BASIN X
          *            *
          **************

             SUBBASIN RUNOFF DATA

255 BA          SUBBASIN CHARACTERISTICS
                      TAREA        18.09  SUBBASIN AREA

256 LU          UNIFORM LOSS RATE
                      STRTL         .97  INITIAL LOSS
                      CNSTL         .33  UNIFORM LOSS RATE
                      RTIMP       10.00  PERCENT IMPERVIOUS AREA

257 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        6.85  LAG
                                   ***

                                   UNIT HYDROGRAPH
                              207 END-OF-PERIOD ORDINATES
             9.       18.       27.       36.       56.       77.       98.      119.      145.      172.
           199.      226.      258.      295.      331.      367.      408.      457.      505.      554.
           604.      661.      719.      777.      834.      882.      931.      979.     1028.     1063.
          1096.     1129.     1163.     1185.     1203.     1222.     1240.     1249.     1252.     1256.
          1259.     1259.     1256.     1253.     1250.     1243.     1225.     1207.     1189.     1170.
          1149.     1128.     1107.     1086.     1062.     1037.     1013.      989.      960.      930.
           899.      869.      835.      799.      763.      726.      692.      662.      632.      602.
           574.      553.      531.      510.      489.      471.      453.      435.      417.      401.
           386.      371.      356.      344.      333.      322.      311.      300.      289.      278.
           267.      257.      247.      238.      229.      220.      211.      202.      193.      184.
           178.      172.      166.      160.      154.      148.      142.      136.      131.      126.
           122.      117.      113.      108.      104.       99.       95.       92.       89.       85.
            82.       79.       75.       72.       69.       67.       64.       62.       60.       58.
            55.       53.       51.       49.       47.       46.       44.       42.       41.       39.
            37.       36.       35.       33.       32.       31.       30.       29.       27.       26.
            25.       24.       24.       23.       22.       21.       20.       19.       18.       18.
            17.       17.       16.       15.       15.       14.       14.       13.       13.       13.
            12.       12.       11.       11.       11.       10.       10.       10.        9.        9.
             9.        8.        8.        7.        7.        7.        6.        6.        6.        5.
             5.        5.        5.        4.        4.        4.        3.        3.        3.        2.
             2.        2.        2.        1.        1.        1.        0.


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


          **************
          *            *
258 KK    *    SUBXI   *        RUNOFF FROM SUB-BASIN XI
          *            *
          **************

             SUBBASIN RUNOFF DATA

259 BA          SUBBASIN CHARACTERISTICS
                      TAREA         4.78  SUBBASIN AREA
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260 LU          UNIFORM LOSS RATE
                      STRTL         .96  INITIAL LOSS
                      CNSTL         .39  UNIFORM LOSS RATE
                      RTIMP        2.00  PERCENT IMPERVIOUS AREA

261 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        4.62  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                     141 END-OF-PERIOD ORDINATES
              5.      10.      17.      29.      41.      55.      70.      86.     104.     125.
            146.     172.     200.     228.     260.     293.     326.     354.     382.     407.
            426.     446.     461.     471.     482.     487.     489.     491.     490.     488.
            486.     476.     466.     455.     443.     431.     418.     404.     390.     374.
            357.     340.     320.     299.     278.     260.     243.     226.     213.     201.
            189.     179.     168.     159.     150.     141.     134.     128.     121.     115.
            109.     102.      97.      92.      86.      81.      76.      71.      68.      64.
             61.      57.      54.      51.      48.      46.      43.      40.      38.      36.
             34.      32.      30.      28.      27.      25.      24.      23.      21.      20.
             19.      18.      17.      16.      15.      14.      14.      13.      12.      11.
             11.      10.      10.       9.       9.       8.       7.       7.       7.       6.
              6.       6.       5.       5.       5.       5.       5.       4.       4.       4.
              4.       3.       3.       3.       3.       3.       2.       2.       2.       2.
              2.       2.       1.       1.       1.       1.       1.       1.       0.       0.
              0.

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

          **************
          *            *
262 KK    *     CP604  *       COMBINE HYDROGRAPHS RCH15 & SUB X & SUB XI
          *            *
          **************

263 HC          HYDROGRAPH COMBINATION
                      ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                  - ***

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

          **************
          *            *
264 KK    *     RCH16  *       ROUTE HYDROGRAPH CP604 THROUGH REACH 16
          *            *
          **************

             HYDROGRAPH ROUTING DATA

266 RL          ROUTING LOSSES
                      QLOSS         .00  INITIAL LOSS
                      CLOSS         .00  ADDITIONAL FRACTION LOST
                     PERCRT       10.00  CHANNEL PERCOLATION RATE
                     ELVINV         .00  INVERT ELEVATION

265 RS          STORAGE ROUTING
                      NSTPS           3  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC       -1.00  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

267 RC          NORMAL DEPTH CHANNEL
                        ANL        .055  LEFT OVERBANK N-VALUE
                       ANCH        .045  MAIN CHANNEL N-VALUE
                        ANR        .055  RIGHT OVERBANK N-VALUE
                      RLNTH       8200.  REACH LENGTH
                        SEL       .0030  ENERGY SLOPE
                      ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                     CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
```

```
269 RY        ELEVATION   1181.20   1175.10   1173.30   1165.70   1165.70   1172.40   1175.80   1180.70
268 RX        DISTANCE        .00    478.00    966.00    976.00    994.00   1006.00   1381.00   1907.00

                                                   ***

                                  COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      2.96      6.31     10.04     14.17     18.69     23.59     28.89     34.57     44.85
          OUTFLOW        .00     23.48     75.81    152.14    251.62    374.33    520.81    691.78    888.08   1145.31
        ELEVATION    1165.70   1166.52   1167.33   1168.15   1168.96   1169.78   1170.59   1171.41   1172.23   1173.04

          STORAGE      76.71    154.67    277.66    427.50    600.65    797.05   1016.73   1259.67   1525.87   1812.82
          OUTFLOW    1586.65   2499.79   4217.04   6857.55  10387.74  14859.89  20334.90  26875.64  34545.20  43978.84
        ELEVATION    1173.86   1174.67   1175.49   1176.31   1177.12   1177.94   1178.75   1179.57   1180.38   1181.20


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


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          *            *
270 KK    *   SUBXII   *       RUNOFF FROM SUB-BASIN XII
          *            *
          **************

             SUBBASIN RUNOFF DATA

271 BA          SUBBASIN CHARACTERISTICS
                      TAREA       10.32  SUBBASIN AREA

272 LU          UNIFORM LOSS RATE
                      STRTL         .95  INITIAL LOSS
                      CNSTL         .40  UNIFORM LOSS RATE
                      RTIMP        1.00  PERCENT IMPERVIOUS AREA

273 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG       10.39  LAG

                                                   ***

    *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 314 TO 300 INTERVALS

                                          UNIT HYDROGRAPH
                                   300 END-OF-PERIOD ORDINATES
                                          VOLUME = 1.00
          2.       5.       7.       9.      11.      14.      18.      23.      29.      34.
         39.      45.      51.      57.      64.      71.      78.      85.      92.     101.
        110.     119.     128.     137.     146.     158.     170.     182.     194.     207.
        219.     232.     246.     261.     275.     290.     304.     318.     330.     342.
        354.     366.     378.     390.     399.     407.     415.     424.     432.     440.
        446.     451.     455.     460.     464.     469.     472.     472.     473.     474.
        475.     475.     476.     475.     474.     474.     473.     472.     471.     467.
        463.     458.     454.     449.     445.     440.     434.     429.     424.     418.
        413.     408.     401.     395.     389.     383.     377.     371.     364.     356.
        348.     341.     333.     326.     317.     308.     299.     290.     281.     272.
        263.     256.     248.     240.     233.     225.     218.     213.     207.     202.
        197.     192.     186.     182.     177.     173.     168.     163.     159.     155.
        151.     147.     143.     140.     136.     132.     130.     127.     124.     121.
        119.     116.     113.     110.     108.     105.     102.      99.      97.      95.
         92.      90.      88.      85.      83.      81.      79.      76.      74.      72.
         70.      68.      67.      65.      64.      62.      61.      59.      58.      56.
         55.      53.      52.      50.      49.      48.      47.      46.      45.      43.
         42.      41.      40.      39.      38.      37.      36.      35.      34.      33.
         32.      32.      31.      30.      29.      28.      27.      27.      26.      25.
         25.      24.      24.      23.      23.      22.      21.      21.      20.      20.
         19.      19.      18.      18.      17.      17.      17.      16.      16.      15.
         15.      14.      14.      14.      13.      13.      13.      12.      12.      12.
         12.      11.      11.      11.      10.      10.      10.      10.       9.       9.
          9.       9.       8.       8.       8.       8.       8.       7.       7.       7.
          7.       7.       7.       6.       6.       6.       6.       6.       6.       5.
          5.       5.       5.       5.       5.       5.       5.       5.       5.       4.
          4.       4.       4.       4.       4.       4.       4.       4.       4.       4.
          3.       3.       3.       3.       3.       3.       3.       3.       3.       3.
          3.       2.       2.       2.       2.       2.       2.       2.       2.       2.
          2.       2.       2.       2.       1.       1.       1.       1.       1.       1.
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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          *            *
274 KK    *    CP605   *      COMBINE HYDROGRAPHS RCH16 & SUB XII & RCH9
          *            *
          **************

275 HC        HYDROGRAPH COMBINATION
                   ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                  ***

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

          **************
          *            *
276 KK    *    RCH17   *      ROUTE HYDROGRAPH CP605 THROUGH REACH 17
          *            *
          **************

            HYDROGRAPH ROUTING DATA

278 RL        ROUTING LOSSES
                  QLOSS        .00  INITIAL LOSS
                  CLOSS        .00  ADDITIONAL FRACTION LOST
                 PERCRT      10.00  CHANNEL PERCOLATION RATE
                 ELVINV        .00  INVERT ELEVATION

277 RS        STORAGE ROUTING
                  NSTPS          4  NUMBER OF SUBREACHES
                   ITYP       FLOW  TYPE OF INITIAL CONDITION
                 RSVRIC      -1.00  INITIAL CONDITION
                      X        .00 WORKING R AND D COEFFICIENT

279 RC        NORMAL DEPTH CHANNEL
                    ANL       .055  LEFT OVERBANK N-VALUE
                   ANCH       .045  MAIN CHANNEL N-VALUE
                    ANR       .055  RIGHT OVERBANK N-VALUE
                  RLNTH      9800.  REACH LENGTH
                    SEL      .0030  ENERGY SLOPE
                  ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
281 RY      ELEVATION   1159.70   1153.30   1153.80   1147.10   1147.10   1151.80   1153.10   1158.60
280 RX      DISTANCE        .00   1401.00   1617.00   1637.00   1662.00   1694.00   1720.00   2801.00
                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE        .00      4.21      9.40     15.55     22.67     30.76     39.82     49.85     61.40     75.21
        OUTFLOW        .00     23.95     80.28    167.01    285.56    438.01    626.65    853.80   1157.03   1514.94
      ELEVATION    1147.10   1147.76   1148.43   1149.09   1149.75   1150.42   1151.08   1151.74   1152.41   1153.07

        STORAGE     112.90    213.47    355.38    538.40    762.54   1027.78   1334.14   1681.60   2065.95   2473.07
        OUTFLOW    1976.63   2958.29   4567.43   6910.99  10102.72  14250.89  19458.45  25823.72  33918.61  43550.56
      ELEVATION    1153.73   1154.40   1155.06   1155.72   1156.38   1157.05   1157.71   1158.37   1159.04   1159.70

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

          **************
          *            *
282 KK    *   SBXIII   *      RUNOFF FROM SUB-BASIN XIII
          *            *
          **************

            SUBBASIN RUNOFF DATA

283 BA        SUBBASIN CHARACTERISTICS
```

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                TAREA        5.03  SUBBASIN AREA

284 LU        UNIFORM LOSS RATE
                STRTL         .95  INITIAL LOSS
                CNSTL         .40  UNIFORM LOSS RATE
                RTIMP         .00  PERCENT IMPERVIOUS AREA

285 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG        8.10  LAG

                                        ***

                                   UNIT HYDROGRAPH
                              245 END-OF-PERIOD ORDINATES
      2.      4.      5.      7.      9.     14.     18.     22.     26.     31.
     36.     42.     47.     52.     58.     66.     73.     80.     87.     96.
    105.    115.    125.    134.    145.    156.    168.    179.    191.    201.
    211.    221.    230.    240.    248.    254.    261.    268.    274.    279.
    282.    286.    290.    293.    294.    295.    296.    296.    297.    296.
    296.    295.    295.    294.    290.    287.    283.    279.    276.    272.
    267.    263.    259.    255.    250.    245.    240.    235.    230.    224.
    218.    212.    206.    199.    192.    185.    178.    170.    164.    158.
    152.    145.    139.    134.    130.    126.    122.    117.    114.    110.
    106.    103.     99.     96.     93.     90.     87.     84.     81.     79.
     77.     75.     73.     70.     68.     66.     64.     62.     60.     58.
     56.     54.     52.     51.     49.     47.     45.     43.     42.     41.
     40.     39.     37.     36.     35.     34.     33.     31.     31.     30.
     29.     28.     27.     26.     25.     24.     23.     23.     22.     21.
     21.     20.     19.     19.     18.     17.     17.     16.     16.     15.
     15.     14.     14.     13.     13.     12.     12.     12.     11.     11.
     11.     10.     10.     10.      9.      9.      9.      8.      8.      8.
      8.      7.      7.      7.      7.      6.      6.      6.      6.      6.
      5.      5.      5.      5.      5.      5.      4.      4.      4.      4.
      4.      4.      4.      4.      3.      3.      3.      3.      3.      3.
      3.      3.      3.      3.      3.      3.      2.      2.      2.      2.
      2.      2.      2.      2.      2.      2.      2.      2.      2.      2.
      1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
      1.      1.      1.      1.      1.      1.      1.      0.      0.      0.
      0.      0.      0.      0.      0.

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          *            *
286 KK    *   SUBXIV   *      RUNOFF FROM SUB-BASIN XIV
          *            *
          **************

            SUBBASIN RUNOFF DATA

287 BA        SUBBASIN CHARACTERISTICS
                TAREA       21.10  SUBBASIN AREA

288 LU        UNIFORM LOSS RATE
                STRTL         .96  INITIAL LOSS
                CNSTL         .36  UNIFORM LOSS RATE
                RTIMP        5.00  PERCENT IMPERVIOUS AREA

289 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG        7.55  LAG

                                        ***

                                   UNIT HYDROGRAPH
                              229 END-OF-PERIOD ORDINATES
      9.     17.     26.     35.     49.     69.     89.    110.    130.    156.
    182.    208.    234.    263.    298.    333.    368.    403.    446.    492.
    539.    586.    633.    689.    744.    799.    855.    906.    952.    999.
   1045.   1092.   1125.   1157.   1189.   1221.   1248.   1266.   1283.   1301.
   1318.   1324.   1327.   1330.   1333.   1335.   1332.   1329.   1326.   1323.
   1311.   1294.   1276.   1259.   1241.   1221.   1200.   1180.   1159.   1138.
   1114.   1091.   1068.   1044.   1016.    987.    958.    928.    897.    862.
    828.    793.    758.    727.    698.    668.    639.    611.    591.    571.
    550.    530.    511.    493.    476.    458.    441.    426.    412.    397.
    383.    370.    359.    348.    338.    327.    316.    306.    295.    284.
    274.    266.    257.    248.    239.    231.    222.    213.    204.    196.
    190.    184.    178.    172.    167.    161.    155.    149.    143.    139.
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134.    130.    126.    121.    117.    113.    108.    104.    100.    97.
 94.     91.     88.     84.     81.     78.     75.     72.     70.    68.
 66.     63.     61.     59.     57.     55.     53.     51.     49.    48.
 46.     45.     43.     41.     40.     38.     37.     36.     35.    34.
 33.     31.     30.     29.     28.     27.     26.     25.     24.    24.
 23.     22.     21.     20.     19.     19.     18.     18.     17.    17.
 16.     15.     15.     14.     14.     14.     13.     13.     13.    12.
 12.     12.     11.     11.     11.     10.     10.     10.      9.     9.
  8.      8.      8.      7.      7.      7.      6.      6.      6.     6.
  5.      5.      5.      4.      4.      4.      3.      3.      3.     3.
  2.      2.      2.      1.      1.      1.      1.      0.      0.

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          *            *
290 KK    *    CP606   *      COMBINE HYDROGRAPHS RCH17 & SUB XIII & SUB IV
          *            *
          **************

291 HC         HYDROGRAPH COMBINATION
                    ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                          ***

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

          **************
          *            *
292 KK    *    CP700   *      COMBINE HYDROGRAPHS CP606 & CP505
          *            *
          **************

                         ******************************************
                         CP700 IS CONFLUENCE OF EAST AND WEST PRONGS
                         AND IS THE LOWER LIMIT OF UPPER WATERSHED
                         ******************************************

300 HC         HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                          ***

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

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          *            *
301 KK    *   RCH710   *      ROUTE HYDROGRAPH CP700 THROUGH REACH 710
          *            *
          **************

            HYDROGRAPH ROUTING DATA

303 RL         ROUTING LOSSES
                   QLOSS        .00  INITIAL LOSS
                   CLOSS        .00  ADDITIONAL FRACTION LOST
                  PERCRT      10.00  CHANNEL PERCOLATION RATE
                  ELVINV        .00  INVERT ELEVATION

302 RS         STORAGE ROUTING
                   NSTPS          2  NUMBER OF SUBREACHES
                    ITYP       FLOW  TYPE OF INITIAL CONDITION
                  RSVRIC      -1.00  INITIAL CONDITION
                       X        .00 WORKING R AND D COEFFICIENT

304 RC         NORMAL DEPTH CHANNEL
                     ANL       .055  LEFT OVERBANK N-VALUE
                    ANCH       .045  MAIN CHANNEL N-VALUE
                     ANR       .055  RIGHT OVERBANK N-VALUE
                   RLNTH      6500.  REACH LENGTH
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                SEL        .0026  ENERGY SLOPE
              ELMAX           .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                              CROSS-SECTION DATA
                    --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
    RY    ELEVATION   1120.00   1114.00   1114.00   1103.00   1103.00   1111.00   1112.00   1120.00
    RX    DISTANCE    2767.00   3206.00   4047.00   4063.00   4115.00   4137.00   4339.00   4747.00

                                          ***

                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

      STORAGE        .00      7.19     14.89     23.09     31.79     40.99     50.70     60.91     71.62     82.87
      OUTFLOW        .00     73.49    235.47    467.71    764.22   1122.30   1540.73   2019.17   2557.78   3160.68
    ELEVATION    1103.00   1103.89   1104.79   1105.68   1106.58   1107.47   1108.37   1109.26   1110.16   1111.05

      STORAGE     107.90    149.23    196.87    332.23    515.02    712.64    925.10   1152.39   1394.52   1651.48
      OUTFLOW    3958.22   5110.15   6593.07   9002.20  13101.62  18578.92  25360.57  33429.04  42790.07  53462.76
    ELEVATION    1111.95   1112.84   1113.74   1114.63   1115.53   1116.42   1117.32   1118.21   1119.11   1120.00


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          *            *
307 KK    *   SUB720   *      RUNOFF FROM SUB-BASIN 720
          *            *
          **************

            SUBBASIN RUNOFF DATA

308 BA        SUBBASIN CHARACTERISTICS
                    TAREA       15.80  SUBBASIN AREA

309 LU        UNIFORM LOSS RATE
                    STRTL         .86  INITIAL LOSS
                    CNSTL         .34  UNIFORM LOSS RATE
                    RTIMP        3.00  PERCENT IMPERVIOUS AREA

310 UD        SCS DIMENSIONLESS UNITGRAPH
                     TLAG        4.34  LAG

                                          ***

                                     UNIT HYDROGRAPH
                                 132 END-OF-PERIOD ORDINATES
          20.      39.      68.     113.     159.     213.     272.     331.     409.     487.
         575.     679.     783.     901.    1025.    1147.    1251.    1355.    1445.    1517.
        1588.    1635.    1674.    1709.    1715.    1722.    1722.    1716.    1709.    1677.
        1638.    1598.    1552.    1507.    1458.    1406.    1354.    1291.    1226.    1158.
        1080.    1002.     931.     866.     801.     754.     708.     664.     625.     586.
         551.     518.     486.     461.     438.     414.     390.     366.     345.     326.
         306.     287.     267.     250.     237.     224.     211.     198.     185.     175.
         165.     155.     146.     136.     128.     121.     114.     106.      99.      93.
          88.      83.      78.      74.      69.      65.      62.      58.      54.      51.
          48.      45.      43.      40.      38.      35.      33.      31.      29.      28.
          26.      24.      23.      22.      20.      19.      18.      18.      17.      16.
          15.      14.      14.      13.      12.      11.      11.      10.       9.       8.
           8.       7.       6.       6.       5.       4.       4.       3.       2.       2.
           1.       0.


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          *            *
311 KK    *   RCH730   *      ROUTE HYDROGRAPH SUB720 THROUGH REACH 730
          *            *
          **************

            HYDROGRAPH ROUTING DATA

313 RL        ROUTING LOSSES
                    QLOSS         .00  INITIAL LOSS
                    CLOSS         .00  ADDITIONAL FRACTION LOST
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                PERCRT       10.00  CHANNEL PERCOLATION RATE
                ELVINV         .00  INVERT ELEVATION

312 RS        STORAGE ROUTING
                 NSTPS           7  NUMBER OF SUBREACHES
                  ITYP        FLOW  TYPE OF INITIAL CONDITION
                RSVRIC       -1.00  INITIAL CONDITION
                     X         .00 WORKING R AND D COEFFICIENT

314 RC        NORMAL DEPTH CHANNEL
                   ANL        .070  LEFT OVERBANK N-VALUE
                  ANCH        .035  MAIN CHANNEL N-VALUE
                   ANR        .070  RIGHT OVERBANK N-VALUE
                 RLNTH      21500.  REACH LENGTH
                   SEL       .0058  ENERGY SLOPE
                 ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
316 RY      ELEVATION     20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
315 RX      DISTANCE     100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE        .00      2.94      6.56     10.87     25.09     76.55    128.05    179.58    231.14    282.73
        OUTFLOW        .00     11.57     38.64     80.19    145.92    356.85    688.19   1116.44   1629.76   2220.32
      ELEVATION      10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

        STORAGE     334.36    386.03    437.73    489.46    541.23    593.03    644.86    696.73    748.64    800.57
        OUTFLOW    2882.32   3611.18   4403.13   5255.00   6164.05   7127.87   8144.32   9211.48  10327.60  11491.09
      ELEVATION      15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     9211. TO    11491.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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          *            *
317 KK    *   SUB730   *       RUNOFF FROM SUB-BASIN 730
          *            *
          **************

             SUBBASIN RUNOFF DATA

318 BA        SUBBASIN CHARACTERISTICS
                TAREA        2.60  SUBBASIN AREA

319 LU        UNIFORM LOSS RATE
                STRTL         .99  INITIAL LOSS
                CNSTL         .34  UNIFORM LOSS RATE
                RTIMP         .00  PERCENT IMPERVIOUS AREA

320 UD        SCS DIMENSIONLESS UNITGRAPH
                 TLAG        4.65  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                         142 END-OF-PERIOD ORDINATES
          3.       6.       9.      16.      22.      29.      38.      46.      56.      67.
         78.      92.     107.     122.     139.     157.     174.     189.     204.     219.
        229.     239.     248.     254.     260.     263.     264.     265.     265.     264.
        263.     258.     253.     247.     241.     234.     228.     220.     213.     205.
        195.     186.     176.     165.     154.     143.     134.     125.     117.     111.
        104.      99.      93.      87.      83.      78.      74.      70.      67.      63.
         60.      57.      53.      51.      48.      45.      42.      39.      37.      36.
         34.      32.      30.      28.      27.      25.      24.      23.      21.      20.
         19.      18.      17.      16.      15.      14.      13.      13.      12.      11.
         11.      10.      10.       9.       8.       8.       8.       7.       7.       6.
          6.       6.       5.       5.       5.       5.       4.       4.       4.       4.
          3.       3.       3.       3.       3.       3.       3.       2.       2.       2.
          2.       2.       2.       2.       2.       2.       1.       1.       1.       1.
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                1.        1.        1.        1.        1.        1.        0.        0.        0.        0.
                0.        0.

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            **************
            *            *
321 KK      *    CP710   *       COMBINE HYDROGRAPHS RCH730 & SUB730
            *            *
            **************

322 HC          HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                  ***

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

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            *            *
323 KK      *   SUB740   *       RUNOFF FROM SUB-BASIN 740
            *            *
            **************

               SUBBASIN RUNOFF DATA

324 BA          SUBBASIN CHARACTERISTICS
                     TAREA        5.20  SUBBASIN AREA

325 LU          UNIFORM LOSS RATE
                     STRTL         .49  INITIAL LOSS
                     CNSTL         .07  UNIFORM LOSS RATE
                     RTIMP       10.00  PERCENT IMPERVIOUS AREA

UD              SCS DIMENSIONLESS UNITGRAPH
                      TLAG         .44  LAG
                                                                  ***

                                                   UNIT HYDROGRAPH
                                              15 END-OF-PERIOD ORDINATES
               1022.     3462.     4793.     4229.     2740.     1563.      954.      565.      336.      198.
                120.       70.       45.       26.       11.

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

            **************
            *            *
327 KK      *   RCH750   *       ROUTE HYDROGRAPH SUB740 THROUGH REACH 750
            *            *
            **************

               HYDROGRAPH ROUTING DATA

329 RL          ROUTING LOSSES
                     QLOSS         .00  INITIAL LOSS
                     CLOSS         .00  ADDITIONAL FRACTION LOST
                    PERCRT       10.00  CHANNEL PERCOLATION RATE
                    ELVINV         .00  INVERT ELEVATION

328 RS          STORAGE ROUTING
                     NSTPS          13  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

330 RC          NORMAL DEPTH CHANNEL
                       ANL        .070  LEFT OVERBANK N-VALUE
                      ANCH        .035  MAIN CHANNEL N-VALUE
                       ANR        .070  RIGHT OVERBANK N-VALUE
                     RLNTH      38600.  REACH LENGTH
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                    SEL       .0130  ENERGY SLOPE
                  ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
332 RY      ELEVATION    20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
331 RX      DISTANCE    100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE        .00      5.28     11.78     19.51     45.05    137.44    229.89    322.40    414.97    507.60
        OUTFLOW        .00     17.33     57.85    120.05    218.46    534.24   1030.30   1671.44   2439.95   3324.10
      ELEVATION      10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

        STORAGE     600.30    693.05    785.87    878.75    971.69   1064.69   1157.75   1250.88   1344.06   1437.31
        OUTFLOW    4315.19   5406.38   6592.03   7867.39   9228.35  10671.31  12193.06  13790.72  15461.69  17203.58
      ELEVATION      15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     4315. TO    17204.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

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          *            *
333 KK    *   SUB750   *      RUNOFF FROM SUB-BASIN 750
          *            *
          **************

             SUBBASIN RUNOFF DATA

334 BA          SUBBASIN CHARACTERISTICS
                      TAREA       25.00  SUBBASIN AREA

335 LU          UNIFORM LOSS RATE
                      STRTL         .91  INITIAL LOSS
                      CNSTL         .40  UNIFORM LOSS RATE
                      RTIMP         .00  PERCENT IMPERVIOUS AREA

336 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        5.36  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                     163 END-OF-PERIOD ORDINATES
             20.       41.       61.      101.      149.      197.      250.      312.      373.      438.
            520.      601.      683.      789.      898.     1007.     1129.     1258.     1387.     1508.
           1617.     1726.     1830.     1904.     1979.     2054.     2099.     2140.     2180.     2200.
           2207.     2214.     2216.     2209.     2203.     2193.     2153.     2112.     2071.     2025.
           1977.     1930.     1878.     1824.     1770.     1712.     1644.     1576.     1508.     1426.
           1345.     1263.     1192.     1124.     1056.      998.      950.      903.      857.      816.
            775.      734.      700.      666.      632.      604.      580.      555.      530.      505.
            480.      456.      436.      415.      395.      375.      354.      334.      318.      304.
            291.      277.      263.      250.      237.      226.      216.      206.      196.      186.
            175.      167.      159.      152.      144.      137.      129.      122.      117.      112.
            107.      102.       96.       91.       87.       83.       79.       76.       72.       68.
             65.       62.       59.       56.       54.       51.       48.       46.       44.       42.
             40.       38.       36.       33.       32.       31.       29.       28.       27.       25.
             24.       23.       22.       22.       21.       20.       19.       18.       18.       17.
             16.       15.       14.       14.       13.       12.       11.       10.       10.        9.
              8.        8.        7.        6.        6.        5.        4.        4.        3.        2.
              2.        1.        0.

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

          **************
          *            *
337 KK    *    CP710   *      COMBINE HYDROGRAPHS RCH750 & SUB750
          *            *
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338 HC          HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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


          **************
          *            *
339 KK    *     CP710  *       COMBINE ALL HYDROGRAPHS ABOVE CP710
          *            *
          **************

340 HC          HYDROGRAPH COMBINATION
                     ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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


          **************
          *            *
341 KK    *    RCH760  *       ROUTE HYDROGRAPH CP710 THROUGH REACH 760
          *            *
          **************

             HYDROGRAPH ROUTING DATA

343 RL          ROUTING LOSSES
                     QLOSS         .00  INITIAL LOSS
                     CLOSS         .00  ADDITIONAL FRACTION LOST
                    PERCRT       10.00  CHANNEL PERCOLATION RATE
                    ELVINV         .00  INVERT ELEVATION

342 RS          STORAGE ROUTING
                     NSTPS           2  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

344 RC          NORMAL DEPTH CHANNEL
                       ANL        .055  LEFT OVERBANK N-VALUE
                      ANCH        .045  MAIN CHANNEL N-VALUE
                       ANR        .055  RIGHT OVERBANK N-VALUE
                     RLNTH       6300.  REACH LENGTH
                       SEL       .0027  ENERGY SLOPE
                     ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
346 RY       ELEVATION   1070.00   1065.00   1057.00   1057.00   1066.00   1065.00   1065.00   1070.00
345 RX       DISTANCE    1772.00   3567.00   3599.00   3653.00   3681.00   3841.00   5268.00   5297.00

                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      5.58     11.65     18.20     25.23     32.74     40.73     49.20     58.16     67.59
          OUTFLOW        .00     50.26    162.51    325.33    535.21    790.68   1091.20   1436.76   1827.64   2264.36
        ELEVATION    1057.00   1057.68   1058.37   1059.05   1059.74   1060.42   1061.11   1061.79   1062.47   1063.16

          STORAGE      77.51     87.91    143.89    324.94    537.77    775.44   1037.81   1324.87   1636.64   1973.10
          OUTFLOW    2747.56   3278.00   3098.99   4410.36   8459.97  14144.32  21348.80  30107.86  40468.44  52483.52
        ELEVATION    1063.84   1064.53   1065.21   1065.89   1066.58   1067.26   1067.95   1068.63   1069.32   1070.00

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          *            *
347 KK    *   SUB760   *      RUNOFF FROM SUB-BASIN 760
          *            *
          **************

             SUBBASIN RUNOFF DATA

348 BA         SUBBASIN CHARACTERISTICS
                    TAREA        4.70  SUBBASIN AREA

349 LU         UNIFORM LOSS RATE
                    STRTL         .99  INITIAL LOSS
                    CNSTL         .32  UNIFORM LOSS RATE
                    RTIMP         .00  PERCENT IMPERVIOUS AREA

350 UD         SCS DIMENSIONLESS UNITGRAPH
                     TLAG        4.23  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                         129 END-OF-PERIOD ORDINATES
             6.      12.      22.      36.      50.      68.      86.     106.     130.     155.
           184.     217.     250.     288.     327.     363.     395.     428.     451.     474.
           493.     505.     518.     523.     525.     526.     524.     522.     515.     502.
           490.     476.     462.     447.     431.     414.     395.     375.     354.     329.
           305.     283.     262.     242.     228.     214.     200.     188.     176.     165.
           155.     146.     138.     131.     123.     116.     109.     102.      96.      90.
            84.      78.      74.      70.      66.      62.      57.      54.      51.      48.
            45.      42.      39.      37.      35.      33.      30.      28.      27.      25.
            24.      22.      21.      20.      19.      17.      16.      15.      14.      14.
            13.      12.      11.      11.      10.       9.       9.       8.       8.       7.
             7.       6.       6.       6.       5.       5.       5.       5.       4.       4.
             4.       4.       3.       3.       3.       3.       3.       2.       2.       2.
             2.       2.       1.       1.       1.       1.       0.       0.       0.

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

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          *            *
351 KK    *   CP760    *      COMBINE ALL HYDROGRAPHS ABOVE CP760
          *            *
          **************

352 HC         HYDROGRAPH COMBINATION
                    ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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

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          *            *
353 KK    *   RCH770   *      ROUTE HYDROGRAPH CP760 THROUGH REACH 770
          *            *
          **************

             HYDROGRAPH ROUTING DATA

355 RL         ROUTING LOSSES
                    QLOSS         .00  INITIAL LOSS
                    CLOSS         .00  ADDITIONAL FRACTION LOST
                   PERCRT       10.00  CHANNEL PERCOLATION RATE
                   ELVINV         .00  INVERT ELEVATION

354 RS         STORAGE ROUTING
                   NSTPS           5  NUMBER OF SUBREACHES
                    ITYP        FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC       -1.00  INITIAL CONDITION
                        X         .00 WORKING R AND D COEFFICIENT

356 RC         NORMAL DEPTH CHANNEL
                     ANL        .055  LEFT OVERBANK N-VALUE
                    ANCH        .045  MAIN CHANNEL N-VALUE
```

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                ANR        .055  RIGHT OVERBANK N-VALUE
              RLNTH      14600.  REACH LENGTH
                SEL      .0027  ENERGY SLOPE
              ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
    RY     ELEVATION   1070.00   1065.00   1057.00   1057.00   1066.00   1065.00   1065.00   1070.00
357 RX     DISTANCE    1772.00   3567.00   3599.00   3653.00   3681.00   3841.00   5268.00   5297.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

      STORAGE        .00     12.94     27.00     42.17     58.46     75.86     94.38    114.02    134.77    156.64
      OUTFLOW        .00     50.26    162.51    325.33    535.21    790.68   1091.20   1436.76   1827.64   2264.36
    ELEVATION    1057.00   1057.68   1058.37   1059.05   1059.74   1060.42   1061.11   1061.79   1062.47   1063.16

      STORAGE     179.62    203.72    333.46    753.03   1246.27   1797.05   2405.08   3070.34   3792.84   4572.58
      OUTFLOW    2747.56   3278.00   3098.99   4410.36   8459.97  14144.32  21348.80  30107.86  40468.44  52483.52
    ELEVATION    1063.84   1064.53   1065.21   1065.89   1066.58   1067.26   1067.95   1068.63   1069.32   1070.00


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          *            *
359 KK    *   SUB780   *       RUNOFF FROM SUB-BASIN 780
          *            *
          **************

             SUBBASIN RUNOFF DATA

360 BA          SUBBASIN CHARACTERISTICS
                     TAREA        8.20  SUBBASIN AREA

    LU          UNIFORM LOSS RATE
                     STRTL         .94  INITIAL LOSS
                     CNSTL         .54  UNIFORM LOSS RATE
                     RTIMP        1.00  PERCENT IMPERVIOUS AREA

362 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG        3.20  LAG

                                                  ***

                                                UNIT HYDROGRAPH
                                          98 END-OF-PERIOD ORDINATES
              18.       37.       80.      124.      179.      236.      309.      386.      484.      585.
             701.      814.      912.     1004.     1071.     1131.     1168.     1196.     1202.     1205.
            1199.     1182.     1146.     1107.     1064.     1019.      970.      915.      854.      787.
             714.      646.      585.      533.      490.      451.      414.      381.      350.      324.
             302.      280.      257.      238.      219.      201.      183.      169.      156.      144.
             132.      122.      113.      104.       94.       87.       81.       74.       67.       62.
              58.       53.       48.       45.       42.       38.       35.       32.       30.       28.
              25.       23.       22.       20.       18.       17.       15.       14.       13.       12.
              12.       11.       10.        9.        9.        8.        7.        7.        6.        5.
               5.        4.        3.        3.        2.        2.        1.        0.


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


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          *            *
363 KK    *   RCH790   *       ROUTE HYDROGRAPH SUB780 THROUGH REACH 790
          *            *
          **************

             HYDROGRAPH ROUTING DATA

365 RL          ROUTING LOSSES
                     QLOSS         .00  INITIAL LOSS
                     CLOSS         .00  ADDITIONAL FRACTION LOST
                    PERCRT       10.00  CHANNEL PERCOLATION RATE
                    ELVINV         .00  INVERT ELEVATION
```

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364 RS          STORAGE ROUTING
                     NSTPS          4  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

366 RC          NORMAL DEPTH CHANNEL
                       ANL       .050  LEFT OVERBANK N-VALUE
                      ANCH       .025  MAIN CHANNEL N-VALUE
                       ANR       .050  RIGHT OVERBANK N-VALUE
                     RLNTH      11200.  REACH LENGTH
                       SEL      .0071  ENERGY SLOPE
                     ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                         --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
368 RY       ELEVATION    20.00    13.00    13.00    10.00    10.00    13.00    13.00    20.00
367 RX       DISTANCE    100.00   101.00   175.00   185.00   215.00   225.00   299.00   300.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE       .00     4.30     9.07    14.32    20.04    26.23    38.89    65.70    92.53   119.39
        OUTFLOW       .00    52.62   170.58   342.96   567.32   843.40  1204.52  1818.35  2615.39  3566.63
      ELEVATION     10.00    10.53    11.05    11.58    12.11    12.63    13.16    13.68    14.21    14.74

        STORAGE    146.26   173.15   200.06   226.99   253.95   280.92   307.91   334.93   361.96   389.02
        OUTFLOW   4656.24  5873.33  7209.60  8658.40 10214.15 11872.11 13628.13 15478.54 17420.08 19449.79
      ELEVATION     15.26    15.79    16.32    16.84    17.37    17.89    18.42    18.95    19.47    20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      343. TO    19450.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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          *            *
369 KK    *   SUB800   *      RUNOFF FROM SUB-BASIN 800
          *            *
          **************

             SUBBASIN RUNOFF DATA

370 BA          SUBBASIN CHARACTERISTICS
                     TAREA      10.90  SUBBASIN AREA

371 LU          UNIFORM LOSS RATE
                     STRTL        .84  INITIAL LOSS
                     CNSTL        .36  UNIFORM LOSS RATE
                     RTIMP       3.00  PERCENT IMPERVIOUS AREA

372 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG       4.88  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                     148 END-OF-PERIOD ORDINATES
          11.      21.      32.      57.      82.     107.     140.     172.     204.     247.
         290.     334.     391.     448.     506.     574.     641.     708.     765.     822.
         876.     915.     954.     990.    1012.    1033.    1051.    1055.    1058.    1060.
        1057.    1053.    1045.    1024.    1002.     980.     955.     930.     904.     876.
         847.     817.     781.     745.     707.     665.     622.     582.     546.     510.
         479.     454.     429.     405.     384.     363.     343.     325.     307.     291.
         278.     265.     252.     239.     226.     214.     204.     193.     182.     172.
         161.     152.     145.     138.     131.     124.     117.     110.     105.     100.
          94.      89.      84.      79.      75.      71.      68.      64.      60.      57.
          54.      51.      49.      46.      43.      41.      39.      37.      35.      33.
          31.      30.      28.      27.      25.      24.      23.      21.      20.      19.
          18.      17.      16.      15.      15.      14.      13.      12.      12.      11.
          11.      10.      10.      10.       9.       9.       8.       8.       7.       7.
           7.       6.       6.       5.       5.       5.       4.       4.       4.       3.
           3.       2.       2.       2.       1.       1.       1.       0.
```

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

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          *            *
373 KK    *   DVT800   *      SPLIT HYDROGRAPH SUB800 50/50
          *            *
          **************

    DT        DIVERSION
                   ISTAD     DVT805  DIVERSION HYDROGRAPH IDENTIFICATION

    DI           INFLOW        .00    100.00   1000.00  10000.00

    DQ     DIVERTED FLOW       .00     50.00    500.00   5000.00

                                                   ***


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          **************
          *            *
377 KK    *   RCH810   *      ROUTE HYDROGRAPH DVT800 THROUGH REACH 810
          *            *
          **************

            HYDROGRAPH ROUTING DATA

379 RL        ROUTING LOSSES
                   QLOSS        .00  INITIAL LOSS
                   CLOSS        .00  ADDITIONAL FRACTION LOST
                  PERCRT      10.00  CHANNEL PERCOLATION RATE
                  ELVINV        .00  INVERT ELEVATION

RS            STORAGE ROUTING
                  NSTPS          5  NUMBER OF SUBREACHES
                   ITYP       FLOW  TYPE OF INITIAL CONDITION
                  RSVRIC      -1.00  INITIAL CONDITION
                       X        .00 WORKING R AND D COEFFICIENT

380 RC        NORMAL DEPTH CHANNEL
                    ANL       .070  LEFT OVERBANK N-VALUE
                   ANCH       .035  MAIN CHANNEL N-VALUE
                    ANR       .070  RIGHT OVERBANK N-VALUE
                  RLNTH      16000.  REACH LENGTH
                    SEL      .0069  ENERGY SLOPE
                  ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
382 RY      ELEVATION     20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
381 RX      DISTANCE     100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                                   ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE       .00      2.19      4.88      8.09     18.68     56.97     95.29    133.64    172.01    210.41
        OUTFLOW       .00     12.62     42.14     87.46    159.16    389.22    750.62   1217.71   1777.60   2421.74
      ELEVATION     10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

        STORAGE    248.83    287.28    325.75    364.25    402.77    441.32    479.90    518.50    557.12    595.78
        OUTFLOW   3143.79   3938.76   4802.55   5731.70   6723.22   7774.47   8883.12  10047.08  11264.45  12533.48
      ELEVATION     15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     8883. TO    12533.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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              *            *
383 KK        *   SUB810   *       RUNOFF FROM SUB-BASIN 810
              *            *
              **************

                 SUBBASIN RUNOFF DATA

384 BA             SUBBASIN CHARACTERISTICS
                        TAREA        4.00  SUBBASIN AREA

385 LU             UNIFORM LOSS RATE
                        STRTL         .99  INITIAL LOSS
                        CNSTL         .42  UNIFORM LOSS RATE
                        RTIMP         .00  PERCENT IMPERVIOUS AREA

386 UD             SCS DIMENSIONLESS UNITGRAPH
                         TLAG        3.16  LAG

                                                    ***

                                                UNIT HYDROGRAPH
                                          97 END-OF-PERIOD ORDINATES
                 9.      19.      40.      63.      90.     119.     156.     195.     244.     296.
               354.     409.     458.     501.     535.     562.     581.     591.     595.     594.
               591.     579.     561.     540.     519.     495.     471.     442.     411.     375.
               339.     307.     277.     254.     233.     215.     196.     181.     166.     155.
               144.     132.     122.     112.     103.      94.      86.      80.      74.      67.
                62.      57.      53.      48.      44.      41.      37.      34.      31.      29.
                27.      24.      23.      21.      19.      18.      16.      15.      14.      13.
                12.      11.      10.       9.       8.       8.       7.       6.       6.       6.
                 5.       5.       5.       4.       4.       4.       3.       3.       3.       2.
                 2.       2.       1.       1.       1.       0.       0.

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

              **************
              *            *
387 KK        *    CP810   *       COMBINE HYDROGRAPHS RCH810 & SUB810
              *            *
              **************

388 HC             HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                    ***

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

              **************
              *            *
389 KK        *   RCH795   *       ROUTE HYDROGRAPH CP810 THROUGH REACH 795
              *            *
              **************

                 HYDROGRAPH ROUTING DATA

391 RL             ROUTING LOSSES
                        QLOSS         .00  INITIAL LOSS
                        CLOSS         .00  ADDITIONAL FRACTION LOST
                       PERCRT       10.00  CHANNEL PERCOLATION RATE
                       ELVINV         .00  INVERT ELEVATION

390 RS             STORAGE ROUTING
                        NSTPS           3  NUMBER OF SUBREACHES
                         ITYP        FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

392 RC             NORMAL DEPTH CHANNEL
                          ANL        .050  LEFT OVERBANK N-VALUE
                         ANCH        .025  MAIN CHANNEL N-VALUE
                          ANR        .050  RIGHT OVERBANK N-VALUE
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                RLNTH        8600.  REACH LENGTH
                  SEL        .0056  ENERGY SLOPE
                ELMAX           .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                    CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 RY      ELEVATION     20.00     13.00     13.00     10.00     10.00     13.00     13.00     20.00
 RX      DISTANCE     100.00    101.00    175.00    185.00    215.00    225.00    299.00    300.00

                                                  ***

                                    COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

      STORAGE       .00      3.30      6.96     10.99     15.39     20.14     29.86     50.45     71.05     91.67
      OUTFLOW       .00     46.74    151.49    304.58    503.84    749.03   1069.74   1614.89   2322.75   3167.54
    ELEVATION     10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

      STORAGE    112.30    132.95    153.62    174.30    195.00    215.71    236.43    257.18    277.94    298.71
      OUTFLOW   4135.23   5216.14   6402.89   7689.57   9071.25  10543.69  12103.22  13746.59  15470.88  17273.47
    ELEVATION     15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      504. TO    17273.
               THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
               THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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


          **************
          *            *
395 KK    *   SUB790   *      RUNOFF FROM SUB-BASIN 790
          *            *
          **************

             SUBBASIN RUNOFF DATA

 BA            SUBBASIN CHARACTERISTICS
                    TAREA        4.60  SUBBASIN AREA

397 LU         UNIFORM LOSS RATE
                    STRTL        1.02  INITIAL LOSS
                    CNSTL         .29  UNIFORM LOSS RATE
                    RTIMP         .00  PERCENT IMPERVIOUS AREA

398 UD         SCS DIMENSIONLESS UNITGRAPH
                     TLAG        2.63  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                     81 END-OF-PERIOD ORDINATES
          15.      38.      73.     116.     163.     223.     293.     374.     467.     559.
         640.     705.     760.     791.     813.     818.     815.     808.     778.     745.
         710.     671.     628.     578.     522.     462.     411.     365.     330.     298.
         269.     243.     221.     203.     185.     167.     152.     137.     121.     111.
         101.      91.      83.      75.      67.      61.      55.      50.      44.      41.
          37.      33.      30.      27.      25.      22.      20.      18.      17.      15.
          14.      12.      11.      10.       9.       8.       8.       7.       7.       6.
           5.       5.       4.       4.       3.       3.       2.       2.       1.       1.
           0.


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


          **************
          *            *
399 KK    *   CP770    *      COMBINE HYDROGRAPHS RCH790, RCH795 & SUB790
          *            *
          **************

 HC          HYDROGRAPH COMBINATION
                    ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

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

          **************
          *            *
401 KK    *    CP770   *      COMBINE ALL HYDROGRAPHS ABOVE CP770
          *            *
          **************

402 HC         HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                          ***

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

          **************
          *            *
403 KK    *   RCH820   *      ROUTE HYDROGRAPH CP770 THROUGH REACH 820
          *            *
          **************

             HYDROGRAPH ROUTING DATA

405 RL         ROUTING LOSSES
                    QLOSS        .00  INITIAL LOSS
                    CLOSS        .00  ADDITIONAL FRACTION LOST
                   PERCRT      10.00  CHANNEL PERCOLATION RATE
                   ELVINV        .00  INVERT ELEVATION

404 RS         STORAGE ROUTING
                    NSTPS          2  NUMBER OF SUBREACHES
                     ITYP       FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC      -1.00  INITIAL CONDITION
                        X        .00 WORKING R AND D COEFFICIENT

406 RC         NORMAL DEPTH CHANNEL
                      ANL       .055  LEFT OVERBANK N-VALUE
                     ANCH       .045  MAIN CHANNEL N-VALUE
                      ANR       .055  RIGHT OVERBANK N-VALUE
                    RLNTH      5500.  REACH LENGTH
                      SEL      .0071  ENERGY SLOPE
                    ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
408 RY       ELEVATION   1000.00   994.00   987.00   988.00   994.00   993.00   993.00  1000.00
407 RX       DISTANCE    2069.00  2933.00  3070.00  3135.00  3163.00  3226.00  3834.00  4251.00
                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00     2.50     9.48    18.27    28.50    40.16    53.25    67.78    83.73   113.43
          OUTFLOW        .00    25.87   174.58   470.37   898.95  1463.41  2169.21  3022.85  4031.26  5044.41
        ELEVATION     987.00   987.68   988.37   989.05   989.74   990.42   991.11   991.79   992.47   993.16

          STORAGE     190.07   276.39   374.64   484.93   607.25   741.60   887.98  1046.40  1216.85  1399.34
          OUTFLOW    6751.25  9734.38 14144.21 19824.74 26745.48 34932.24 44429.96 55291.27 67572.17 81330.04
        ELEVATION     993.84   994.53   995.21   995.89   996.58   997.26   997.95   998.63   999.32  1000.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN    67572. TO    81330.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

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          *            *
409 KK    *   SUB830   *      RUNOFF FROM SUB-BASIN 830
          *            *
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  SUBBASIN RUNOFF DATA

410 BA      SUBBASIN CHARACTERISTICS
                TAREA        5.50  SUBBASIN AREA

411 LU      UNIFORM LOSS RATE
                STRTL         .50  INITIAL LOSS
                CNSTL         .08  UNIFORM LOSS RATE
                RTIMP        9.00  PERCENT IMPERVIOUS AREA

412 UD      SCS DIMENSIONLESS UNITGRAPH
                TLAG         .21  LAG

                                          ***

                                     UNIT HYDROGRAPH
                                 8 END-OF-PERIOD ORDINATES
     5487.     8861.     4181.     1695.      664.      262.      105.       42.


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*            *
413 KK  *  RCH840  *      ROUTE HYDROGRAPH SUB830 THROUGH REACH 840
*            *
**************

  HYDROGRAPH ROUTING DATA

415 RL      ROUTING LOSSES
                QLOSS         .00  INITIAL LOSS
                CLOSS         .00  ADDITIONAL FRACTION LOST
               PERCRT       10.00  CHANNEL PERCOLATION RATE
               ELVINV         .00  INVERT ELEVATION

RS          STORAGE ROUTING
                NSTPS          14  NUMBER OF SUBREACHES
                 ITYP        FLOW  TYPE OF INITIAL CONDITION
               RSVRIC       -1.00  INITIAL CONDITION
                    X         .00 WORKING R AND D COEFFICIENT

416 RC      NORMAL DEPTH CHANNEL
                  ANL        .070  LEFT OVERBANK N-VALUE
                 ANCH        .035  MAIN CHANNEL N-VALUE
                  ANR        .070  RIGHT OVERBANK N-VALUE
                RLNTH      42500.  REACH LENGTH
                  SEL       .0069  ENERGY SLOPE
                ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
418 RY     ELEVATION    20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
417 RX     DISTANCE    100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                          ***

                                COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE       .00      5.81     12.97     21.49     49.61    151.33    253.12    354.97    456.90    558.89
        OUTFLOW       .00     12.62     42.14     87.46    159.16    389.22    750.62   1217.71   1777.60   2421.74
      ELEVATION     10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

        STORAGE    660.95    763.08    865.27    967.54   1069.87   1172.26   1274.73   1377.26   1479.86   1582.53
        OUTFLOW   3143.79   3938.76   4802.55   5731.70   6723.22   7774.47   8883.12  10047.08  11264.45  12533.48
      ELEVATION     15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     7774. TO    12533.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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              *            *
419 KK        *   SUB840   *       RUNOFF FROM SUB-BASIN 840
              *            *
              **************

                 SUBBASIN RUNOFF DATA

420 BA             SUBBASIN CHARACTERISTICS
                        TAREA       17.00  SUBBASIN AREA

421 LU             UNIFORM LOSS RATE
                        STRTL         .97  INITIAL LOSS
                        CNSTL         .38  UNIFORM LOSS RATE
                        RTIMP         .00  PERCENT IMPERVIOUS AREA

422 UD             SCS DIMENSIONLESS UNITGRAPH
                         TLAG        6.44  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                     195 END-OF-PERIOD ORDINATES
                 10.      19.      29.      40.      62.      85.     107.     131.     160.     189.
                218.     249.     288.     326.     365.     408.     459.     511.     562.     618.
                679.     740.     801.     857.     909.     960.    1012.    1054.    1089.    1124.
               1160.    1184.    1203.    1223.    1242.    1249.    1252.    1255.    1258.    1256.
               1253.    1250.    1246.    1228.    1209.    1189.    1170.    1147.    1125.    1102.
               1080.    1054.    1028.    1002.     975.     943.     911.     879.     845.     806.
                768.     729.     693.     661.     629.     596.     569.     546.     524.     501.
                480.     461.     442.     422.     405.     389.     373.     357.     344.     332.
                321.     309.     297.     285.     274.     262.     252.     242.     233.     223.
                213.     204.     194.     185.     178.     172.     165.     159.     152.     146.
                140.     134.     129.     124.     119.     114.     109.     105.     100.      95.
                 92.      88.      85.      81.      78.      74.      71.      68.      65.      63.
                 61.      58.      56.      53.      51.      49.      47.      45.      44.      42.
                 40.      38.      37.      35.      34.      33.      31.      30.      29.      28.
                 26.      25.      24.      23.      22.      22.      21.      20.      19.      18.
                 17.      17.      16.      15.      15.      14.      14.      13.      13.      13.
                 12.      12.      11.      11.      11.      10.      10.       9.       9.       9.
                  8.       8.       8.       7.       7.       6.       6.       6.       5.       5.
                  5.       4.       4.       4.       3.       3.       3.       2.       2.       2.
                  2.       1.       1.       1.       0.

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              *            *
423 KK        *    CP820   *       COMBINE HYDROGRAPHS RCH840 & SUB840
              *            *
              **************

424 HC             HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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              **************
              *            *
425 KK        *    CP820   *       COMBINE ALL HYDROGRAPHS ABOVE CP820
              *            *
              **************

426 HC             HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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              *            *
427 KK        *   RCH850   *      ROUTE HYDROGRAPH CP820 THROUGH REACH 850
              *            *
              **************

                 HYDROGRAPH ROUTING DATA

429 RL             ROUTING LOSSES
                        QLOSS        .00  INITIAL LOSS
                        CLOSS        .00  ADDITIONAL FRACTION LOST
                       PERCRT      10.00  CHANNEL PERCOLATION RATE
                       ELVINV        .00  INVERT ELEVATION

428 RS             STORAGE ROUTING
                        NSTPS          3  NUMBER OF SUBREACHES
                         ITYP       FLOW  TYPE OF INITIAL CONDITION
                       RSVRIC      -1.00  INITIAL CONDITION
                            X        .00 WORKING R AND D COEFFICIENT

430 RC             NORMAL DEPTH CHANNEL
                          ANL       .055  LEFT OVERBANK N-VALUE
                         ANCH       .045  MAIN CHANNEL N-VALUE
                          ANR       .055  RIGHT OVERBANK N-VALUE
                        RLNTH      7600.  REACH LENGTH
                          SEL      .0071  ENERGY SLOPE
                        ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
432 RY        ELEVATION   1000.00   994.00   987.00   988.00   994.00   993.00   993.00  1000.00
431 RX        DISTANCE    2069.00  2933.00  3070.00  3135.00  3163.00  3226.00  3834.00  4251.00

                                                   ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00     3.45    13.10    25.25    39.38    55.49    73.58    93.65   115.70   156.74
          OUTFLOW        .00    25.87   174.58   470.37   898.95  1463.41  2169.21  3022.85  4031.26  5044.41
        ELEVATION     987.00   987.68   988.37   989.05   989.74   990.42   991.11   991.79   992.47   993.16

          STORAGE     262.65   381.91   517.68   670.08   839.10  1024.75  1227.03  1445.94  1681.47  1933.63
          OUTFLOW    6751.25  9734.38 14144.21 19824.74 26745.48 34932.24 44429.96 55291.27 67572.17 81330.04
        ELEVATION     993.84   994.53   995.21   995.89   996.58   997.26   997.95   998.63   999.32  1000.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN    44430. TO    81330.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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              **************
              *            *
433 KK        *   SUB860   *      RUNOFF FROM SUB-BASIN 860
              *            *
              **************

                 SUBBASIN RUNOFF DATA

434 BA             SUBBASIN CHARACTERISTICS
                        TAREA       4.80  SUBBASIN AREA

435 LU             UNIFORM LOSS RATE
                        STRTL       1.02  INITIAL LOSS
                        CNSTL        .29  UNIFORM LOSS RATE
                        RTIMP        .00  PERCENT IMPERVIOUS AREA

UD                 SCS DIMENSIONLESS UNITGRAPH
                         TLAG       5.42  LAG

                                                   ***

                                          UNIT HYDROGRAPH
                                     165 END-OF-PERIOD ORDINATES
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4.	8.	11.	19.	28.	37.	47.	58.	70.	81.
97.	112.	127.	147.	167.	188.	210.	234.	258.	282.
302.	323.	343.	358.	372.	386.	396.	404.	412.	417.
419.	420.	421.	420.	419.	418.	412.	404.	397.	388.
380.	371.	362.	351.	341.	331.	319.	306.	293.	279.
264.	249.	234.	221.	208.	196.	186.	177.	168.	160.
152.	145.	137.	131.	125.	118.	114.	109.	104.	100.
95.	90.	86.	82.	78.	74.	71.	67.	63.	60.
57.	55.	52.	50.	47.	45.	43.	41.	39.	37.
35.	33.	32.	30.	29.	27.	26.	25.	23.	22.
21.	20.	19.	18.	17.	17.	16.	15.	15.	14.
13.	12.	12.	11.	11.	10.	10.	9.	9.	8.
8.	8.	7.	7.	7.	6.	6.	6.	5.	5.
5.	5.	4.	4.	4.	4.	4.	4.	4.	3.
3.	3.	3.	3.	3.	3.	2.	2.	2.	2.
2.	2.	2.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.					

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          **************
          *            *
437 KK    *   SUB870   *      RUNOFF FROM SUB-BASIN 870
          *            *
          **************

             SUBBASIN RUNOFF DATA

438 BA          SUBBASIN CHARACTERISTICS
                     TAREA        6.80  SUBBASIN AREA

439 LU          UNIFORM LOSS RATE
                     STRTL         .90  INITIAL LOSS
                     CNSTL         .29  UNIFORM LOSS RATE
                     RTIMP        1.00  PERCENT IMPERVIOUS AREA

440 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG        4.36  LAG
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UNIT HYDROGRAPH
133 END-OF-PERIOD ORDINATES

8.	17.	29.	48.	67.	91.	116.	141.	174.	207.
244.	288.	333.	383.	435.	488.	532.	577.	616.	647.
677.	699.	715.	732.	735.	737.	738.	736.	733.	721.
704.	687.	668.	649.	628.	606.	584.	558.	530.	502.
469.	436.	404.	377.	349.	327.	307.	288.	271.	255.
239.	225.	211.	200.	190.	180.	170.	160.	150.	142.
133.	125.	117.	109.	103.	97.	92.	86.	81.	76.
72.	68.	64.	60.	56.	53.	50.	47.	44.	41.
39.	36.	34.	32.	30.	29.	27.	25.	24.	22.
21.	20.	19.	18.	17.	16.	15.	14.	13.	12.
11.	11.	10.	10.	9.	8.	8.	8.	7.	7.
7.	6.	6.	6.	5.	5.	5.	4.	4.	4.
3.	3.	3.	3.	2.	2.	2.	1.	1.	1.
1.	0.	0.							

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          **************
          *            *
441 KK    *    CP850   *      COMBINE ALL HYDROGRAPHS ABOVE CP850
          *            *
          **************

442 HC          HYDROGRAPH COMBINATION
                     ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE
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              **************
              *            *
443 KK        *   RCH880   *      ROUTE HYDROGRAPH CP850 THROUGH REACH 880
              *            *
              **************

                HYDROGRAPH ROUTING DATA

445 RL            ROUTING LOSSES
                       QLOSS        .00  INITIAL LOSS
                       CLOSS        .00  ADDITIONAL FRACTION LOST
                      PERCRT      10.00  CHANNEL PERCOLATION RATE
                      ELVINV        .00  INVERT ELEVATION

444 RS            STORAGE ROUTING
                       NSTPS          2  NUMBER OF SUBREACHES
                        ITYP       FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

446 RC            NORMAL DEPTH CHANNEL
                         ANL       .055  LEFT OVERBANK N-VALUE
                        ANCH       .045  MAIN CHANNEL N-VALUE
                         ANR       .055  RIGHT OVERBANK N-VALUE
                       RLNTH      7000.  REACH LENGTH
                         SEL      .0071  ENERGY SLOPE
                       ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
448 RY        ELEVATION   1000.00   994.00   987.00   988.00   994.00   993.00   993.00  1000.00
447 RX        DISTANCE    2069.00  2933.00  3070.00  3135.00  3163.00  3226.00  3834.00  4251.00

                                                      ***

                                      COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00     3.18    12.07    23.26    36.27    51.11    67.78    86.26   106.57   144.37
            OUTFLOW        .00    25.87   174.58   470.37   898.95  1463.41  2169.21  3022.85  4031.26  5044.41
          ELEVATION     987.00   987.68   988.37   989.05   989.74   990.42   991.11   991.79   992.47   993.16

            STORAGE     241.91   351.76   476.81   617.18   772.86   943.85  1130.16  1331.78  1548.72  1780.97
            OUTFLOW    6751.25  9734.38 14144.21 19824.74 26745.48 34932.24 44429.96 55291.27 67572.17 81330.04
          ELEVATION     993.84   994.53   995.21   995.89   996.58   997.26   997.95   998.63   999.32  1000.00


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              **************
              *            *
449 KK        *   DVT805   *      RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH
              *            *
              **************

450 DR            RETRIEVE DIVERSION HYDROGRAPH
                       ISTAD      DVT805  DIVERSION HYDROGRAPH IDENTIFICATION

                                                      ***


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


              **************
              *            *
451 KK        *   DVT890   *      SPLIT RETRIEVED HYDROGRAPH 50/50
              *            *
              **************

  DT          DIVERSION
                       ISTAD      DVT940  DIVERSION HYDROGRAPH IDENTIFICATION

  DI             INFLOW         .00    100.00   1000.00  10000.00
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    DQ      DIVERTED FLOW        .00     50.00    500.00   5000.00
                                                                ***

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

          **************
          *            *
455 KK    *    RCH900  *       ROUTE HYDROGRAPH DVT890 THROUGH REACH 900
          *            *
          **************

             HYDROGRAPH ROUTING DATA

457 RL         ROUTING LOSSES
                    QLOSS         .00  INITIAL LOSS
                    CLOSS         .00  ADDITIONAL FRACTION LOST
                   PERCRT       10.00  CHANNEL PERCOLATION RATE
                   ELVINV         .00  INVERT ELEVATION

456 RS         STORAGE ROUTING
                   NSTPS          11  NUMBER OF SUBREACHES
                    ITYP        FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC       -1.00  INITIAL CONDITION
                        X         .00 WORKING R AND D COEFFICIENT

458 RC         NORMAL DEPTH CHANNEL
                     ANL        .070  LEFT OVERBANK N-VALUE
                    ANCH        .035  MAIN CHANNEL N-VALUE
                     ANR        .070  RIGHT OVERBANK N-VALUE
                   RLNTH      33200.  REACH LENGTH
                     SEL       .0069  ENERGY SLOPE
                   ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
460 RY       ELEVATION    20.00    12.00    12.00    10.00    10.00    12.00    12.00    20.00
459 RX       DISTANCE    100.00   101.00   190.00   195.00   205.00   210.00   299.00   300.00
                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       .00     4.54    10.13    16.78    38.75   118.21   197.73   277.30   356.92   436.59
          OUTFLOW       .00    12.62    42.14    87.46   159.16   389.22   750.62  1217.71  1777.60  2421.74
        ELEVATION     10.00    10.53    11.05    11.58    12.11    12.63    13.16    13.68    14.21    14.74

          STORAGE    516.32   596.10   675.93   755.82   835.75   915.74   995.79  1075.88  1156.03  1236.23
          OUTFLOW   3143.79  3938.76  4802.55  5731.70  6723.22  7774.47  8883.12 10047.08 11264.45 12533.48
        ELEVATION     15.26    15.79    16.32    16.84    17.37    17.89    18.42    18.95    19.47    20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     7774. TO    12533.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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

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          *            *
461 KK    *    SUB900  *       RUNOFF FROM SUB-BASIN 900
          *            *
          **************

             SUBBASIN RUNOFF DATA

462 BA         SUBBASIN CHARACTERISTICS
                   TAREA        4.20  SUBBASIN AREA

463 LU         UNIFORM LOSS RATE
                  STRTL        1.01  INITIAL LOSS
                  CNSTL         .25  UNIFORM LOSS RATE
                  RTIMP         .00  PERCENT IMPERVIOUS AREA
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464 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG        6.59  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                     200 END-OF-PERIOD ORDINATES
          2.      5.      7.      9.     14.     20.     25.     30.     37.     44.
         51.     58.     67.     76.     85.     94.    106.    118.    130.    143.
        157.    171.    186.    200.    213.    225.    237.    249.    257.    266.
        274.    282.    287.    292.    296.    301.    302.    302.    303.    304.
        303.    303.    302.    301.    297.    292.    288.    283.    278.    272.
        267.    262.    256.    250.    244.    237.    230.    222.    215.    207.
        198.    189.    180.    171.    163.    156.    148.    140.    135.    130.
        124.    119.    114.    110.    105.    101.     97.     93.     89.     85.
         83.     80.     77.     74.     71.     69.     66.     63.     61.     59.
         56.     54.     52.     49.     47.     45.     43.     42.     40.     39.
         37.     36.     34.     33.     32.     30.     29.     28.     27.     26.
         25.     24.     23.     22.     21.     20.     19.     18.     18.     17.
         16.     16.     15.     15.     14.     13.     13.     12.     12.     11.
         11.     11.     10.     10.      9.      9.      9.      8.      8.      8.
          7.      7.      7.      6.      6.      6.      6.      6.      5.      5.
          5.      5.      4.      4.      4.      4.      4.      4.      4.      3.
          3.      3.      3.      3.      3.      3.      3.      3.      3.      2.
          2.      2.      2.      2.      2.      2.      2.      2.      2.      2.
          1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
          1.      1.      1.      0.      0.      0.      0.      0.      0.      0.

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

          **************
          *            *
465 KK    *    CP880   *       COMBINE HYDROGRAPHS RCH900 & SUB900
          *            *
          **************

    HC          HYDROGRAPH COMBINATION
                      ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                  ***

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

          **************
          *            *
467 KK    *    SUB910  *       RUNOFF FROM SUB-BASIN 910
          *            *
          **************

             SUBBASIN RUNOFF DATA

468 BA          SUBBASIN CHARACTERISTICS
                      TAREA       7.50  SUBBASIN AREA

469 LU          UNIFORM LOSS RATE
                      STRTL        .91  INITIAL LOSS
                      CNSTL        .27  UNIFORM LOSS RATE
                      RTIMP       1.00  PERCENT IMPERVIOUS AREA

470 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG        4.67  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                     142 END-OF-PERIOD ORDINATES
          8.     16.     26.     44.     63.     83.    107.    131.    159.    191.
        223.    262.    304.    347.    396.    447.    497.    541.    584.    626.
        655.    685.    712.    728.    744.    755.    758.    761.    761.    758.
        756.    744.    728.    712.    694.    676.    657.    636.    614.    593.
        566.    539.    511.    479.    447.    417.    390.    364.    341.    322.
        304.    287.    271.    255.    241.    227.    214.    204.    194.    185.
        175.    165.    156.    148.    140.    132.    124.    116.    109.    104.
         98.     93.     88.     82.     78.     74.     70.     66.     62.     58.
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```
55.      52.      49.      47.      44.      41.      39.      37.      35.      33.
31.      29.      28.      26.      25.      24.      22.      21.      20.      19.
18.      17.      16.      15.      14.      13.      13.      12.      11.      11.
10.       9.       9.       8.       8.       8.       7.       7.       7.       6.
 6.       6.       6.       5.       5.       5.       4.       4.       4.       3.
 3.       3.       3.       2.       2.       2.       1.       1.       1.       1.
 0.       0.

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          *            *
471 KK    *    CP880   *      COMBINE ALL HYDROGRAPHS ABOVE CP880
          *            *
          **************

472 HC         HYDROGRAPH COMBINATION
                    ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                          ***

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          *            *
473 KK    *   RCH920   *      ROUTE HYDROGRAPH CP880 THROUGH REACH 920
          *            *
          **************

            HYDROGRAPH ROUTING DATA

475 RL         ROUTING LOSSES
                   QLOSS        .00  INITIAL LOSS
                   CLOSS        .00  ADDITIONAL FRACTION LOST
                  PERCRT      10.00  CHANNEL PERCOLATION RATE
                  ELVINV        .00  INVERT ELEVATION

474 RS         STORAGE ROUTING
                   NSTPS          2  NUMBER OF SUBREACHES
                    ITYP       FLOW  TYPE OF INITIAL CONDITION
                  RSVRIC      -1.00  INITIAL CONDITION
                       X        .00 WORKING R AND D COEFFICIENT

476 RC         NORMAL DEPTH CHANNEL
                     ANL       .055  LEFT OVERBANK N-VALUE
                    ANCH       .045  MAIN CHANNEL N-VALUE
                     ANR       .055  RIGHT OVERBANK N-VALUE
                   RLNTH      7300.  REACH LENGTH
                     SEL      .0071  ENERGY SLOPE
                   ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
478 RY       ELEVATION   1000.00    994.00    987.00    988.00    994.00    993.00    993.00   1000.00
477 RX       DISTANCE    2069.00   2933.00   3070.00   3135.00   3163.00   3226.00   3834.00   4251.00
                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE        .00      3.32     12.58     24.26     37.83     53.30     70.68     89.96    111.14    150.56
        OUTFLOW        .00     25.87    174.58    470.37    898.95   1463.41   2169.21   3022.85   4031.26   5044.41
      ELEVATION     987.00    987.68    988.37    989.05    989.74    990.42    991.11    991.79    992.47    993.16

        STORAGE     252.28    366.84    497.25    643.63    805.98    984.30   1178.60   1388.86   1615.09   1857.30
        OUTFLOW    6751.25   9734.38  14144.21  19824.74  26745.48  34932.24  44429.96  55291.27  67572.17  81330.04
      ELEVATION     993.84    994.53    995.21    995.89    996.58    997.26    997.95    998.63    999.32   1000.00

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              *            *
479 KK        *   SUB920   *        RUNOFF FROM SUB-BASIN 920
              *            *
              **************

                SUBBASIN RUNOFF DATA

480 BA            SUBBASIN CHARACTERISTICS
                       TAREA        3.90  SUBBASIN AREA

481 LU            UNIFORM LOSS RATE
                       STRTL        1.01  INITIAL LOSS
                       CNSTL         .25  UNIFORM LOSS RATE
                       RTIMP         .00  PERCENT IMPERVIOUS AREA

482 UD            SCS DIMENSIONLESS UNITGRAPH
                        TLAG        2.43  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                         75 END-OF-PERIOD ORDINATES
              15.      40.      74.     119.     171.     230.     309.     396.     490.     570.
             639.     694.     725.     744.     749.     745.     730.     700.     666.     629.
             589.     541.     487.     427.     376.     332.     297.     267.     239.     214.
             195.     177.     158.     143.     128.     113.     102.      92.      82.      74.
              67.      59.      53.      48.      43.      38.      35.      31.      28.      25.
              22.      20.      18.      16.      15.      13.      12.      11.      10.       9.
               8.       7.       7.       6.       5.       5.       4.       4.       3.       3.
               2.       2.       1.       1.       0.

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              *            *
   KK         *   CP920    *        COMBINE HYDROGRAPHS RCH920 & SUB920
              *            *
              **************

484 HC            HYDROGRAPH COMBINATION
                       ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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

              **************
              *            *
485 KK        *   RCH930   *        ROUTE HYDROGRAPH CP920 THROUGH REACH 930
              *            *
              **************

                HYDROGRAPH ROUTING DATA

487 RL            ROUTING LOSSES
                       QLOSS         .00  INITIAL LOSS
                       CLOSS         .00  ADDITIONAL FRACTION LOST
                      PERCRT       10.00  CHANNEL PERCOLATION RATE
                      ELVINV         .00  INVERT ELEVATION

486 RS            STORAGE ROUTING
                       NSTPS           3  NUMBER OF SUBREACHES
                        ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

   RC             NORMAL DEPTH CHANNEL
                         ANL        .055  LEFT OVERBANK N-VALUE
                        ANCH        .045  MAIN CHANNEL N-VALUE
                         ANR        .055  RIGHT OVERBANK N-VALUE
                       RLNTH       7800.  REACH LENGTH
                         SEL       .0071  ENERGY SLOPE
                       ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
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CROSS-SECTION DATA

		--- LEFT OVERBANK ---			+ ------ MAIN CHANNEL			------- + --- RIGHT OVERBANK ---	
490 RY	ELEVATION	1000.00	994.00	987.00	988.00	994.00	993.00	993.00	1000.00
489 RX	DISTANCE	2069.00	2933.00	3070.00	3135.00	3163.00	3226.00	3834.00	4251.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	3.54	13.45	25.92	40.42	56.95	75.52	96.12	118.75	160.87
OUTFLOW	.00	25.87	174.58	470.37	898.95	1463.41	2169.21	3022.85	4031.26	5044.41
ELEVATION	987.00	987.68	988.37	989.05	989.74	990.42	991.11	991.79	992.47	993.16
STORAGE	269.56	391.96	531.31	687.71	861.19	1051.72	1259.32	1483.99	1725.72	1984.51
OUTFLOW	6751.25	9734.38	14144.21	19824.74	26745.48	34932.24	44429.96	55291.27	67572.17	81330.04
ELEVATION	993.84	994.53	995.21	995.89	996.58	997.26	997.95	998.63	999.32	1000.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 55291. TO 81330.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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              *            *
491 KK        *   SUB935   *      RUNOFF FROM SUB-BASIN 935
              *            *
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SUBBASIN RUNOFF DATA

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492 BA          SUBBASIN CHARACTERISTICS
                     TAREA        8.20  SUBBASIN AREA

493 LU          UNIFORM LOSS RATE
                     STRTL        1.00  INITIAL LOSS
                     CNSTL         .29  UNIFORM LOSS RATE
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

494 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG        7.91  LAG
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UNIT HYDROGRAPH
239 END-OF-PERIOD ORDINATES

3.	6.	9.	12.	16.	24.	31.	38.	45.	53.
63.	72.	81.	91.	102.	114.	127.	139.	151.	167.
184.	200.	217.	233.	253.	273.	292.	312.	331.	347.
364.	380.	397.	411.	423.	434.	445.	457.	465.	471.
477.	483.	490.	491.	492.	494.	495.	496.	494.	493.
492.	491.	489.	483.	477.	470.	464.	458.	450.	443.
436.	429.	421.	413.	404.	396.	388.	378.	367.	357.
347.	336.	324.	311.	299.	287.	275.	264.	254.	244.
233.	225.	217.	210.	203.	196.	189.	183.	177.	170.
164.	159.	154.	149.	144.	138.	135.	131.	127.	123.
120.	116.	112.	108.	105.	101.	98.	95.	92.	89.
86.	82.	79.	76.	73.	71.	69.	67.	65.	63.
61.	59.	57.	54.	53.	51.	49.	48.	46.	45.
43.	42.	40.	39.	37.	36.	35.	34.	33.	32.
31.	29.	28.	27.	26.	26.	25.	24.	23.	23.
22.	21.	20.	20.	19.	18.	18.	17.	17.	16.
16.	15.	14.	14.	14.	13.	13.	12.	12.	12.
11.	11.	10.	10.	10.	9.	9.	9.	8.	8.
8.	8.	7.	7.	7.	7.	6.	6.	6.	6.
6.	5.	5.	5.	5.	5.	5.	5.	5.	4.
4.	4.	4.	4.	4.	4.	4.	3.	3.	3.
3.	3.	3.	3.	3.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	

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            *            *
495 KK      *   DVT940   *      RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH
            *            *
            **************

496 DR          RETRIEVE DIVERSION HYDROGRAPH
                     ISTAD      DVT940  DIVERSION HYDROGRAPH IDENTIFICATION

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            *            *
497 KK      *   RCH950   *      ROUTE HYDROGRAPH DVT940 THROUGH REACH 950
            *            *
            **************

               HYDROGRAPH ROUTING DATA

499 RL          ROUTING LOSSES
                      QLOSS        .00  INITIAL LOSS
                      CLOSS        .00  ADDITIONAL FRACTION LOST
                     PERCRT      10.00  CHANNEL PERCOLATION RATE
                     ELVINV        .00  INVERT ELEVATION

498 RS          STORAGE ROUTING
                      NSTPS         10  NUMBER OF SUBREACHES
                       ITYP       FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

500 RC          NORMAL DEPTH CHANNEL
                        ANL       .070  LEFT OVERBANK N-VALUE
                       ANCH       .035  MAIN CHANNEL N-VALUE
                        ANR       .070  RIGHT OVERBANK N-VALUE
                      RLNTH     31000.  REACH LENGTH
                        SEL      .0087  ENERGY SLOPE
                      ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
502 RY       ELEVATION    20.00     12.00     12.00     10.00     10.00     12.00     12.00     20.00
501 RX       DISTANCE    100.00    101.00    190.00    195.00    205.00    210.00    299.00    300.00

                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       .00      4.24      9.46     15.67     36.18    110.38    184.63    258.92    333.27    407.66
          OUTFLOW       .00     14.17     47.32     98.21    178.72    437.05    842.86   1367.35   1996.04   2719.33
        ELEVATION     10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

          STORAGE    482.11    556.60    631.14    705.73    780.37    855.06    929.80   1004.59   1079.43   1154.32
          OUTFLOW   3530.11   4422.77   5392.71   6436.04   7549.39   8729.83   9974.72  11281.71  12648.67  14073.65
        ELEVATION     15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     6436. TO    14074.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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


            **************
            *            *
    KK      *   SUB950   *      RUNOFF FROM SUB-BASIN 950
            *            *
            **************

               SUBBASIN RUNOFF DATA
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504 BA          SUBBASIN CHARACTERISTICS
                      TAREA        6.50  SUBBASIN AREA

505 LU          UNIFORM LOSS RATE
                      STRTL         .93  INITIAL LOSS
                      CNSTL         .25  UNIFORM LOSS RATE
                      RTIMP        2.00  PERCENT IMPERVIOUS AREA

506 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        6.43  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                     195 END-OF-PERIOD ORDINATES
          4.       7.      11.      15.      24.      33.      41.      50.      61.      72.
         84.      96.     110.     125.     140.     157.     176.     196.     216.     237.
        261.     284.     308.     329.     349.     369.     388.     404.     418.     431.
        445.     454.     461.     469.     476.     478.     479.     481.     482.     481.
        480.     478.     477.     470.     462.     455.     447.     439.     430.     422.
        413.     403.     393.     383.     372.     360.     348.     335.     322.     307.
        293.     278.     264.     252.     239.     227.     217.     208.     200.     191.
        183.     176.     168.     161.     154.     148.     142.     136.     131.     127.
        122.     118.     113.     109.     104.     100.      96.      92.      89.      85.
         81.      77.      74.      70.      68.      65.      63.      60.      58.      56.
         53.      51.      49.      47.      45.      43.      42.      40.      38.      36.
         35.      34.      32.      31.      30.      28.      27.      26.      25.      24.
         23.      22.      21.      20.      19.      19.      18.      17.      17.      16.
         15.      15.      14.      13.      13.      12.      12.      11.      11.      10.
         10.      10.       9.       9.       9.       8.       8.       7.       7.       7.
          7.       6.       6.       6.       6.       5.       5.       5.       5.       5.
          5.       4.       4.       4.       4.       4.       4.       4.       3.       3.
          3.       3.       3.       3.       3.       2.       2.       2.       2.       2.
          2.       2.       2.       1.       1.       1.       1.       1.       1.       1.
          1.       0.       0.       0.       0.

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          **************
          *            *
507 KK    *    CP950   *       COMBINE HYDROGRAPHS RCH950 & SUB950
          *            *
          **************

508 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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

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          *            *
509 KK    *   RCH960   *       ROUTE HYDROGRAPH CP950 THROUGH REACH 960
          *            *
          **************

             HYDROGRAPH ROUTING DATA

511 RL          ROUTING LOSSES
                      QLOSS         .00  INITIAL LOSS
                      CLOSS         .00  ADDITIONAL FRACTION LOST
                     PERCRT       10.00  CHANNEL PERCOLATION RATE
                     ELVINV         .00  INVERT ELEVATION

510 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC       -1.00  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

512 RC          NORMAL DEPTH CHANNEL
                        ANL        .070  LEFT OVERBANK N-VALUE
                       ANCH        .035  MAIN CHANNEL N-VALUE
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                ANR        .070  RIGHT OVERBANK N-VALUE
              RLNTH       3000.  REACH LENGTH
                SEL       .0034  ENERGY SLOPE
              ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
    RY   ELEVATION    20.00    13.00    13.00    10.00    10.00    13.00    13.00    20.00
513 RX   DISTANCE    100.00   101.00   175.00   185.00   215.00   225.00   299.00   300.00

                                          ***

                                COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

      STORAGE      .00     1.15     2.43     3.83     5.37     7.03    10.42    17.60    24.79    31.98
      OUTFLOW      .00    26.01    84.31   169.52   280.42   416.89   595.38   898.80  1292.76  1762.95
    ELEVATION    10.00    10.53    11.05    11.58    12.11    12.63    13.16    13.68    14.21    14.74

      STORAGE    39.18    46.38    53.59    60.80    68.02    75.25    82.48    89.71    96.95   104.20
      OUTFLOW  2301.53  2903.13  3563.64  4279.76  5048.76  5868.27  6736.25  7650.90  8610.58  9613.84
    ELEVATION    15.26    15.79    16.32    16.84    17.37    17.89    18.42    18.95    19.47    20.00


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          *            *
515 KK    *   SUB960   *      RUNOFF FROM SUB-BASIN 960
          *            *
          **************

            SUBBASIN RUNOFF DATA

516 BA        SUBBASIN CHARACTERISTICS
                  TAREA       16.30  SUBBASIN AREA

    LU        UNIFORM LOSS RATE
                  STRTL         .93  INITIAL LOSS
                  CNSTL         .37  UNIFORM LOSS RATE
                  RTIMP        2.00  PERCENT IMPERVIOUS AREA

518 UD        SCS DIMENSIONLESS UNITGRAPH
                   TLAG        6.35  LAG

                                          ***

                                     UNIT HYDROGRAPH
                                192 END-OF-PERIOD ORDINATES
      10.      19.      29.      40.      62.      84.     106.     130.     159.     187.
     216.     249.     287.     325.     363.     408.     459.     509.     560.     617.
     678.     738.     798.     850.     901.     952.    1003.    1038.    1073.    1107.
    1140.    1159.    1179.    1198.    1212.    1216.    1219.    1222.    1223.    1219.
    1216.    1213.    1201.    1182.    1163.    1144.    1123.    1101.    1079.    1057.
    1032.    1006.     981.     956.     924.     892.     861.     828.     790.     752.
     714.     678.     646.     614.     583.     555.     532.     510.     488.     467.
     448.     429.     410.     393.     378.     362.     346.     333.     322.     310.
     299.     287.     276.     264.     253.     243.     234.     224.     215.     205.
     196.     186.     178.     171.     165.     159.     152.     146.     140.     133.
     128.     123.     118.     114.     109.     104.      99.      95.      91.      88.
      84.      81.      77.      74.      70.      67.      64.      62.      60.      57.
      55.      53.      50.      48.      46.      45.      43.      41.      39.      38.
      36.      35.      33.      32.      31.      29.      28.      27.      26.      25.
      24.      23.      22.      21.      20.      19.      18.      18.      17.      16.
      16.      15.      14.      14.      13.      13.      12.      12.      12.      11.
      11.      11.      10.      10.       9.       9.       9.       8.       8.       8.
       7.       7.       6.       6.       6.       5.       5.       5.       4.       4.
       4.       3.       3.       3.       3.       2.       2.       2.       1.       1.
       1.       0.

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


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          *            *
519 KK    *   CP960    *      COMBINE HYDROGRAPHS RCH960 & SUB960
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          *            *
          ***************

520 HC          HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***


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


          ***************
          *            *
521 KK    *    RCH970  *       ROUTE HYDROGRAPH CP960 THROUGH REACH 970
          *            *
          ***************

             HYDROGRAPH ROUTING DATA

523 RL          ROUTING LOSSES
                     QLOSS         .00  INITIAL LOSS
                     CLOSS         .00  ADDITIONAL FRACTION LOST
                    PERCRT       10.00  CHANNEL PERCOLATION RATE
                    ELVINV         .00  INVERT ELEVATION

522 RS          STORAGE ROUTING
                     NSTPS           4  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

524 RC          NORMAL DEPTH CHANNEL
                       ANL        .070  LEFT OVERBANK N-VALUE
                      ANCH        .035  MAIN CHANNEL N-VALUE
                       ANR        .070  RIGHT OVERBANK N-VALUE
                     RLNTH      11200.  REACH LENGTH
                       SEL       .0062  ENERGY SLOPE
                     ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
526 RY       ELEVATION    20.00     13.00     13.00     10.00     10.00     13.00     13.00     20.00
525 RX       DISTANCE    100.00    101.00    175.00    185.00    215.00    225.00    299.00    300.00

                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      4.30      9.07     14.32     20.04     26.23     38.89     65.70     92.53    119.39
          OUTFLOW        .00     35.13    113.86    228.92    378.68    562.96    803.99   1213.72   1745.72   2380.65
        ELEVATION      10.00     10.53     11.05     11.58     12.11     12.63     13.16     13.68     14.21     14.74

          STORAGE     146.26    173.15    200.06    226.99    253.95    280.92    307.91    334.93    361.96    389.02
          OUTFLOW    3107.95   3920.33   4812.27   5779.31   6817.75   7924.40   9096.51  10331.63  11627.57  12982.35
        ELEVATION      15.26     15.79     16.32     16.84     17.37     17.89     18.42     18.95     19.47     20.00


*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     5779. TO    12982.
               THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
               THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)


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


          ***************
          *            *
527 KK    *    SUB970  *       RUNOFF FROM SUB-BASIN 970
          *            *
          ***************

             SUBBASIN RUNOFF DATA

528 BA          SUBBASIN CHARACTERISTICS
                     TAREA        5.20  SUBBASIN AREA

529 LU          UNIFORM LOSS RATE
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                STRTL        .90  INITIAL LOSS
                CNSTL        .26  UNIFORM LOSS RATE
                RTIMP       3.00  PERCENT IMPERVIOUS AREA

530 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG        4.92  LAG

                                                  ***

                                          UNIT HYDROGRAPH
                                     150 END-OF-PERIOD ORDINATES
          5.      10.      15.      27.      38.      50.      65.      80.      95.     115.
        135.     155.     182.     209.     236.     267.     299.     331.     358.     385.
        411.     430.     448.     467.     477.     487.     497.     499.     500.     502.
        500.     499.     497.     487.     477.     467.     455.     444.     432.     419.
        405.     392.     375.     359.     342.     322.     302.     282.     265.     248.
        232.     220.     208.     196.     186.     176.     166.     158.     149.     141.
        135.     129.     123.     116.     110.     104.      99.      94.      89.      84.
         79.      74.      71.      67.      64.      61.      57.      54.      51.      49.
         46.      44.      41.      39.      37.      35.      33.      31.      30.      28.
         26.      25.      24.      23.      21.      20.      19.      18.      17.      16.
         16.      15.      14.      13.      13.      12.      11.      11.      10.      10.
          9.       9.       8.       8.       7.       7.       7.       6.       6.       6.
          5.       5.       5.       5.       5.       4.       4.       4.       4.       4.
          3.       3.       3.       3.       3.       2.       2.       2.       2.       2.
          2.       1.       1.       1.       1.       1.       1.       0.       0.       0.

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

          **************
          *            *
531 KK    *     CP930  *       COMBINE HYDROGRAPHS RCH970 & SUB970
          *            *
          **************

532 HC        HYDROGRAPH COMBINATION
                ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                  ***

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

          **************
          *            *
533 KK    *     CP930  *       COMBINE ALL HYDROGRAPHS ABOVE CP930
          *            *
          **************

534 HC        HYDROGRAPH COMBINATION
                ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                  ***

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

          **************
          *            *
535 KK    *    RCH980  *       ROUTE HYDROGRAPH CP930 THROUGH REACH 980
          *            *
          **************

            HYDROGRAPH ROUTING DATA

537 RL        ROUTING LOSSES
                QLOSS        .00  INITIAL LOSS
                CLOSS        .00  ADDITIONAL FRACTION LOST
               PERCRT      10.00  CHANNEL PERCOLATION RATE
               ELVINV        .00  INVERT ELEVATION

536 RS        STORAGE ROUTING
                NSTPS           2  NUMBER OF SUBREACHES
```

```
                ITYP        FLOW  TYPE OF INITIAL CONDITION
              RSVRIC       -1.00  INITIAL CONDITION
                   X         .00 WORKING R AND D COEFFICIENT

538 RC        NORMAL DEPTH CHANNEL
                 ANL        .055  LEFT OVERBANK N-VALUE
                ANCH        .045  MAIN CHANNEL N-VALUE
                 ANR        .055  RIGHT OVERBANK N-VALUE
               RLNTH       7300.  REACH LENGTH
                 SEL       .0047  ENERGY SLOPE
               ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
540 RY      ELEVATION   889.00    884.00    879.00    878.00    881.00    883.00    883.00    889.00
539 RX      DISTANCE   2075.00   2373.00   2406.00   2556.00   2566.00   2752.00   3423.00   3440.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE        .00      4.31     16.92     32.23     48.10     64.52     83.19    107.36    137.13    195.81
        OUTFLOW        .00     25.51    172.81    495.81    945.65   1510.25   1941.98   2529.84   3343.28   4634.39
      ELEVATION     878.00    878.58    879.16    879.74    880.32    880.89    881.47    882.05    882.63    883.21

        STORAGE     297.49    400.31    506.44    616.07    729.21    845.86    966.01   1089.67   1216.84   1347.51
        OUTFLOW    7060.12  10142.94  13894.88  18284.01  23275.55  28852.31  35004.35  41725.70  49012.90  56864.30
      ELEVATION     883.79    884.37    884.95    885.53    886.10    886.68    887.26    887.84    888.42    889.00


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


          **************
          *            *
541 KK    *   SUB990   *       RUNOFF FROM SUB-BASIN 990
          *            *
          **************

             SUBBASIN RUNOFF DATA

542 BA        SUBBASIN CHARACTERISTICS
                 TAREA         .90  SUBBASIN AREA

543 LU        UNIFORM LOSS RATE
                 STRTL         .85  INITIAL LOSS
                 CNSTL         .23  UNIFORM LOSS RATE
                 RTIMP        2.00  PERCENT IMPERVIOUS AREA

544 UD        SCS DIMENSIONLESS UNITGRAPH
                 TLAG        1.91  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                         59 END-OF-PERIOD ORDINATES
             5.      17.      32.      50.      74.     103.     138.     168.     191.     208.
           216.     218.     216.     207.     195.     181.     165.     147.     125.     106.
            92.      80.      69.      61.      54.      47.      41.      36.      31.      27.
            24.      21.      18.      16.      14.      12.      10.       9.       8.       7.
             6.       5.       5.       4.       4.       3.       3.       2.       2.       2.
             2.       1.       1.       1.       1.       1.       1.       0.       0.


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


          **************
          *            *
545 KK    *   SB1000   *       RUNOFF FROM SUB-BASIN 1000
          *            *
          **************

             SUBBASIN RUNOFF DATA

546 BA        SUBBASIN CHARACTERISTICS
                 TAREA        3.80  SUBBASIN AREA
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```
547 LU          UNIFORM LOSS RATE
                      STRTL        .94  INITIAL LOSS
                      CNSTL        .23  UNIFORM LOSS RATE
                      RTIMP       1.00  PERCENT IMPERVIOUS AREA

UD              SCS DIMENSIONLESS UNITGRAPH
                       TLAG        .86  LAG

                                                  ***

                                                UNIT HYDROGRAPH
                                           28 END-OF-PERIOD ORDINATES
            163.     494.    1025.    1609.    1906.    1934.    1759.    1491.    1112.     804.
            600.     459.     346.     257.     194.     144.     106.      81.      61.      46.
             34.      26.      20.      16.      12.       8.       4.       1.

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

          **************
          *            *
549 KK    *    CP980   *       COMBINE ALL HYDROGRAPHS ABOVE CP980
          *            *
          **************

550 HC          HYDROGRAPH COMBINATION
                      ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

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

          **************
          *            *
KK        *   RC1010   *       ROUTE HYDROGRAPH CP980 THROUGH REACH 1010
          *            *
          **************

            HYDROGRAPH ROUTING DATA

553 RL          ROUTING LOSSES
                      QLOSS        .00  INITIAL LOSS
                      CLOSS        .00  ADDITIONAL FRACTION LOST
                     PERCRT      10.00  CHANNEL PERCOLATION RATE
                     ELVINV        .00  INVERT ELEVATION

552 RS          STORAGE ROUTING
                      NSTPS          2  NUMBER OF SUBREACHES
                       ITYP       FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

554 RC          NORMAL DEPTH CHANNEL
                        ANL       .055  LEFT OVERBANK N-VALUE
                       ANCH       .045  MAIN CHANNEL N-VALUE
                        ANR       .055  RIGHT OVERBANK N-VALUE
                      RLNTH      5000.  REACH LENGTH
                        SEL      .0047  ENERGY SLOPE
                      ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
556 RY        ELEVATION   889.00   884.00   879.00   878.00   881.00   883.00   883.00   889.00
555 RX        DISTANCE   2075.00  2373.00  2406.00  2556.00  2566.00  2752.00  3423.00  3440.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       .00     2.95    11.59    22.08    32.94    44.19    56.98    73.54    93.93   134.11
          OUTFLOW       .00    25.51   172.81   495.81   945.65  1510.25  1941.98  2529.84  3343.28  4634.39
        ELEVATION    878.00   878.58   879.16   879.74   880.32   880.89   881.47   882.05   882.63   883.21

          STORAGE    203.76   274.18   346.87   421.97   499.46   579.35   661.65   746.35   833.45   922.95
```

OUTFLOW	7060.12	10142.94	13894.88	18284.01	23275.55	28852.31	35004.35	41725.70	49012.90	56864.30
ELEVATION	883.79	884.37	884.95	885.53	886.10	886.68	887.26	887.84	888.42	889.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 28852. TO 56864.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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              **************
              *            *
557 KK        *   SB1020   *      RUNOFF FROM SUB-BASIN 1020
              *            *
              **************

                 SUBBASIN RUNOFF DATA

558 BA             SUBBASIN CHARACTERISTICS
                        TAREA        4.50  SUBBASIN AREA

559 LU             UNIFORM LOSS RATE
                        STRTL         .84  INITIAL LOSS
                        CNSTL         .32  UNIFORM LOSS RATE
                        RTIMP        2.00  PERCENT IMPERVIOUS AREA

560 UD             SCS DIMENSIONLESS UNITGRAPH
                         TLAG        3.97  LAG
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***

UNIT HYDROGRAPH
121 END-OF-PERIOD ORDINATES

7.	13.	25.	40.	56.	76.	96.	121.	147.	176.
211.	246.	287.	329.	368.	404.	439.	463.	488.	506.
519.	531.	533.	536.	535.	533.	528.	514.	501.	486.
471.	454.	437.	419.	397.	375.	351.	324.	298.	276.
254.	237.	221.	206.	193.	180.	168.	157.	147.	139.
131.	123.	115.	108.	101.	94.	88.	81.	76.	72.
67.	63.	58.	55.	52.	48.	45.	42.	39.	37.
34.	32.	29.	28.	26.	24.	23.	21.	20.	19.
18.	16.	15.	14.	14.	13.	12.	11.	10.	10.
9.	8.	8.	7.	7.	6.	6.	6.	5.	5.
5.	5.	4.	4.	4.	4.	3.	3.	3.	3.
2.	2.	2.	2.	1.	1.	1.	1.	1.	0.
0.									

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              **************
              *            *
561 KK        *   CP1010   *      COMBINE HYDROGRAPHS RCH1010 & SUB1020
              *            *
              **************

562 HC             HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
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              **************
              *            *
563 KK        *   RC1030   *      ROUTE HYDROGRAPH CP1010 THROUGH REACH 1030
              *            *
              **************

                 HYDROGRAPH ROUTING DATA

565 RL             ROUTING LOSSES
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```
                QLOSS        .00  INITIAL LOSS
                CLOSS        .00  ADDITIONAL FRACTION LOST
               PERCRT      10.00  CHANNEL PERCOLATION RATE
               ELVINV        .00  INVERT ELEVATION

    RS      STORAGE ROUTING
                NSTPS          2  NUMBER OF SUBREACHES
                 ITYP       FLOW  TYPE OF INITIAL CONDITION
               RSVRIC      -1.00  INITIAL CONDITION
                    X        .00 WORKING R AND D COEFFICIENT

566 RC      NORMAL DEPTH CHANNEL
                  ANL       .055  LEFT OVERBANK N-VALUE
                 ANCH       .045  MAIN CHANNEL N-VALUE
                  ANR       .055  RIGHT OVERBANK N-VALUE
                RLNTH      6500.  REACH LENGTH
                  SEL      .0047  ENERGY SLOPE
                ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                CROSS-SECTION DATA
                     --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
568 RY    ELEVATION   889.00   884.00   879.00   878.00   881.00   883.00   883.00   889.00
567 RX    DISTANCE   2075.00  2373.00  2406.00  2556.00  2566.00  2752.00  3423.00  3440.00

                                          ***

                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

      STORAGE      .00     3.83    15.07    28.70    42.83    57.45    74.07    95.60   122.10   174.35
      OUTFLOW      .00    25.51   172.81   495.81   945.65  1510.25  1941.98  2529.84  3343.28  4634.39
    ELEVATION   878.00   878.58   879.16   879.74   880.32   880.89   881.47   882.05   882.63   883.21

      STORAGE   264.89   356.44   450.94   548.56   649.30   753.16   860.15   970.25  1083.48  1199.84
      OUTFLOW  7060.12 10142.94 13894.88 18284.01 23275.55 28852.31 35004.35 41725.70 49012.90 56864.30
    ELEVATION   883.79   884.37   884.95   885.53   886.10   886.68   887.26   887.84   888.42   889.00

1
                                   RUNOFF SUMMARY
                             FLOW IN CUBIC FEET PER SECOND
                          TIME IN HOURS,  AREA IN SQUARE MILES

                                    PEAK   TIME OF   AVERAGE FLOW FOR MAXIMUM PERIOD   BASIN   MAXIMUM   TIME OF
  OPERATION          STATION        FLOW    PEAK      6-HOUR     24-HOUR    72-HOUR   AREA    STAGE   MAX STAGE
+
  HYDROGRAPH AT
+                    SUB A          994.   13.83       448.       115.       83.      2.78
  ROUTED TO
+                    STR A          671.   14.83       363.        91.       66.      2.78     3.11
  ROUTED TO
+                    RCH 1          474.   17.33       287.        76.       55.      2.78
  HYDROGRAPH AT
+                    SUB B         1872.   14.50      1050.       283.      205.      6.87
  ROUTED TO
+                    STR B         1302.   15.67       846.       221.      160.      6.87     3.01
  ROUTED TO
+                    RCH 2         1214.   16.33       772.       207.      150.      6.87
  HYDROGRAPH AT
+                    SUB C          396.   14.00       199.        53.       39.      1.09
  ROUTED TO
+                    STR C          388.   14.17       195.        51.       37.      1.09     2.49
  ROUTED TO
+                    RCH 3          340.   15.00       185.        49.       35.      1.09
  2 COMBINED AT
+                    CP500         1449.   16.00       930.       254.      184.      7.96
  ROUTED TO
+                    RCH 4         1392.   16.33       887.       244.      177.      7.96
  2 COMBINED AT
+                    CP501         1759.   16.83      1158.       316.      229.     10.74
```

	ROUTED TO							
+		RCH 5	1740.	17.17	1151.	316.	229.	10.74
	HYDROGRAPH AT							
+		SUB I	2684.	20.00	2485.	1187.	859.	32.21
	2 COMBINED AT							
+		CP502	3702.	17.83	3260.	1448.	1049.	42.95
	ROUTED TO							
+		RCH 6	3628.	19.33	3211.	1427.	1033.	42.95
	HYDROGRAPH AT							
+		SUB II	1620.	15.00	1037.	295.	213.	7.10
	2 COMBINED AT							
+		CP503	3856.	19.00	3394.	1674.	1211.	50.05
	ROUTED TO							
+		RCH 7	3790.	20.00	3373.	1660.	1201.	50.05
	HYDROGRAPH AT							
+		SUBIII	1021.	16.83	824.	286.	207.	7.02
	2 COMBINED AT							
+		CP504	4282.	19.50	3815.	1901.	1376.	57.07
	ROUTED TO							
+		RCH 8	4144.	21.17	3787.	1880.	1361.	57.07
	HYDROGRAPH AT							
+		SUBIV	831.	21.00	780.	394.	285.	10.54
	2 COMBINED AT							
+		CP505	4838.	21.17	4443.	2211.	1600.	67.61
	HYDROGRAPH AT							
+		SUB D	1540.	17.17	1276.	462.	335.	11.06
	ROUTED TO							
+		STR D	1287.	18.00	1076.	382.	276.	11.06	3.54
	ROUTED TO							
+		RCH 9	954.	21.17	758.	281.	203.	11.06
	HYDROGRAPH AT							
+		SUB145	2311.	16.50	1822.	637.	464.	12.83
	ROUTED TO							
+		RCH65	2007.	17.83	1533.	543.	394.	12.83
	HYDROGRAPH AT							
+		SUB F	2970.	25.00	2885.	1660.	1201.	60.10
	2 COMBINED AT							
+		CP400	3444.	21.00	3400.	2125.	1538.	72.93
	ROUTED TO							
+		STR F	2749.	23.67	2708.	1646.	1191.	72.93	2.56
	ROUTED TO							
+		RCH11	2621.	24.00	2581.	1497.	1084.	72.93
	HYDROGRAPH AT							
+		SUB V	674.	14.33	375.	101.	73.	2.45
	2 COMBINED AT							
+		CP600	2621.	24.00	2582.	1582.	1145.	75.38
	ROUTED TO							
+		RCH12	2615.	24.50	2576.	1534.	1110.	75.38
	HYDROGRAPH AT							
+		SUBVI	1081.	17.00	892.	321.	233.	7.60
	2 COMBINED AT							
+		CP601	2819.	22.00	2762.	1804.	1306.	82.98
	ROUTED TO							

+		RCH13	2817.	22.33	2760.	1788.	1294.	82.98	
+	HYDROGRAPH AT	SUBVII	549.	17.33	459.	168.	122.	4.08	
+	2 COMBINED AT	CP602	2980.	21.50	2909.	1927.	1395.	87.06	
+	ROUTED TO	RCH14	2963.	22.83	2884.	1819.	1317.	87.06	
+	HYDROGRAPH AT	SBVIII	1942.	15.83	1421.	454.	329.	10.07	
+	HYDROGRAPH AT	SUBIX	991.	18.50	879.	364.	263.	9.20	
+	HYDROGRAPH AT	SUB E	602.	15.17	392.	113.	82.	2.72	
+	ROUTED TO	STR E	533.	15.33	348.	95.	69.	2.72	1.58
+	ROUTED TO	RCH10	404.	17.67	281.	81.	58.	2.72	
+	4 COMBINED AT	CP603	4061.	17.50	3854.	2561.	1855.	109.05	
+	ROUTED TO	RCH15	3983.	18.67	3828.	2421.	1753.	109.05	
+	HYDROGRAPH AT	SUB X	2128.	18.67	1913.	845.	615.	18.09	
+	HYDROGRAPH AT	SUBXI	760.	16.50	598.	202.	147.	4.78	
+	3 COMBINED AT	CP604	6289.	18.33	5749.	3305.	2396.	131.92	
+	ROUTED TO	RCH16	6234.	19.17	5714.	3229.	2339.	131.92	
+	HYDROGRAPH AT	SUBXII	719.	22.17	685.	370.	268.	10.32	
+	3 COMBINED AT	CP605	7091.	20.33	6685.	3738.	2708.	153.30	
+	ROUTED TO	RCH17	7045.	21.33	6640.	3638.	2633.	153.30	
+	HYDROGRAPH AT	SBXIII	448.	20.00	413.	195.	141.	5.03	
+	HYDROGRAPH AT	SUBXIV	2075.	19.33	1897.	874.	634.	21.10	
+	3 COMBINED AT	CP606	8985.	20.83	8405.	4522.	3274.	179.43	
+	2 COMBINED AT	CP700	13220.	21.00	12308.	6461.	4678.	247.04	
+	ROUTED TO	RCH710	13176.	21.50	12253.	6411.	4640.	247.04	
+	HYDROGRAPH AT	SUB720	2705.	16.17	2071.	683.	496.	15.80	
+	ROUTED TO	RCH730	2470.	17.17	1850.	614.	445.	15.80	
+	HYDROGRAPH AT	SUB730	428.	16.50	337.	113.	82.	2.60	
+	2 COMBINED AT	CP710	2835.	17.00	2123.	714.	517.	18.40	

+	HYDROGRAPH AT	SUB740	7336.	12.33	1457.	396.	287.	5.20
+	ROUTED TO	RCH750	4789.	13.50	1275.	348.	252.	5.20
+	HYDROGRAPH AT	SUB750	3114.	17.17	2596.	942.	681.	25.00
+	2 COMBINED AT	CP710	4957.	13.67	3452.	1248.	905.	30.20
+	3 COMBINED AT	CP710	15417.	20.00	14409.	8008.	5798.	295.64
+	ROUTED TO	RCH760	15360.	20.50	14375.	7860.	5690.	295.64
+	HYDROGRAPH AT	SUB760	859.	16.17	647.	207.	150.	4.70
+	2 COMBINED AT	CP760	15528.	20.50	14541.	8015.	5802.	300.34
+	ROUTED TO	RCH770	15414.	21.50	14467.	7621.	5515.	300.34
+	HYDROGRAPH AT	SUB780	1657.	15.00	1068.	307.	222.	8.20
+	ROUTED TO	RCH790	1597.	15.50	1039.	298.	216.	8.20
+	HYDROGRAPH AT	SUB800	1675.	16.67	1351.	473.	343.	10.90
+	DIVERSION TO	DVT805	837.	16.67	675.	236.	172.	10.90
+	HYDROGRAPH AT	DVT800	837.	16.67	675.	236.	172.	10.90
+	ROUTED TO	RCH810	748.	17.83	590.	213.	154.	10.90
+	HYDROGRAPH AT	SUB810	886.	15.00	565.	161.	116.	4.00
+	2 COMBINED AT	CP810	1170.	16.50	983.	363.	263.	14.90
+	ROUTED TO	RCH795	1132.	17.00	961.	353.	256.	14.90
+	HYDROGRAPH AT	SUB790	1370.	14.50	775.	209.	151.	4.60
+	3 COMBINED AT	CP770	3512.	15.17	2519.	808.	585.	27.70
+	2 COMBINED AT	CP770	15853.	21.33	14903.	8271.	5986.	328.04
+	ROUTED TO	RCH820	15838.	21.67	14891.	8214.	5944.	328.04
+	HYDROGRAPH AT	SUB830	10124.	12.00	1506.	403.	292.	5.50
+	ROUTED TO	RCH840	4393.	13.67	1235.	339.	246.	5.50
+	HYDROGRAPH AT	SUB840	1846.	18.33	1627.	661.	479.	17.00
+	2 COMBINED AT	CP820	4304.	13.83	2426.	966.	700.	22.50
+	2 COMBINED AT	CP820	16831.	21.33	15846.	8995.	6510.	350.54

+	ROUTED TO	RCH850	16805.	21.67	15829.	8902.	6442.	350.54
+	HYDROGRAPH AT	SUB860	710.	17.33	594.	217.	157.	4.80
+	HYDROGRAPH AT	SUB870	1251.	16.17	958.	313.	227.	6.80
+	3 COMBINED AT	CP850	17185.	21.67	16252.	9296.	6728.	362.14
+	ROUTED TO	RCH880	17152.	22.00	16224.	9195.	6654.	362.14
+	HYDROGRAPH AT	DVT805	837.	16.67	675.	236.	172.	10.90
+	DIVERSION TO	DVT940	419.	16.67	338.	118.	86.	10.90
+	HYDROGRAPH AT	DVT890	419.	16.67	338.	118.	86.	10.90
+	ROUTED TO	RCH900	295.	21.00	250.	93.	68.	10.90
+	HYDROGRAPH AT	SUB900	538.	18.50	477.	197.	143.	4.20
+	2 COMBINED AT	CP880	743.	19.67	670.	280.	203.	15.10
+	HYDROGRAPH AT	SUB910	1321.	16.50	1044.	353.	256.	7.50
+	3 COMBINED AT	CP880	17841.	21.83	16893.	9664.	6994.	384.74
+	ROUTED TO	RCH920	17806.	22.17	16858.	9544.	6906.	384.74
+	HYDROGRAPH AT	SUB920	1308.	14.33	702.	186.	135.	3.90
+	2 COMBINED AT	CP920	17805.	22.17	16863.	9679.	7004.	388.64
+	ROUTED TO	RCH930	17779.	22.50	16835.	9542.	6905.	388.64
+	HYDROGRAPH AT	SUB935	831.	19.83	764.	355.	257.	8.20
+	HYDROGRAPH AT	DVT940	419.	16.67	338.	118.	86.	10.90
+	ROUTED TO	RCH950	315.	20.33	265.	97.	70.	10.90
+	HYDROGRAPH AT	SUB950	868.	18.33	765.	314.	227.	6.50
+	2 COMBINED AT	CP950	1137.	19.00	1008.	412.	299.	6.50
+	ROUTED TO	RCH960	1117.	19.17	991.	406.	294.	6.50
+	HYDROGRAPH AT	SUB960	1854.	18.17	1631.	664.	481.	16.30
+	2 COMBINED AT	CP960	2836.	18.67	2513.	1030.	746.	22.80
+	ROUTED TO	RCH970	2740.	19.00	2423.	989.	716.	22.80
	HYDROGRAPH AT							

+		SUB970	899.	16.83	727.	256.	185.	5.20
	2 COMBINED AT							
+		CP930	3359.	18.33	2950.	1211.	877.	28.00
	3 COMBINED AT							
+		CP930	19978.	22.00	18885.	10761.	7788.	424.84
	ROUTED TO							
+		RCH980	19963.	22.17	18855.	10608.	7677.	424.84
	HYDROGRAPH AT							
+		SUB990	399.	13.83	180.	47.	34.	.90
	HYDROGRAPH AT							
+		SB1000	3159.	12.67	757.	191.	138.	3.80
	3 COMBINED AT							
+		CP980	19963.	22.17	18855.	10786.	7806.	429.54
	ROUTED TO							
+		RC1010	19935.	22.33	18822.	10669.	7721.	429.54
	HYDROGRAPH AT							
+		SB1020	888.	15.83	650.	204.	148.	4.50
	2 COMBINED AT							
+		CP1010	20002.	21.50	18881.	10816.	7828.	434.04
	ROUTED TO							
+		RC1030	19991.	21.83	18857.	10673.	7724.	434.04

*** NORMAL END OF HEC-1 ***

APPENDIX C

HEC-1 INPUT DATA

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PRECIPITATION AND AERIAL REDUCTION —

→ USE NOAA ATLAS 2, PRECIP-FREQ OF WESTERN U.S.

→ PLOT 2, 5, 10, 25, 50 AND 100 YEAR POINT VALUES ON FIGURE 1

→ DRAW LINE OF BEST FIT AND DETERMINE CORRECTED VALUE FOR 100 YEAR 24 HOUR

→ USE FIG. 15 OF NOAA TECHNICAL MEMORANDUM NWS HYDRO 40 TO DETERMINE AERIAL REDUCTION

JD RECORDS FOR HEC 1 :

AREA	POINT PRECIP	REDUCTION FACTOR	REDUCED PRECIP
0.1	4.40	1.00	4.40
10	4.40	0.95	4.18
50	"	0.88	3.85
100	"	0.85	3.74
200	"	0.82	3.61
300	"	0.80	3.54
400	"	0.79	3.50
500	"	0.78	3.45

```
JD   4.40   0.1
PC
|
PC
JD   4.18   10
JD   3.85   50
JD   3.74   100
JD   3.61   200
JD   3.54   300
JD   3.50   400
JD   3.45   500
```

MAX 9 VALUES IN HEC 1

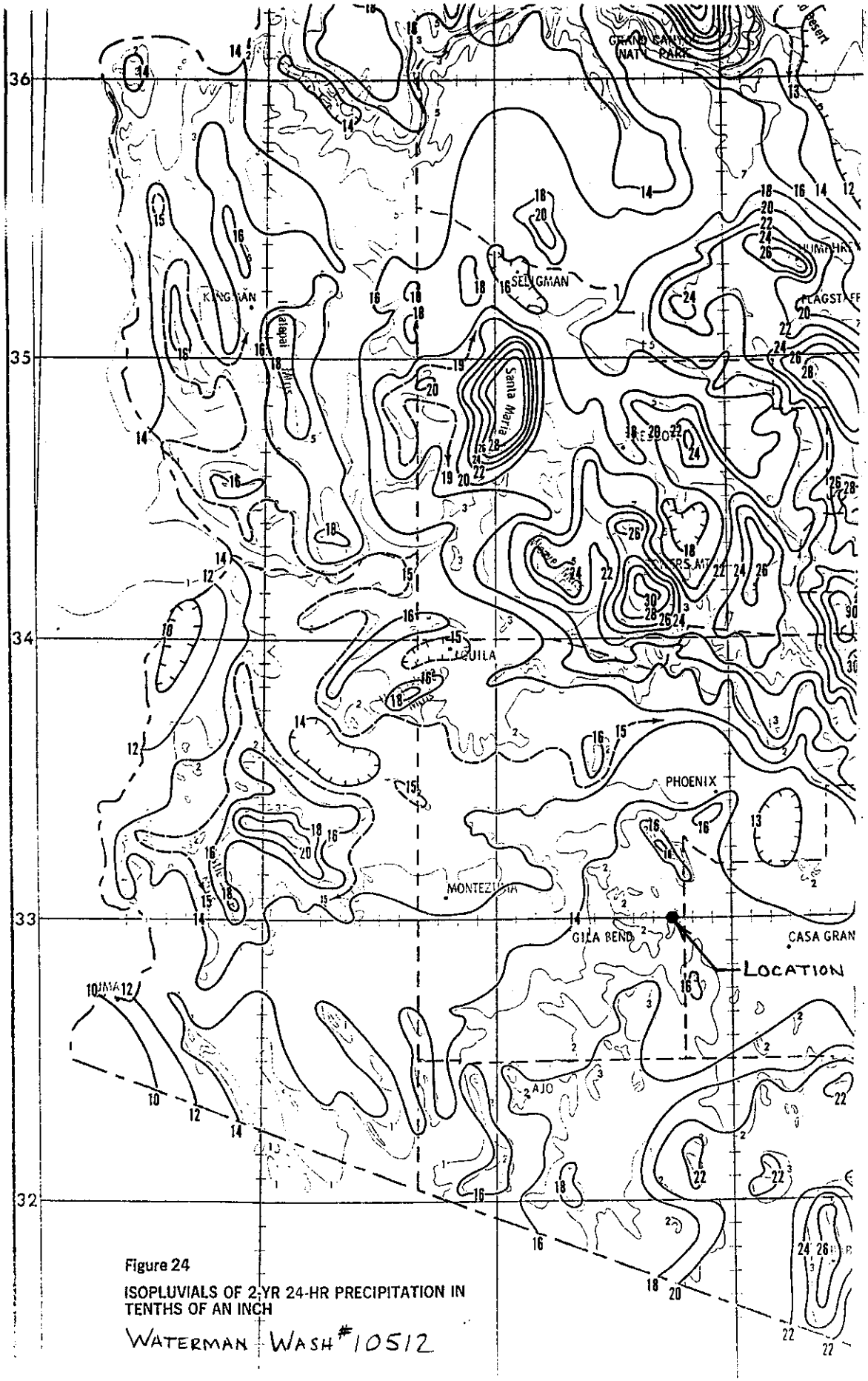

Figure 24

ISOPLUVIALS OF 2-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

WATERMAN WASH #10512

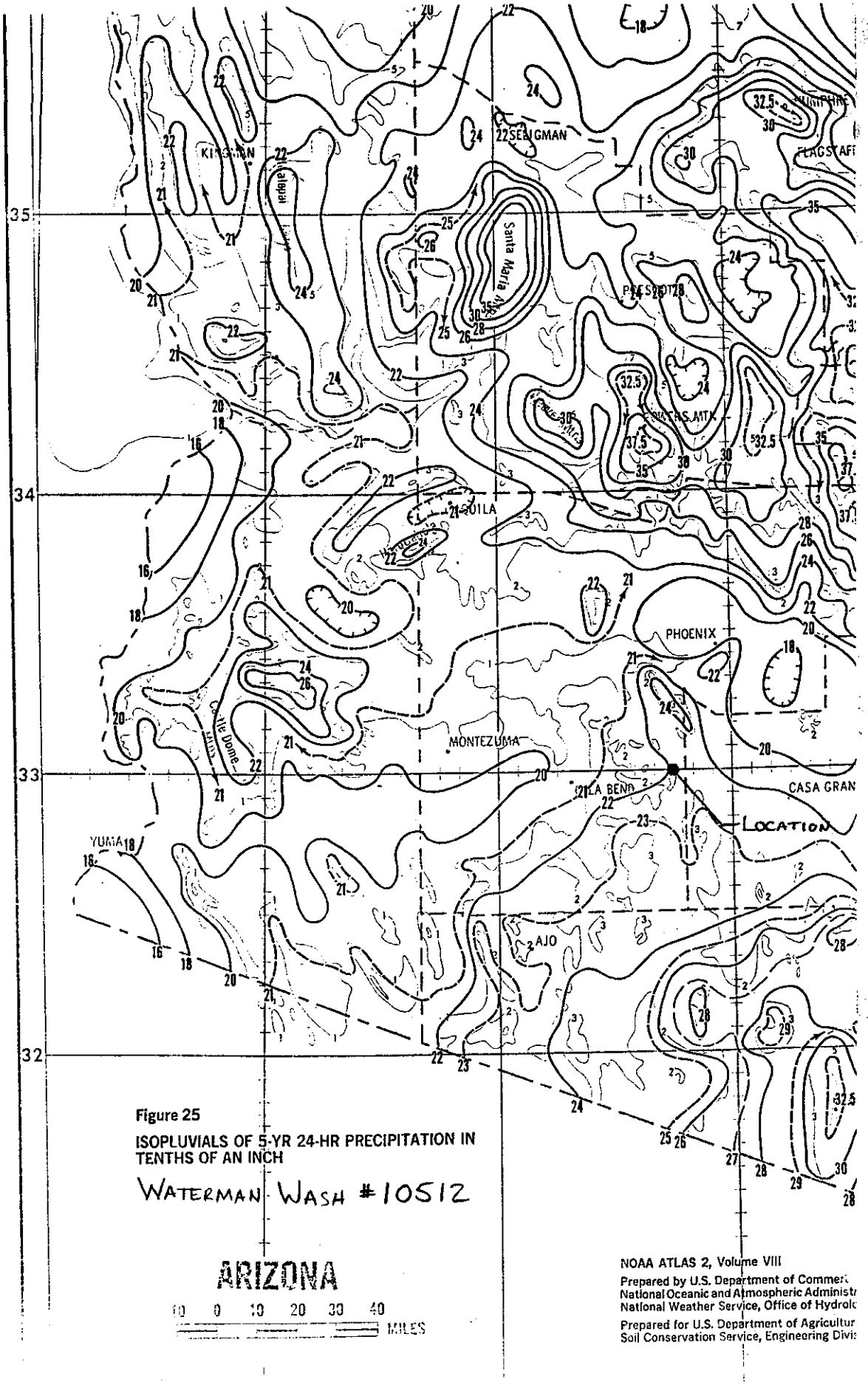

Figure 25

ISOPLUVIALS OF 5-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

WATERMAN WASH #10512

ARIZONA

10 0 10 20 30 40 MILES

NOAA ATLAS 2, Volume VIII

Prepared by U.S. Department of Commerc
National Oceanic and Atmospheric Administr
National Weather Service, Office of Hydrolo

Prepared for U.S. Department of Agricultur
Soil Conservation Service, Engineering Divis

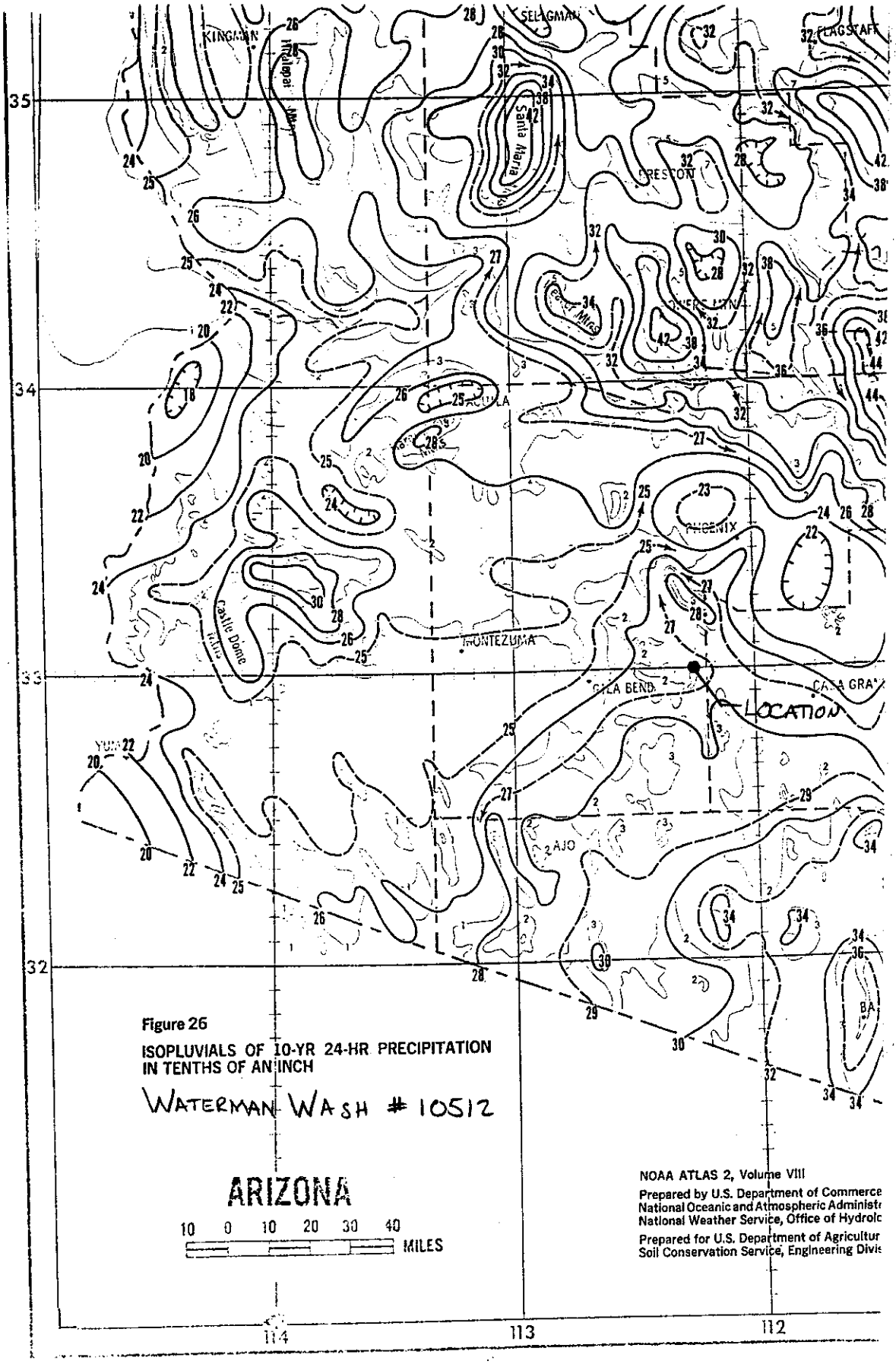

Figure 26

ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

WATERMAN WASH # 10512

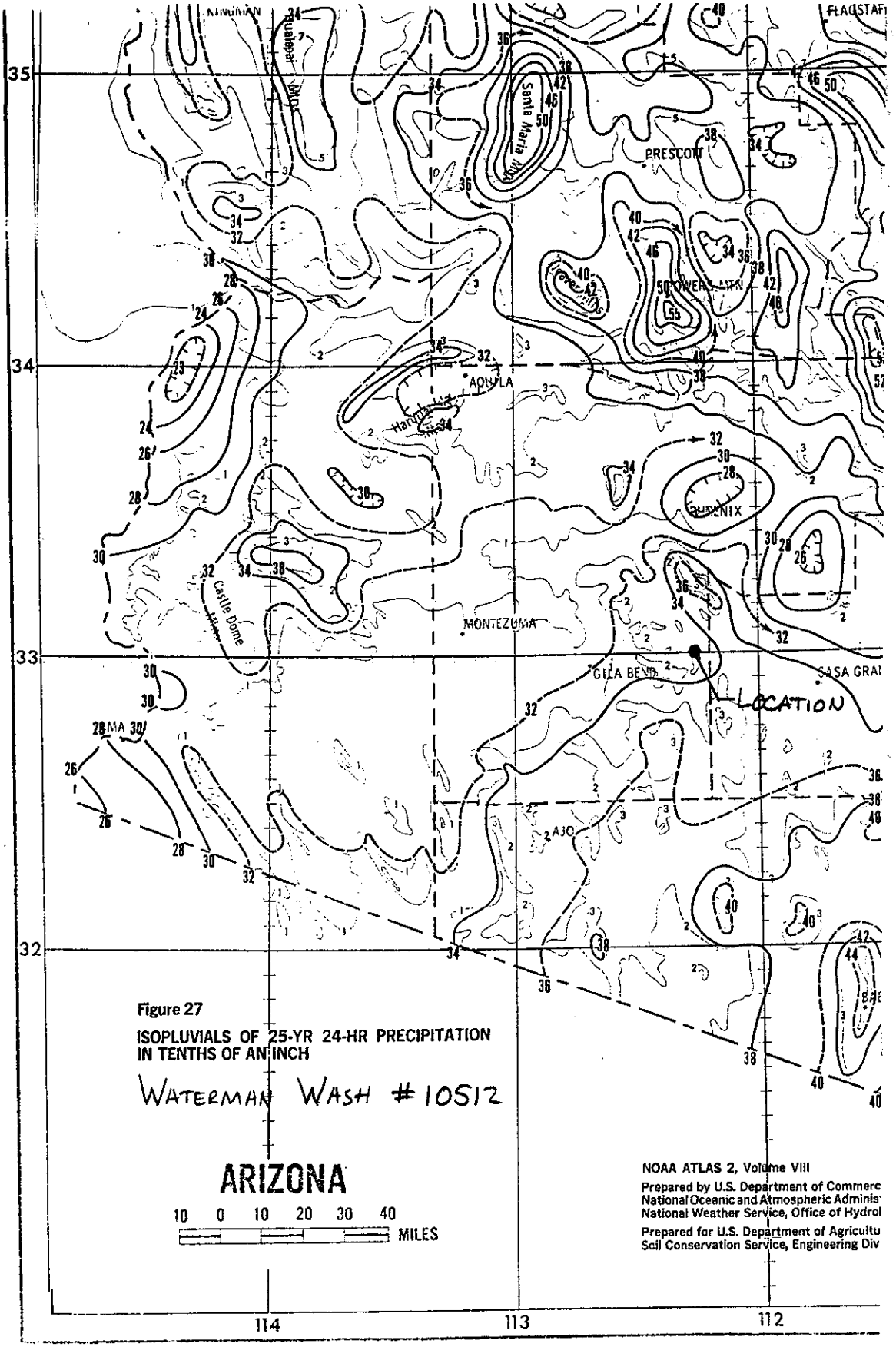

Figure 27

ISOPLUVIALS OF 25-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

WATERMAN WASH #10512

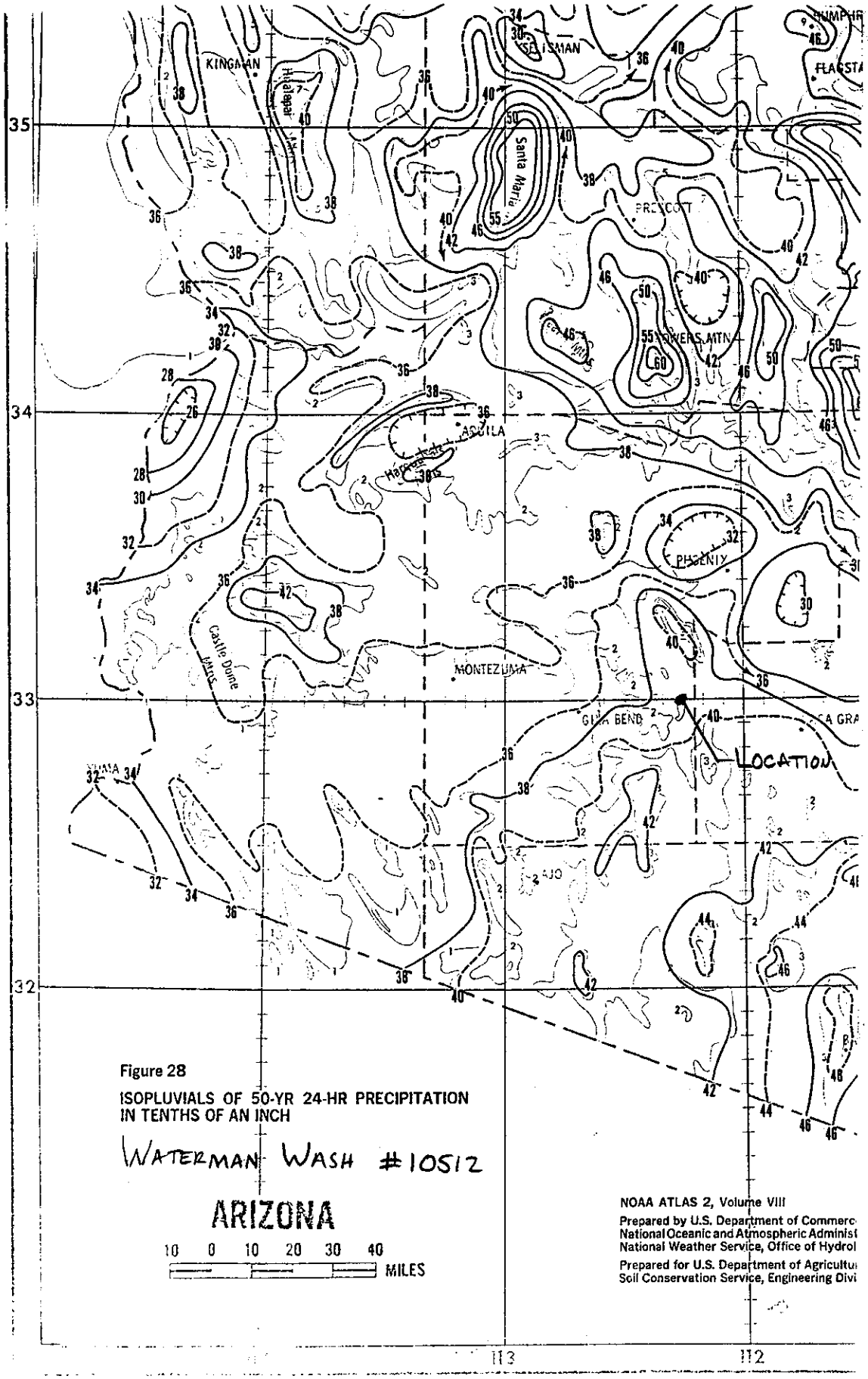

Figure 28

ISOPLUVIALS OF 50-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

WATERMAN WASH #10512

ARIZONA

10 0 10 20 30 40 MILES

NOAA ATLAS 2, Volume VIII

Prepared by U.S. Department of Commerc
National Oceanic and Atmospheric Administ
National Weather Service, Office of Hydrol

Prepared for U.S. Department of Agricultu
Soil Conservation Service, Engineering Divi

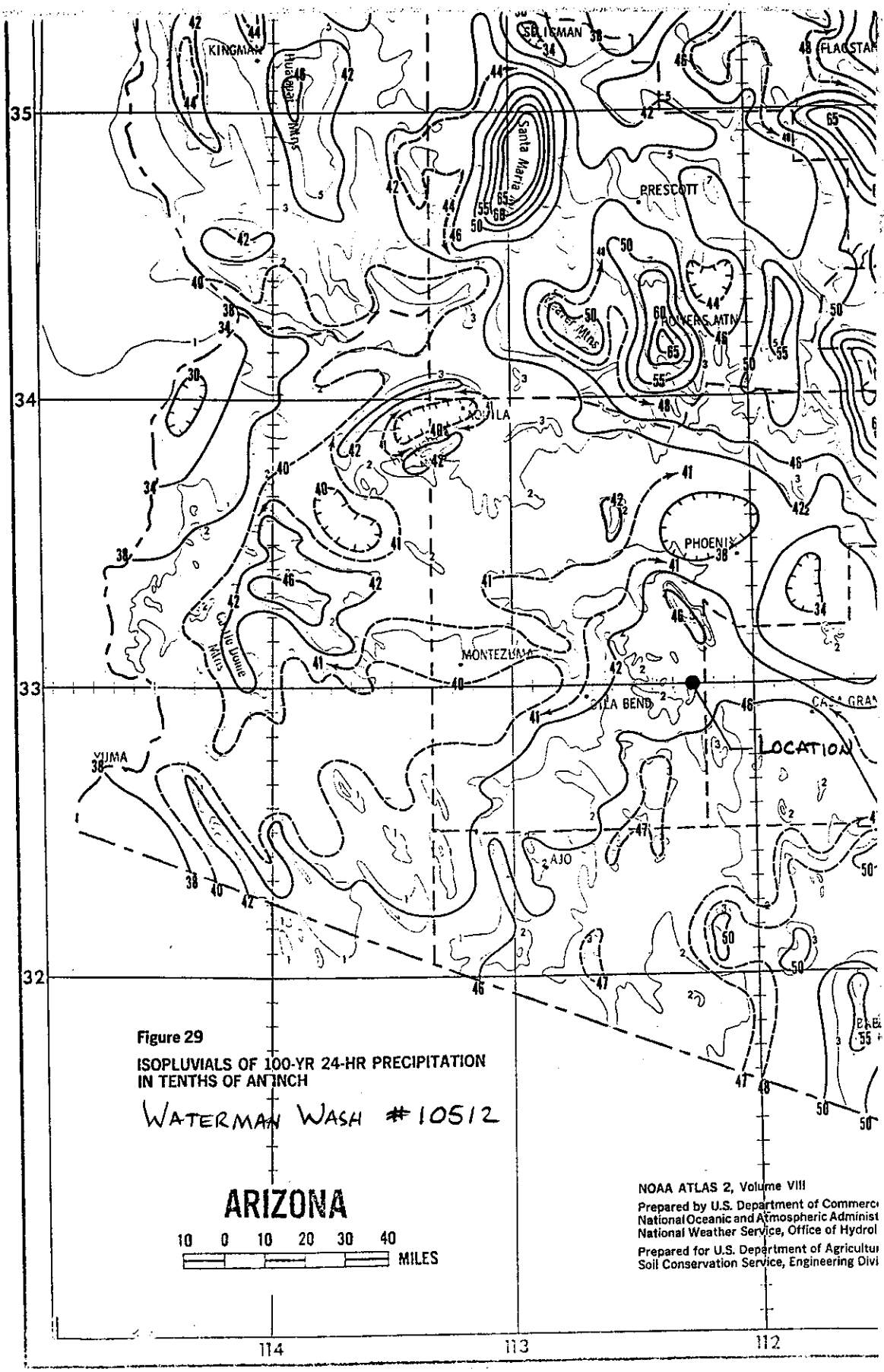

Figure 29

ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

WATERMAN WASH #10512

ARIZONA

10 0 10 20 30 40 MILES

NOAA ATLAS 2, Volume VIII

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administ
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Prepared for U.S. Department of Agricultu
Soil Conservation Service, Engineering Divi

ADDENDUM to "HYDROLOGIC DESIGN FOR HIGHWAY DRAINAGE IN ARIZONA" April 1975

Steps to be used to determine precipitation values for various durations and return periods.

STEP 1. From the precipitation maps in the manual "Hydrologic Design for Highway Drainage in Arizona", determine the precipitation values for the 6 and 24 hour duration storms for return periods of 2, 5, 10, 25, 50 and 100 years. Tabulate these values in Table 1 in the column headed 'Map Values'

TABLE 1

Return Period (Years)	Precipitation Values (inches)			
	6 hour duration		24 hour duration	
	Map Value	Corrected Value	Map Value	Corrected Value
2			1.60	1.60
5			2.25	2.30
10			2.70	2.75
25			3.35	3.35
50			3.90	3.85
100			4.45	4.40

NOTE: There is a possibility of making an error while reading the maps because, (1) a site is not easy to locate precisely on a series of 12 maps, (2) there may be some slight registration differences in printing, and (3) precise interpolation between isolines is difficult. In order to minimize any errors in reading the maps, these values should be plotted on the diagram "Precipitation Depth versus Return Period" Fig. 1.

Project No. 384-2 Station _____
Waterman Wash

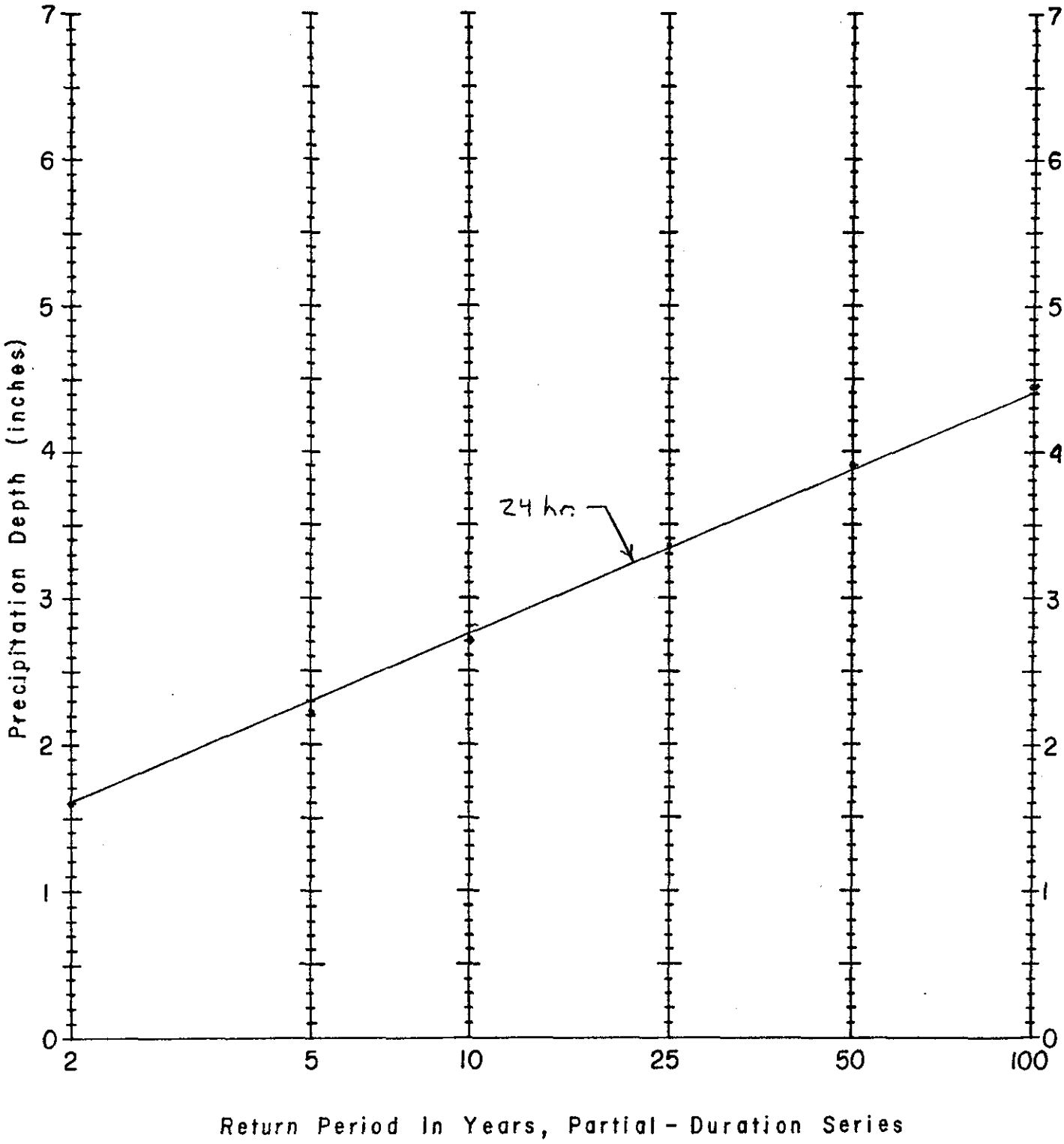

Figure 1 Precipitation Depth Versus Return Period for Partial-Duration Series

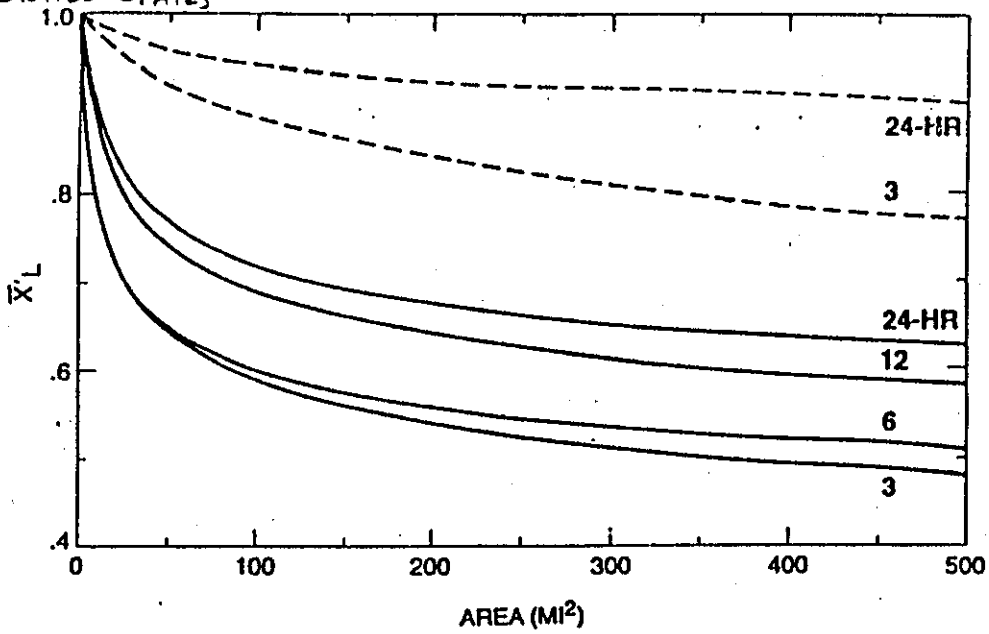

Figure 14.--$\bar{X}'_L$ (2.54-yr depth-area ratio, see sec. 4.3) for 3-, 6-, 12-, and 24-hr in southeast Arizona. Dashed lines are 3-hr and 24-hr Chicago $\bar{X}'_L$ (from TR 24)

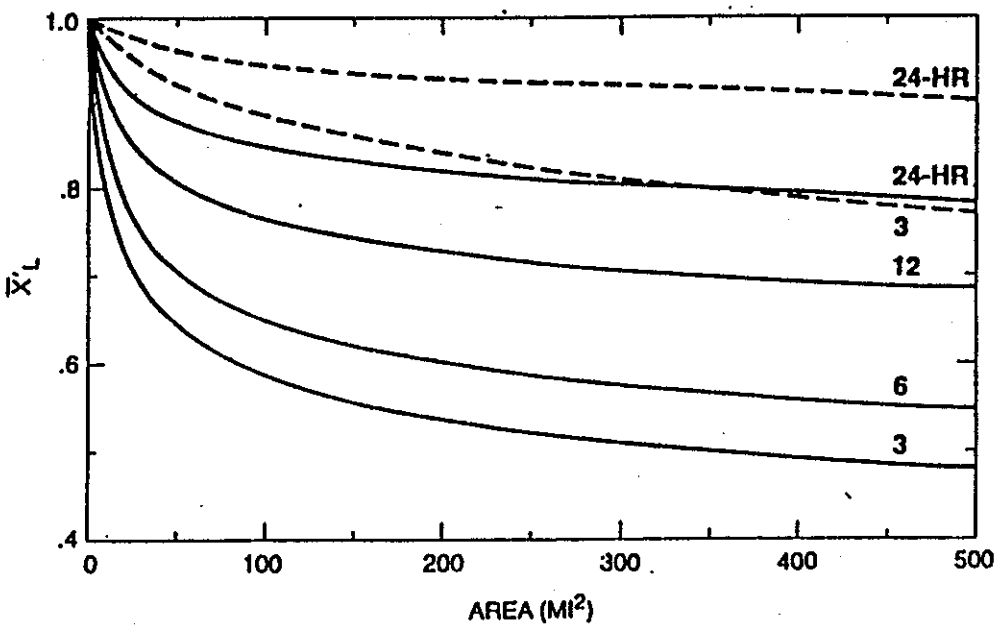

Figure 15.--Same as figure 14, but for central Arizona.

be attributed to a mixture of storm types, but still different from these found in the central Plains.

The recorder-pair data for distances greater than 15 mi contain little information on the structure of 1- and 2-hr storms. This is supported by the low

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ESTIMATE COMPUTATION TIME INTERVAL:

UPPER WATERSHED		LOWER WATERSHED	
SUB BASIN	TC (HRS)	SUB BASIN	TC (HRS)
A	3.28	720	7.24
B	4.35	730	7.75
C	3.67	740	0.74
D	8.75	750	5.93
E	5.43	760	7.05
F	21.96	780	5.34
145	7.58	790	4.39
I	13.72	800	3.13
II	5.28	810	5.27
III	8.23	830	0.35
IV	15.18	840	10.73
V	4.30	860	9.04
VI	8.65	870	7.26
VII	9.00	900	10.98
VIII	6.57	910	7.78
IX	11.04	920	4.05
X	11.42	935	13.18
XI	7.70	950	10.72
XII	16.03	960	10.58
XIII	13.50	970	8.20
XIV	12.58	990	3.19
21	198.22	1000	1.44
		1020	6.61
		23	158.95

$$\text{AVG TC} = \frac{198.22 + 158.95}{21 + 23}$$

$$= 8.12 \text{ HRS}$$

$$\text{TIME INTERVAL} = 0.133 \times \text{AVG TC}$$

$$= 0.133 \times 8.12$$

$$= 1.08 \text{ HRS} = 65 \text{ MIN}$$

USE OF THIS TIME INTERVAL RESULTS IN NUMEROUS HEC 1 WARNING MESSAGES SUGGESTING A SHORTER TIME INTERVAL. A SENSATIVITY ANALYSIS INDICATES USE OF A 10 MINUTE TIME INTERVAL DOES NOT CHANGE RESULTING PEAK FLOWS SIGNIFICANTLY WHILE ELIMINATING MOST OF THE TIME INTERVAL WARNING MESSAGES.

∴ USE 10 MIN TIME INTERVAL

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UPPER BASIN

SUB-BASIN	AREA
A	2.78
B	6.87
C	1.09
D	11.06
E	2.72
F	60.1
145	12.83
I	32.21
II	7.1
III	7.02
IV	10.54
V	2.45
VI	7.60
VII	4.08
VIII	10.07
IX	9.20
X	18.09
XI	4.78
XII	10.32
XIII	5.03
XIV	21.1

TOTAL 247.04 SQ. MI

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LOWER BASIN

SUB-BASIN	AREA
720	15.8
730	2.6
740	5.2
750	25.0
760	4.7
780	8.2
790	4.6
800	10.9
810	4.0
830	5.5
840	17.0
860	4.8
870	6.8
900	4.2
910	7.5
920	3.9
935	8.2
950	6.5
960	16.3
970	5.2
990	0.9
1000	3.8
1020	4.5

TOTAL 176.1 mi^2

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SOILS LIST
UPPER - BASIN

SANDY LOAM

DATELAND
DENURA
GROWLER
MOHALL
MOMOLI

LOAM

CIPRIANO
GUNSIGHT
QUILOTOSA

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SOILS LIST

LOWER - BASIN

LOAM	SANDY LOAM	CLAY LOAM	CLAY	LOAMY SAND
AGUALT	ANTHO	AVONDALE	CASHION	VINT
ESTRELLA	BRIOS	AVONDA	GADSEN	
GILMAN	CARRIZO	CASA GRANDE	VECONT	
GUNSIGHT	COOLIDGE	GLENBAR		
LAVEEN	MARIPO	TREMANT		
PERRYVILLE	VALENCIA	WINTERSBURG		
PINAL	CHERIONI			
RILLITO				
TUCSON				
GACHADO				
HARQUA				
PINAMT				

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LOSSES —

→ REFERENCES / AREA:

BUCKEYE
CASA GRANDE } UNPUBLISHED SOIL SURVEYS
CHANDLER
CENTRAL MARICOPA

→ METHOD:

ESTIMATE % AREAS FOR EACH SOIL TYPE
ESTIMATE % IMPERVIOUS FOR EACH SUB-BASIN, DEDUCT FROM TOTAL
WEIGHT UL FROM TABLE 4.3
WEIGHT IL FROM TABLE 4.3 (NORMAL)
ESTIMATE SOIL COVER/LAND USE % TABLE 4.1
10 % OF AGRICULTURE SHOWN WAS USED
WEIGHT IA
IA + IL = STRTL (STARTING LOSS FOR HEC 1)

Table 4.1
Surface Retention Loss for
Various Land Surfaces in Maricopa County

Land-use and/or Surface Cover (1)	Surface Retention Loss IA, inches (2)
Natural	
Desert and rangeland, flat slope	0.35
Hillslopes, Sonoran Desert	0.15
Mountain, with vegetated surface	0.25
Developed (Residential and Commercial)	
Lawn and turf	0.20
Desert landscape	0.10
Pavement	0.05
Agricultural	
Tilled fields and irrigated pasture	0.50

Table 4.3
Initial Loss Plus Uniform Loss Rate Parameter Values
for Bare Ground according to Soil Texture Classification

Soil Texture Classification (1)	Uniform Loss Rate CNSTL (2)	Initial Loss, inches IL[1]		
		Dry (3)	Normal (4)	Saturated (5)
sand	4.6	1.3	1.3	0
loamy sand	1.2	0.8	0.8	0
sandy loam	0.40	0.7	0.6	0
loam	0.25	0.8	0.7	0
silty loam	0.15	0.6	0.5	0
silt	0.10	0.6	0.5	0
sandy clay loam	0.06	0.6	0.5	0
clay loam	0.04	0.5	0.4	0
silty clay loam	0.04	0.6	0.5	0
sandy clay	0.02	0.4	0.3	0
silty clay	0.02	0.4	0.3	0
clay	0.01	0.3	0.2	0

[1] Selection of IL:
Dry = Nonirrigated lands such as desert and rangeland;
Normal = Irrigated lawn, turf, and permanent pasture;
Saturated = Irrigated agricultural land.

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SUB - BASIN	SANDY LOAM IL=0.6 UL=0.4	LOAM IL=0.7 UL=0.25	WEIGHTED IL AVG.	WEIGHTED UL AVG.
A	2.621	0.159	0.61	0.39
B	5.841	1.029	0.62	0.38
C	0.386	0.704	0.66	0.30
D	9.40	1.66	0.62	0.38
E	2.640	0.0805	0.60	0.40
F	52.840	8.260	0.61	0.38
145	5.132	7.698	0.66	0.31
I	25.77	6.44	0.62	0.37

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SUB-BASIN	SANDY LOAM IL=0.6 UL=0.4	LOAM IL=0.7 UL=0.25	WEIGHTED IL AVG.	WEIGHTED UL AVG.
II	5.68	1.42	0.62	0.37
III	6.669	0.351	0.61	0.39
IV	9.576	1.064	0.61	0.39
V	2.45	—	0.60	0.40
VI	6.46	1.14	0.62	0.38
VII	4.08	—	0.60	0.40
VIII	7.049	3.021	0.63	0.36
IX	9.20	—	0.60	0.40

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UPPER BASIN
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SUB-BASIN	SANDY LOAM IL=0.6 UL=0.4	LOAM IL=0.7 UL=0.25	WEIGHTED IL AVG.	WEIGHTED UL AVG
X	9.045	9.045	0.65	0.33
XI	4.541	0.239	0.61	0.39
XII	9.923	0.307	0.60	0.40
XIII	5.03	—	0.60	0.40
XIV	15.825	5.275	0.63	0.36

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UPPER BASIN

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SUB-BASIN	DRAINAGE AREA SQ.MI.	(0.15) HILLSLOPE SQ.MI.	(0.35) DESERT + RANGELAND mi^2	WEIGHTED IA VALUE	IL	STRTL IA+IL	UL	ASSUMED IMPERVIOUS %
A	2.78	0.22	2.56	0.33	.61	0.94	.39	0
B	6.87	0.34	6.53	0.34	.62	0.96	.38	0
C	1.09	0.17	0.92	0.32	.66	0.98	.30	4
D	11.06	0.55	10.51	0.34	.62	0.96	.38	2
E	2.72	0	2.72	0.35	.60	0.95	.40	1
F	60.1	3.06	58.04	0.34	.61	0.95	.38	3
145	12.83	8.98	3.85	0.21	.66	0.87	.31	10
I	32.21	3.22	28.99	0.33	.62	0.95	.37	1
II	7.1	0.57	6.53	0.33	.62	0.95	.37	0
III	7.02	0.21	6.81	0.34	.61	0.95	.39	0
IV	10.54	0.64	10.0	0.34	.61	0.95	.39	0

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UPPER BASIN
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SUB-BASIN	DRAINAGE AREA SQ. MI.	HILLSLOPE (0.15) SQ. MI.	DESERT + RANGELAND (0.35) mi²	WEIGHTED IA VALUE	IL	STRTL IA+IL	UL	ASSUMED IMPERVIOUS %
V	2.45	0	2.45	0.35	.60	0.95	.40	0
VI	7.60	0.38	7.22	0.34	.62	0.96	.38	2
VII	4.08	0	4.08	0.35	.60	0.95	.40	1
VIII	10.07	0.50	9.57	0.34	.63	0.97	.36	5
IX	9.20	0	9.20	0.35	.60	0.95	.40	0
X	18.09	2.71	15.38	0.32	.65	0.97	.33	10
X	4.78	0.10	4.68	0.35	.61	0.96	.39	2
XI	10.32	0.10	10.22	0.35	.60	0.95	.40	1
XIII	5.03	0	5.03	0.35	.60	0.95	.40	0
XIV	21.1	2.19	16.08	0.33	.63	0.96	.36	5

DESIGNED BY BLO DATE Aug 91 SHEET NO. 1 PAGE NO.
CHECKED BY GSS DATE Aug 91 OF 2 JOB NO. 10512
REVIEWED BY DATE SUBJECT: WATERMAN WASH
APPROVED BY DATE LOWER BASIN

Sub Basin Number	Drainage Area sq mi	Hillslope Sonoran Desert Area sq mi	Tilled Fields and Irrigated Pasture sq mi	Tilled Fields and Irrigated Pasture * sq mi	Desert & Rangeland Flat Slope sq mi	Weighted IA Value	Initial Loss IL	STRTL IA + IL	Uniform Loss UL	Assumed Impervious Area (%)
720	15.8	2.7	—	—	13.1	0.32	0.54	0.86	0.34	3
730	2.6	—	—	—	2.6	0.35	0.64	0.99	0.34	—
740	5.2	5.2	—	—	—	0.15	0.34	0.49	0.07	10
750	25.0	—	4.3	0.43	24.57	0.35	0.56	0.91	0.40	—
760	4.7	—	—	—	4.7	0.35	0.64	0.99	0.32	—
780	8.2	0.8	—	—	7.4	0.33	0.61	0.94	0.54	1
790	4.6	—	4.4	0.44	4.16	0.36	0.66	1.02	0.29	—
800	10.9	2.0	—	—	8.9	0.31	0.53	0.84	0.36	3
810	4.0	—	—	—	4.0	0.35	0.64	0.99	0.42	—
830	5.5	5.5	—	—	—	0.15	0.35	0.50	0.08	9
840	17.0	—	6.3	0.63	16.37	0.36	0.61	0.97	0.38	—
860	4.8	—	1.9	0.19	4.61	0.36	0.66	1.02	0.29	—
870	6.8	0.3	2.6	0.26	6.24	0.35	0.55	0.90	0.29	—
900	4.2	—	0.5	0.05	4.15	0.35	0.66	1.01	0.25	—
910	7.5	0.6	1.6	0.16	6.74	0.34	0.57	0.91	0.27	1
920	3.9	—	3.7	0.37	3.53	0.36	0.65	1.01	0.25	—
935	8.2	0.2	—	—	8.0	0.35	0.65	1.00	0.29	—
950	6.5	0.3	—	—	6.2	0.34	0.59	0.93	0.25	2
960	16.3	1.0	—	—	15.3	0.34	0.59	0.93	0.37	2
970	5.2	0.2	0.3	0.03	4.97	0.34	0.56	0.90	0.26	3

* IT IS ESTIMATED THAT ONLY 10% OF THE AGRICULTURAL LAND SHOWN IS IN ACTIVE USE.

LOWER BASIN

SC 3020

DESIGNED BY BLO DATE AUG 91 SHEET NO. 2 PAGE NO.
CHECKED BY GSB DATE AUG 91 OF 2 JOB NO. 10512
REVIEWED BY DATE SUBJECT: WATERMAN WASH
APPROVED BY DATE LOWER BASIN

SUB BASIN NUMBER	DRAINAGE AREA SQ.MI.	HILLSLOPE SONORAN DESERT AREA SQ.MI.	TILLED FIELDS AND IRRIGATED SQ.MI.	PASTURE SQ.MI.	DESERT & RANGELAND FLAT SLOPE SQ.MI.	WEIGHTED IA VALUE	INITIAL LOSS IL	STRTL IA+IL	UNIFORM LOSS UL	ASSUMED IMPERVIOUS AREA (%)
990	0.9	0.2	—	—	0.7	0.31	0.54	0.85	0.23	—
1000	3.8	0.4	0.2	0.02	3.38	0.33	0.61	0.94	0.23	—
1020	4.5	1.2	—	—	3.3	0.30	0.54	0.84	0.32	1

LOWER BASIN

SC 3020

LOWER BASIN

DESIGNED BY BLO DATE Aug 91 SHEET NO. 1 PAGE NO.
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REVIEWED BY DATE SUBJECT: WATERMAN WASH
APPROVED BY DATE LOWER BASIN

SUB BASIN	LOAMY SAND IL = 0.8 UL = 1.2	SANDY LOAM IL = 0.6 UL = 0.4	LOAM IL = 0.7 UL = 0.25	CLAY LOAM IL = 0.4 UL = 0.04	SANDY CLAY (IMPERV) IL = 0.3 UL = 0.02	TB TD PVD IL = 0.6 UL = 0.4	(RS) ROCK OUTCROP NOT WEIGHTED	WEIGHTED AVERAGE IL	WEIGHTED AVERAGE UL
720	0.5	11.5			3.4		0.4	0.54	0.34
730		1.6	1.0					0.64	0.34
740					4.1	0.6	0.5	0.34	0.07
750		22.8		0.2	0.1	1.9		0.56	0.40
760		2.2	2.3	0.1		0.1		0.64	0.32
780	1.9	5.2			1.0		0.1	0.61	0.54
790		1.4	3.0	0.2				0.66	0.29
800	0.9	6.6			3.0		0.4	0.53	0.36
810	0.4	2.2	1.2	0.1	0.1			0.64	0.42
830					4.2	0.8	0.5	0.35	0.08
840		14.5	0.8	1.0		1.1		0.61	0.38
860		1.5	3.1	0.2				0.66	0.29
870		4.3	0.6	1.5	0.4			0.55	0.29
900		0.5	3.3	0.3	0.1			0.66	0.25
910		3.4	1.8	1.1	0.7	0.4	0.1	0.57	0.27
920		0.6	2.9	0.4				0.65	0.25
935		3.0	4.8	0.1	0.3			0.65	0.29
950		1.9	3.2	0.2	1.1		0.1	0.59	0.25
960	1.2	8.9	3.2		2.6	0.1	0.3	0.59	0.37
970		2.3	1.5	0.2	1.1		0.1	0.56	0.26

SC 3020

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APPROVED BY DATE LOWER BASIN

SUB BASIN	LOAMY SAND IL=0.8 UL=1.2	SANDY LOAM IL=0.6 UL=0.4	LOAM IL=0.7 UL=0.25	CLAY LOAM IL=0.4 UL=0.04	SANDY CLAY (IMPERV) IL=0.3 UL=0.02	TB TD PVD IL=0.6 UL=0.4	(RS) ROCK OUTCROP NOT WEIGHTED	WEIGHTED VALUE IL	WEIGHTED VALUE UL
990		0.3	0.3	0.1	0.2			0.54	0.23
1000		2.0	1.4		0.3	0.1		0.61	0.23
1020		3.4	0.1			0.9	0.1	0.54	0.32

LOWER BASIN

SC 3020

Job No. 10512 Page No.

Computed by GSB Date Aug 91
Checked by Date
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Approved by Date

Subject WATERMAN WASH
UPPER BASIN

Sheet No. of

DETERMINE T_c's & LAG FOR DRAINAGE AREAS

METHODOLOGY

1) FROM TOPOGRAPHY
   a) DETERMINE SLOPE
   b) DETERMINE HYDRAULIC LENGTH (ℓ)

2) USING UPLAND METHOD (NEH, Ch 15) DETERMINE T_c BY
   a) DETERMINE VELOCITY (V) FROM FIG 15.2
   b) DETERMINE TRAVEL TIME T_t FROM EQ. 15.1
   c) SUM T_t's TO OBTAIN T_c

3) CALCULATE LAG (L) USING EQ 15.3

EQ. 15.1 → $T_t = \frac{\ell}{3600\,V}$

EQ 15.3 → $L = 0.6\,T_c$

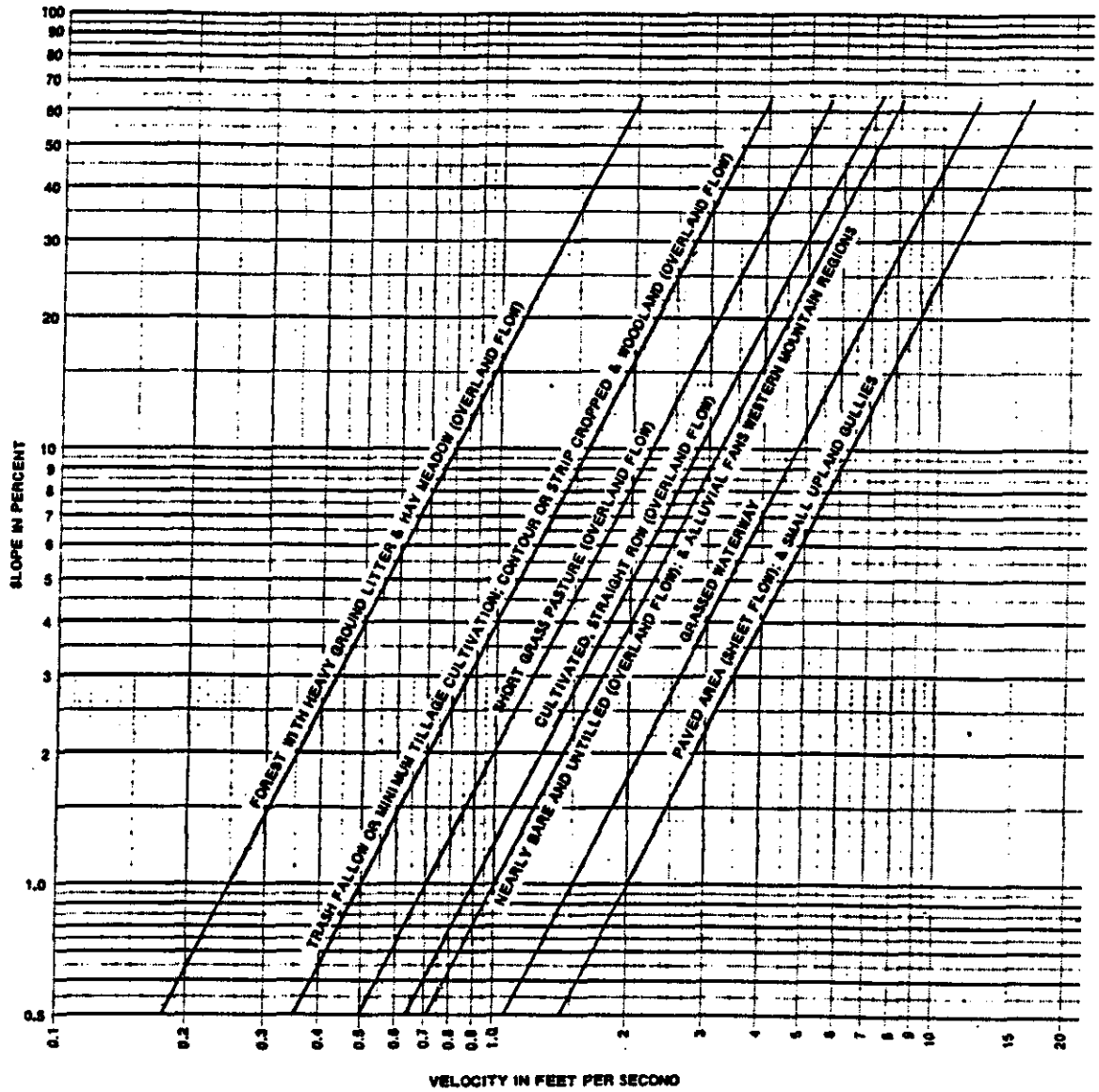

Figure 15.2.—Velocities for upland method of estimating T_c

Job No. _____ Page No. _____

Subject WATERMAN WASH

Computed by _____ Date _____

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DRAINAGE AREA#	SLOPE %	VELOCITY (ft/s) FROM FIG. 15.2	HYDRAULIC LENGTH (FT)	T_t (hr) FROM EQ. 15.1	T_c (hr) SUM T_t's	LAG (hr) EQ. 15.3
A	30.0	5.5	2000	0.10		
	1.9	1.45	16,600	3.18	3.28	1.97
B	29.0	5.4	5000	0.26		
	1.7	1.4	20,600	4.09	4.35	2.61
C	22.0	4.8	900	0.05		
	1.2	1.15	15,000	3.62	3.67	2.20
D	1.0	1.0	31500	8.75	8.75	5.25
E	1.1	1.1	21,500	5.43	5.43	3.26
F	22.9	4.9	3500	0.20		
	0.9	0.97	76,000	21.76	21.96	13.18
145	20.0	4.5	4,000	0.25		
	1.4	1.25	33000	7.33	7.58	4.55

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SHEET NO. 7 OF 8
CALCULATED BY TDC DATE 9-12-89
CHECKED BY DATE
SCALE

Drainage Area #	Slope (%)	Velocity (ft/s) (From Fig. 15.2	Hydraulic Length (ft)	T_t (hr) EQ 15.1	T_c (hr) Sum T_t's	Lag (hr) EQ 15.3
I (m+w)	11.9	3.5	6,700	0.53		
	1.0	1.0	47,500	13.19	13.72	8.23
II (m+w)	31.9	5.7	3,300	0.16		
	0.8	0.9	16,600	5.12	5.28	3.17
III (m+w)	22.4	4.9	3,700	0.21		
	0.81	0.9	26,000	8.02	8.23	4.94
IV (m+w)	14.9	3.9	6,800	0.48		
	1.14	1.1	58,200	14.70	15.18	9.11
V	0.5	0.71	11,000	4.30	4.30	2.58
VI (m+w)	26.7	5.30	3,000	0.16		
	0.8	0.9	27,500	8.49	8.65	5.19
VII	0.5	0.71	23,000	9.0	9.0	5.4
VIII	0.8	0.9	21,300	6.57	6.57	3.94
IX	0.6	0.78	31,000	11.04	11.04	6.62
X (m+w	29.2	5.5	6,200	0.31		
	1.2	1.15	46,000	11.11	11.42	6.85

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JOB Waterman Wash
SHEET NO. 8 OF 8
CALCULATED BY TDC DATE 9-12-89
CHECKED BY DATE
SCALE

Drainage Area #	Slope (%)	Velocity (ft/s) (From Fig. 15.2	Hydraulic Length (ft)	T_t (hr) EQ 15.1	T_c (hr) Sum T_t's	Lag (hr) EQ 15.3
XI (mtn)	53.5	7.4	1,000	0.04		
	0.6	0.78	21,500	7.66	7.7	4.62
XII	0.6	0.78	45,000	16.03	16.03	9.62
XIII	0.5	0.71	34,500	13.50	13.54	8.10
XIV (mtn)	26.7	5.25	9,500	0.50		
	1.0	1.0	43,500	12.08	12.58	7.55

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DESIGNED BY BGO DATE Aug 91 SHEET NO. 1 PAGE NO.
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REVIEWED BY DATE SUBJECT: WATERMAN WASH
APPROVED BY DATE LOWER BASIN

LOWER BASIN

SUB	REACH #1						REACH #2						TOTAL	LAG
BASIN	LENGTH (FT)	TOP ELEV	BOTTOM ELEV	SLOPE %	AVERAGE VELOCITY (FPS)	TIME (HRS)	LENGTH (FT)	TOP ELEV	BOTTOM ELEV	SLOPE %	AVERAGE VELOCITY (FPS)	TIME (HRS)	TIME	TIME
720	6673	2400	1635	11.46	3.25	0.57	28809	1635	1240	1.37	1.2	6.67	7.24	4.34
730	21484	1240	1115	0.58	0.77	7.75							7.75	4.65
740	10417	3100	1620	14.21	3.9	0.74							0.74	0.44
750	38574	1620	1116	1.3	1.2	8.93							8.93	5.36
760	20052	1210	1088	0.61	0.79	7.05							7.05	4.23
780	1790	1800	1260	30.2	5.5	0.10	17904	1260	1102	0.88	0.95	5.24	5.34	3.20
790	17230	1100	1055	0.4	0.71	4.39							4.39	2.63
800	4232	2600	1560	24.6	5.0	0.24	31250	1560	1220	1.09	1.1	7.89	8.13	4.88
810	15951	1200	1090	0.69	0.84	5.27							5.27	3.16
830	6836	3500	1500	29.3	5.4	0.35							0.35	0.21
840	42480	1500	1038	1.09	1.1	10.73							10.73	6.44
860	27669	1200	1006	0.70	0.85	9.04							9.04	5.43
870	2279	1800	1390	18.0	4.4	0.14	30762	1390	1010	1.24	1.2	7.12	7.26	4.36
900	33203	1220	990	0.69	0.84	10.98							10.98	6.59
910	3418	2400	1600	23.4	4.8	0.20	35482	1600	988	1.72	1.3	7.58	7.78	4.67
920	11068	1028	965	0.57	0.76	4.05							4.05	2.43
935	2116	1800	1350	21.3	4.7	0.13	45085	1350	935	0.92	0.96	13.05	13.18	7.91
950	4069	1800	1470	8.11	2.8	0.40	40853	1470	1010	1.13	1.1	10.32	10.72	6.43
960	2279	1510	1440	3.07	1.8	0.35	40527	1440	1000	1.09	1.1	10.23	10.58	6.35
970	22135	1060	940	0.54	0.75	8.20							8.20	4.92

SC 3020

DESIGNED BY BLO DATE Aug 91 SHEET NO. 2 PAGE NO.
CHECKED BY GSB DATE Aug 91 OF 2 JOB NO. 10512
REVIEWED BY DATE SUBJECT: WATERMAN WASH LOWER BASIN
APPROVED BY DATE

LOWER BASIN

SUB BASIN	REACH #1 LENGTH (FT)	TOP ELEV	BOTTOM ELEV	SLOPE %	AVERAGE VELOCITY (FPS)	TIME (HRS)	REACH #2 LENGTH (FT)	TOP ELEV	BOTTOM ELEV	SLOPE %	AVERAGE VELOCITY (FPS)	TIME (HRS)	TOTAL TIME	LAG TIME
990	1465	1150	995	10.6	3.2	0.13	9928	995	917	0.79	0.9	3.06	3.19	1.91
1000	2604	1600	1040	21.5	4.7	0.15	6510	1040	910	2.0	1.4	1.29	1.44	0.86
1020	1953	1400	1080	16.4	4.0	0.14	22135	1080	885	0.88	0.95	6.47	6.61	3.97

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JOB Waterman Wash
SHEET NO. 1 OF 4
CALCULATED BY TDC DATE 1/22/90
CHECKED BY DATE
SCALE Cross Sections For Normal Depth Routing

UPPER BASIN

	Reach #	Ft. Upstream of Confluence	X-Section # Used
West Prong	5	38,000'	208
	6	26000'	183
	7	13 000'	156
	8	5000'	140
East Prong	12	43000'	95
	13	39000'	87
	14	32000'	72
	15	23 000'	55
	16	14200'	36
	17	6000'	20

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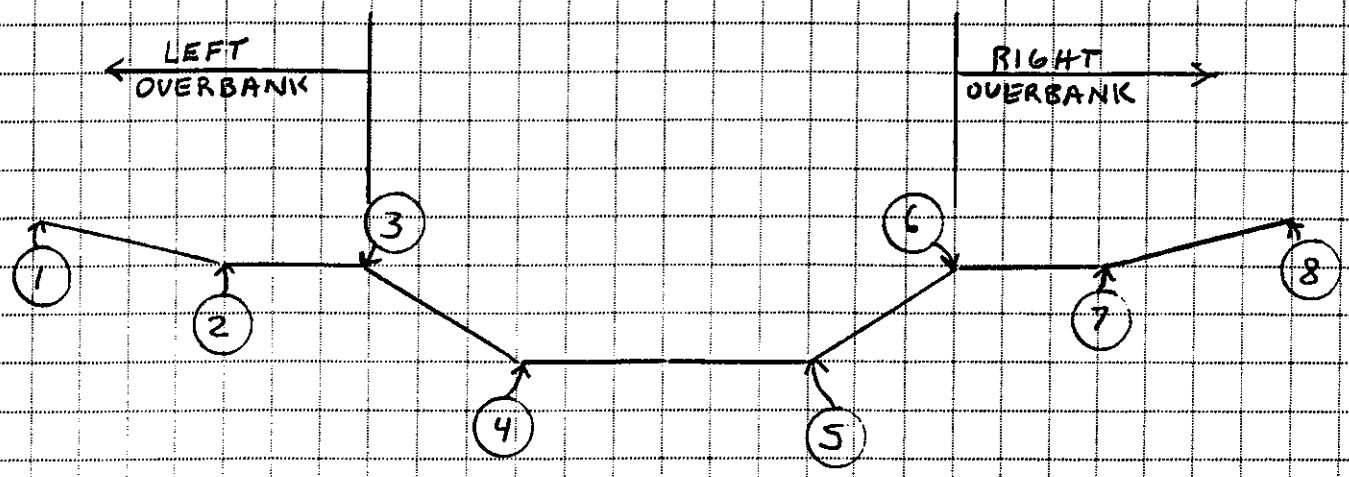
JOB Waterman Wash
SHEET NO. 2 OF 4
CALCULATED BY TDC DATE 1/23/90
CHECKED BY DATE
SCALE

UPPER BASIN



Normal Depth Point Locations For X-Sect.

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JOB: Waterman Wash
SHEET NO. 3 OF 4
CALCULATED BY: TDC DATE: 11/23/90
CHECKED BY: DATE:
SCALE: EAST PRONG X-SECTIONS

UPPER BASIN

Reach # 17 (X-Sect # 20)

Elev (Y)	Dist (X)
1159.7	0
1153.3	1401
1153.8	1617
1147.1	1637
1147.1	1662
1151.8	1694
1153.1	1720
1158.6	2801

Reach # 16 (X-Sect # 36)

Elev (Y)	Dist (X)
1181.2	0
1175.1	478
1173.3	966
1165.7	976
1165.7	994
1172.4	1006
1175.8	1381
1180.7	1907

Reach # 15 (X-Sect # 55)

Elev (Y)	Dist (X)
1200.1	0
1195.8	227
1194.7	1232
1189.5	1239
1189.5	1255
1194.4	1266
1196.9	1799
1198.3	2061

Reach # 14 (X-Sect # 72)

Elev (Y)	Dist (X)
1220.3	0
1216.8	1194
1215.5	1481
1211.9	1503
1211.8	1526
1217.3	1532
1217.4	1791
1220.3	2510

Reach # 13 (X-Sect # 87)

Elev (Y)	Dist (X)
1241.6	0
1238.9	459
1237.7	960
1233.3	976
1233.6	1014
1236.7	1025
1237.9	1374
1241.8	2432

Reach # 12 (X-Sect # 95)

Elev (Y)	Dist (X)
1253.5	0
1249.5	754
1248.4	1102
1244.0	1112
1244.1	1126
1247.8	1138
1249.8	1342
1255	2306

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JOB [illegible]
SHEET NO. 4 OF 4
CALCULATED BY TDZ DATE 1/23/96
CHECKED BY DATE
SCALE WEST PRONG X-SECTIONS

UPPER BASIN

Reach #8 (X-Sect #140)

Elev (Y)	Dist. (X)
1160.5	0
1160.6	700
1160.1	736
1156.2	760
1156.6	879
1159.0	921
1161.0	1012
1160	2810

Reach #7 (X-Sect # 156)

Elev (Y)	Dist (X)
1195.3	0
1193.4	711
1192.3	922
1187.8	940
1186.9	999
1192.1	1016
1193.2	1293
1195.3	1738

Reach #6 (X-Sect #183)

Elev (Y)	Dist. (X)
1263.5	0
1262.2	1804
1258.5	2973
1256.3	2985
1256.3	3043
1260.7	3060
1262.6	3096
1262.9	3218

Reach #5 (X-Sect # 208)

Elev (Y)	Dist (X)
1336.5	0
1333.8	580
1330.9	921
1325.1	936
1326.6	1012
1329.9	1025
1333.4	1554
1335.9	2381

REACH #'s 1, 2, 3, 4, 9, 10, 65, 11 (X-SECT # 7)

ELEV (Y)	DIST (X)
20	100
12	101
12	190
10	195
10	205
12	210
12	299
20	300

← ADDED AUG 91

PRODUCT 205-1/ NEBS Inc., Groton, Mass. 01471 To Order PHONE TOLL FREE 1-800-225-6380

EXCERPT FROM CELLA-BARR STUDY

```
112        KM   RUNOFF FROM SUBBASIN 10
113        BA   42.46
114        LS           79.8
115        UD    5.31

116        KK       7 ROUTE HYDROGRAPH 10 THROUGH REACH 7
117        RS       1    FLOW     -1
118        RC   0.045   0.030   0.045   39600  0.0051
119        RX       0      50      70     120     200     220     235     390
120        RY    1156    1152    1148    1146    1146    1148    1152    1156

121        KK   SUB11
122        KM   RUNOFF FROM SUBBASIN 11
123        BA   25.62
124        LS           79.6
125        UD    4.89

126        KK       6 COMBINE THREE HYDROGRAPHS 1-9 WITH 10 AND 11
127        HC       3
```

NOTE: END POINTS IN CELLA-BARR REACHES 8, 9, 10 & 11 WERE RAISED FROM 1 TO 6 FEET TO AVOID HEC 1 OVERFLOW WARNING MESSAGE IF RUN AS-IS.

NOTE: ROUGHNESS COEFFICIENTS USED WITH THESE ROUTING TABLES WERE INCREASED TO CORRESPOND TO STANLEY COEFFICIENTS USED IN UPPER BASIN.

1 HEC-1 INPUT PAGE 4

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LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

128        KK       8 ROUTE HYDROGRAPHS 1-11 THROUGH REACH 8
129        RS       1    FLOW    -1
130        RC   0.050   0.035   0.050    9500  0.0026
131        RX    2767    3206    4047    4063    4115    4137    4339    4747
132        RY    1115    1114    1114    1103    1103    1111    1112    1114
```

TABLE 8

```
133        KK   SUB12
134        KM   RUNOFF FROM SUBBASIN 12
135        BA   25.25
136        LS           79.4
137        UD    4.45

138        KK       7 COMBINE 2 HYDROGRAPHS 1-11 WITH ~~14 AND~~ 12
139        HC       2

140        KK       9 ROUTE HYDROGRAPHS 1-12 THROUGH REACH 9
141        RS       1    FLOW     -1
142        RC   0.050   0.035   0.050   22200  0.0027
143        RX    1772    3567    3599    3653    3661    3841    5268    5297
144        RY    1066    1065    1057    1057    1066    1065    1065    1067
```

TABLE 9

```
145        KK   SUB13
146        KM   RUNOFF FROM SUBBASIN 13
147        BA   31.96
148        LS           78
149        UD    6.37

150        KK   SUB14
151        KM   RUNOFF FROM SUBBASIN 14
152        BA    8.88
153        LS           79
154        UD    2.50

155        KK       8 COMBINE THREE HYDROGRAPHS 1-12 WITH 13 AND 14
```

WATERMAN WASH
LOWER BASIN
SHT 1 OF 4

EXCERPT FROM
CELLA-BARR STUDY

```
156          HC      3

157          KK   SUB15
158          KM   RUNOFF FROM SUBBASIN 15
159          BA    25.2
160          LS              78
161          UD    4.30

162          KK      9 COMBINE TWO HYDROGRAPHS 1-14 WITH 15
163          HC      2

164          KK     10 ROUTE HYDROGRAPHS 1-15 THROUGH REACH 10
165          RS      1    FLOW      -1
166          RC  0.050   0.035   0.050   29000  0.0071
167          RX   2069    2933    3070    3135    3163    3226    3634    4251
168          RY    995     994     987     988     994     993     993     995
```

TABLE 10

```
1                                      HEC-1 INPUT                                    PAGE  5

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

169          KK   SUB16
170          KM   RUNOFF FROM SUBBASIN 16
171          BA    24.3
172          LS            79.4
173          UD    4.20

174          KK   SUB17
175          KM   RUNOFF FROM SUBBASIN 17
176          BA   51.77
177          LS            79.4
178          UD    6.47

179          KK     10 COMBINE THREE HYDROGRAPHS 1-15 WITH 16 AND 17
180          HC      3

181          KK     11 ROUTE HYDROGRAPHS 1-19 THROUGH REACH 11
182          RS      1    FLOW      -1
183          RC  0.050   0.035   0.050   15800  0.0047
184          RX   2075    2373    2406    2556    2566    2752    3423    3440
185          RY    888     884     879     878     881     883     883     888
```

TABLE 11

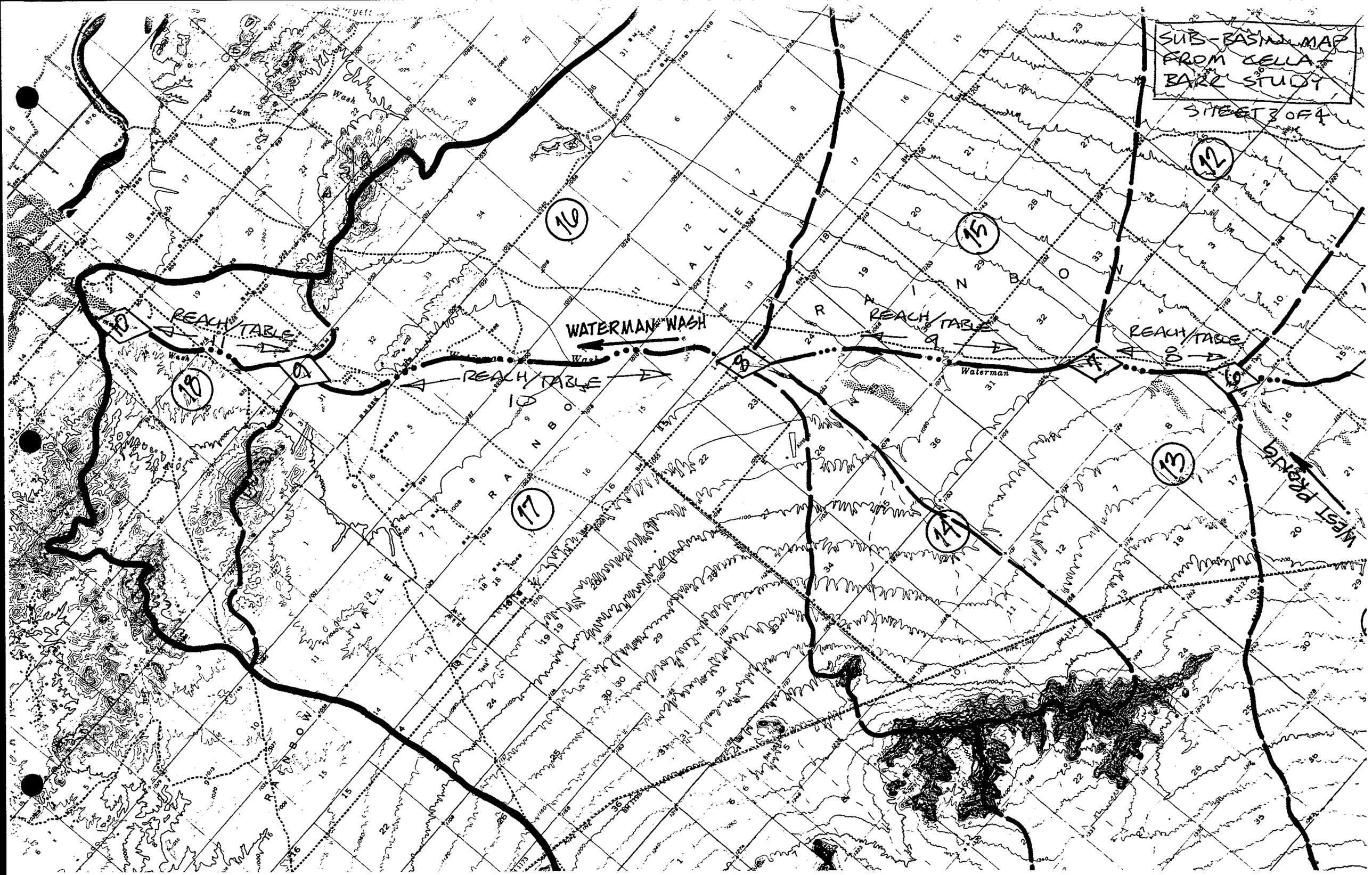
```
186          KK   SUB18
187          KM   RUNOFF FROM SUBBASIN 18
188          BA     8.4
189          LS           80.5
190          UD    2.44

191          KK     11 COMBINE TWO HYDROGRAPHS 1-17 WITH 18
192          HC      2
193          ZZ
```

```
1*****************************************
*                                       *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*          FEBRUARY 1981                *
*        REVISED 30 OCT 81              *
*                                       *
*RUN DATE FRI, OCT 07 1988 TIME 08:53:49*
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
```

SHEET 2 OF 4
LOWER BASIN


SUB-BASIN MAP
FROM CELLA
BARR STUDY
SHEET 3 OF 4
WATERMAN WASH
REACH/TABLE 10
REACH/TABLE 9
REACH/TABLE 8
REACH/TABLE 11
RAINBOW VALLEY
Waterman
Wash
Lum
Wash
WEST PRESCOTT
16
15
12
18
17
14
13

Computed by GSB Date Aug 91
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Approved by Date

Job No. 10512 Page No.
Subject RATING TABLE
WATERMAN WASH

Sheet No. 4 of 4

TABLE #5, #6	RX	100	101	175	185	215	225	299	300		
	RY	20	13	13	10	10	13	13	20		
										LOWER BASIN ONLY	
	TABLE #5			"n"	0.070		0.035		0.070		
	TABLE #6			"n"	0.050		0.025		0.050		
TABLE #7	RX	100	101	190	195	205	210	299	300		
	RY	20	12	12	10	10	12	12	20	UPPER AND LOWER BASIN	
	TABLE #7			"n"	0.070		0.035		0.070		

Computed by: BCO Date: Aug 91
Checked by: Date:
Reviewed by: Date:
Approved by: Date:

Job No. 10512 Page No.
Subject: WATERMAN WASH
LOWER BASIN
Sheet No. 1 of 1

CALCULATE # OF SUBREACHES FOR EACH ROUTING REACH (NSTPS)

ASSUME: $\Delta t = 10$ min.
$V = 5$ fps

PROCEDURE
1) DETERMINE REACH LENGTH

2) DETERMINE TIME (T_T) IN MINUTES FOR FLOW TO TRAVEL FROM TOP OF REACH TO BOTTOM OF REACH IF $V=5$ fps.

3) DIVIDE TRAVEL TIME BY Δt

REACH #	LENGTH (ft)	V (fps)	T_T (min.)	Δt (min.)	NSTPS ($T_T/\Delta t$)		
710	6510	5	21.7	10	2.17	≈	2
730	21484	5	71.6	10	7.16	≈	7
750	38574	5	128.6	10	12.86	≈	13
760	6250	5	20.8	10	2.08	≈	2
770	14583	5	48.6	10	4.86	≈	5
790	11230	5	37.4	10	3.74	≈	4
795	8626	5	28.8	10	2.88	≈	3
810	15951	5	53.2	10	5.32	≈	5
820	5469	5	18.2	10	1.82	≈	2
840	42480	5	141.6	10	14.16	≈	14
850	7552	5	25.2	10	2.52	≈	3
880	7031	5	24.4	10	2.44	≈	2
900	33203	5	110.7	10	11.07	≈	11
920	7292	5	24.3	10	2.43	≈	2
930	7813	5	26.0	10	2.60	≈	3
950	30990	5	103.3	10	10.33	≈	10
960	2930	5	9.8	10	0.98	≈	1
970	11230	5	37.4	10	3.74	≈	4
980	7292	5	24.3	10	2.43	≈	2
1010	4948	5	16.5	10	1.65	≈	2
1030	6510	5	21.7	10	2.17	≈	2

Job No. 10512 Page No.

Computed by BCO Date Aug 91

Checked by Date

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Subject WATERMAN WASH
UPPER BASIN

Sheet No. of

CALCULATE # OF SUBREACHES FOR EACH ROUTING REACH (NSTPS)

ASSUME: $\Delta t = 10$ min.
$V = 5$ fps

PROCEDURE

1) DETERMINE REACH LENGTH

2) DETERMINE (T_t) IN MINUTES FOR FLOW TO TRAVEL FROM TOP OF REACH TO BOTTOM OF REACH IF $V = 5$ fps.

3) DIVIDE TRAVEL TIME BY Δt

REACH #	LENGTH (ft)	V (fps)	T_T (min)	Δt (min)	NSTPS ($T_T/\Delta t$)
1	26,000	5	86.81	10	8.6 ≈ 9
2	11,400	5	37.98	10	3.8 ≈ 4
3	6,500	5	21.70	10	2.2 ≈ 3
4	6,500	5	21.70	10	2.2 ≈ 3
5	8,500	5	28.33	10	2.8 ≈ 3
6	17,000	5	56.70	10	5.7 ≈ 6
7	9,000	5	30.00	10	3.0 ≈ 3
8	9,500	5	31.67	10	3.2 ≈ 4
9	45,200	5	150.80	10	15.1 ≈ 16
10	29,900	5	99.7	10	9.97 ≈ 10
65	32,500	5	108.5	10	10.9 ≈ 11
11	12,500	5	41.23	10	4.1 ≈ 5
12	5,400	5	18.0	10	1.8 ≈ 2
13	2,000	5	6.7	10	.7 ≈ 1
14	11,100	5	37.0	10	3.7 ≈ 4
15	10,400	5	34.7	10	3.5 ≈ 4
16	8,200	5	27.3	10	2.7 ≈ 3
17	9,800	5	32.7	10	3.3 ≈ 4

DESIGNED BY RLD DATE Aug 91 SHEET NO. 1 PAGE NO.
CHECKED BY GSB DATE Aug 91 OF 1 JOB NO. 12512
REVIEWED BY DATE SUBJECT: WATERMAN WASH
APPROVED BY DATE LOWER BASIN

HEC 1 → REACH #	RX - RY RATING TABLE	RC.RLNTH REACH LENGTH	RC.ANL "n" LEFT OVERBANK	RC.ANTH "n" CHANNEL	RC.ANR "n" RIGHT OVERBANK	RC.SEL E.G. SLOPE	RL.PERCRT PERCOLATION RATE	RS.NSTPS # ROUTING STEPS
710	8	6510	0.055	0.045	0.055	0.0026	5	2
730	7	21484	0.070	0.035	0.070	0.0058	5	7
750	7	38574	0.070	0.035	0.070	0.013	5	13
760	9	6250	0.055	0.045	0.055	0.0027	5	2
770	9	14583	0.055	0.045	0.055	0.0027	5	5
790	6	11230	0.050	0.025	0.050	0.0071	5	4
795	6	8626	0.050	0.025	0.050	0.0056	5	3
810	7	15951	0.070	0.035	0.070	0.0069	5	5
820	10	5469	0.055	0.045	0.055	0.0071	5	2
840	7	42480	0.070	0.035	0.070	0.0069	5	14
850	10	7552	0.055	0.045	0.055	0.0071	5	3
880	10	7031	0.055	0.045	0.055	0.0071	5	2
900	7	33203	0.070	0.035	0.070	0.0069	5	11
920	10	7292	0.055	0.045	0.055	0.0071	5	2
930	10	7813	0.055	0.045	0.055	0.0071	5	3
950	7	30990	0.070	0.035	0.070	0.0087	5	10
960	5	2930	0.070	0.035	0.070	0.0034	5	1
970	5	11230	0.070	0.035	0.070	0.0062	5	4
980	11	7292	0.055	0.045	0.055	0.0047	5	2
1010	11	4948	0.055	0.045	0.055	0.0047	5	2
1030	11	6510	0.055	0.045	0.055	0.0047	5	2

WATERMAN WASH
LOWER BASIN
HYDROGRAPH ROUTING
DATA

SC 3020

APPENDIX D

RAILROAD EMBANKMENT AND CULVERTS

DESIGNED BY GSB DATE AUG 91 SHEET NO. 1 PAGE NO.
CHECKED BY DATE OF 4 JOB NO. 10512
REVIEWED BY DATE SUBJECT: WATERMAN WASH
APPROVED BY DATE

METHODOLOGY FOR ESTIMATING HIGH WATER STAGE ALONG SPRR:

1. ESTIMATE TOP OF RAILROAD EMBANKMENT FROM AERIAL TOPOGRAPHY.
2. ESTIMATE TOP OF RAIL ELEVATION BY ADDING AN ASSUMED 0.5 FEET HEIGHT OF RAIL.
3. SUBTRACT MEASURE DOWN OBTAINED IN FIELD FROM TOP OF RAIL TO FLOWLINE OF UPSTREAM SIDE OF CULVERT.
4. ADD THE MAXIMUM AVERAGE STAGE ELEVATION FROM HEC-1 RUN TO THE ESTIMATED CULVERT FLOWLINE TO OBTAIN AN ESTIMATED STAGE ELEVATION FOR EACH CULVERT.
5. MAP THE POTENTIAL FLOOD ZONE ALONG THE RAILROAD EMBANKMENT AS A FUNCTION OF THESE ELEVATIONS. RAILROAD TRACK FLOOD ZONE ALSO INCLUDES EXISTING DIVERSION CHANNEL WHICH INTERCONNECTS CERTAIN GROUPS OF CULVERTS

Job No. 10512 Page No.

Subject WATERMAN WASH

Computed by B.CO Date 8/13/91

Checked by Date

Reviewed by Date

Approved by Date

Sheet No. 2 of 4

	CULVERT	TOP OF RAILROAD EMBANK.	HEIGHT OF RR RAIL	TOP OF RR RAIL	MEASURE-DOWN TO CULVERT FE	ESTIMATED FE	MAXIMUM AVERAGE HEC-1 STAGE	ESTIMATED STAGE ELEVATION
STRUCTURE A	1	1510.6	0.5 FT	1511.1	7.7 FT	1503.4	3.11 FT	1506.51
	2	1508.0	0.5	1508.5	6.0	1502.5	3.11	1505.61
	3	1506.0	0.5	1506.5	7.5	1499.0	3.11	1502.11
	4	1499.6	0.5	1500.1	7.0	1493.1	3.11	1496.21
	5	1497.1	0.5	1497.6	6.0	1491.6	3.11	1494.71
	6	1491.5	0.5	1492.0	7.0	1485.0	3.11	1488.11
STRUCTURE B	7	1476.0	0.5	1476.5	7.0	1469.5	3.01	1472.51
	8	1473.2	0.5	1473.7	7.4	1466.3	3.01	1469.31
	9	1464.6	0.5	1465.1	7.0	1458.1	3.01	1461.11
	10	1458.8	0.5	1459.3	7.8	1451.5	3.01	1454.51
	11	1444.0	0.5	1444.5	6.0	1438.5	3.01	1441.51
	12	1423.7	0.5	1424.2	8.5	1415.7	3.01	1418.71
	13	1422.1	0.5	1422.6	9.4	1413.2	3.01	1416.21
STRUCT C	14	1420.0	0.5	1420.5	7.8	1412.7	2.49	1415.19
	15	1420.0	0.5	1420.5	7.2	1413.3	2.49	1415.79
	16	1420.0	0.5	1420.5	8.2	1412.3	2.49	1414.79
	17	1411.6	0.5	1412.1	8.6	1403.5	3.54	1407.04

Job No. 10512 Page No.

Subject WATERMAN WASH

Computed by BCO Date 8/13/91

Checked by Date

Reviewed by Date

Approved by Date

Sheet No. 3 of 4

	CULVERT	TOP OF RAILROAD EMBANK	HEIGHT OF RR RAIL	TOP OF RR RAIL	MEASURE-DOWN TO CULVERT FE	ESTIMATED FE	MAXIMUM AVERAGE HEC-1 STAGE	ESTIMATED STAGE ELEVATION
STRUCTURE D	18	1404.9	0.5	1405.4	8.3	1397.1	3.54	1400.64
	19	1400.4	0.5	1400.9	6.2	1394.7	3.54	1398.24
	20	1396.6	0.5	1397.1	6.0	1391.1	3.54	1394.64
	21	1390.3	0.5	1390.8	7.9	1382.9	3.54	1386.44
STRUCTURE E	22	1386.8	0.5	1387.3	7.1	1380.2	1.58	1381.78
	23	1380.0	0.5	1380.5	7.8	1372.7	1.58	1374.28
	24	1372.6	0.5	1373.1	5.6	1367.5	1.58	1369.08
	25	1367.6	0.5	1368.1	6.3	1361.8	1.58	1363.38
	26	1364.4	0.5	1364.9	6.5	1358.4	1.58	1359.98
	27	1360.0	0.5	1360.5	7.9	1352.6	1.58	1354.18
	28	1353.8	0.5	1354.3	7.2	1347.1	1.58	1348.68
	29	1349.7	0.5	1350.2	5.7	1344.5	1.58	1346.08
STRUCTURE F	30	1342.4	0.5	1342.9	7.8	1335.1	2.56	1337.66
	31	1337.2	0.5	1337.7	6.1	1331.6	2.56	1334.16
	32	1325.2	0.5	1325.7	5.6	1320.1	2.56	1322.66
	33	1320.0	0.5	1320.5	10.0	1310.5	2.56	1313.06
	34	1318.7	0.5	1319.2	6.7	1312.5	2.56	1315.06

Computed by B.C.O. Date 8/13/91
Checked by Date
Reviewed by Date
Approved by Date

Job No. 10512 Page No.
Subject WATERMAN WASH

Sheet No. 4 of 4

CULVERT	TOP OF RAILROAD EMBANK.	HEIGHT OF RR RAIL	TOP OF RR RAIL	MEASURE-DOWN TO CULVERT FE	ESTIMATED FE	MAXIMUM AVERAGE HEC-1 STAGE	ESTIMATED STAGE ELEVATION
35	1315.3	0.5	1315.8	6.3	1309.5	2.56	1312.06
36	1309.7	0.5	1310.2	6.3	1303.9	2.56	1306.46
37	1303.9	0.5	1304.4	5.5	1298.9	2.56	1301.46
38	1301.5	0.5	1302.0	7.8	1294.2	2.56	1296.76
39	1301.2	0.5	1301.7	8.3	1293.4	2.56	1295.96
40	1301.8	0.5	1302.3	7.0	1295.3	2.56	1297.86
41	1299.9	0.5	1300.4	4.7	1295.7	2.56	1298.26
42	1298.1	0.5	1298.6	7.00	1291.6	2.56	1294.16
43	1297.1	0.5	1297.6	5.3	1292.3	2.56	1294.86
44	1296.5	0.5	1297.00	6.0	1291.0	2.56	1293.56
45	1295.6	0.5	1296.1	4.4	1291.7	2.56	1294.26
46	1295.0	0.5	1295.5	5.6	1289.9	2.56	1292.46

STRUCTURE ℄

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Determine Stage/Discharge Curves For Each R.R. Structure

Methodology

For Pipe Culverts

1) From Measurement Taken In The Field, Determine Maximum Headwater (HW) Available

2) From Charts Provided In HEC 5 "Hydraulic Charts for the Selection of Highway Culverts" Determine Discharge Rates For Various HW Values From Top Of Pipe To Maximum HW.

3) From Fig 3.22 of The Concrete Pipe Handbook, Determine Discharge Rates For Various HW From Invert To Top Of Pipe.

For Box Culverts + Misc Bridge Type Crossings

1) Same As (1) Above

2) From Charts Provided In HEC 10 "Capacity Charts For The Hydraulic Design Of Highway Culverts" Determine Discharge Rates For Various HW Values From Top Of Pipe To Maximum HW. Use HEC 10 Procedures For Non-Chart Widths.

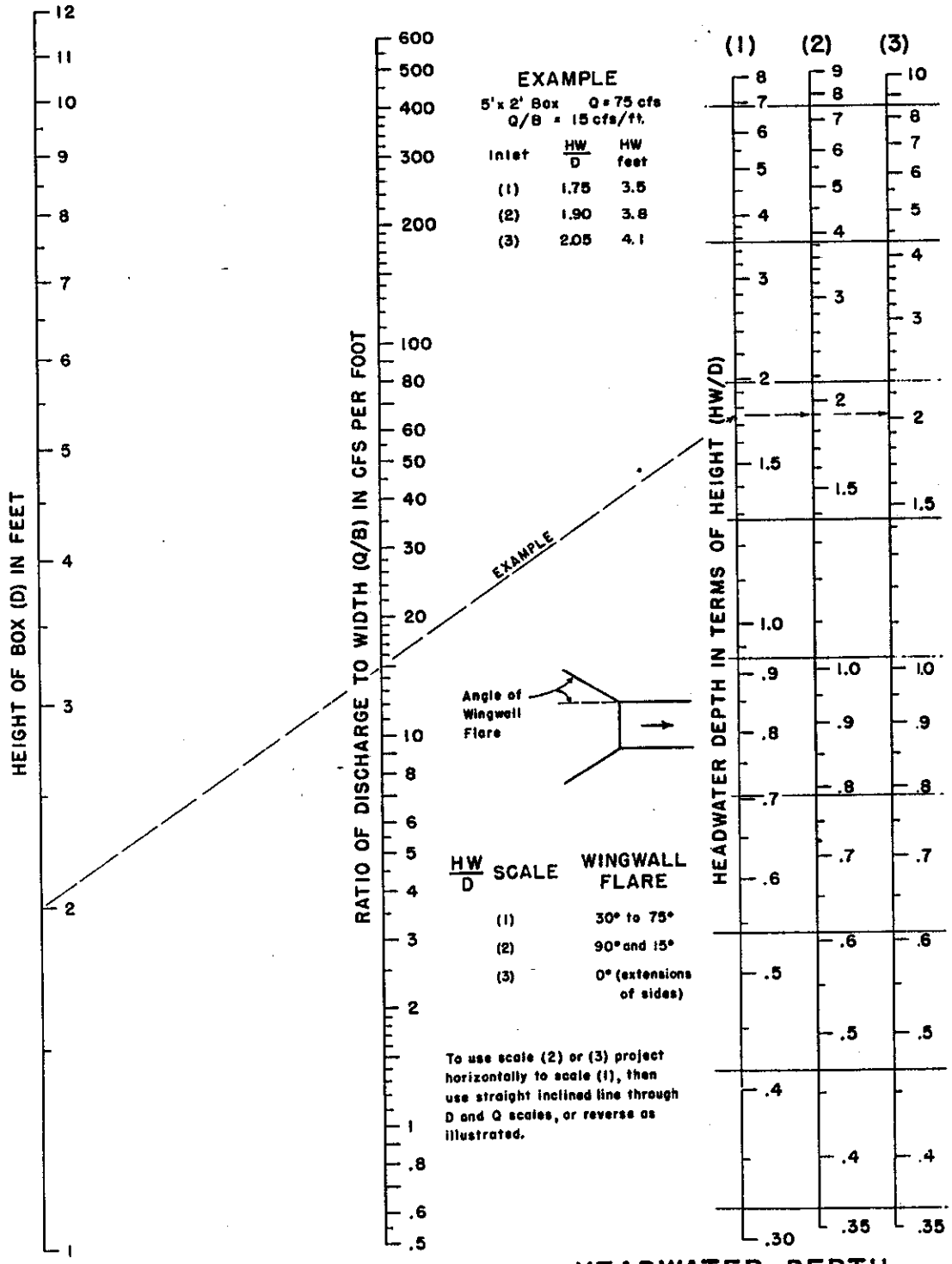
3) Determine The Capacity Of All Non-Pipe Structures Using HEC 10 Charts. For Multispan Structures Use The Sum Of The Individual Span Capacities

4) Using Mannings Equation Determine Discharge Rates For Various HW From Invert To Top Of Structure.

Stanley Consultants Used A Computer Program To Complete Step 4 Above.

PRODUCT 205-1 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

CHART I

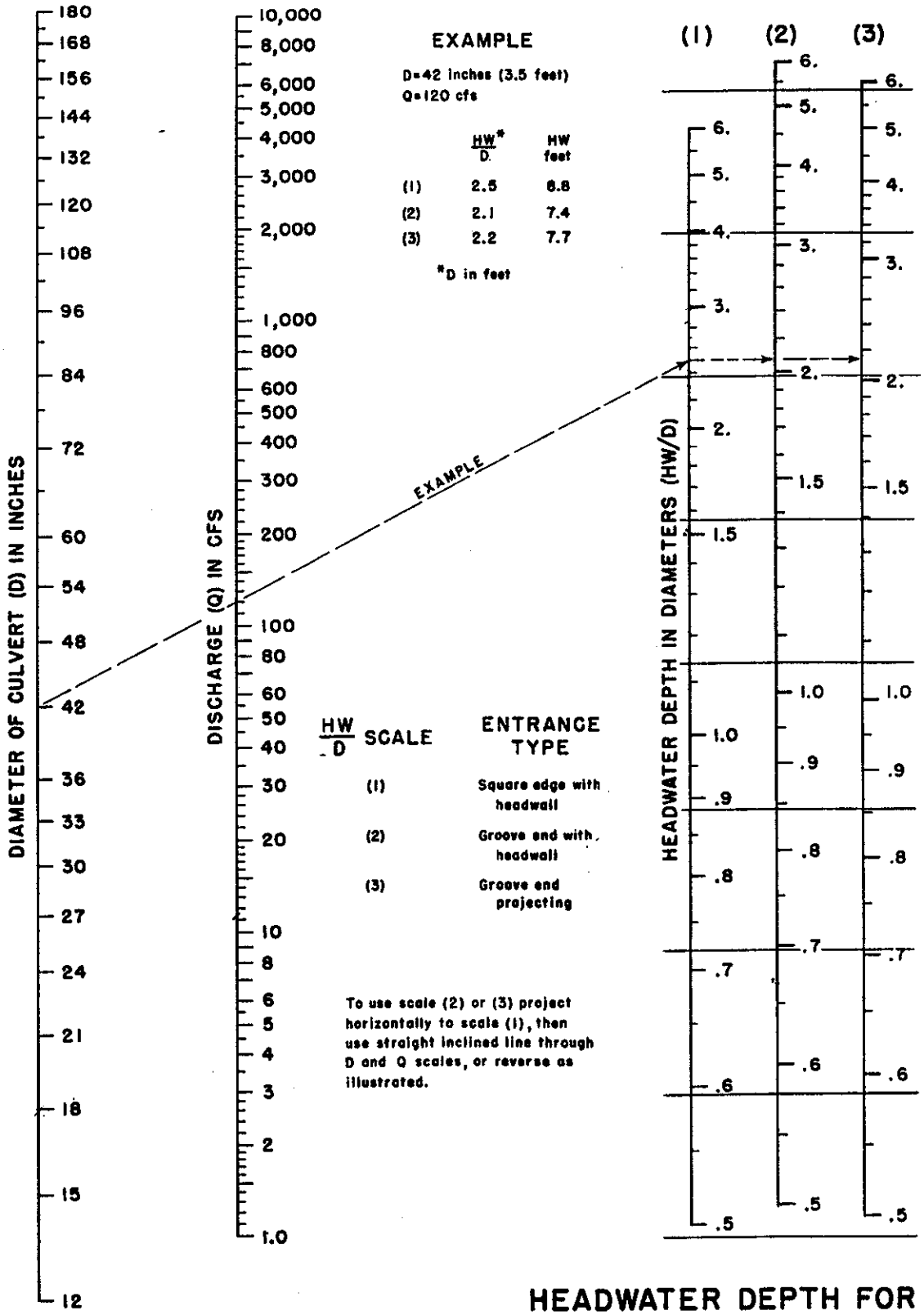


HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

3 of 20
HEC 5

CHART 2

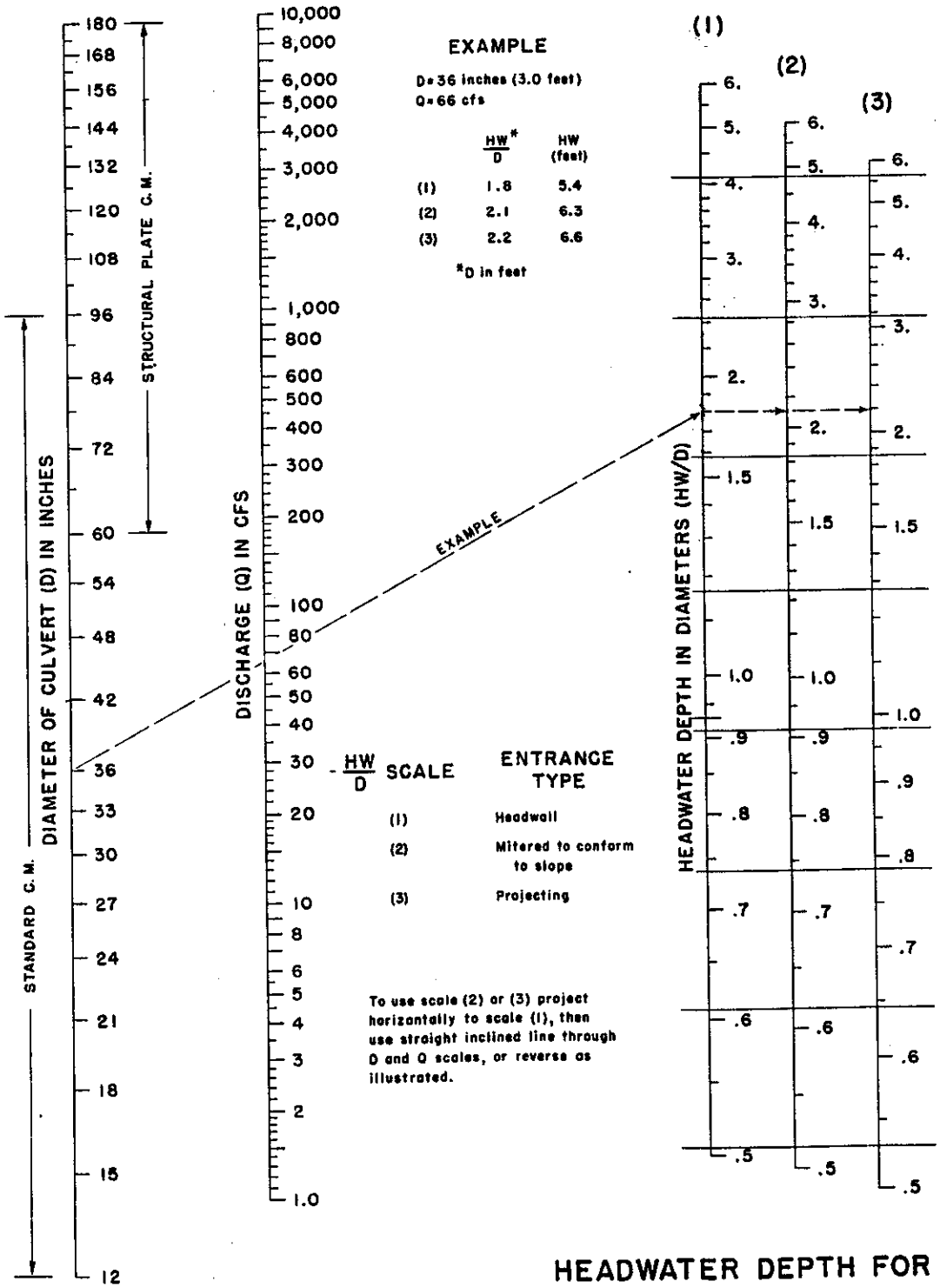


HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

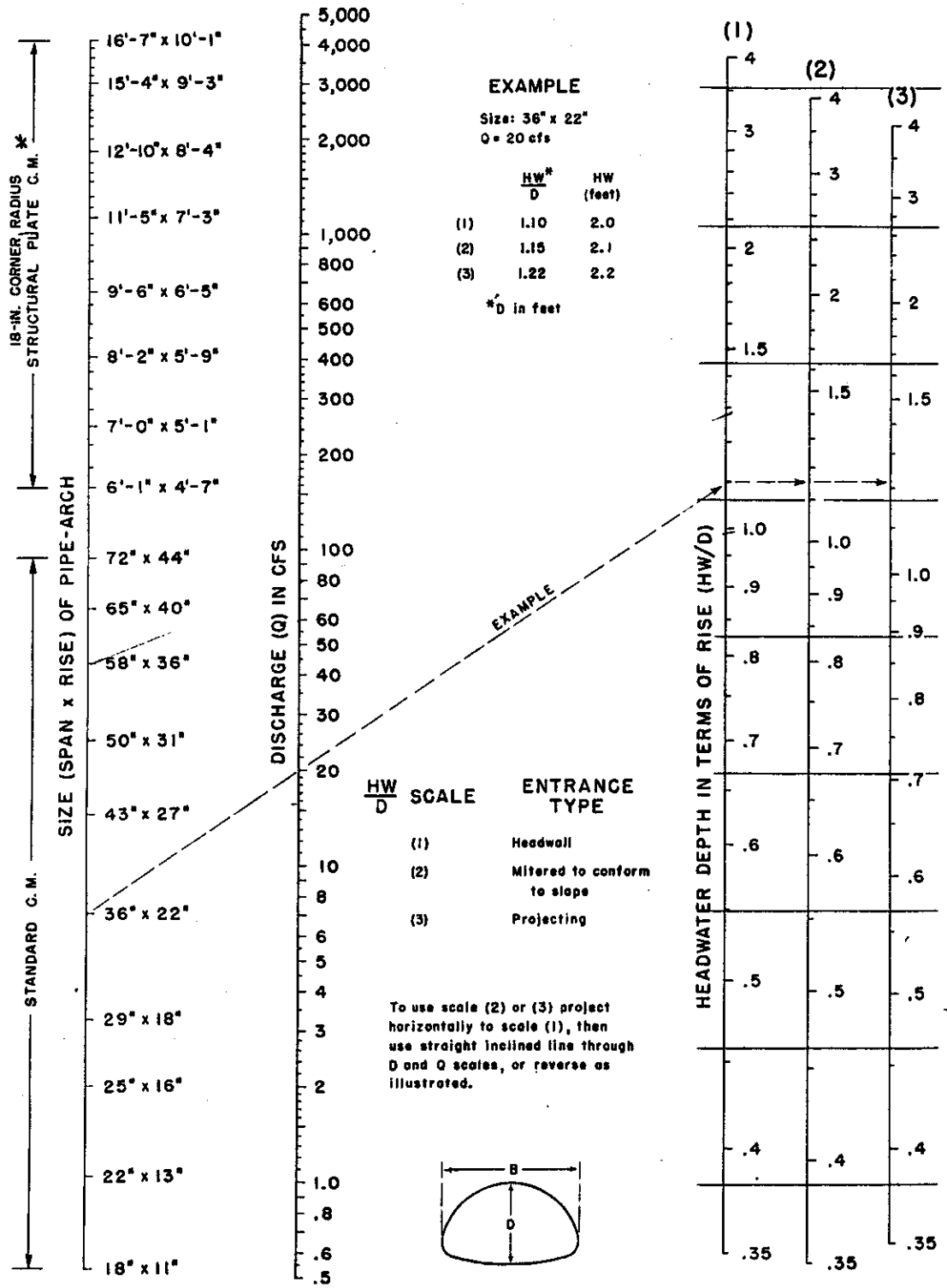
CHART 5



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

CHART 6

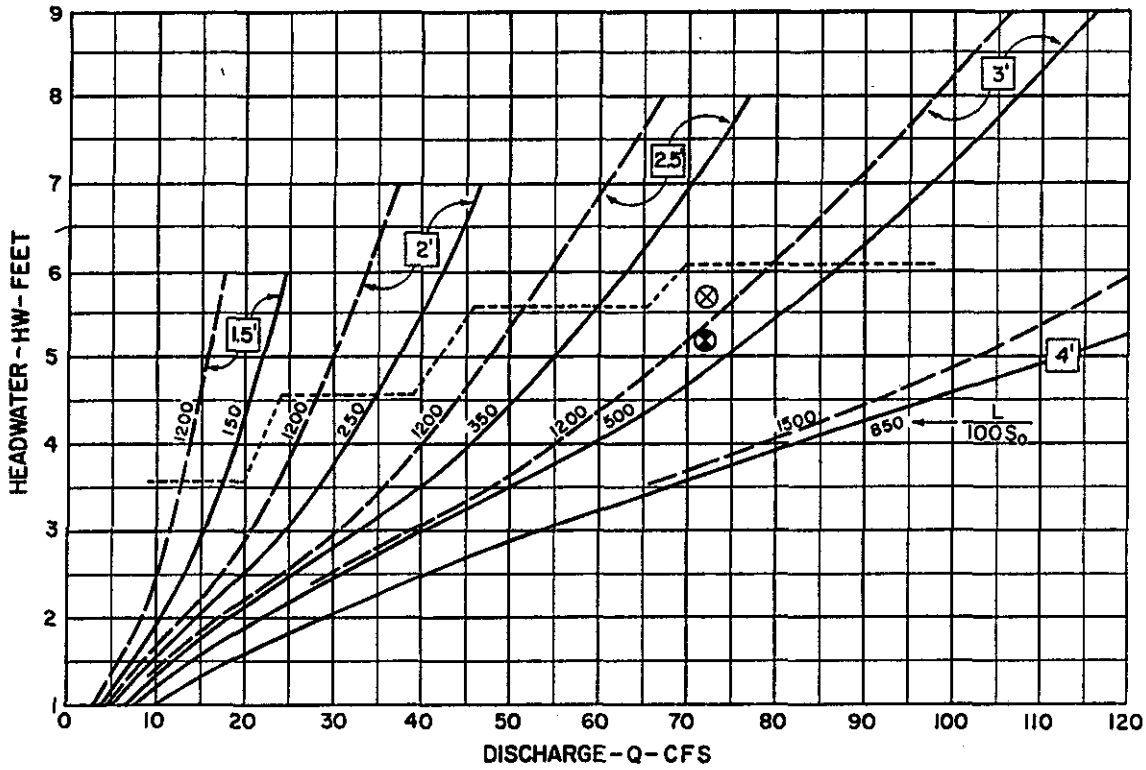


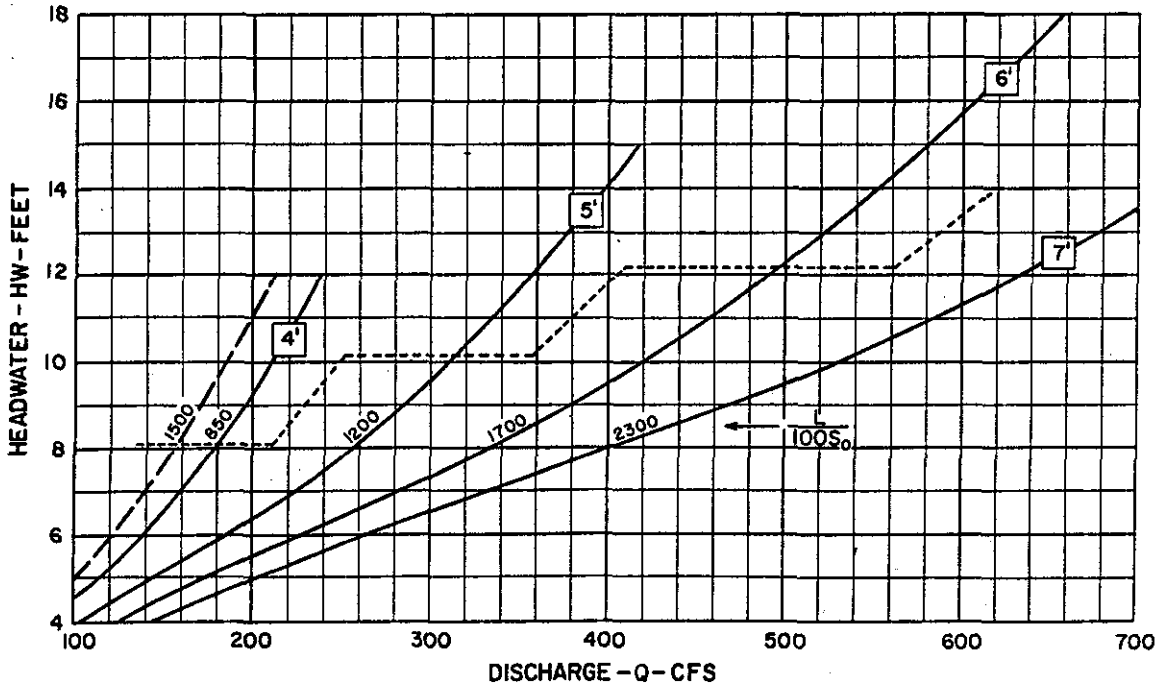
*ADDITIONAL SIZES NOT DIMENSIONED ARE LISTED IN FABRICATOR'S CATALOG

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR C. M. PIPE-ARCH CULVERTS WITH INLET CONTROL

CHART 4





EXAMPLE

⊗ GIVEN:
72 CFS; AHW = 5.7 FT.
L = 200 FT.; S_0 = 0.002

⊗ SELECT 3' x 3'
HW = 5.2 FT.

CULVERT CAPACITY
SQUARE CONCRETE BOX
90° AND 15° WINGWALL FLARE
1.5' X 1.5' TO 7' X 7' ▣

BUREAU OF PUBLIC ROADS JAN. 1963

HANDBOOK OF CONCRETE CULVERT PIPE HYDRAULICS

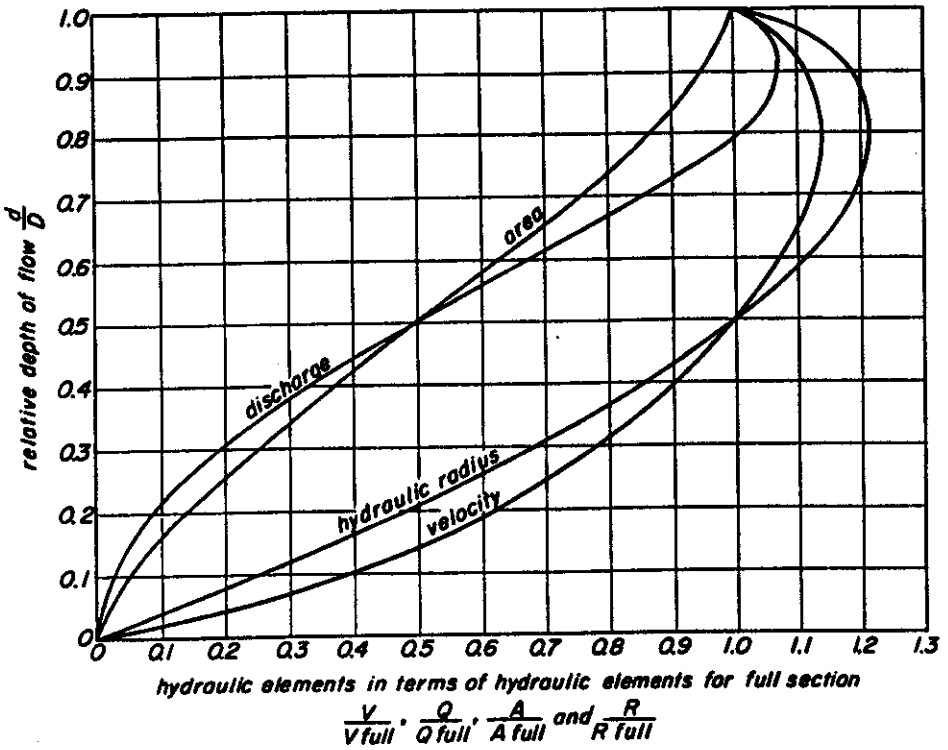


Fig. 36. Hydraulic elements—relative flow properties of a circular conduit.

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The preliminary hydrology model submitted to Maricopa County Flood Control District modeled the area south of the S.P.R.R. as 46 seperate drainage areas draining into 44 drainage structures along the railroad. The approach to determine a flood plain south of the railroad was to be as follows:

Proposed Methodology for Delineation Waterman Wash Floodplain, South of Southern Pacific Railroad.

1.) Prepare delineation of entire basin watershed, including subareas which contribute to each individual cross drainage structures on the railroad.

2.) Model subareas using HEC-1 methodology to produce 100-year peak discharge and flood hydrograph approaching each structure.

3.) Compare peak discharge against Dibble and Associates report as a check.

4.) Calculate incremental hydraulic capacity of each drainage structure (elevation-discharge curve).

5.) Return HEC-1 model to include routing of each subarea thru a "Null Structure". Summate outflow hydrographs and route downstream, combining with subareas North of S.P.R.R. to produce model of entire watershed.

6.) When aerial mapping is available, determine reservoir capacity upstream of each structure (elevation-storage curve).

7.) Rerun HEC-1 with reservoir in place for each structure to determine peak discharges for project and depth of ponding upstream of S.P.R.R.

8.) Delineate floodplain by connecting ponding limits of each reservoir, mapping a smooth line for the AH zone limits.

Upon receipt of the aerial mapping it was evident that modeling each structure and accompanying drainage area separately was not the proper approach. The detailed mapping showed that because of the topography severed of the drainage

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areas were interconnected and therefor the structures which drain the areas work as a system. From site visits and investigations it is felt that before floodwater would overtop the railroad it would flow to the east behind the railroad in search of an outlet.

We then revised the HEC-1 model by summing certain drainage areas and combining the discharges of the structures which drained the summed drainage areas. Loss Rate parameters were revised by calculating weighted numbers from the combined areas. The Lag Time used for the combined areas was the longest lag time of the subbasins which were combined to make one larger area.

An elevation-storage curve was determined from the aerial mapping.

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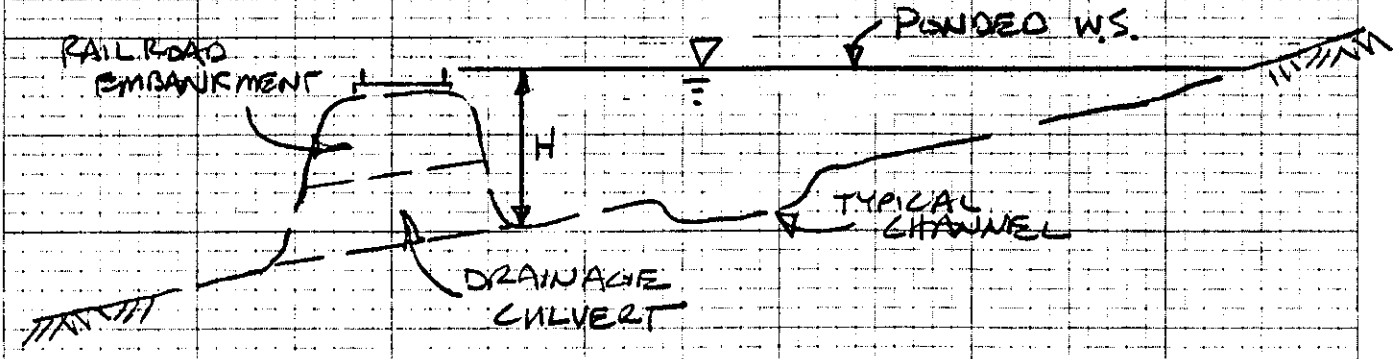
TYPICAL ELEV -VS- AREA FOR RAILROAD STRUCTURES

TYPICAL SECTION:



① H VARIES. ESTIMATED AVG H = 7'.

② ESTIMATE SURFACE AREA @ H = 7' BY PLANIMETER ON TOPOGRAPHIC MAP.

③ ESTIMATE AREA @ EVEN FOOT INCREMENTS FROM H = 0' TO 7' BY PROPORTION TO AREA @ H = 7'

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STAGE – AREA ESTIMATES:

STAGE	— AREA — STRUCT A CULVERTS 1–6	STRUCT B CULVERTS 7–13	STRUCT C CULVERTS 14,15,16	STRUCT D CULVERTS 17–21	STRUCT E CULVERTS 22–29	STRUCT F CULVERTS 30–46
0	0	0	0	0	0	0
1	8.5	17.3	0.6	11.1	7.6	46.2
2	17.0	34.6	1.1	22.2	15.3	92.3
3	25.5	51.9	1.7	33.3	22.9	138.5
4	34.1	69.3	2.3	44.5	30.6	184.7
5	42.6	86.6	2.9	55.6	38.2	230.9
6	51.1	103.9	3.4	66.7	45.9	277.0
7	59.6	121.2	4.0	77.8	53.5	323.2

SC 3020

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Stage/Discharge Summary

Drain. Area #	M.P #	Descript.	HW HEIGHT VS. DISCHARGE (CFS) 1'	2'	3'	4'	5'	6'	7'	8'	9'
1	21.75	DBL. BOX	45.4	127.7	226.5	334.7		592	800 (7.7)		
2	21.90	(2) 36" CMP	16.8	56.0	70	100	122	142			
3	22.0	SGL. BOX	27.4	78.6	141.6	214		359	439 (7.5)		
4	22.25	(2) 36" CMP	16.8	56	70	100	122	142	160		
5	22.40	36"×58"	14.4	48	60	84	102	120	145		
6	22.65	2(36") CMP	16.8	56	70	100	122	142	160		
7	23.2	(2) 42" CMP	17.3	63.2	107.1	120	158	184	208		
8	23.3	DBL. BOX	46.5	131	232.8	342		573	701 (7.5)		
9	23.65	(2) 42" CMP	17.3	63.2	107.1	120	158	184	208		
10	23.9	(2) 48" CMP	19.9	71	130.6	142	190	228	260	280 (7.05)	
11	24.4	DBL BOX	43.1	121.5	222	350 (4.5)		484			
12	24.9	QUAD. BOX	110	220	330	440	540	640	750		
13	25.0	DBL. BOX	35.5	96.4	166.8	242.1	320.3		540 (7.5)		700 (9.5)
14	25.4	SGL. BOX	32.3	94.1	171.5	263		440	554 (7.05)		
15	25.5	SGL BOX	32.3	94.1	169		313		443 (7.25)		

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SHEET NO. 13 OF 20
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CHECKED BY: DATE:
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DRAIN AREA #	M.P. #	DESC.	HW HEIGHT VS DISCHARGE (CFS) 1'	2'	3'	4'	5'	6'	7'	8'	9'
16	25.7	(2) 60"x38"	33.6	112	140	180	222	260	296	324	
17	26.2	DBL. BOX	52.8	151.2	271.9	416		696		(8.5) 950	
18	26.5	DBL. BOX	42.5	120	213.1	315.4		594		806	
19	26.7	SGL. BOX	30.4	88.4		221		302			
20	27.0	SGL. BOX	30.4	88.4		221		302			
21	27.4	DBL. BOX	46.3	129.9	230.1	339.7	454	580		798	
22	27.75	DBL. BOX	43.3	121.3	214.5	316.4	424		600		
23	28.0	SGL. BOX	27	77.3	138.8	202		339		436	
24	28.3	(3) 27" S.P.	22.8	61	72	96	114	(5.6) 123			
25	28.5	DBL. BOX	43	127.4	227.1	346		(6.25) 534			
26	28.7	(2) 48" CMP	19.9	71	130.6	142	190	228	266	(7.75) 280	
27	29.0	(2) 36"x58"	28.8	96	120	168	204	240	290	312	
28	29.3	(3) 36"x58"	43.2	144	180	252	306	360	435	468	
29	29.5	DBL. BOX	15.3	41.6		100	(5.7) 136				
30	29.8	SGL. BOX	29.4	84.4	152.3	227.9	371		(7.75) 469		
31	30.0	TRP. BOX	67.4	190.6	339.4	517		747			
32	30.5	DBL. BOX	45.9	129.6	225	332	(5.5) 455				

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SHEET NO. 14 OF 20
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DRAIN AREA #	M.P. #	DESC.	HW HEIGHT VS DISCHARGE (CFS) 1'	2'	3'	4'	5'	6'	7'	8'	9'
33	31.0 (-200)	SGL. BOX	29.3	84.1	151.4	226.4	306.3	393		571	718 (1.0)
34	31.0 (+100)	(4) BOX	137.3	402.1	735.7		1458		2006		
35	31.2	SGL. BOX	26.6	76.4	138		255	320 (6.5)			
36	31.5	SGL. BOX	30.4	88.4		221		317 (6.3)			
37	31.8	DBL. BOX	30.8	83.5		202	260 (5.5)				
38	32.1	SGL. BOX	27.9	80	144.0	215.3	291.4	369		497	
39	32.3	TRP. BOX	87.5	251.7	454.2	680	924		1419	1688 (8.25)	
40	32.4	DBL. BOX	45.9	129.2	229.5	340	476		662 (7.15)		
41	32.7	(4) 40" S.P.	22.5	76.5	121.5	142.5	177.5	215	225 (6.3)		
42	33.1	(2) 36"x58"	28.8	96	120	168	204	240	290		
43	33.3	SGL BOX		14.2	23.0	29	35	36 (5.3)			
	33.4	DBL. BOX		80 (2.5)	100	136	164	176			
44	33.7	SGL. BOX		20.1	30	36	39 (4.5)				
	33.8	DBL. BOX		80 (2.5)	100	136	164	176			

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Elev / Discharge Curve - Structure A (CFS)

Str. #	H 1	2	3	4	5	6	7
1	45.4	127.7	226.5	334.7	463.4	592	800
2	16.8	56	70	100	122	142	142
3	27.4	78.6	141.6	214	286.5	359	439
4	16.8	56	70	100	122	142	160
5	14.4	48	60	84	102	120	145
6	16.8	56	70	100	122	142	160
	138	422	638	933	1218	1497	1846

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SCALE

Elev / Discharge Curve - Structure B (CFS)

Str #	1	2	3	4	5	6	7
7	17.3	63.2	107.1	120	158	184	208
8	46.5	131	232.8	342	458	523	701
9	17.3	63.2	107.1	120	158	184	208
10	19.9	71	130.6	142	190	228	260
11	43.1	121.5	222	350	417	484	484
12	110	220	330	440	540	640	750
13	35.5	96.4	166.8	242.1	320.3	430	540
	290	766	1296	1756	2241	2723	3151

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ELEV/DISCHARGE CURVE - STRUCTURE C (CFS)

STR #	1	2	3	4	H 5	6	7
14	32.3	94.1	171.5	263	351.5	440	554
15	32.3	94.1	169	241	313	378	443
16	33.6	112	140	180	222	260	296
	98	300	481	684	887	1078	1293

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ELEV/DISCHARGE CURVE - STRUCTURE D (CFS)

STR #	H 1	2	3	4	5	6	7
17	52.8	151.2	271.9	416	556	696	823
18	42.5	120	213.1	315.4	454.7	594	700
19	30.4	88.4	154.7	221	261.5	302	302
20	30.4	88.4	154.7	221	261.5	302	302
21	46.3	129.9	230.1	339.7	454	580	689
	202	578	1025	1513	1988	2474	2816

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Approved by _____ Date _____

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ELEV / DISCHARGE CURVE - STRUCTURE E (CFS)

STR #	1	2	3	H 4	5	6	7
22	43.3	121.3	214.5	316.4	424	512	600
23	27	77.3	138.8	202	270.5	339	387.5
24	22.8	61	72	96	114	123	123
25	43	127.4	227.1	346	440	534	534
26	19.9	71	130.6	142	190	228	260
27	28.8	96	120	168	204	240	290
28	43.2	144	180	252	306	360	435
29	15.3	41.6	71	100	118	136	136
	243	740	1154	1622	2067	2472	2766

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Elev / Discharge Curve - Structure F (CFS)

Str #	H 1	2	3	4	5	6	7
30	29.4	84.4	152.3	227.9	371	404	437
31	67.4	190.6	339.4	512	630	747	747
32	45.9	129.6	225	332	394	455	455
33	29.3	84.1	151.4	226.4	306.3	393	482
34	137.3	402.1	735.7	1096.9	1458	1732	2006
35	26.6	76.4	138	196.5	255	320	320
36	30.4	88.4	154.7	221	269	317	317
37	30.8	83.5	142.8	202	231	260	260
38	27.9	80	144	215.3	291.4	369	433
39	87.5	251.7	454.2	680	924	1416	1554
40	45.9	129.2	229.5	340	470	566	662
41	22.5	76.5	121.5	142.5	177.5	215	225
42	28.8	96	120	168	204	240	290
43/44	530	94.2	123	165	199	212	212
45/46	535	100.1	130	172	203	215	215
	675	1967	3362	4898	6353	7861	8615

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SHEET NO. 1 OF 46

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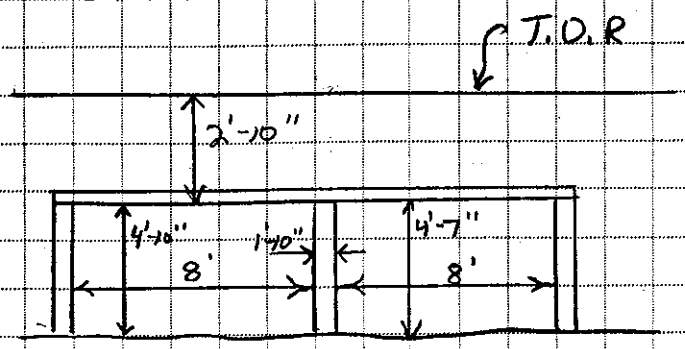
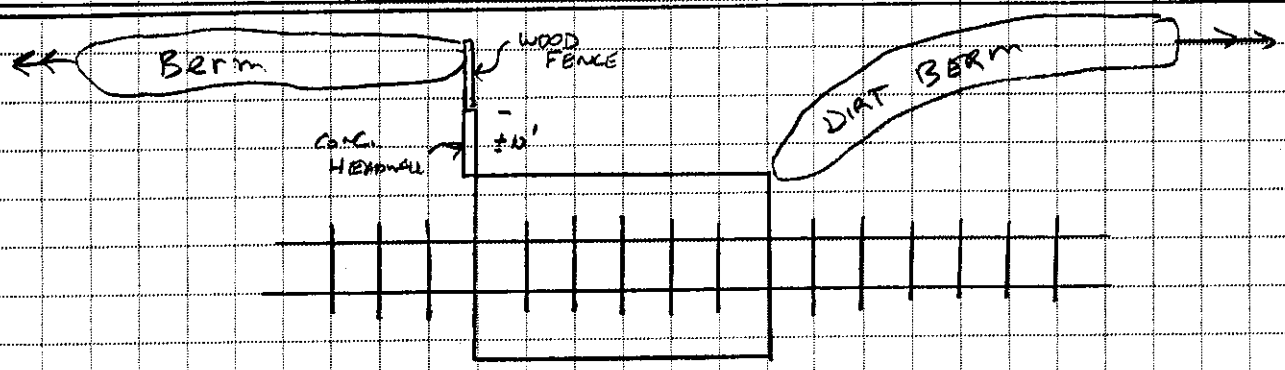
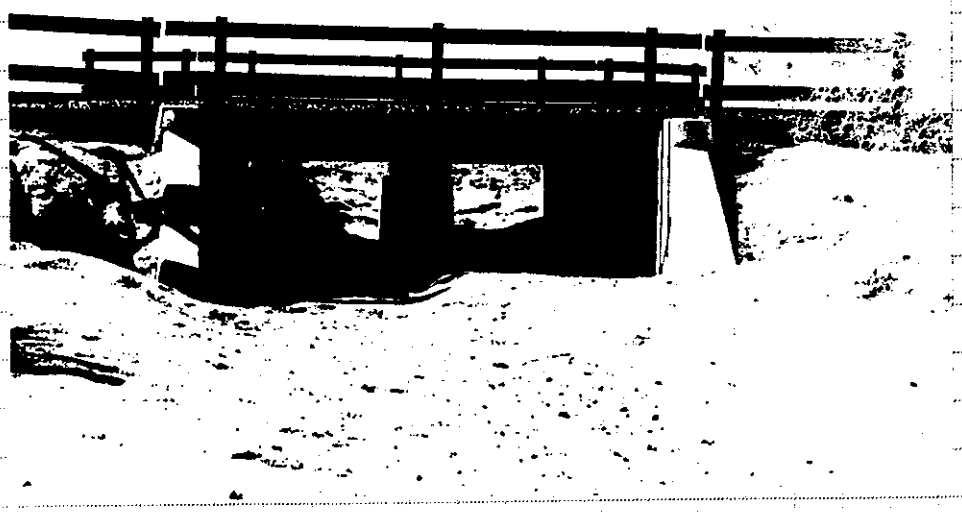
STRUCTURE # 1

MP 21.75







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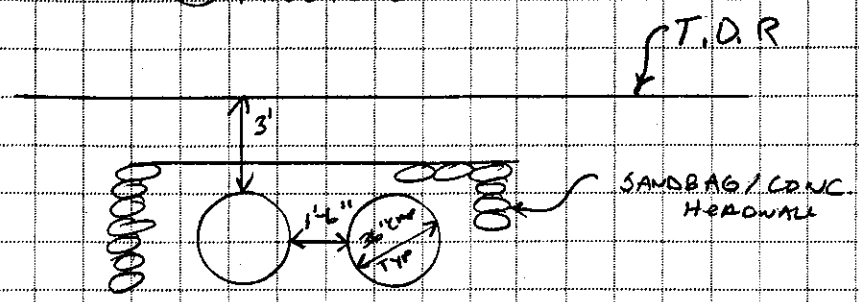
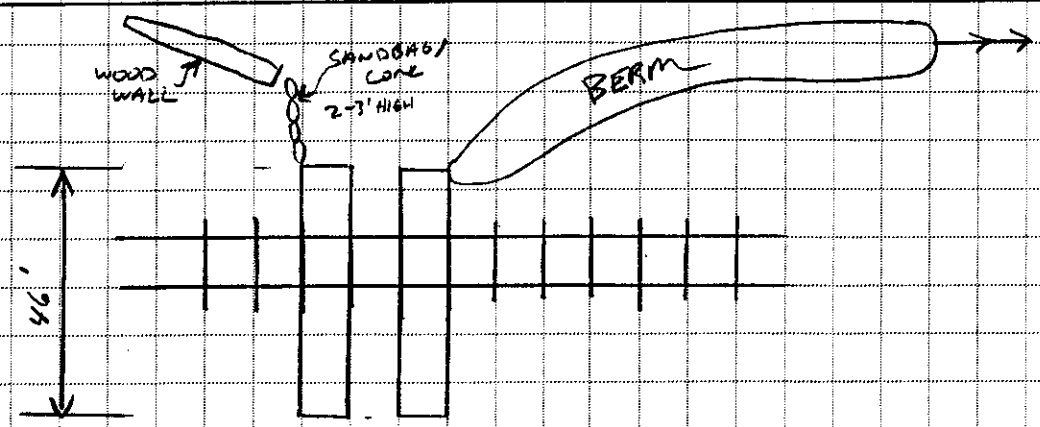
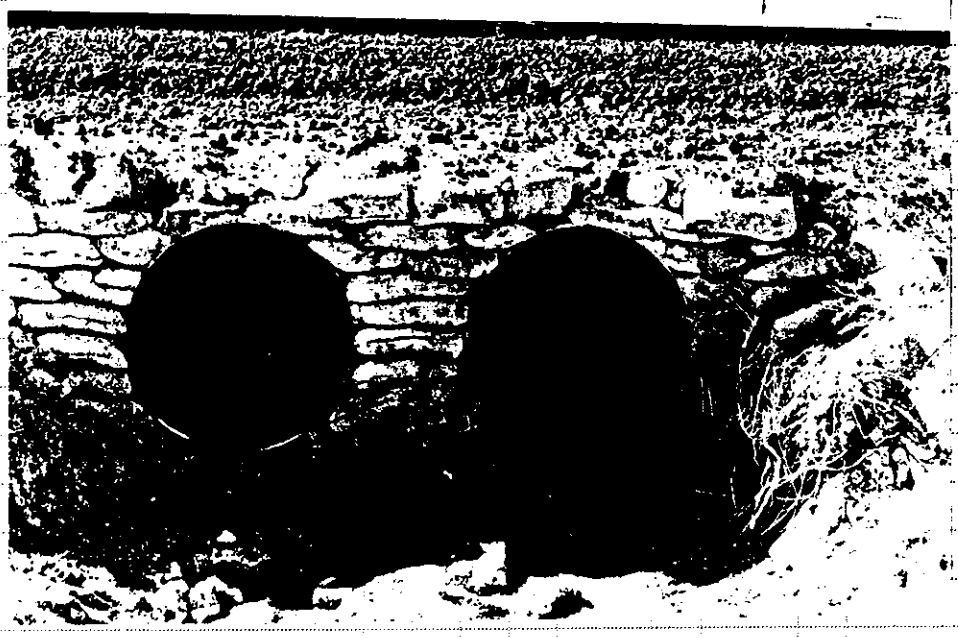
STRUCTURE # 2

MP 21.90







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JOB Waterman Wash

SHEET NO. 3 OF 46

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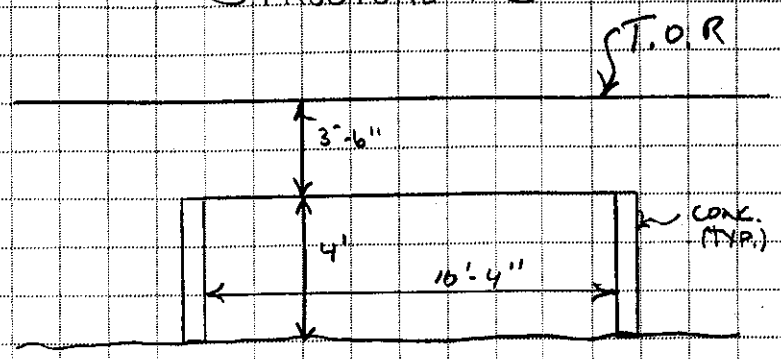
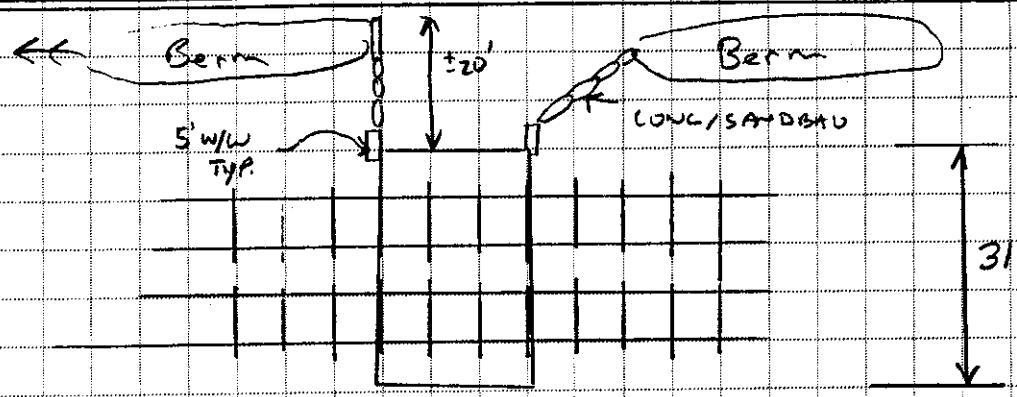
STRUCTURE #3

MP 22.0





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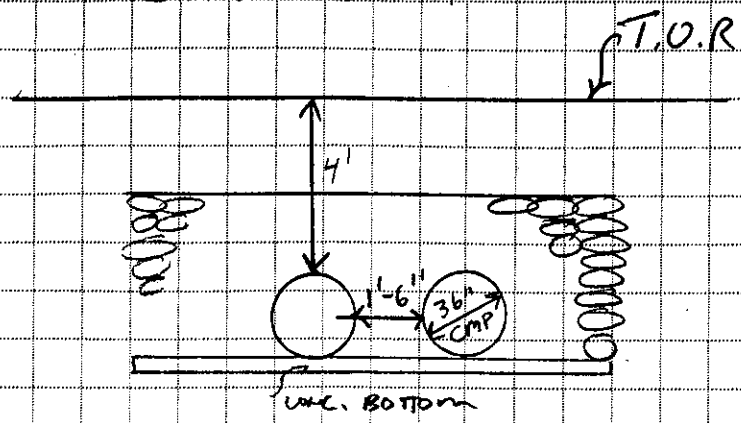
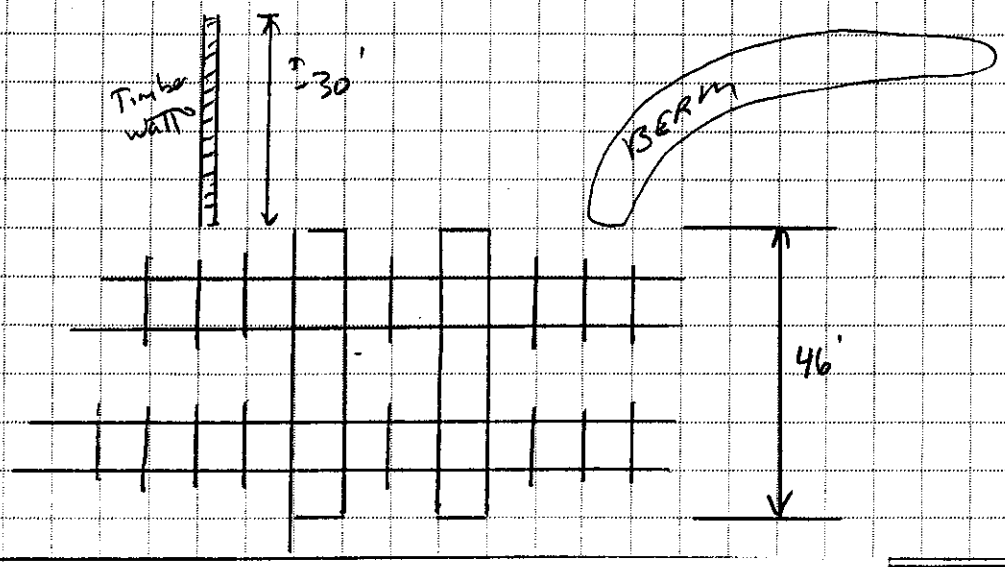
STRUCTURE #4

MP 22.25





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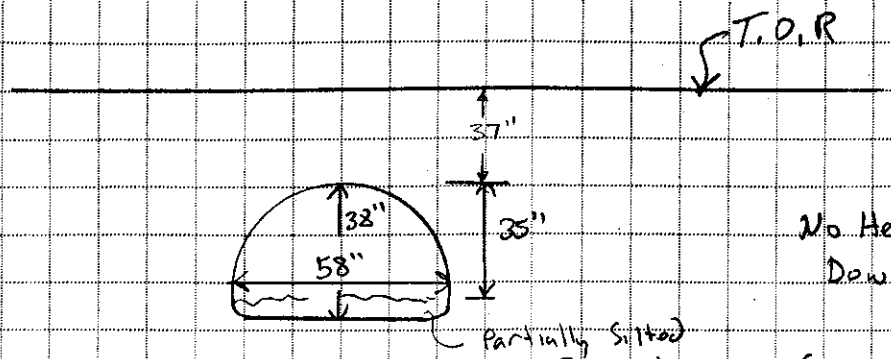
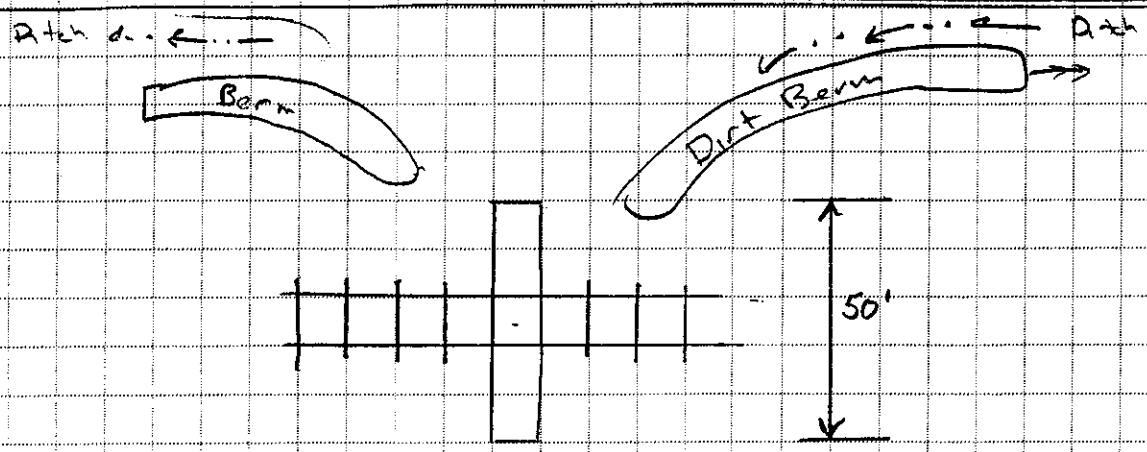
STRUCTURE #5

MP 22.40



No Headwall Downstream

Conc. Headwall with No wingwalls Upstream



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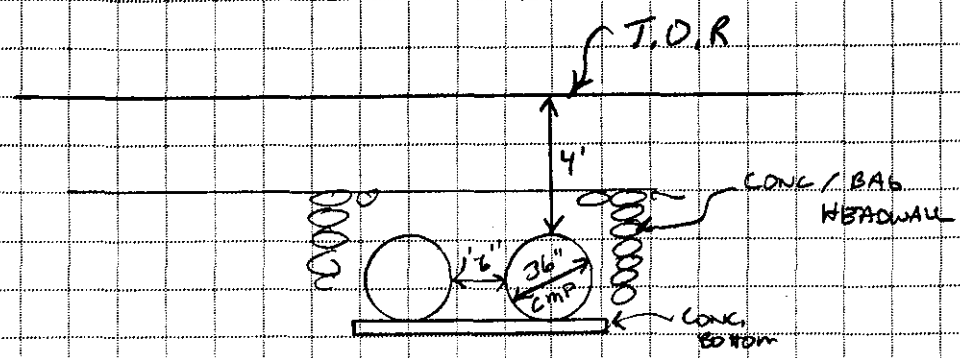
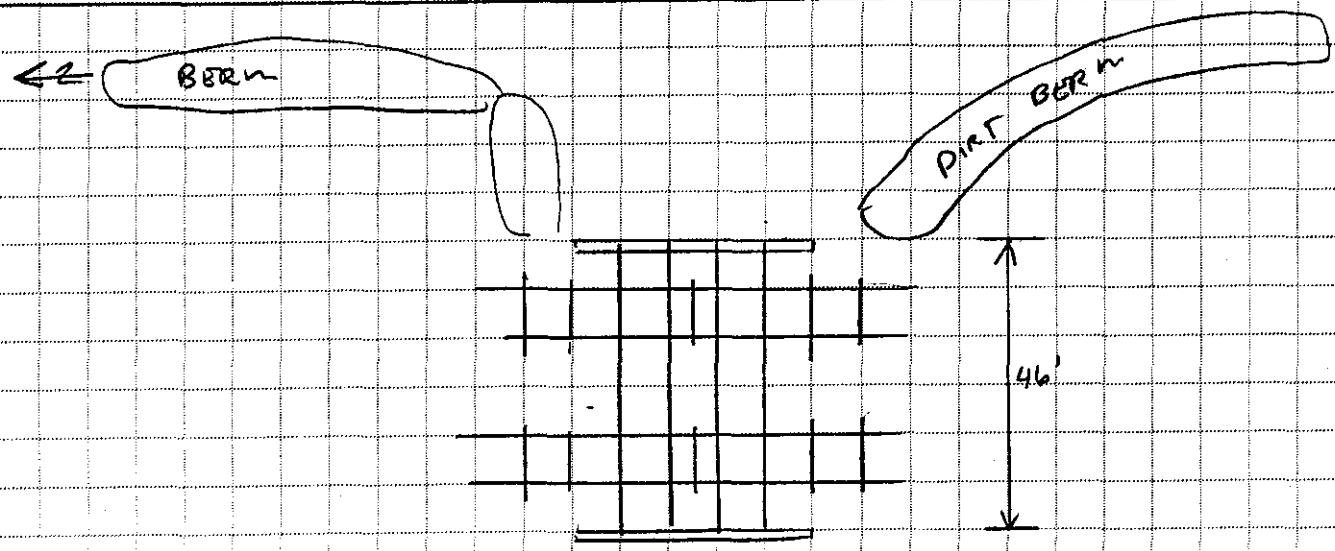
STRUCTURE # 6

MP 22.65





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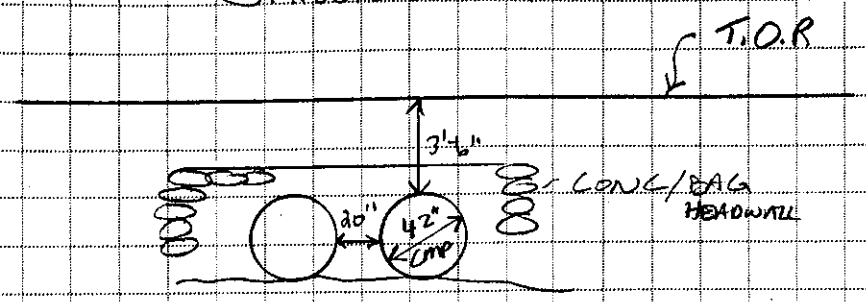
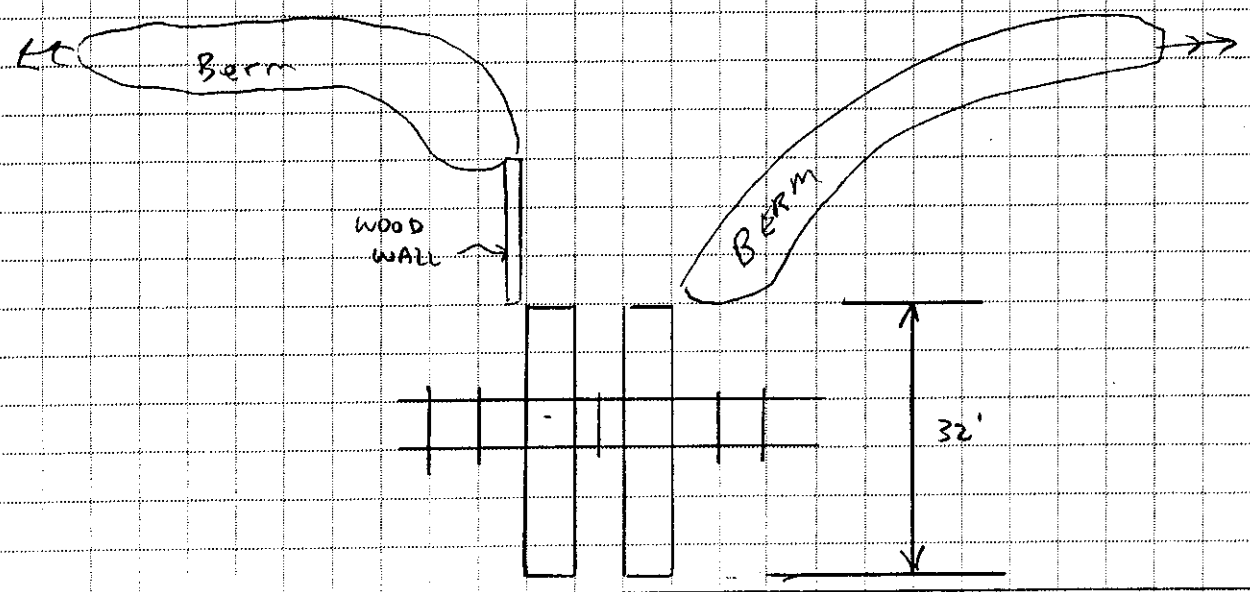
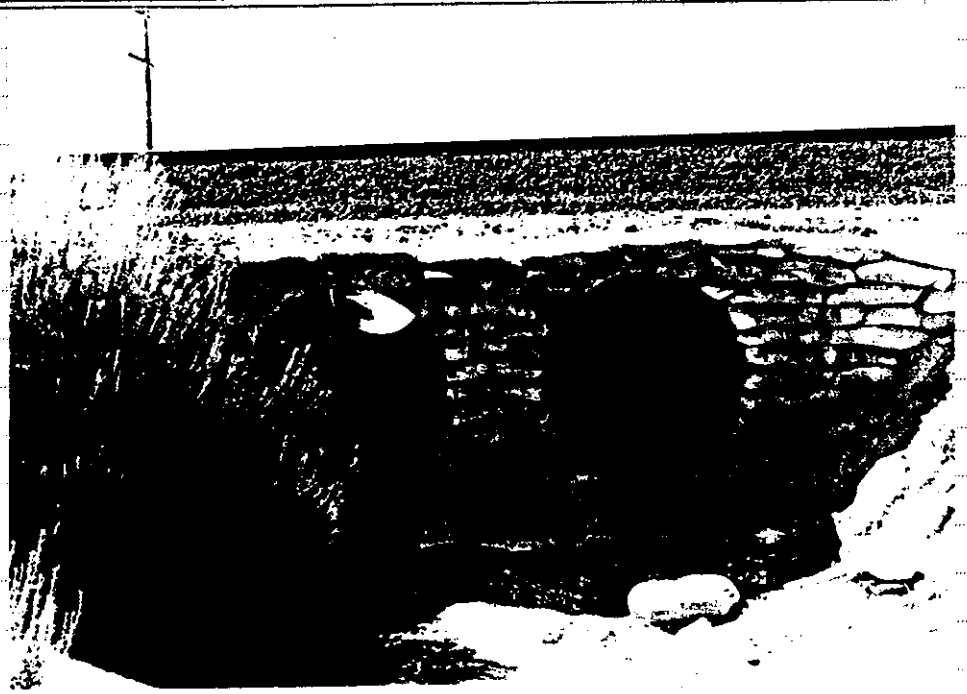
STRUCTURE # 7

MP 23.20







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JOB Waterman Wash

SHEET NO. 8 OF 46

CALCULATED BY TDC / DM DATE 2-3-89

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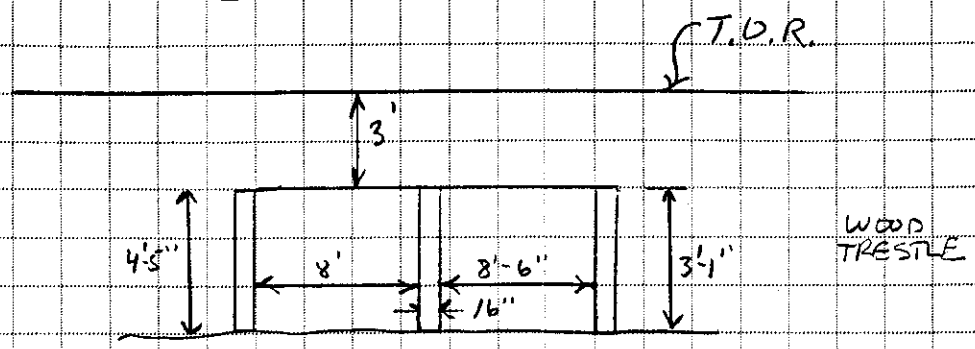
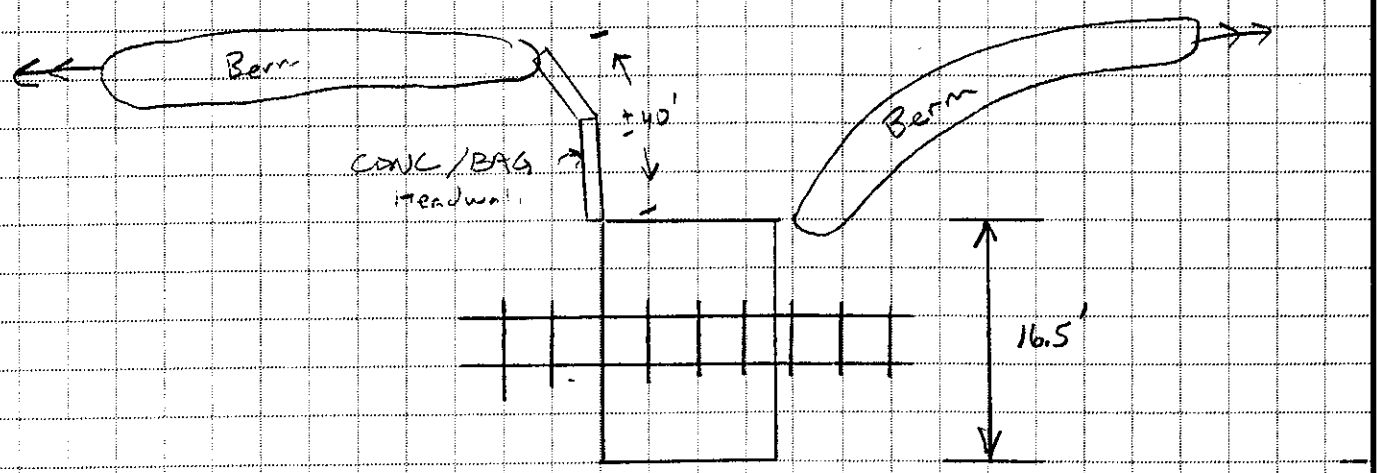
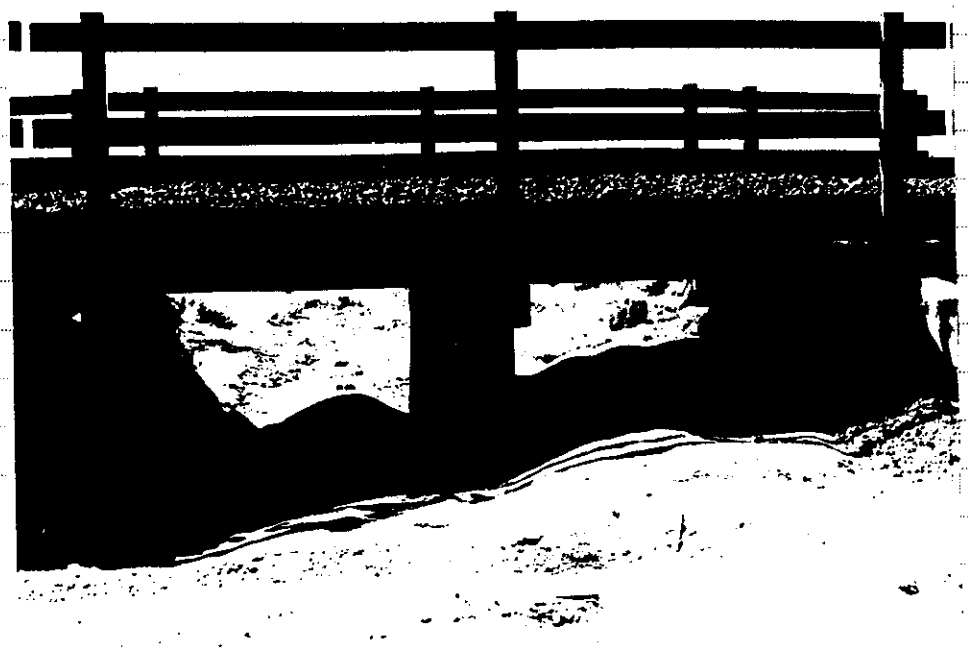
STRUCTURE # 8

MP 23.30







PRODUCT 205-1 NEBS Groton, Mass 01471 To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB

SHEET NO. 9 OF 46

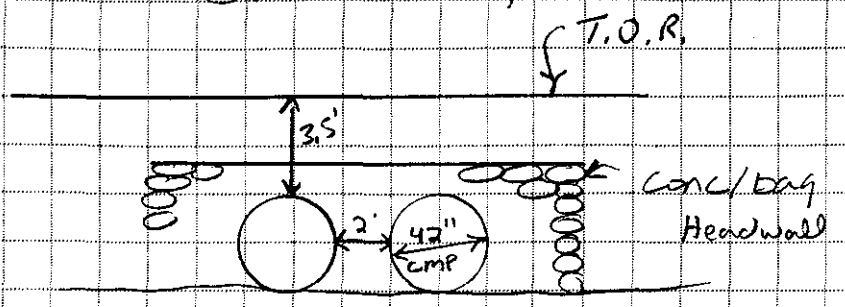
CALCULATED BY TDC/DM DATE 7-3-89

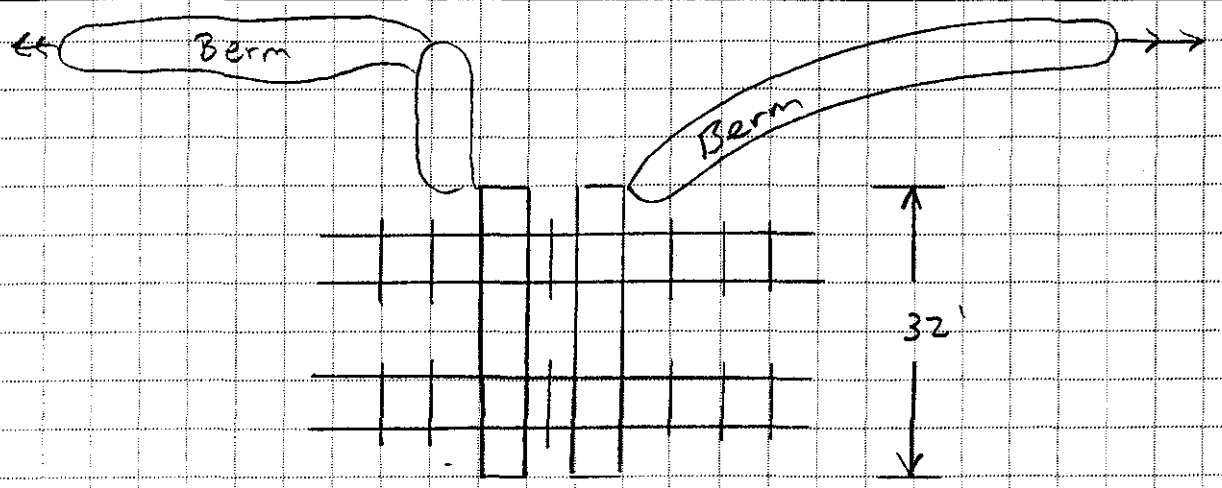
CHECKED BY DATE

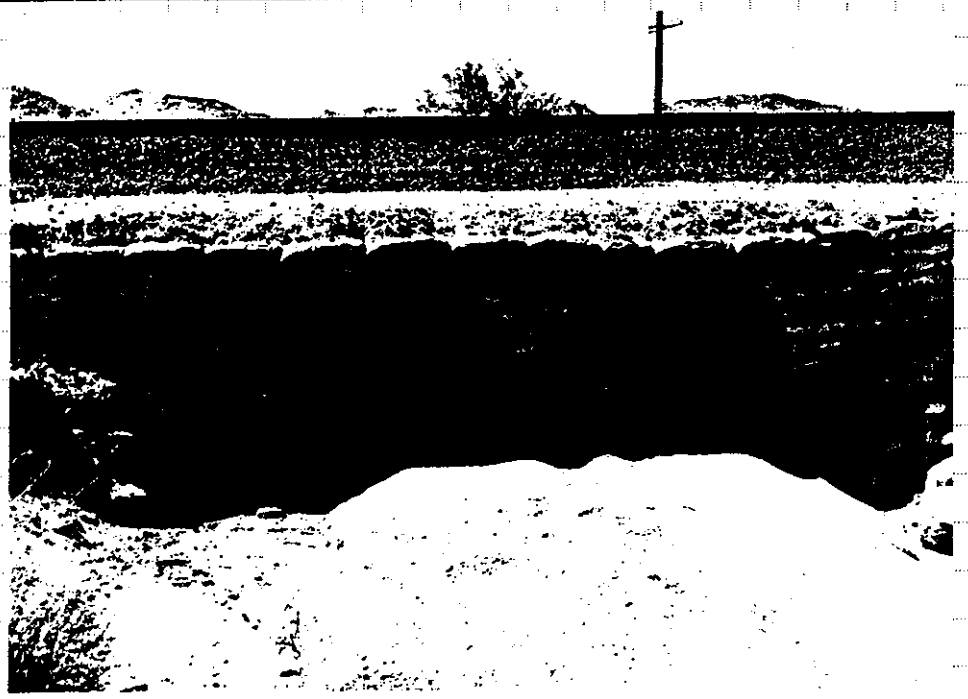
SCALE

STRUCTURE # 9

MP 23.65







PRODUCT 205-1 NEBS Inc. Groton, Mass 01471. To Order PHONE TOLL FREE 1-800-225-6380

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JOB: Waterman Wash

SHEET NO. 10 OF 46

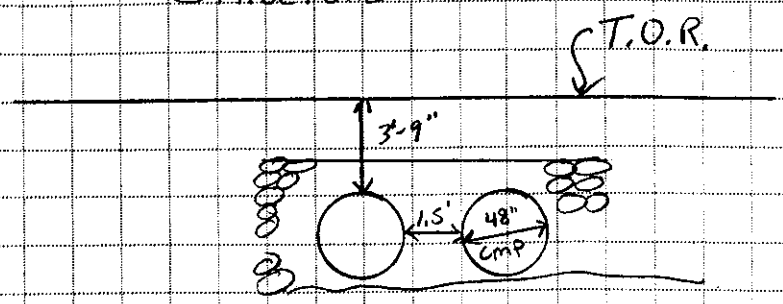
CALCULATED BY TPG / DM DATE 7-3-89

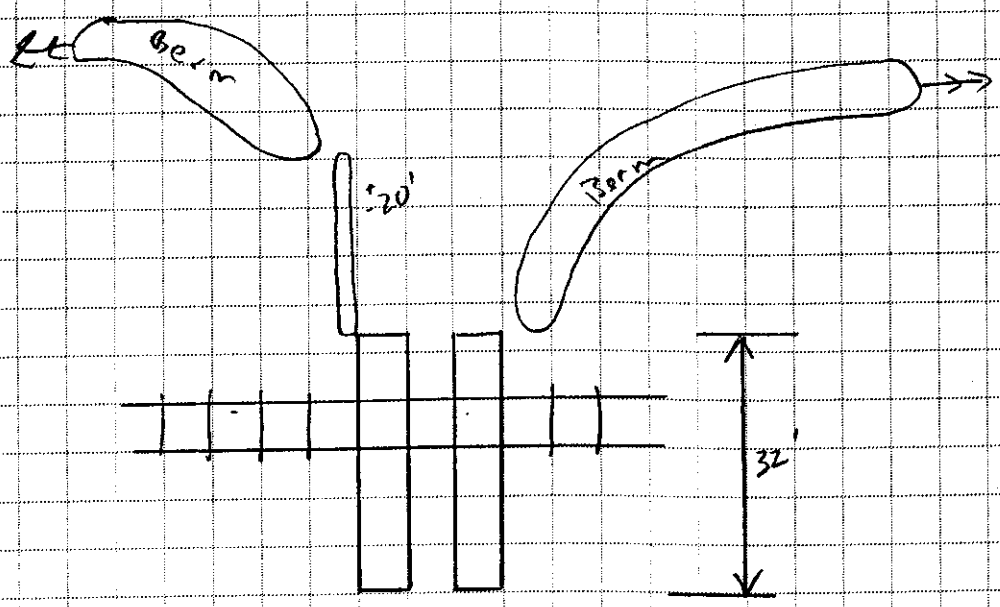
CHECKED BY _____ DATE _____

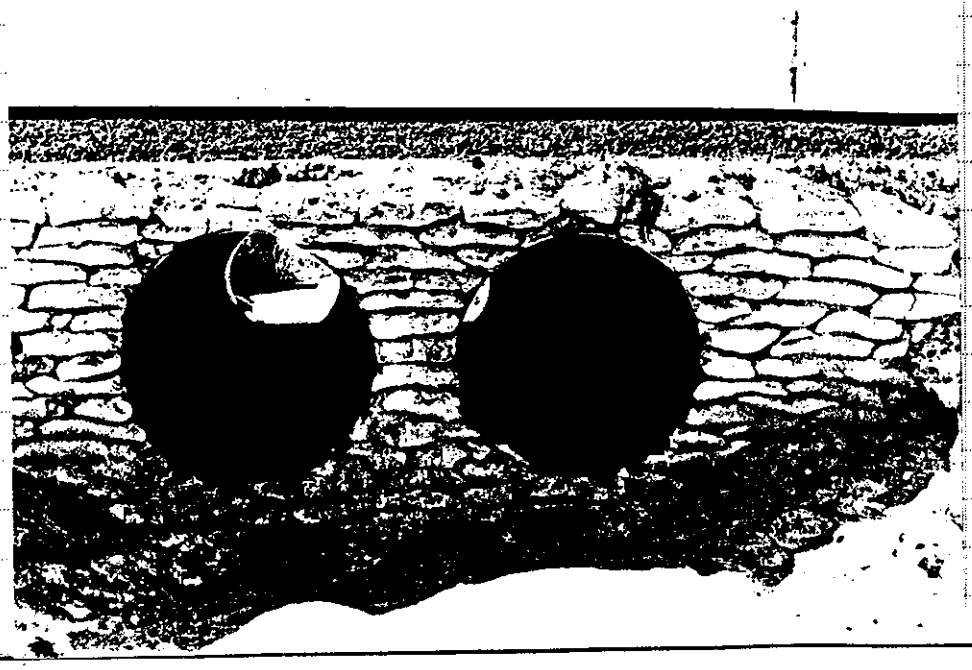
SCALE _____

STRUCTURE # 10

MP 23.90







PRODUCT 205-1 VERIFY Boston (617) 1-(Order) PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB

SHEET NO. 11 OF

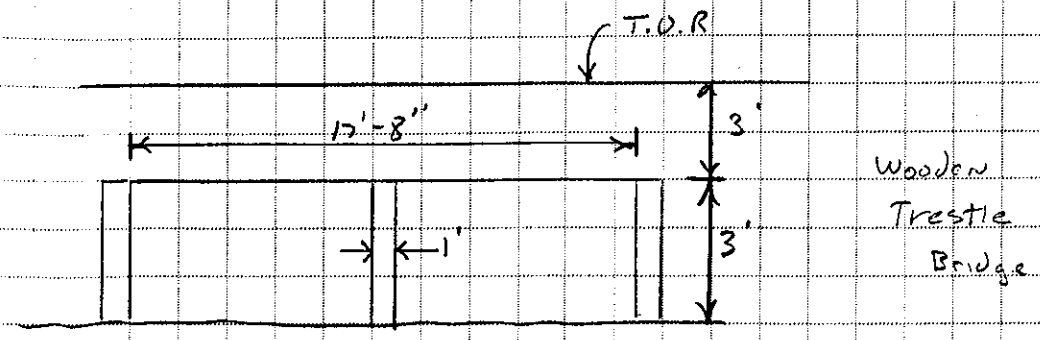
CALCULATED BY DWB/TDC DATE 6/19/89

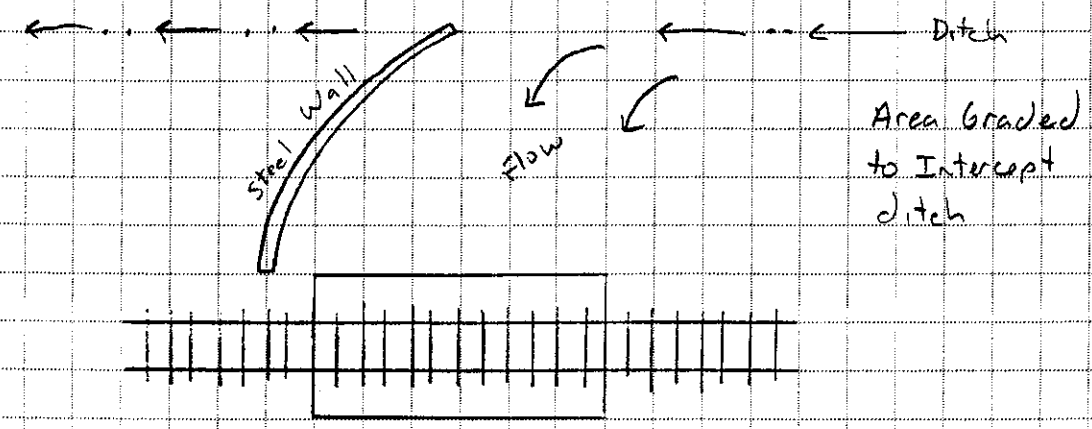
CHECKED BY DATE

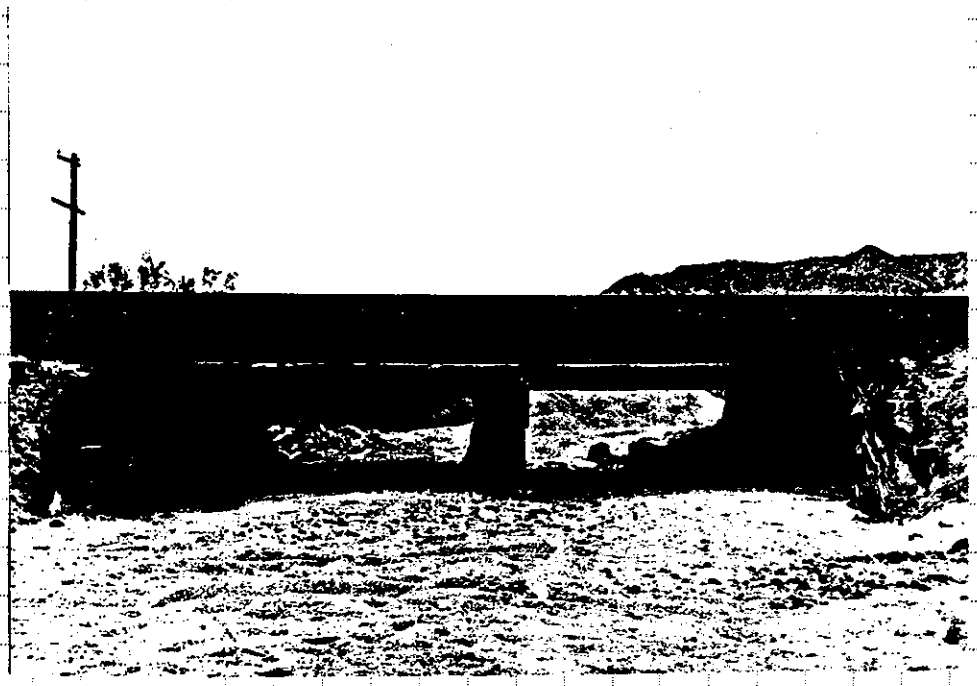
SCALE

STRUCTURE # 11

MP 24.4







PRODUCT 205-1 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

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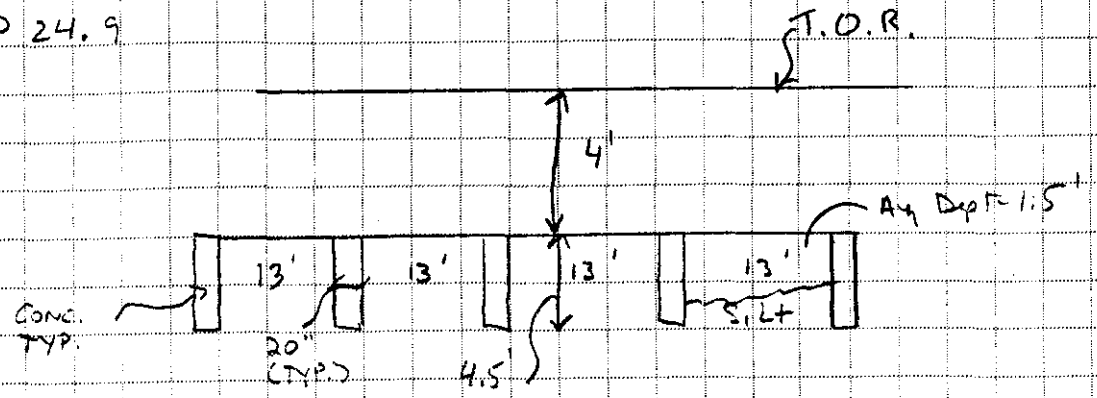
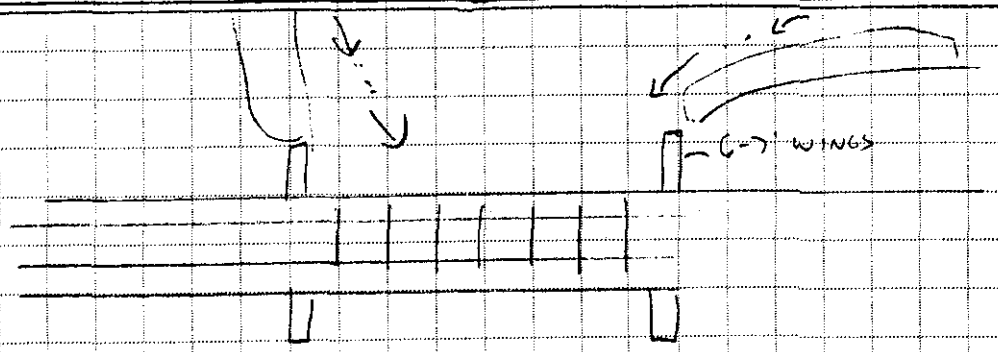
JOB Waterman Wash
SHEET NO. 12 OF 46
CALCULATED BY DWB / TPK DATE 11/1/89
CHECKED BY DATE
SCALE

STRUCTURE # 12

MP 24.9





NO PICTURE

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JOB Waterman Wash

SHEET NO. 13 OF 46

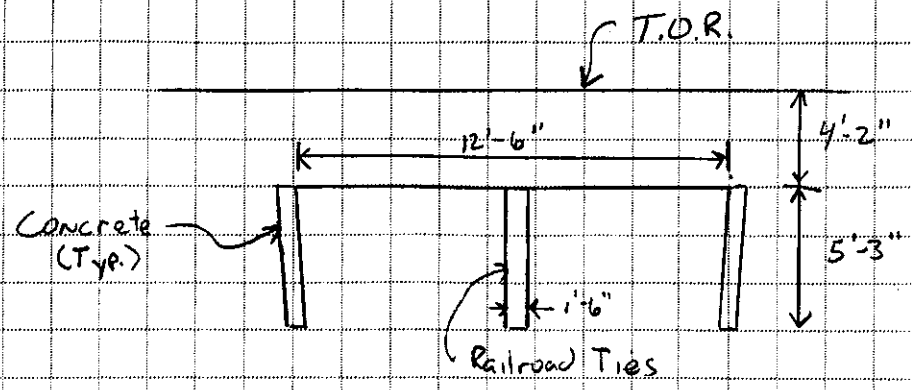
CALCULATED BY DWB / TDC DATE 6/19/89

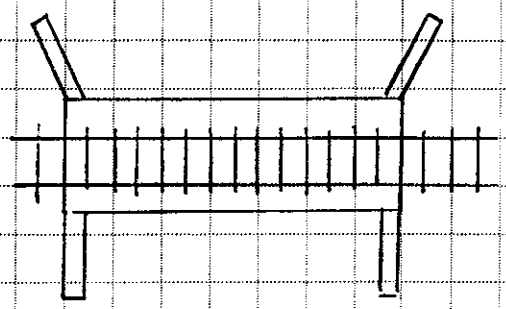
CHECKED BY DATE

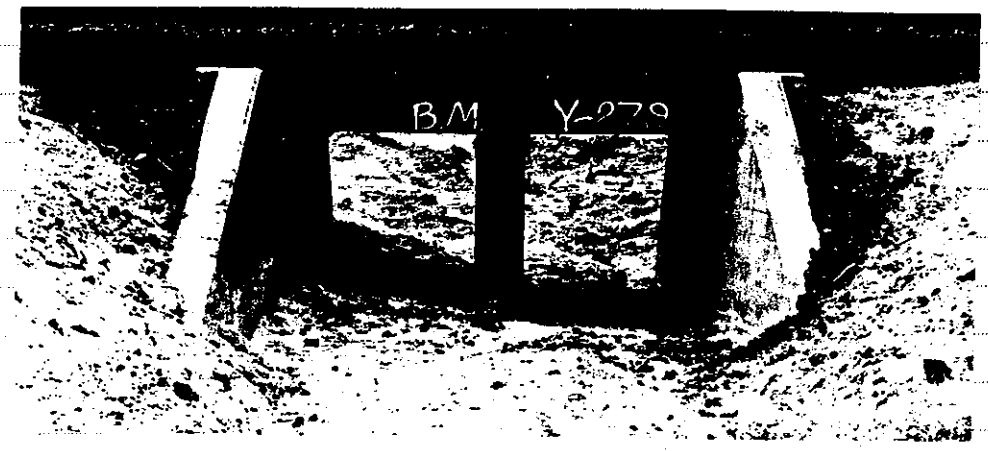
SCALE

MP 25

STRUCTURE # 13







PRODUCT 205-1 NEBS Inc Groton Mass 01471 - To Order PHONE TOLL FREE 1-800-225-6380

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JOB Waterman Wash

SHEET NO. 14 OF 46

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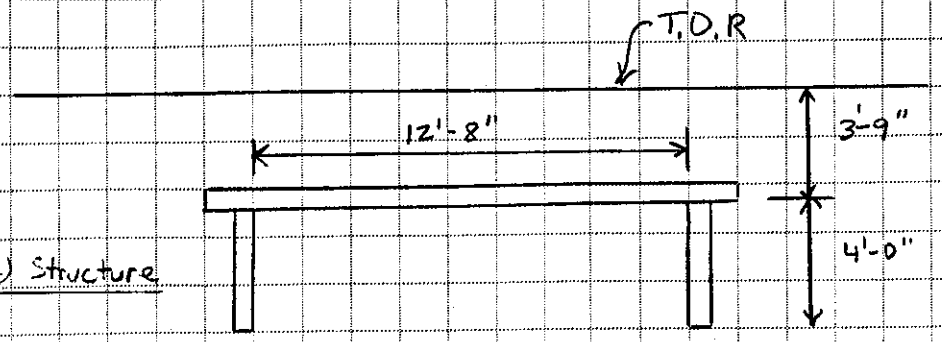
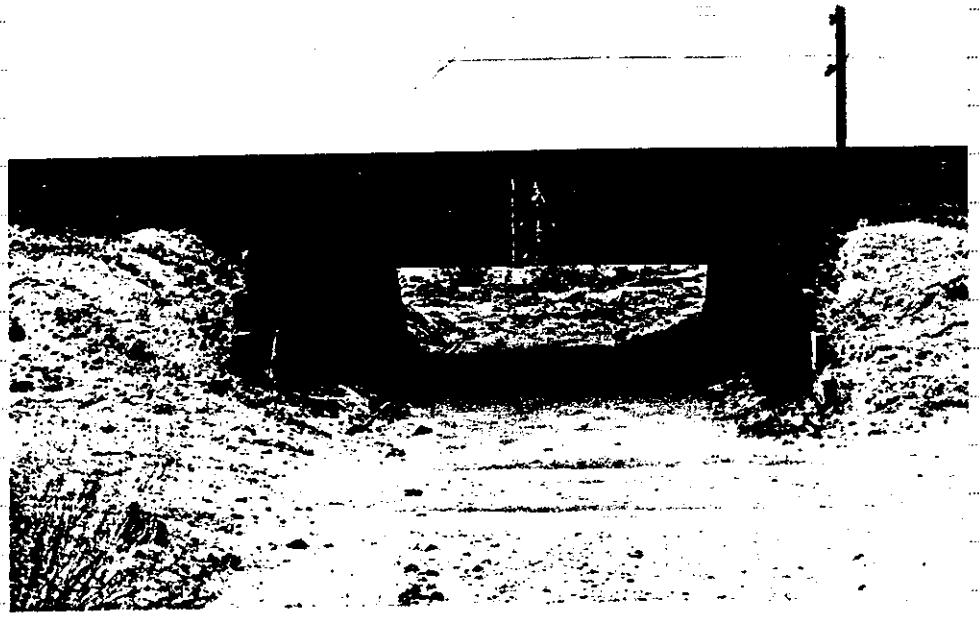
SCALE

STRUCTURE # 14

MP 25.4



All Wood Structure



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JOB Waterman Wash

SHEET NO. 15 OF 46

CALCULATED BY DWB / TDC DATE 6/19/89

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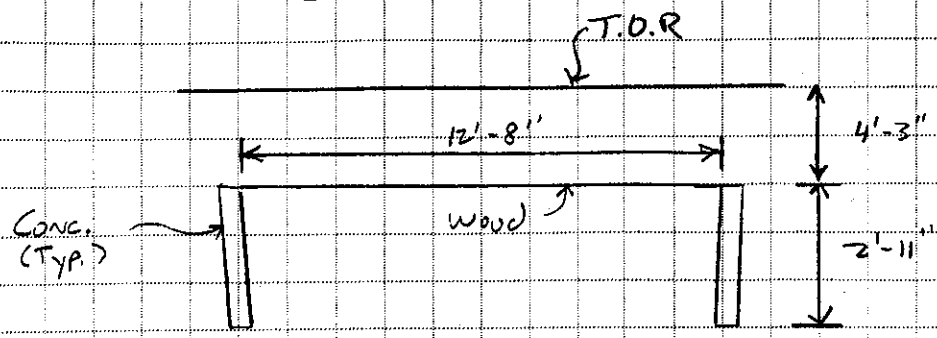
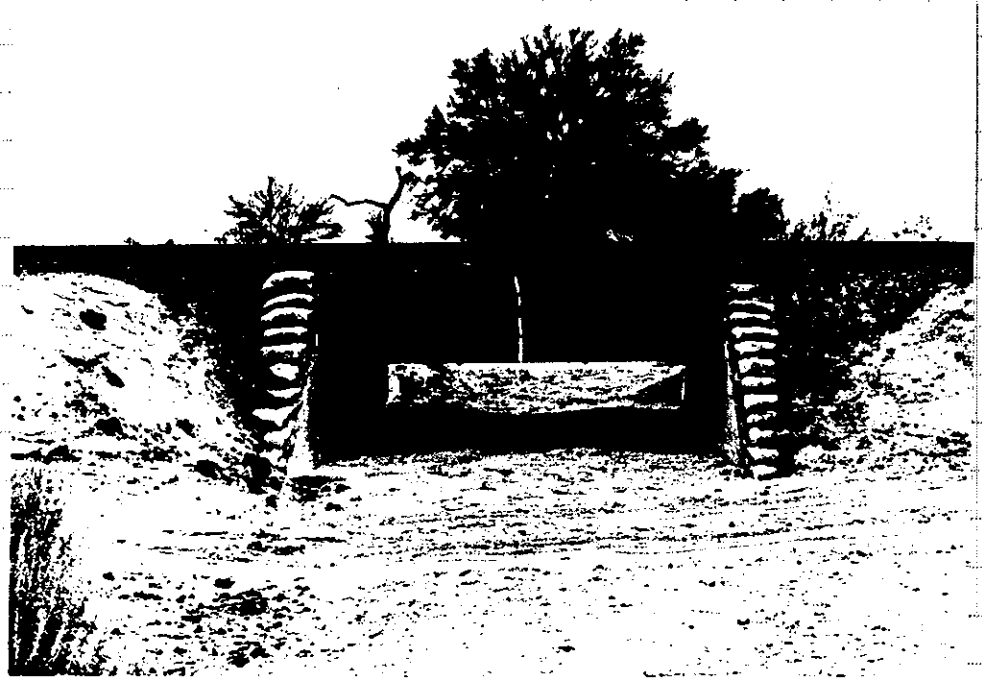
MP 25.5

STRUCTURE # 15





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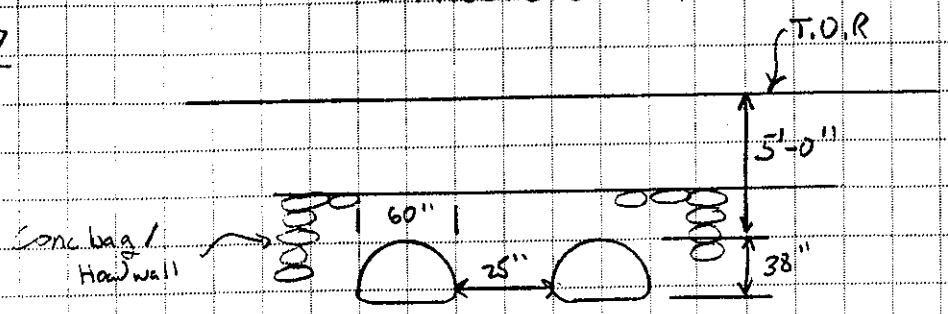
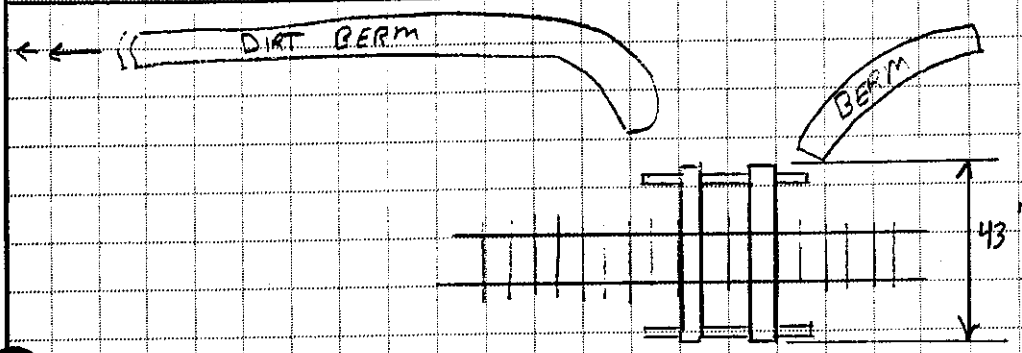
JOB: Waterman Wash
SHEET NO. 16 OF 46
CALCULATED BY DWB / TPC DATE 6/19/89
CHECKED BY DATE
SCALE

STRUCTURE # 16

MP 25.7





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JOB Waterman Wash

SHEET NO. 17 OF 46

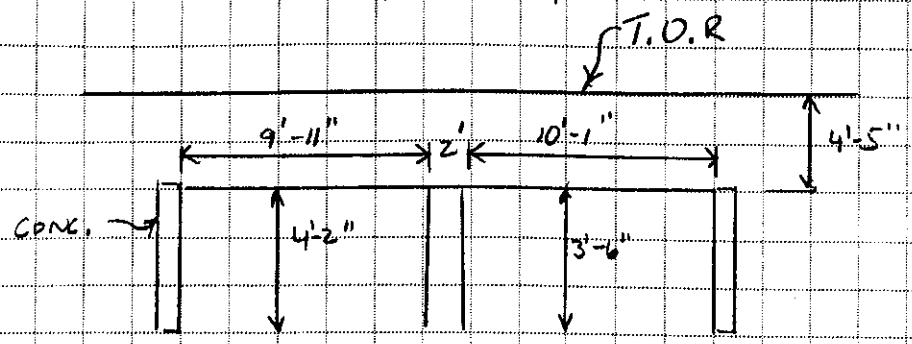
CALCULATED BY DWB / TDC DATE 6/19/89

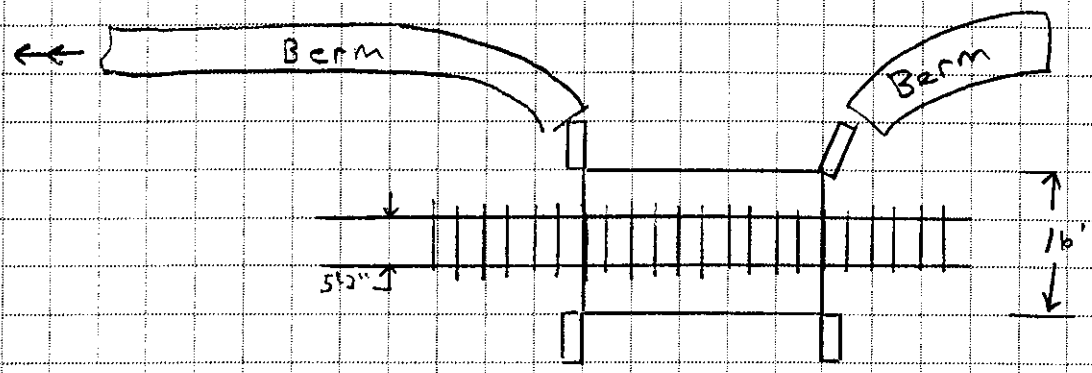
CHECKED BY _____ DATE _____

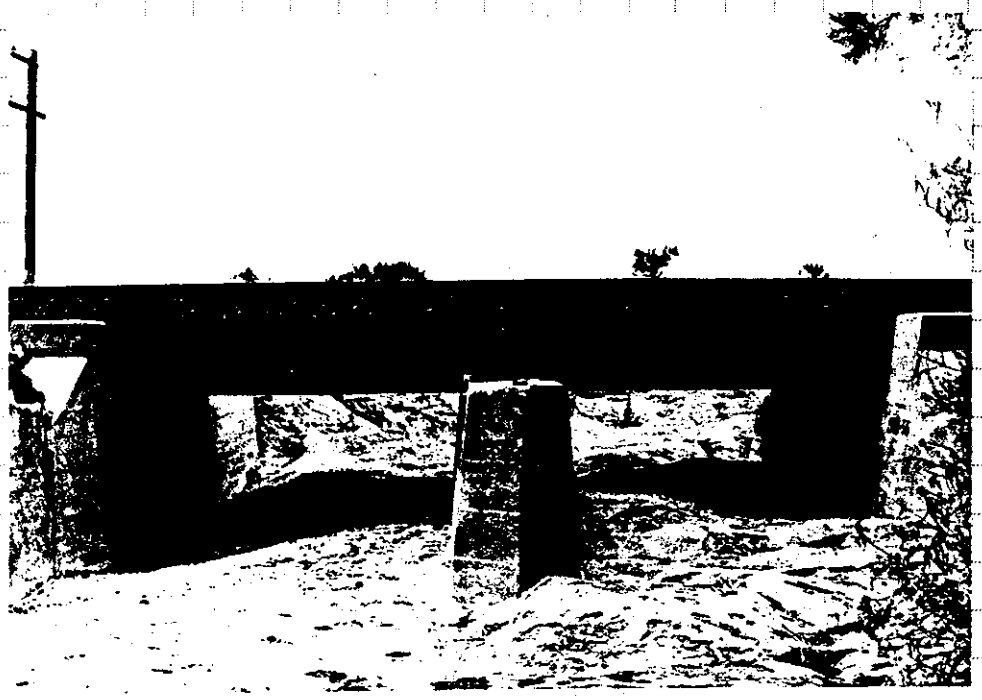
SCALE _____

STRUCTURE #17

MP 26.2







PRODUCT 205-1 NEBS Inc. Groton, Mass 01471 To Order PHONE TOLL FREE 1-800-225-6380

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JOB Waterman Wash

SHEET NO. 18 OF 46

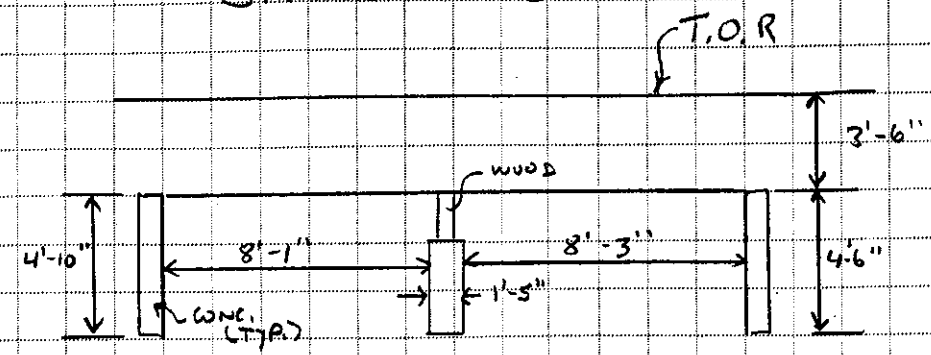
CALCULATED BY DWB/TDC DATE 6/19/89

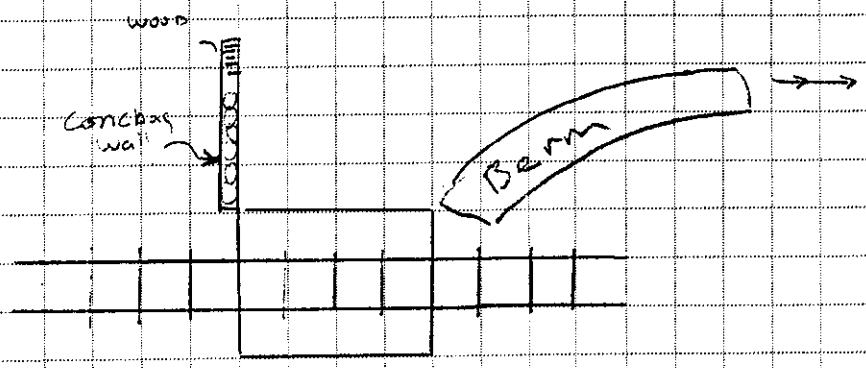
CHECKED BY DATE

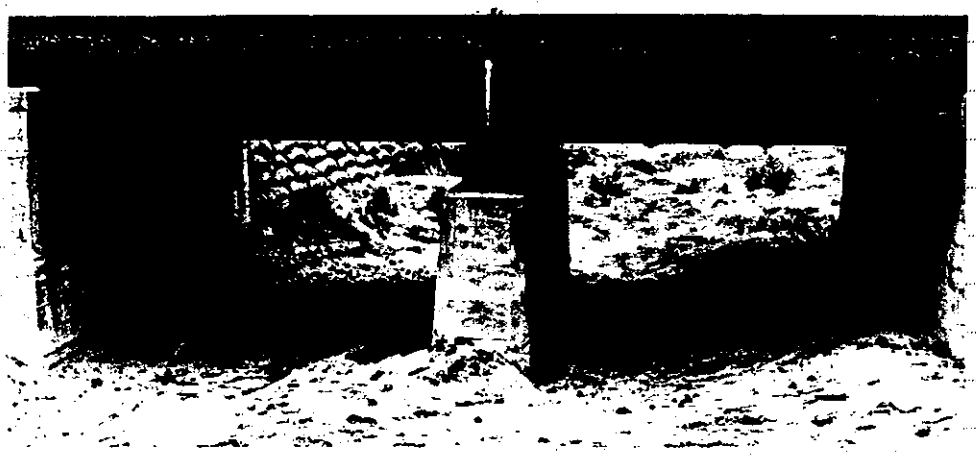
SCALE

STRUCTURE # 18

MP 26.5







PRODUCT 205-1 NEBS Inc Groton Mass 01471 To Order PHONE TOLL FREE 1-800-225-6380

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JOB Waterman Wash

SHEET NO. 19 OF 46

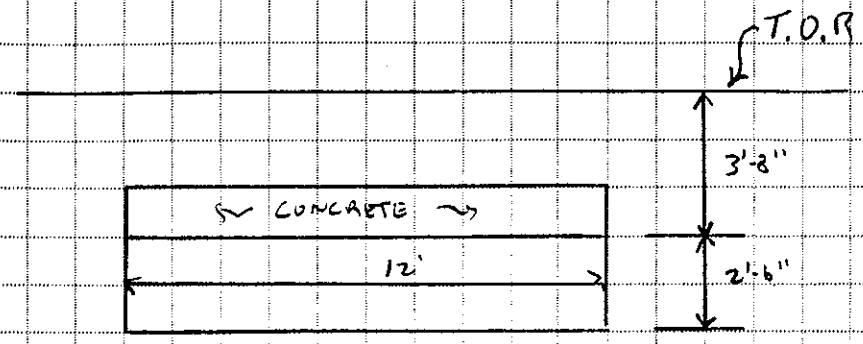
CALCULATED BY DWB / TDL DATE 6/19/89

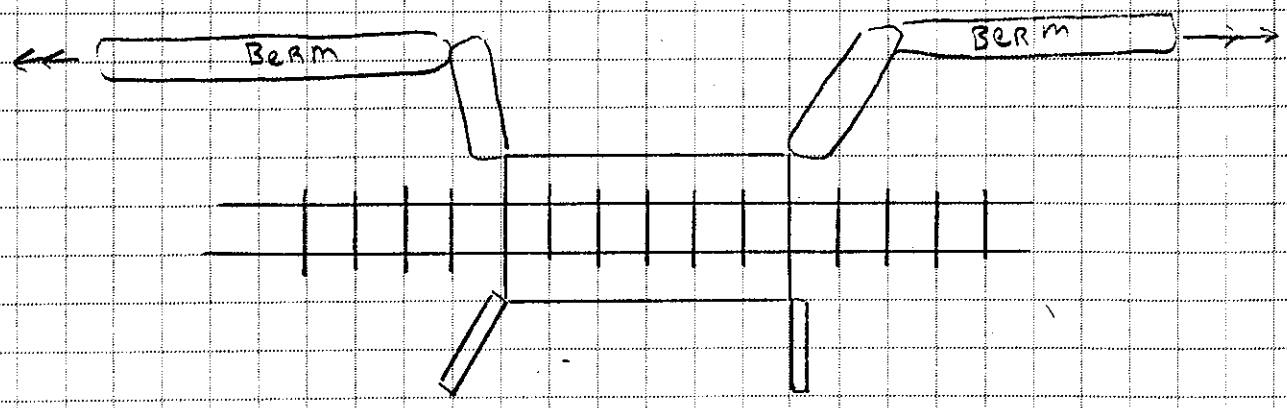
CHECKED BY DATE

SCALE

STRUCTURE # 19

MP 26.7





PRODUCT 205-1 NEBS Order PHONE TOLL FREE 1-800-225-6380

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JOB Waterman Wash

SHEET NO. 20 OF 46

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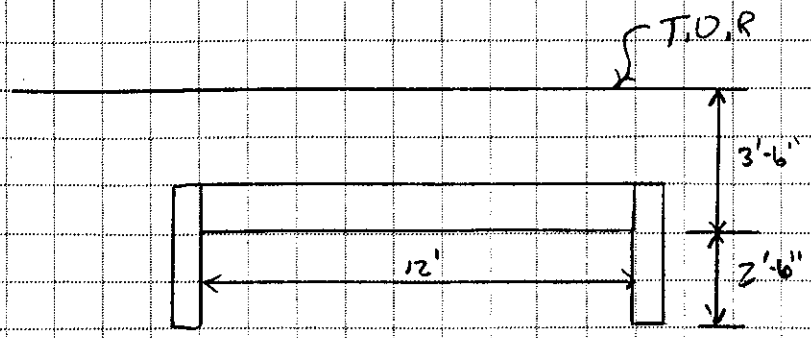
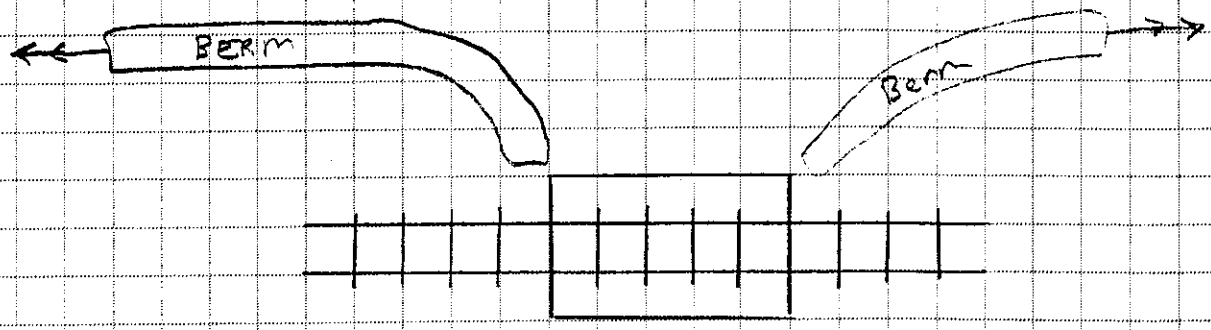
SCALE

STRUCTURE # 20

MP 27.0





PRODUCT 035 NEBS Groton Mass 01471 To Order PHONE TOLL FREE 1-800-225-6380

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JOB Waterman Wash

SHEET NO. 21 OF 46

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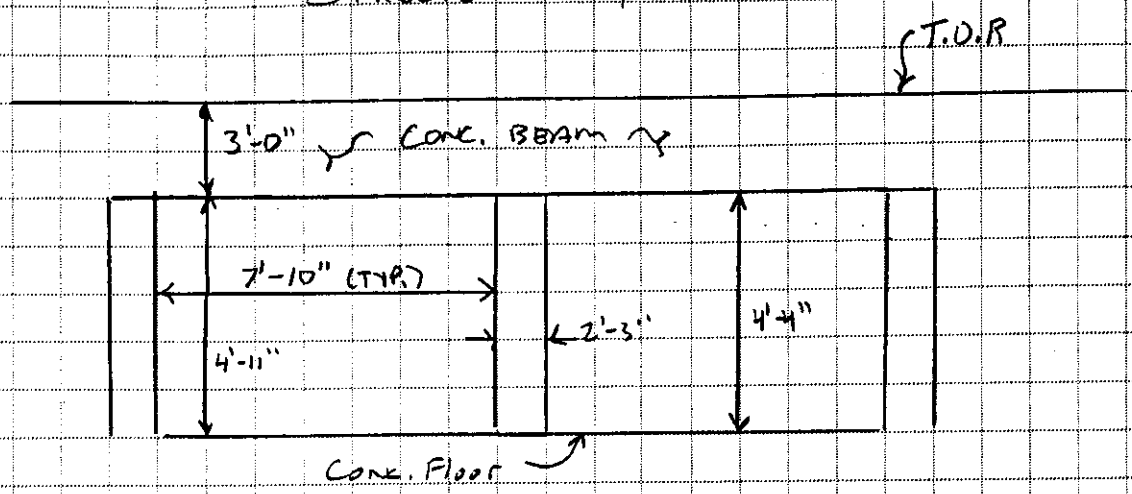
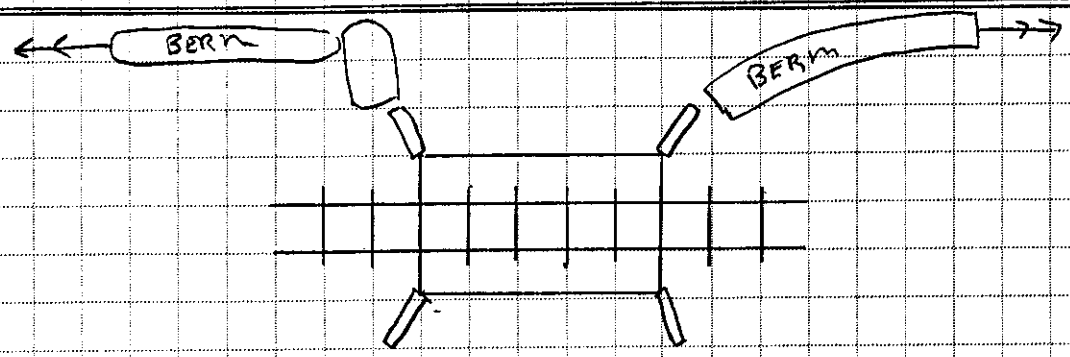
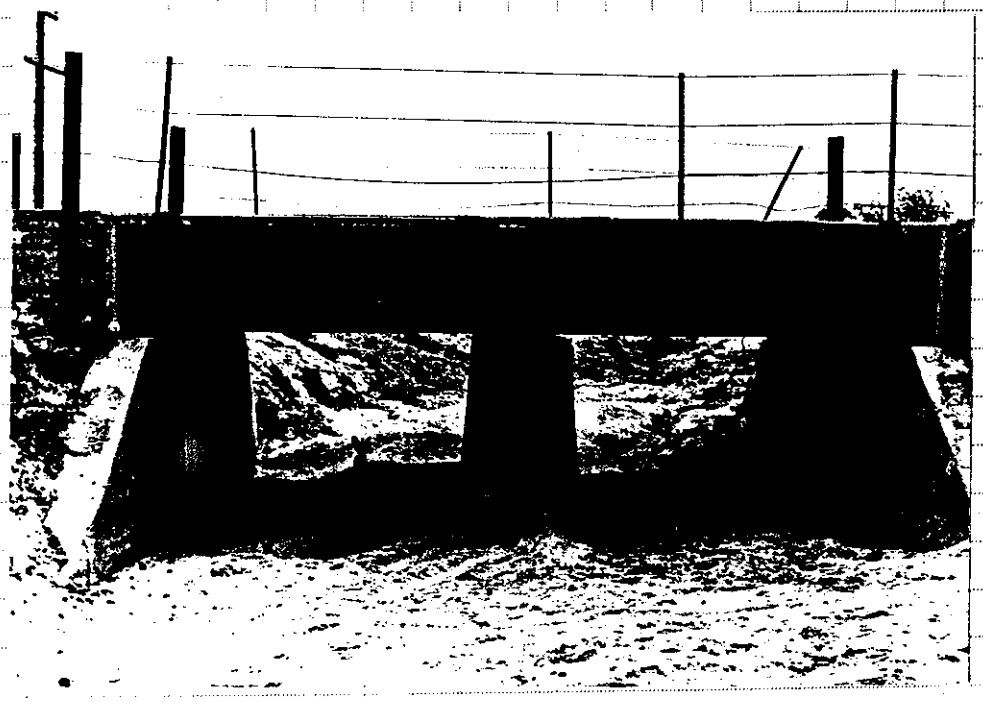
SCALE

STRUCTURE # 21

MP 27.4







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JOB Waterman Was-

SHEET NO. 22 OF 46

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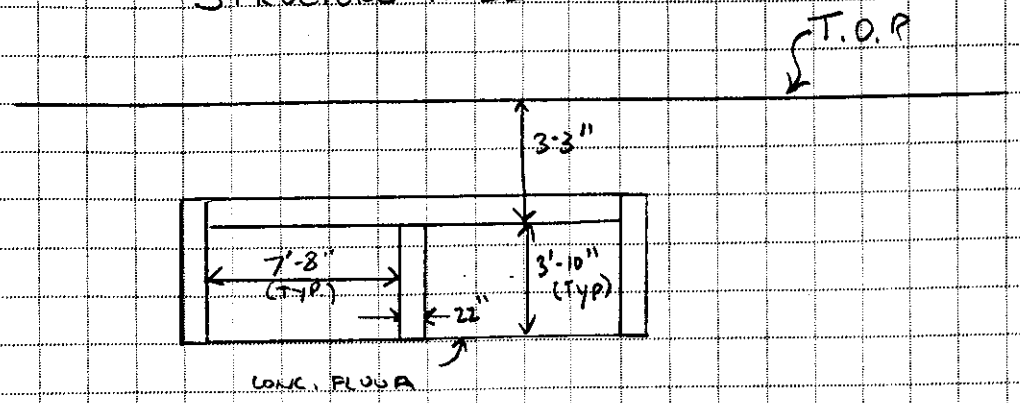
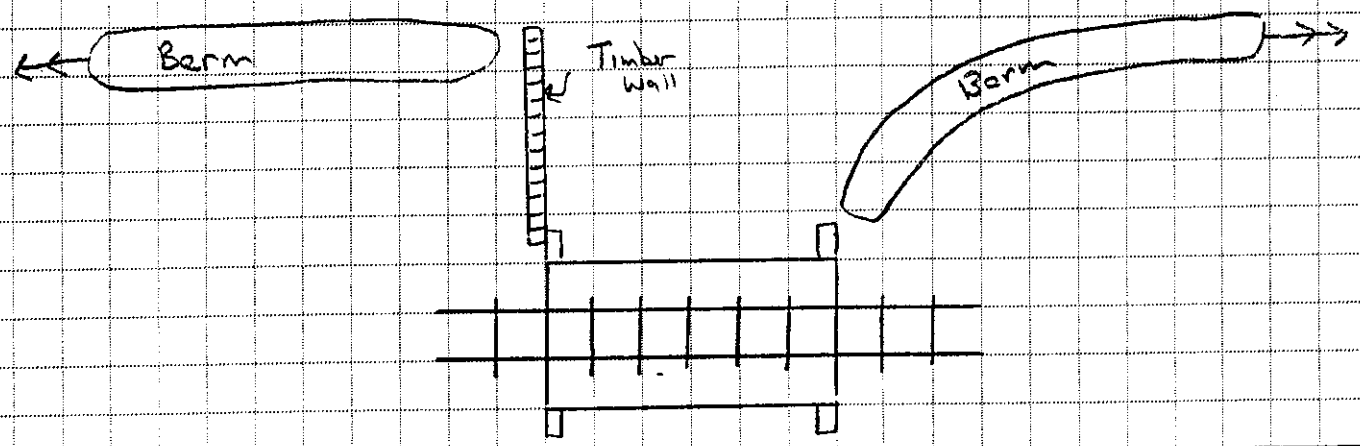
SCALE

STRUCTURE # 22

MP 27.75





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JOB Waterman Wash
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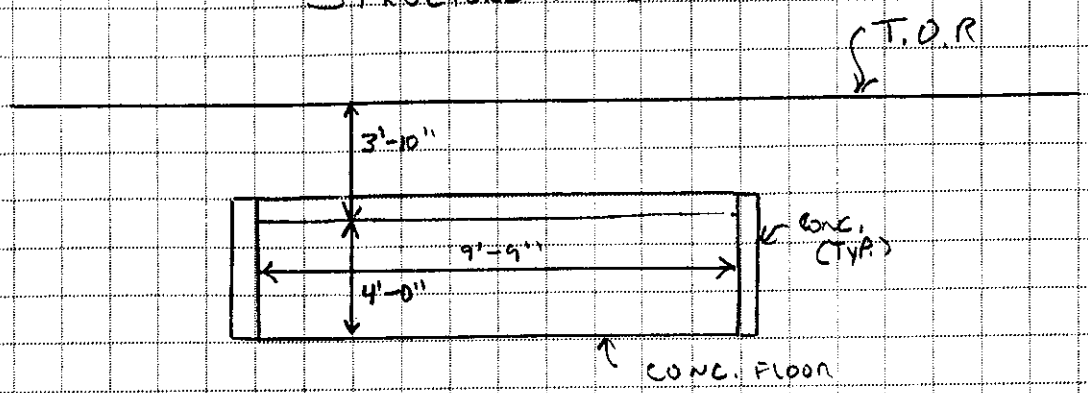
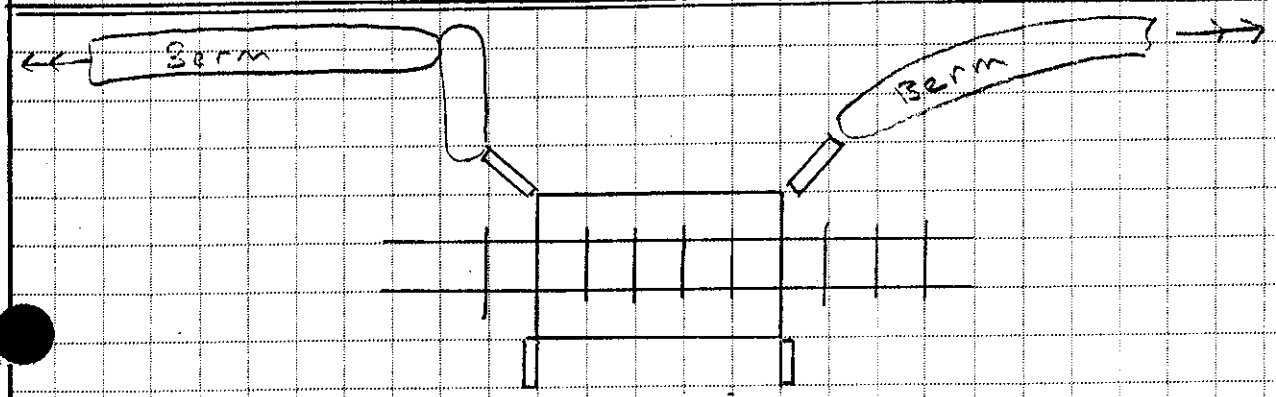
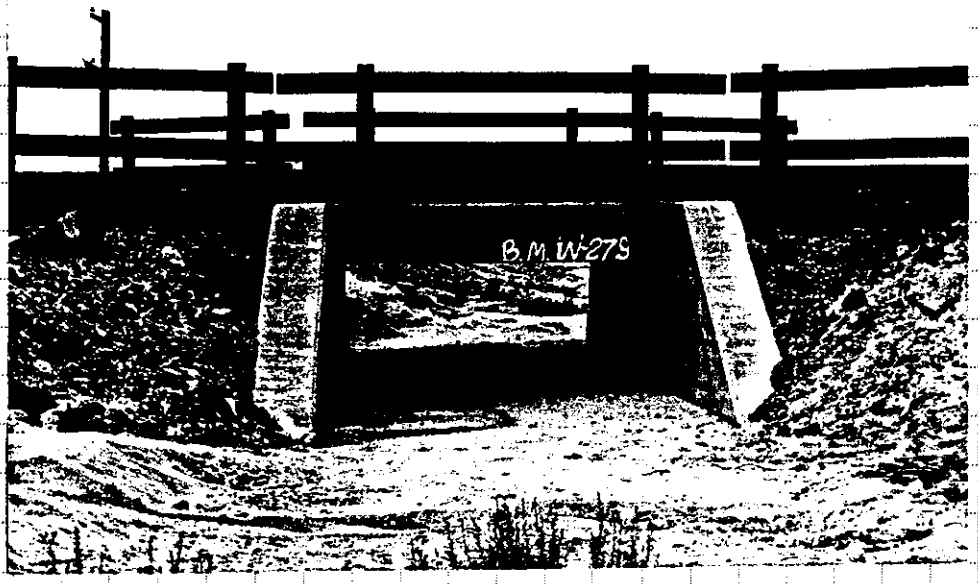
MP 28

STRUCTURE # 23







PRODUCT 205-1 NEBS inc., Groton, Mass. 01471. To Order PHONE-TOLL FREE 1-800-225-6380

STANLEY

JOB

SHEET NO. 24 OF 46

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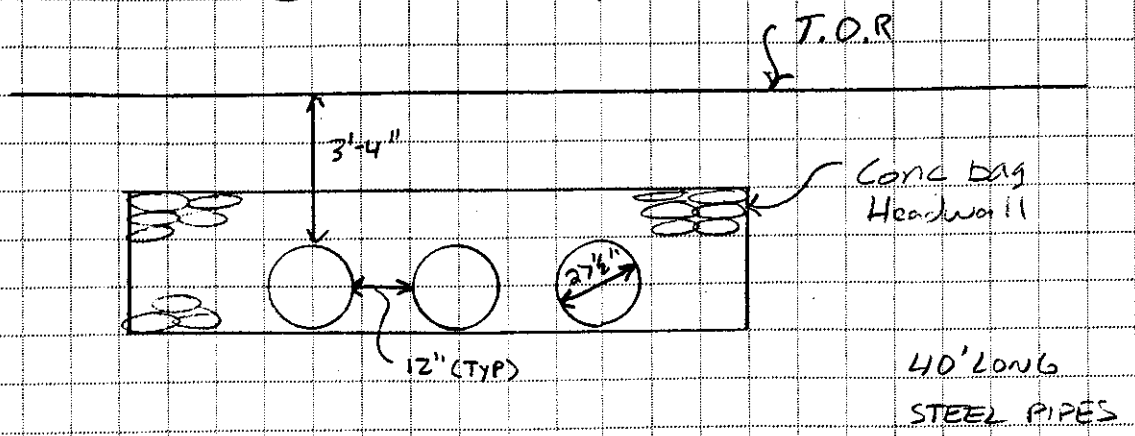
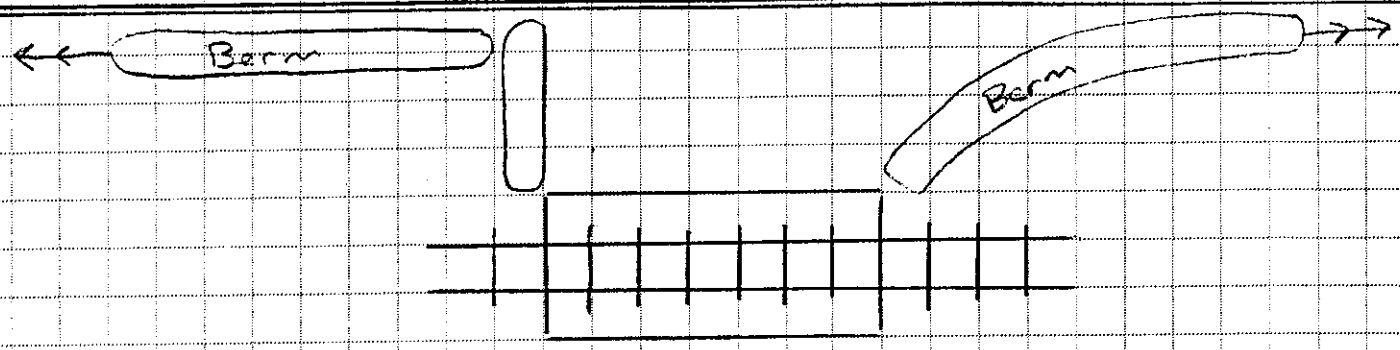
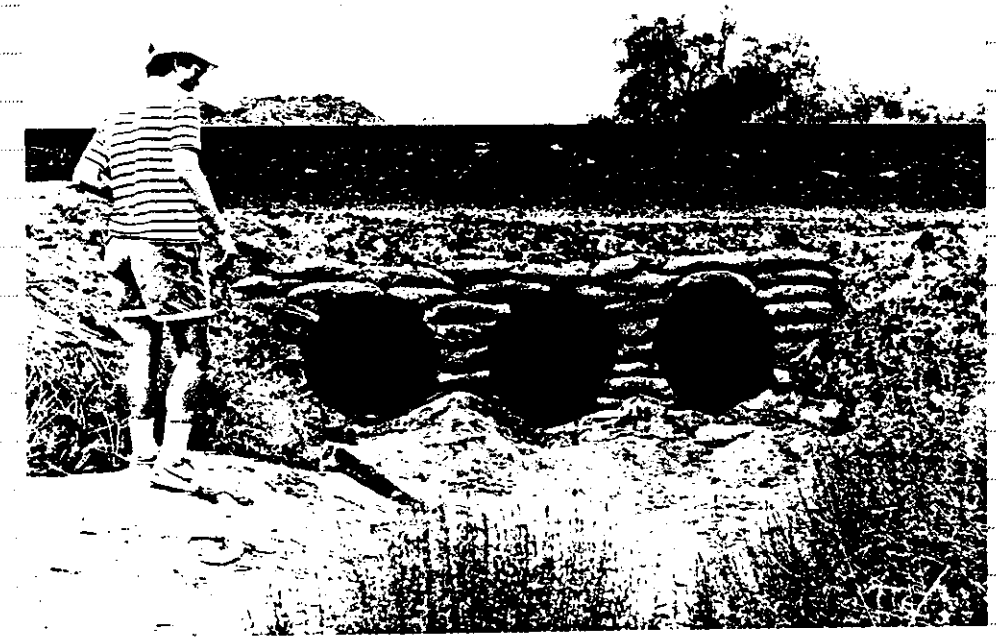
SCALE

STRUCTURE # 24

MP 28.3







PRODUCT 205-1 NEBS Inc. Groton, Mass 01471 To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB: Western ~ Wa.
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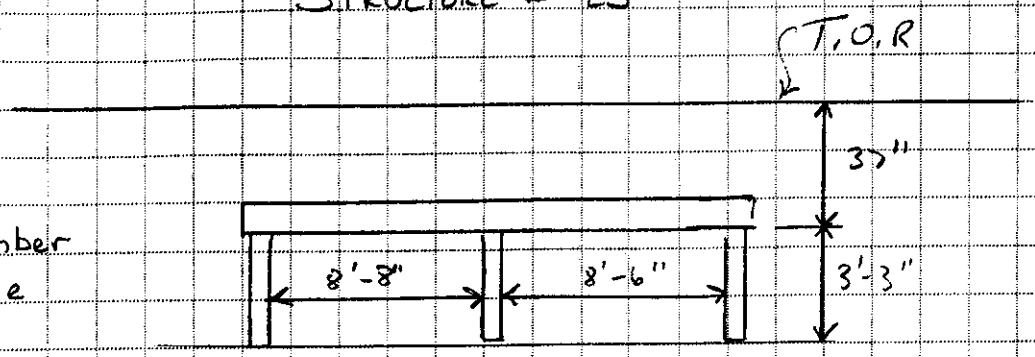
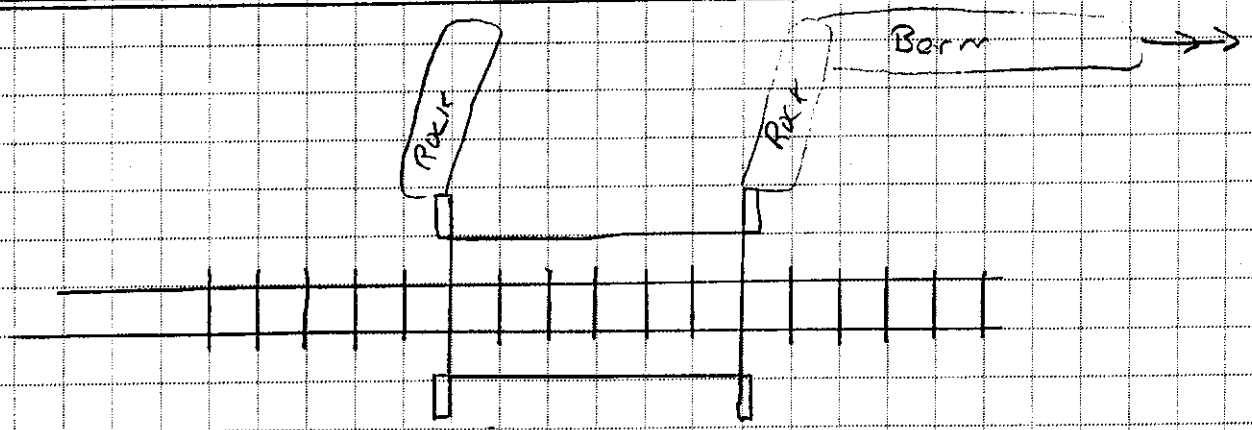
SCALE

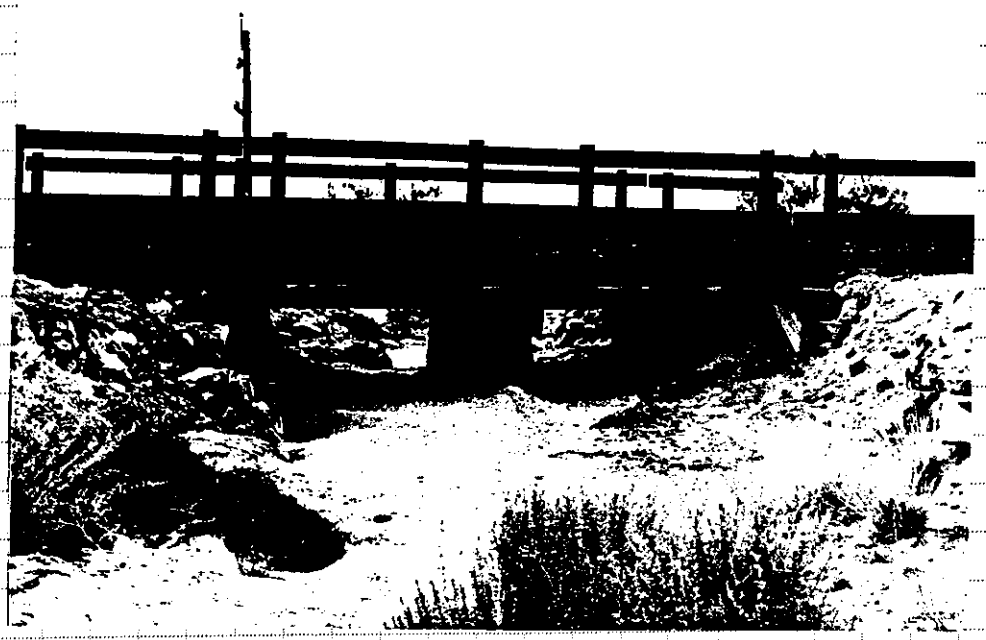
STRUCTURE # 25

MP 28.5

All Timber Bridge







PRODUCT 209-1 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

JOB Waterman Wash

SHEET NO. 26 OF 46

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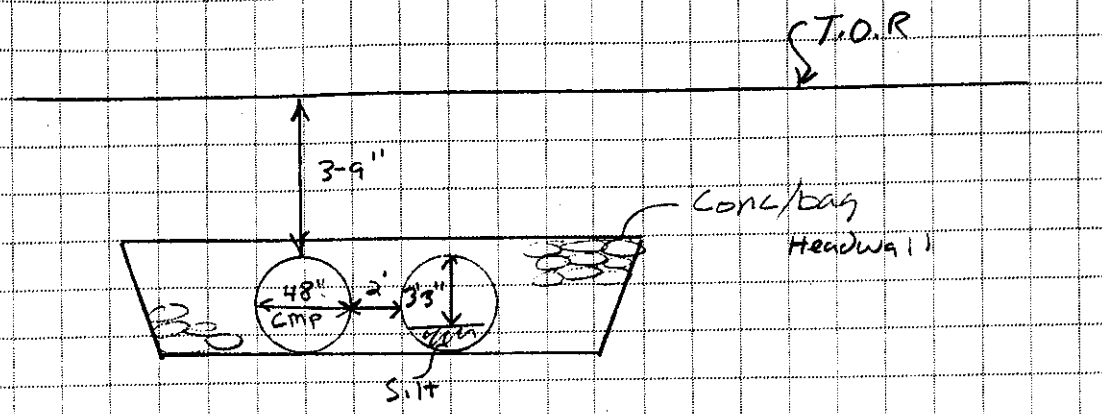
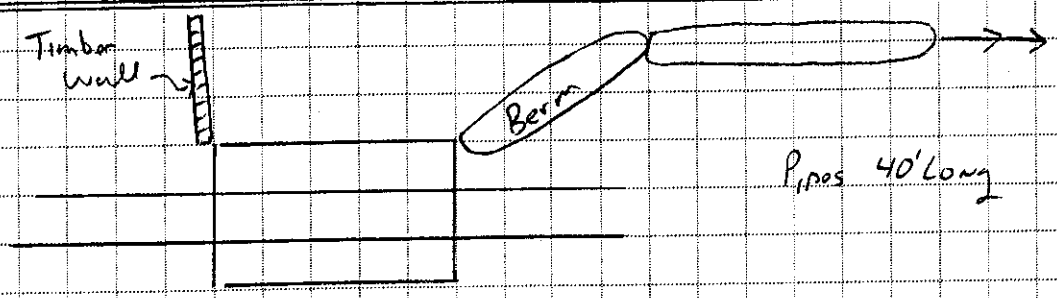
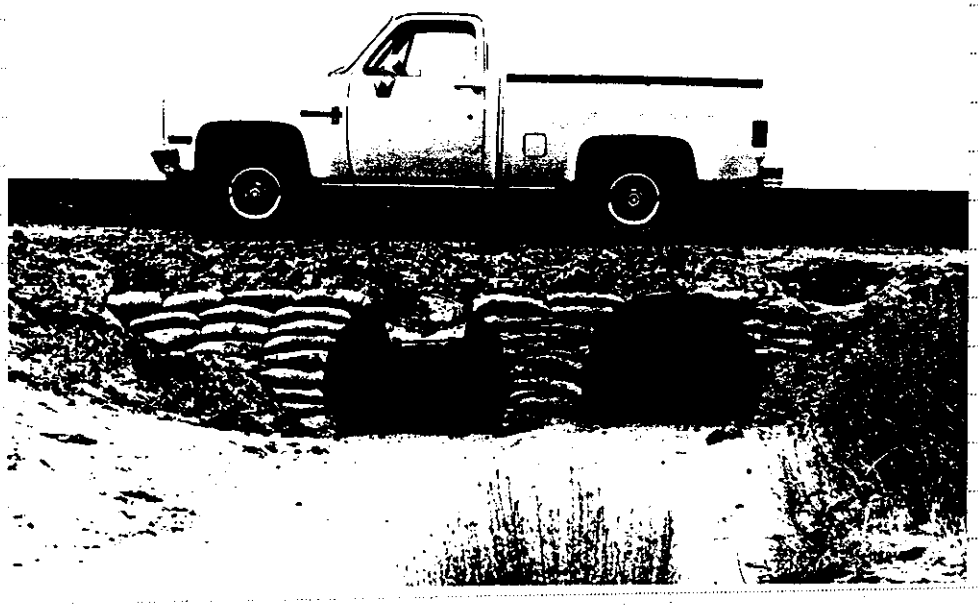
SCALE

STRUCTURE # 26

MP 28.7







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JOB Waterman Wash

SHEET NO. 27 OF 46

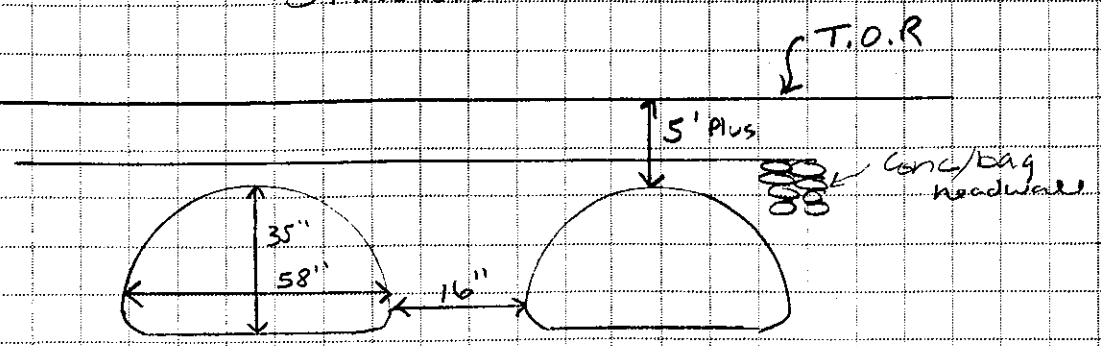
CALCULATED BY DWB/TDC DATE 6/19/89

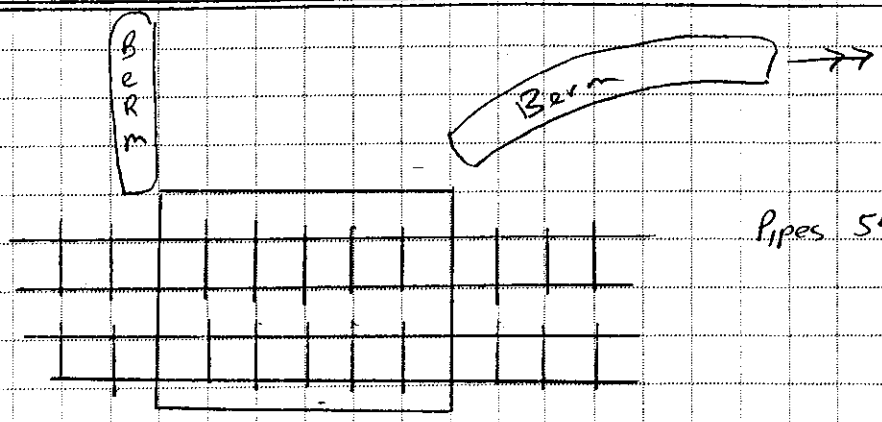
CHECKED BY DATE

SCALE

STRUCTURE # 27

MP 29





PRODUCT 205-1 NEBS Inc Groton Mass 01471 To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB Waterman Wash

SHEET NO. 28 OF 46

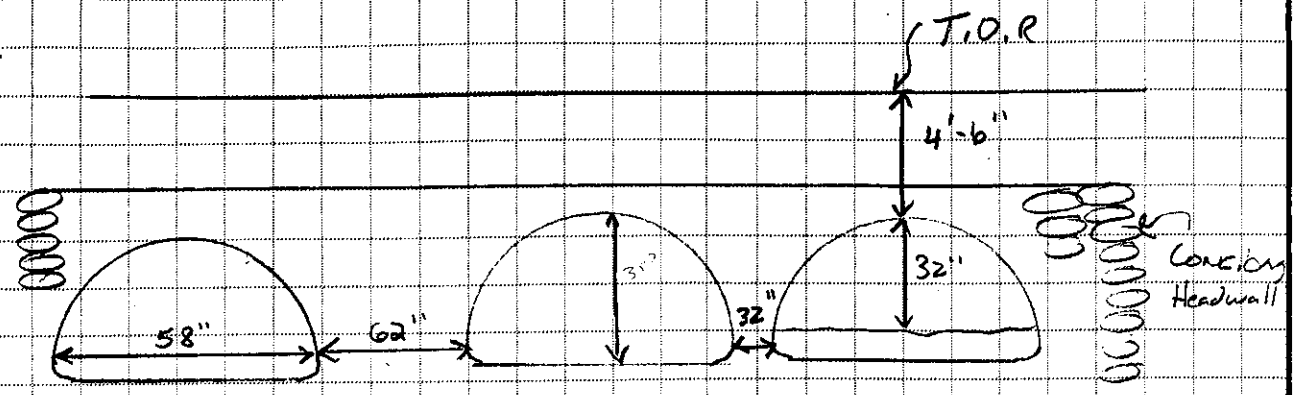
CALCULATED BY DWB/JDC DATE 6/19/89

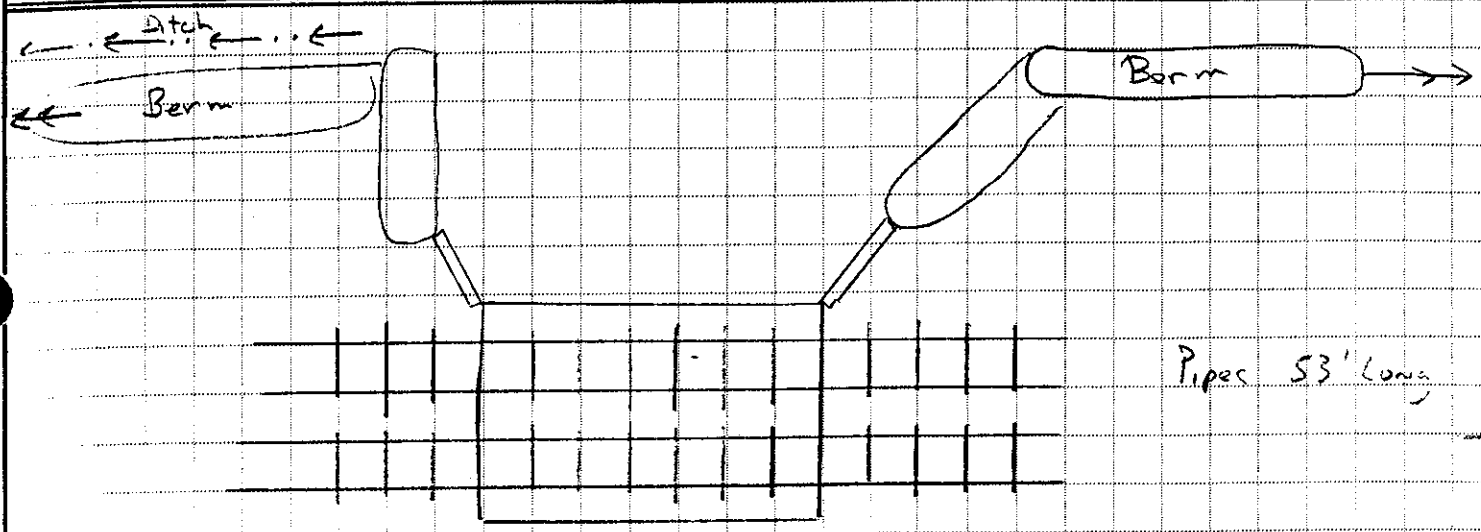
CHECKED BY DATE

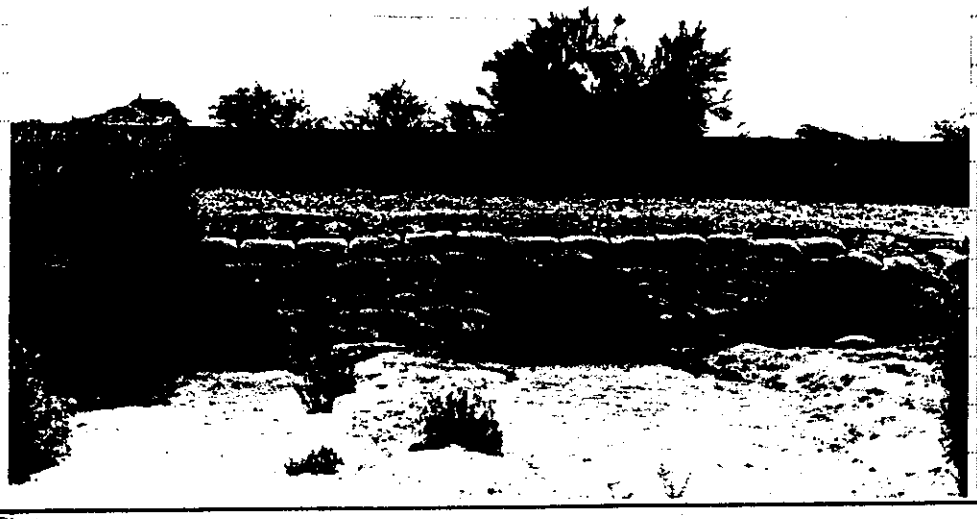
SCALE

STRUCTURE # 28

MP 29.3







NEBS Inc Groton Mass 01471 To Order PHONE TOLL FREE 1-800-225-6380

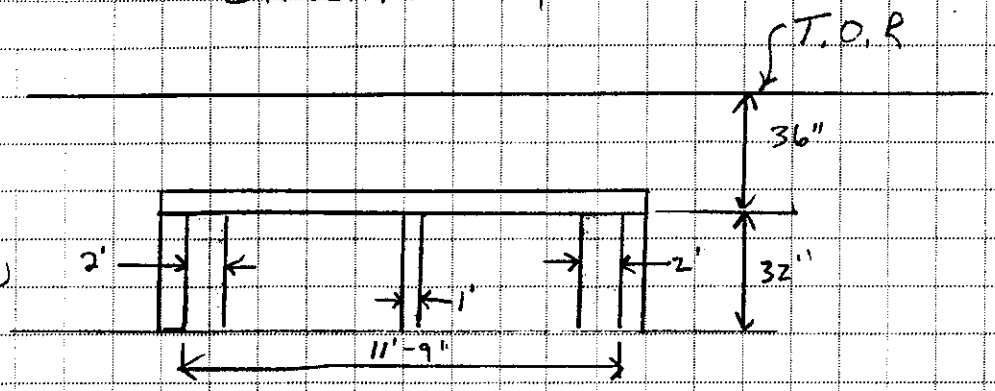
STANLEY

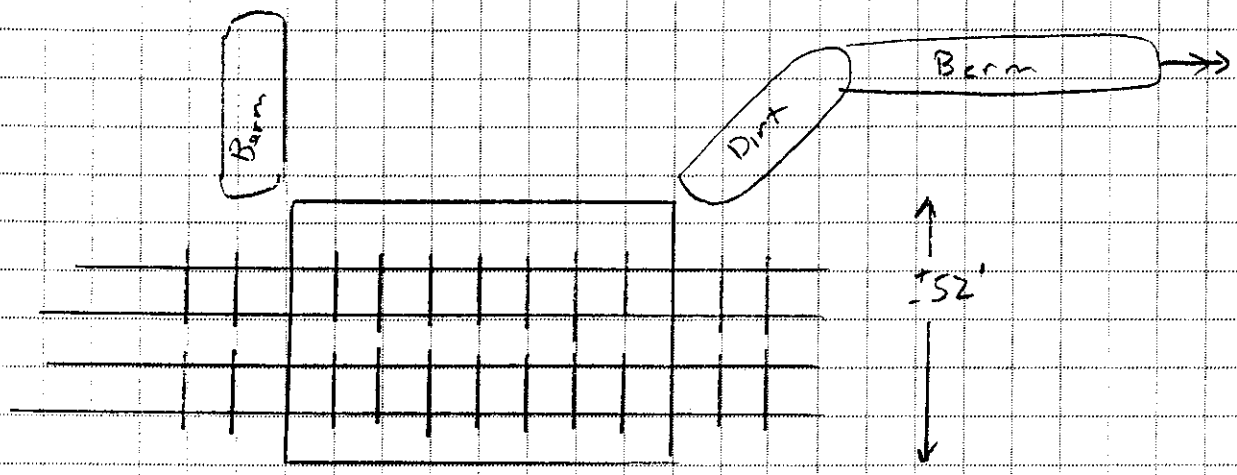
JOB Waterman Wash
SHEET NO. 29 OF 40
CALCULATED BY DWB/TDC DATE 6/19/29
CHECKED BY DATE
SCALE

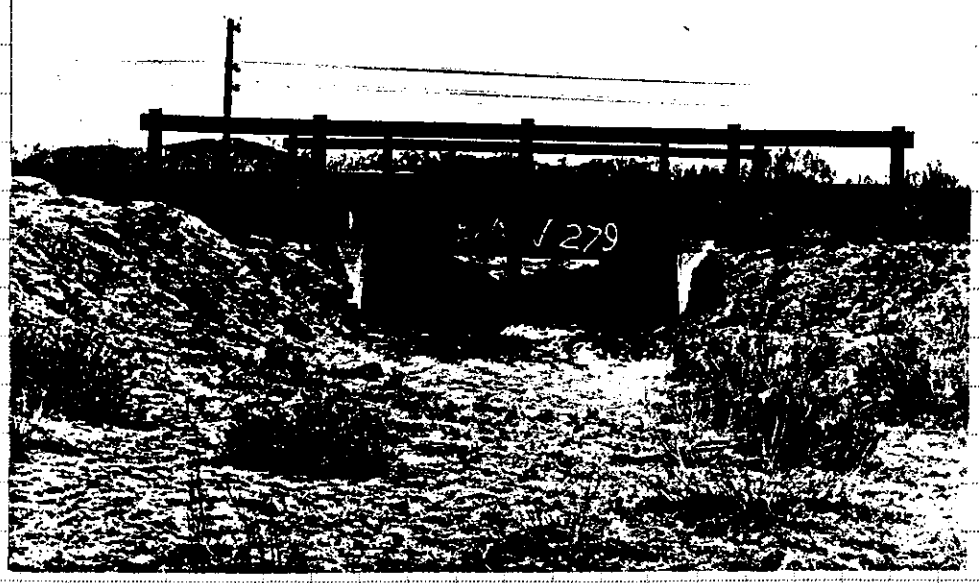
STRUCTURE # 29

MP 29.5

Blue Is Wood
Underpinning Added
For Add. Strength







PRODUCT 205-1 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB Waterman Wash

SHEET NO. 30 OF 46

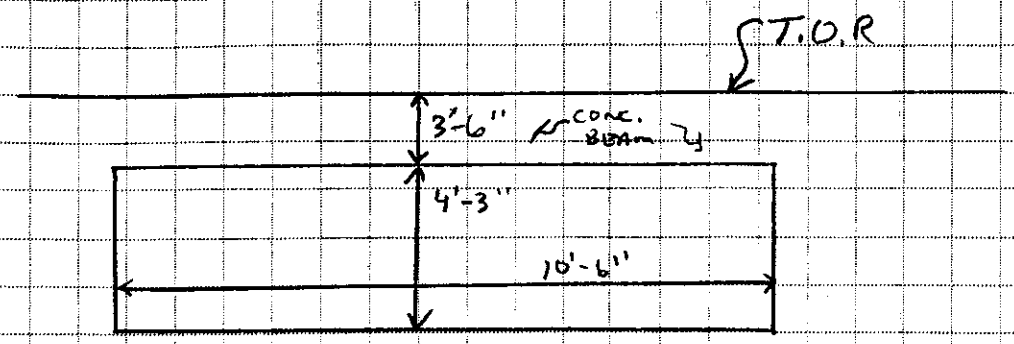
CALCULATED BY DWB/JDC DATE 6/19/89

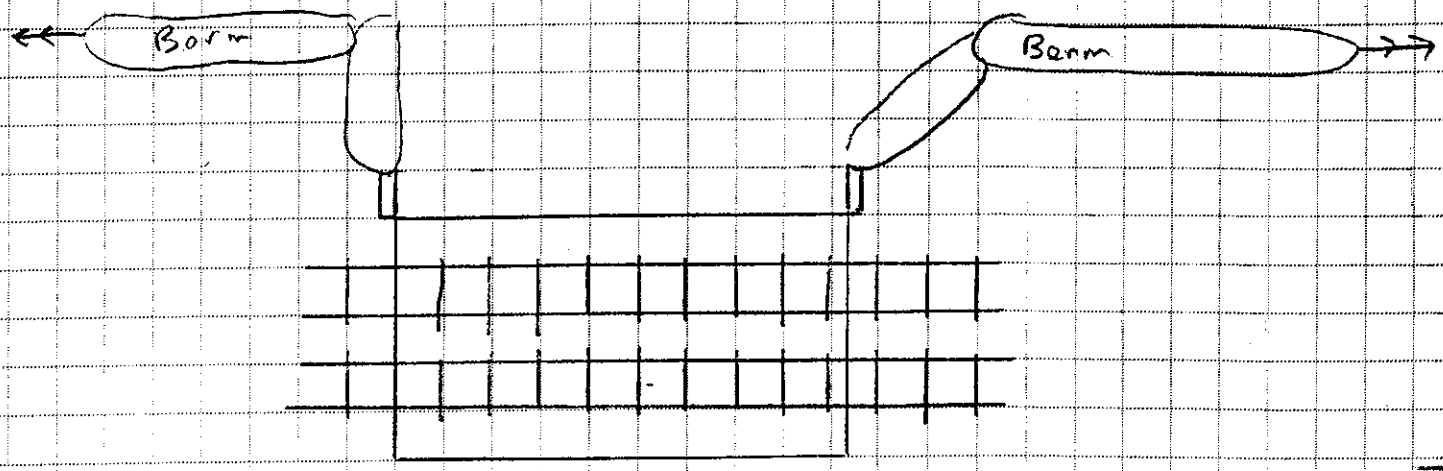
CHECKED BY DATE

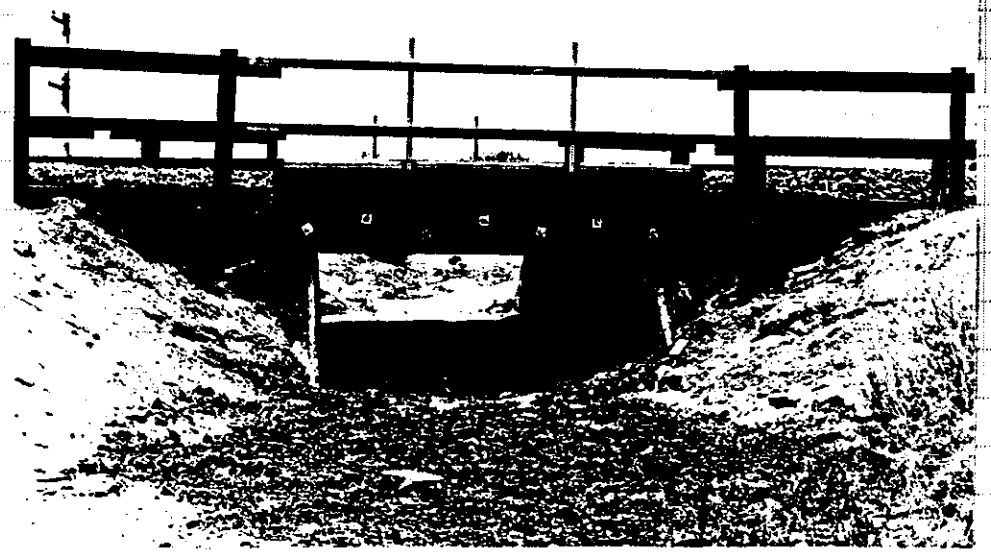
SCALE

STRUCTURE # 30

MP 29.8







PRODUCT 205-1 NEBS 1-800-225-6380

STANLEY

JOB Watrman Wash

SHEET NO. 31 OF 46

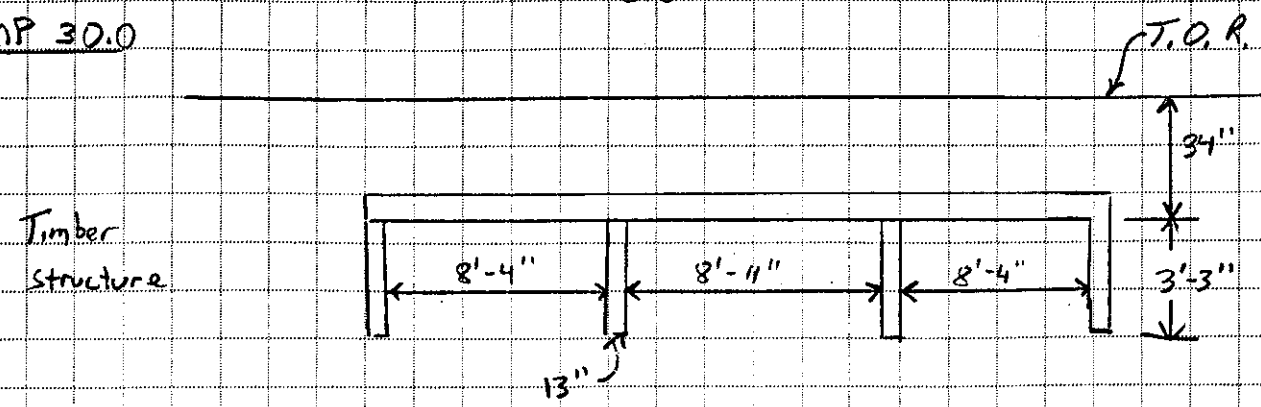
CALCULATED BY DWB/TDC DATE 6/19/89

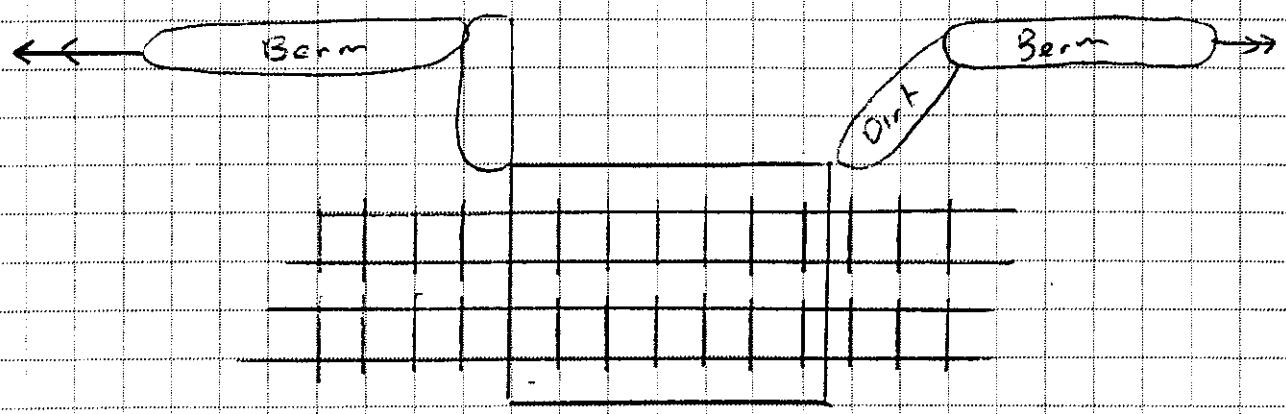
CHECKED BY DATE

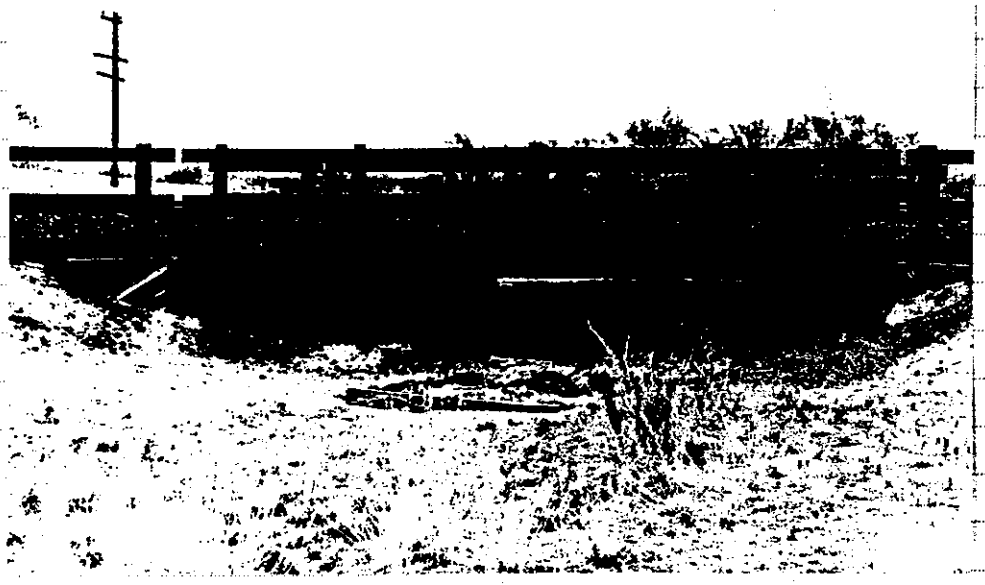
SCALE

STRUCTURE #31

MP 30.0







STANLEY

JOB [illegible]

SHEET NO. 32 OF [illegible]

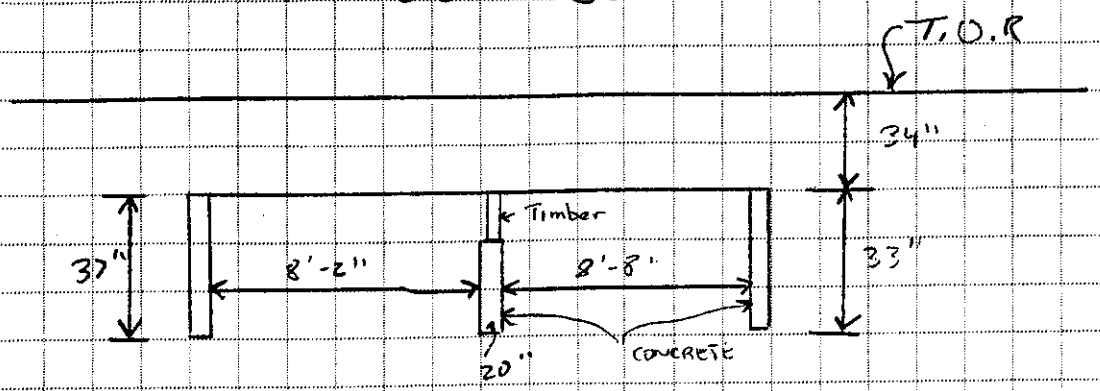
CALCULATED BY DWB/TDC DATE 6/19/89

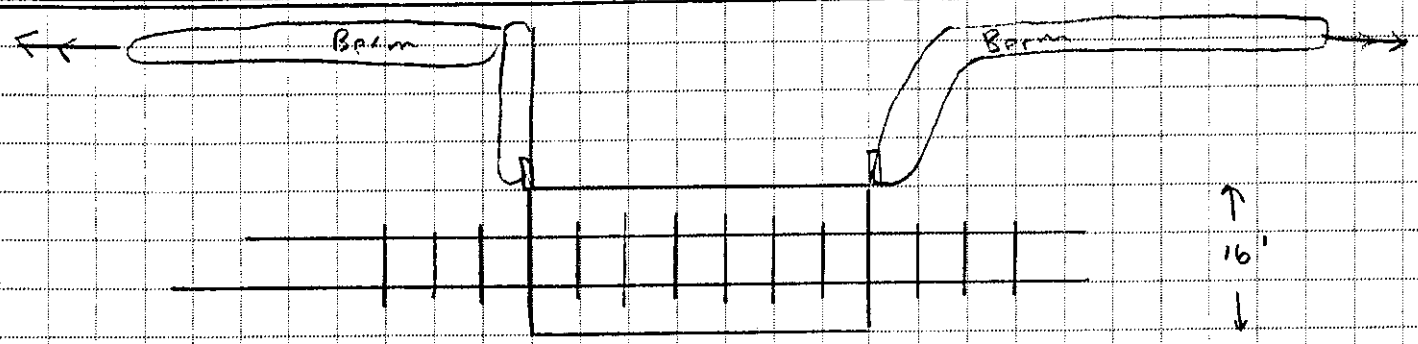
CHECKED BY DATE

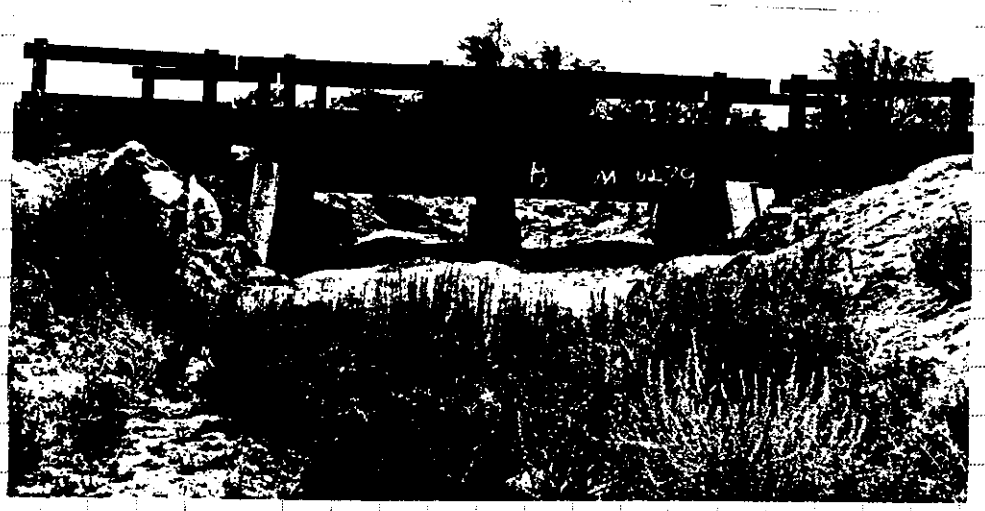
SCALE

STRUCTURE # 32

MP 30.5







PRODUCT 295-1 /MESBEE/ Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB Waterman Wash

SHEET NO. 33 OF

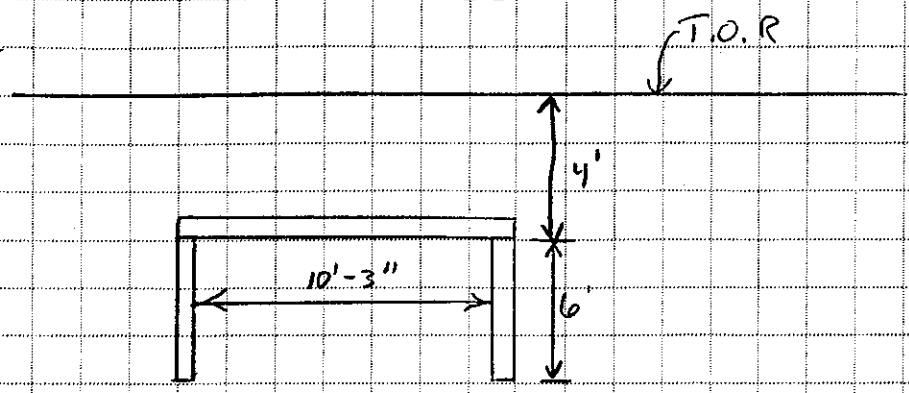
CALCULATED BY DWB/TDC DATE 6/19/89

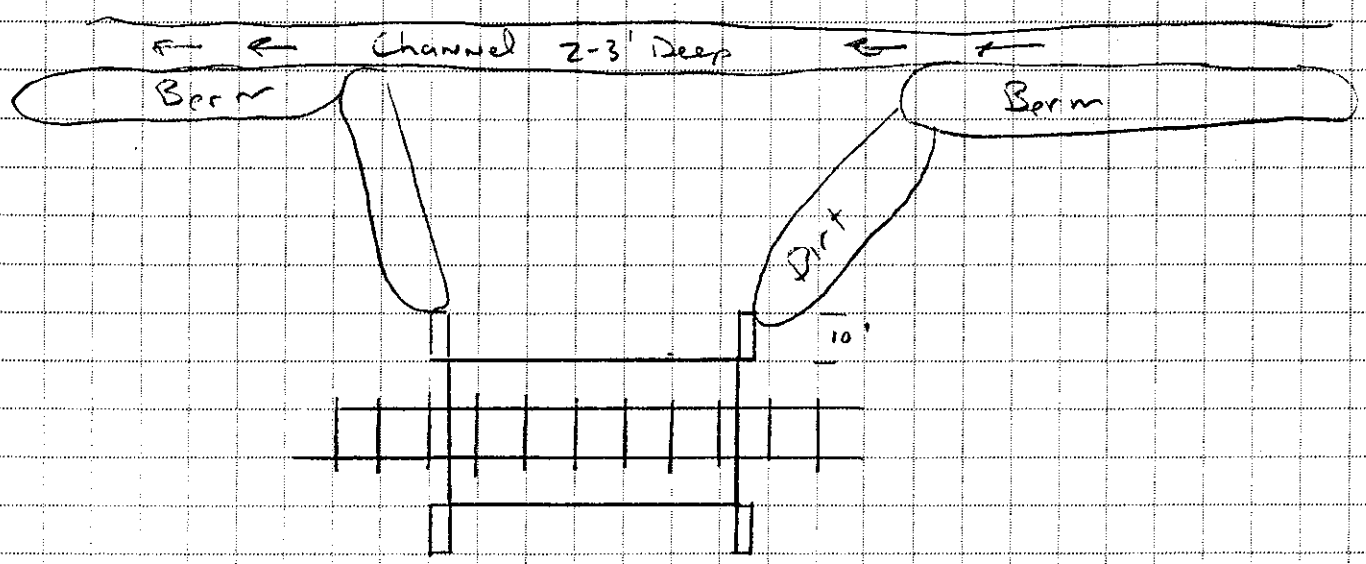
CHECKED BY DATE

SCALE

STRUCTURE # 33

MP 31.0 (-200')





PRODUCT 205-1/ MESSIF Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB Water on Wash

SHEET NO. 34 OF 44

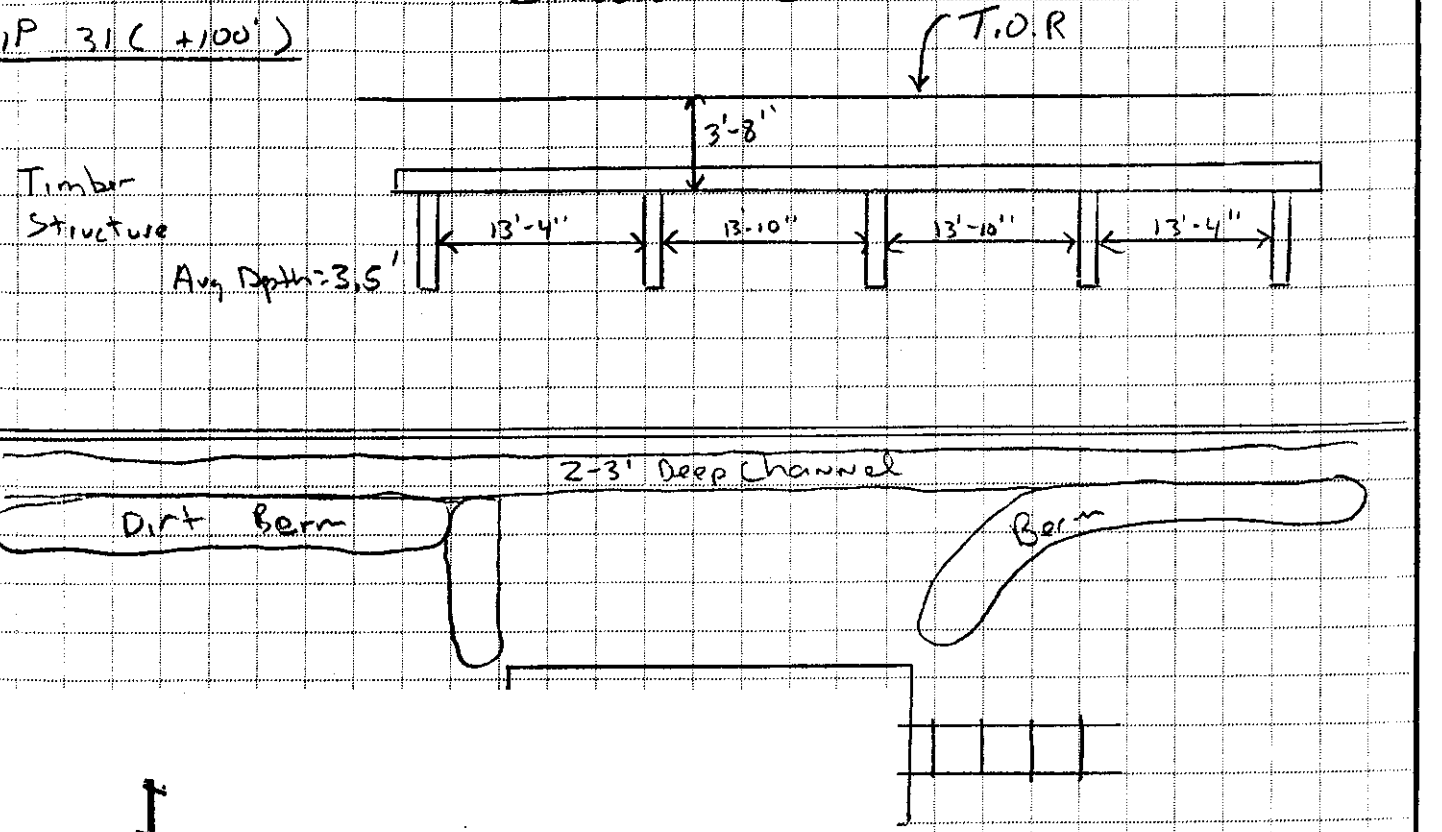
CALCULATED BY DWB / TDC DATE 6/19/09

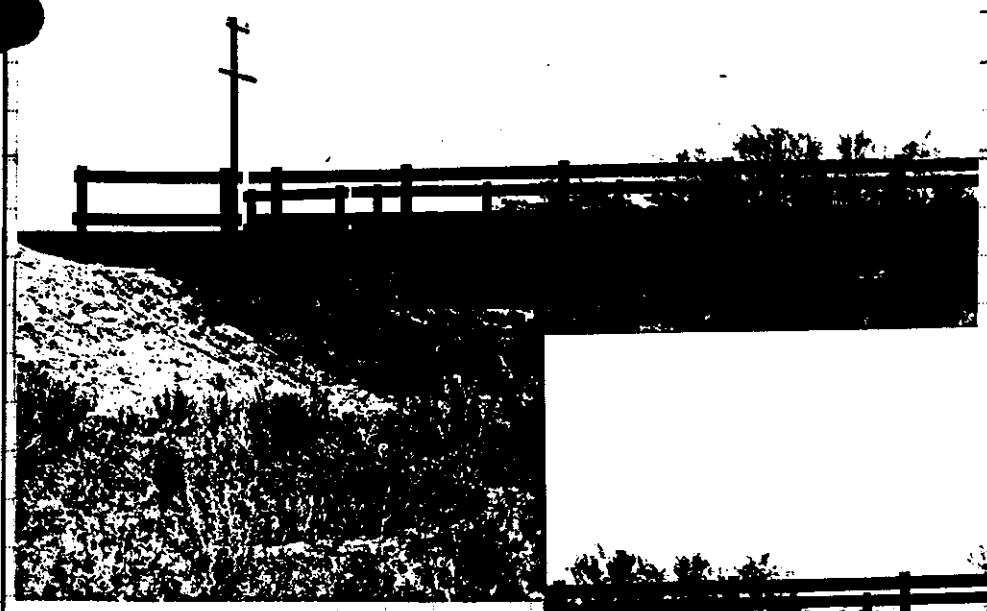
CHECKED BY DATE

SCALE

STRUCTURE # 34

MP 31 (+100')





PRODUCT 205-1/ Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB [illegible]

SHEET NO. 35 OF

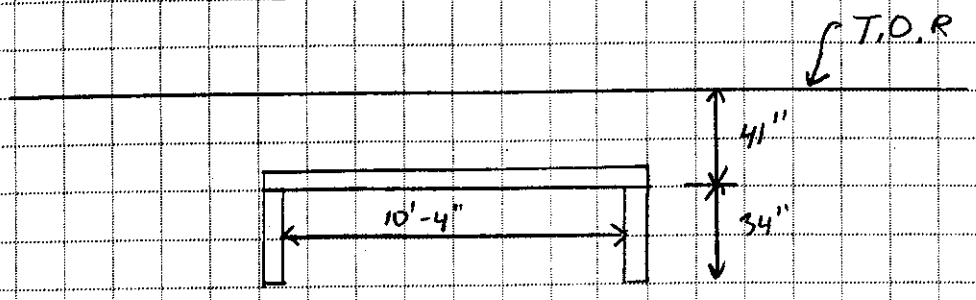
CALCULATED BY DWB/TDC DATE 6/19/89

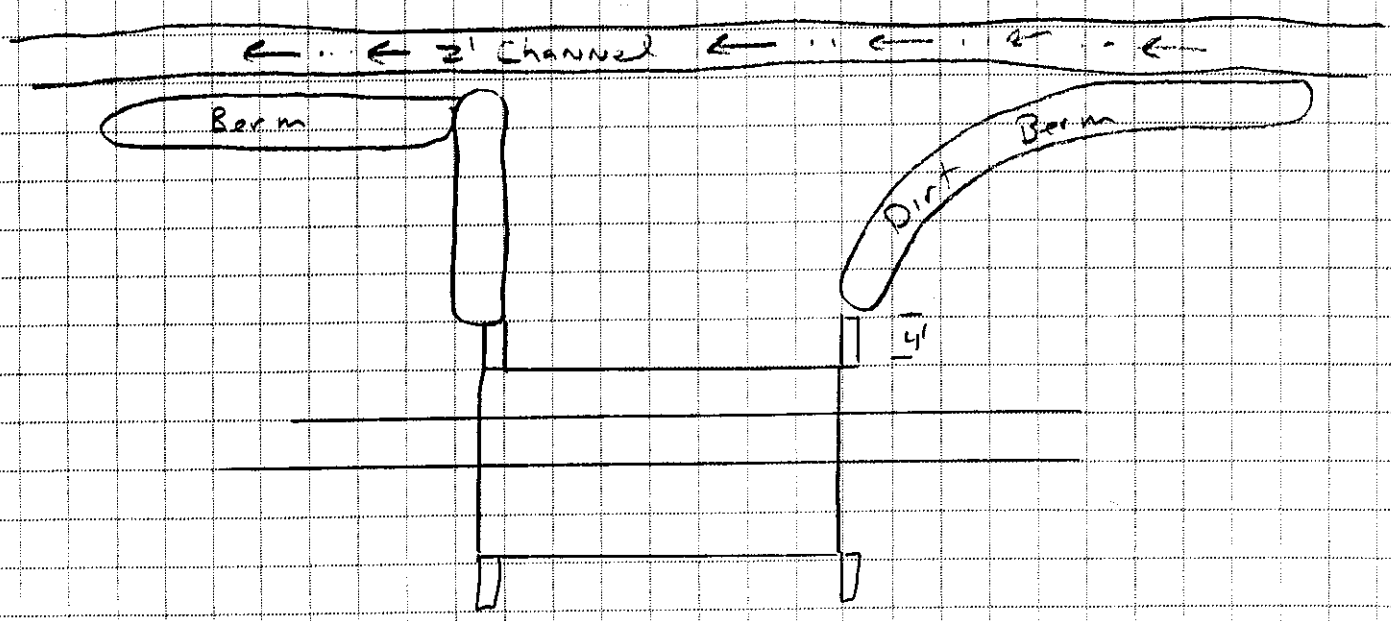
CHECKED BY DATE

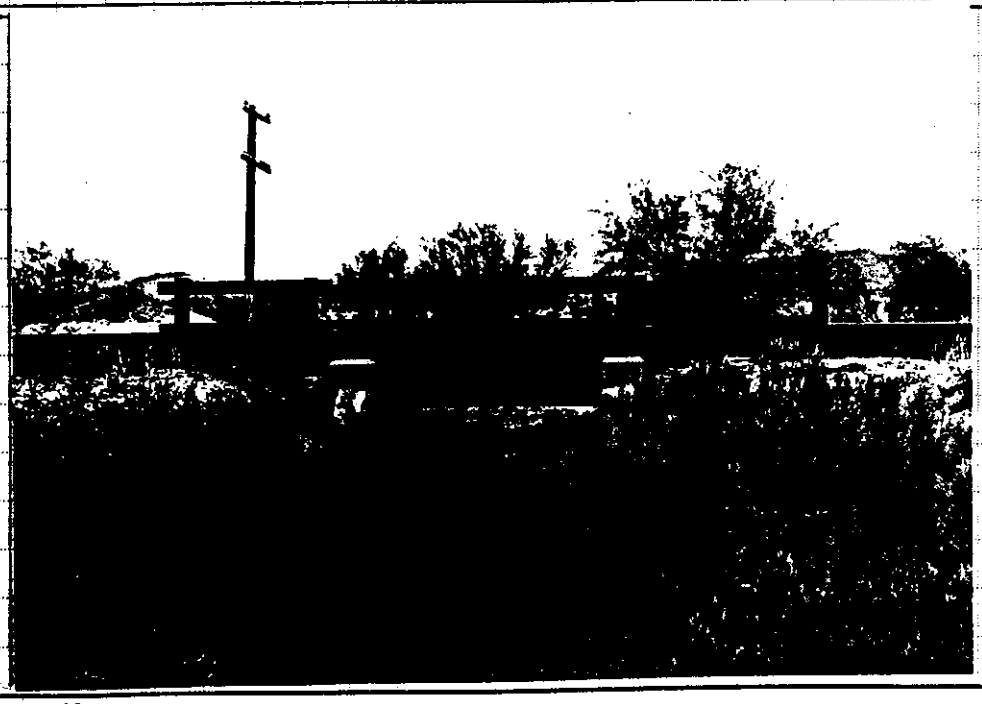
SCALE

STRUCTURE # 35

MP 31.2







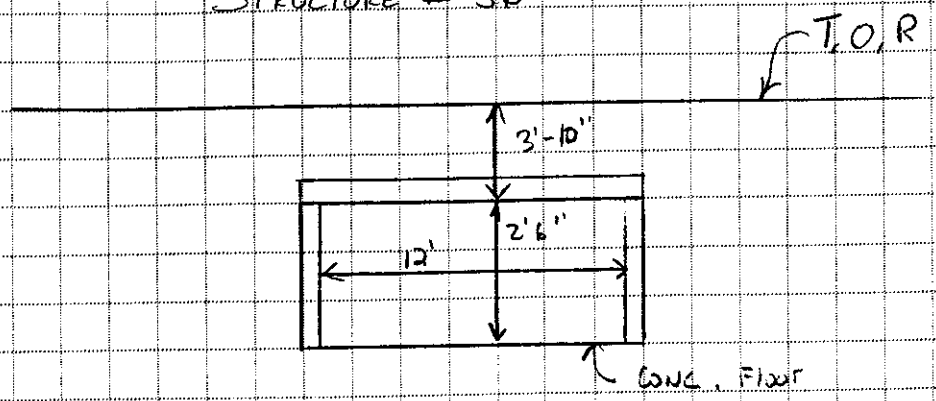
PRODUCT 206-1 AMSBIS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

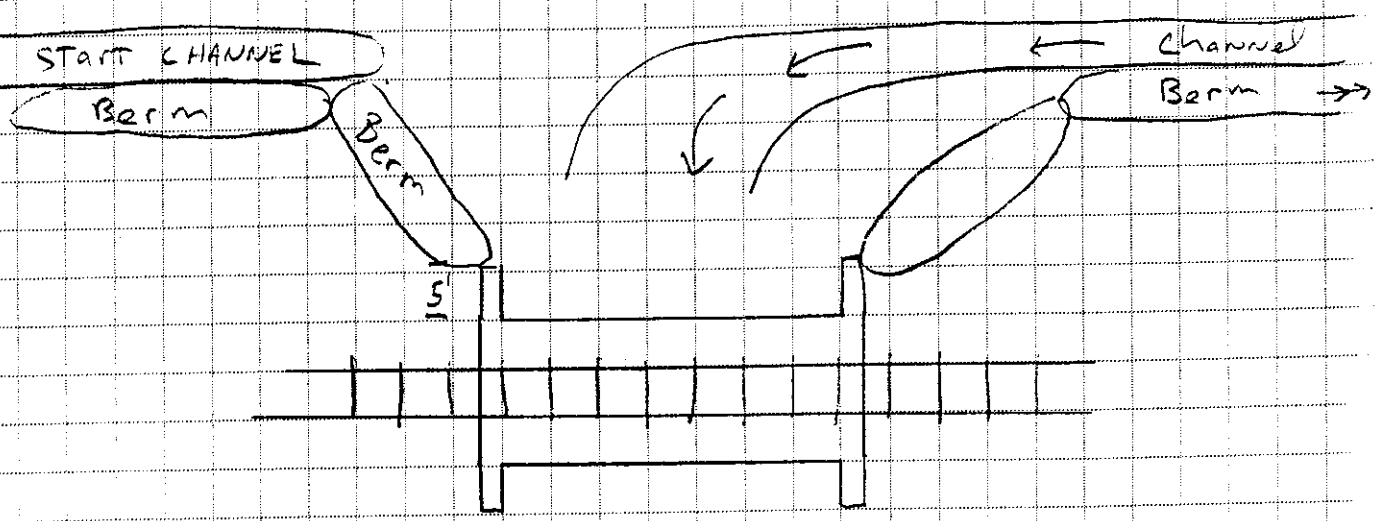
STANLEY

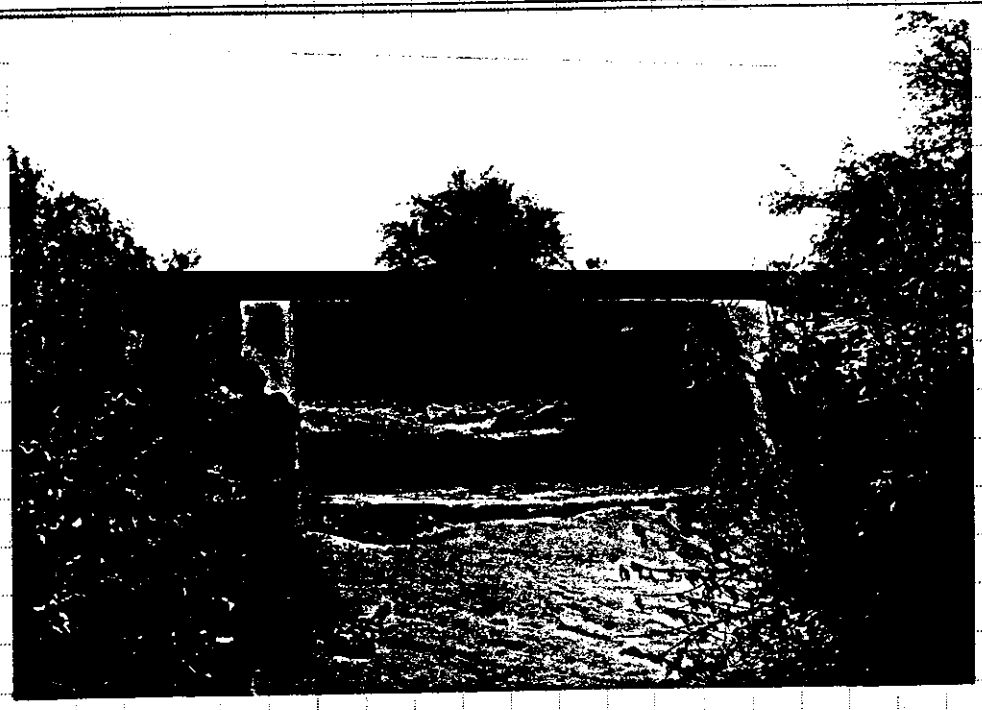
JOB Waterman Wash
SHEET NO. 36 OF 70
CALCULATED BY DWB/TDK DATE 6/19/99
CHECKED BY DATE
SCALE

STRUCTURE # 36

MP 31.5







PRODUCT 205-1 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB Waterman Wa

SHEET NO. 37 OF 46

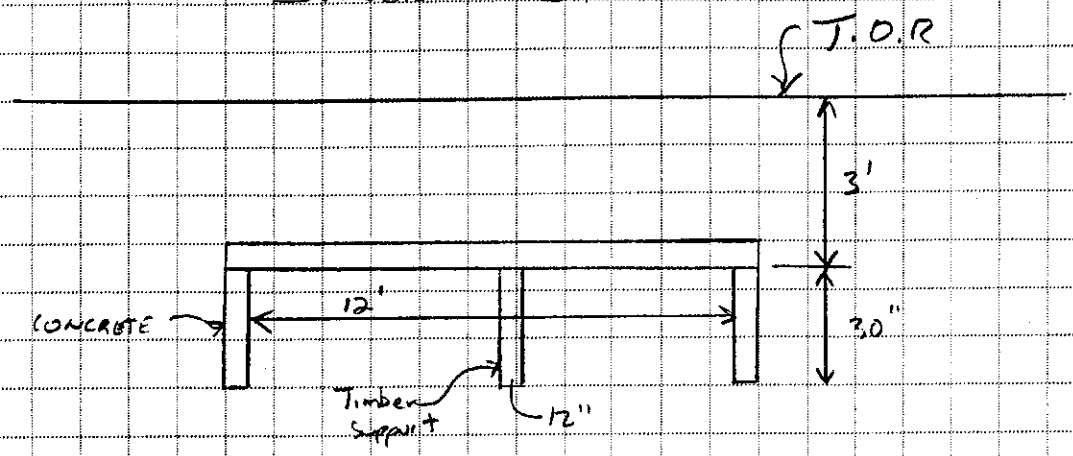
CALCULATED BY DWB/TDC DATE 6/19/29

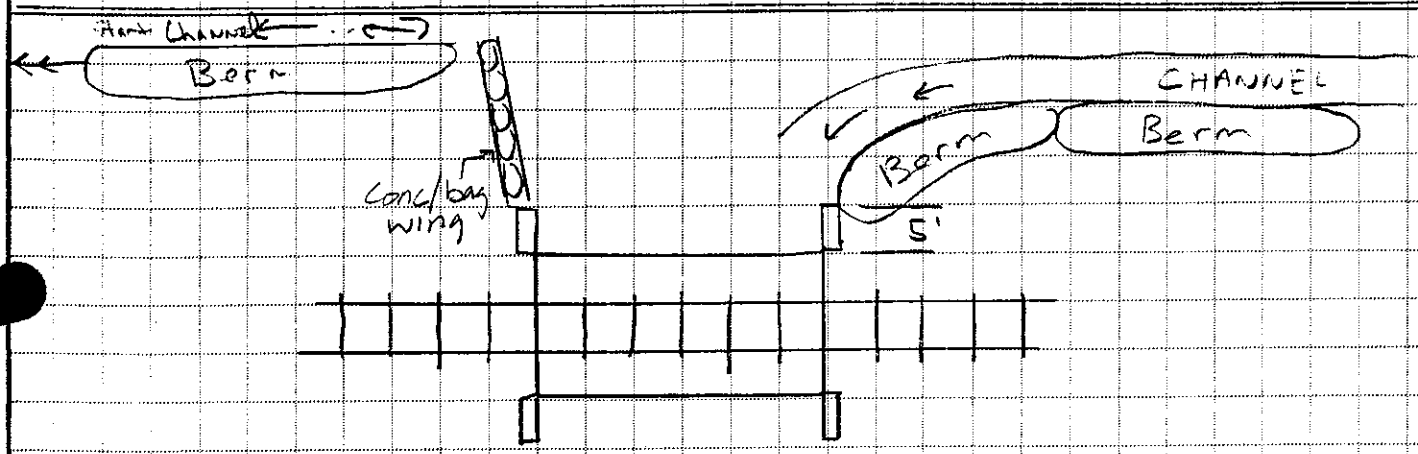
CHECKED BY DATE

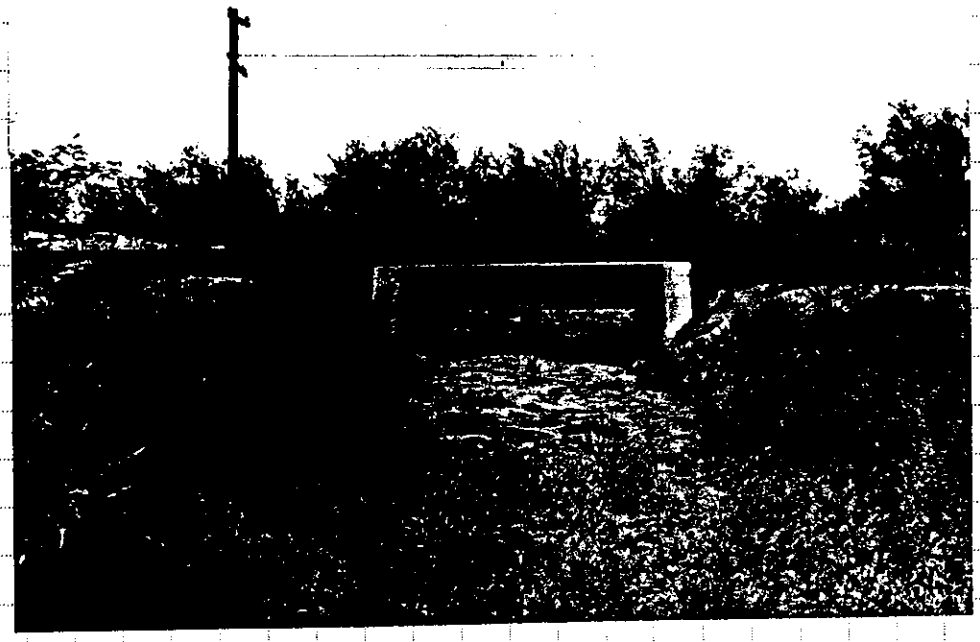
SCALE

STRUCTURE # 37

MP 31.8







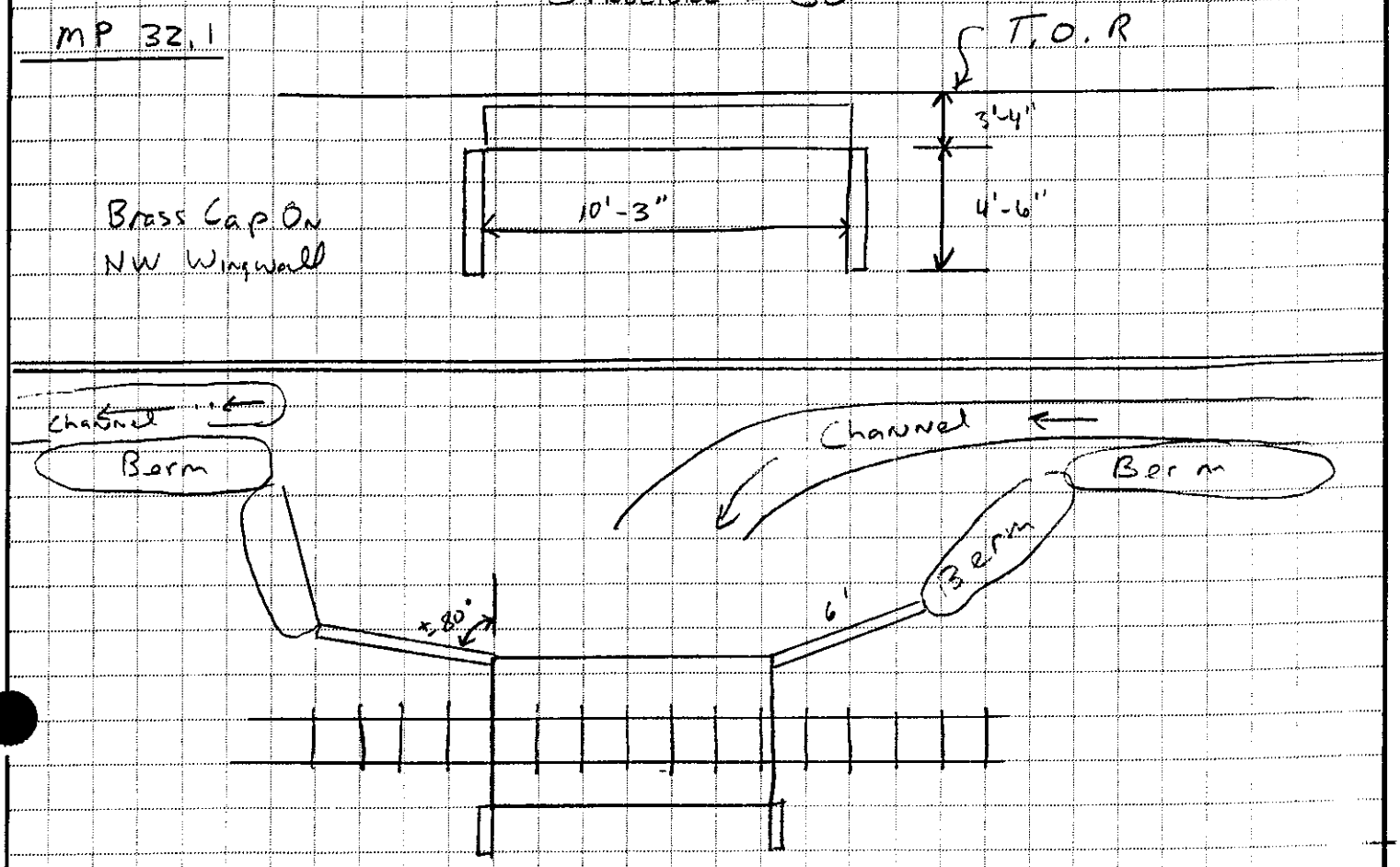
PRODUCT 205-1, NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

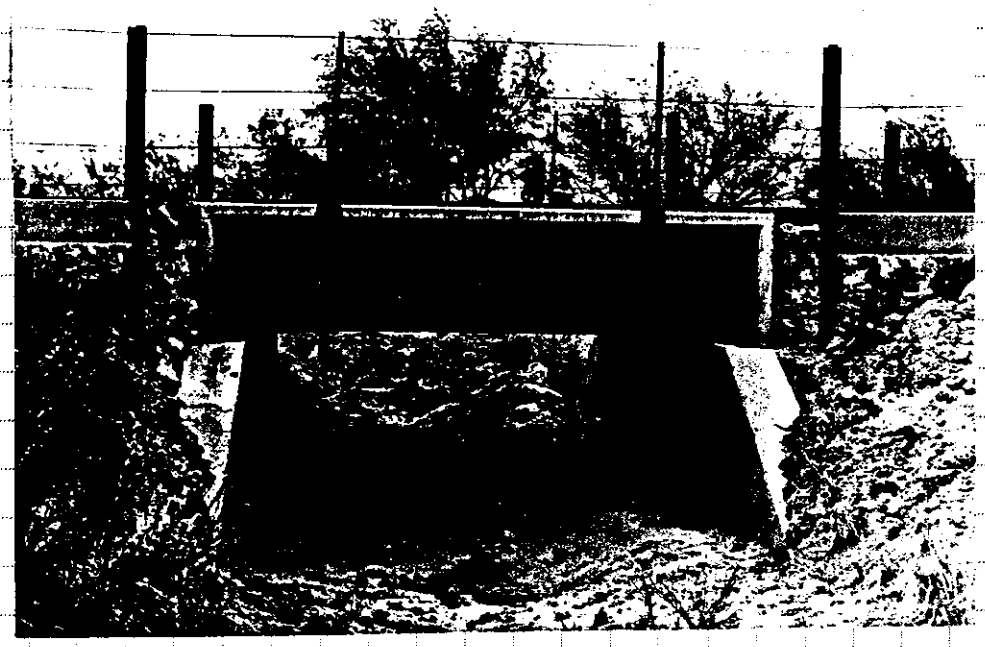
STANLEY

JOB Waterman Wash
SHEET NO. 38 OF 416
CALCULATED BY DWB/TDC DATE 6/19/89
CHECKED BY DATE
SCALE

STRUCTURE # 38

MP 32.1





PRODUCT 205-1 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

JOB

SHEET NO. 61 OF 90

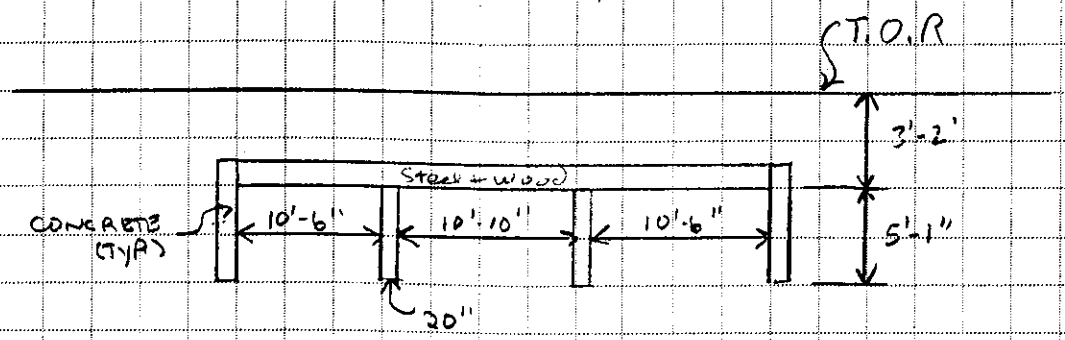
CALCULATED BY DWB/TDL DATE 6/19/99

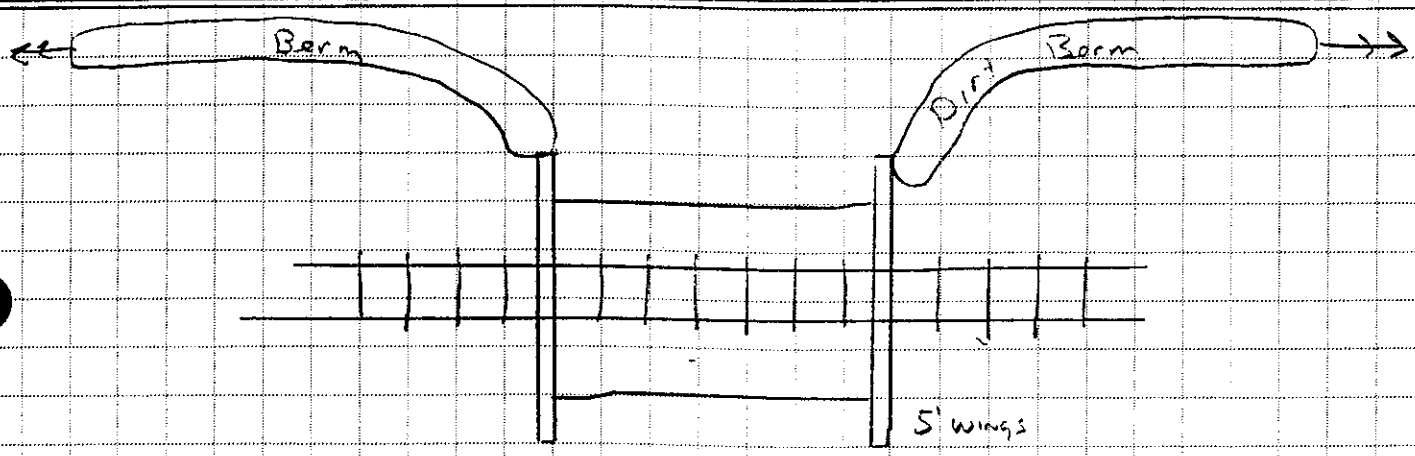
CHECKED BY DATE

SCALE

STRUCTURE # 39

MP 32.3





PRODUCT 205-1 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB Waterman Nash

SHEET NO. 40 OF 40

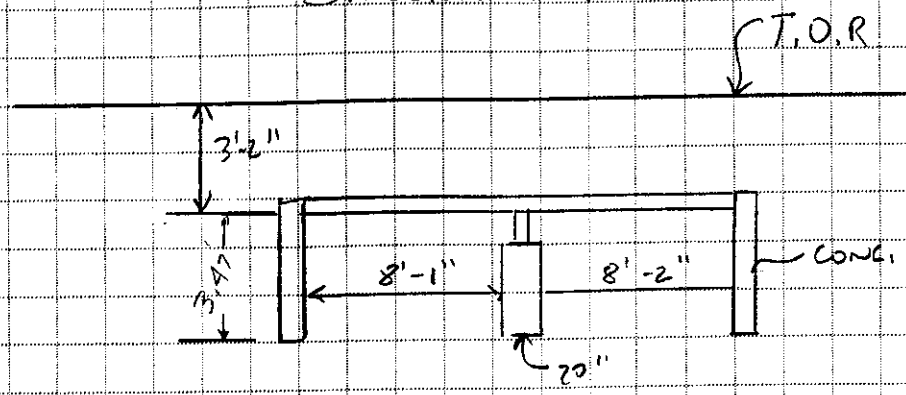
CALCULATED BY DWB/JDC DATE 6/19/2

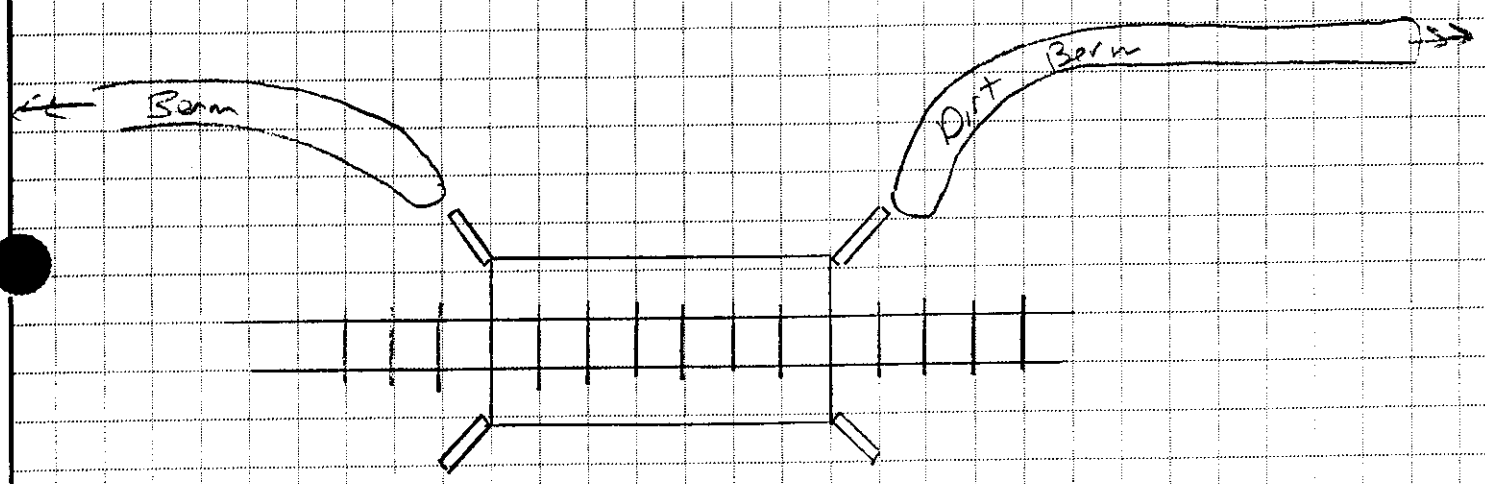
CHECKED BY DATE

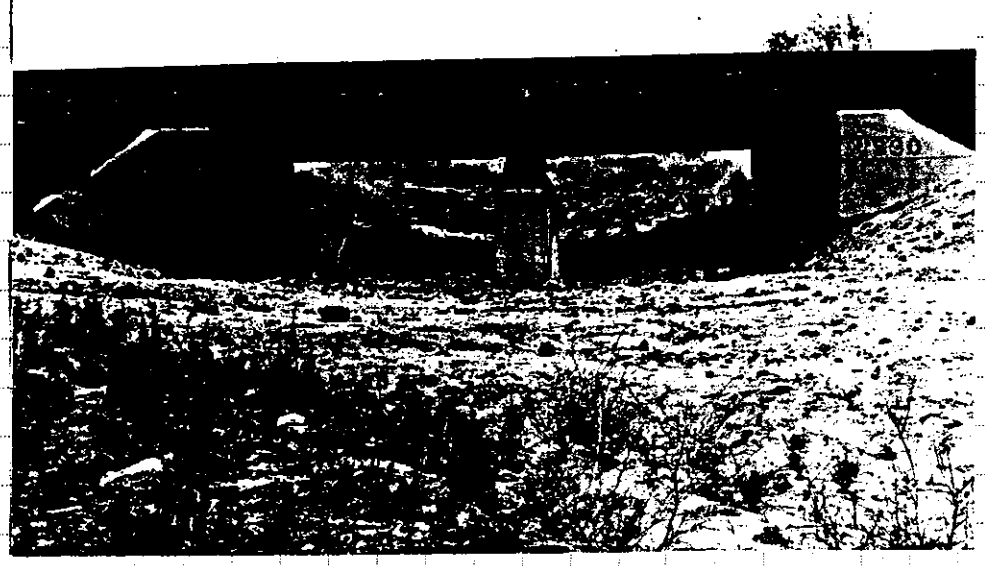
SCALE

STRUCTURE # 40

MP 32.4







PRODUCT 205-1 / NEBS / Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

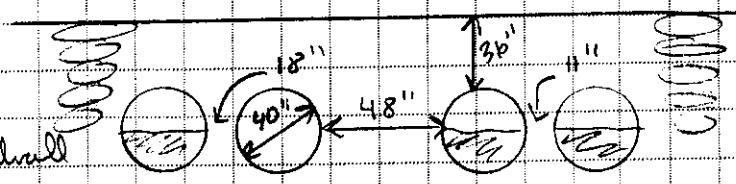
STANLEY

JOB Water vs Wash
SHEET NO. 41 OF 110
CALCULATED BY DWB/TDC DATE 6/19/89
CHECKED BY DATE
SCALE

STRUCTURE # 41

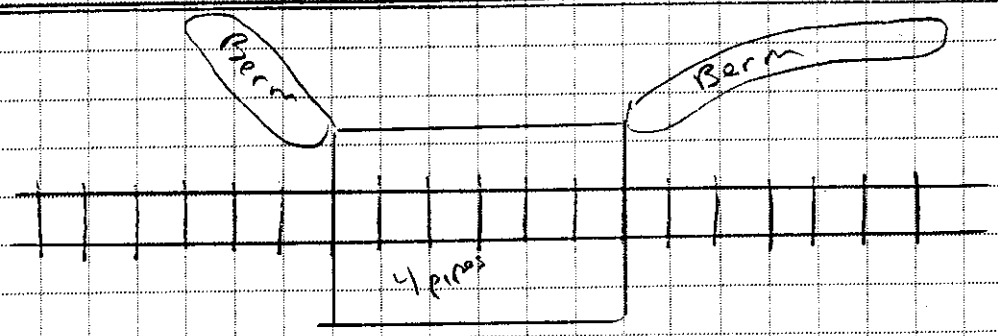
MP 32.7

T.O.R



Upstream has conc/bag headwall
No wings, no headwall downstream

3 pipes half silted
4 Steel Pipes
40' Long



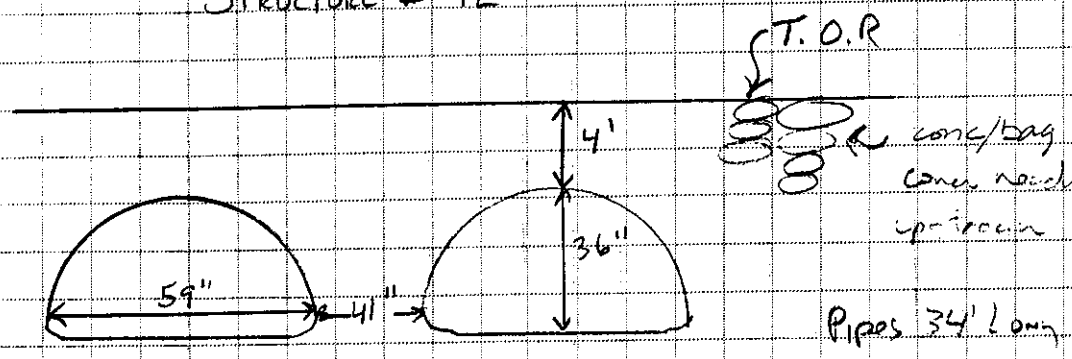
PRODUCT 205-1 ACCO Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

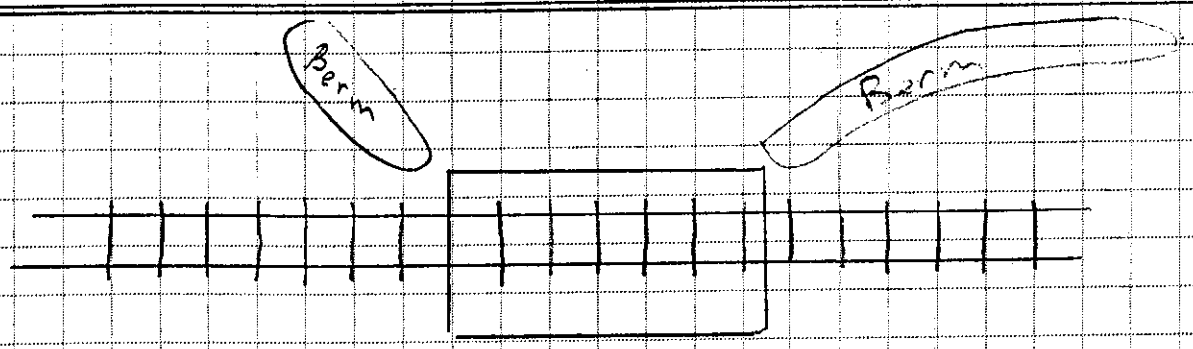
STANLEY

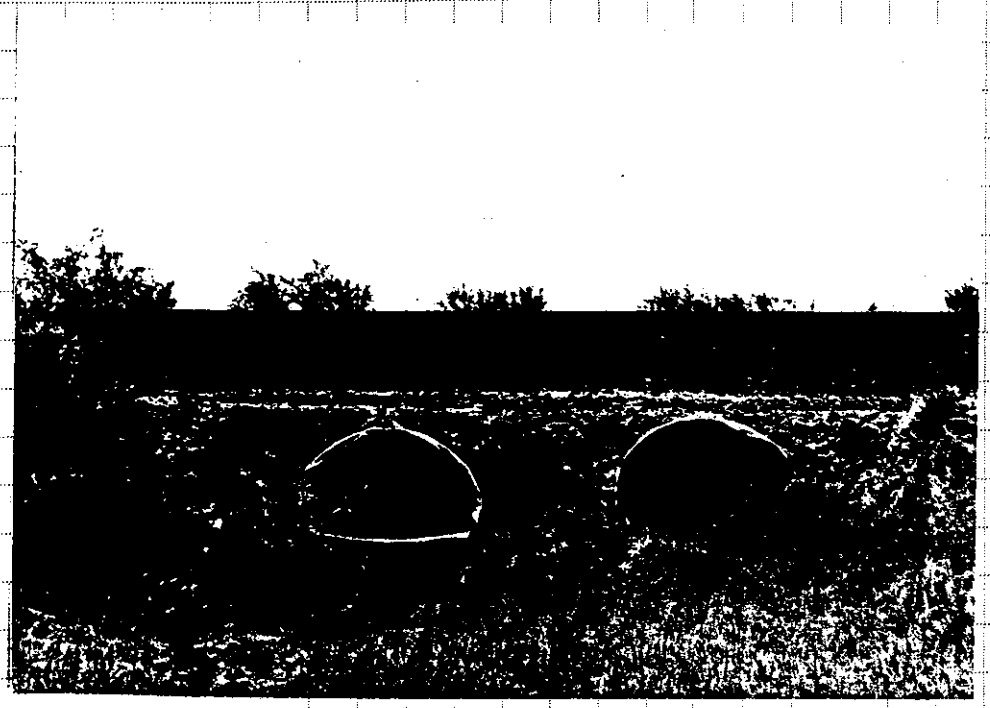
JOB Watermill
SHEET NO. 42 OF 46
CALCULATED BY DWB / TDC DATE
CHECKED BY DATE
SCALE

STRUCTURE # 42

MP 33.1







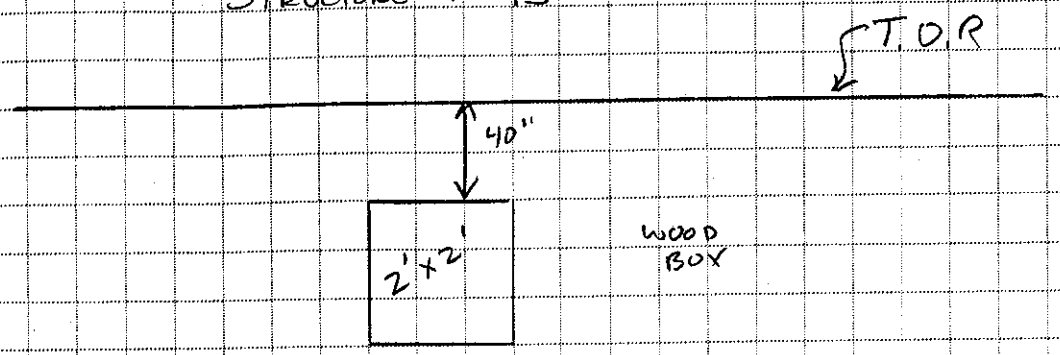
PRODUCT 205-1 NEBS Inc., Groton, Mass. 01471. To Order-PHONE TOLL FREE 1-800-225-6380

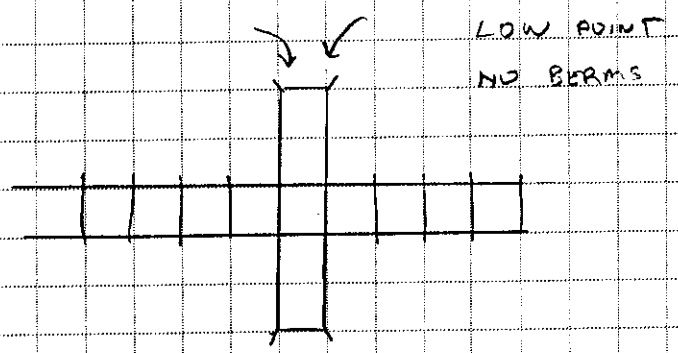
STANLEY

JOB Waterman Wash
SHEET NO. 43 OF 46
CALCULATED BY DWB/TDC DATE 6/19/99
CHECKED BY DATE
SCALE

STRUCTURE # 43

MP 33.3





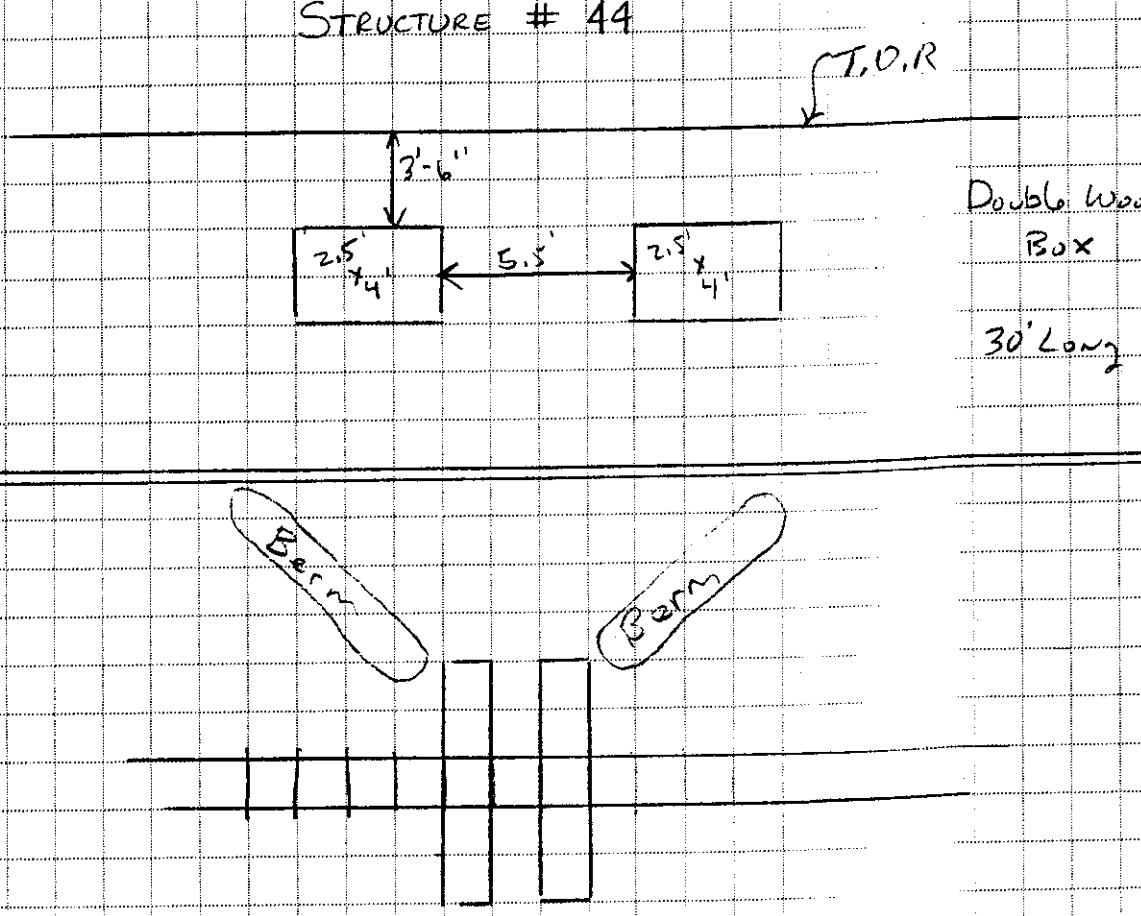
PRODUCT 205-1 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

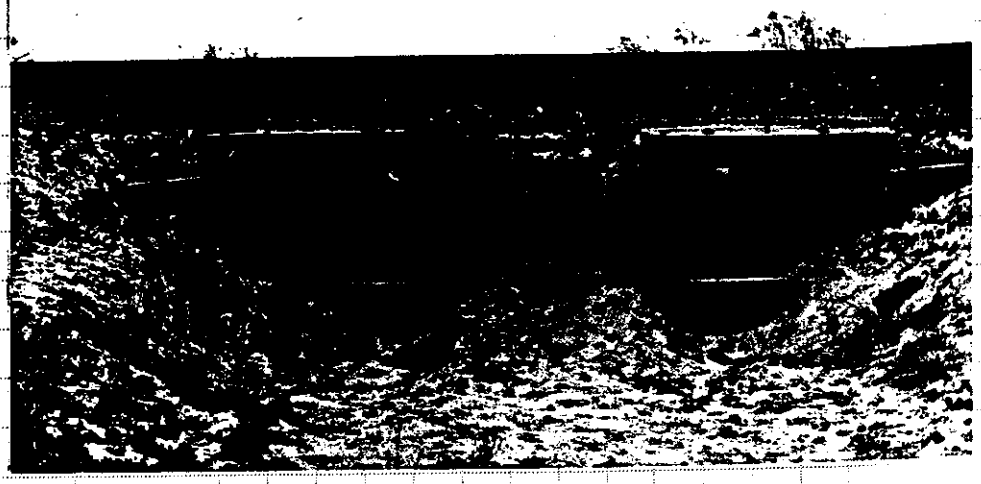
STANLEY

JOB Waterman Nash
SHEET NO. 44 OF 46
CALCULATED BY DWB/TOC DATE 6/19/89
CHECKED BY DATE
SCALE

STRUCTURE # 44

MP 33.4





PRODUCT 206-1 / NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB Waterman Wash

SHEET NO. 46 OF 46

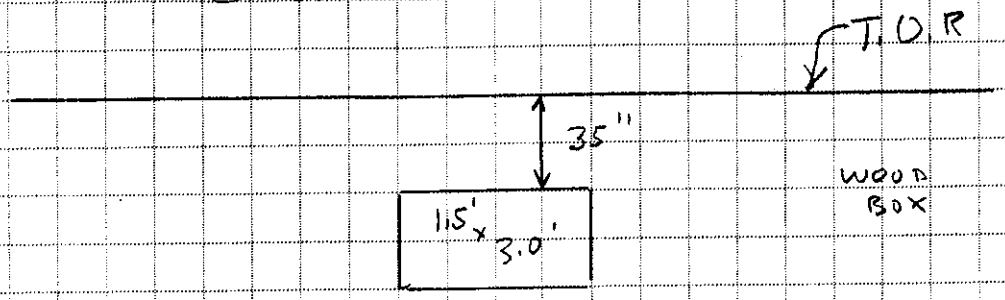
CALCULATED BY DWB / TDC DATE 6/19/89

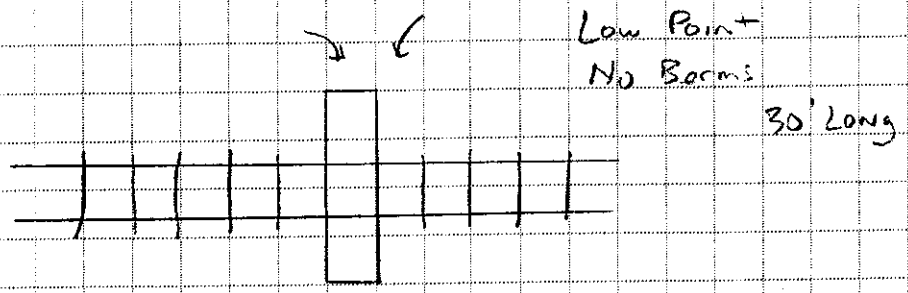
CHECKED BY DATE

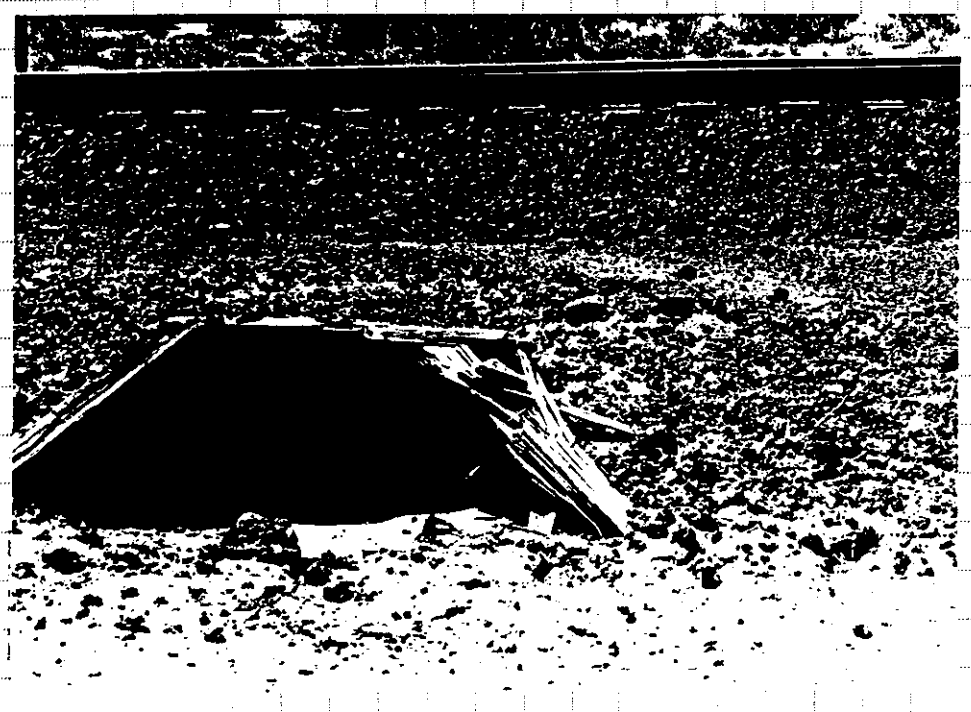
SCALE

STRUCTURE # 45

MP 33.7







PRODUCT 205-1 NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB Waterman Ward

SHEET NO. 46 OF

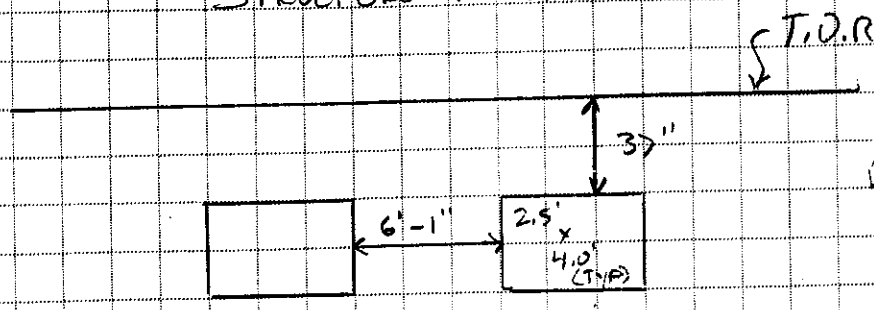
CALCULATED BY DWB / TDC DATE 6/19/87

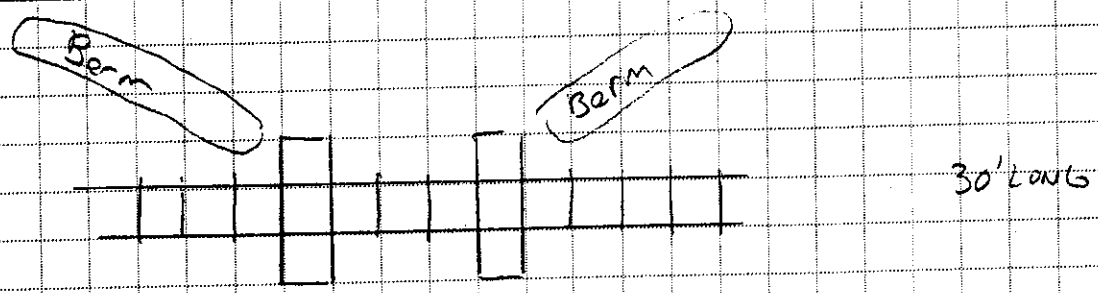
CHECKED BY DATE

SCALE

STRUCTURE # 46

MP 33.8





PRODUCT 205-1 / NEBS Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

STANLEY

JOB Waterman [illegible]

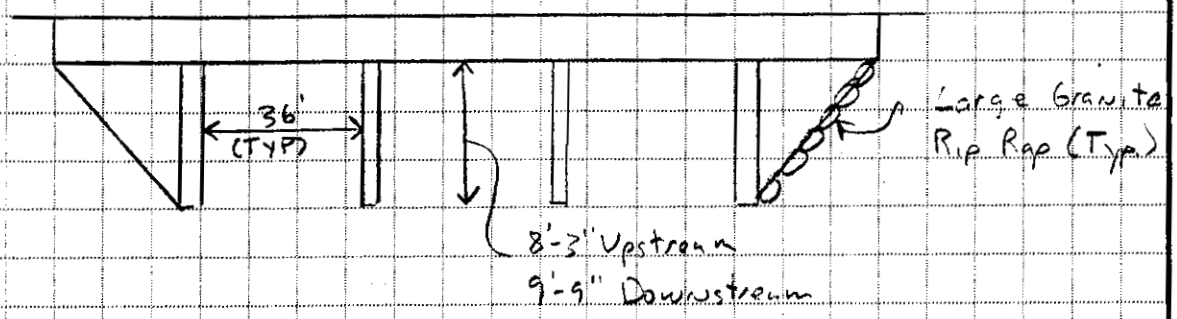
SHEET NO. 1 OF 1

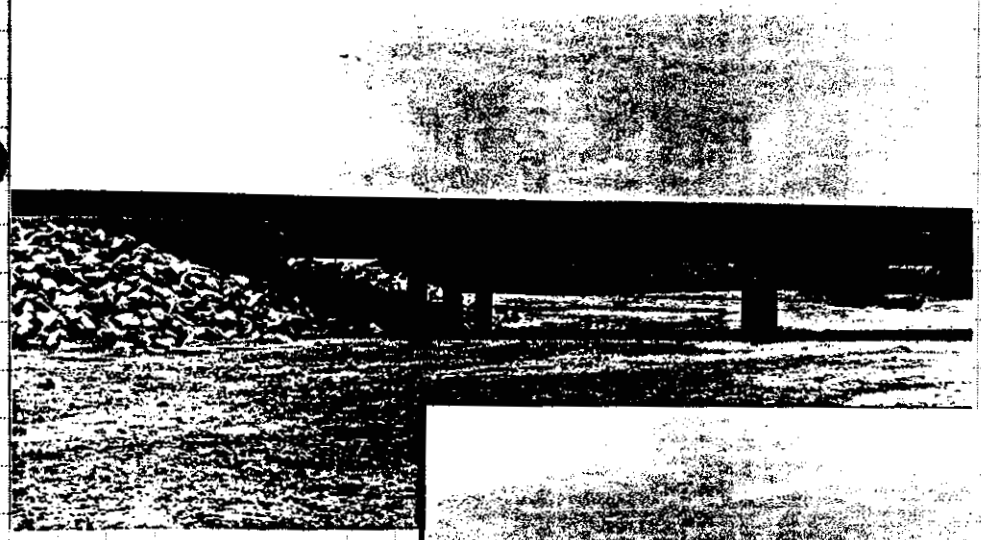
CALCULATED BY DWB / TDL DATE 6/19/89

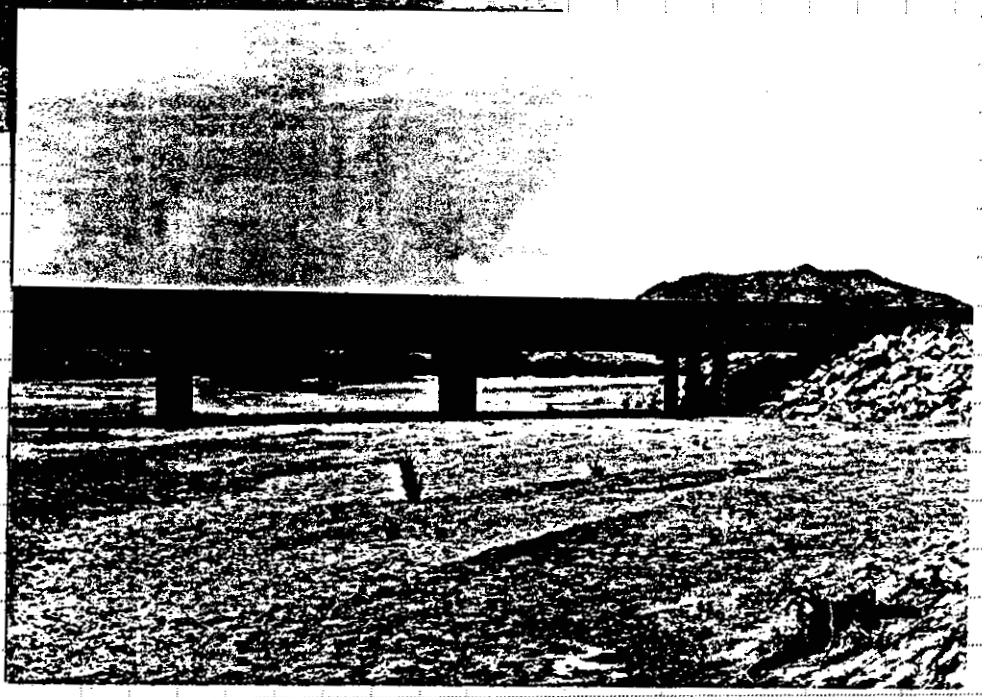
CHECKED BY DATE

SCALE

MP 25 Highway Bridge







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APPENDIX E

U.S. GEOLOGICAL SURVEY DISCHARGE FREQUENCY ANALYSIS

(EXCERPTS FROM REFERENCES 10 AND 11)

BASIN CHARACTERISTICS AND STREAMFLOW STATISTICS IN ARIZONA AS OF 1989

FLOOD CONTROL DISTRICT
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REMARKS

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 91–4041

Prepared in cooperation with the
ARIZONA DEPARTMENT OF WATER RESOURCES and
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

U.S. DEPARTMENT OF THE INTERIOR
MANUEL LUJAN, Jr., Secretary

U.S. GEOLOGICAL SURVEY
Dallas L. Peck, Director

For additional information
write to:

District Chief
U.S. Geological Survey
375 South Euclid Avenue
Tucson, Arizona 85719

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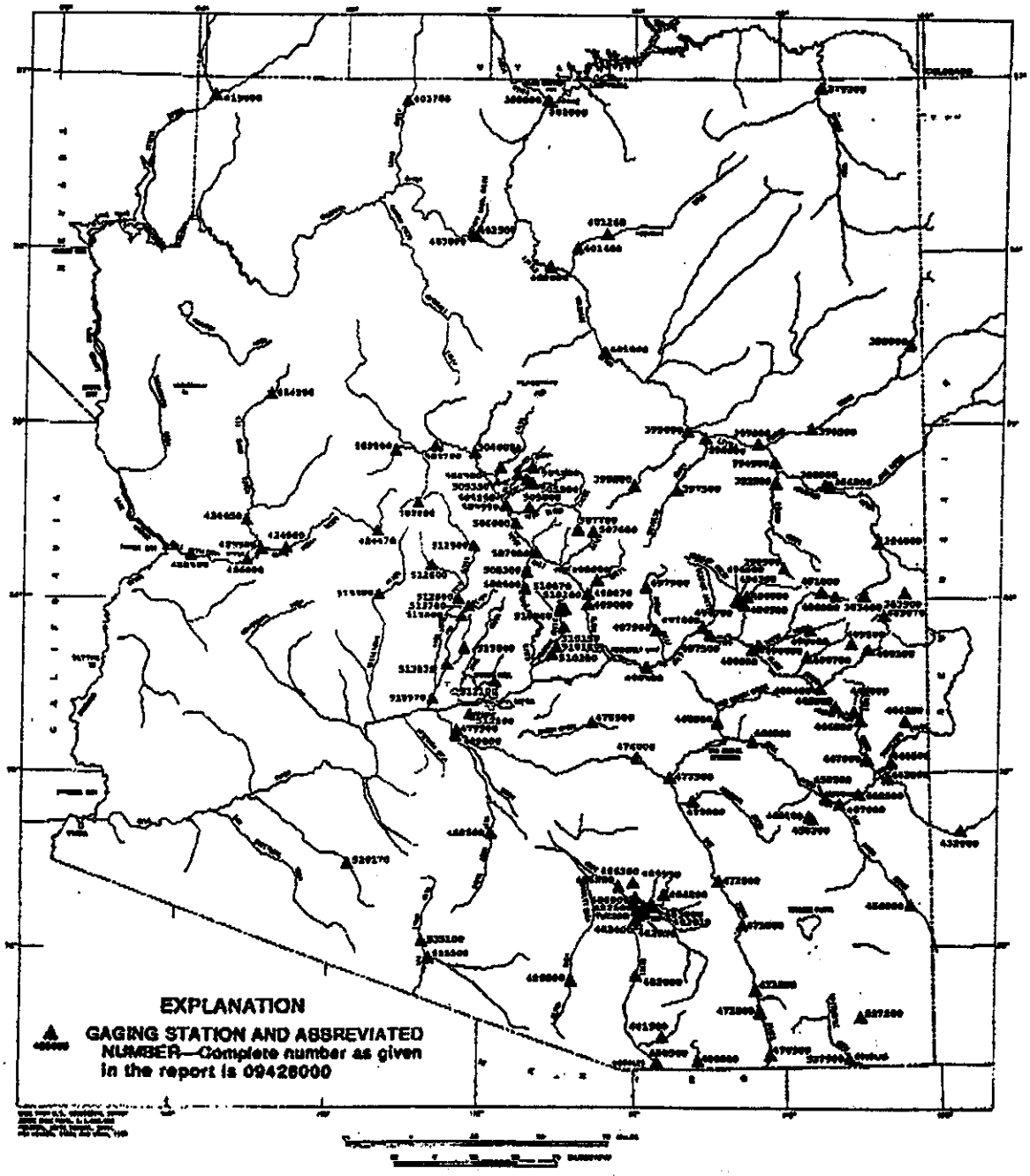


Figure 1.--Location of continuous-gaging stations.

GILA RIVER BASIN

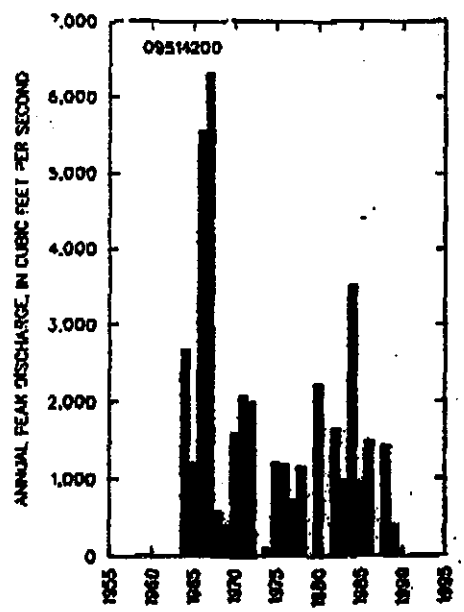
09514200 WATERMAN WASH NEAR BUCKEYE, AZ

LOCATION.--Lat 33°19'49", long 112°30'33", in SW¼NE¼ sec.24, T.1 S., R.3 W., Maricopa County, Hydrologic Unit 15070101, 2.4 mi above mouth, 5.2 mi southeast of Buckeye.

DRAINAGE AREA.--420 mi².

ANNUAL PEAK DISCHARGE

WATER YEAR	DATE	ANNUAL PEAK DISCHARGE (FT³/S)	DISCHARGE CODES	WATER YEAR	DATE	ANNUAL PEAK DISCHARGE (FT³/S)	DISCHARGE CODES
1964	09-13-64	2,680		1977	10-23-76	740	
1965	08-00-65	1,200	ES	1978	08-04-78	1,150	
1966	09-13-66	5,560		1980	02-15-80	2,220	
1967	09-03-67	6,300		1981	00-00-81	0	
1968	12-15-67	560		1982	09-27-82	1,660	
1969	08-29-69	400		1983	12-10-82	985	
1970	08-09-70	1,600		1984	09-02-84	3,520	
1971	08-11-71	2,080		1985	12-28-84	950	
1972	08-00-72	2,000		1986	07-22-86	1,500	
1973	00-00-73	0		1987	00-00-87	0	
1974	09-03-74	100	ES	1988	12-17-87	1,430	
1975	10-28-74	1,200		1989	00-00-89	402	
1976	09-26-76	1,180					



MAGNITUDE AND PROBABILITY OF INSTANTANEOUS PEAK FLOW BASED ON PERIOD OF RECORD 1964-78, 1980-89

DISCHARGE, IN FT³/S, FOR INDICATED RECURRENCE INTERVAL IN YEARS, AND EXCEEDANCE PROBABILITY, IN PERCENT

2	5	10	25	50†	100†
50%	20%	10%	4%	2%	1%
1,330	2,420	3,380	4,880	6,240	7,840

WEIGHTED SKEW (LOGS)= 0.14
MEAN (LOGS)= 3.15
STANDARD DEV. (LOGS)= 0.32

† Reliability of values in colum is uncertain, and potential errors are large.

BASIN CHARACTERISTICS

MAIN CHANNEL SLOPE (FT/MI)	STREAM LENGTH (MI)	MEAN BASIN ELEVATION (FT)	FORESTED AREA (PERCENT)	SOIL INDEX	MEAN ANNUAL PRECIPITATION (IN)	RAINFALL INTENSITY, 24-HOUR 2-YEAR (IN)	RAINFALL INTENSITY, 24-HOUR 50-YEAR (IN)
21.2	37.7	1,570	0.0	2.5	9.2	1.7	3.8

ARIZONA DEPARTMENT OF TRANSPORTATION

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Water Resources Division

REPORT: ADOT-RS-15(121) FINAL REPORT

METHODS FOR ESTIMATING THE MAGNITUDE AND FREQUENCY OF FLOODS IN ARIZONA

BY R. H. ROESKE

Prepared by:
United States Geological Survey
Water Resources Division
301 W. Congress
Tucson, Arizona 85701
September 1978

Prepared for:
Arizona Department of Transportation
206 South 17th Avenue
Phoenix, Arizona 85007

In cooperation with the
United States Department of Transportation
Federal Highway Administration

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Water Resources Division

STA NO.	STATION NAME	REGION	YR	BASIN CHAR DA	EL	PR	FLOOD DISCHARGES Q2	Q5	Q10	Q25	Q50	Q100	Q500
09514200	WATERMAN WASH NEAR BUCKEYE, AZ	2	12	403.00	1570	9.2	1360 1360	3030 3250	4560 5260	7020 8760	9230 12200	11800 16400	19200 30000
09515500	HASSAYAMPA R. AT BOX DAMSITE, NR. WICKENBURG, AZ	3	33	417.00	4750	19.3	3090 3060	8220 8150	13600 13500	23200 23100	32700 32600	44500 44300	82500 81800
09515800	HARTMAN WASH NEAR WICKENBURG, AZ	3	12	5.57	2690	11.0	238 214	972 814	2000 1580	4260 3240	6890 5080	10600 7730	24900 17400
09516500	HASSAYAMPA RIVER NR MORRISTOWN, AZ	3	21	774.00	3190	16.9	1930 2260	6320 7830	11100 14700	19300 26700	27000 39200	36000 53400	61700 101000
09516600	OX WASH NEAR MORRISTOWN, AZ	3	13	6.31	2290	12.2	200 192	730 694	1410 1340	2830 2680	4400 4170	6520 6190	14300 13600
09516800	JACK RABBIT WASH NR TONOPAH, AZ	2	12	137.00	2260	9.2	481 524	2710 2470	6550 5310	16600 12200	29900 20400	50700 33500	145000 88100
09517000	HASSAYAMPA RIVER NR ARLINGTON, AZ	2,3	15	1470.00	3010	15.9	1220 1390	4480 4840	8450 8890	16100 16300	24000 23800	34000 33200	66600 63100
09517200	CENTENNIAL WASH TRIB NR WENDEN, AZ	2	13	2.79	2480	8.0	132 124	329 304	532 485	886 809	1230 1120	1660 1520	3020 2790
09517280	TIGER WASH NEAR AGUILA, AZ	2	13	85.20	2590	9.6	760 716	2260 2020	3950 3390	7090 5920	10300 8410	14400 11700	27900 22000
09517400	WINTERS WASH NEAR TONOPAH, AZ	2	14	47.80	1630	9.1	787 725	1180 1190	1460 1670	1810 2480	2080 3320	2350 4270	3020 7530
09517500	CENTENNIAL WASH NEAR ARLINGTON, AZ	2	15	1810.00	1870	8.2	1890 2040	5590 6150	9730 10900	17400 19400	25200 28100	35000 38800	67700 74500
09519600	RAINBOW WASH TRIB NR BUCKEYE, AZ	2	13	2.43	950	7.6	440 378	852 702	1190 964	1700 1430	2140 1850	2610 2360	3910 3950
09519750	BENDER WASH NEAR GILA BEND, AZ	2	13	68.80	1900	8.5	498 500	2000 1830	4070 3480	8580 6890	13800 10600	21100 15800	49000 34400
09519760	SAUCEDA WASH NEAR GILA BEND, AZ	2	13	126.00	1980	8.2	617 630	1510 1620	2420 2700	3990 4590	5510 6500	7360 8800	13300 16400

STATION NUMBER	STATION NAME	REGION MAIN STREAM	PERIOD OF RECORD	DRAINAGE AREA (SQ MI)	PEAK DISCHARGE DATE	PEAK DISCHARGE FT³/S
09510200	SYCAMORE CREEK NEAR FORT MCDOWELL, AZ	3	1961-75	165.00	9- 5-70	24200
09512100	INDIAN BEND WASH NEAR SCOTTSDALE, AZ	3	1961-75	142.00	6-22-72	21000
09512200	SALT R TRIB IN SOUTH MT PARK, AT PHOENIX, AZ	2	1961-75	1.75	9- 8-65	670
09512300	CAVE CREEK NR CAVE CREEK, AZ	3	1958-75	121.00	12-19-67	12400
09512420	LYNX CREEK TRIB NR PRESCOTT, AZ	3	1969-75	0.95	UNKNOWN	820
09512500	AGUA FRIA RIVER NEAR MAYER, AZ	3	1940-75	588.00	9- 5-70	19800
09512700	AGUA FRIA RIVER TRIB NO 2 NR ROCK SPRINGS, AZ	3	1963-75	1.11	8- 2-64	1200
09512800	AGUA FRIA RIVER NR ROCK SPRINGS, AZ	3	1970-75	1130.00	9- 5-70	40100
09513650	AGUA FRIA RIVER AT EL MIRAGE, AZ	3	1963-75	7/ 178.00	9- 5-70	5000
09513780	NEW RIVER NR ROCK SPRINGS, AZ	3	1962-75	67.30	9- 5-70	18600
09513800	NEW RIVER AT NEW RIVER, AZ	3	1961-75	85.70	9- 5-70	19500
09513820	DEADMAN WASH NEAR NEW RIVER, AZ	3	1960-75	11.10	12-25-59	1450
09513835	NEW RIVER AT BELL ROAD, NR PEORIA, AZ	3	1963,1965-75	187.00	12-19-67	14600
09513860	SKUNK CREEK NR PHOENIX, AZ	3	1960-75	64.60	8- 1-66	11500
09513890	NEW RIVER AT PEORIA, AZ	3	1960-72	317.00	9- 5-70	20000
09513910	NEW RIVER NEAR GLENDALE, AZ	3	1943,1955,1960-75	323.00	8- -43	38000
09513970	AGUA FRIA RIVER AT AVONDALE, AZ	3	1960-75	7/ 556.00	8- 6-70	20600
09514200	WATERMAN WASH NEAR BUCKEYE, AZ	2	1964-75	403.00	9- 3-67	6300
09514500	HASSAYAMPA RIVER NR WAGONER, AZ	3	1940-46	78.70	4-16-41	1700
09515500	HASSAYAMPA R. AT BOX DAMSITE, NR. WICKENBURG, AZ	3	1925,1927,1937-38,1946-75	417.00	9- 5-70	58000
09515800	HARIMAN WASH NEAR WICKENBURG, AZ	3	1960-75	5.57	8-10-67	2600
09516500	HASSAYAMPA RIVER NR MORRISTOWN, AZ	3	1939-47,1964-75	774.00	9- 5-70	47500
09516600	OX WASH NEAR MORRISTOWN, AZ	3	1963-75	6.31	8-26-64	2900
09516800	JACK RABBIT WASH NR TONOPAH, AZ	2	1964-75	137.00	10- 7-72	6840
09517000	HASSAYAMPA RIVER NR ARLINGTON, AZ	2,3	1961-75	1470.00	9- 5-70	39000
09517200	CENTENNIAL WASH TRIB NR WENDEN, AZ	2	1963-75	2.79	9- 5-70	720
09517280	TIGER WASH NEAR AGUILA, AZ	2	1963-75	85.20	8-20-70	4550
09517400	WINTERS WASH NEAR TONOPAH, AZ	2	1962-75	47.80	10- 6-72	2100
09517500	CENTENNIAL WASH NEAR ARLINGTON, AZ	2	1961-75	1810.00	7-23-61	14500
09519600	RAINBOW WASH TRIB NR BUCKEYE, AZ	2	1963-75	2.43	9- 3-67	1430
09519750	RENDER WASH NEAR GILA BEND, AZ	2	1963-75	68.80	8- -71	2670
09519760	SANCEDA WASH NEAR GILA BEND, AZ	2	1963-75	126.00	8- -70	2850
09519780	WINDMILL WASH NR GILA BEND, AZ	2	1960-75	12.90	12-19-67	8430
09520100	MILLPARK WASH NEAR SENTINEL, AZ	2	1963-75	8.70	8- 2-74	1530
09520110	HOTTSHOT ARROYO NEAR AJO, AZ	2	1966-75	0.04	9-13-66	215
					9-23-74	215

UNITED STATES
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GEOLOGICAL SURVEY

MOBILE QUADRANGLE
ARIZONA-MARICOPA CO.
15 MINUTE SERIES (TOPOGRAPHIC)

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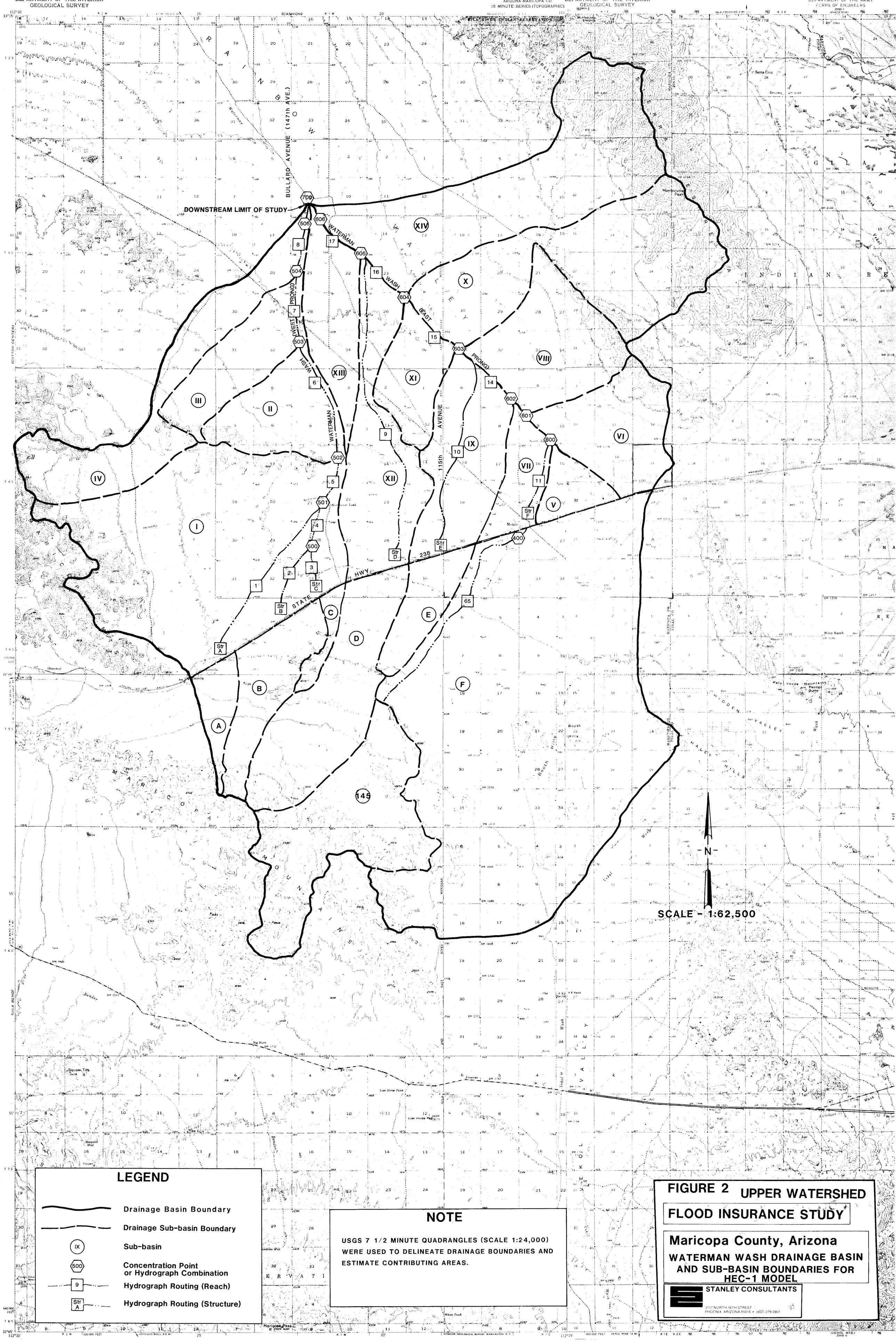

LEGEND

- Drainage Basin Boundary
- Drainage Sub-basin Boundary
- IX — Sub-basin
- 500 — Concentration Point or Hydrograph Combination
- 9 — Hydrograph Routing (Reach)
- Str A — Hydrograph Routing (Structure)

NOTE

USGS 7 1/2 MINUTE QUADRANGLES (SCALE 1:24,000) WERE USED TO DELINEATE DRAINAGE BOUNDARIES AND ESTIMATE CONTRIBUTING AREAS.

FIGURE 2 UPPER WATERSHED

FLOOD INSURANCE STUDY

Maricopa County, Arizona

WATERMAN WASH DRAINAGE BASIN AND SUB-BASIN BOUNDARIES FOR HEC-1 MODEL

STANLEY CONSULTANTS
3117 NORTH 16TH STREET
PHOENIX, ARIZONA 85016 • (602) 279-0901

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WATERMAN WASH HYDROLOGY UPPER AND LOWER WATERSHED MARICOPA COUNTY, ARIZONA

LOWER WATERSHED BASIN AND SUB-BASIN BOUNDARIES FOR HEC-1 MODEL

FIGURE 3

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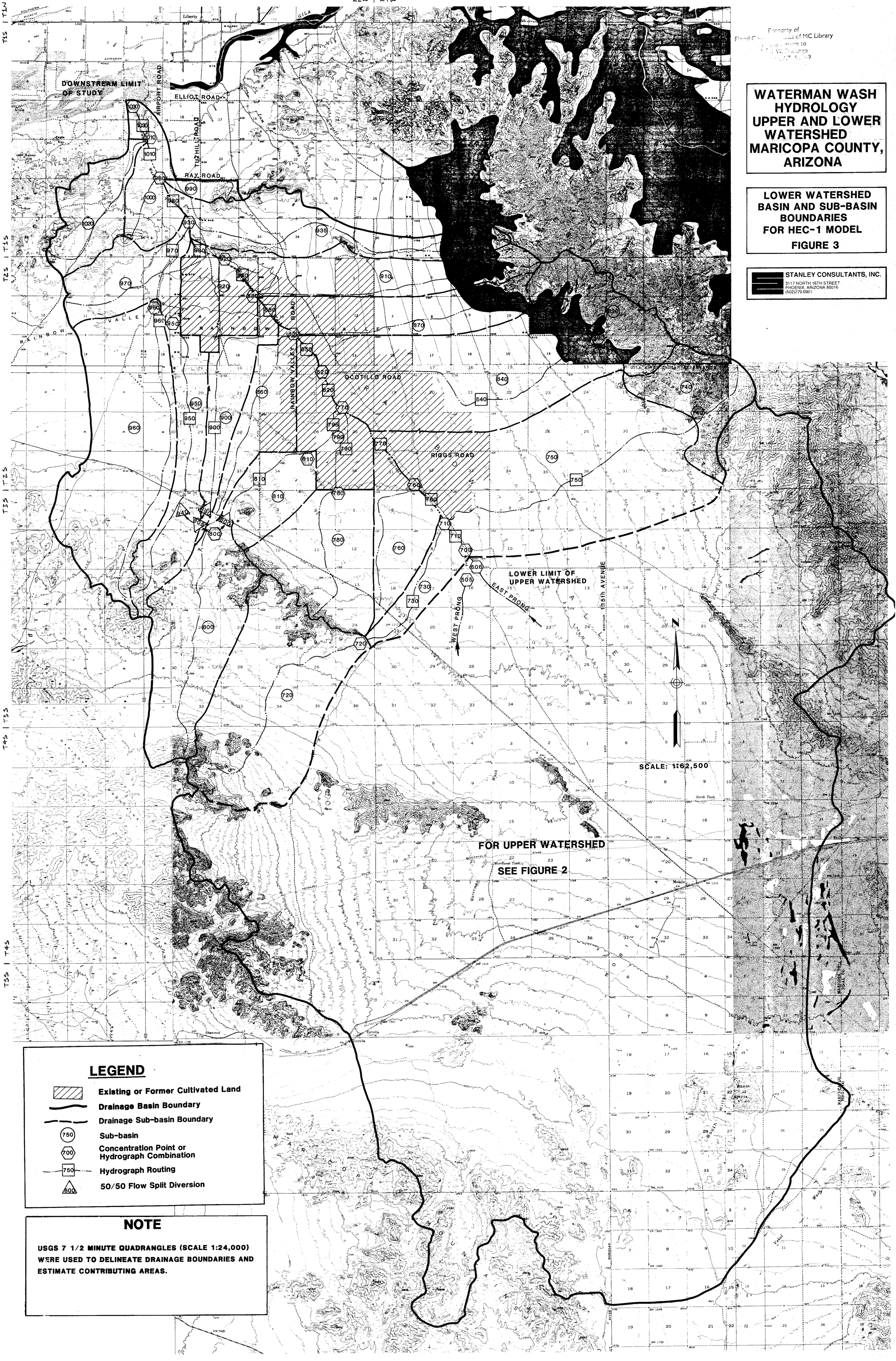

LEGEND

- Existing or Former Cultivated Land
- Drainage Basin Boundary
- Drainage Sub-basin Boundary
- (750) Sub-basin
- (700) Concentration Point or Hydrograph Combination
- 750 Hydrograph Routing
- (800) 50/50 Flow Split Diversion

NOTE

USGS 7 1/2 MINUTE QUADRANGLES (SCALE 1:24,000) WERE USED TO DELINEATE DRAINAGE BOUNDARIES AND ESTIMATE CONTRIBUTING AREAS.