STANLEY CONSULTANTS, INC.

2929 East Camelback Road, Suite 130 • Phoenix, AZ 85016-4425

Tel: 602/912-6500 • Fax: 602/912-6599

TO: Flood Control District of Maricopa County
2801 W. Durango St
Phx, Az. 85009

ATTN: Greg Rodzenko

DATE: 6-23-94

PROJECT: Paradise Village Gateway

PROJECT #: 11673

THE FOLLOWING ITEMS ARE TRANSMITTED:

COPIES	ORIGINALS	DESCRIPTION
1		Amendment to Master Drainage Report

THE ABOVE ITEMS ARE SUBMITTED:

- ☐ AT YOUR REQUEST
- ☐ FOR YOUR REVIEW
- ☐ FOR YOUR APPROVAL
- ☐ FOR YOUR SIGNATURE
- ☐ AS REVISED
- ☒ YOUR INFORMATION

REMARKS:

BY: Scott Burkhart

RECEIVED:

DATE:

FLOOD CONTROL DISTRICT
RECEIVED
JUN 23 1994
CHENG | P&PM
DER | HYDRO
ADMIN | LMGT
FILE
WORKS

STANLEY CONSULTANTS, INC.

2929 East Camelback Road, Suite 130 • Phoenix, AZ 85016-4425 Tel: 602/912-6500 • Fax: 602/912-6599

June 22, 1994

Mr. Gary W. Boesch, P.E.
CITY OF PHOENIX
Development Services Department
Project Engineering Division
200 West Washington Street
Phoenix, AZ 85004

RE: Amendment to Master Drainage Report for Paradise Village Gateway
(Northeast Corner of Tatum and Shea Boulevards)
Revised May 1994
DIS 43476

Dear Mr. Boesch:

A revision has been made to the east side storm drain system for the above project. The pipe run that extends from the "Apartment Complex" flow discharge point to the outlet in Indian Bend Wash has been reduced in size from 48" to 42" diameter.

This change was made due to the "Revised Drainage Report for Paradise Village Gateway Apartment Complex", Rick Engineering (May 1994). According to this report, the apartment complex area will discharge a flow rate of about 10 cfs to the east side storm drain system and our previous calculations assumed a discharge of 40 cfs. Since the previous total discharge was 84 cfs and now it has been reduced to 54 cfs, the change made in the pipe size is adequate.

Enclosed is the revised HGL calculation which replaces the original one in Appendix F (on-site drainage) and a revised Exhibit D that reflect these changes. Please incorporate this letter and its attachments in your copies of the original report. If you have any questions, please call me at 912-6500.

Sincerely,

STANLEY CONSULTANTS, INC.

G. Scott Buchanan

G. Scott Buchanan, P.E.

Registered Professional Engineer (Civil)
CERTIFICATE NO. 26837
G. SCOTT BUCHANAN
Date Signed 6/22/94
ARIZONA, U.S.A.

gsb/tlb:JUN084:11623

Enclosure

cc: Westcor
Rick Engineering
FCD – Greg Rodzenko

50TH STREET PIPE

$Q_T = 44\ cfs + 10\ cfs = 54\ cfs$ (PROJECT SITE + RICK ENGINEERING)

POINT	STATION	REACH DESCRIPTION	ENERGY GRADE LINE ELEVATION	HYDRAULIC GRADE LINE ELEVATION	HEAD LOSS CALCULATION
1 OUTLET 42"	@ INDIAN BEND WASH	Q = 54 cfs, V = 5.6 fps	1359.70 X-SECT. 12.226 HEC-2 MODEL	1359.30 @ Q=7000 cfs 11623H2D	INV. EL. = 1353.00
		LOSS @ PIPE OUTLET INTO THE INDIAN BEND WASH * $V^2/2g = 0.49'$			$K_{EXIT} = K_{CONTR.} + K_{EXP.} = 0.06 + 0.10$ LOSS = 0.16 x 0.49 = 0.08'
1	17 + 57	FRICTION LOSS Q = 54 cfs L = 200' x 42"Ø V = 5.6 fps	1359.87	1359.38	$S_F = 0.0027$ LOSS = 0.0027 x 200' = 0.54'
2	15 + 57	LOSSES IN MH $(A_2/A_1)^{0.5} = (16/9.62)^{0.5} = 1.3$	1360.41	1359.92	$K_{BEND} = 0.23 (45°)$ $K_{CONTR.} = 0.13$ $K_{EXP.} = 0.17$ LOSS = 0.53 x 0.49 = 0.26'
2	//	FRICTION LOSS Q = 54 cfs L = 125' x 42"Ø	1360.67	1360.18	$S_F = 0.0027$ LOSS = 0.0027 x 125' = 0.34'
3	14 + 32	LOSSES IN MH $(A_2/A_1)^{0.5} = 1.3$	1361.01	1360.52	$K_{EXP.} = 0.17$ $K_{CONT.} = 0.13$ LOSS = 0.30 x 0.49 = 0.15'
3	//	FRICTION LOSS Q = 44 cfs L = 526' x 42"Ø V = 4.6 fps	1361.16	1360.67	$S_F = 0.0018$ LOSS = 0.0018 x 526 = 0.95'
4	9 + 06	LOSSES IN MH $(A_2/A_1)^{0.5} = (16/9.62)^{0.5} = 1.3$	$V^2/2g = 0.33$ 1361.95	1361.62	$K_{BEND} = 0.30 (90°)$ $K_{CONTR.} = 0.13$ $K_{EXP.} = 0.17$ LOSS = 0.60 x 0.33 = 0.20'
4	//	FRICTION LOSS Q = 44 cfs L = 40' x 36"Ø V = 6.2 fps	1362.15	1361.82	$S_F = 0.0039$ LOSS = 0.0039 x 40' = 0.16'
5	8 + 66	LOSSES IN MH $(A_2/A_1)^{0.5} = (16/7.07)^{0.5} = 1.50$	$V^2/2g = 0.6$ 1362.58	1361.98	$K_{BEND} = 0.30 (90°)$ $K_{CONTR.} = 0.21$ $K_{EXP.} = 0.30$ LOSS = 0.81 x 0.6 = 0.49'
5	//		1363.07	1362.47	

* IT WAS ASSUMED THAT AT THE OUTLET A HEADWALL, WINGWALLS AND A TRASH RACK WILL BE PLACED.

AN CONTRACTION/EXPANTION TRANSITION WAS ASSUMED.

$(A_2/A_1)^{1/2} = [9.62/(0.75)(9.62)]^{1/2} = 1.15$

STANLEY CONSULTANTS
ENGINEERS • PLANNERS • SURVEYORS
3117 NORTH 16TH STREET
PHOENIX, AZ 85016 • (602) 279-0901

JOB WESTCOR TATUM/THEA #11623

SHEET NO. 1 OF

CALCULATED BY JRB DATE 6/22/94

CHECKED BY DATE

SCALE

50TH STREET PIPE (continued)

POINT	STATION	REACH DESCRIPTION	ENERGY GRADE LINE ELEVATION	HYDRAULIC GRADE LINE ELEVATION	HEAD LOSS CALCULATION
5	8+66		1363.07	1362.47	
		FRICTION LOSS Q = 30 cfs L = 390' x 30"ø V = 6.1 fps			$S_f = 0.0045$ LOSS = 0.0045 x 390 = 1.76'
6	4+76		$V^2/2g = 0.58$ 1364.81	1364.23	
		LOSSES IN MH $(A_2/A_1)^{0.5} = (16/4.91)^{0.5} = 1.80$			$K_{BEND} = 0.30$ (90°) $K_{CONTR.} = 0.34$ $K_{EXP.} = 0.47$ LOSS = 1.11 x 0.58 = 0.64'
6	"		1365.45	1364.87	
		FRICTION LOSS Q = 15 cfs L = 238' x 24"ø V = 4.8 fps			$S_f = 0.0036$ LOSS = 0.0036 x 238' = 0.86'
7	2+38		$V^2/2g = 0.36$ 1366.09	1365.73	
		LOSSES IN MH $(A_2/A_1)^{0.5} = (16/3.15)^{0.5} = 2.25$			$K_{EXP.} = 0.62$ $K_{CONTR.} = 0.39$ LOSS = 1.01 x 0.36' = 0.36'
7	"		1366.45	1366.09	
		FRICTION LOSS L = 238' x 24"ø			$S_f = 0.0036$ LOSS = 0.0036 x 238' = 0.86'
8	0+00		1367.31	1366.95	
		LOSSES IN MH $(A_2/A_1)^{0.5} = 2.25$			$K_{EXP.} = 0.62$ $K_{CONTR.} = 0.39$ LOSS = 1.01 x 0.36' = 0.36'
8	"		1367.67	1367.31	

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3117 NORTH 16TH STREET
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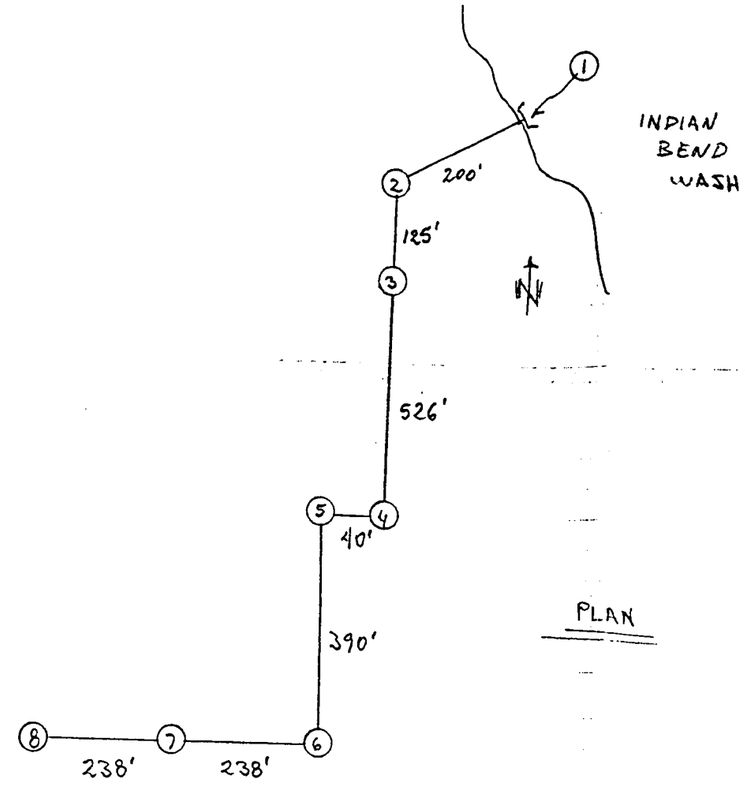
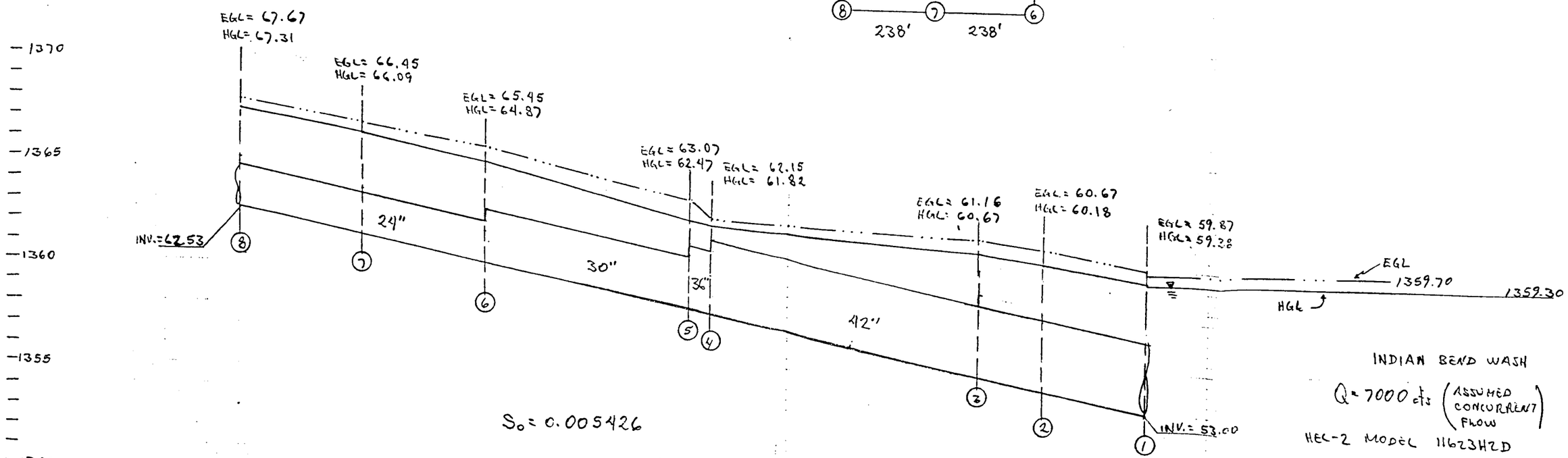
JOB WESTCOR TATUM/VHEA #11673
SHEET NO. 2 OF
CALCULATED BY JBB DATE 6/22/94
CHECKED BY DATE
SCALE



PLAN



$S_o = 0.005426$

PIPE PROFILE

INDIAN BEND WASH

Q = 7000 cfs (ASSUMED CONCURRENT FLOW)

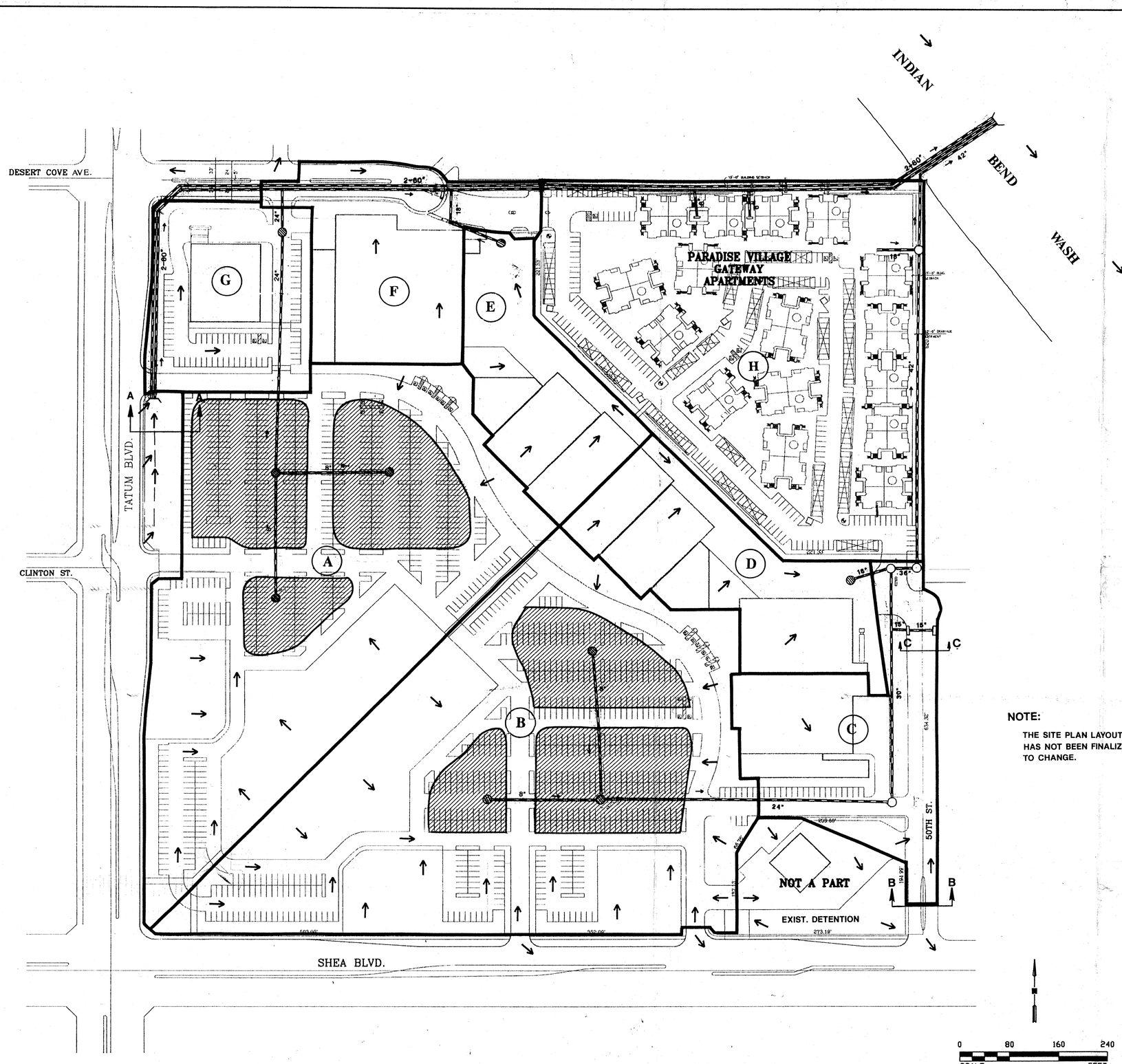
HEC-2 MODEL 11623H2D

IC 3643

STANLEY CONSULTANTS, INC.
2929 E CAMELBACK RD SUITE 130
PHOENIX, ARIZONA 85016 • (602) 912-6500

PROJ 11623

APRIL 1994
REVISED: MAY 1994



NOTE:

THE SITE PLAN LAYOUT IN THIS EXHIBIT HAS NOT BEEN FINALIZED AND IS SUBJECT TO CHANGE.

LEGEND

- 24" — PROPOSED STORM DRAIN PIPE W/DIAM.
- DIRECTION OF FLOW
- A A — HYDRAULIC CROSS SECTION
- DRAINAGE SUB BASIN BOUNDARY
- (A) — DRAINAGE SUB BASIN NAME
- PROPOSED ONSITE DETENTION

0 80 160 240
SCALE FEET

WESTCOR
NE CORNER OF TATUM & SHEA
EXHIBIT "D"
ONSITE DRAINAGE

FLOOD CONTROL DISTRICT RECEIVED
JUN 23 1994

CH ENG	P & PM
DEP	HYDRO
ADMIN	LMGT
FINANCE	FILE
O & O	
CERTIFICATE REMARKS	

MASTER DRAINAGE REPORT

FOR

PARADISE VILLAGE GATEWAY

(NE CORNER OF TATUM AND SHEA BOULEVARDS)

PREPARED FOR

WESTCOR PARTNERS
11411 North Tatum Boulevard
Phoenix, Arizona 85028-2399

PREPARED BY

STANLEY CONSULTANTS, INC.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016

Registered Professional Engineer (Civil)
CERTIFICATE NO.
26837
G. SCOTT
BUCHANAN
Date Signed 5-17-94
ARIZONA, U.S.A.

Prepared April 1994
Revised May 1994
Per City of Phoenix Comments

SCI #11623

TABLE OF CONTENTS

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Proposed Onsite Drainage Improvements 15

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Appendix A (Inside Pocket)

1. HEC-1 and HEC-2 input files on diskette
2. Exhibit A Offsite Drainage
3. Exhibit B Location of HEC-2 Cross Sections
4. Exhibit C Results of Survey; Val-Tec, Inc.
5. Exhibit D Onsite Drainage

Appendix B Offsite HEC-1 Hydrology Model

Appendix C Offsite HEC-1 Input Data and Supporting Calculations

Appendix D HEC-2 Water Surface Profiles
Indian Bend Wash, Shea Boulevard

Appendix E Hydraulic Grade Line Analysis
Proposed 2-60" Storm Drain Pipes from Tatum Boulevard
to Indian Bend Wash

Appendix F Onsite Drainage

Registered Professional Engineer (Civil)
CERTIFICATE NO.
26837
G. SCOTT
BUCHANAN
Date Signed 5-17-94
ARIZONA, U.S.A.

INTRODUCTION

This project is located at the northeast corner of Tatum and Shea Boulevards in the City of Phoenix. The project site is approximately 40 gross acres. The proposed development consists of two separate, distinct land uses. The majority of the property, consisting primarily of the frontages on Tatum and Shea as well as the central portion will be developed as a retail shopping center. The remaining portion consisting of approximately 7.2 acres in the northeast quadrant of the overall project site will be developed with residential apartments.

Westcor Partners, who owns the overall project site, will be developing the retail shopping center and providing access and utility improvements to the apartment parcel. The apartment portion of the project site will be owned and developed by Evans-Withycombe, Inc. Stanley Consultants is providing engineering design and survey for the retail portion and extension of access and utilities and Rick Engineering is the engineer for the apartment parcel. Both projects go by the name "Paradise Village Gateway".

The existing site consists of both natural desert and graded vacant land. To the west and south are Tatum and Shea Boulevards respectively. Both Tatum and Shea are paved major arterial roadways with three lanes in each direction along with a center turn lane. To the north is an existing vacant parcel of land as well as the existing Anasazi Terrace apartment complex. Access to Anasazi Terrace is via Desert Cove Avenue, a paved two lane public roadway. To the northeast is the Indian Bend Wash, a major watercourse with combined channelization and recreation improvements. To the east is the existing Quail Haven Condominium development and an existing commercial office and restaurant complex. Fiftieth Street, which borders a portion of the Paradise Village Gateway project

on the east is a paved two-lane private roadway. The existing gas station near the southeast corner of the project site is not a part of this project.

The potential offsite contributing drainage area to the Paradise Village Gateway project is significant. It extends to the southwest southeast approximately three miles and includes a large portion of the Phoenix Mountain Preserve. The primary channel from this contributing area has been referred to recently as "Squaw Peak Wash", named after Squaw Peak which is at the upper limit of the drainage area. The total potential contributing area to the project site amounts to about 2.2 square miles. Drainage from Squaw Peak Wash contributes to Indian Bend Wash at numerous locations.

This report is intended to address both the offsite contributing drainage and the onsite runoff. It provides a detailed analysis of existing drainage in the project area and was prepared in accordance with current City of Phoenix and Maricopa County drainage standards. Because of the potential impacts of drainage to both the retail shopping center and apartment aspects of the Paradise Village Gateway project and because of the interaction of drainage between these two proposed developments, this report is intended to serve as a "master" drainage report. It will address drainage considerations common to the two developments. Onsite drainage analysis and design for the apartment portion of this project is provided in more detail by Rick Engineering, Inc. by separate report and plans. The apartment portion of this project will be constructed prior to the retail shopping center. Many of the drainage issues relative to the retail shopping center portion will be addressed in preliminary or conceptual fashion in this report since final layout and onsite grading have not been finalized at this point. A final report will be prepared and submitted for the retail shopping center upon submittal of grading and drainage plans for that portion.

PREVIOUS REPORTS AND ANALYSIS

A number of drainage and floodplain reports have been performed in the project area over the years by various engineers for various purposes. The following is a synopsis of previous reports investigated relative to the Paradise Village Gateway project:

1. Master Drainage Study Indian Bend Wash, prepared for the City of Phoenix (Project No. ST-731400.00), by Yost and Gardner Engineers, April 1975.

   This report presents four alternative approaches for handling of 100-year flows in the main channel of Indian Bend Wash. The report recommended designing the channel as a wide shallow greenbelt with a small grassed low flow channel which would be adaptable for multiple use. This report laid the original groundwork for channelization of Indian Bend Wash through this area and included estimated peak flows, proposed channel alignment and bed profile, typical cross sections and it estimated the 100-year water surface profile.

   Channelization improvements were made subsequent to the report. The present Indian Bend Wash channel adjacent to the project site contains the Stonecreek Golf Course. No report or analysis of backwater within the adjacent Indian Bend Wash has been found which would reflect all of the current hydraulic conditions that exist for the wash.

2. HEC-2 backwater model for Indian Bend Wash (from Shea Boulevard to 1000 feet north of Desert Cove), by Wildan Associates, Phoenix, Arizona, October 1981.

   A HEC-2 backwater model was done by Wildan Associates for Indian Bend Wash from Shea Boulevard to 1000 feet north of Desert Cove. This model is dated October 19, 1981. It used

a 100-year peak flow of 21,000 cfs. This model would not reflect the reconstruction of the Stonecreek Golf Course which was done in 1988. It is unknown what vertical datum was used for this study.

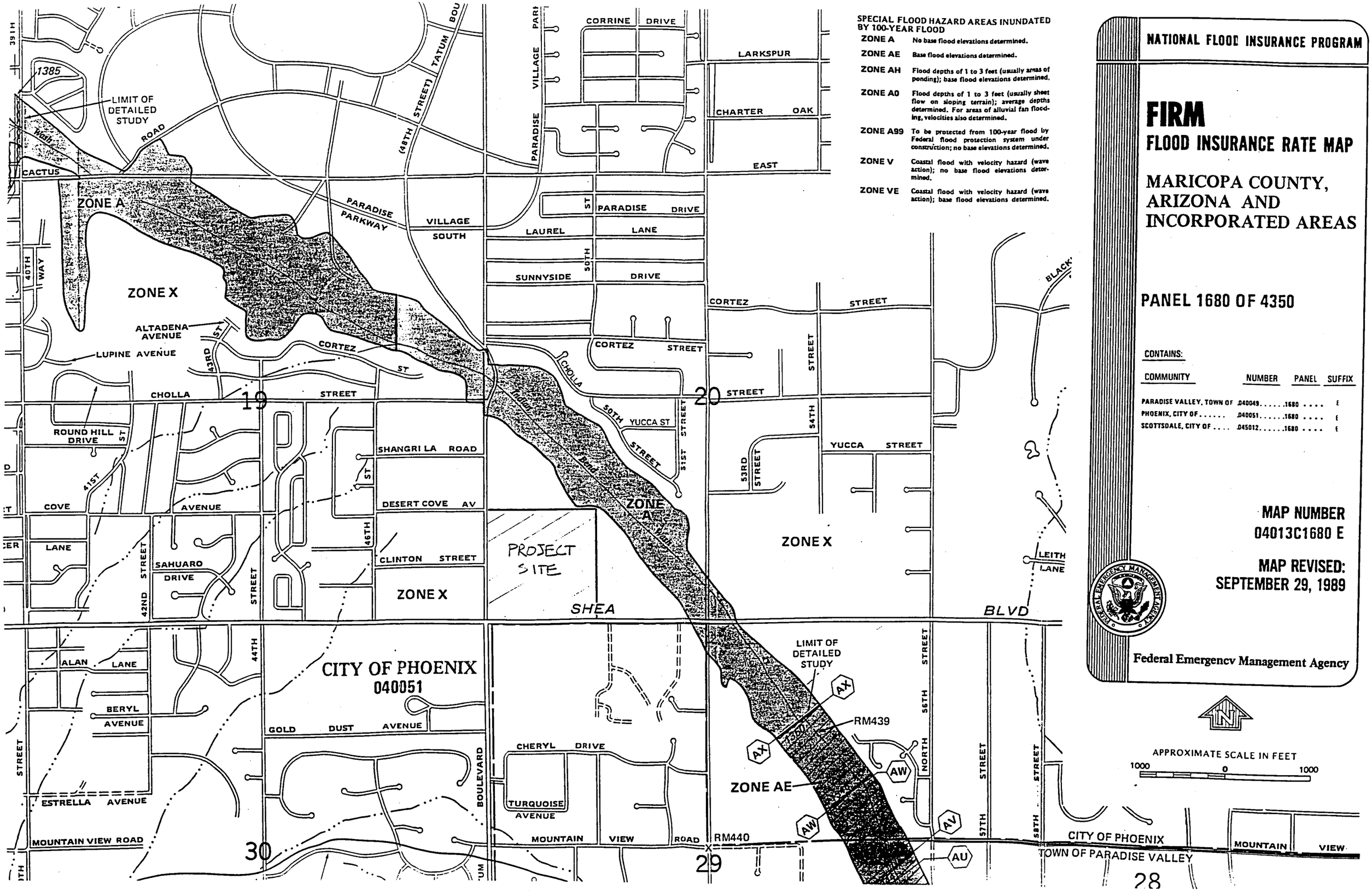
3. Hydraulic Grading Plan and Backwater Analysis for Indian Bend Wash, by Erie and Associates, Phoenix, Arizona, June 1993.

A hydraulic grading plan and backwater analysis was performed by Erie and Associates beginning in January, 1988 and revised on various dates through June 1993 for Indian Bend Wash in the vicinity of Shea Boulevard. This design and backwater analysis was done in support of a Letter of Map Revision for a recent residential project located south of Shea Boulevard and east of the Wash. The upstream limit of the backwater analysis is approximately 200 feet upstream from the Shea Boulevard bridge. The analysis reflects current conditions downstream from that location. Vertical datum is City of Phoenix. Various flow rates ranging from a 10-year discharge of 3100 cfs to a 500-year discharge of 31,000 cfs were run.

4. Flood Insurance Rate Map for Maricopa County, Arizona and Incorporated Areas, (Panel 1680 of 4350), Phoenix, Arizona, September 1989.

The Flood Insurance Rate Map for Maricopa County, Arizona and Incorporated Areas (Panel 1680 of 4350 dated Revised September 29, 1989) indicates an approximate Zone "A" for Indian Bend Wash adjacent to the project site. A Zone "A" has no base flood elevations determined. According to the Flood Insurance Rate Map, the project site is not located

within the approximate "A" Zone limit. Refer to the flood insurance rate map exhibit on the following page.


SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD
ZONE A No base flood elevations determined.
ZONE AE Base flood elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99 To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 1680 OF 4350
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
PARADISE VALLEY, TOWN OF .040049 .....1680 .... E
PHOENIX, CITY OF ..... .040051 .....1680 .... E
SCOTTSDALE, CITY OF .... .045012 .....1680 .... E
MAP NUMBER
04013C1680 E
MAP REVISED:
SEPTEMBER 29, 1989
Federal Emergency Management Agency
APPROXIMATE SCALE IN FEET
1000 0 1000
LIMIT OF DETAILED STUDY
ZONE A
ZONE X
ZONE AE
CITY OF PHOENIX
040051
CITY OF PHOENIX
TOWN OF PARADISE VALLEY
PROJECT SITE
RM439
RM440
1385
1390
CACTUS ROAD
PARADISE VILLAGE PARKWAY SOUTH
CORRINE DRIVE
LARKSPUR
CHARTER OAK
EAST
PARADISE DRIVE
LAUREL LANE
SUNNYSIDE DRIVE
CORTEZ STREET
CHOLLA STREET
YUCCA STREET
SHANGRI LA ROAD
DESERT COVE AV
CLINTON STREET
SHEA BLVD
MOUNTAIN VIEW ROAD
GOLD DUST AVENUE
CHERYL DRIVE
TURQUOISE AVENUE
ESTRELLA AVENUE
BERYL AVENUE
ALAN LANE
SAHUARO DRIVE
COVE AVENUE
ROUND HILL DRIVE
LUPINE AVENUE
ALTADENA AVENUE
LEITH LANE
BLACK
Indian Bend Wash
19
20
29
30
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5. Hydrologic Studies for the Village of Paradise Valley, prepared for Daycor Associates by Val-Tec, Inc., January 1976.

This report was done for the initial planning of "The Villages of Paradise Valley", a 1,200 acre planned community extending from 40th Street to 52nd Street from Thunderbird to Cholla including Paradise Valley Mall and a portion of the Indian Bend Wash. Contributing flow rates were estimated for a 100-year storm based on the old ADOT SCS method for existing watershed conditions. The report mentions that Indian Bend Wash channelization improvements were being designed by Water Resources Associates. This report identifies Parcel LD15 at the northeast corner of Shea and Tatum as one of several parcels not requiring onsite stormwater detention because of "suitable drainage outfall". This report estimated a 100-year discharge of 1,340 cfs from a contributing area of about 2 square miles to the southwest of the subject site with outfall to Tatum between Shea and the Indian Bend Wash.

6. Shea Boulevard Drainage Study, prepared for the City of Phoenix (Project # ST-75091.00), by Yost and Gardner Engineers, May 1976.

This report was done in conjunction with the design of a major storm drain in Shea Boulevard. It includes the area contributing runoff to Shea from 32nd Street to Tatum. This report uses a 2-year design frequency for the storm drain and assumes that the proposed detention basin/dam flood control projects in the contributing area to the south are constructed. These proposed flood control projects were the subject of a concurrent study by Dashney and Associates for the City of Phoenix.

7. Study for Flood Control Measures at 40th Street and Double Tree Ranch Road, Volume I, prepared for the City of Phoenix (Project # ST-75235.00), by Dashney and Associates, Inc., December 1976.

This report is an investigation of past flooding in the area along with a hydrologic and hydraulic analysis of the existing watershed and a preliminary engineering and economic evaluation of proposed flood control alternatives. The report uses the SCS TR-20 method with a 1-hour storm for estimating flow volumes and peak rates and combines hydrology with hydraulic analysis along the main flow path of Squaw Peak Wash to estimate flow splits and distributions. The report identifies the intersection of Tatum and Clinton as a primary concentration point for discharge. Peak flows estimated at this point are as follows:

2-year	420 cfs
5-year	700 cfs
10-year	970 cfs
25-year	1,230 cfs
50-year	1,500 cfs
100-year	1,740 cfs

The Dashney Report does not include any analysis of local drainage from roughly 100 acres at the southwest corner of Tatum and Shea that contributes runoff to the subject site under current conditions.

The report identifies several flood control options including channels and levees in the lower watershed and detention storage in the upper watershed. None of the flood control

alternatives from the Dashney Report were ever constructed. The report made no assumption that the proposed storm drain in Shea Boulevard is constructed and functional. Only Volume I of the Dashney Report containing narrative and summary was located. Volumes II through V containing the technical hydrology and hydraulic support have not been located.

8. Preliminary Hydrology Report for Anasazi Terrace, prepared for L.C.I. Properties by DNA, Inc., July 1987.

This report was prepared for the apartment complex adjacent to the north side of the subject site. It uses the Dashney hydrology along with some hydraulic analysis of a typical Tatum Boulevard roadway section to estimate how much flow is carried by Tatum and how much might overflow and affect Anasazi Terrace. From this analysis, it was estimated that 800 cfs of the 1,740 cfs estimated by Dashney would overflow the east side of Tatum. A block fence was built along the south side of the project along with a shallow drainage swale to carry local flows. The easternmost corner of the project was designated as a drainage easement to allow flows into the Indian Bend Wash. Remaining flows in Tatum Boulevard drain north to the Indian Bend Wash near Cholla Street.

There is no detention of onsite runoff designed with this project because it was deemed to have adequate outfall to the Indian Bend Wash. The report states that finished floors in Anasazi Terrace have been set 3 feet above the adjacent 100-year water surface in Indian Bend Wash.

9. Drainage Report for Anasazi Business Park, prepared by Z & H Engineers.

Report not found.

10. Drainage Report for Quail Haven Condominiums (engineer and date unknown)

Report not found.

EXISTING HYDROLOGY AND HYDRAULICS

The upper portion of the Squaw Peak Wash watershed is in a predominantly natural state and will probably never be developed to any significant extent since it is protected by mountain preserve. The lower portion of the Squaw Peak Wash watershed has been almost entirely developed with a mixture of medium to low density residential development; churches, retail, office and associated roadway and utility improvements.

Squaw Peak Wash in the lower watershed has been extensively channelized and diked. Portions of the lower wash are not able to convey the entire 100-year peak discharge and breakouts occur at various locations. The wash's main channel continuously gets smaller and smaller as it approaches the project site until near the intersection of Clinton Street and Tatum Boulevard, it all but disappears and flow is carried almost entirely within existing roadways.

The project site itself presently drains to the east and northeast. Existing slopes range from about 1/2 to 3/4 percent. A portion of the site drains to the existing earth swale which parallels the block fence bordering the Anasazi Terrace apartments. This swale carries drainage east to the Indian Bend Wash. The remainder of the site drains to the east. Some of this flow discharges across 50th Street to the existing office and restaurant development. The rest of the flow sheet drains to Indian Bend Wash at the northeast corner of the project site or is diverted to that location by the existing block fence along the Quail Haven Condominium development.

Existing condition hydrology for the project site and the contributing offsite drainage area was analyzed using the Clark Unitgraph and Green and Ampt loss rate options of the Corps of Engineers HEC-1 computer model. This methodology comes from the Drainage Design manual for Maricopa

County, Volume I, Hydrology. A summary of major input parameters is found in the HEC-1 printout in Appendix B. Appendix C contains all of the supporting data and calculations for the HEC-1 input.

Hydraulic rating curves at the various potential flow split locations in the lower Squaw Peak Wash watershed were developed based on survey notes, approximated field cross sections and estimated proportions. The most significant flow splits were analyzed using survey information and HEC-2 hydraulic sections. The less significant or less complex flow splits were analyzed based on approximate field sections and normal depth hydraulics or the proportion of flow in each direction was estimated based on visual inspection and judgement.

Detention of onsite runoff has been provided within a relatively small portion of the developed offsite contributing area. Where detention does occur, it has been reflected in the initial abstract parameter in the HEC-1 model. Hydrograph reach routing for defined channels is performed using the modified Puls storage method. Kinematic wave routing was used for streetflow reaches. Generally, when more than one land use, percent impervious, initial abstract, etc. were present in a given drainage sub-basin, HEC-1 input parameters were area-weighted.

There is only one roadway cross drainage structure in the study area at 40th Street and Squaw Peak Wash. This structure is a 3 barrel, 8 foot wide by 4 foot high concrete box culvert in combination with a roadway dip. It does not have any significant affect on hydrology. The existing storm drain in Shea Boulevard which begins west of the study area and discharges to the Indian Bend Wash was only designed for a 2-year return frequency and was assumed to have no significant affect on offsite hydrology. The existing storm drain in Tatum Boulevard which drains to Indian Bend Wash was also considered insignificant in terms of offsite hydrology.

The 2-hour storm distribution from the County's Hydrology Manual was used in the offsite hydrology model as opposed to the 6-hour distribution. The 2-hour distribution contains a greater peak rainfall intensity than the 6-hour distribution and is more reflective of the depth-duration-frequency results from statistical analysis of local rainfall data. A 6-hour model was run for comparison to the 2-hour model and was found to produce similar runoff volumes but significantly lower peak flows. The 6-hour model has not been included in this report.

The analysis of the Squaw Peak Watershed in this report, although not as extensive, is the most definitive since the Dashney Report of 1976. The estimated peak discharge from the mountain preserve portion of the contributing area in this report is slightly less than what Dashney had estimated. The mountain preserve area produces the bulk of the runoff. This report estimates a 100-year discharge of about 2800 cfs and the Dashney report estimated about 3300 cfs. In a hydrologic sense, these discharges are very similar.

Development which has occurred in the contributing area between the mountain preserve and the project site subsequent to the Dashney Report has apparently affected the hydrology and hydraulics in the lower watershed. Peak discharges which used to be dispersed and attenuated as they approached the Indian Bend Wash appear to be more channelized, sustained and directed. Development has apparently reduced the natural storage capacity of the contributing watershed and the general absence of onsite runoff detention has probably increased peak runoff and volume.

The result appears to be that a greater proportion of flow reaches the Tatum and Shea site than it did in 1976. We estimate the 100-year discharge in Tatum Boulevard and Clinton Street to be about 1900 cfs. This is a little more than the 1740 cfs estimated by Dashney. Discharges of this magnitude

have the potential to exceed the capacity of Tatum Boulevard in the vicinity of Clinton Street and sheet flow across the site. We estimate the potential overflow from Tatum Boulevard to be just over 400 cfs. This flow would sheet across the existing project site and would discharge to the Indian Bend Wash at the project's northeast corner. The remaining approximately 1500 cfs flows north in Tatum Boulevard.

The HEC-1 runoff model for Squaw Peak Wash also indicates potential breakout of flow from local offsite contributing areas near the intersection of Tatum and Shea. This local runoff may overflow Tatum Boulevard from Shea to Clinton and Shea Boulevard from Tatum to 50th Street onto the project site at a shallow depth of, say, less than 3 inches. Approximately 5 cfs may break out of Shea Boulevard to 50th Street. None of the local offsite breakout flow peaks concurrently with either the Squaw Peak Wash flow or the onsite flow from the project.

The 1500 cfs that flows north in Tatum Boulevard joins with additional minor contributing drainage at Desert Cove Avenue and continues north to the Indian Bend Wash. It appears that Tatum Boulevard will convey most but not all of this 1500 cfs.

PROPOSED ONSITE DRAINAGE IMPROVEMENTS

The design of onsite drainage improvements is predicated on the following concepts:

1. Since the existing site is subject to overflow from Squaw Peak Wash/Tatum Boulevard, and since the project site has been the historical path for at least a portion of the Squaw Peak Wash discharge, the onsite improvements will be designed to receive the existing overflow from Tatum Boulevard estimated at just over 400 cfs. This overflow will be carried through the project site and discharged to the Indian Bend Wash.

2. With the exception of design concept 1 above, all proposed grades within and adjacent to this project will be designed to preclude the entry of overflow from Tatum and Shea Boulevard.

3. All onsite drainage will discharge at the northeast corner of the project site to the Indian Bend Wash. Onsite developed condition peak discharge to the Indian Bend Wash for both the retail shopping center and apartment parcels together will not exceed the present condition peak discharge from the project site as a whole.

The first design concept is intended to maintain the existing pattern of major drainage in the project area considering the historic path of Squaw Peak Wash. By designing this project to receive existing Squaw Peak Wash overflow, the present flooding potential of adjacent and downstream properties will not be increased or impacted in a negative way. Receiving the Squaw Peak Wash overflow will be accomplished by constructing an onsite channel along the east side of Tatum Boulevard north of Clinton Street. This channel will be designed to accept and carry just over 400 cfs. The channel will terminate at a proposed onsite driveway located mid-way between Clinton Street and Desert Cove Avenue.

At this point, the flow will be picked up by a pair of proposed 60" diameter concrete storm drain pipes which will discharge to the Indian Bend Wash. Inlet control and hydraulic grade line analysis for the two 60" pipes is contained in Appendix E. Starting conditions for the hydraulic grade line analysis are based on the Indian Bend Wash HEC-2 backwater model which was done for this report and is located in Appendix D. Starting conditions assume a concurrent flow in Indian Bend Wash of 7,000 cfs, which was approximated from high water marks left from the October 1993 flow, a recent major runoff event.

In addition to the HEC-2 backwater analysis for Tatum Boulevard in Appendix C, a HEC-2 backwater analysis has also been performed for Shea Boulevard from 50th Street to Tatum and is contained in Appendix D. In accordance with design concept number two, onsite grades along Tatum from Shea to Clinton and along Shea from Tatum to 50th Street will be set higher than the adjacent 100-year water surface in each respective street.

In a similar way, the high grade break in Desert Cove Avenue, when it is reconstructed, will be set just above the adjacent 100-year high water elevation in Tatum. The existing high grade break in 50th Street just north of Shea will remain as is. As mentioned previously, it is estimated that approximately 5 cfs may break out of Shea and flow north in 50th Street. Since this flow is not concurrent with onsite flow and does not exceed the design capacity of 50th Street or the two proposed sump catch basins at the north end of 50th Street, it will be picked up by these catch basins and discharged to Indian Bend Wash.

With regard to design concept number three, the peak discharge from the existing condition onsite project area is estimated at 144 cfs. This assumes that the entire site discharges to a single point at

the project's northeast corner. with construction of this project as proposed, existing discharge which crosses 50th Street into the existing commercial/restaurant development to the east will no longer occur. All runoff from the proposed project will drain by surface flow or storm drain flow to the northeast corner of the project and discharge to the Indian Bend Wash.

In order to reduce the discharge from the proposed developed site to the existing condition level, onsite detention will be provided for a major portion of the development. Discharge from the detention will be metered to a proposed storm drain collection system. The storm drain collection system will also receive inflow from contributing areas that do not have detention. A portion of the onsite drainage will discharge to one of the two 60" diameter offsite storm drains.

The concurrence in time of the onsite and offsite discharge in the one 60" pipe is considered unlikely based on a comparison of the peak times estimated from the HEC-1 offsite hydrology model. Discharges into the 60" storm drain were therefore assumed to be functions of inlet control. Inlets will be set at an elevation higher than the hydraulic grade line for the 60" pipe. A major collector pipe will be provided along the eastern edge of the project for discharge from both the retail and apartment parcels. This pipe will have sufficient capacity so that inflow to it can also be a function of inlet control. A hydraulic grade line analysis for the east pipe is included in Appendix F. This analysis assumes the same starting hydraulic conditions as for the two 60" pipes.

Appendix F contains estimated peak discharges and runoff volumes for the retail parcel. Exhibit D illustrates the proposed onsite contributing areas and inlet points and collector pipe for the retail parcel. The design of onsite drainage for the retail parcel is conceptual at this point as final approval has not been given to the site plan layout and no grading and drainage plan has been finalized. The

total discharge from contributing sub-basins of the retail parcel amounts to about 100 cfs. This assumes that sub-basins A and B will have a total metered detention outlet capacity of 30 cfs in final design and that all peak discharges occur simultaneously. For preliminary design purposes, it has been assumed that 100-year 2-hour detention has been provided in onsite sub-basins A and B so that a post-development discharge comparison can be made on a 100-year basis.

Detention volume required and provided calculations along with estimated metered discharge for the apartment parcel are included in the drainage report prepared by Rick Engineering Company. The total metered detention discharge and surface runoff discharge for the apartment and retail parcels will not exceed 144 cfs for a 100-year storm.

Since the apartment project will be constructed prior to the retail project, interim drainage measures will be required. Temporary grading and catch basins will be provided southwest of the proposed partition wall which will separate the two projects to intercept drainage and divert it to the proposed storm drains until the retail project is constructed. Lateral stubs will be provided to the proposed storm drains for this interim drainage. Further design details to handle interim drainage will be provided by Rick Engineering.

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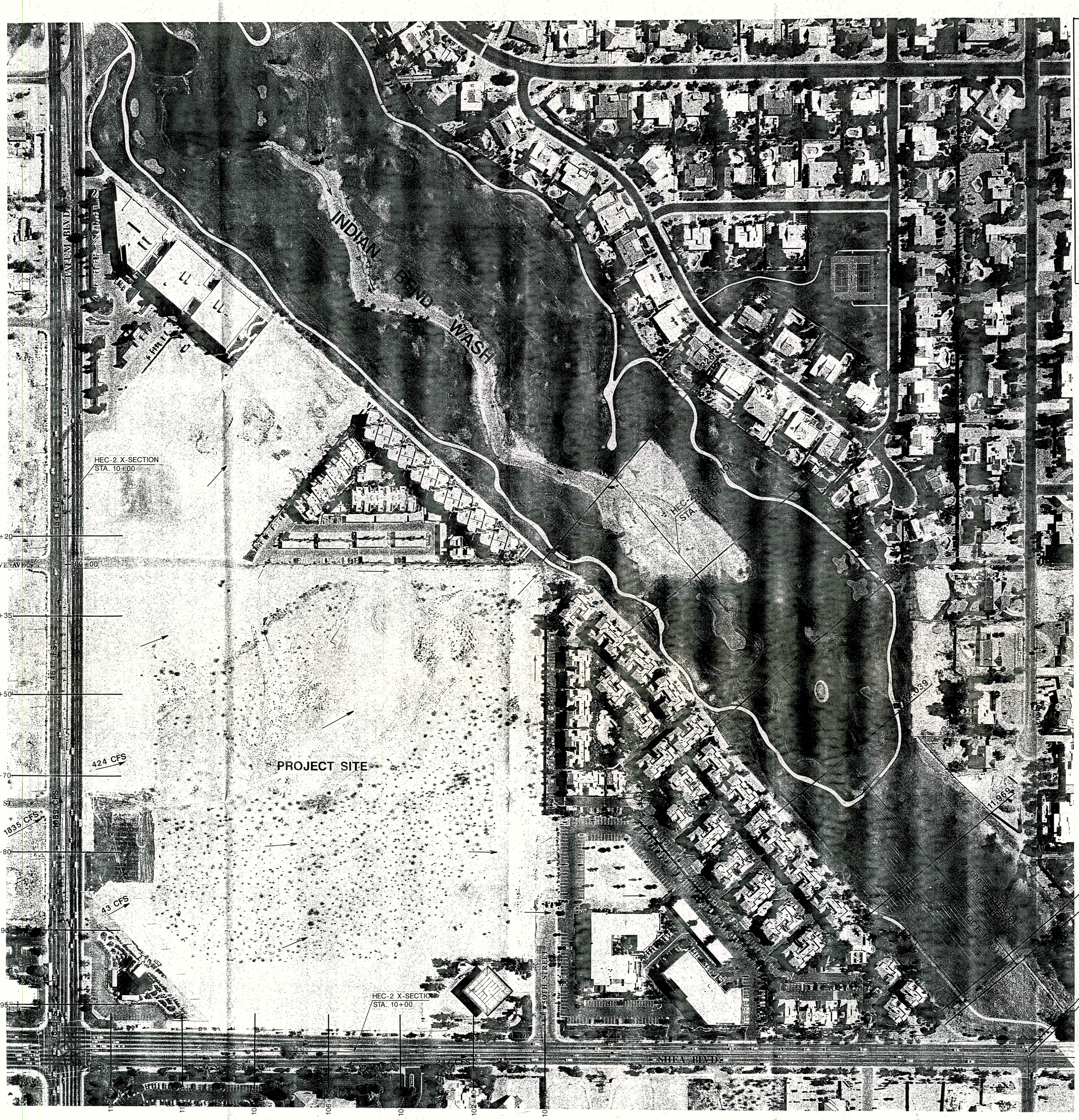


WESTCOR
NE CORNER TATUM & SHEA

EXHIBIT B

PROJECT SITE AND HEC-2 X-SECTIONS

LEGEND

99+20	HEC-2 CROSS SECTION
→	DIRECTION OF FLOW
98 CFS	100-YR PEAK DISCHARGE

S.C.I. #.11623
DATE: APRIL 1994 REVISED: MAY 1994

STANLEY CONSULTANTS, INC.
2929 EAST CAMELBACK ROAD, SUITE 130
PHOENIX, ARIZONA 85016 • (602) 912-6500
INTERNATIONAL CONSULTANTS IN ENGINEERING, ARCHITECTURE, PLANNING, AND MANAGEMENT

N
1"=100'

FROM ERIE AND ASSOCIATES
HYDRAULIC GRADING PLAN
DATE: JAN. 1988

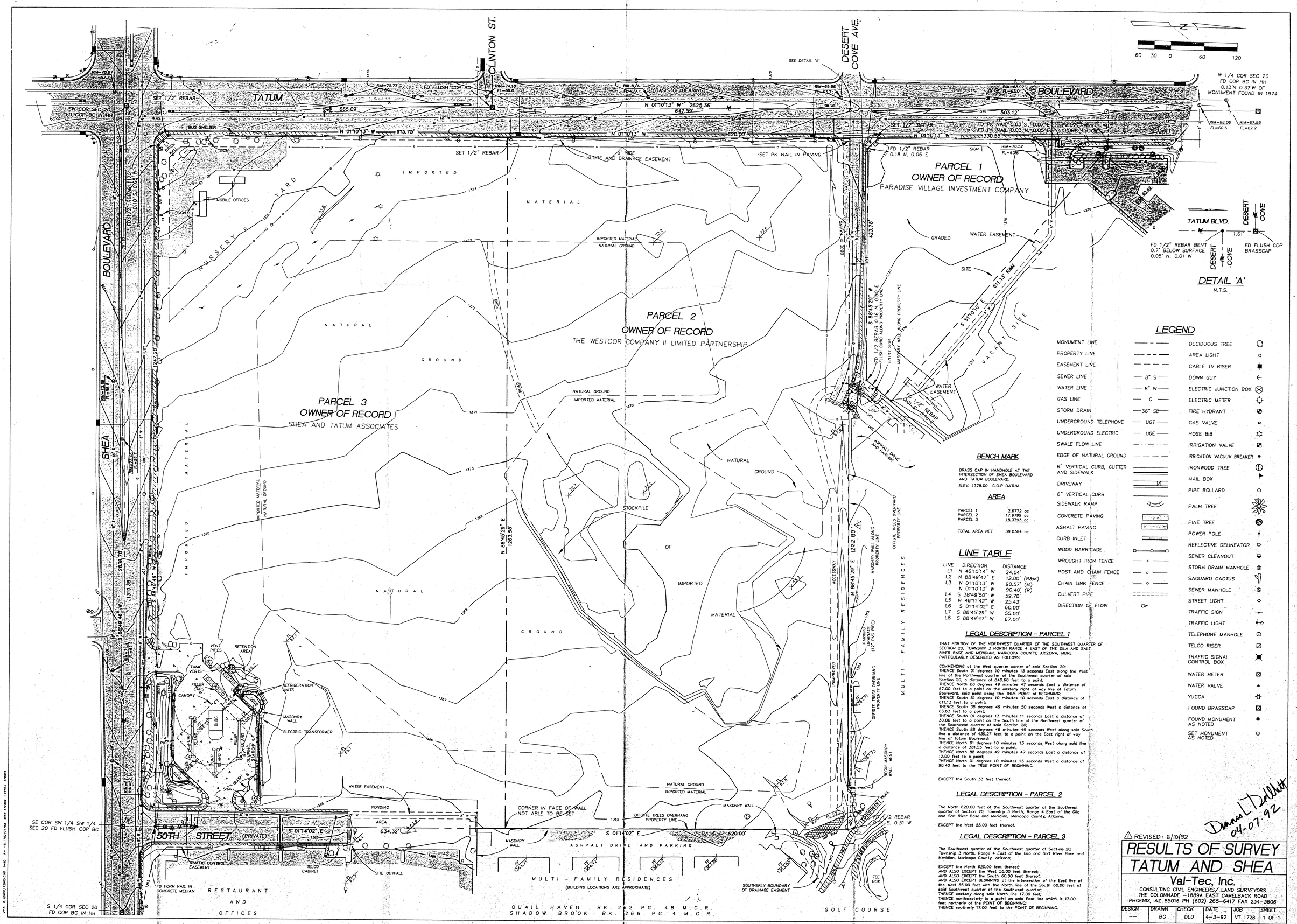
AERIAL MAPPING COMPANY, INC
PHOENIX, ARIZONA
263—5728

Flt: Date
JULY 11, 1991

CITY OF PHOENIX

Scale 1"= 100'

QUARTER SECTION NUMBER 29 - 39



LEGEND

MONUMENT LINE	DECIDUOUS TREE
PROPERTY LINE	AREA LIGHT
EASEMENT LINE	CABLE TV RISER
SEWER LINE — 8" S —	DOWN GUY
WATER LINE — 8" W —	ELECTRIC JUNCTION BOX
GAS LINE — G —	ELECTRIC METER
STORM DRAIN — 36" SD —	FIRE HYDRANT
UNDERGROUND TELEPHONE — UGT —	GAS VALVE
UNDERGROUND ELECTRIC — UGE —	HOSE BIB
SWALE FLOW LINE	IRRIGATION VALVE
EDGE OF NATURAL GROUND	IRRIGATION VACUUM BREAKER
6" VERTICAL CURB, GUTTER AND SIDEWALK	IRONWOOD TREE
DRIVEWAY	MAIL BOX
6" VERTICAL CURB	PIPE BOLLARD
SIDEWALK RAMP	PALM TREE
CONCRETE PAVING	PINE TREE
ASHALT PAVING	POWER POLE
CURB INLET	REFLECTIVE DELINEATOR
WOOD BARRICADE	SEWER CLEANOUT
WROUGHT IRON FENCE	STORM DRAIN MANHOLE
POST AND CHAIN FENCE	SAGUARO CACTUS
CHAIN LINK FENCE	SEWER MANHOLE
CULVERT PIPE	STREET LIGHT
DIRECTION OF FLOW	TRAFFIC SIGN
	TRAFFIC LIGHT
	TELEPHONE MANHOLE
	TELCO RISER
	TRAFFIC SIGNAL CONTROL BOX
	WATER METER
	WATER VALVE
	YUCCA
	FOUND BRASSCAP
	FOUND MONUMENT AS NOTED
	SET MONUMENT AS NOTED

BENCH MARK

BRASS CAP IN HANDHOLE AT THE INTERSECTION OF SHEA BOULEVARD AND TATUM BOULEVARD.

ELEV. 1378.00 C.O.P DATUM

AREA

PARCEL 1	2.6722 ac
PARCEL 2	17.9799 ac
PARCEL 3	18.3793 ac
TOTAL AREA NET	39.0364 ac

LINE TABLE

LINE	DIRECTION	DISTANCE
L1	N 46°10'14" W	24.04'
L2	N 88°49'47" E	12.00' (R&M)
L3	N 01°10'13" W	90.57' (M)
	N 01°10'13" W	90.40' (R)
L4	S 38°49'50" W	59.70'
L5	N 46°11'42" W	25.43'
L6	S 01°14'02" E	60.00'
L7	S 88°45'29" W	55.00'
L8	S 88°49'47" W	67.00'

LEGAL DESCRIPTION - PARCEL 1

THAT PORTION OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 20, TOWNSHIP 3 NORTH RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING at the West quarter corner of said Section 20;
THENCE South 01 degrees 10 minutes 13 seconds East along the West line of the Northwest quarter of the Southwest quarter of said Section 20, a distance of 840.68 feet to a point;
THENCE North 88 degrees 49 minutes 47 seconds East a distance of 67.00 feet to a point on the easterly right of way line of Tatum Boulevard, said point being the TRUE POINT OF BEGINNING;
THENCE South 51 degrees 10 minutes 10 seconds East a distance of 611.13 feet to a point;
THENCE South 38 degrees 49 minutes 50 seconds West a distance of 63.63 feet to a point;
THENCE South 01 degrees 13 minutes 11 seconds East a distance of 30.00 feet to a point on the South line of the Northwest quarter of the Southwest quarter of said Section 20;
THENCE South 88 degrees 46 minutes 49 seconds West along said South line a distance of 436.27 feet to a point on the East right of way line of Tatum Boulevard;
THENCE North 01 degrees 10 minutes 13 seconds West along said line a distance of 381.55 feet to a point;
THENCE North 88 degrees 49 minutes 47 seconds East a distance of 12.00 feet to a point;
THENCE North 01 degrees 10 minutes 13 seconds West a distance of 90.40 feet to the TRUE POINT OF BEGINNING.

EXCEPT the South 33 feet thereof.

LEGAL DESCRIPTION - PARCEL 2

The North 620.00 feet of the Southwest quarter of the Southwest quarter of Section 20, Township 3 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona.

EXCEPT the West 55.00 feet thereof.

LEGAL DESCRIPTION - PARCEL 3

The Southwest quarter of the Southwest quarter of Section 20, Township 3 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona;

EXCEPT the North 620.00 feet thereof;
AND ALSO EXCEPT the West 55.00 feet thereof;
AND ALSO EXCEPT the South 60.00 feet thereof;
AND ALSO EXCEPT BEGINNING at the intersection of the East line of the West 55.00 feet with the North line of the South 60.00 feet of said Southwest quarter of the Southwest quarter;
THENCE easterly along said North line 17.00 feet;
THENCE northwesterly to a point on said East line which is 17.00 feet northerly of the POINT OF BEGINNING;
THENCE southerly 17.00 feet to the POINT OF BEGINNING.

Donna L. Dellitt 04-07-92

△ REVISED: 8/10/92

RESULTS OF SURVEY
TATUM AND SHEA

Val-Tec, Inc.
CONSULTING CIVIL ENGINEERS/ LAND SURVEYORS
THE COLONNADE -1889A EAST CAMELBACK ROAD
PHOENIX, AZ 85016 PH (602) 265-6417 FAX 234-3606

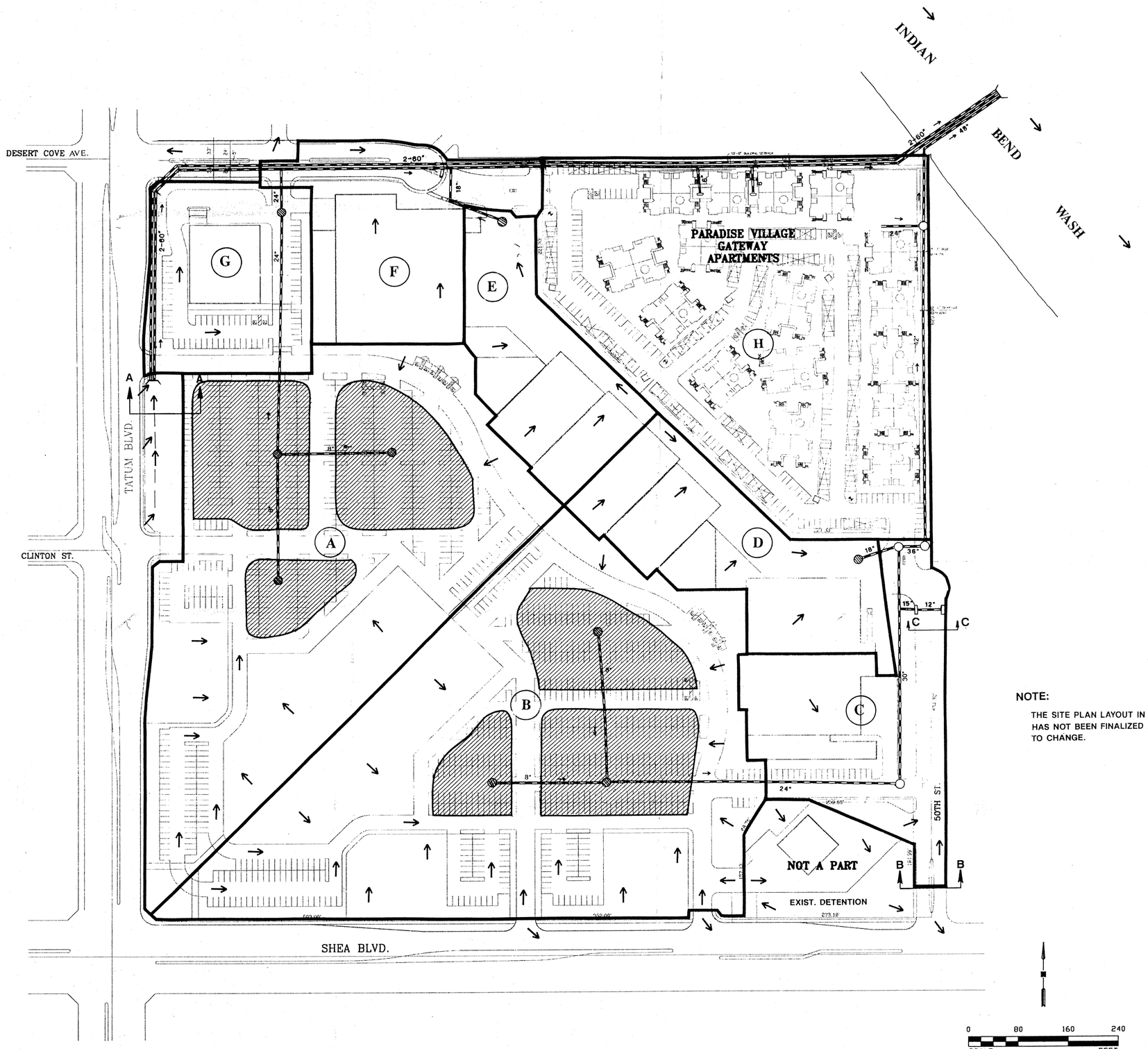
DESIGN	DRAWN	CHECK	DATE	JOB	SHEET
--	BG	DLD.	4-3-92	VT 1728	1 OF 1

EXHIBIT C
PARADISE VILLAGE GATEWAY

STANLEY CONSULTANTS, INC.
2929 E CAMELBACK RD SUITE 130
PHOENIX, ARIZONA 85016 • (602) 912-6500

PROJ 11623

APRIL 1994
REVISED: MAY 1994



NOTE:

THE SITE PLAN LAYOUT IN THIS EXHIBIT HAS NOT BEEN FINALIZED AND IS SUBJECT TO CHANGE.

LEGEND

- 24" — PROPOSED STORM DRAIN PIPE W/DIAM.
- → → DIRECTION OF FLOW
- A A — HYDRAULIC CROSS SECTION
- DRAINAGE SUB BASIN BOUNDARY
- (A) DRAINAGE SUB BASIN NAME
- PROPOSED ONSITE DETENTION

0 80 160 240
SCALE FEET

WESTCOR
NE CORNER OF TATUM & SHEA
EXHIBIT "D"
ONSITE DRAINAGE

WESTCOR
NE CORNER TATUM & SHEA

EXHIBIT A
OFFSITE DRAINAGE

LEGEND

N

1"=1000'

DRAINAGE SUB-BASIN BOUNDARY

(50) HEC-1 SUB-BASIN DESIGNATION

DIRECTION OF FLOW

NOTE:

BASE MAP REPRODUCED FROM USGS 7.5 MIN. QUARDRANGLES. (SUNNYSLOPE & PARADISE VALLEY)

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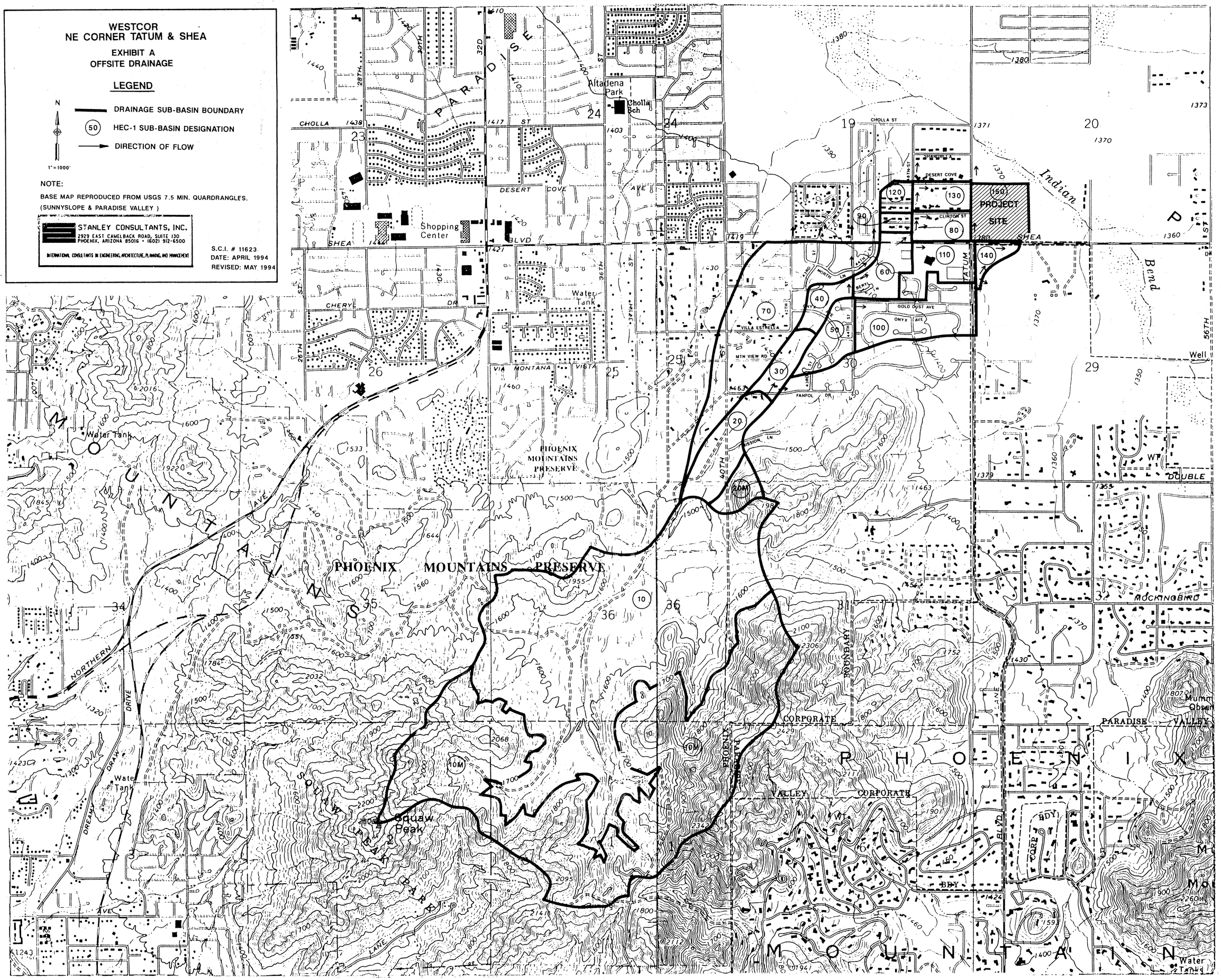
S.C.I. # 11623
DATE: APRIL 1994
REVISED: MAY 1994



APPENDIX B
OFF-SITE HYDROLOGY

STANLEY CONSULTANTS, INC.

WESTCOR TATUM/SHEA JOB # 11623 APRIL 1994
OFF-SITE HYDROLOGY (EXISTING CONDITIONS)

SUMMARY TABLE HEC-1 MODEL 11623H1P (2-hr storm distribution, 100-yr frequency)

Location	Q_{100} (cfs)	T_p (hr)	V_{100} (ac-ft)	Comments
SUM10	2738	1.33	122	From Phx. Mountain Preserve.
SUM80A	1835	1.58	117	@ Tatum & Clinton from the west.
SUM110	197	1.25	11	@ Intersection Tatum & Shea.
SM150A	424	1.58	18	Off-site discharge to project site.

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*          SEPTEMBER 1990              *
*            VERSION 4.0               *
*                                      *
*  RUN DATE  04/11/1994  TIME  09:08:28 *
*                                      *
****************************************
```

```
************************************
*                                  *
*    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


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

  1           ID
  2           ID        WESTCOR TATUM AND SHEA OFFSITE HYDROLOGY  100-YR, 2-HR
  3           ID        STANLEY CONSULTANTS JOB # 11623
  4           ID        HEC-1 MODEL INPUT FILENAME: 11623H1P
  5           ID
  6           ID        ****************************************************************
  7           ID        THE METHODOLOGY APPLIED IN THIS MODEL IS BASED ON THE DRAINAGE
  8           ID        DESIGN MANUAL FOR MARICOPA COUNTY, VOLUME 1, HYDROLOGY.
  9           ID        ****************************************************************
 10           ID
 11           ID        1. CLARK UNIT HYDROGRAPH
 12           ID
 13           ID        2. 2-HR STORM DISTRIBUTION. TOTAL CONTRIBUTING AREA OF 2.50 SQ MI.
 14           ID           100-YR RAINFALL TOTAL OF 2.77 IN BASED ON NOAA ISOPLUVIALS AND
 15           ID           PREFRE COMPUTER PROGRAM. AERIAL REDUCTION COEFFICIENT OF 0.977
 16           ID           BASED ON TABLE 2.2 OF HYDROLOGY MANUAL AND TOTAL CONTRIBUTING
 17           ID           AREA OF 2.50 SQ MI.
 18           ID
 19           ID        3. COMPUTATION TIME INTERVAL:  5 MIN
 20           ID
 21           ID        4. GREEN-AMPT LOSS RATES FOR EXISTING OFFSITE AREA BASED ON FCD HEC-1
 22           ID           MODEL TATUM WASH PROJECT DATED 01-01-94. SURFACE RETENTION LOSS (IA)
 23           ID           ESTIMATED BASED ON TABLE 4.1 OF HYDROLOGY MANUAL EXCEPT WHEN ONSITE
 24           ID           DETENTION OR RETENTION IS PRESENT, IN WHICH CASE, IA IS INCREASED.
 25           ID           PERCENT IMPERVIOUS ESTIMATED BASED ON LAND USE FOR DEVELOPED SUB-
 26           ID           BASINS OR ROCK OUTCROP FOR PHX MTN PRESERVE SUB-BASINS.
 27           ID
 28           ID        5. TIME OF CONCENTRATION (TC), AND STORAGE COEFFICIENT (R), BASED ON
 29           ID           MCUHP1 (REVISED 12-16-91). LENGTHS AND SLOPES ESTIMATED FROM U.S.G.S.
 30           ID           7.5 MIN QUADRANGLES. Kb BASED ON THE FOLLOWING m AND b PARAMETERS
 31           ID           WHICH ARE ESTIMATED FROM TABLE 5.1 OF HYDROLOGY MANUAL. VALUES ARE
 32           ID           AREA-WEIGHTED FOR COMPOSITE LAND USE.
 33           ID
 34           ID           LAND USE                                  m        b     SUB BASIN
 35           ID           ---------------------------------------  --------  -----  -----------
 36           ID           A.  MED-HIGH DENSE RES, COMMERCIAL,      -0.00625  0.040  70, 80, 100,
 37           ID               OFFICE, CHURCH & VACANT LOTS                          110, 140 &
 38           ID                                                                     150
 39           ID           A1. MED-LOW DENSE RESIDENTIAL            -0.01000  0.060  40, 50, 60,
 40           ID                                                                     70, 80, 90,
 41           ID                                                                     100, 120 &
 42           ID                                                                     130
 43           ID           B.  VERY LOW DENSE RESIDENTIAL           -0.01375  0.080  20,30 & 150
 44           ID           C.  EXISTING DESERT (0-10% SLOPE)        -0.02500  0.150  10
 45           ID           D.  MOUNTAIN PRESERVE (>10% SLOPE)       -0.03000  0.200  10M & 20M
 46           ID
 47           ID        6. TIME-AREA RELATION FROM TABLE 5.2:
 48           ID           A. EXIST MOUNTAIN PRESERVE SUB-BASINS USE NATURAL TIME-AREA UA
 49           ID              RECORD.
 50           ID           B. ALL OTHER SUB-BASINS USE URBAN TIME-AREA UA RECORD.
 51           ID
 52           ID        7. HYDROGRAPH ROUTING THRU STREET REACH USES KINEMATIC WAVE AND ASSUMES:
 53           ID           TRAPEZOID CHANNEL, B=50' OR 100'; SIDE SLOPE 1V:0.01H; "n" = 0.016;
 54           ID           SLOPE ESTIMATED FROM U.S.G.S. QUADS AND STANLEY SUPPLEMENTAL SURVEY.
 55           ID
```



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

 56           ID        8. HYDROGRAPH ROUTING THRU MAIN WASH CHANNEL USES NORMAL DEPTH MODIFIED
 57           ID           PULS ASSUMING THE FOLLOWING:
 58           ID           A. 8-POINT XSECTN WITH LOW FLOW AND OVERBANKS
```

```
 59          ID          B. NSTPS = ESTIMATED TRAVEL TIME / COMP TIME INTERVAL
 60          ID              TRAVEL TIME BASED ON ASSUMED FLOW VEL OF 5FT/SEC
 61          ID          C. INFILTRATION/PERCOLATION IS ZERO
 62          ID          D. INITIAL DISCHARGE IS ZERO
 63          ID
 64          ID        9. HYDROGRAPH  FLOW SPLIT DIVERSIONS BASED ON COMBINATION OF STANLEY
 65          ID           FIELD SURVEY DATA AND FIELD VISITS.
 66          ID
             *DIAGRAM
 67          IT       5                    100
 68          IO       5

 69          KK  SUB10M     RUNOFF HYDROGRAPH FROM SUB-BASIN 10M
 70          BA    .797
 71          IN       5
 72          PB   2.706
 73          PC    .000    .011    .018    .023    .028    .032    .046    .071    .100    .137
 74          PC    .176    .232    .327    .601    .743    .863    .901    .930    .954    .962
 75          PC    .970    .979    .982    .992   1.000
 76          LG    .250    .350   4.300    .510  15.000
 77          UC    .192    .027
 78          UA       0       3       5       8      12      20      43      75      90      96
 79          UA     100

 80          KK   RCH10     ROUTE HYDROGRAPH SUB10M THRU REACH 10
 81          RS       8    FLOW       0
 82          RC    .065     .05    .065    7500     .17
 83          RX     100     100     335     345     355     365     600     600
 84          RY   110.0   107.0   105.0   100.0   100.0   105.0   107.0   110.0

 85          KK   SUB10     RUNOFF HYDROGRAPH FROM SUB-BASIN 10
 86          BA    .903
 87          LG    .200    .350   4.300    .510  10.000
 88          UC    .696    .384
 89          UA       0       3       5       8      12      20      43      75      90      96
 90          UA     100

 91          KK   SUM10     COMBINE HYDROGRAPHS SUB10 AND RCH10
 92          HC       2

 93          KK  RCH20A     ROUTE HYDROGRAPH SUM10 ALONG MAIN CHANNEL TO 40TH STREET
 94          RS       2    FLOW       0
 95          RC    .065     .05    .065    1700     .11
 96          RX     100     100     200     210     240     250     350     350
 97          RY   110.0   107.0   105.0   100.0   100.0   105.0   107.0   110.0

 98          KK  SUB20M     RUNOFF HYDROGRAPH FROM SUB-BASIN 20M
 99          BA    .025
100          LG    .200    .350   4.300    .510  15.000
101          UC    .171    .112
102          UA       0       3       5       8      12      20      43      75      90      96
103          UA     100
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

104          KK  RCH20B     ROUTE HYDROGRAPH SUB20M ALONG 40TH STREET TO MAIN WASH
105          RS       1    FLOW       0
106          RC     .06     .04     .05    1100     .03
107          RX     100     100     191     197     202     208     300     300
108          RY   110.0   105.0   103.0   100.0   100.0   103.0   105.0   110.0

109          KK   SUM20     COMBINE HYDROGRAPHS RCH20A AND RCH20B
110          HC       2

111          KK  RCH20C     ROUTE HYDROGRAPH SUM20 ALONG MAIN WASH TO FANFOL DRIVE
112          RS       1    FLOW       0
113          RC    .065     .05    .065    1300    .013
114          RX     100     100     170     185     215     255     300     300
115          RY   110.0   107.0   105.0   100.0   100.0   105.0   107.0   110.0

116          KK   SUB20     RUNOFF HYDROGRAPH FROM SUB-BASIN 20
117          BA    .067
118          LG    .200    .350   4.300    .510   5.000
119          UC    .300    .278
120          UA       0       3       5       8      12      20      43      75      90      96
121          UA     100

122          KK   SUM20     COMBINE HYDROGRAPHS RCH20C AND SUB20
123          HC       2

124          KK  DVT20N     SPLIT HYDROGRAPH SUM20. DVT20N GOES NORTH THRU SUB-BASIN 30 AND
125          KM             DIVERTED HYDROGRAPH DVR20E GOES EAST OUT OF MODEL
126          DT  DVR20E
127          DI       0     129     418     840    1390    2070    2530    3080    3700
128          DQ       0       0       0       0       0       0      69     195     358

129          KK  RCH30A     ROUTE HYDROGRAPH DVT20N THRU REACH 30A, SINGLE CHANNEL
130          RS       1    FLOW       0
131          RC    .065     .04    .065     900    .010
132          RX     100     100     167     185     215     239     300     300
133          RY   110.0   106.0   106.0   100.0   100.0   106.0   106.0   110.0

134          KK  RCH30B     ROUTE HYDROGRAPH RCH30A THRU REACH 30B, DOUBLE CHANNEL
135          RS       1    FLOW       0
136          RC    .040     .06    .040     900    .013
137          RX     100     116     146     154     254     262     277     285
138          RY   104.0   100.0   100.0   102.0   102.0   100.0   100.0   104.0
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139          KK   SUB30     RUNOFF HYDROGRAPH FROM SUB-BASIN 30
140          BA    .031
141          LG    .200    .350   4.300    .490   5.000
142          UC    .271    .266
143          UA       0       5      16      30      65      77      84      90      94      97
144          UA     100
```



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

145          KK   SUM30     COMBINE HYDROGRAPHS RCH30B AND SUB30
146          HC       2

147          KK  RCH40A     ROUTE HYDROGRAPH SUM30 THRU REACH 40A
148          RS       1    FLOW       0
149          RC    .065     .04    .065    1100    .017
150          RX     100     100     105     120     180     195     200     200
151          RY   110.0   105.0   105.0   100.0   100.0   105.0   105.0   110.0

152          KK   SUB40     RUNOFF HYDROGRAPH FROM SUB-BASIN 40
153          BA    .027
154          LG    .200    .350   4.300    .490  15.000
155          UC    .167    .153
156          UA       0       5      16      30      65      77      84      90      94      97
157          UA     100

158          KK   SUM40     COMBINE HYDROGRAPHS RCH40A AND SUB40
159          HC       2

160          KK   SUB50     RUNOFF HYDROGRAPH FROM SUB-BASIN 50
161          BA    .044
162          LG    .200    .350   4.300    .490  15.000
163          UC    .150    .101
164          UA       0       5      16      30      65      77      84      90      94      97
165          UA     100

166          KK  DVT50N     SPLIT HYDROGRAPH SUB50. 50% GOES NORTH IN 44TH STREET (DVT50N)
167          KM             AND 50% GOES EAST IN GOLD DUST (DVR50E)
168          DT  DVR50E
169          DI       0      20      50     100     200     300
170          DQ       0      10      25      50     100     150

171          KK  RCH40B     ROUTE HYDROGRAPH DVT50N NORTH IN 44TH STREET
172          RK     500    .017    .016            TRAP      50    0.01

173          KK   SUM40     COMBINE HYDROGRAPHS SUM40 AND RCH40B
174          KM             TOTAL FLOW AT MAIN CHANNEL AND 44TH STREET
175          HC       2

176          KK  DVT40E     SPLIT HYDROGRAPH SUM40. DVT40E GOES EAST THRU MAIN CHANNEL
177          KM             AND DIVERTED HYDROGRAPH DVR40N GOES NORTH IN 44TH STREET
178          DT  DVR40N
179          DI       0     100     500     956    1577    2277    3101
180          DQ       0       0       0       6      77     177     301

181          KK  RCH60N     ROUTE HYDROGRAPH DVT40E THRU REACH 60N (MAIN CHANNEL)
182          KO       1
183          RS       1    FLOW       0
184          RC    .035    .035    .035    1500    .011
185          RX     100     100     101     113     191     203     205     205
186          RY   110.0   104.0   103.0   100.0   100.0   103.0   104.0   110.0
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

187          KK   SUB60     RUNOFF HYDROGRAPH FROM SUB-BASIN 60
188          BA    .045
189          LG    .730    .350   3.500    .310  35.000
190          UC    .154    .123
191          UA       0       5      16      30      65      77      84      90      94      97
192          UA     100

193          KK   SUB70     RUNOFF HYDROGRAPH FROM SUB-BASIN 70
194          BA    .233
195          LG    .200    .350   3.500    .310  16.000
196          UC    .271    .233
197          UA       0       5      16      30      65      77      84      90      94      97
198          UA     100

199          KK  DVR40N     RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH FROM SUB40 (DVR40N)
200          DR  DVR40N

201          KK  DVT70A     SPLIT HYDROGRAPH DVR40N. DVT70A GOES NORTH IN 44TH STREET TO SHEA
202          KM             AND DVR70B GOES EAST IN 44TH PLACE (NORTH LANE)
203          DT  DVR70B
204          DI       0      10      50     116     423
205          DQ       0       0       8      16      73

206          KK   SUM70     COMBINE HYDROGRAPHS SUB70 AND DVT70A
207          HC       2

208          KK  DVT70C     SPLIT HYDROGRAPH SUM70. DVT70C GOES EAST IN SHEA AND
209          KM             DVR70D GOES NORTH OUT OF MODEL
210          DT  DVR70D
211          DI       0      35     100     200     300     400
212          DQ       0       0      65     165     265     365

213          KK  DVR70B     RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH FROM SUB70 (DVR70B)
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214          DR  DVR70B

215          KK   SUM70     COMBINE HYDROGRAPHS DVT70C & DVR70B (TOTAL FLOW @ 44TH PL & SHEA)
216          HC       2

217          KK  DVT70E     SPLIT HYDROGRAPH SUM70. DVT70E GOES EAST IN SHEA AND
218          KM             DVR70F GOES NORTH OUT OF MODEL
219          DT  DVR70F
220          DI       0      50     100     130     318
221          DQ       0      50     100     125     300
222          KM        KKRCH60E     ROUTE HYDROGRAPH DVT70E THRU REACH 60E (SHEA BLVD TO
223          KM        KM           MAIN CHANNEL)
224          KM        RK   500    .014    .016            TRAP     100    0.01
225          KM        KK SUM60     COMBINE HYDROGRAPHS RCH60N, SUB60 AND RCH60E
226          KM        HC     3
1                                   HEC-1 INPUT                                                PAGE  6

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

227          KK   SUM60     COMBINE HYDROGRAPHS RCH60N, SUB60 AND DVT70E
228          HC       3

229          KK  DVT60A     SPLIT HYDROGRAPH SUM60. DVT60A STAYS IN MAIN CHANNEL AND
230          KM             DVR60B GOES EAST IN SHEA
231          DT  DVR60B
232          DI       0     100     500    1000    1500    2387    3270
233          DQ       0       0       0       0       0      17     150

234          KK  DVT60C     SPLIT HYDROGRAPH DVT60A. DVT60C STAYS IN MAIN CHANNEL AND
235          KM             DVR60D GOES NORTH IN 46TH STREET
236          DT  DVR60D
237          DI       0     100     329     510     878    1325    2157    3279
238          DQ       0       0       6      43     134     258     407     579

239          KK  RCH80A     ROUTE HYDROGRAPH DVT60C THRU SUB80 (PARKING LOT)
240          RS       1    FLOW       0
241          RC    .065     .04    .045     700    .009
242          RX     100     100     101     107     122     162     200     200
243          RY   110.0   103.0   103.0   100.0   100.0   102.0   103.0   110.0

244          KK  RCH80B     ROUTE HYDROGRAPH RCH80A THRU RCH80B (VACANT PARCEL)
245          RS       1    FLOW       0
246          RC    .065     .05    .065     700    .009
247          RX     100     100     243     247     252     256     400     400
248          RY   110.0   103.0   102.0   100.0   100.0   102.0   103.0   110.0

249          KK   SUB80     RUNOFF HYDROGRAPH FROM SUB-BASIN 80
250          BA    .033
251          LG    .240    .350   3.500    .280  40.000
252          UC    .150    .110
253          UA       0       5      16      30      65      77      84      90      94      97
254          UA     100

255          KK  DVR60D     RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH FROM SUB60 (DVR60D)
256          DR  DVR60D

257          KK   RCH90     ROUTE HYDROGRAPH DVR60D NORTH IN 46TH STREET TO CLINTON STREET
258          RK     400    .008    .016            TRAP      50    0.01

259          KK   SUB90     RUNOFF HYDROGRAPH FROM SUB-BASIN 90
260          BA    .011
261          LG    .200    .350   3.500    .280  15.000
262          UC    .150    .130
263          UA       0       5      16      30      65      77      84      90      94      97
264          UA     100

265          KK   SUM90     COMBINE HYDROGRAPHS RCH90 AND SUB90
266          HC       2
1                                   HEC-1 INPUT                                                PAGE  7

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

267          KK  DVT90E     SPLIT HYDROGRAPH SUM90. DVT90E GOES EAST IN CLINTON STREET AND
268          KM             DVR90N GOES NORTH IN 46TH STREET
269          DT  DVR90N
270          DI       0      50     102     236     578
271          DQ       0      50     100     220     490

272          KK  RCH80C     ROUTE HYDROGRAPH DVT90E EAST IN CLINTON STREET TO TATUM
273          RK    1300    .008    .016            TRAP      50    0.01

274          KK  SUM80A     COMBINE HYDROGRAPHS RCH80B, SUB80 AND RCH80C
275          HC       3

276          KK  DVR50E     RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH FROM SUB50 (DVR50E)
277          DR  DVR50E

278          KK  RCH100     ROUTE HYDROGRAPH DVR50E IN GOLD DUST TO TATUM
279          RK    2700    .011    .016            TRAP      50    0.01

280          KK  SUB100     RUNOFF HYDROGRAPH FROM SUB-BASIN 100
281          BA    .098
282          LG    .750    .350   3.500    .290  19.000
283          UC    .283    .247
284          UA       0       5      16      30      65      77      84      90      94      97
285          UA     100

286          KK  SUM100     COMBINE HYDROGRAPHS RCH100 AND SUB100
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287          HC       2

288          KK  DT100N     SPLIT HYDROGRAPH SUM100. DT100N GOES NORTH IN TATUM AND
289          KM             DR100E GOES EAST THRU SUB140
290          DT  DR100E
291          DI       0      25      50      75     100     125     150
292          DQ       0       0       0      25      50      75     100

293          KK  RC110N     ROUTE HYDROGRAPH DT100N NORTH IN TATUM TO SHEA
294          RK     750    .005    .016            TRAP     100    0.01

295          KK  DVR60B     RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH FROM SUM60 (DVR60B)
296          DR  DVR60B

297          KK  RC110E     ROUTE HYDROGRAPH DVR60B EAST IN SHEA TO TATUM
298          RK    1300    .009    .016            TRAP     100    0.01

299          KK  SUB110     RUNOFF HYDROGRAPH FROM SUB-BASIN 110
300          BA    .053
301          LG    .230    .350   3.500    .280  69.000
302          UC    .183    .163
303          UA       0       5      16      30      65      77      84      90      94      97
304          UA     100
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

305          KK  SUM110     COMBINE HYDROGRAPHS RCH110N, RC110E AND SUB110
306          HC       3

307          KK  DT110N     SPLIT HYDROGRAPH SUM110 50/50. DT110N GOES NORTH IN TATUM AND
308          KM             DR110E GOES EAST IN SHEA
309          DT  DR110E
310          DI       0      20      40      60      80     100     150     200     300
311          DQ       0      10      20      30      40      50      75     100     150

312          KK  DVT80A     SPLIT HYDROGRAPH DT110N
313          KM             DVR80B GOES ACROSS PROJECT SITE
314          DT  DVR80B
315          DI       0       3       6       3      63     125
316          DQ       0       0       0       0       0      75

317          KK  SUM80B     COMBINE HYDROGRAPHS SUB80A AND DVT80A
318          KM             TOTAL FLOW AT TATUM AND CLINTON
319          HC       2

320          KK  DVT80C     SPLIT HYDROGRAPH DVT80A
321          KM             DVR80D GOES ACROSS PROJECT SITE
322          DT  DVR80D
323          DI       0      50     100     544    1230    2649
324          DQ       0       0       0      44     230     649

325          KK  RC130A     ROUTE HYDROGRAPH DVT80C NORTH IN TATUM TO DESERT COVE
326          RK     650    .006    .016            TRAP     100    0.01

327          KK  DVR90N     RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH FROM SUM90 (DVR90N)
328          DR  DVR90N

329          KK  RCH120     ROUTE HYDROGRAPH DVR90N NORTH IN 46TH STREET TO DESERT COVE
330          RK     650    .007    .016            TRAP      50    0.01

331          KK  SUB120     RUNOFF HYDROGRAPH FROM SUB-BASIN 120
332          BA    .016
333          LG    .200    .350   3.500    .280  15.000
334          UC    .158    .125
335          UA       0       5      16      30      65      77      84      90      94      97
336          UA     100

337          KK  SUM120     COMBINE HYDROGRAPHS RCH120 AND SUB120
338          HC       2

339          KK  DT120E     SPLIT HYDROGRAPH SUM120. DT120E GOES EAST IN DESERT COVE AND
340          KM             DR120N GOES NORTH IN 46TH STREET OUT OF MODEL
341          DT  DR120N
342          DI       0      31      67     390     630
343          DQ       0      30      50     316     490
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

344          KK  RC130B     ROUTE HYDROGRAPH DT120E EAST IN DESERT COVE TO TATUM
345          RK    1300    .007    .016            TRAP      50    0.01

346          KK  SUB130     RUNOFF HYDROGRAPH FROM SUB-BASIN 130
347          BA    .030
348          LG    .200    .350   3.500    .280  15.000
349          UC    .237    .224
350          UA       0       5      16      30      65      77      84      90      94      97
351          UA     100

352          KK  SUM130     COMBINE HYDROGRAPHS RC130A, RC130B AND SUB130
353          KM             TOTAL FLOW AT TATUM AND DESERT COVE
354          HC       3

355          KK  DR100E     RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH FROM SUM100 (DR100E)
356          DR  DR100E

357          KK  DT140N     SPLIT HYDROGRAPH DR100E. DT140N GOES NORTH THRU SUB140 (75%) AND
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358          KM                DR140E GOES EAST OUT OF MODEL (25%)
359          DT   DR140E
360          DI        0      100      200      300      400      500
361          DQ        0       25       50       75      100      125

362          KK   RC140A      ROUTE HYDROGRAPH DT140N NORTH THRU SUB140
363          RK     1300     .007    .016             TRAP      50    0.01

364          KK   SUB140      RUNOFF HYDROGRAPH FROM SUB-BASIN 140
365          BA     .017
366          LG    1.300     .350   3.500    .260  60.000
367          UC     .175     .188
368          UA        0        5       16       30       65       77       84       90       94       97
369          UA      100

370          KK   DR110E      RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH FROM SUM110 (DR110E)
371          DR   DR110E

372          KK   RC140B      ROUTE HYDROGRAPH DR110E EAST IN SHEA TO 50TH STREET
373          KM                ASSUMING NO BREAK OUT TO NORTH THRU PROJECT SITE
374          RK     1300     .008    .016             TRAP     100    0.01

375          KK   SUM140      COMBINE HYDROGRAPHS RC140A, SUB140 AND RC140B
376          KM                TOTAL FLOW AT SHEA AND 50TH STREET
377          HC        3

378          KK   DVR80B      RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH DVR80B
379          DR   DVR80B

380          KK   DVR80D      RETRIEVE PREVIOUSLY SPLIT HYDROGRAPH DVR80D
381          DR   DVR80D
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

382          KK   SM150A      COMBINE HYDROGRAPHS DVR80B AND DVR80D
383          HC        2

384          KK   RCH150      ROUTE HYDROGRAPHS SM150A ACROSS EXISTING PROJECT SITE
385          RK     1400     .007    .060             TRAP     200    0.01

386          KK   SUB150      RUNOFF HYDROGRAPH FROM SUB-BASIN 150
387          KM                ASSUMES TOTAL PROJECT SITE OUTFALLS TO A SINGLE CONCENTRATION POINT
388          BA     .058
389          LG     .200     .350   3.500    .320    .000
390          UC     .221     .128
391          UA        0        5       16       30       65       77       84       90       94       97
392          UA      100

393          KK   SM150B      COMBINE HYDROGRAPHS RCH159 AND SUB150
394          HC        2
395          ZZ
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1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   69     SUB10M
               V
               V
   80      RCH10
               .
               .
   85          .        SUB10
               .           .
               .           .
   91      SUM10............
               V
               V
   93     RCH20A
               .
               .
   98          .      SUB20M
               .           V
               .           V
  104          .      RCH20B
               .           .
               .           .
  109      SUM20............
               V
               V
  111     RCH20C
               .
               .
  116          .        SUB20
               .           .
               .           .
  122      SUM20............
               .
               .
  126          .-------> DVR20E
  124     DVT20N
               V
               V
  129     RCH30A
               V
               V
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134     RCH30B
          .
          .
139       .        SUB30
          .           .
          .           .
145    SUM30............
          V
          V
147     RCH40A
          .
          .
152       .        SUB40
          .           .
          .           .
158    SUM40............
          .
          .
160       .        SUB50
          .           .
          .           .
168       .           .-------> DVR50E
166       .      DVT50N
          .           V
          .           V
171       .      RCH40B
          .           .
          .           .
173    SUM40............
          .
          .
178       .-------> DVR40N
176     DVT40E
          V
          V
181     RCH60N
          .
          .
187       .        SUB60
          .           .
          .           .
193       .           .      SUB70
          .           .        .
          .           .        .
200       .           .        .<-------- DVR40N
199       .           .      DVR40N
          .           .        .
          .           .        .
203       .           .        .-------> DVR70B
201       .           .      DVT70A
          .           .        .
          .           .        .
206       .           .      SUM70............
          .           .        .
          .           .        .
210       .           .        .-------> DVR70D
208       .           .     DVT70C
          .           .        .
          .           .        .
214       .           .        .<-------- DVR70B
213       .           .      DVR70B
          .           .        .
          .           .        .
215       .           .      SUM70............
          .           .        .
          .           .        .
219       .           .        .-------> DVR70F
217       .           .     DVT70E
          .           .        .
          .           .        .
227    SUM60........................
          .
          .
231       .-------> DVR60B
229     DVT60A
          .
          .
236       .-------> DVR60D
234     DVT60C
          V
          V
239     RCH80A
          V
          V
244     RCH80B
          .
          .
249       .        SUB80
          .           .
          .           .
256       .           .        .<-------- DVR60D
255       .           .     DVR60D
          .           .        V
          .           .        V
257       .           .      RCH90
          .           .        .
          .           .        .
259       .           .        .      SUB90
          .           .        .        .
          .           .        .        .
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```
265                 .           .       SUM90............
                    .           .           .
                    .           .           .-------> DVR90N
269                 .           .
267                 .           .      DVT90E
                    .           .           V
                    .           .           V
272                 .           .      RCH80C
                    .           .           .
                    .           .           .
274           SUM80A........................
                    .
                    .
277                 .           .<------- DVR50E
276                 .      DVR50E
                    .           V
                    .          -V
278                 .      RCH100
                    .           .
                    .           .
280                 .           .      SUB100
                    .           .           .
                    .           .           .
286                 .      SUM100............
                    .           .
                    .           .
290                 .           .-------> DR100E
288                 .      DT100N
                    .           V
                    .           V
293                 .      RC110N
                    .           .
                    .           .
296                 .           .           .<------- DVR60B
295                 .           .      DVR60B
                    .           .           V
                    .           .           V
297                 .           .      RC110E
                    .           .           .
                    .           .           .
299                 .           .           .      SUB110
                    .           .           .           .
                    .           .           .           .
305                 .      SUM110........................
                    .           .
                    .           .
309                 .           .-------> DR110E
307                 .      DT110N
                    .           .
                    .           .
314                 .           .-------> DVR80B
312                 .      DVT80A
                    .           .
                    .           .
317           SUM80B............
                    .
                    .
322                 .-------> DVR80D
320           DVT80C
                    V
                    V
325           RC130A
                    .
                    .
328                 .           .<------- DVR90N
327                 .      DVR90N
                    .           V
                    .           V
329                 .      RCH120
                    .           .
                    .           .
331                 .           .      SUB120
                    .           .           .
                    .           .           .
337                 .      SUM120............
                    .           .
                    .           .
341                 .           .-------> DR120N
339                 .      DT120E
                    .           V
                    .           V
344                 .      RC130B
                    .           .
                    .           .
346                 .           .      SUB130
                    .           .           .
                    .           .           .
352           SUM130........................
                    .
                    .
356                 .           .<------- DR100E
355                 .      DR100E
                    .           .
                    .           .
359                 .           .-------> DR140E
357                 .      DT140N
                    .           V
                    .           V
362                 .      RC140A
                    .           .
```

```
364                 SUB140
                       .
                       .
371                    .<-------- DR110E
370                    .     DR110E
                       .        V
                       .        V
372                    .     RC140B
                       .        .
                       .        .
375            SUM140.......................
                       .
                       .
379                    .<-------- DVR80B
378                 DVR80B
                       .
                       .
381                    .<-------- DVR80D
380                    .     DVR80D
                       .        .
                       .        .
382                 SM150A............
                       V
                       V
384                 RCH150
                       .
                       .
386                    .     SUB150
                       .        .
                       .        .
393                 SM150B............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990             *
*             VERSION 4.0               *
*                                       *
*  RUN DATE  04/11/1994  TIME  09:08:28 *
*                                       *
*****************************************
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```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*          (916) 756-1104           *
*                                   *
*************************************
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WESTCOR TATUM AND SHEA OFFSITE HYDROLOGY 100-YR, 2-HR
STANLEY CONSULTANTS JOB # 11623
HEC-1 MODEL INPUT FILENAME: 11623H1P

****
THE METHODOLOGY APPLIED IN THIS MODEL IS BASED ON THE DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY, VOLUME 1, HYDROLOGY.
****

1. CLARK UNIT HYDROGRAPH

2. 2-HR STORM DISTRIBUTION. TOTAL CONTRIBUTING AREA OF 2.50 SQ MI. 100-YR RAINFALL TOTAL OF 2.77 IN BASED ON NOAA ISOPLUVIALS AND PREFRE COMPUTER PROGRAM. AERIAL REDUCTION COEFFICIENT OF 0.977 BASED ON TABLE 2.2 OF HYDROLOGY MANUAL AND TOTAL CONTRIBUTING AREA OF 2.50 SQ MI.

3. COMPUTATION TIME INTERVAL: 5 MIN

4. GREEN-AMPT LOSS RATES FOR EXISTING OFFSITE AREA BASED ON FCD HEC-1 MODEL TATUM WASH PROJECT DATED 01-01-94. SURFACE RETENTION LOSS (IA) ESTIMATED BASED ON TABLE 4.1 OF HYDROLOGY MANUAL EXCEPT WHEN ONSITE DETENTION OR RETENTION IS PRESENT, IN WHICH CASE, IA IS INCREASED. PERCENT IMPERVIOUS ESTIMATED BASED ON LAND USE FOR DEVELOPED SUB-BASINS OR ROCK OUTCROP FOR PHX MTN PRESERVE SUB-BASINS.

5. TIME OF CONCENTRATION (TC), AND STORAGE COEFFICIENT (R), BASED ON MCUHP1 (REVISED 12-16-91). LENGTHS AND SLOPES ESTIMATED FROM U.S.G.S. 7.5 MIN QUADRANGLES. Kb BASED ON THE FOLLOWING m AND b PARAMETERS WHICH ARE ESTIMATED FROM TABLE 5.1 OF HYDROLOGY MANUAL. VALUES ARE AREA-WEIGHTED FOR COMPOSITE LAND USE.

LAND USE	m	b	SUB BASIN
A. MED-HIGH DENSE RES, COMMERCIAL, OFFICE, CHURCH & VACANT LOTS	-0.00625	0.040	70, 80, 100, 110, 140 & 150
A1. MED-LOW DENSE RESIDENTIAL	-0.01000	0.060	40, 50, 60, 70, 80, 90, 100, 120 & 130
B. VERY LOW DENSE RESIDENTIAL	-0.01375	0.080	20,30 & 150
C. EXISTING DESERT (0-10% SLOPE)	-0.02500	0.150	10
D. MOUNTAIN PRESERVE (>10% SLOPE)	-0.03000	0.200	10M & 20M

6. TIME-AREA RELATION FROM TABLE 5.2:
   A. EXIST MOUNTAIN PRESERVE SUB-BASINS USE NATURAL TIME-AREA UA RECORD.
   B. ALL OTHER SUB-BASINS USE URBAN TIME-AREA UA RECORD.

7. HYDROGRAPH ROUTING THRU STREET REACH USES KINEMATIC WAVE AND ASSUMES:

TRAPEZOID CHANNEL, B=50' OR 100'; SIDE SLOPE 1V:0.01H; "n" = 0.016;
SLOPE ESTIMATED FROM U.S.G.S. QUADS AND STANLEY SUPPLEMENTAL SURVEY.

8. HYDROGRAPH ROUTING THRU MAIN WASH CHANNEL USES NORMAL DEPTH MODIFIED PULS ASSUMING THE FOLLOWING:
   A. 8-POINT XSECTN WITH LOW FLOW AND OVERBANKS
   B. NSTPS = ESTIMATED TRAVEL TIME / COMP TIME INTERVAL
      TRAVEL TIME BASED ON ASSUMED FLOW VEL OF 5FT/SEC
   C. INFILTRATION/PERCOLATION IS ZERO
   D. INITIAL DISCHARGE IS ZERO

9. HYDROGRAPH FLOW SPLIT DIVERSIONS BASED ON COMBINATION OF STANLEY FIELD SURVEY DATA AND FIELD VISITS.

```
 68 IO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT        HYDROGRAPH TIME DATA
                     NMIN          5  MINUTES IN COMPUTATION INTERVAL
                    IDATE     1    0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ        100  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     1    0  ENDING DATE
                   NDTIME       0815  ENDING TIME
                    ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .08 HOURS
                   TOTAL TIME BASE    8.25 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
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*** *

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          **************
          *            *
181 KK    *    RCH60N  *          ROUTE HYDROGRAPH DVT40E THRU REACH 60N (MAIN CHANNEL)
          *            *
          **************

182 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          1  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

            HYDROGRAPH ROUTING DATA

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

184 RC        NORMAL DEPTH CHANNEL
                     ANL       .035  LEFT OVERBANK N-VALUE
                    ANCH       .035  MAIN CHANNEL N-VALUE
                     ANR       .035  RIGHT OVERBANK N-VALUE
                   RLNTH      1500.  REACH LENGTH
                     SEL      .0110  ENERGY SLOPE
                   ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                      --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
186 RY     ELEVATION   110.00   104.00   103.00   100.00   100.00   103.00   104.00   110.00
185 RX     DISTANCE    100.00   100.00   101.00   113.00   191.00   203.00   205.00   205.00
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***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	1.45	2.98	4.58	6.27	8.02	9.85	11.72	13.62	15.53
OUTFLOW	.00	120.48	385.96	765.91	1249.61	1831.59	2528.54	3369.10	4306.71	5335.78
ELEVATION	100.00	100.53	101.05	101.58	102.11	102.63	103.16	103.68	104.21	104.74
STORAGE	17.43	19.33	21.23	23.14	25.04	26.94	28.85	30.75	32.65	34.56
OUTFLOW	6450.99	7648.77	8926.21	10280.79	11710.30	13212.80	14786.53	16429.87	18141.37	19919.68
ELEVATION	105.26	105.79	106.32	106.84	107.37	107.89	108.42	108.95	109.47	110.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 1250. TO 19920.
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.)

****

HYDROGRAPH AT STATION RCH60N

****

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	100.0
1		0005	2	0.	.0	100.0
1		0010	3	0.	.0	100.0
1		0015	4	0.	.0	100.0
1		0020	5	1.	.0	100.0
1		0025	6	1.	.0	100.0
1		0030	7	1.	.0	100.0
1		0035	8	2.	.0	100.0
1		0040	9	3.	.0	100.0
1		0045	10	4.	.1	100.0
1		0050	11	7.	.1	100.0
1		0055	12	10.	.1	100.0
1		0100	13	15.	.2	100.1
1		0105	14	35.	.4	100.2
1		0110	15	80.	1.0	100.4
1		0115	16	239.	2.1	100.8
1		0120	17	772.	4.6	101.6
1		0125	18	1748.	7.8	102.6
1		0130	19	2294.	9.2	103.0
1		0135	20	1957.	8.4	102.7
1		0140	21	1500.	7.0	102.3
1		0145	22	1284.	6.4	102.1
1		0150	23	1186.	6.0	102.0
1		0155	24	1088.	5.7	101.9
1		0200	25	973.	5.3	101.8
1		0205	26	846.	4.9	101.7
1		0210	27	724.	4.4	101.5
1		0215	28	611.	3.9	101.4
1		0220	29	494.	3.4	101.2
1		0225	30	402.	3.0	101.1
1		0230	31	344.	2.7	101.0
1		0235	32	294.	2.4	100.9
1		0240	33	247.	2.2	100.8
1		0245	34	205.	1.9	100.7

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0250	35	168.	1.7	100.6
1		0255	36	138.	1.6	100.6
1		0300	37	118.	1.4	100.5
1		0305	38	107.	1.3	100.5
1		0310	39	97.	1.2	100.4
1		0315	40	86.	1.0	100.4
1		0320	41	74.	.9	100.3
1		0325	42	63.	.8	100.3
1		0330	43	54.	.7	100.2
1		0335	44	47.	.6	100.2
1		0340	45	40.	.5	100.2
1		0345	46	35.	.4	100.2
1		0350	47	30.	.4	100.1
1		0355	48	25.	.3	100.1
1		0400	49	21.	.3	100.1
1		0405	50	17.	.2	100.1
1		0410	51	14.	.2	100.1
1		0415	52	11.	.1	100.0
1		0420	53	9.	.1	100.0
1		0425	54	7.	.1	100.0
1		0430	55	5.	.1	100.0
1		0435	56	4.	.0	100.0
1		0440	57	3.	.0	100.0
1		0445	58	2.	.0	100.0
1		0450	59	2.	.0	100.0
1		0455	60	1.	.0	100.0
1		0500	61	1.	.0	100.0
1		0505	62	1.	.0	100.0
1		0510	63	0.	.0	100.0
1		0515	64	0.	.0	100.0
1		0520	65	0.	.0	100.0
1		0525	66	0.	.0	100.0
1		0530	67	0.	.0	100.0
1		0535	68	0.	.0	100.0

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAG
1		0540	69	0.	.0	100.
1		0545	70	0.	.0	100.
1		0550	71	0.	.0	100.
1		0555	72	0.	.0	100.
1		0600	73	0.	.0	100.
1		0605	74	0.	.0	100.
1		0610	75	0.	.0	100.
1		0615	76	0.	.0	100.
1		0620	77	0.	.0	100.
1		0625	78	0.	.0	100.
1		0630	79	0.	.0	100.
1		0635	80	0.	.0	100.
1		0640	81	0.	.0	100.
1		0645	82	0.	.0	100.
1		0650	83	0.	.0	100.
1		0655	84	0.	.0	100.
1		0700	85	0.	.0	100.
1		0705	86	0.	.0	100.
1		0710	87	0.	.0	100.
1		0715	88	0.	.0	100.
1		0720	89	0.	.0	100.
1		0725	90	0.	.0	100.
1		0730	91	0.	.0	100.
1		0735	92	0.	.0	100.
1		0740	93	0.	.0	100.
1		0745	94	0.	.0	100.
1		0750	95	0.	.0	100.
1		0755	96	0.	.0	100.
1		0800	97	0.	.0	100.
1		0805	98	0.	.0	100.
1		0810	99	0.	.0	100.
1		0815	100	0.	.0	100.

****

PEAK FLOW (CFS)	TIME (HR)
2294.	1.50

	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	8.25-HR
(CFS)	258.	187.	187.	187.
(INCHES)	1.265	1.265	1.265	1.265
(AC-FT)	128.	128.	128.	128.

PEAK STORAGE (AC-FT)	TIME (HR)
9.	1.50

MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	8.25-HR
1.	1.	1.	1.

PEAK STAGE (FEET)	TIME (HR)
102.98	1.50

MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	8.25-HR
100.51	100.37	100.37	100.37

CUMULATIVE AREA = 1.89 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	SUB10M	2555.	1.25	118.	86.	86.	.80		
ROUTED TO	RCH10	2519.	1.33	118.	86.	86.	.80	104.89	1.33
HYDROGRAPH AT	SUB10	1037.	1.67	128.	93.	93.	.90		
2 COMBINED AT	SUM10	2738.	1.33	246.	179.	179.	1.70		
ROUTED TO	RCH20A	2805.	1.33	246.	179.	179.	1.70	103.68	1.33
HYDROGRAPH AT	SUB20M	65.	1.25	4.	3.	3.	.03		
ROUTED TO	RCH20B	54.	1.33	4.	3.	3.	.03	100.15	1.33
2 COMBINED AT	SUM20	2859.	1.33	249.	181.	181.	1.73		
ROUTED TO	RCH20C	2495.	1.42	249.	181.	181.	1.73	105.28	1.42

+	HYDROGRAPH AT	SUB20	100.	1.42	9.	6.	6.	.07	
+	2 COMBINED AT	SUM20	2595.	1.42	258.	188.	188.	1.79	
+	DIVERSION TO	DVR20E	84.	1.42	2.	2.	2.	1.79	
+	HYDROGRAPH AT	DVT20N	2511.	1.42	256.	186.	186.	1.79	
+ +	ROUTED TO	RCH30A	2623.	1.42	256.	186.	186.	1.79	105.65 1.42
+ +	ROUTED TO	RCH30B	2531.	1.42	256.	186.	186.	1.79	103.57 1.42
+	HYDROGRAPH AT	SUB30	48.	1.33	4.	3.	3.	.03	
+	2 COMBINED AT	SUM30	2573.	1.42	260.	189.	189.	1.82	
+ +	ROUTED TO	RCH40A	2465.	1.50	260.	189.	189.	1.82	103.47 1.50
+	HYDROGRAPH AT	SUB40	60.	1.25	4.	3.	3.	.03	
+	2 COMBINED AT	SUM40	2484.	1.50	264.	192.	192.	1.85	
+	HYDROGRAPH AT	SUB50	116.	1.17	7.	5.	5.	.04	
+	DIVERSION TO	DVR50E	58.	1.17	3.	2.	2.	.04	
+	HYDROGRAPH AT	DVT50N	58.	1.17	3.	2.	2.	.04	
+	ROUTED TO	RCH40B	55.	1.17	3.	2.	2.	.04	
+	2 COMBINED AT	SUM40	2496.	1.50	268.	195.	195.	1.89	
+	DIVERSION TO	DVR40N	210.	1.50	10.	7.	7.	1.89	
+	HYDROGRAPH AT	DVT40E	2286.	1.50	258.	187.	187.	1.89	
+ +	ROUTED TO	RCH60N	2294.	1.50	258.	187.	187.	1.89	102.98 1.50
+	HYDROGRAPH AT	SUB60	112.	1.25	8.	6.	6.	.05	
+	HYDROGRAPH AT	SUB70	462.	1.33	41.	30.	30.	.23	
+	HYDROGRAPH AT	DVR40N	210.	1.50	10.	7.	7.	.00	
+	DIVERSION TO	DVR70B	33.	1.50	1.	1.	1.	.00	
+	HYDROGRAPH AT	DVT70A	176.	1.50	9.	6.	6.	.00	
+	2 COMBINED AT	SUM70	561.	1.42	50.	36.	36.	.23	
+	DIVERSION TO	DVR70D	526.	1.00	41.	30.	30.	.23	
+	HYDROGRAPH AT	DVT70C	35.	1.00	9.	6.	6.	.23	
+	HYDROGRAPH AT	DVR70B	33.	1.50	1.	1.	1.	.00	
+	2 COMBINED AT	SUM70	68.	1.50	10.	8.	8.	.23	
+	DIVERSION TO	DVR70F	68.	.08	10.	8.	8.	.23	
+	HYDROGRAPH AT	DVT70E	0.	.08	0.	0.	0.	.23	
+	3 COMBINED AT	SUM60	2326.	1.50	266.	193.	193.	2.17	

+	DIVERSION TO	DVR60B	16.	1.50	0.	0.	0.	2.17	
+	HYDROGRAPH AT	DVT60A	2311.	1.50	265.	193.	193.	2.17	
+	DIVERSION TO	DVR60D	431.	1.50	39.	28.	28.	2.17	
+	HYDROGRAPH AT	DVT60C	1880.	1.50	227.	165.	165.	2.17	
+	ROUTED TO	RCH80A	1823.	1.50	227.	165.	165.	2.17	104.10 1.50
+	ROUTED TO	RCH80B	1769.	1.58	227.	165.	165.	2.17	104.18 1.58
+	HYDROGRAPH AT	SUB80	100.	1.17	7.	5.	5.	.03	
+	HYDROGRAPH AT	DVR60D	431.	1.50	39.	28.	28.	.00	
+	ROUTED TO	RCH90	425.	1.50	39.	28.	28.	.00	
+	HYDROGRAPH AT	SUB90	29.	1.17	2.	1.	1.	.01	
+	2 COMBINED AT	SUM90	433.	1.50	41.	30.	30.	.01	
+	DIVERSION TO	DVR90N	375.	1.50	37.	27.	27.	.01	
+	HYDROGRAPH AT	DVT90E	57.	1.50	3.	2.	2.	.01	
+	ROUTED TO	RCH80C	52.	1.58	3.	2.	2.	.01	
+	3 COMBINED AT	SUM80A	1835.	1.58	237.	172.	172.	2.22	
+	HYDROGRAPH AT	DVR50E	58.	1.17	3.	2.	2.	.00	
+	ROUTED TO	RCH100	56.	1.25	3.	2.	2.	.00	
+	HYDROGRAPH AT	SUB100	163.	1.33	15.	11.	11.	.10	
+	2 COMBINED AT	SUM100	214.	1.33	18.	13.	13.	.10	
+	DIVERSION TO	DR100E	164.	1.17	10.	7.	7.	.10	
+	HYDROGRAPH AT	DT100N	50.	1.17	9.	6.	6.	.10	
+	ROUTED TO	RC110N	50.	1.25	9.	6.	6.	.10	
+	HYDROGRAPH AT	DVR60B	16.	1.50	0.	0.	0.	.00	
+	ROUTED TO	RC110E	12.	1.58	1.	0.	0.	.00	
+	HYDROGRAPH AT	SUB110	147.	1.25	13.	10.	10.	.05	
+	3 COMBINED AT	SUM110	197.	1.25	23.	16.	16.	.15	
+	DIVERSION TO	DR110E	98.	1.25	11.	8.	8.	.15	
+	HYDROGRAPH AT	DT110N	98.	1.25	11.	8.	8.	.15	
+	DIVERSION TO	DVR80B	43.	1.42	2.	1.	1.	.15	
+	HYDROGRAPH AT	DVT80A	61.	1.42	10.	7.	7.	.15	
+	2 COMBINED AT	SUM80B	1889.	1.58	247.	179.	179.	2.37	
+	DIVERSION TO	DVR80D	424.	1.58	35.	26.	26.	2.37	
+	HYDROGRAPH AT	DVT80C	1464.	1.58	211.	154.	154.	2.37	

+	ROUTED TO	RC130A	1445.	1.58	211.	154.	154.	2.37
+	HYDROGRAPH AT	DVR90N	375.	1.50	37.	27.	27.	.00
+	ROUTED TO	RCH120	367.	1.50	38.	27.	27.	.00
+	HYDROGRAPH AT	SUB120	43.	1.17	3.	2.	2.	.02
+	2 COMBINED AT	SUM120	378.	1.50	40.	29.	29.	.02
+	DIVERSION TO	DR120N	306.	1.50	32.	24.	24.	.02
+	HYDROGRAPH AT	DT120E	72.	1.50	8.	6.	6.	.02
+	ROUTED TO	RC130B	69.	1.58	8.	6.	6.	.02
+	HYDROGRAPH AT	SUB130	62.	1.25	5.	4.	4.	.03
+	3 COMBINED AT	SUM130	1541.	1.58	225.	163.	163.	2.41
+	HYDROGRAPH AT	DR100E	164.	1.33	10.	7.	7.	.00
+	DIVERSION TO	DR140E	41.	1.33	2.	2.	2.	.00
+	HYDROGRAPH AT	DT140N	123.	1.33	7.	5.	5.	.00
+	ROUTED TO	RC140A	121.	1.33	7.	5.	5.	.00
+	HYDROGRAPH AT	SUB140	36.	1.25	3.	2.	2.	.02
+	HYDROGRAPH AT	DR110E	98.	1.25	11.	8.	8.	.00
+	ROUTED TO	RC140B	95.	1.25	11.	8.	8.	.00
+	3 COMBINED AT	SUM140	247.	1.33	22.	16.	16.	.02
+	HYDROGRAPH AT	DVR80B	43.	1.25	2.	1.	1.	.00
+	HYDROGRAPH AT	DVR80D	424.	1.58	35.	26.	26.	.00
+	2 COMBINED AT	SM150A	424.	1.58	37.	27.	27.	.00
+	ROUTED TO	RCH150	373.	1.75	40.	29.	29.	.00
+	HYDROGRAPH AT	SUB150	144.	1.25	9.	7.	7.	.06
+	2 COMBINED AT	SM150B	379.	1.75	49.	36.	36.	.06

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
RCH40B	MANE	.49	57.75	71.03	.70	5.00	54.58	70.00	.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1649E+01 EXCESS= .0000E+00 OUTFLOW= .1652E+01 BASIN STORAGE= .6982E-05 PERCENT ERROR= -.2

RCH90	MANE	.19	429.96	90.38	-1.00	5.00	424.62	90.00	-1.00
RCH80C	MANE	1.34	55.49	92.17	2.84	5.00	51.99	95.00	2.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1654E+01 EXCESS= .0000E+00 OUTFLOW= .1665E+01 BASIN STORAGE= .1310E-03 PERCENT ERROR= -.7

RCH100	MANE	2.32	56.16	74.24	-1.00	5.00	56.16	75.00	-1.00

RC110N	MANE	1.23	50.00	73.00	.84	5.00	50.00	75.00	.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4361E+01 EXCESS= .0000E+00 OUTFLOW= .4366E+01 BASIN STORAGE= .7497E-03 PERCENT ERROR= -.2

RC110E	MANE	1.92	15.21	95.50	-1.00	5.00	11.85	95.00	-1.00
RC130A	MANE	.38	1455.59	95.44	.83	5.00	1445.48	95.00	.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1047E+03 EXCESS= .0000E+00 OUTFLOW= .1047E+03 BASIN STORAGE= .7031E-03 PERCENT ERROR= .0

RCH120	MANE	.38	373.95	90.72	-1.00	5.00	366.68	90.00	-1.00
RC130B	MANE	1.13	71.32	92.84	4.63	5.00	68.92	95.00	4.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3925E+01 EXCESS= .0000E+00 OUTFLOW= .3949E+01 BASIN STORAGE= .2387E-03 PERCENT ERROR= -.6

RC140A	MANE	1.02	122.22	81.41	-1.00	5.00	120.63	80.00	-1.00
RC140B	MANE	1.24	98.05	77.70	-1.00	5.00	95.01	75.00	-1.00
RCH150	MANE	5.00	424.58	105.86	-1.00	5.00	372.51	105.00	-1.00

*** NORMAL END OF HEC-1 ***

APPENDIX C

HEC-1 INPUT DATA AND SUPPORTING CALCULATIONS

BASIN CHARACTERISTICS AND PARAMETERS USED FOR OFF-SITE HYDROLOGY HEC-1 MODEL 11623H1P (EXISTING CONDITIONS)

STANLEY CONSULTANTS, INC.
WESTCOR TATUM/SHEA JOB # 11623

* = average
** = weighted

APRIL 1994
FILE: PARMHEC1.WK1

SUB BASIN	AREA (ac)	AREA (sq.mi.)	LENGTH (ft)	LENGTH (mi)	HIGH ELEV (ft)	LOW EL (ft)	SLOPE (%)	SLOPE (ft/mi)	ADJ. SLOP (ft/mi)	XKSAT (in/hr)	VEG. (%)	ADJ. XKSAT	PSIF (in)	DTHETA	IA (in)	RTIMP (%)	m	b	Kb	UA
10M	510	0.797	1650	0.313	2302*	1700	36.48	1926	315	0.40	35	0.51	4.3	0.35	0.25	15	-0.03000	0.20	0.119	Natural
10	578	0.903	8500	1.610	1700	1495	2.41	127	127	0.40	35	0.51	4.3	0.35	0.20	10	-0.02500	0.15	0.081	Natural
20M	16	0.025	1000	0.189	1800	1500	30.00	1584	315	0.40	35	0.51	4.3	0.35	0.20	15	-0.03000	0.20	0.164	Natural
20	43	0.067	2860	0.542	1495	1455	1.40	74	74	0.40	35	0.51	4.3	0.35	0.20	5	-0.01375	0.08	0.058	Natural
30	20	0.031	1800	0.341	1455	1438	0.94	50	50	0.40	30	0.49	4.3	0.35	0.20	5	-0.01375	0.08	0.062	Urban
40	17	0.027	1610	0.305	1438	1410	1.74	92	92	0.40	30	0.49	4.3	0.35	0.20	15	-0.01000	0.06	0.048	Urban
50	28	0.044	1560	0.295	1450	1418	2.05	108	108	0.40	30	0.49	4.3	0.35	0.20	15	-0.01000	0.06	0.046	Urban
60	29	0.045	1960	0.371	1418	1392	1.33	70	70	0.25	30	0.31	3.5	0.35	0.73**	35**	-0.00625	0.04	0.031	Urban
70	149	0.233	6420	1.216	1520	1397	1.92	101	101	0.25	30	0.31	3.5	0.35	0.20	16**	-0.00860	0.05	0.031	Urban
80	21	0.033	1420	0.269	1393	1376	1.20	63	63	0.25	20	0.28	3.5	0.35	0.24**	40**	-0.00790	0.05	0.040	Urban
90	7	0.011	800	0.152	1392	1386	0.75	40	40	0.25	20	0.28	3.5	0.35	0.20	15	-0.01000	0.06	0.052	Urban
100	63	0.098	3500	0.663	1428	1383	1.29	68	68	0.25	25	0.29	3.5	0.35	0.75**	19**	-0.00940	0.06	0.043	Urban
110	34	0.053	2460	0.466	1405	1380	1.02	54	54	0.25	20	0.28	3.5	0.35	0.23**	69**	-0.00625	0.04	0.030	Urban
120	10	0.016	920	0.174	1391	1384	0.76	40	40	0.25	20	0.28	3.5	0.35	0.20	15	-0.01000	0.06	0.050	Urban
130	19	0.030	1700	0.322	1386	1375	0.65	34	34	0.25	20	0.28	3.5	0.35	0.20	15	-0.01000	0.06	0.047	Urban
140	11	0.017	1400	0.265	1383	1372	0.79	41	41	0.25	15	0.26	3.5	0.35	1.30	60	-0.00625	0.04	0.033	Urban
150	37	0.058	1500	0.284	1376	1365	0.73	39	39	0.25	35	0.32	3.5	0.35	0.20	0	-0.01150	0.07	0.050	Urban
TOTAL	1592	2.488																		

FILE: 11623FRE.IN

1/7

1

*** O U T P U T D A T A ***

REVISED JUNE 1988 TO UPDATE COMPUTATION OF SHORT-DURATION VALUES

PRECIPITATION FREQUENCY VALUES FOR WESTCOR TATUM/SHEA JOB #11623
PRIMARY ZONE NUMBER= 7
SHORT-DURATION ZONE NUMBER= 8

LATITUDE 33.50N LONGITUDE 111.90W ELEVATION 1800 FEET

POINT VALUES

RETURN PERIOD

DURATION	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	
5-MIN	.31	.42	.49	.59	.67	.75	.93	5-MIN
10-MIN	.47	.64	.75	.91	1.03	1.15	1.43	10-MIN
15-MIN	.57	.80	.95	1.15	1.32	1.47	1.84	15-MIN
30-MIN	.76	1.07	1.28	1.56	1.78	2.00	2.51	30-MIN
1-HR	.93	1.32	1.58	1.94	2.22	2.50	3.14	1-HR
2-HR	1.05	1.48	1.77	2.16	2.47	2.77	3.47	2-HR
3-HR	1.14	1.59	1.89	2.31	2.63	2.95	3.70	3-HR
6-HR	1.30	1.79	2.13	2.59	2.95	3.30	4.12	6-HR
12-HR	1.50	2.04	2.41	2.91	3.31	3.70	4.60	12-HR
24-HR	1.70	2.29	2.69	3.24	3.67	4.10	5.09	24-HR

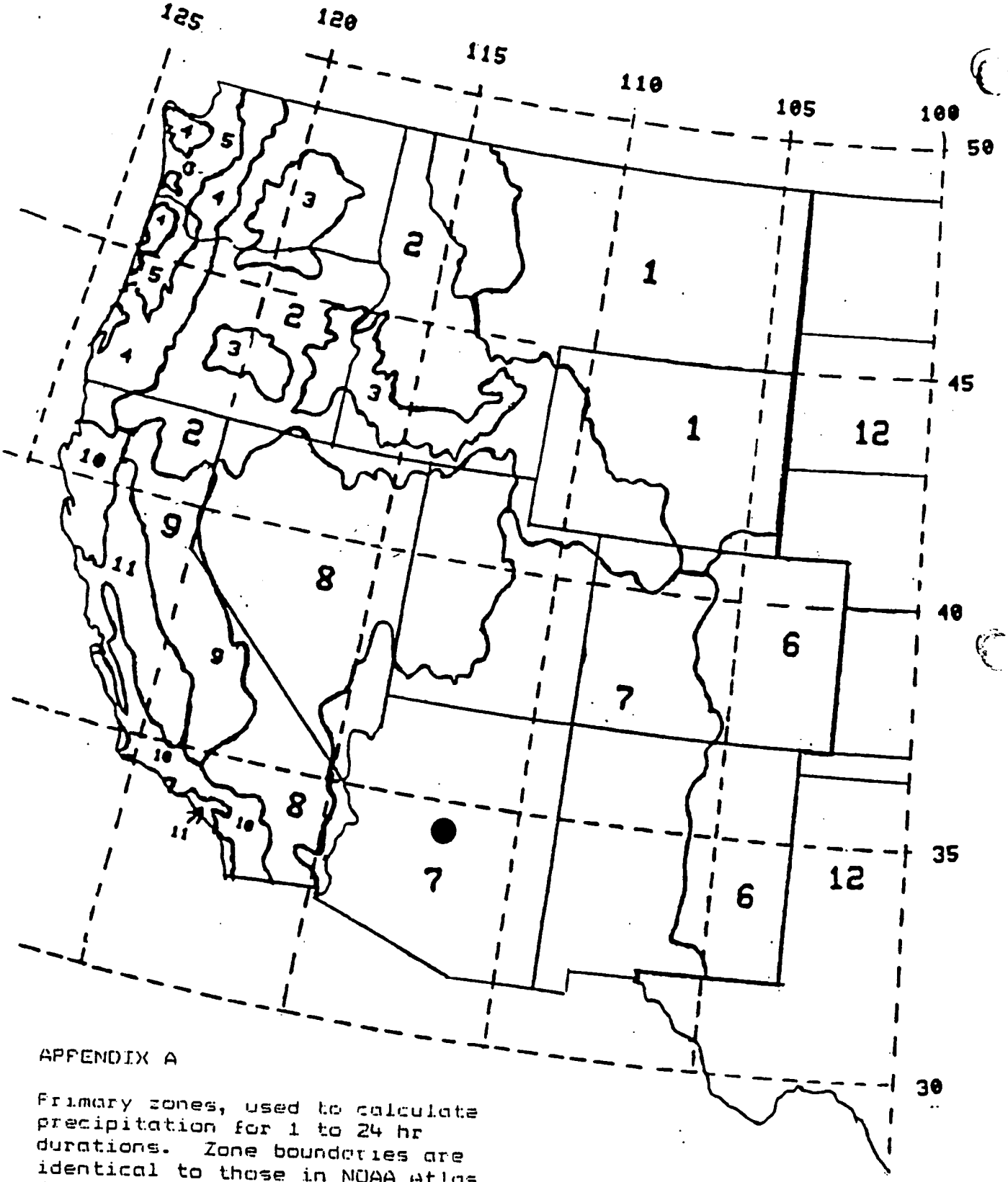
* IF YOUR SITE IS IN ARIZONA OR NEW MEXICO, PLEASE CONSULT THE FOLLOWING PAPER FOR REVISED DEPTH-AREA VALUES:
  DEPTH-AREA RATIOS IN THE SEMI-ARID SOUTHWEST UNITED STATES
  NOAA TECHNICAL MEMORANDUM NWS HYDRO-40
  ZEHR AND MYERS
  AUGUST 1984

INPUT DATA

PROJECT NAME=WESTCOR TATUM/SHEA JOB #11623
ZONE= 7 SHORT-DURATION ZONE= 8
LATITUDE= 33.50 LONGITUDE= 111.90 ELEVATION= 1800
2-YR, 6-HR PCPN= 1.30 100-YR, 6-HR PCPN= 3.30
2-YR, 24-HR PCPN= 1.70 100-YR, 24-HR PCPN= 4.10

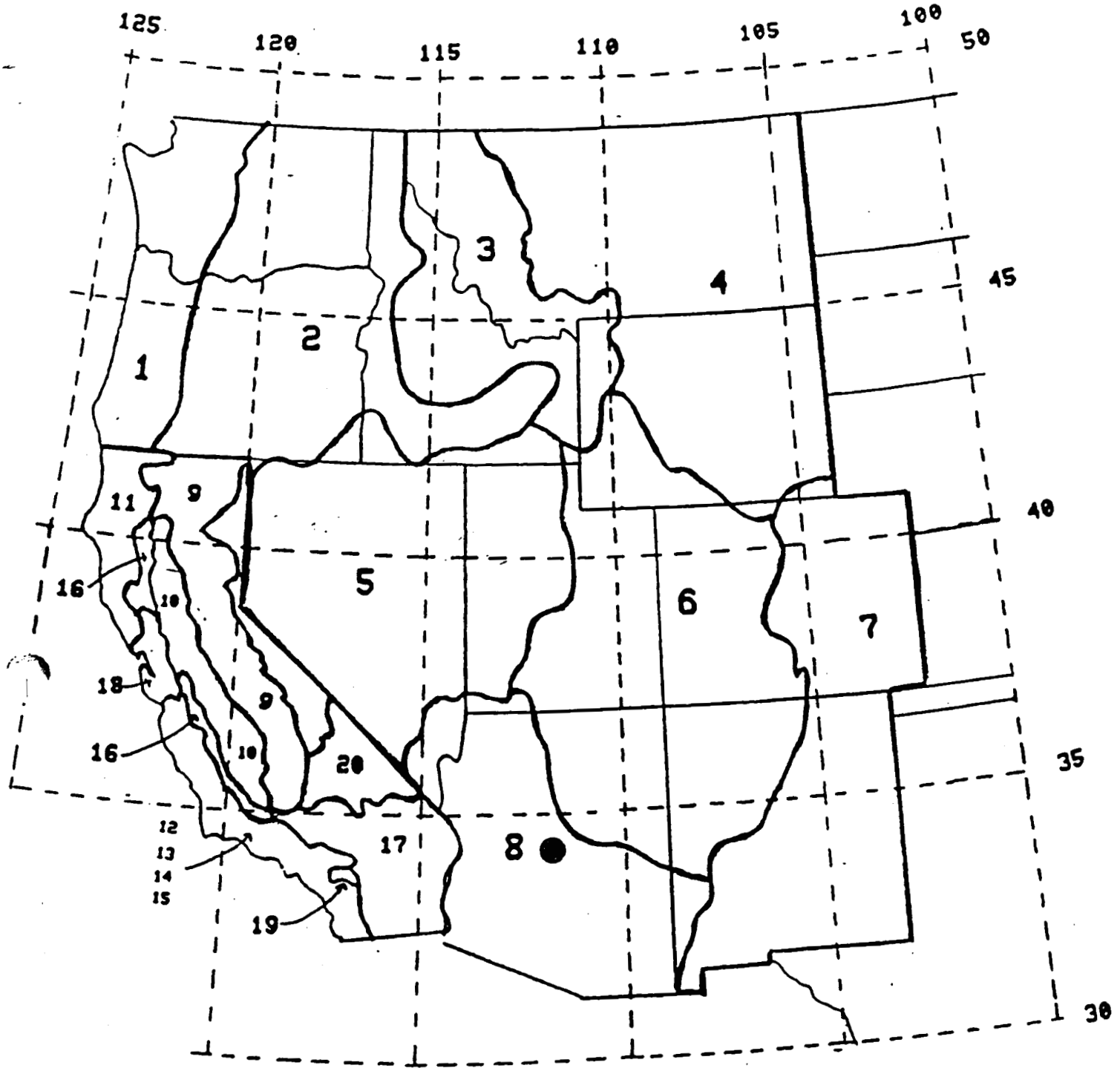
* * * * E N D O F R U N * * * *

2



APPENDIX A

Primary zones, used to calculate precipitation for 1 to 24 hr durations. Zone boundaries are identical to those in NOAA Atlas 2, but zone numbers may differ.



APPENDIX B

Short-duration zones, used to calculate 5 to 30 min durations.

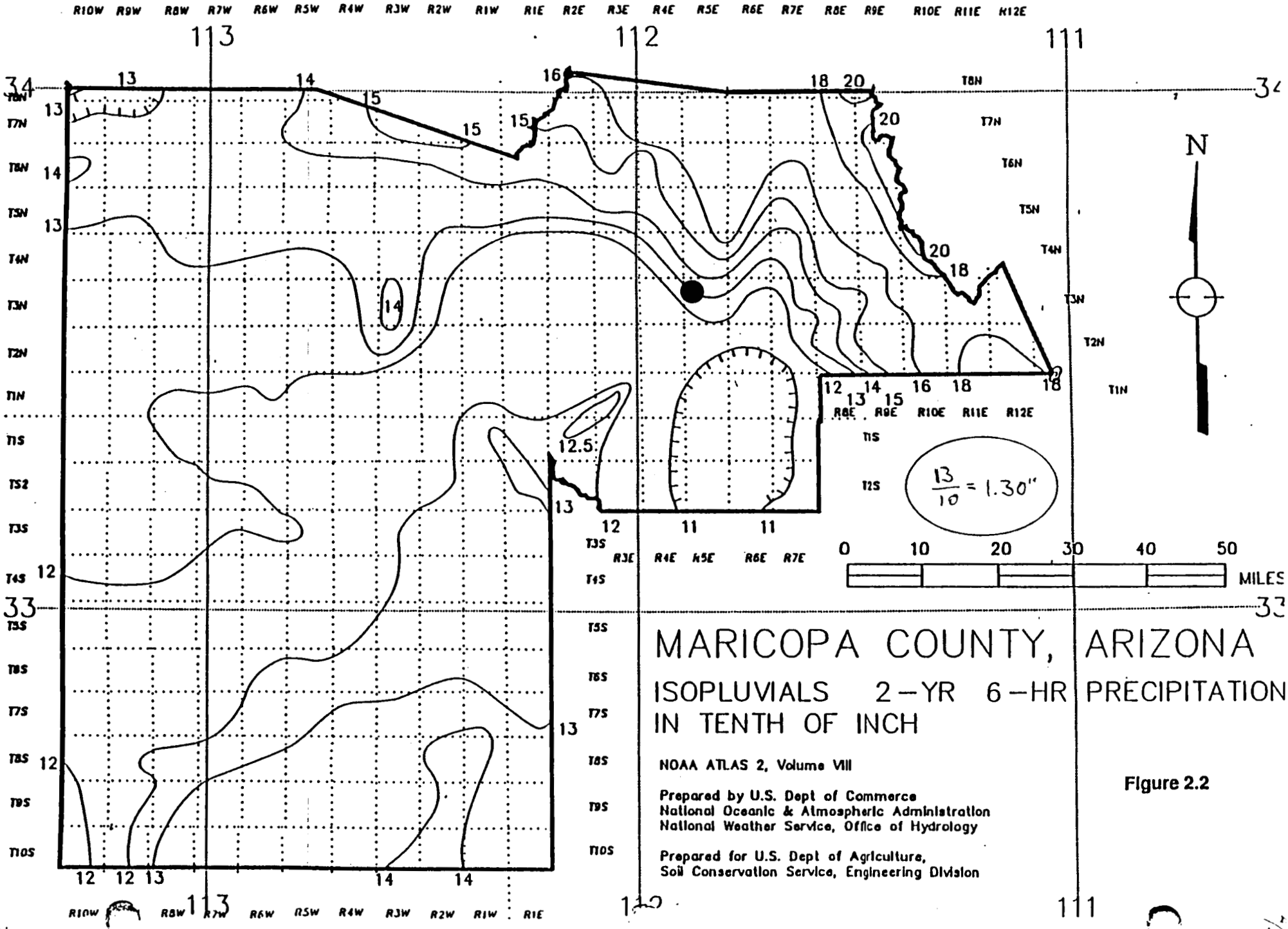

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 2-YR 6-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
MILES
0 10 20 30 40 50
13/10 = 1.30"
113
112
111
34
33

Figure 2.2

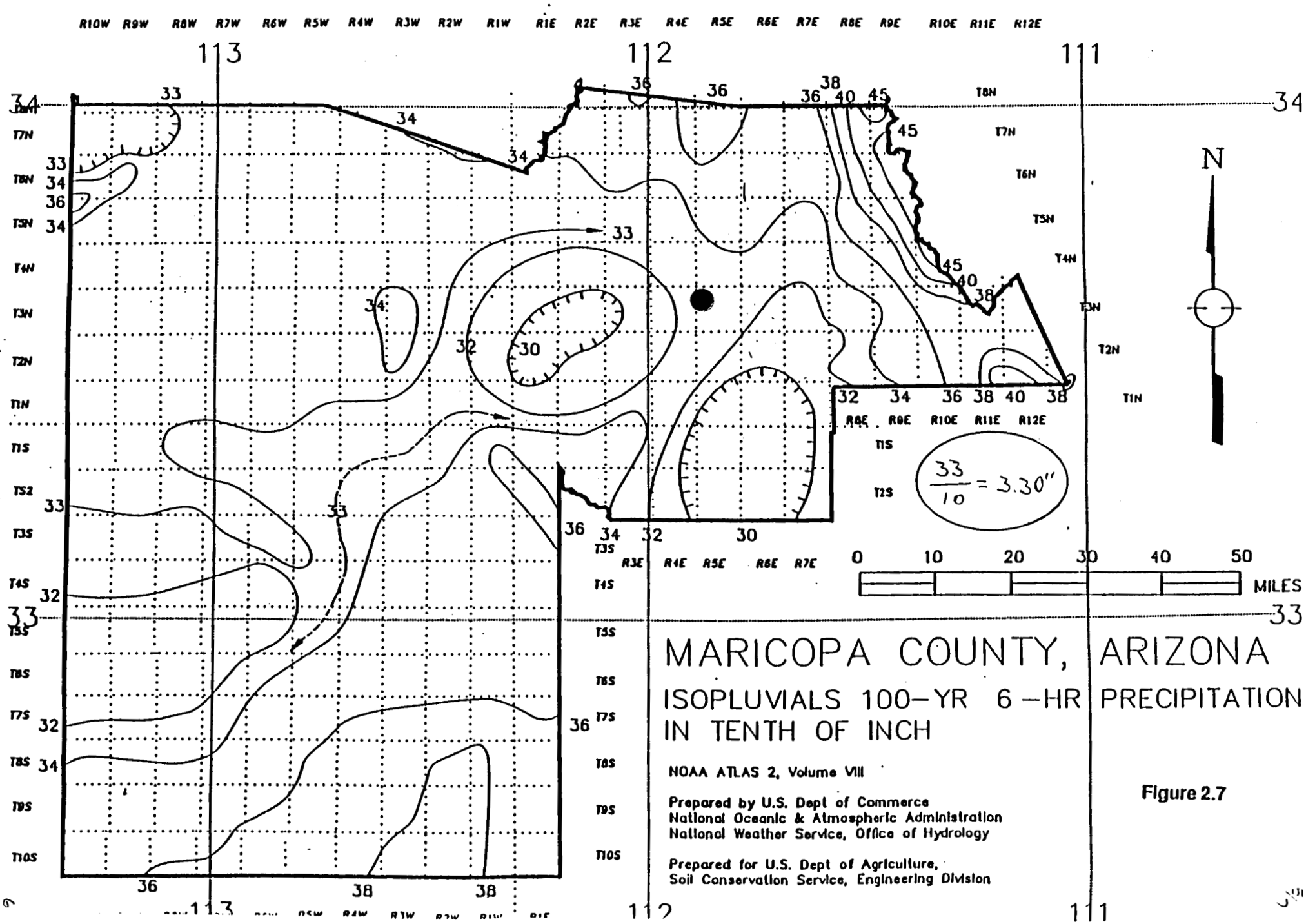

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 100-YR 6-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
0 10 20 30 40 50
MILES
33/10 = 3.30"
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E R9E R10E R11E R12E
T8N T7N T6N T5N T4N T3N T2N T1N T1S T2S T3S T4S T5S T6S T7S T8S T9S T10S
113 112 111
34 33

Figure 2.7

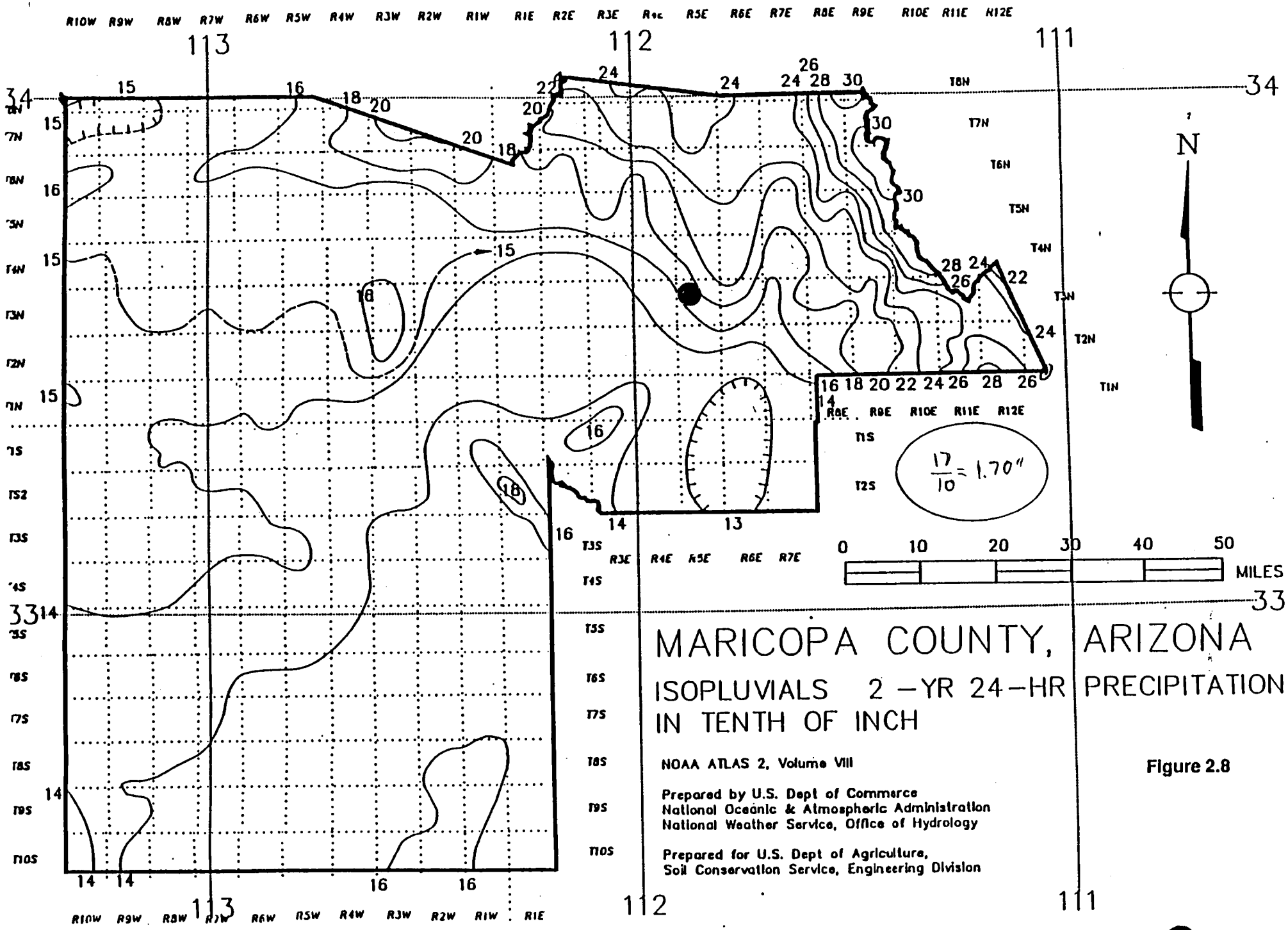

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 2 -YR 24-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
MILES
0 10 20 30 40 50
17/10 = 1.70"
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E R9E R10E R11E R12E
T8N T7N T6N T5N T4N T3N T2N T1N T1S T2S T3S T4S T5S T6S T7S T8S T9S T10S
113 112 111
34 33

Figure 2.8

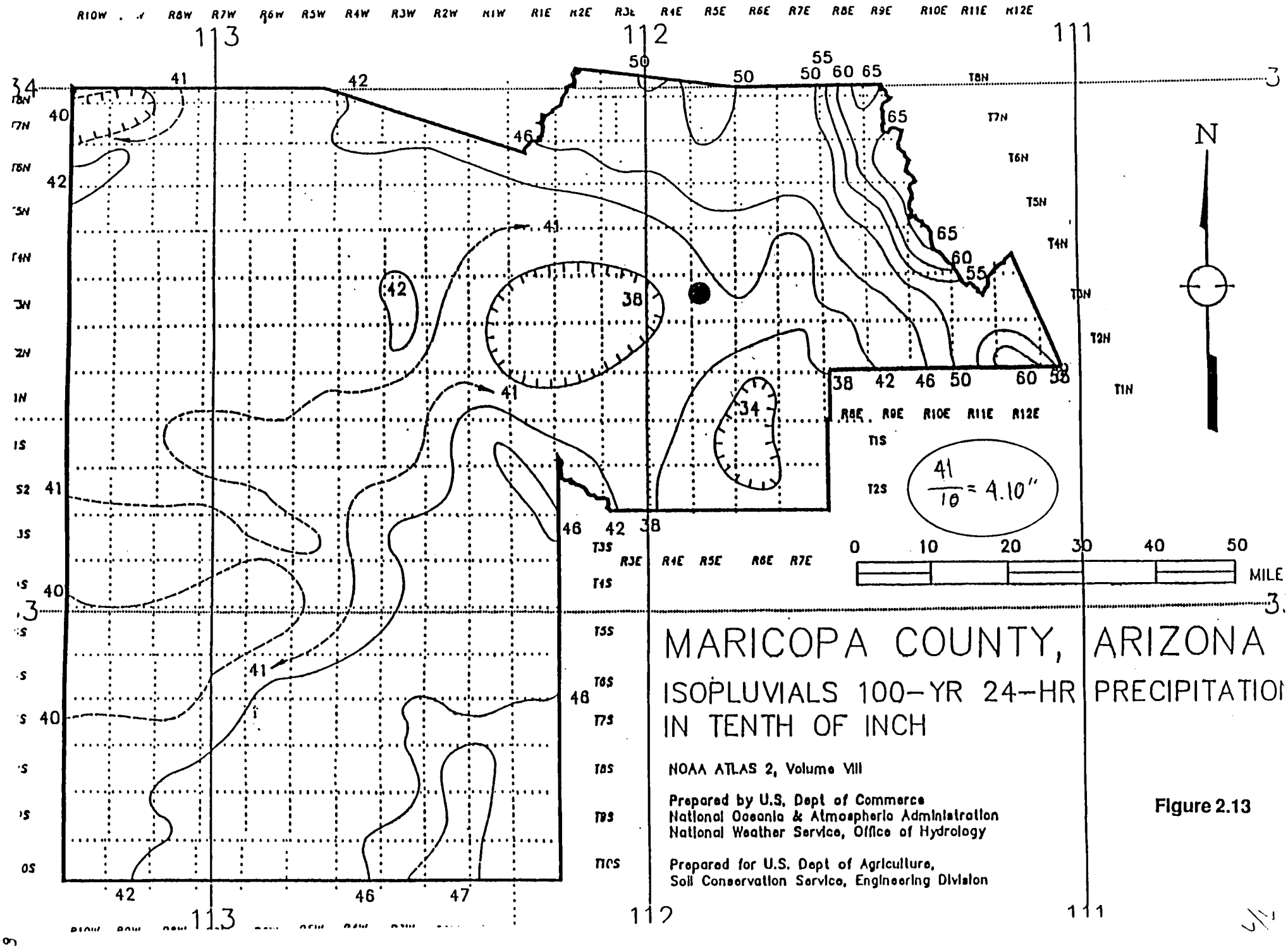

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 100-YR 24-HR PRECIPITATION
IN TENTH OF INCH
NOAA ATLAS 2, Volume VIII
Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division
N
0 10 20 30 40 50
MILE
41/10 = 4.10"
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E R9E R10E R11E R12E
T8N T7N T6N T5N T4N T3N T2N T1N
T1S T2S T3S T4S T5S T6S T7S T8S T9S T10S
113 112 111

Figure 2.13

DESIGNED BY JRB DATE 11/13/94 SHEET NO. PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR TATUM/SHEA
APPROVED BY DATE

SOIL CLASSIFICATION

The predominant soil texture classification was determined with the use of the Soil Conservation Service Soil Surveys of "Eastern Maricopa and Northern Pinal Counties Area, Arizona" and the "Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona".

The project area is located between the two soil surveys mentioned above.

According to these soil surveys the following types of soil groups exist in the area of study:

EASTER MARICOPA AND NORTHERN PINAL COUNTIES AREA, ARIZONA

SOIL GROUP AND MAP SYMBOL	SOIL TEXTURE CLASSIFICATION * (SEE NOTE BELOW)	XKSAT **
ROCK LAND R_O	SANDY LOAM	0.40
ROUGH BROKEN LAND R_U	"	0.40
TREMANT T_rB	"	0.40
PINAMT P_vC	"	0.40

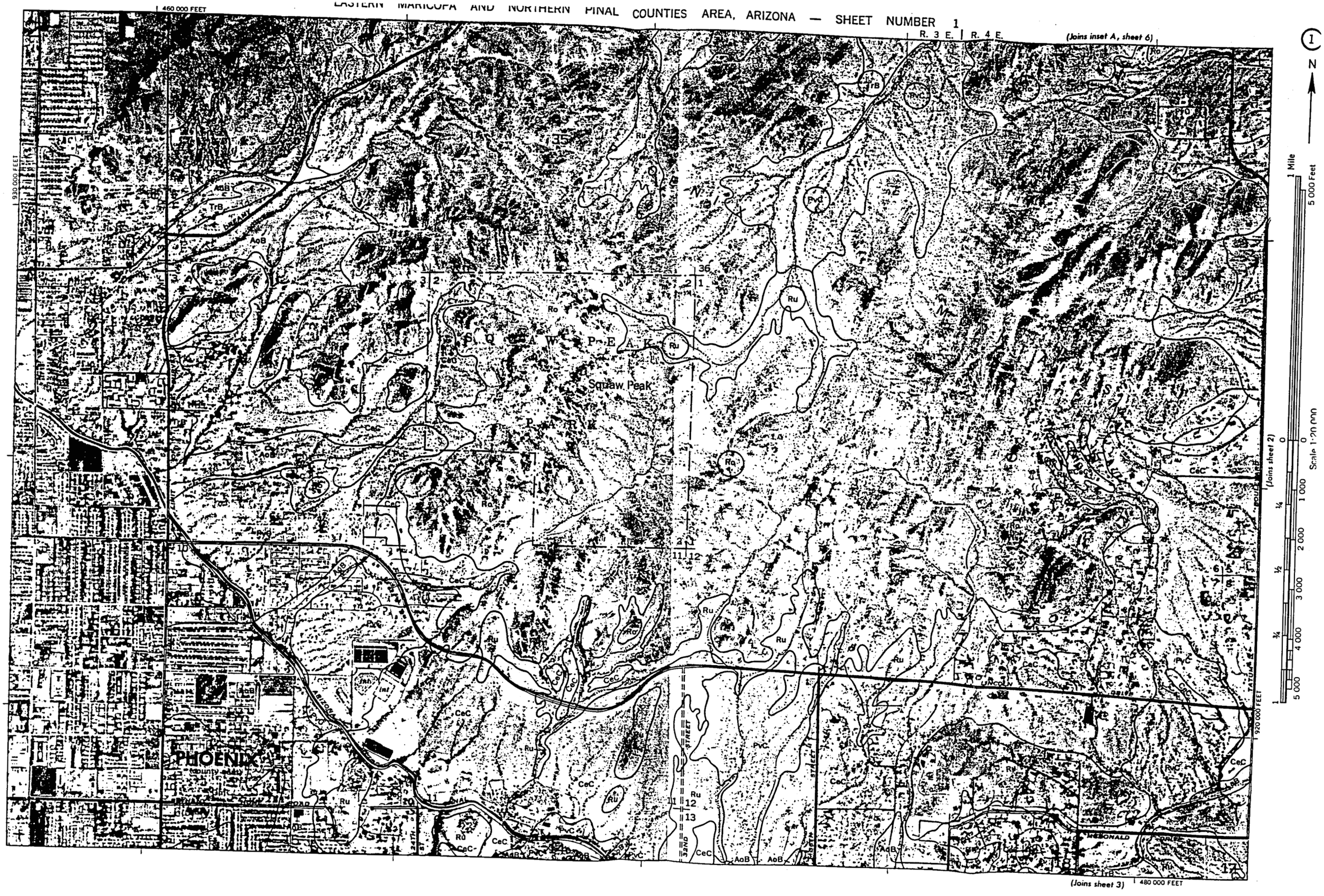
AGUILA-CAREFREE AREA, PARTS OF MARICOPA AND PINAL COUNTIES, ARIZONA

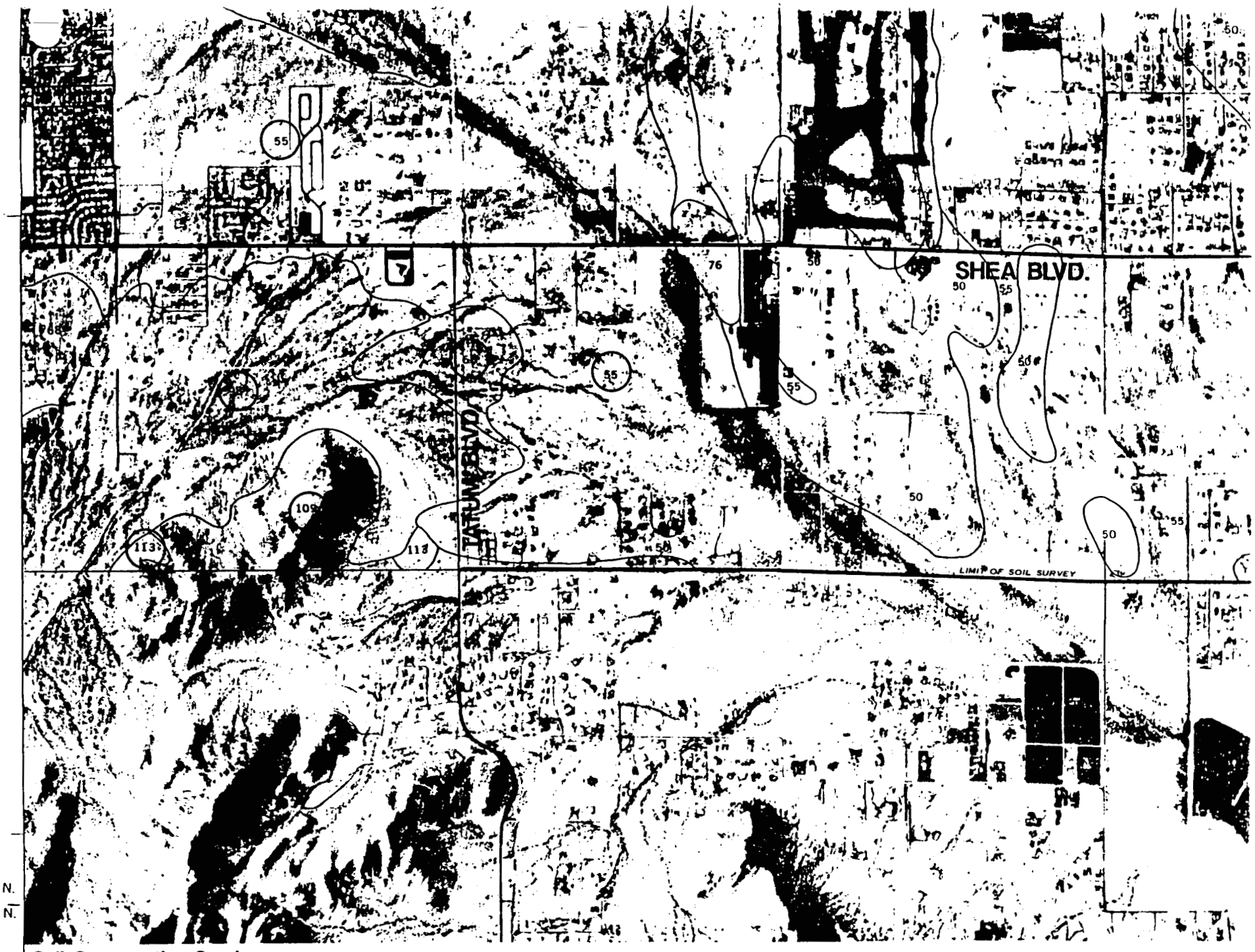
SOIL GROUP AND MAP SYMBOL	SOIL TEXTURE CLASSIFICATION * (SEE NOTE BELOW)	XKSAT **
ROCK OUTCROP 109	SANDY LOAM	0.40
PINAMT 98	LOAM	0.25

* FROM AERIAL PHOTOGRAPHS AVAILABLE AND THE SCS SOIL SURVEYS IT WAS CONCLUDED THAT THE PREDOMINANT TYPES OF SOILS ARE SANDY LOAM AND LOAM.

** FROM TABLE 1.2 (Drainage Design Manual for Maricopa County, Volume I).

EASTERN MARICOPA AND NORTHERN PINAL COUNTIES AREA, ARIZONA — SHEET NUMBER 1





Soil Conservation Service

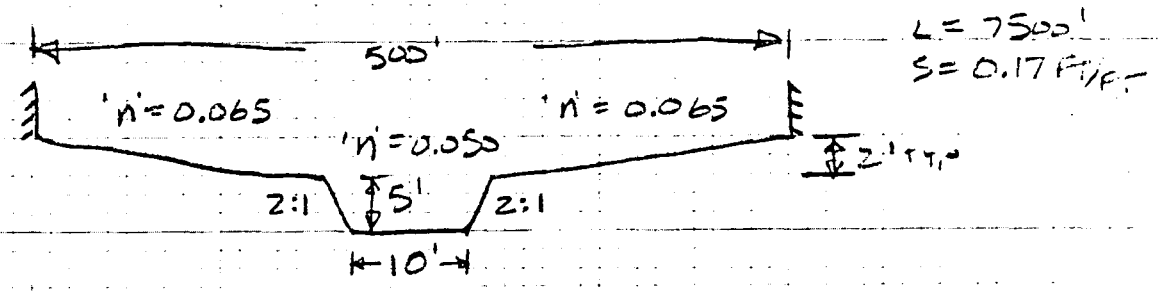
Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona

(SHEET #46)

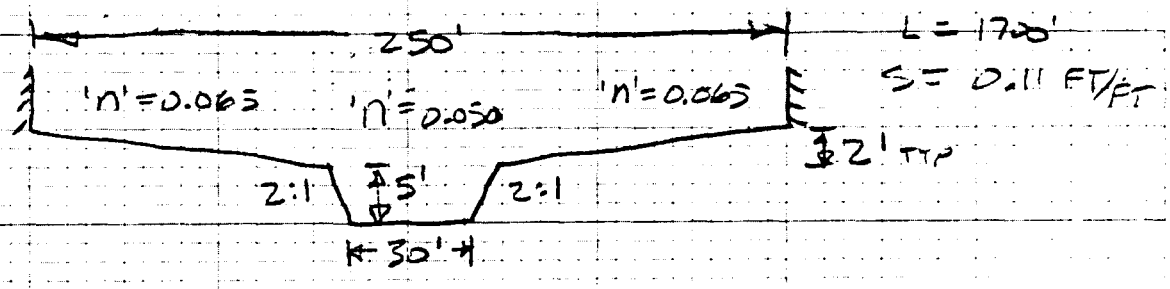
DESIGNED BY GTS	DATE 2-17-94	SHEET NO. 1	PAGE NO.
CHECKED BY	DATE	OF 4	JOB NO. 11623
REVIEWED BY	DATE	SUBJECT: WESTRX TATUM & SHEA	
APPROVED BY	DATE		

ROUTING REACHES FOR HEC-1 (MODIFIED PILS)

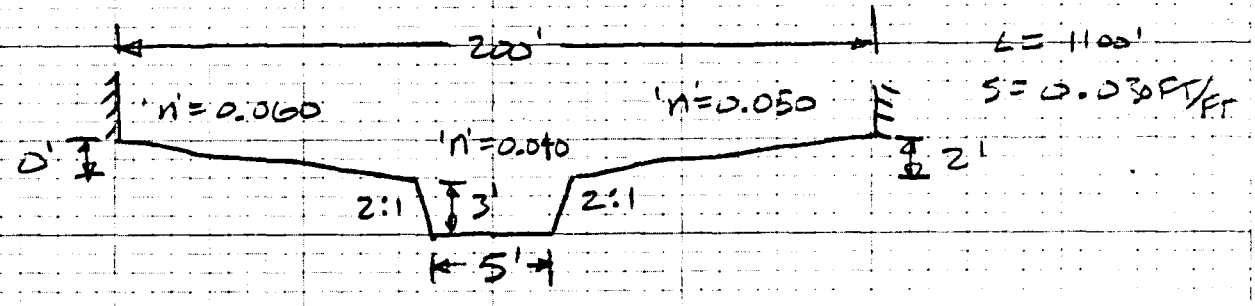
RCH 10



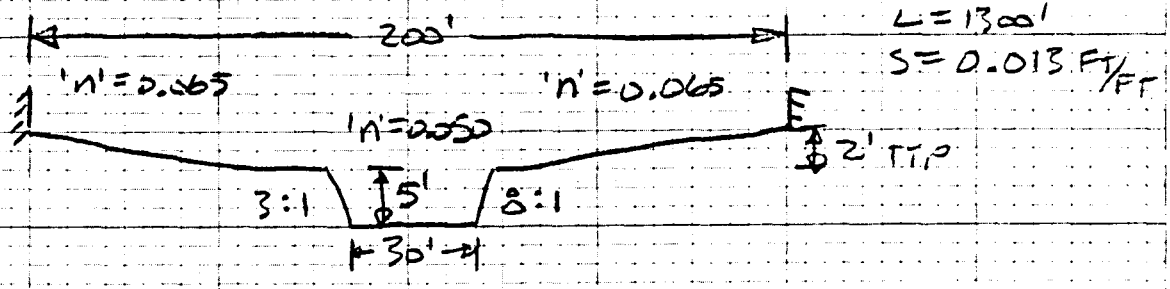
RCH 20A



RCH 20B



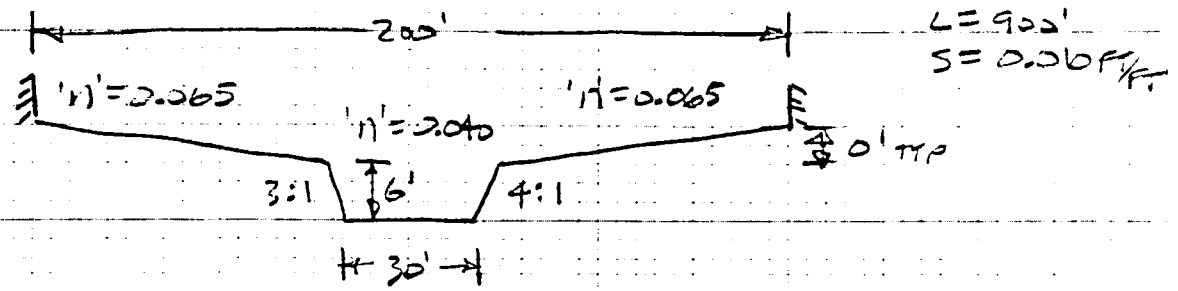
RCH 20C



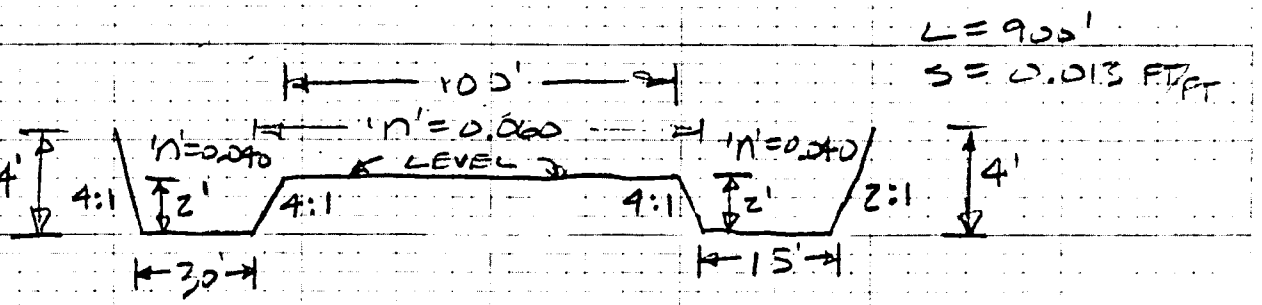
SC 3020

DESIGNED BY GSB	DATE 2-17-94	SHEET NO. 2	PAGE NO.
CHECKED BY	DATE	OF 4	JOB NO. 11-23
REVIEWED BY	DATE	SUBJECT: WESTCOR TATUM & SHEA	
APPROVED BY	DATE		

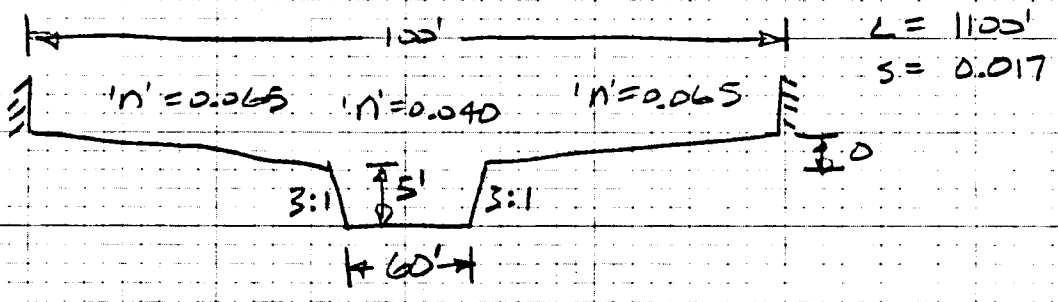
RCH 30A (SINGLE CHANNEL)



RCH 30B



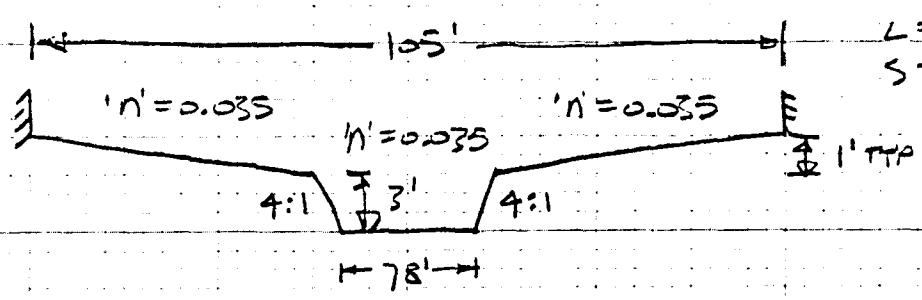
RCH 40A



SC 3020

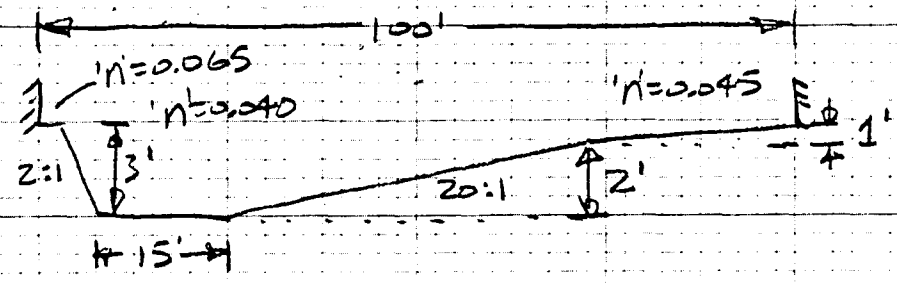
DESIGNED BY GFB	DATE 2-17-94	SHEET NO. 3	PAGE NO.
CHECKED BY	DATE	OF 4	JOB NO. 11623
REVIEWED BY	DATE	SUBJECT: WESTCOR PATHWAY & CHANNEL	
APPROVED BY	DATE		

RCH 60N



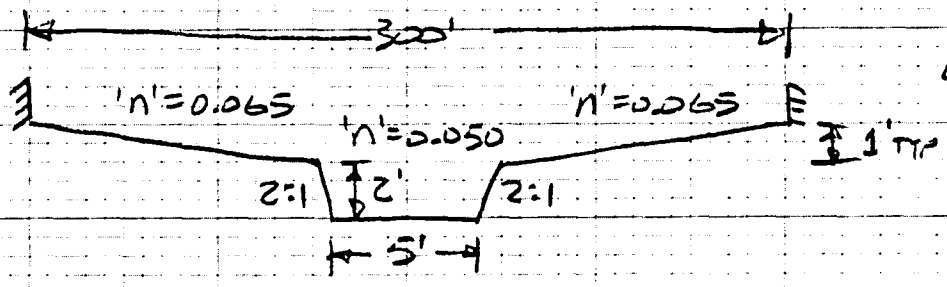
L = 1500'
S = 0.011

RCH 80A



L = 700'
S = 0.009 FT/FT

RCH 80B



L = 700'
S = 0.009 FT/FT

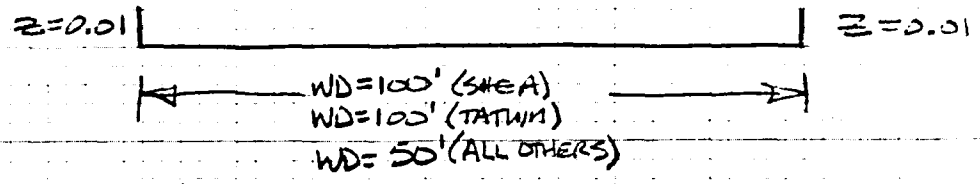
SC 3020

DESIGNED BY GSB	DATE 2-17-94	SHEET NO. 4	PAGE NO.
CHECKED BY	DATE	OF 4	JOB NO. 11623
REVIEWED BY	DATE	SUBJECT: WESTCOR TATUM & SHEA	
APPROVED BY	DATE		

ROUTING REACHES FOR HEC-1 (KINEMATIC WAVE)

TRAP

'n' = 0.016

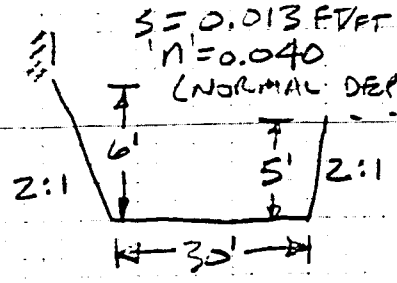


REACH	LENGTH	SLOPE	WD
RCH 40B	500'	0.017 FT/FT	50'
RCH 60E	500'	0.014	100'
RCH 90	400'	0.008	50'
RCH 80C	1300'	0.008	50'
RCH 100	2700'	0.011	50'
RC110N	750'	0.005	100'
RC110E	1300'	0.009	100'
RCH 80D	650'	0.006	100'
RC130A	650'	0.006	100'
RCH120	650'	0.007	50'
RC130B	1300'	0.007	50'
RC140A	1300'	0.007	50
RC140B	1300	0.008	100'

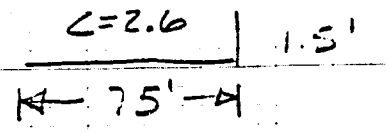
SC 3020

DESIGNED BY GSB DATE 2-17-94 SHEET NO. 1 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTOR TATUM & SLIEM
APPROVED BY DATE

SPLIT @ MAIN CHANNEL & FANFOL DR (DUT2ON/DVR2OE)



MAIN CHANNEL



WIER OVERFLOW TO EAST

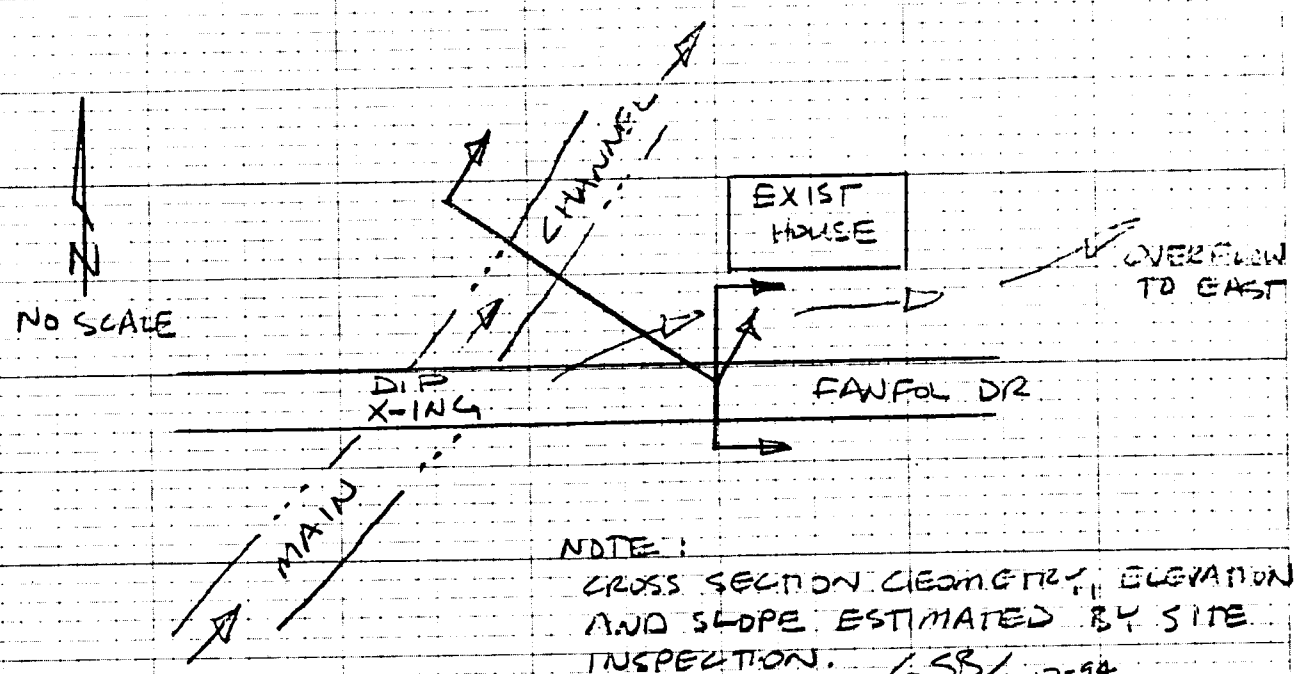
$Q = CLH^{3/2}$

$L = 75'$

d	V	Q
0	0	0
1.0	4.0	129
2.0	6.1	418
3.0	7.8	840
4.0	9.2	1390
5.0	10.4	2070
5.5	10.9	2460
6.0	11.4	2880
6.5	11.9	3340

d	Q	TOTAL Q
0	0	0
↓	↓	129
		418
		840
		1390
0	0	2070
.5	69	2530
1.0	195	3080
1.5	358	3700

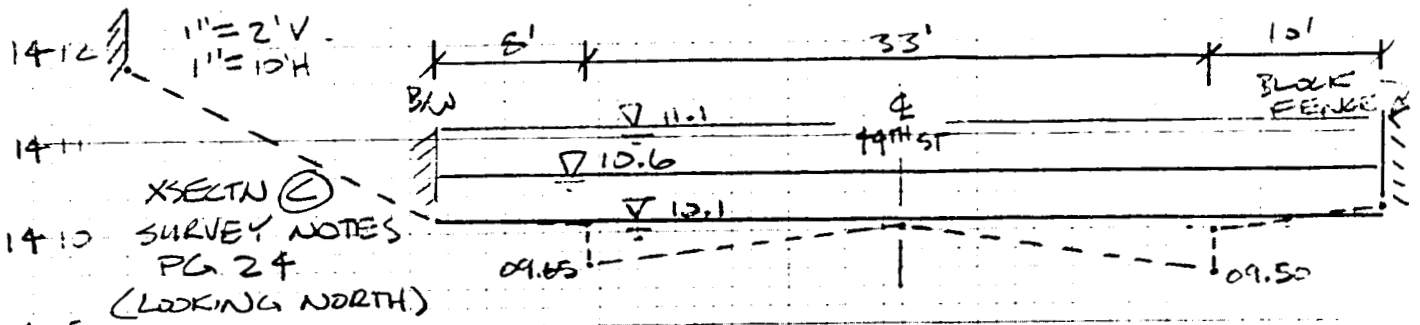
DI	0	129	418	840	1390	2070	2530	3080	3700
DQ	0	0	0	0	0	0	69	195	358



NOTE:
CROSS SECTION GEOMETRY, ELEVATION AND SLOPE ESTIMATED BY SITE INSPECTION. GSB/2-17-94

DESIGNED BY GSS DATE 2-16-94 SHEET NO. 2 PAGE NO.
CHECKED BY DATE OF JOB NO.
REVIEWED BY DATE SUBJECT: WESTLOOP DATA 1 & 2
APPROVED BY DATE

SPLIT @ MAIN CHANNEL & 44TH ST (DVT40E / DVR40N)



ASSUME BROAD CRESTED WIER WITH C = 2.75

$Q = CLH^{3/2}$

ELEV	H	L	Q	TOTAL Q
09.6	0	0	0	0
10.1	0.5/2	33'	6	6
10.6	0.5+.5/2	33'	59	
	0.5	18'	18	77
11.1	1.0+.5/2	33'	127	
	1.0	18'	50	177
11.6	1.5+.5/2	33'	210	
	1.5	18'	91	301

HEC-2 BACKWATER MODEL 11623 H2Y CWSEL @ ℄ 44TH ST

Q	CWSEL @ XSECTN 9.835	CWSEL @ XSECTN 10.165	CWSEL @ ℄ 44TH ST		44TH ST WIER W.S.	Q MAIN CHANNEL
100	08.64	09.19	08.92		09.6	500
500	09.31	09.89	09.60		10.1	950
1000	09.84	10.47	10.16		10.6	1500
1500	10.28	10.94	10.61		11.1	2100
2000	10.68	11.35	11.02		11.6	2500
2500	11.06	11.70	11.38			
3000	11.40	12.04	11.72			
DI	100	500	956	1577	2277	3101
DQ	0	0	6	77	177	301

```
1*******************************************
 *  HEC-2 WATER SURFACE PROFILES            *
 *                                          *
 *  Version   4.6.2;  May 1991              *
 *                                          *
 *  RUN DATE    18FEB94    TIME   16:03:34  *
 *******************************************
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*************************************
*  U.S. ARMY CORPS OF ENGINEERS
*  HYDROLOGIC ENGINEERING CENTER
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616-4687
*          (916) 756-1104
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

1

18FEB94 16:03:34 PAGE 1

THIS RUN EXECUTED 18FEB94 16:03:34

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*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************
```

```
T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
T2      RATING CURVE FOR MAIN CHANNEL SPLIT AT 44TH STREET
T3      MAIN CHANNEL AT 44TH ST               INPUT  FILENAME: 11623H2Y
T4
T4      1. CROSS SECTIONS ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
T4
T4      2. CROSS SECTION GR STATIONING USES CENTERLINE OF MAIN CHANNEL
T4         AS STA 10+00
T4
T4      3. CENTERLINE INTERSECTION OF 44TH STREET AND MAIN CHANNEL
T4         CORRESPONDS TO CROSS SECTION LOCATION STATION 10+00
T4
T4      4. CROSS SETION DATA DEVELOPED FROM SCI SURVEY NOTES PG 26
T4
T4      5. STARTING WATER SURFACE ELEVATION BASED ON SLOPE-AREA METHOD
T4            USING ESTIMATED SLOPE OF 0.011 FT/FT
T4
```

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		2			0.011				1407.0	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1		-1							

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

38	43	1	2	13	55	16	14	26	17
15	56	18							

```
 J5  LPRNT    NUMSEC                    ********REQUESTED SECTION NUMBERS********

     -10       -10

 NC    0.035      0.035      0.035       0.1        0.3
 QT        7        100        500      1000       1500       2000       2500       3000
 X1    9.335          5      947.0    1052.0
 GR   1410.0      947.0     1408.0     961.0     1406.6     1000.0     1407.6     1039.0     1410.9     1052.0
1                                  -
   18FEB94      16:03:34                                                                                    PAGE    2


 X1    9.835          9      947.0    1052.0         50         50         50
 GR   1410.6      947.0     1408.9     950.0     1408.1      995.0     1407.5      997.0     1407.4     1000.0
 GR   1407.5     1003.0     1408.1    1005.0     1408.8     1050.0     1411.5     1053.0

 X1   10.165          5      947.0    1053.0         33         33         33
 GR   1411.8      947.0     1409.2     950.0     1408.3     1000.0     1409.1     1050.0     1411.9     1053.0

 X1   10.665          5      942.0    1059.0         45         55         50
 GR   1412.3      942.0     1409.6     952.0     1409.9     1000.0     1410.4     1048.0     1412.4     1059.0
1
   18FEB94      16:03:34                                                                                    PAGE    3

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

 J1  ICHECK    INQ       NINV      IDIR      STRT     METRIC    HVINS     Q         WSEL      FQ

                 3                          0.011                                  1407.5

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN       ALLDC     IBW       CHNIM     ITRACE

      2                  -1

1
   18FEB94      16:03:34                                                                                    PAGE    4

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                 4                          0.011                                  1408.0

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN       ALLDC     IBW       CHNIM     ITRACE

      3                  -1

1
   18FEB94      16:03:34                                                                                    PAGE    5

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                 5                          0.011                                  1408.5

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN       ALLDC     IBW       CHNIM     ITRACE

      4                  -1

1
```

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		6			0.011				1409.0	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	5		-1							

1

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		7			0.011				1409.5	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	6		-1							

1

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		8			0.011				1410.0	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15		-1							

1

THIS RUN EXECUTED 18FEB94 16:03:36

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

MAIN CHANNEL AT 44TH ST

SUMMARY PRINTOUT

SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*XN
9.335	100.00	1407.62	.00	.00	.00	.00	100.00	2.86	35.00	.00	.00	.0

	9.335	500.00	1408.47	.00	.00	.00	.00	500.00	4.95	35.00	.00	.00	.0
	9.335	1000.00	1409.10	.00	.00	.00	.00	1000.00	6.36	35.00	.00	.00	.0
	9.335	1500.00	1409.61	.00	.00	.00	.00	1500.00	7.31	35.00	.00	.00	.0
	9.335	2000.00	1410.05	.00	.00	.00	.00	2000.00	8.05	35.00	.00	.00	.0
	9.335	2500.00	1410.40	.00	.00	.00	.00	2500.00	8.80	35.00	.00	.00	.0
	9.335	3000.00	1410.74	.00	.00	.00	.00	3000.00	9.38	35.00	.00	.00	.0
*	9.835	100.00	1408.64	1408.64	.00	.00	.00	100.00	3.59	35.00	.00	.00	.0
*	9.835	500.00	1409.31	1409.31	.00	.00	.00	499.73	5.42	35.00	.27	1.89	35.0
*	9.835	1000.00	1409.84	1409.84	.00	.00	.00	998.28	6.81	35.00	1.72	2.85	35.0
*	9.835	1500.00	1410.28	1410.28	.00	.00	.00	1495.77	7.84	35.00	4.23	3.48	35.0
*	9.835	2000.00	1410.68	1410.68	.00	.00	.00	1992.25	8.59	35.00	7.75	3.95	35.0
*	9.835	2500.00	1411.06	1411.06	.00	.00	.00	2487.78	9.18	35.00	12.22	4.31	35.0
*	9.835	3000.00	1411.40	1411.40	.00	.00	.00	2982.59	9.75	35.00	17.40	4.65	35.0
*	10.165	100.00	1409.19	.00	.00	.00	.00	100.00	2.16	35.00	.00	.00	.0
*	10.165	500.00	1409.89	.00	.00	.00	.00	500.00	4.26	35.00	.00	.00	.0
	10.165	1000.00	1410.47	.00	.00	.00	.00	1000.00	5.66	35.00	.00	.00	.0
	10.165	1500.00	1410.94	.00	.00	.00	.00	1500.00	6.66	35.00	.00	.00	.0
	10.165	2000.00	1411.35	.00	.00	.00	.00	2000.00	7.48	35.00	.00	.00	.0
	10.165	2500.00	1411.70	.00	.00	.00	.00	2500.00	8.21	35.00	.00	.00	.0
	10.165	3000.00	1412.04	.00	.00	.00	.00	3000.00	8.82	35.00	.00	.00	.0
*	10.665	100.00	1410.23	1410.23	.00	.00	.00	100.00	3.43	35.00	.00	.00	.0
*	10.665	500.00	1410.87	1410.87	.00	.00	.00	500.00	5.42	35.00	.00	.00	.0
*	10.665	1000.00	1411.41	1411.41	.00	.00	.00	1000.00	6.72	35.00	.00	.00	.0
*	10.665	1500.00	1411.85	1411.85	.00	.00	.00	1500.00	7.59	35.00	.00	.00	.0
*	10.665	2000.00	1412.25	1412.25	.00	.00	.00	2000.00	8.23	35.00	.00	.00	.0
*	10.665	2500.00	1412.58	1412.58	.00	.00	.00	2500.00	8.86	35.00	.00	.00	.0
*	10.665	3000.00	1412.89	1412.89	.00	.00	.00	3000.00	9.42	35.00	.00	.00	.0

1

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION SECNO=     9.835  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.835  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.835  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.835  PROFILE=  2  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.835  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.835  PROFILE=  3  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.835  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.835  PROFILE=  4  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.835  PROFILE=  5  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.835  PROFILE=  5  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.835  PROFILE=  6  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.835  PROFILE=  6  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.835  PROFILE=  7  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.835  PROFILE=  7  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    10.165  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    10.165  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    10.665  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.665  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    10.665  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    10.665  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.665  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    10.665  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    10.665  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.665  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
```

```
CAUTION SECNO=     10.665  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     10.665  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.665  PROFILE=  4  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     10.665  PROFILE=  4  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     10.665  PROFILE=  5  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.665  PROFILE=  5  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     10.665  PROFILE=  5  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     10.665  PROFILE=  6  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.665  PROFILE=  6  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     10.665  PROFILE=  6  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     10.665  PROFILE=  7  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.665  PROFILE=  7  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     10.665  PROFILE=  7  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

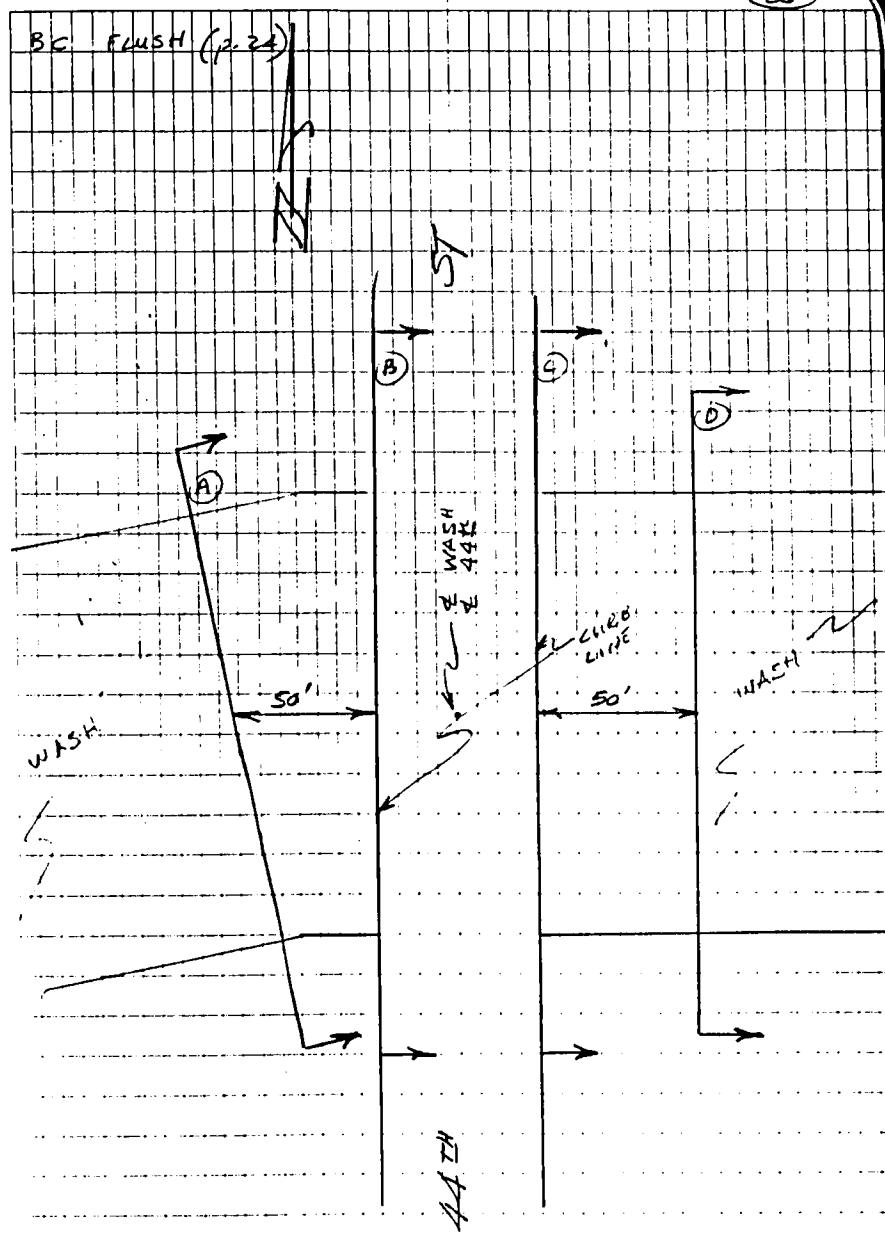
TBM BC 1408.69

1412.30	1409.57	1409.9	1410.37	1412.37
T/B @ WALL 58'	TOE 48'	℄ WASH (A)	TOE 48'	T/B 59'
(N)			(S)	

1410.15	1409.20	1408.30	1409.11	1410.30
106' GB T/C	50' T/C	℄ WASH T/C (B)	50' T/C	100' T/C
(N)				(S)

1409.97	1408.86	1407.40	1408.76	1410.16
106' GB T/C	50' T/C	℄ WASH T/C (C)	50 T/C	100 T/C
(N)				(S)

1410.00	1408.04	1406.6	1407.62	1410.90
T/B @ WALL 53'	TOE 39'	℄ WASH (D)	TOE 39'	52' T/B @ WALL
(N)				(S)



TBM F.H.						1402.34
	6.86	1409.20				
TBM B.C.					0.51	1408.69
	0.56	1409.25				
F.H.					6.90	1402.35 (+0.01)
TBM BC						1408.69

1408.6	1409.05	1408.99	1408.64	1408.72	1408.68	1409.00	1409.03	1410.2
NG	B/W	T/C	G	℄	G	T/C	B/W	NG (YARD)
30.5	20.50	16.50	ROLL	NORTH LN.		16.5	20.5	30.5
(N)				(A)				(S)

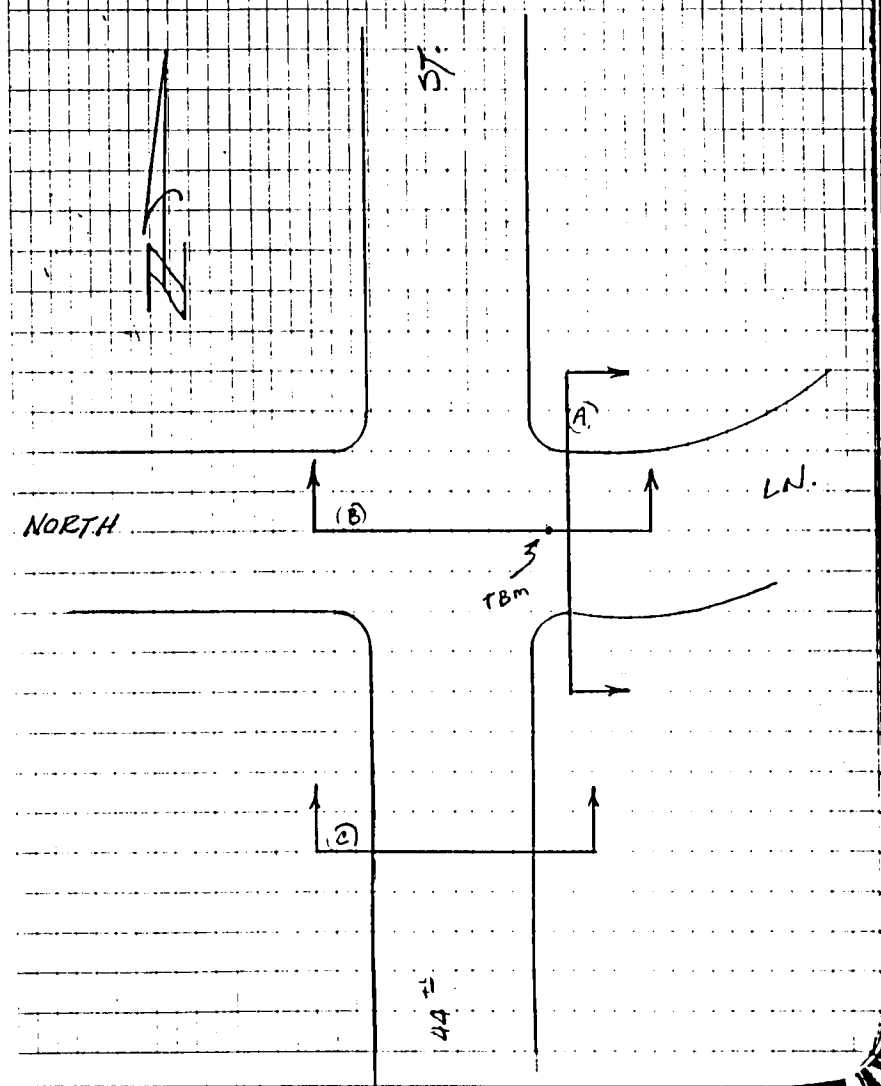
	1409.31	1409.98	1408.47	1408.94	1408.31	1409.72	1408.57
	P	P	VG	℄	VG	P	P
	61.5	41.5	20.6	44th ST.	20.6	42.0	62.0
	℄ N. LN	℄ N. LN				℄ N. LN	℄ N. LN
	20' W OF BC	℄ S. LET		(B)		℄ GB.	20' E. OF GB
W							(E)

1411.9	1410.17	1410.14	1409.05	1410.05	1409.50	1409.97	1410.08	1410.2
NG	B/W	T/C	G	℄	G	T/C	B/W	NG
℄ WALL	24.50	16.50		44th ST.		16.50	20.50	℄ WALL 26.50
+1.2				(C)				
(W)								(E)

SEE p. 26 FOR WASH SECTIONS

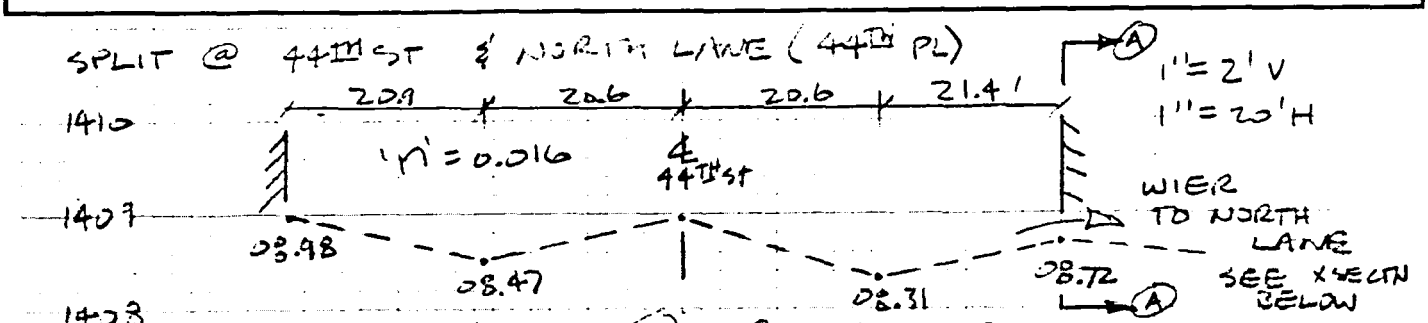
TOP SE BOLT FH NW COR 44th ST. & SHEA

BC FLUSH @ 44th ST. & NORTH LN. - 33' E. of INT. PC B.C. ON NORTH LN.

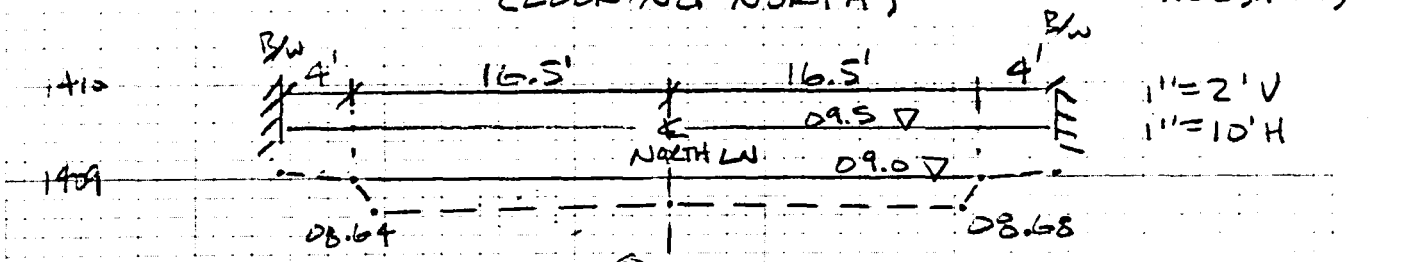


DESIGNED BY G.S.B. DATE 2-23-94 SHEET NO. 3 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTGOR DATUM & SHEA
APPROVED BY DATE

SPLIT @ 44TH ST & NORTH LANE (44TH PL)



XSECTN (B) FOR HEC-2 NORMAL DEPTH
SURVEY NOTES PG 24 (FILENAME: 11623H2W)
(LOOKING NORTH)



XSECTN (A) WIER FLOW
SURVEY NOTES PG 24
(LOOKING EAST)

ASSUME BROAD CRESTED WIER WITH C = 2.75
$Q = CLH^{3/2}$

ELEV	H	L	Q	TOTAL Q
08.34	.2	32	8	8
09.0	.32	32	16	16
09.5	.82	32	65	
	.5	0	8	73

HEC-2 NORMAL DEPTH MODEL 11623 H2W

Q	CWSEL @ ℄ INTERSECTION			NORTH LN WIER W.S.	Q 44TH ST
10	08.61				
50	08.84				
100	08.99			9.0	100
200	09.19				
300	09.37			9.5	± 350

(DVT70A / DVR70B)

DI	0	10	50	116	423
DQ	0	0	8	16	73

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    26FEB94    TIME   12:49:08 *
 *****************************************
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*************************************
 *  U.S. ARMY CORPS OF ENGINEERS
 *  HYDROLOGIC ENGINEERING CENTER
 *  609 SECOND STREET, SUITE D
 *  DAVIS, CALIFORNIA 95616-4687
 *          (916) 756-1104
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                  X     X
XXXXXXX  XXXX     X          XXXXX   XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX              XXXXXXX
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1
   26FEB94       12:49:08                                                                    PAGE     1
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                                                                    THIS RUN EXECUTED 26FEB94     12:49:08
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
T2      RATING CURVE FOR 44TH STREET AND NORTH LANE FLOW SPLIT
T3      44TH ST AND NORTH LN                  INPUT  FILENAME: 11623H2W
T4
T4      1. CROSS SECTION ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
T4
T4      2. CROSS SECTION GR STATIONING USES CENTERLINE OF 44TH ST
T4         AS STA 10+00
T4
T4      3. CROSS SETION DATA DEVELOPED FROM SCI SURVEY NOTES PG 24
T4
T4      4. STARTING WATER SURFACE ELEVATION BASED ON SLOPE-AREA METHOD
T4            USING ESTIMATED SLOPE OF 0.009 FT/FT
T4

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                2                           0.009                                   1408.5

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     1                  -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38        43         1         2        13        55        16        14        26        17
    15        56        18

J5  LPRNT     NUMSEC                        ********REQUESTED SECTION NUMBERS********

    -10       -10

NC    0.016     0.016     0.016       0.1       0.3
QT        5        10        50       100       200       300
X1    10.00         7     958.0    1042.5
GR   1415.0     958.0    1409.0     958.5    1408.5     979.4    1408.9    1000.0    1408.3    1020.6
GR   1408.7    1042.0    1415.0    1042.5
1
   26FEB94       12:49:08                                                                    PAGE     2

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                3                           0.009                                   1409.0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     2                  -1

1
   26FEB94       12:49:08                                                                    PAGE     3

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                4                           0.009                                   1409.5

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     3                  -1
```

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		5			0.009				1410.0	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	4		-1							

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		6			0.009				1410.5	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15		-1							

THIS RUN EXECUTED 26FEB94 12:49:09

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

44TH ST AND NORTH LN

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
*	10.000	10.00	1408.61	1408.61	.00	.00	.00	10.00	2.08	16.00	.00	.00	.
*	10.000	50.00	1408.84	1408.84	.00	.00	.00	50.00	2.87	16.00	.00	.00	.
*	10.000	100.00	1408.99	1408.99	.00	.00	.00	100.00	3.38	16.00	.00	.00	.
*	10.000	200.00	1409.19	1409.19	.00	.00	.00	200.00	4.31	16.00	.00	.00	.
*	10.000	300.00	1409.37	1409.37	.00	.00	.00	300.00	4.87	16.00	.00	.00	.

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 10.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 3 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 4 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 5 CRITICAL DEPTH ASSUMED

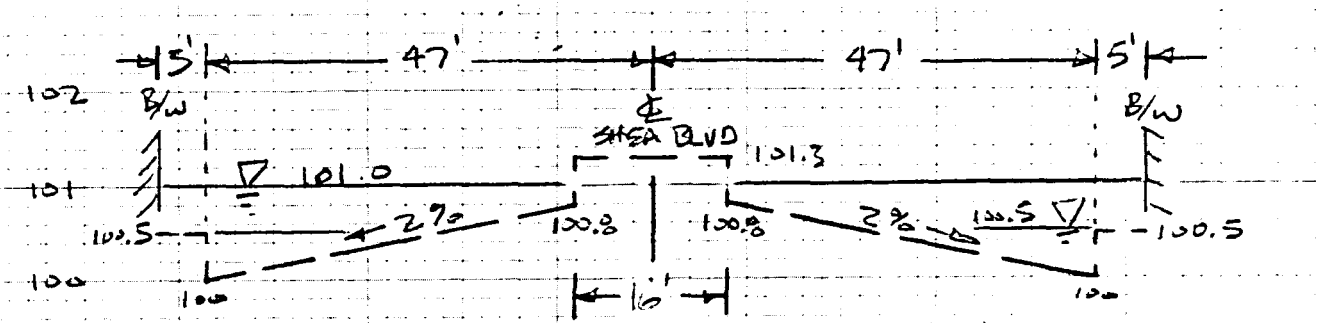
DESIGNED BY GKB DATE 2-28-94 SHEET NO. 4 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR DATUM & SHEA
APPROVED BY DATE

SPLIT @ SHEA BLVD AND 42ND, 43RD, 44TH STREETS

ASSUME NORMAL DEPTH TYPICAL CROSS SECTION IN SHEA BLVD. ESTIMATE LONG. SLOPE BASED ON SCI SURVEY NOTES. INCLUDE EXISTING MEDIAN. STEEPEST NORMAL SECTION @ BACK OF WALK.

ASSUME THAT CAPACITY OF SHEA BLVD @ TOP OF CURB WILL TRAVEL EAST IN SHEA BLVD PAST THE INTERSECTIONS WITH 42ND ST, 43RD ST AND 44TH ST. ANY FLOW IN EXCESS OF SHEA CAPACITY WILL DIVERT AND GO NORTH @ EACH OF THESE INTERSECTING STREETS.

TYPICAL SECTION:



1"=2' V (ARBITRARY DATUM)
1"=20' H

'n' = 0.016
S = 0.008 FT/FT
Q = 35 CFS @ ELEV 100.5 (CRITICAL)
V = 2.7 FT/SEC

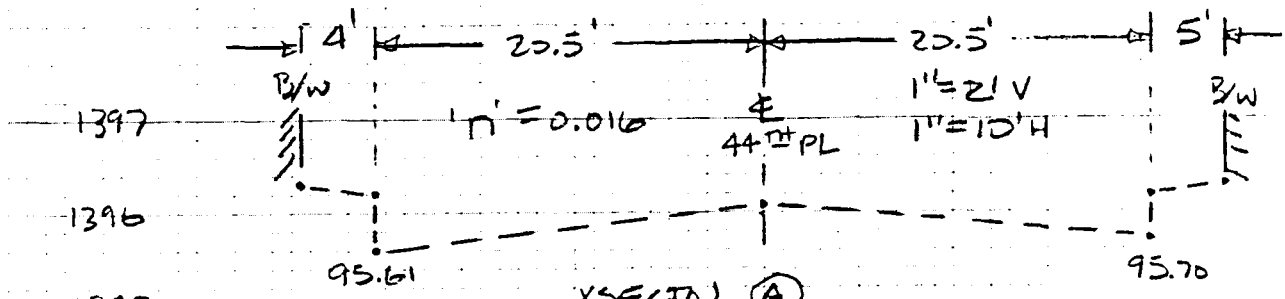
REFER TO HEC-2 FILE 11623H2V

DI	0	35	100	200	300	400
DQ	0	0	65	165	265	365

(DVT70C/DVR70D)

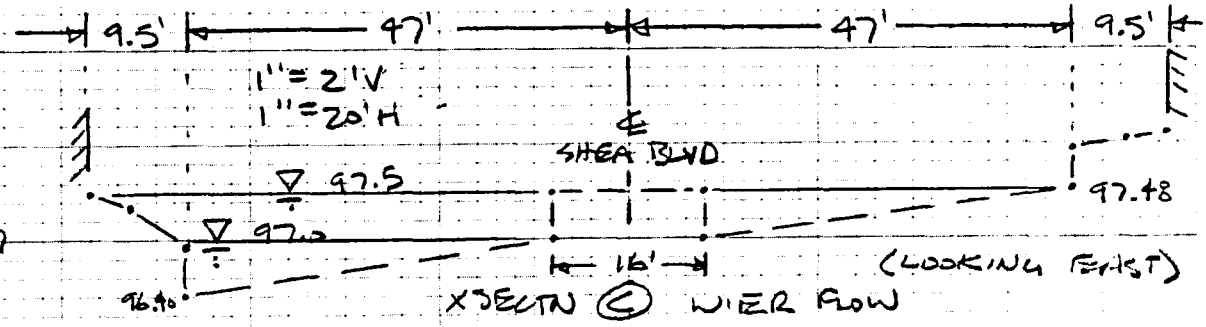
DESIGNED BY GSB DATE 2-23-94 SHEET NO. 5 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR TRAILS & SHEA
APPROVED BY DATE

FLOW SPLIT SHEA BLVD & 44TH PL.



XSECTN (A)
FOR HEC-2 NORMAL DEPTH
SURVEY NOTES PG 22
(LOOKING NORTH)

HEC-2 FILENAME
11623H2U



(LOOKING EAST)

XSECTN (C) WIER FLOW
SURVEY NOTES PG 22

ASSUME BROAD CRESTED WIER WITH C = 2.75
$Q = CLH^{3/2}$

ELEV	H	L	Q	TOTAL Q
97	0.3	39	18	18
97.5	.5 + .3	39	77	
	.25	9.5	3	
	.25	39	13	93

HEC-2 NORMAL DEPTH MODEL 11623H2U

Q	CWSEL		SHEA WIER WS	Q 44TH PL
125	96.52			
300	96.98		97.0	18

(DVT70E/DVR70F)

DI	0	50	100	130	318
DQ	0	50	100	125	300

44th CRT & SHEA

1396.32

97.0	96.29	96.20	95.61	96.08	95.70	96.19	96.24	97.1
NG	B/W	B/C	G	℄ 44th	G	B/C	B/W	NG
34.50	24.50	20.50				20.50	24.50	34.50

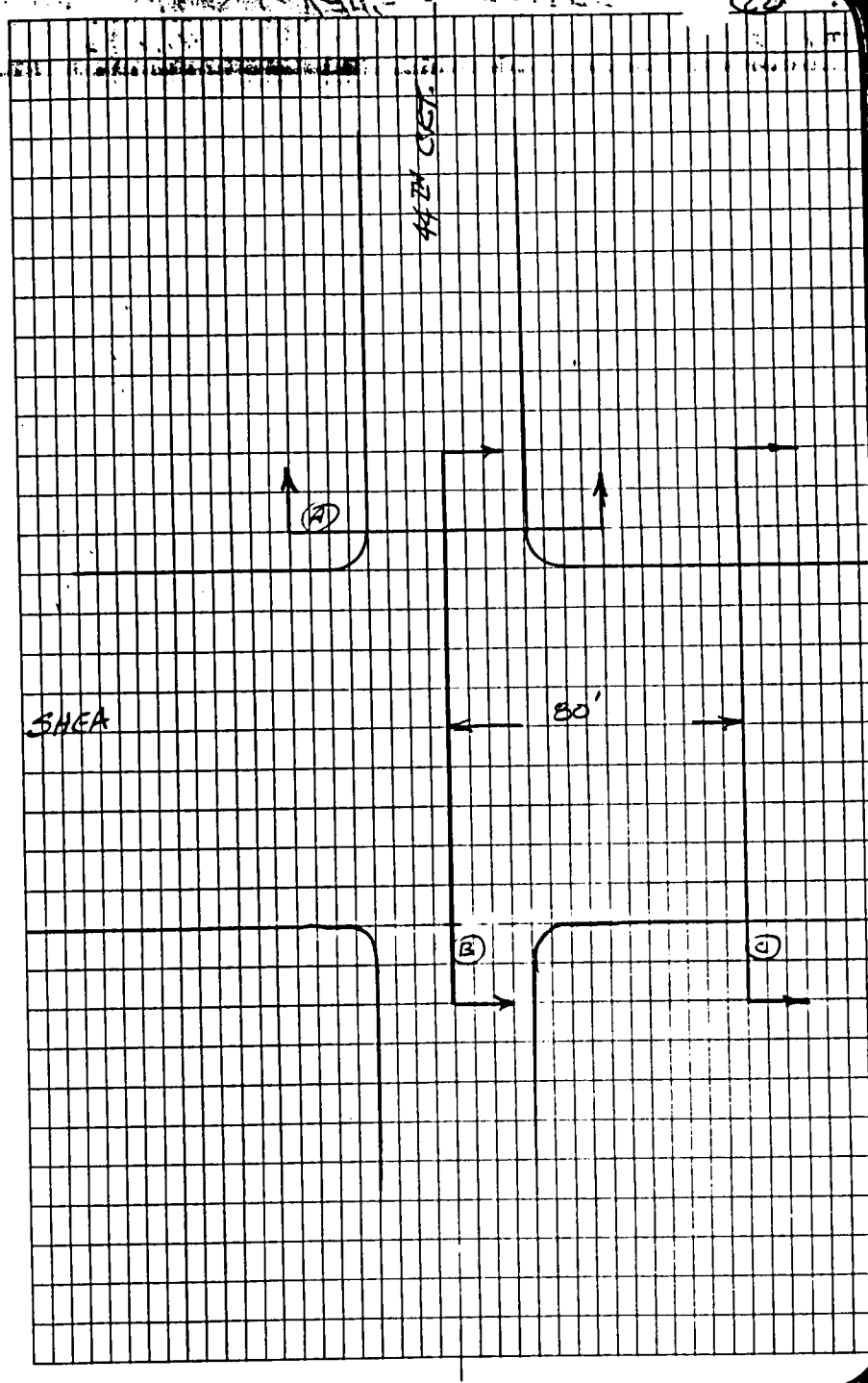
(W.) 2' VERT C:G (A) ℄ RET (E.)

95.72	96.08	95.96	96.83	97.57	98.30	98.69
PVMT 20' N. OF RET	PVMT ℄ RET 72'	PVMT SHEA GUTT LINE 47'	PVMT ℄ SHEA 0	PVMT SHEA W/GUTT LINE 47'	PVMT PL 73'	PVMT 20' S. OF RET

(N.) (B) (S.)

97.8	97.50	97.35	96.90	96.46	97.00	97.50	97.50	97.00	97.48	97.94	98.01	98.11	98.40
NG	B/W	F/W	B/C	G	P	TOP MED	TOP MED	P	G	B/C	F/W	B/W	NG
66.5	56.5	52.5		47'			0		47'		52.5	56.5	66.5

(N.) (C) (S.)



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1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    26FEB94    TIME   16:47:56 *
 *****************************************
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*************************************
*  U.S. ARMY CORPS OF ENGINEERS
*  HYDROLOGIC ENGINEERING CENTER
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616-4687
*          (916) 756-1104
*************************************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                   X
X     X  X        X     X             X
X     X  XXXXXXX   XXXXX              XXXXXXX
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1
   26FEB94      16:47:57                                                                    PAGE    1
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                                                                THIS RUN EXECUTED 26FEB94     16:47:57
 *************************************
  HEC-2 WATER SURFACE PROFILES

  Version   4.6.2;  May 1991
 *************************************

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
 T2      NORMAL DEPTH RATING CURVE FOR 44TH PL NORTH OF SHEA BLVD
 T3      44TH PL NORTH OF SHEA                INPUT  FILENAME: 11623H2U
 T4
 T4      1. CROSS SECTION ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
 T4
 T4      2. CROSS SECTION GR STATIONING USES CENTERLINE OF 44TH PL
 T4         AS STA 10+00
 T4
 T4      3. STARTING WATER SURFACE ELEVATION BASED ON SLOPE-AREA METHOD
 T4            USING ESTIMATED SLOPE OF 0.007 FT/FT
 T4

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                 2                           0.007

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1                  -1

 J3  VARIABLE CODES FOR SUMMARY PRINTOUT

      38        43         1         2        13        55        16        14        26        17
      15        56        18

 J5  LPRNT     NUMSEC                    ********REQUESTED SECTION NUMBERS********

     -10       -10

 NC    0.016     0.016     0.016       0.1       0.3
 QT        5       100       125       200       250       300
 X1    10.00         9     975.0    1025.0
 GR   1400.0     975.0    1396.3     975.5    1396.2     979.5    1395.6     979.5    1396.1    1000.0
 GR   1395.7    1020.5    1396.2    1020.5    1396.3    1024.5    1400.0    1025.0
1
   26FEB94      16:47:57                                                                    PAGE    2

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                 3                           0.007

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      2                  -1

1
   26FEB94      16:47:57                                                                    PAGE    3

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                 4                           0.007

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      3                  -1

1
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T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                5                           0.007
J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
     4                  -1
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1


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T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                6                           0.007
J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
    15                  -1
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1

THIS RUN EXECUTED 26FEB94 16:47:57

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*************************************
 HEC-2 WATER SURFACE PROFILES
 Version   4.6.2;  May 1991
*************************************
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

44TH PL NORTH OF SHEA

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
*	10.000	100.00	1396.44	1396.44	.00	.00	.00	100.00	4.08	16.00	.00	.00	.
*	10.000	125.00	1396.52	1396.52	.00	.00	.00	125.00	4.39	16.00	.00	.00	.
*	10.000	200.00	1396.73	1396.73	.00	.00	.00	200.00	5.12	16.00	.00	.00	.
*	10.000	250.00	1396.87	1396.87	.00	.00	.00	250.00	5.47	16.00	.00	.00	.
*	10.000	300.00	1396.98	1396.98	.00	.00	.00	300.00	5.85	16.00	.00	.00	.

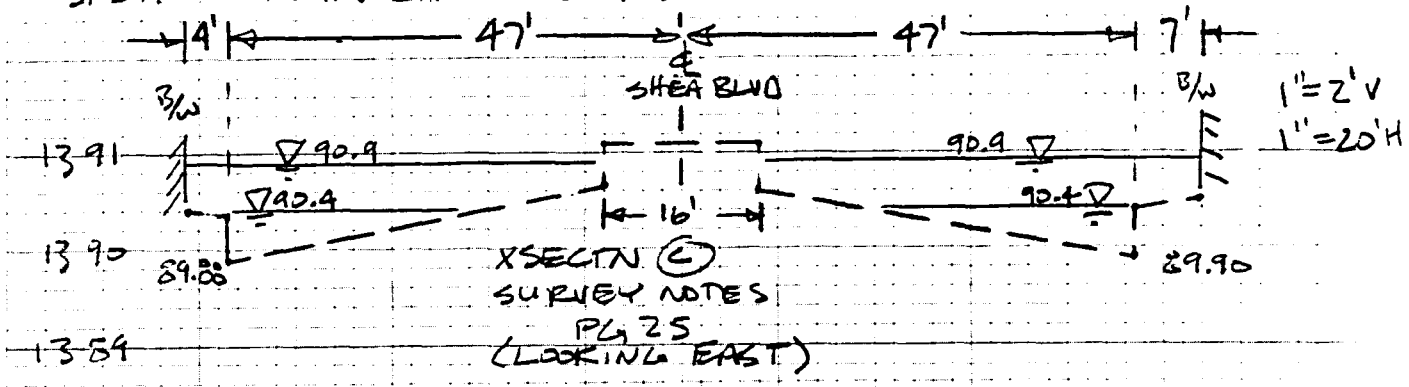
1

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION SECNO=     10.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.000  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.000  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.000  PROFILE=  5  CRITICAL DEPTH ASSUMED
```

DESIGNED BY GSB DATE 2-25-94 SHEET NO. 6 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTLAKE PATHW. & SHEA
APPROVED BY DATE

SPLIT @ MAIN CHANNEL & SHEA BLVD



ASSUME BROAD CRESTED WIER WITH C = 2.75

$Q = CLH^{3/2}$

ELEV	H	L	Q	TOTAL Q
89.9	0	0	0	0
90.4	.5/2	25x2=50	17	17
90.9	.5+.5/2	39x2=78	139	
	.5	11	11	150

HEC-2 BACKWATER MODEL 11623H2X
CWSEL @ MAIN WASH STA 10+50

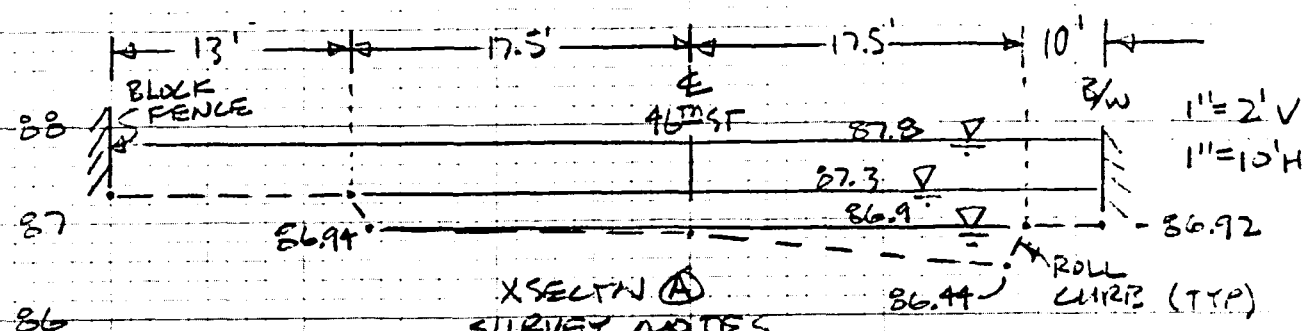
Q	CWSEL @XSECTN 9.750	CWSEL @XSECTN 10.175	CWSEL 10+50	SHEA WIER W.S.	Q MAIN CHANNEL
100	86.50	88.64			
500	87.64	89.21			
1000	88.50	89.63			
1500	88.93	89.92	89.80	89.9	1500+
2000	88.88	90.33	90.15	90.4	2370
2500	89.16	90.68	90.49		
3000	89.44	91.02	90.82	90.9	3120

(DVT60A/DVR60B)

D1	0	100	500	1000	1500	2387	3270
DQ	0	0	0	0	0	17	150

DESIGNED BY GSB DATE 2-25-94 SHEET NO. 7 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTLOR TATUM & SHEA
APPROVED BY DATE

SPLIT @ MAIN CHANNEL & 46TH ST



XSECTN Ⓐ
SURVEY NOTES
PG 25 (W/ VERT ADJUSTMENT)
LOOKING NORTH

ASSUME BROAD CRESTED WIER WITH C = 2.75
$Q = CLH^{3/2}$

ELEV	H	L	Q	TOTAL Q
86.4	0	0	0	0
86.9	.5/2	17	6	6
87.3	.4+.5/2	17	24	
	.4	17+10=27	19	43
87.8	.9+.5/2	17	58	
	.9	17+10=27	63	
	.5	13	13	134
88.3	1.4+.5/2	17	99	
	1.4	17+10=27	123	
	1.0	13	36	258
88.8	1.9+.5/2	17	147	
	1.9	17+10=27	194	
89.3	1.5	13	66	407

579 @ ELEV 89.3

HEC-2 BACKWATER MODEL 11623H2X CWSEL @ 9.55

Q	CWSEL @ XSECTN 9.25	CWSEL @ XSECTN 9.75	CWSEL 9.55	46TH ST WIER WS	Q MAIN CHANNEL
100	85.95	86.50	86.28	86.4	100
500	87.02	87.64	87.39	86.9	323
1000	87.83	88.50	88.23	87.3	467
1500	88.48	88.93	88.75	87.8	744
1900	88.75	88.88	88.83	88.3	1067
2300	88.95	89.16	89.07	88.8	1750
2700	89.09	89.44	89.30	89.3	2700

DI	0	100	329	510	878	1325	2157	3279
DQ	0	0	6	43	134	258	407	579

(DVT60C/DVR60D)

SC 3020

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1*******************************************
 *  HEC-2 WATER SURFACE PROFILES            *
 *                                          *
 *  Version   4.6.2;  May 1991              *
 *                                          *
 *  RUN DATE    25FEB94    TIME   15:46:45  *
 *******************************************
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************************************
 *  U.S. ARMY CORPS OF ENGINEERS
 *  HYDROLOGIC ENGINEERING CENTER
 *  609 SECOND STREET, SUITE D
 *  DAVIS, CALIFORNIA 95616-4687
 *          (916) 756-1104
************************************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                   X
X     X  X        X     X             X
X     X  XXXXXXX   XXXXX              XXXXXXX
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1
   25FEB94       15:46:45                                                                    PAGE    1
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                                                                  THIS RUN EXECUTED 25FEB94     15:46:45
************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
************************************
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```
T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
T2      RATING CURVE FOR MAIN CHANNEL SPLITS AT SHEA AND AT 46TH STREET
T3      MAIN CHANNEL SHEA/46TH                INPUT  FILENAME: 11623H2X
T4
T4      1. CROSS SECTIONS ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
T4
T4      2. CROSS SECTION GR STATIONING USES CENTERLINE OF MAIN CHANNEL
T4         AS STA 10+00
T4
T4      3. CENTERLINE INTERSECTION OF 46TH STREET AND MAIN CHANNEL
T4         CORRESPONDS TO CROSS SECTION LOCATION STATION 10+00
T4
T4      4. CROSS SETION DATA DEVELOPED FROM SCI SURVEY NOTES PG 25 AND
T4         SUBSEQUENT SITE VISITS
T4
T4      5. STARTING WATER SURFACE ELEVATION BASED ON SLOPE-AREA METHOD
T4         USING ESTIMATED SLOPE OF 0.013 FT/FT
T4

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

              2                             0.013                                   1385.5

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     1                  -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38        43        1         2         13        55        16        14        26        17
    15        56        18

J5  LPRNT     NUMSEC                    ********REQUESTED SECTION NUMBERS********

    -10       -10

NC    0.035     0.025     0.025     0.1       0.3
QT        7       100       475       900      1275      1520      1725      1890
X1     9.25         9     977.0    1025.1
GR   1390.0     977.0    1387.6     978.0    1385.6     985.0    1384.9    1000.0    1386.0    1025.0
GR   1386.5    1025.1    1388.5    1065.0    1388.0    1065.0    1388.5    1090.0
1
   25FEB94       15:46:45                                                                    PAGE    2


NC    0.020     0.035     0.020     0.1       0.3
QT        7       100       500      1000      1500      1900      2300      2700
X1     9.75        10     971.0    1034.0        60        40        50
GR   1390.0     943.0    1387.3     943.0    1386.9     944.0    1386.5     971.0    1385.6    1000.0
GR   1385.6    1007.0    1387.9    1034.0    1388.3    1052.0    1388.4    1069.0    1390.0    1069.0

NC    0.025     0.025     0.025     0.1       0.3
QT        7       100       500      1000      1500      2000      2500      3000
X1    10.175       16     875.0    1060.0       200       200       200
GR   1395.0     875.0    1389.3     875.0    1389.4     900.0    1388.5     950.0    1388.1    1000.0
GR   1388.6    1050.0    1389.4    1060.0    1389.2    1066.0    1388.9    1067.0    1389.4    1080.0
GR   1389.9    1095.0    1390.4    1095.0    1390.8    1107.0    1390.3    1107.0    1390.5    1167.0
GR   1395.0    1167.0
1
   25FEB94       15:46:45                                                                    PAGE    3

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
```

```
 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                3                           0.013                                     1386.0
 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
      2                  -1
1
   25FEB94      15:46:45                                                                                PAGE    4

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                4                           0.013                                     1386.5
 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
      3                  -1
1
   25FEB94      15:46:45                                                                                PAGE    5

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                5                           0.013                                     1387.0
 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
      4                  -1
1
   25FEB94      15:46:45                                                                                PAGE    6

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                6                           0.013                                     1387.5
 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
      5                  -1
1
   25FEB94      15:46:45                                                                                PAGE    7

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                7                           0.013                                     1388.0
 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
      6                  -1
1
   25FEB94      15:46:45                                                                                PAGE    8

 T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                8                           0.013                                     1388.5
 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
     15                  -1
1
   25FEB94      15:46:45                                                                                PAGE    9


                                                                    THIS RUN EXECUTED 25FEB94    15:46:47
*************************************
 HEC-2 WATER SURFACE PROFILES
 Version   4.6.2;  May 1991
*************************************

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

MAIN CHANNEL SHEA/46TH
SUMMARY PRINTOUT
```

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
*	9.250	100.00	1385.95	1385.95	.00	.00	.00	100.00	4.31	25.00	.00	.00	.
*	9.250	475.00	1387.02	1387.02	.00	.00	.00	469.45	6.78	25.00	5.55	2.08	25.
*	9.250	900.00	1387.83	1387.83	.00	.00	.00	837.90	7.82	25.00	62.10	3.49	25.
*	9.250	1275.00	1388.48	1388.48	.00	.00	.00	1108.97	8.04	25.00	166.03	3.68	25.
*	9.250	1520.00	1388.75	1388.75	.00	.00	.00	1260.37	8.37	25.00	259.63	4.17	25.
*	9.250	1725.00	1388.93	1388.93	.00	.00	.00	1386.70	8.73	25.00	338.30	4.59	25.
*	9.250	1890.00	1389.09	1389.09	.00	.00	.00	1478.70	8.87	25.00	411.30	4.88	25.
*	9.750	100.00	1386.50	1386.50	.00	.00	.00	100.00	4.18	20.00	.00	.00	.
*	9.750	500.00	1387.64	.00	93.09	3.64	20.00	406.91	4.84	20.00	.00	.00	.
*	9.750	1000.00	1388.50	.00	235.19	4.73	20.00	756.69	5.49	20.00	8.12	.87	35.
*	9.750	1500.00	1388.93	.00	362.65	5.85	20.00	1097.75	6.63	20.00	39.60	1.60	35.
	9.750	1900.00	1388.88	1388.86	458.37	7.56	20.00	1395.46	8.59	20.00	46.18	2.00	35.
*	9.750	2300.00	1389.16	1389.16	560.60	8.18	20.00	1657.17	9.19	20.00	82.23	2.50	35.
*	9.750	2700.00	1389.44	1389.44	662.54	8.69	20.00	1913.50	9.68	20.00	123.96	2.92	35.
	10.175	100.00	1388.64	1388.64	.00	.00	.00	100.00	3.11	25.00	.00	.00	.
*	10.175	500.00	1389.21	1389.21	.00	.00	.00	497.63	4.77	25.00	2.37	1.71	25.
*	10.175	1000.00	1389.63	1389.63	.00	.00	.00	970.31	5.48	25.00	29.69	3.14	25.
*	10.175	1500.00	1389.92	1389.92	.00	.00	.00	1428.12	6.19	25.00	71.88	3.88	25.
	10.175	2000.00	1390.33	.00	.00	.00	.00	1858.76	6.05	25.00	141.24	4.26	25.
	10.175	2500.00	1390.68	.00	.00	.00	.00	2262.79	6.08	25.00	237.21	3.74	25.
	10.175	3000.00	1391.02	.00	.00	.00	.00	2626.25	6.05	25.00	373.75	3.77	25.

1

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION SECNO=     9.250  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.250  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.250  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.250  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.250  PROFILE=  5  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.250  PROFILE=  6  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.250  PROFILE=  7  CRITICAL DEPTH ASSUMED

CAUTION SECNO=     9.750  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.750  PROFILE=  1  MINIMUM SPECIFIC ENERGY
WARNING SECNO=     9.750  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     9.750  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     9.750  PROFILE=  4  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=     9.750  PROFILE=  6  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.750  PROFILE=  6  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.750  PROFILE=  6  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     9.750  PROFILE=  7  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.750  PROFILE=  7  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.750  PROFILE=  7  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=    10.175  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.175  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    10.175  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    10.175  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.175  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    10.175  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    10.175  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.175  PROFILE=  4  MINIMUM SPECIFIC ENERGY
```

46TH ST. & SHEA

TBM E.H. 1391.65

NOTE: BY FIELD INSPECTION, HIGH POINT IN EAST GUTTER IS ±15-20' NORTH OF CROSS SECTION (A) AND ±.2' HIGHER IN ELEV. ADJUST ℄, EAST G & TC.

GSB/2-25-94

ADD 0.1' ADD 0.2'

87.3	87.28	86.94	86.80	86.24	86.72	86.72	85.40	84.85	85.10
NG	T/C	G	℄	G	T/C	B/W	E/P	℄	PVMT
C WALL	B/W				C VAULT			℄	
30.5	17.5		46TH		17.2	21.5	39.0	57.0	93.0

(A)

(W) (E)

87.4	87.28	86.94	86.48	85.62	85.58	87.85	88.30	89.25
77.5	57.0	G	79.0	℄ WASH	7.0	34.0	52.0	69.0
NG	T/C		℄ 46TH	C B/C E.SIDE 46TH	B/W	E/P	PVMT	PVMT

(NW) (B) (SE)

91.0	90.43	90.36	89.88	90.66	91.11	91.09	90.61	89.90	89.40	90.42	90.53	90.2
NG	F/W	T/C	G	P	T/C	T/C P		G	T/C	F/W	B/W	B/W + 20'

(N) (C)

89.9	89.2	89.4	88.5	88.1	88.6	89.14	89.24	88.92	89.43	90.07	90.28
181'	152'	100'	50'	℄ WASH	50'	60' B/W	66 T/C	G	60' ℄ PVMT	G	95' T/C
1' S.OF WALL											

(D)

(NW)

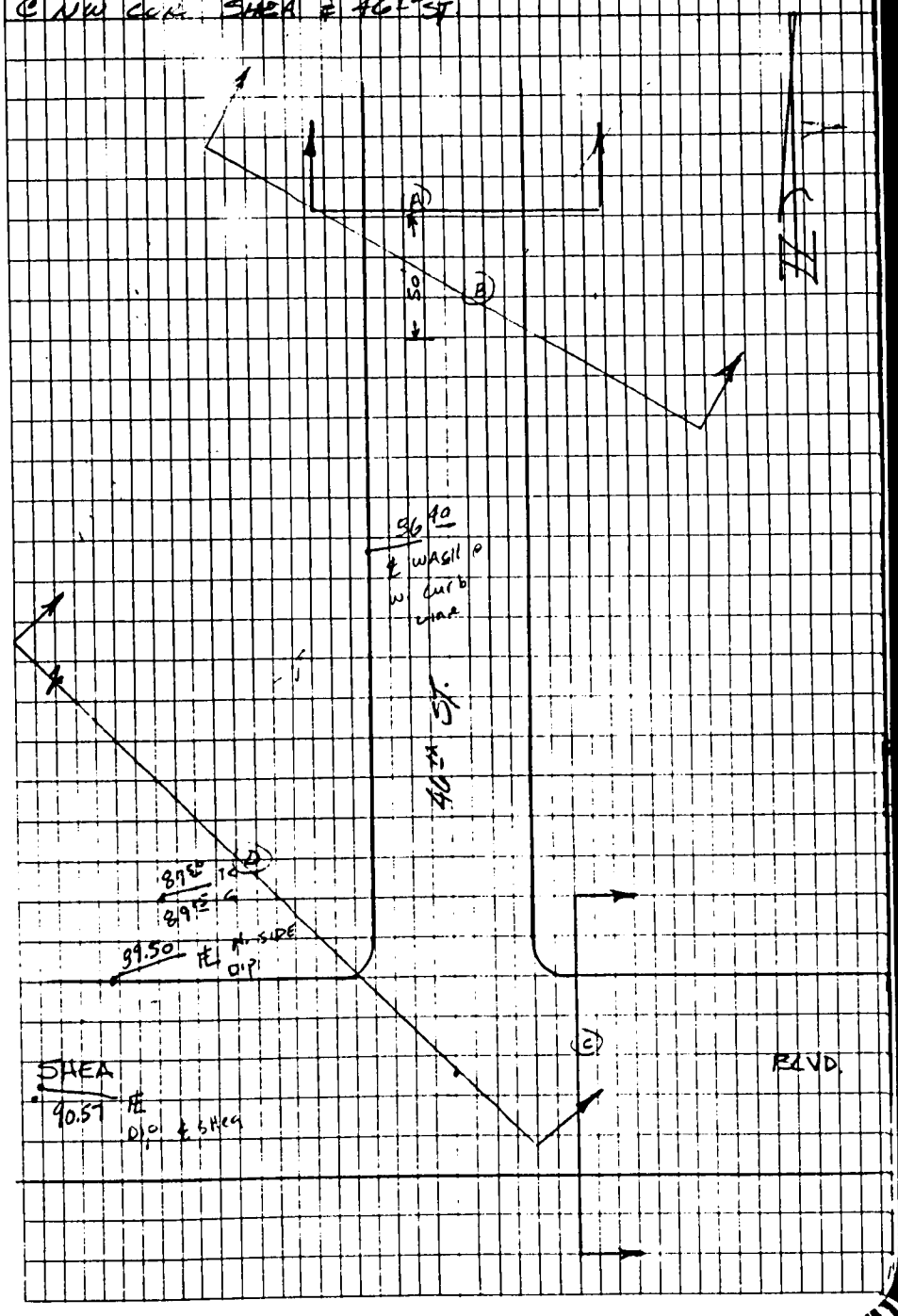
90.12	90.53	90.26	90.76
PVMT	℄ ℄ B.C.	G	T/C 107'

(SE)

2-9-94 SA JH

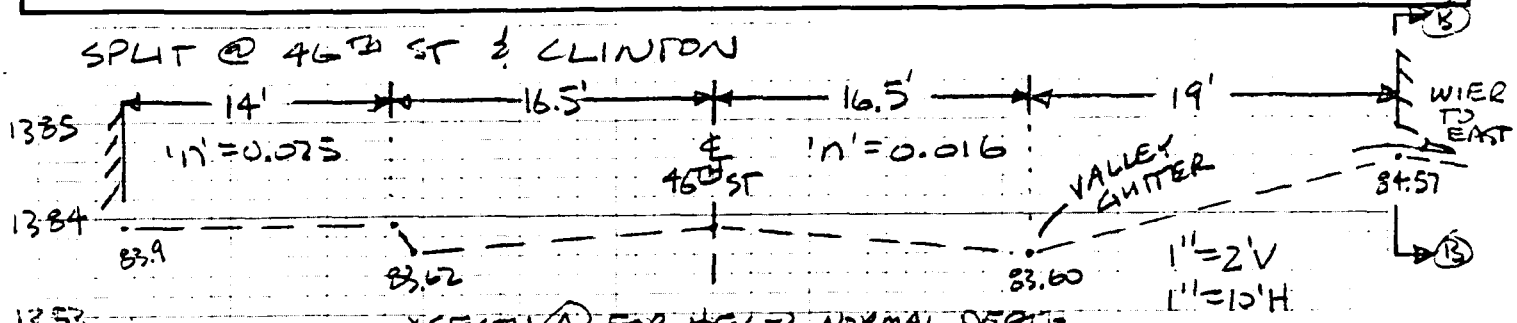
(25)

TOP SE PART FH @ NW COR. SHEA & 46TH ST.

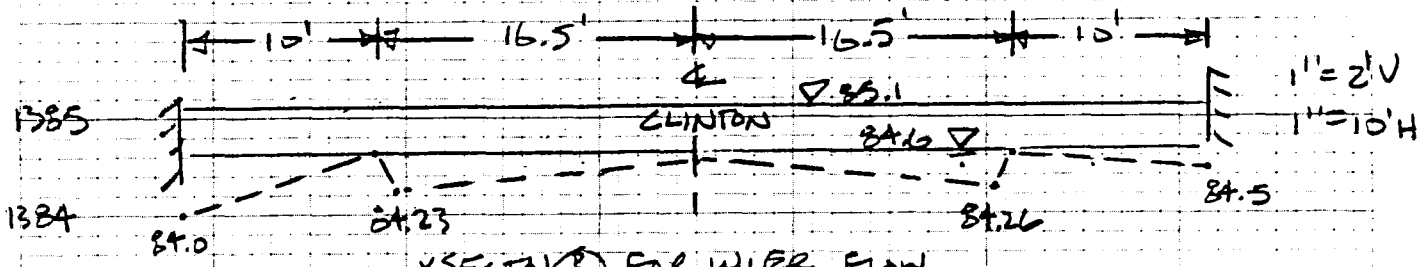


DESIGNED BY GSB DATE 3-1-94 SHEET NO. 8 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR TATUM & SHEA
APPROVED BY DATE

SPLIT @ 46TH ST & CLINTON



XSECTN (A) FOR HEC-2 NORMAL DEPTH
SURVEY NOTES PG 21 (FILE NAME 11623H2R)
(LOOKING NORTH)



XSECTN (B) FOR WIER FLOW
SURVEY NOTES PG 21
(LOOKING EAST)

ASSUME BROAD CRESTED WIER WITH C=2.75
$Q = CLH^{3/2}$

ELEV	H	L	Q	TOTAL Q
84.23	0	0	0	0
84.6	.3	10	5	
	.25	32	11	16
85.1	.5+.3=.8	10	20	
	.5+.25=.75	32	57	
	.55	10	11	88

HEC-2 NORMAL DEPTH MODEL 11623H2R

	Q	CWSEL @ ℄ INTERSECTION			CLINTON WIER W.S.	Q 46TH ST
	50	84.11				
	100	84.28				
	200	84.56			84.6	220
	300	84.76				
	400	84.95				
	500	85.12			85.1	490
DI	0	50	102	236	578	
DQ	0	50	100	220	490	

(DVT90E / DVR90N)

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    01MAR94    TIME   13:19:14 *
 *****************************************
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*************************************
 *  U.S. ARMY CORPS OF ENGINEERS
 *  HYDROLOGIC ENGINEERING CENTER
 *  609 SECOND STREET, SUITE D
 *  DAVIS, CALIFORNIA 95616-4687
 *          (916) 756-1104
*************************************
```

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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
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1
   01MAR94      13:19:14                                                                    PAGE    1
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                                                                    THIS RUN EXECUTED 01MAR94    13:19:14
 *************************************
  HEC-2 WATER SURFACE PROFILES

  Version   4.6.2;  May 1991
 *************************************

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
T2      RATING CURVE FOR 46TH STREET AND CLINTON STREET SPLIT
T3      46TH ST AND CLINTON                    INPUT  FILENAME: 11623H2R
T4
T4      1. CROSS SECTIONS ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
T4
T4      2. CROSS SECTION GR STATIONING USES CENTERLINE OF 46TH ST
T4         AS STA 10+00
T4
T4      3. CROSS SECTION DATA DEVELOPED FROM SCI SURVEY NOTES PG 21
T4
T4      4. STARTING WATER SURFACE ELEVATION BASED ON SLOPE-AREA METHOD
T4         USING ESTIMATED SLOPE OF 0.008 FT/FT
T4

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                 2                           0.008

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
     1                  -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    38        43         1         2        13        55        16        14        26        17
    15        56        18

J5  LPRNT     NUMSEC                    ********REQUESTED SECTION NUMBERS********
   -10       -10

NC    0.025     0.016     0.016       0.1       0.3
QT        6        50       100       200       300       400       500
X1    10.00         8     983.5    1036.0
GR   1390.0     969.0    1383.9     969.5    1383.9     983.5    1383.6     984.5    1383.9    1000.0
GR   1383.6    1016.5    1384.6    1035.5    1390.0    1036.0
1
   01MAR94      13:19:14                                                                    PAGE    2

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                 3                           0.008

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
     2                  -1

1
   01MAR94      13:19:14                                                                    PAGE    3

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                 4                           0.008

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
     3                  -1
```

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		5			0.008					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	4		-1							

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		6			0.008					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	5		-1							

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		7			0.008					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15		-1							

THIS RUN EXECUTED 01MAR94 13:19:15

****
HEC-2 WATER SURFACE PROFILES
Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

46TH ST AND CLINTON

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
*	10.000	50.00	1384.11	1384.11	4.27	1.49	25.00	45.73	3.23	16.00	.00	.00	.
*	10.000	100.00	1384.28	1384.28	11.66	2.17	25.00	88.34	4.01	16.00	.00	.00	.
*	10.000	200.00	1384.56	1384.56	27.07	2.93	25.00	172.93	4.89	16.00	.00	.00	.
*	10.000	300.00	1384.76	1384.76	41.20	3.40	25.00	258.80	5.62	16.00	.00	.00	.
*	10.000	400.00	1384.95	1384.95	55.00	3.73	25.00	345.00	6.19	16.00	.00	.00	.
*	10.000	500.00	1385.12	1385.12	68.71	4.01	25.00	431.29	6.67	16.00	.00	.00	.

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 10.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 3 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 4 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 5 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 6 CRITICAL DEPTH ASSUMED

CLINTON & 46th ST.

TBM B.C. 1383.87

℄ CLINTON

83.9	83.93	83.62	83.87	83.60	84.57	84.42
NG	B/C	G	℄	VG	PUMT	PUMT
30.5	16.50		46th	16.5	35.50	55.50
					GB	

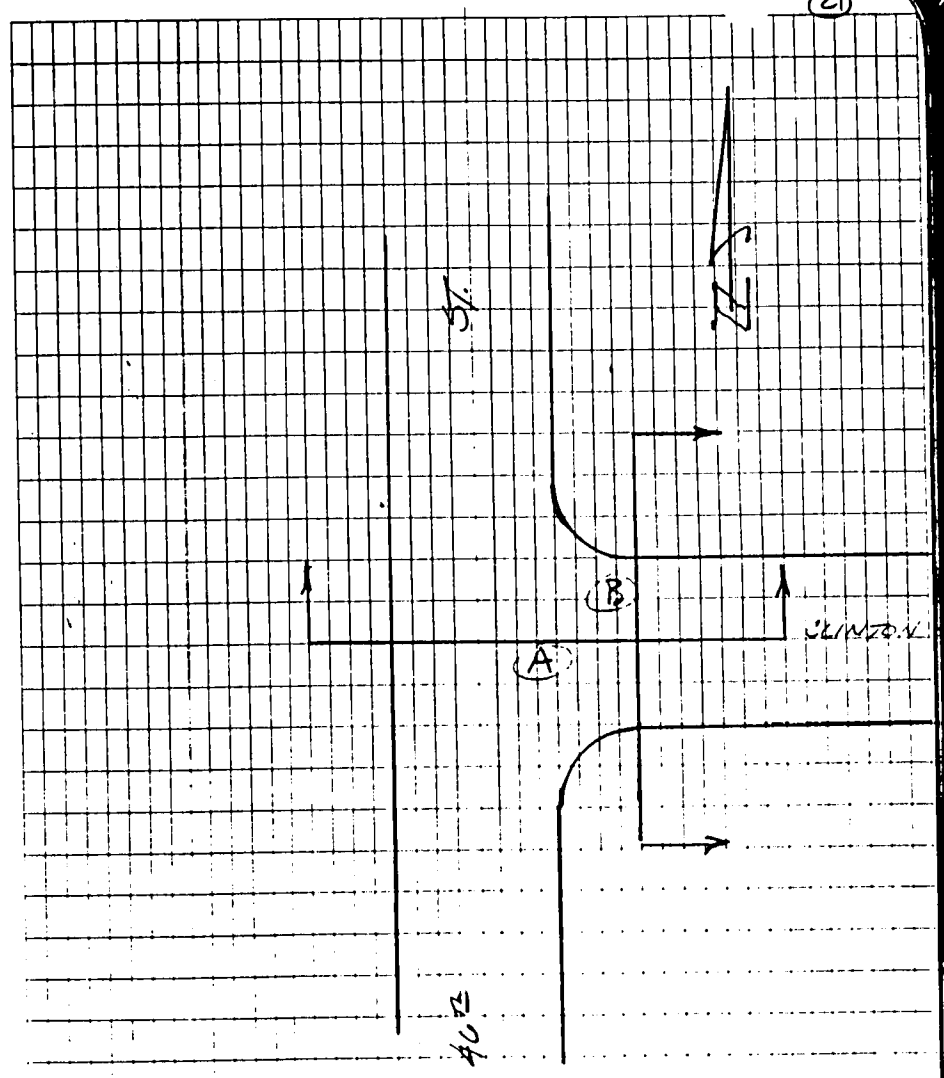
(W) (A) (E)

X-SEC ON CLINTON

84.0	84.61	84.23	84.57	84.26	84.63	84.5
NG	B/C	G	℄	G	B/C	NG
26.50	16.50		CLINTON		16.50	26.50
			RET.			

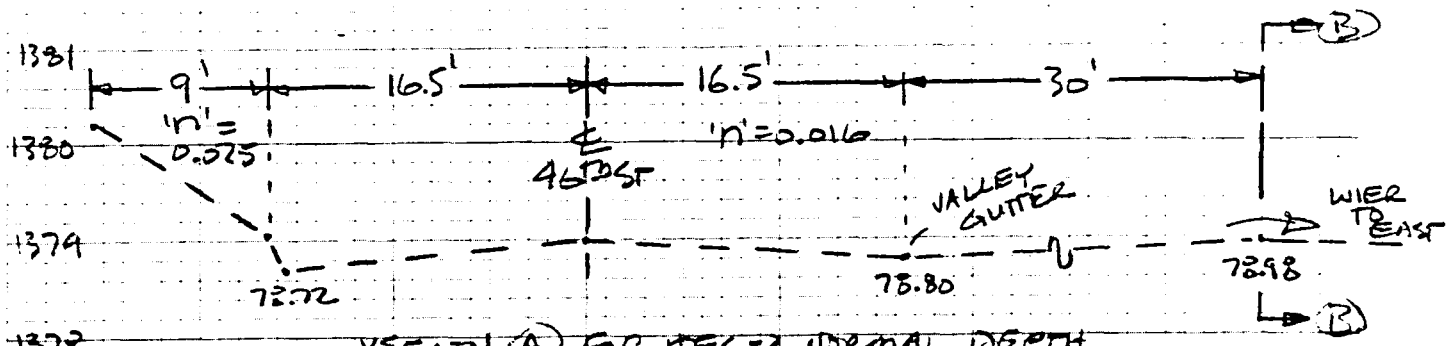
(N) ROW (S)

(B)

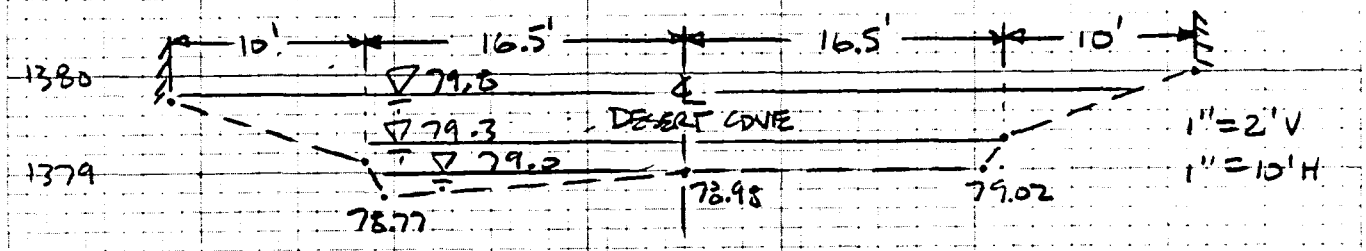


DESIGNED BY GSB DATE 3-1-94 SHEET NO. 9 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR TATUM & SHEA
APPROVED BY DATE

SPLIT @ 46TH ST & DESERT COVE (DT120E/DR120N)



XSECTN (A) FOR HEC-2 NORMAL DEPTH
SURVEY NOTES PG 20 (FILENAME 11623H25)
(LOOKING NORTH)
1" = 2' V
1" = 10' H



XSECTN (B) FOR WIER OVERFLOW
SURVEY NOTES PG 20
(LOOKING EAST)

ASSUME BROAD CRESTED WIER WITH C = 2.75
$Q = CLH^{3/2}$

ELEV	H	L	Q	TOTAL Q
78.77	0	0	0	0
79.0	.06	16	1	1
79.3	.3+.06=.36	16	10	
	.3	16	7	17
79.8	.35	10	6	
	.5+.36=.86	16	35	
80.1	.3+.5=.8	16	31	
	.25	7	2	74

140 @ 80.1

HEC-2 NORMAL DEPTH MODEL 11623H25

	Q	CWSEL @ ℄ INTERSECTION			DESERT COVE WIER W.S.	Q 46TH ST
	50	79.15			79.0	30
	100	79.31			79.3	50
	200	79.56				
	300	79.77			79.8	316
	400	79.96				
	500	80.12			80.1	490
DI	0	31	67	390	630	
DQ	0	30	50	316	490	

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1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    01MAR94    TIME   14:27:29 *
 *****************************************
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*************************************
*  U.S. ARMY CORPS OF ENGINEERS
*  HYDROLOGIC ENGINEERING CENTER
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616-4687
*          (916) 756-1104
*************************************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                   X
X     X  X        X     X             X
X     X  XXXXXXX   XXXXX              XXXXXXX
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1
   01MAR94      14:27:29                                                                    PAGE    1
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                                                                  THIS RUN EXECUTED 01MAR94    14:27:29
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
T2      RATING CURVE FOR 46TH STREET AND DESERT COVE SPLIT
T3      46TH ST AND DESERT COVE                INPUT  FILENAME: 11623H2S
T4
T4      1. CROSS SECTIONS ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
T4
T4      2. CROSS SECTION GR STATIONING USES CENTERLINE OF 46TH ST
T4         AS STA 10+00
T4
T4      3. CROSS SECTION DATA DEVELOPED FROM SCI SURVEY NOTES PG 20
T4
T4      4. STARTING WATER SURFACE ELEVATION BASED ON SLOPE-AREA METHOD
T4         USING ESTIMATED SLOPE OF 0.007 FT/FT
T4

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                2                           0.007

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     1                 -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38        43         1         2        13        55        16        14        26        17
    15        56        18

J5  LPRNT     NUMSEC                    ********REQUESTED SECTION NUMBERS********

   -10       -10

NC    0.025     0.016     0.016       0.1       0.3
QT        6        50       100       200       300       400       500
X1    10.00         8     983.5    1036.0
GR   1385.0     974.0    1380.2     974.5    1379.1     983.5    1378.7     984.5    1379.0    1000.0
GR   1378.8    1016.5    1379.0    1046.5    1385.0    1047.0
1
   01MAR94      14:27:29                                                                    PAGE    2

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                3                           0.007

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     2                 -1

1
   01MAR94      14:27:29                                                                    PAGE    3

T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                4                           0.007

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     3                 -1
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T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		5			0.007					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	4		-1							

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		6			0.007					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	5		-1							

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		7			0.007					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15		-1							

THIS RUN EXECUTED 01MAR94 14:27:30

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

46TH ST AND DESERT COVE

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
*	10.000	50.00	1379.15	1379.15	.00	.05	25.00	28.04	3.06	16.00	21.96	2.88	16.
*	10.000	100.00	1379.31	1379.31	.18	.95	25.00	54.71	3.80	16.00	45.11	3.64	16.
*	10.000	200.00	1379.56	1379.56	1.29	1.46	25.00	107.48	4.73	16.00	91.22	4.57	16.
*	10.000	300.00	1379.77	1379.77	3.31	1.80	25.00	159.81	5.41	16.00	136.87	5.23	16.
*	10.000	400.00	1379.96	1379.96	6.14	2.05	25.00	211.80	5.94	16.00	182.06	5.74	16.
*	10.000	500.00	1380.12	1380.12	9.67	2.26	25.00	263.51	6.40	16.00	226.82	6.17	16.

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 10.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 3 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 4 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 5 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10.000 PROFILE= 6 CRITICAL DEPTH ASSUMED

DESERT COVE & 46th ST.

TBM B/C 1379.45

℄ DESERT COVE

80.2	79.05	78.72	79.00	78.80	78.93	79.02
NG	B/C	G	℄	VG	PUMT	PUMT
25.5	16.5		46.1	16.5	46.50	66.50

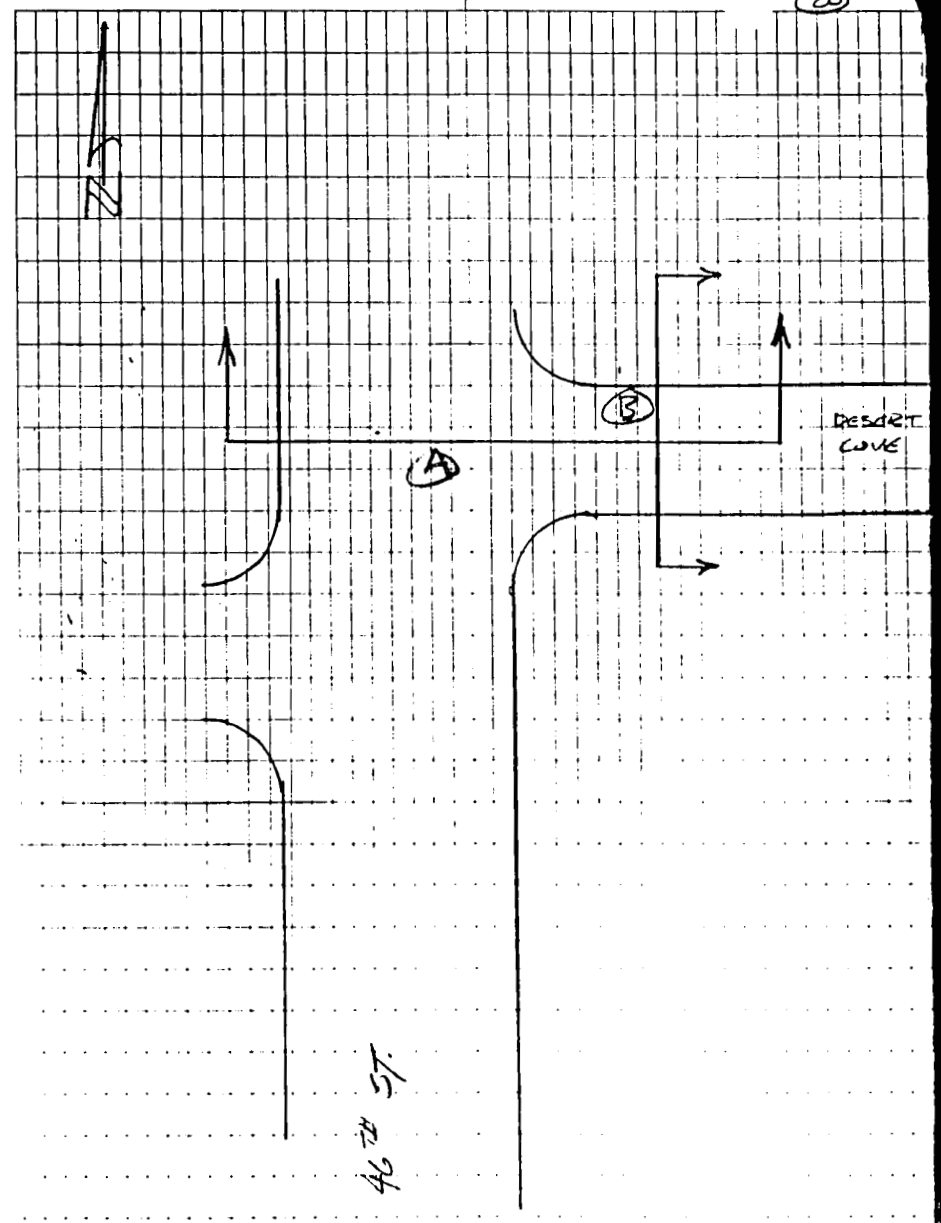
W. (A) GB? E.

X-SEC ON DESERT COVE

79.75	79.12	78.72	78.99	79.02	79.31	80.0
NG	B/C	G	℄	G	B/C	NG
26.50	16.50		D.C.		16.50	26.50

N. ROCK (B) S.

(20)



DESIGNED BY GSB DATE 3-1-94 SHEET NO. 10 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR TATUM & SHEA
APPROVED BY DATE

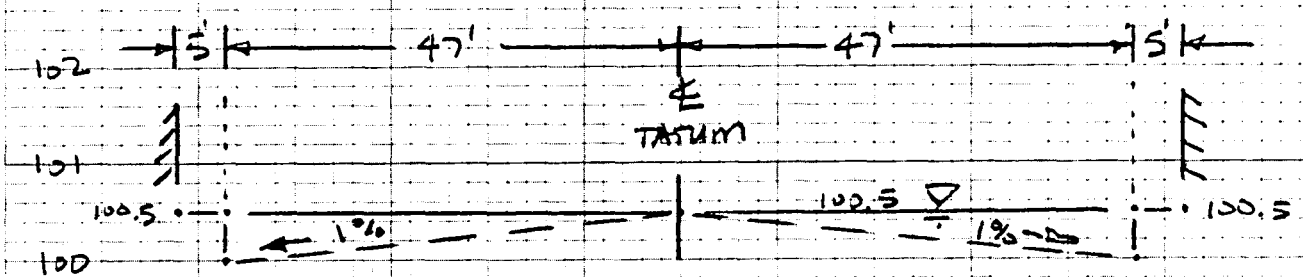
SPLIT @ TATUM SOUTH OF SHEA

ASSUME NORMAL DEPTH TYPICAL CROSS SECTION IN TATUM BLVD SOUTH OF SHEA BLVD. NO MEDIAN PRESENT. ESTIMATE LONGITUDINAL AND CROSS SLOPE. SIDEBOARD HYDRAULIC SECTION AT BACK OF WALK.

ASSUME THAT CAPACITY OF TATUM @ TOP OF CURB WILL TRAVEL NORTH IN TATUM TO INTERSECTION WITH SHEA BLVD. ANY FLOW IN EXCESS OF TATUM CAPACITY WILL DIVERT AND GO EAST THRU MEDICAL OFFICE COMPLEX @ SOUTHEAST CORNER TATUM & SHEA.

TYPICAL SECTION:

1" = 2' V (ARBITRARY DATUM)
1" = 20' H



'n' = 0.016
S = 0.0025 FT/FT (ESTIMATED)
Q = 50 CFS @ ELEV 100.5
V = 1.9 FT/SEC

REFER TO HEC-2 FILE 11623 H2T

DI	0	25	50	75	100	125	150
DQ	0	0	0	25	50	75	100

(DT100N / DR100E)

SC 3020

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1*********************************************
 *  HEC-2 WATER SURFACE PROFILES             *
 *                                           *
 *  Version   4.6.2;  May 1991               *
 *                                           *
 *  RUN DATE    01MAR94    TIME   09:41:24   *
 *********************************************
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************************************
 *  U.S. ARMY CORPS OF ENGINEERS
 *  HYDROLOGIC ENGINEERING CENTER
 *  609 SECOND STREET, SUITE D
 *  DAVIS, CALIFORNIA 95616-4687
 *        (916) 756-1104
************************************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
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1
   01MAR94      09:41:24                                                                    PAGE    1
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                                                                THIS RUN EXECUTED 01MAR94    09:41:24
************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
************************************


T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623
T2      NORMAL DEPTH RATING CURVE FOR TATUM BLVD SOUTH OF SHEA BLVD
T3      TATUM SOUTH OF SHEA                   INPUT  FILENAME: 11623H2T
T4
T4      1. CROSS SECTION ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
T4
T4      2. CROSS SECTION GR STATIONING USES CENTERLINE OF TATUM
T4         AS STA 10+00
T4
T4      3. STARTING WATER SURFACE ELEVATION BASED ON SLOPE-AREA METHOD
T4            USING ESTIMATED SLOPE OF 0.0025 FT/FT
T4

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                2                         0.0025

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     1                 -1


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        43         1         2        13        55        16        14        26        17
     15        56        18

J5  LPRNT    NUMSEC                    ********REQUESTED SECTION NUMBERS********

    -10       -10

NC    0.016     0.016     0.016       0.1       0.3
QT        5        25        50        75       100       125
X1    10.00         9     947.5    1052.5
GR    102.0     947.5     100.5     948.0     100.5     953.0     100.0     953.0     100.5    1000.0
GR    100.0    1047.0     100.5    1047.0     100.5    1052.0     102.0    1052.5
1
   01MAR94      09:41:24                                                                    PAGE    2


T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                3                         0.0025

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     2                 -1

1
   01MAR94      09:41:24                                                                    PAGE    3


T1      WESTCOR NE CORNER TATUM AND SHEA    STANLEY CONSULTANTS # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                4                         0.0025

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     3                 -1

1
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T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		5			0.0025					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	4		-1							

1

T1 WESTCOR NE CORNER TATUM AND SHEA STANLEY CONSULTANTS # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		6			0.0025					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15		-1							

1

THIS RUN EXECUTED 01MAR94 09:41:24

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

TATUM SOUTH OF SHEA

SUMMARY PRINTOUT

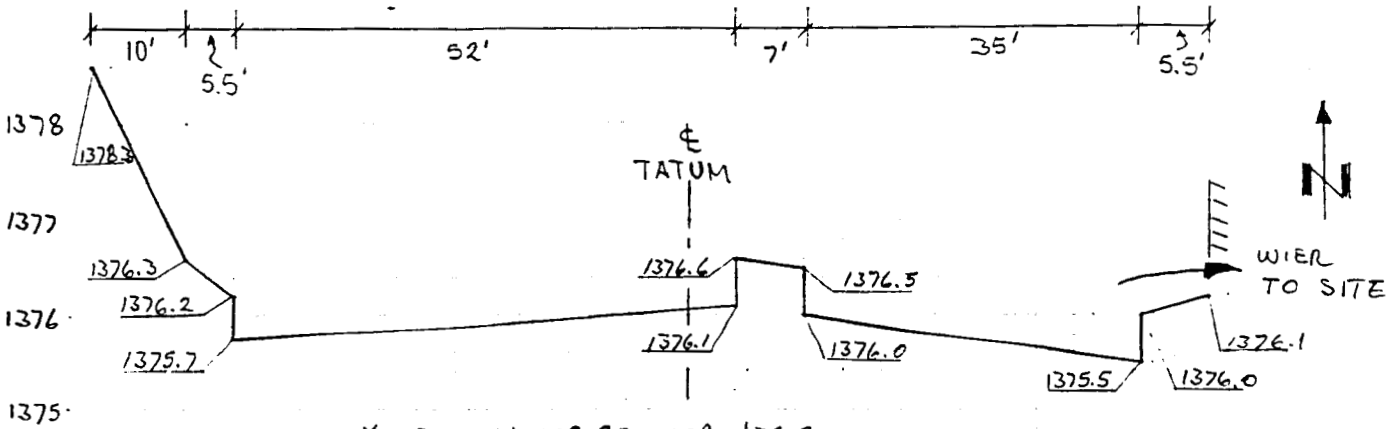
SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
10.000	25.00	100.41	.00	.00	.00	.00	25.00	1.61	16.00	.00	.00	.
10.000	50.00	100.53	.00	.00	.00	.00	50.00	1.87	16.00	.00	.00	.
10.000	75.00	100.60	.00	.00	.00	.00	75.00	2.18	16.00	.00	.00	.
10.000	100.00	100.67	.00	.00	.00	.00	100.00	2.46	16.00	.00	.00	.
10.000	125.00	100.72	.00	.00	.00	.00	125.00	2.69	16.00	.00	.00	.

1

SUMMARY OF ERRORS AND SPECIAL NOTES

DESIGNED BY ARB DATE 3/21/91 SHEET NO. 11 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR TATUM/SHEA
APPROVED BY DATE

Split @ TATUM BLVD & PROJECT SITE (DVT80A / DVR80B)

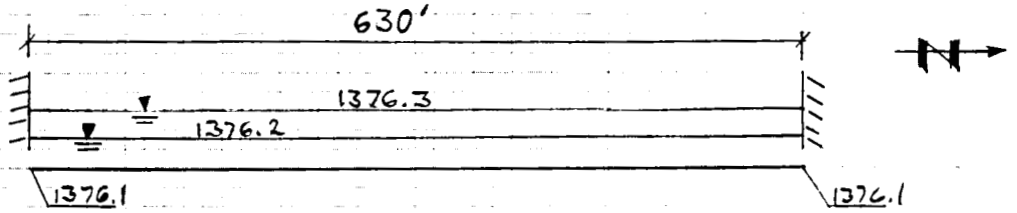


X-SECTION 109.90 FOR HEC-2

For the Project site it was assumed a broad crested wier

L = 630'
C = 2.50
El min = 1376.1

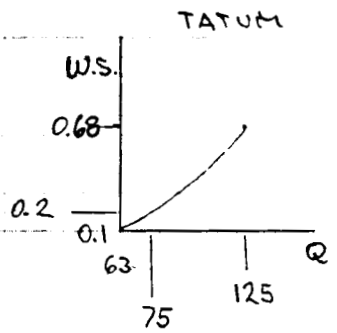
$Q_w = CLH^{3/2}$



ELEV	H	L	Q
1376.2	0.1	630'	50
1376.3	0.2	630'	141

HEC-2 Model 11623H2E (X-SECTION 109.90)

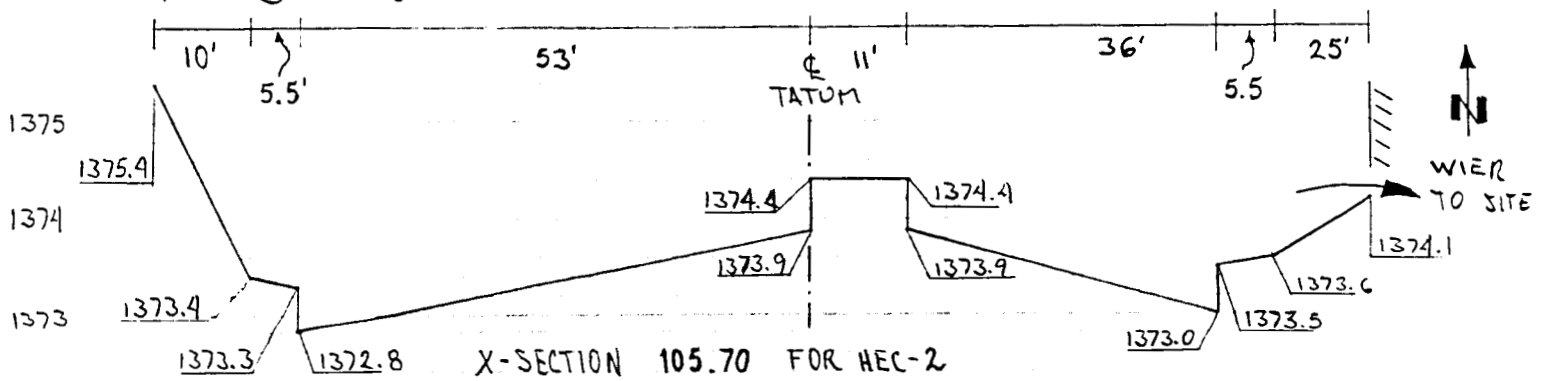
Q	CWSEL @ ℄ INTER-SECTION	PROJECT SITE WIER W.S.	TOTAL Q TATUM BLVD
3	1375.72		
6	1375.78		
31	1375.97		
63	1376.09	1376.1	63
125	1376.68	1376.2	± 125



DI	0	3	6	31	63	125
DQ	0	0	0	0	0	75

DESIGNED BY JRB DATE 3/22/94 SHEET NO. 12 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR TATUM/SHEA
APPROVED BY DATE

Split @ TATUM BLVD & PROJECT SITE (DVT80C/DVR80D)



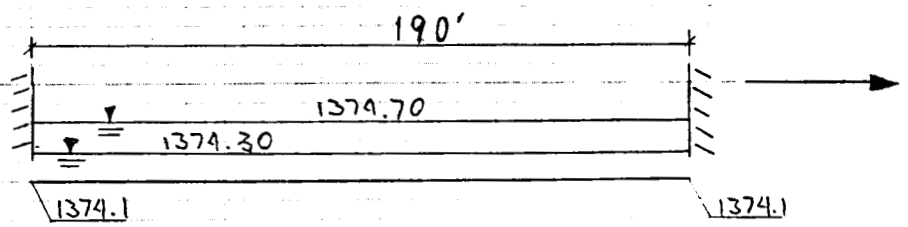
X-SECTION 105.70 FOR HEC-2

For the Project site it was assumed a broad crested wier

L = 190'

C = 2.60 $Q = CLH^{3/2}$

$EL_{min} = \frac{1374.3 + 1373.9 + 1374.2}{3} = 1374.1$



ELEV	H	L	Q
1374.30	0.20	190'	44
1374.70	0.60		230
1375.00	0.90		422
1375.30	1.20		649

HEC-2 MODEL 11623H2E X-SECTION 105.70

Q	CWSEL @ & INTER-SECTION	PROJEC SITE WIER W.S.	TOTAL Q TATUM BLVD
50	1373.50		
100	1373.68		
500	1374.28	1374.30	544
1000	1374.70	1374.70	1230
2000	1375.32	1375.30	2649

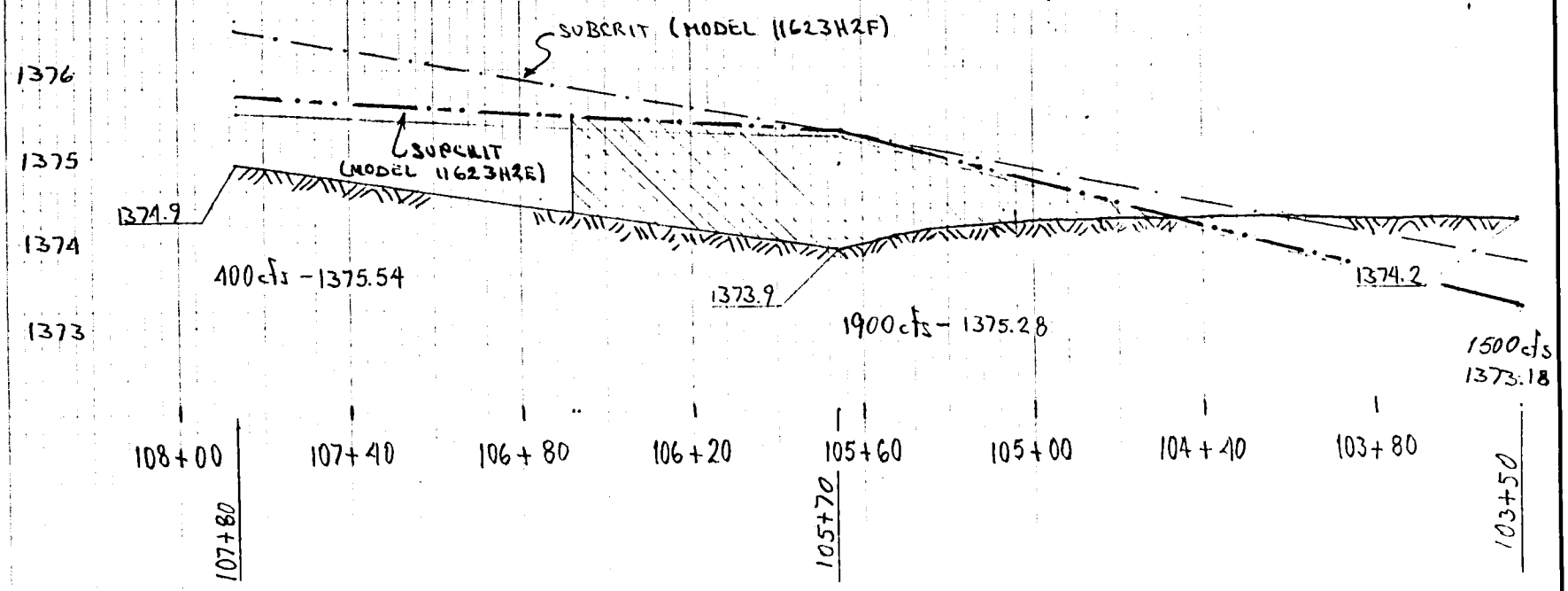
DI	0	50	100	544	1230	2649
DQ	0	0	0	44	230	649

DESIGNED BY JRB DATE 3/23/94 SHEET NO. 13 PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR TAYLOR/SHEA
APPROVED BY DATE

Interpolation between profile 5 & 4 (SUPCRIT)

X-SECT.	Q	WSL
107+80	400	1375.54
105+70	1900	1375.28
103+50	1500	1373.18

AVERAGE WSL = $\frac{75.54 + 75.28 + 73.18}{3}$ = 1374.67



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1*****************************************
*  HEC-2 WATER SURFACE PROFILES           *
*                                         *
*  Version   4.6.2;  May 1991             *
*                                         *
*  RUN DATE    13MAY94    TIME   08:38:13 *
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************************************
*  U.S. ARMY CORPS OF ENGINEERS
*  HYDROLOGIC ENGINEERING CENTER
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616-4687
*        (916) 756-1104
************************************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
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1
13MAY94 08:38:13 PAGE 1

THIS RUN EXECUTED 13MAY94 08:38:13

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************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
************************************
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T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623
T2      RATING CURVE FOR TATUM FLOW SPLIT AT CLINTON
T3      TATUM BLVD SUBCRIT                          FILENAME: 11623H2E
T4
T4      1. CROSS SECTIONS ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
T4
T4      2. CROSS SECTION GR STATIONING USES MEDIAN LINE OF TATUM BLVD
T4         AS STA 10+00
T4
T4      3. CENTERLINE INTERSECTION OF DESERT COVE AVE AND TATUM BLVD
T4         CORRESPONDS TO CROSS SECTION LOCATION STATION 100+00
T4
T4      4. CROSS SECTION GR DATA BASED ON VAL-TEC, INC. RESULTS OF SURVEY
T4         DATED 4/1992. DATUM IS CITY OF PHOENIX.
T4
T4      5. STARTING WATER SURFACE ELEVATION BASED ON SLOPE-AREA METHOD
T4         USING ESTIMATED SLOPE OF 0.0047 FT/FT
T4
T4
J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ
                2                        0.0047                                1369.5
J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE
     1                 -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT
     38       43        1        2       13       55       16       14       26       17
     15       56       18                38       43        1       25       42        8
     39       27       53       54       28        4       37                38       43
      1       50        3       61       27       21       23       24       22       28

J5  LPRNT    NUMSEC                 ********REQUESTED SECTION NUMBERS********
    -10      -10
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1
13MAY94 08:38:13 PAGE 2

```
NC    0.020    0.020    0.016      0.1      0.3
QT        5       50      100      500      800     1500
X1    99.20       14    947.5   1052.5
GR   1371.7    937.5   1369.7    947.5   1369.6    953.0   1369.1    953.1   1369.8   1000.0
GR   1370.3   1000.1   1370.3   1010.9   1369.8   1011.0   1368.8   1046.9   1369.3   1047.0
GR   1369.4   1052.5   1370.0   1067.0   1370.1   1107.0   1370.7   1200.0

X1   101.35       14    947.5   1052.5      215      215      215
GR   1372.6    937.5   1370.6    947.5   1370.5    953.0   1370.0    953.1   1370.8    987.0
GR   1371.3    987.1   1371.3    999.9   1370.8   1000.0   1370.0   1046.9   1370.5   1047.0
GR   1370.6   1052.5   1371.0   1065.0   1372.0   1102.0   1372.6   1132.0

X1   103.50       14    947.5   1052.5      215      215      215
GR   1374.1    937.5   1372.1    947.5   1372.0    953.0   1371.5    953.1   1372.0    987.0
GR   1372.5    987.1   1372.5   1012.0   1372.0   1012.1   1371.5   1046.9   1372.0   1047.0
GR   1372.1   1052.5   1373.0   1067.0   1374.0   1111.0   1374.1   1128.0

QT        5       50      100      500     1000     2000
X1   105.70       13    947.5   1052.5      220      220      220
GR   1375.4    937.5   1373.4    947.5   1373.3    953.0   1372.8    953.1   1373.9   1000.0
GR   1374.4   1000.1   1374.4   1011.0   1373.9   1011.1   1373.0   1046.9   1373.5   1047.0
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GR   1373.6     1052.5     1373.9     1073.0     1373.9     1110.0

QT        5         13         25        125        250        500
X1   107.80         11      947.5     1052.5        210        210        210
GR   1377.0      937.5     1375.0      947.5     1374.9      953.0     1374.4      953.1     1375.0      990.0
GR   1375.5      990.1     1375.6     1000.0     1375.1     1000.1     1374.3     1046.9     1374.8     1047.0
GR   1374.9     1052.5

QT        5          3          6         31         63        125
X1   109.90         11      947.5     1052.5        210        210        210
GR   1378.3      937.5     1376.3      947.5     1376.2      953.0     1375.7      953.1     1376.1     1005.0
GR   1376.6     1005.1     1376.5     1012.0     1376.0     1012.1     1375.5     1046.9     1376.0     1047.0
GR   1376.1     1052.5

X1   111.95         11      947.5     1052.5        205        205        205
GR   1379.5      937.5     1377.5      947.5     1377.4      953.0     1376.9      953.1     1377.3     1007.5
GR   1377.8     1007.6     1377.6     1011.6     1377.1     1011.7     1376.6     1046.9     1377.1     1047.0
GR   1377.2     1052.5
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T1     WESTCOR TATUM AND SHEA      STANLEY CONSULTANTS PROJECT # 11623

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

              3                         0.0047                                1369.7

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

     2                 -1                                                              15

FLOW DISTRIBUTION FOR SECNO=     99.20          CWSEL=   1369.72

STA=     947.    1053.    1060.
  PER Q=     98.1      1.9
   AREA=     30.8      1.3
    VEL=      3.2      1.5
  DEPTH=       .4       .2

FLOW DISTRIBUTION FOR SECNO=    101.35          CWSEL=   1370.75

STA=     947.     948.    1053.    1057.
  PER Q=       .0     99.7       .3
   AREA=       .1     30.8       .4
    VEL=       .1      3.2       .9
  DEPTH=       .1       .4       .1

FLOW DISTRIBUTION FOR SECNO=    103.50          CWSEL=   1372.15

STA=     947.     948.    1053.    1053.
  PER Q=       .0    100.0       .0
   AREA=       .0     28.8       .0
    VEL=       .1      3.5       .1
  DEPTH=       .0       .4       .0

FLOW DISTRIBUTION FOR SECNO=    105.70          CWSEL=   1373.68

STA=     946.     948.    1053.    1058.
  PER Q=       .3     99.6       .1
   AREA=       .2     28.4       .2
    VEL=      1.4      3.5       .6
  DEPTH=       .1       .4       .0

FLOW DISTRIBUTION FOR SECNO=    107.80          CWSEL=   1374.82

STA=     953.    1053.
  PER Q=    100.0
   AREA=     13.1
    VEL=      1.9
  DEPTH=       .2
```



```
   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=    109.90          CWSEL=   1375.78

STA=     953.    1053.
  PER Q=    100.0
   AREA=      3.2
    VEL=      1.9
  DEPTH=       .1

FLOW DISTRIBUTION FOR SECNO=    111.95          CWSEL=   1376.93

STA=     953.    1053.
  PER Q=    100.0
   AREA=      3.8
    VEL=      1.6
  DEPTH=       .1
```

```
T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                4                         0.0047                                    1370.3

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     3                  -1                                                                      15

FLOW DISTRIBUTION FOR SECNO=     99.20          CWSEL=   1370.35

STA=     944.     948.    1053.    1067.    1107.    1145.
  PER Q=       .4      87.8      6.2      4.6      1.0
   AREA=      1.0      89.8      9.4     11.9      4.7
    VEL=      2.0       4.9      3.3      2.0      1.1
  DEPTH=       .3        .9       .6       .3       .1

FLOW DISTRIBUTION FOR SECNO=    101.35          CWSEL=   1371.39

STA=     944.     948.    1053.    1065.    1079.
  PER Q=       .8      93.6      4.8      .9
   AREA=      1.5      90.2      7.3     2.7
    VEL=      2.5       5.2      3.2     1.5
  DEPTH=       .4        .9       .6      .2

FLOW DISTRIBUTION FOR SECNO=    103.50          CWSEL=   1372.84

STA=     944.     948.    1053.    1064.
  PER Q=       .6      97.2      2.1
   AREA=      1.4      92.8      4.5
    VEL=      2.3       5.2      2.4
  DEPTH=       .4        .9       .4

FLOW DISTRIBUTION FOR SECNO=    105.70          CWSEL=   1374.28

STA=     943.     948.    1053.    1073.    1110.
  PER Q=      1.0      85.8      6.5      6.7
   AREA=      1.9      82.7     10.9     14.1
    VEL=      2.6       5.2      3.0      2.4
  DEPTH=       .4        .9       .5       .4

FLOW DISTRIBUTION FOR SECNO=    107.80          CWSEL=   1375.25

STA=     946.     948.    1053.
  PER Q=       .1      99.9
   AREA=       .2      49.8
    VEL=       .8       2.5
  DEPTH=       .1        .5

1
   13MAY94      08:38:13                                                                          PAGE    6

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=    109.90          CWSEL=   1375.97

STA=     953.    1053.
  PER Q=    100.0
   AREA=     12.5
    VEL=      2.5
  DEPTH=       .2

FLOW DISTRIBUTION FOR SECNO=    111.95          CWSEL=   1377.14

STA=     953.    1053.
  PER Q=    100.0
   AREA=     14.3
    VEL=      2.2
  DEPTH=       .2

1
   13MAY94      08:38:13                                                                          PAGE    7

T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                5                         0.0047                                    1370.8

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     4                  -1                                                                      15

FLOW DISTRIBUTION FOR SECNO=     99.20          CWSEL=   1370.62

STA=     943.     948.    1053.    1067.    1107.    1187.
  PER Q=       .6      80.7      6.4      8.0      4.3
   AREA=      2.1     118.4     13.3     22.8     20.9
    VEL=      2.4       5.5      3.8      2.8      1.7
  DEPTH=       .5       1.1       .9       .6       .3
```

```
FLOW DISTRIBUTION FOR SECNO=    101.35          CWSEL=   1371.69

STA=     942.     948.    1053.    1065.    1090.
  PER Q=      1.1     91.0      5.6      2.3
   AREA=      2.9    121.7     11.1      8.7
    VEL=      2.9      6.0      4.0      2.1
  DEPTH=       .5      1.2       .9       .3

FLOW DISTRIBUTION FOR SECNO=    103.50          CWSEL=   1373.15

STA=     942.     948.    1053.    1067.    1074.
  PER Q=      1.0     95.6      3.4       .1
   AREA=      2.8    125.2      8.7       .5
    VEL=      2.8      6.1      3.1       .8
  DEPTH=       .5      1.2       .6       .1

FLOW DISTRIBUTION FOR SECNO=    105.70          CWSEL=   1374.70

STA=     941.     948.    1053.    1073.    1110.
  PER Q=      1.4     78.8      8.5     11.3
   AREA=      4.2    125.4     19.5     29.6
    VEL=      3.3      6.3      4.4      3.8
  DEPTH=       .6      1.2       .9       .8

FLOW DISTRIBUTION FOR SECNO=    107.80          CWSEL=   1375.71

STA=     944.     948.    1053.
  PER Q=       .6     99.4
   AREA=      1.3     95.4
    VEL=      1.1      2.6
  DEPTH=       .4       .9

1
   13MAY94      08:38:13                                                                                    PAGE    8

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=    109.90          CWSEL=   1376.09

STA=     953.    1053.
  PER Q=    100.0
   AREA=     21.9
    VEL=      2.9
  DEPTH=       .2

FLOW DISTRIBUTION FOR SECNO=    111.95          CWSEL=   1377.26

STA=     953.    1053.
  PER Q=    100.0
   AREA=     23.6
    VEL=      2.7
  DEPTH=       .3

1
   13MAY94      08:38:13                                                                                    PAGE    9

T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                6                         0.0047                                    1371.4

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     15                  -1                                                                     15

FLOW DISTRIBUTION FOR SECNO=     99.20          CWSEL=   1371.03

STA=     941.     948.    1053.    1067.    1107.    1200.
  PER Q=       .9     71.2      6.2     10.3     11.4
   AREA=      4.4    161.0     19.2     39.0     58.2
    VEL=      3.0      6.6      4.9      4.0      2.9
  DEPTH=       .7      1.5      1.3      1.0       .6

FLOW DISTRIBUTION FOR SECNO=    101.35          CWSEL=   1372.26

STA=     939.     948.    1053.    1065.    1102.    1115.
  PER Q=      1.6     85.9      6.2      6.2       .1
   AREA=      6.9    182.3     18.3     28.2      1.7
    VEL=      3.5      7.1      5.1      3.3      1.0
  DEPTH=       .8      1.7      1.5       .8       .1

FLOW DISTRIBUTION FOR SECNO=    103.50          CWSEL=   1373.76

STA=     939.     948.    1053.    1067.    1100.
  PER Q=      1.6     91.4      5.3      1.8
   AREA=      6.9    189.1     17.6     12.7
   VEL=       3.5      7.3      4.5      2.1
  DEPTH=       .8      1.8      1.2       .4

FLOW DISTRIBUTION FOR SECNO=    105.70          CWSEL=   1375.32

STA=     938.     948.    1053.    1073.    1110.
  PER Q=      1.9     75.0      9.3     13.8
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```
   AREA=      9.2    190.9     32.2     52.7
    VEL=      4.1      7.9      5.8      5.3
  DEPTH=      1.0      1.8      1.6      1.4

FLOW DISTRIBUTION FOR SECNO=    107.80          CWSEL=   1376.49

STA=     940.     948.    1053.
  PER Q=      1.4     98.6
   AREA=      5.6    177.6
    VEL=      1.3      2.8
  DEPTH=       .7      1.7
```



```
    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=    109.90          CWSEL=   1376.68

STA=     946.     948.    1053.
  PER Q=      .1     99.9
   AREA=      .4     79.8
    VEL=      .5      1.6
  DEPTH=      .2       .8

FLOW DISTRIBUTION FOR SECNO=    111.95          CWSEL=   1377.38

STA=     953.    1053.
  PER Q=    100.0
   AREA=     35.3
    VEL=      3.5
  DEPTH=       .4
```


THIS RUN EXECUTED 13MAY94 08:38:16

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************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

TATUM BLVD SUBCRIT

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
	99.200	50.00	1369.55	.00	.00	.00	.00	49.75	2.75	16.00	.25	.91	20.
	99.200	100.00	1369.72	.00	.00	.05	.00	98.11	3.19	16.00	1.89	1.51	20.
*	99.200	500.00	1370.35	1370.35	2.14	2.04	20.00	438.77	4.89	16.00	59.10	2.27	20.
*	99.200	800.00	1370.62	1370.62	5.06	2.39	20.00	645.40	5.45	16.00	149.54	2.62	20.
*	99.200	1500.00	1371.03	1371.03	13.29	3.02	20.00	1067.39	6.63	16.00	419.32	3.60	20.
	101.350	50.00	1370.60	.00	.00	.00	.00	50.00	2.67	16.00	.00	.00	.
	101.350	100.00	1370.75	1370.74	.00	.05	20.00	99.66	3.23	16.00	.33	.93	20.
*	101.350	500.00	1371.39	1371.39	3.79	2.46	20.00	468.19	5.19	16.00	28.02	2.79	20.
*	101.350	800.00	1371.69	1371.69	8.48	2.88	20.00	728.13	5.98	16.00	63.39	3.21	20.
*	101.350	1500.00	1372.26	1372.26	23.84	3.45	20.00	1288.18	7.07	16.00	187.97	3.90	20.
*	103.500	50.00	1372.00	1372.00	.00	.00	.00	50.00	2.89	16.00	.00	.00	.
*	103.500	100.00	1372.15	1372.15	.00	.06	20.00	100.00	3.48	16.00	.00	.06	20.
*	103.500	500.00	1372.84	1372.84	3.25	2.35	20.00	486.15	5.24	16.00	10.60	2.38	20.
*	103.500	800.00	1373.15	1373.15	7.83	2.82	20.00	764.43	6.10	16.00	27.75	3.00	20.
*	103.500	1500.00	1373.76	1373.76	23.81	3.45	20.00	1370.83	7.25	16.00	105.36	3.48	20.
*	105.700	50.00	1373.50	1373.50	.00	.06	20.00	50.00	3.07	16.00	.00	.00	.
*	105.700	100.00	1373.68	1373.68	.29	1.45	20.00	99.57	3.50	16.00	.14	.64	20.
*	105.700	500.00	1374.28	1374.28	5.05	2.61	20.00	428.97	5.18	16.00	65.98	2.65	20.
*	105.700	1000.00	1374.70	1374.70	14.09	3.34	20.00	787.91	6.28	16.00	198.00	4.04	20.
*	105.700	2000.00	1375.32	1375.32	37.88	4.10	20.00	1499.41	7.85	16.00	462.71	5.45	20.
*	107.800	13.00	1374.70	.00	.00	.00	.00	13.00	1.79	16.00	.00	.00	.
*	107.800	25.00	1374.82	.00	.00	.00	.00	25.00	1.90	16.00	.00	.00	.
*	107.800	125.00	1375.25	.00	.12	.76	20.00	124.88	2.51	16.00	.00	.00	.
*	107.800	250.00	1375.71	.00	1.41	1.12	20.00	248.59	2.61	16.00	.00	.00	.
*	107.800	500.00	1376.49	.00	7.23	1.30	20.00	492.77	2.77	16.00	.00	.00	.

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
*	109.900	3.00	1375.72	1375.72	.00	.00	.00	3.00	1.76	16.00	.00	.00	.
*	109.900	6.00	1375.78	1375.78	.00	.00	.00	6.00	1.86	16.00	.00	.00	.

*	109.900	31.00	1375.97	1375.97	.00	.00	.00	31.00	2.49	16.00	.00	.00	.
*	109.900	63.00	1376.09	1376.09	.00	.00	.00	63.00	2.87	16.00	.00	.00	.
*	109.900	125.00	1376.68	.00	.18	.50	20.00	124.82	1.56	16.00	.00	.00	.
*	111.950	3.00	1376.84	.00	.00	.00	.00	3.00	1.40	16.00	.00	.00	.
*	111.950	6.00	1376.93	.00	.00	.00	.00	6.00	1.59	16.00	.00	.00	.
	111.950	31.00	1377.14	.00	.00	.00	.00	31.00	2.16	16.00	.00	.00	.
	111.950	63.00	1377.26	.00	.00	.00	.00	63.00	2.67	16.00	.00	.00	.
*	111.950	125.00	1377.38	1377.38	.00	.00	.00	125.00	3.55	16.00	.00	.00	.

TATUM BLVD SUBCRIT

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	AREA	ELMIN	DEPTH	XLCH	STENCL	SSTA	ENDST	STENCR	TOPWID	TW
	99.200	50.00	1369.55	18.34	1368.80	.75	.00	.00	953.01	1056.13	.00	66.42	.
	99.200	100.00	1369.72	32.05	1368.80	.92	.00	.00	947.39	1060.29	.00	93.90	.
*	99.200	500.00	1370.35	116.79	1368.80	1.55	.00	.00	944.27	1145.28	.00	201.01	.
*	99.200	800.00	1370.62	177.47	1368.80	1.82	.00	.00	942.90	1187.49	.00	244.59	.
*	99.200	1500.00	1371.03	281.92	1368.80	2.23	.00	.00	940.87	1200.00	.00	259.13	.
	101.350	50.00	1370.60	18.71	1370.00	.60	215.00	.00	947.57	1052.43	.00	71.54	.
	101.350	100.00	1370.75	31.24	1370.00	.75	215.00	.00	946.74	1057.23	.00	92.57	.
*	101.350	500.00	1371.39	101.78	1370.00	1.39	215.00	.00	943.57	1079.25	.00	135.68	.
*	101.350	800.00	1371.69	144.44	1370.00	1.69	215.00	.00	942.07	1090.37	.00	148.30	.
*	101.350	1500.00	1372.26	237.41	1370.00	2.26	215.00	.00	939.19	1115.12	.00	175.94	1.
*	103.500	50.00	1372.00	17.31	1371.50	.50	215.00	.00	952.93	1047.07	.00	69.03	.
*	103.500	100.00	1372.15	28.80	1371.50	.65	215.00	.00	947.24	1053.33	.00	81.05	.
*	103.500	500.00	1372.84	98.65	1371.50	1.34	215.00	.00	943.78	1064.49	.00	120.71	1.
*	103.500	800.00	1373.15	137.26	1371.50	1.65	215.00	.00	942.24	1073.73	.00	131.49	1.
*	103.500	1500.00	1373.76	226.26	1371.50	2.26	215.00	.00	939.20	1100.48	.00	161.28	1.
*	105.700	50.00	1373.50	16.32	1372.80	.70	220.00	.00	947.00	1047.00	.00	55.91	1.
*	105.700	100.00	1373.68	28.83	1372.80	.88	220.00	.00	946.10	1058.03	.00	82.78	1.
*	105.700	500.00	1374.28	109.62	1372.80	1.48	220.00	.00	943.10	1110.00	.00	155.95	2.
*	105.700	1000.00	1374.70	178.61	1372.80	1.90	220.00	.00	941.01	1110.00	.00	168.99	2.
*	105.700	2000.00	1375.32	285.06	1372.80	2.52	220.00	.00	937.89	1110.00	.00	172.11	2.
*	107.800	13.00	1374.70	7.25	1374.30	.40	210.00	.00	953.04	1046.98	.00	41.35	1.
*	107.800	25.00	1374.82	13.14	1374.30	.52	210.00	.00	953.02	1047.86	.00	56.77	1.
*	107.800	125.00	1375.25	49.93	1374.30	.95	210.00	.00	946.26	1052.50	.00	96.22	2.
*	107.800	250.00	1375.71	96.67	1374.30	1.41	210.00	.00	943.95	1052.50	.00	108.55	3.
*	107.800	500.00	1376.49	183.18	1374.30	2.19	210.00	.00	940.03	1052.50	.00	112.47	3.
*	109.900	3.00	1375.72	1.70	1375.50	.22	210.00	.00	953.10	1046.94	.00	17.78	1.
*	109.900	6.00	1375.78	3.22	1375.50	.28	210.00	.00	953.08	1046.96	.00	30.39	1.
*	109.900	31.00	1375.97	12.47	1375.50	.47	210.00	.00	953.05	1046.99	.00	67.96	3.
*	109.900	63.00	1376.09	21.92	1375.50	.59	210.00	.00	953.02	1051.92	.00	90.43	3.
*	109.900	125.00	1376.68	80.13	1375.50	1.18	210.00	.00	945.60	1052.50	.00	106.90	3.
*	111.950	3.00	1376.84	2.14	1376.60	.24	205.00	.00	1029.55	1046.95	.00	17.40	1.
*	111.950	6.00	1376.93	3.78	1376.60	.33	205.00	.00	953.09	1046.97	.00	26.41	1.
	111.950	31.00	1377.14	14.34	1376.60	.54	205.00	.00	953.05	1049.31	.00	70.57	3.
	111.950	63.00	1377.26	23.62	1376.60	.66	205.00	.00	953.03	1052.50	.00	89.43	3.
*	111.950	125.00	1377.38	35.26	1376.60	.78	205.00	.00	953.00	1052.50	.00	95.37	4.

TATUM BLVD SUBCRIT

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	DIFWSP	EG	DIFEG	STENCL	STCHL	XLBEL	RBEL	STCHR	STENCR
	99.200	50.00	1369.55	.00	1369.67	.00	.00	947.50	1369.70	1369.40	1052.50	.00
	99.200	100.00	1369.72	.17	1369.88	.21	.00	947.50	1369.70	1369.40	1052.50	.00
*	99.200	500.00	1370.35	.62	1370.68	1.01	.00	947.50	1369.70	1369.40	1052.50	.00
*	99.200	800.00	1370.62	.27	1371.01	1.34	.00	947.50	1369.70	1369.40	1052.50	.00
*	99.200	1500.00	1371.03	.41	1371.57	1.90	.00	947.50	1369.70	1369.40	1052.50	.00
	101.350	50.00	1370.60	.00	1370.71	.00	.00	947.50	1370.60	1370.60	1052.50	.00
	101.350	100.00	1370.75	.15	1370.91	.20	.00	947.50	1370.60	1370.60	1052.50	.00
*	101.350	500.00	1371.39	.64	1371.78	1.07	.00	947.50	1370.60	1370.60	1052.50	.00
*	101.350	800.00	1371.69	.30	1372.21	1.49	.00	947.50	1370.60	1370.60	1052.50	.00
*	101.350	1500.00	1372.26	.58	1372.96	2.25	.00	947.50	1370.60	1370.60	1052.50	.00
*	103.500	50.00	1372.00	.00	1372.13	.00	.00	947.50	1372.10	1372.10	1052.50	.00
*	103.500	100.00	1372.15	.15	1372.34	.21	.00	947.50	1372.10	1372.10	1052.50	.00
*	103.500	500.00	1372.84	.69	1373.26	1.13	.00	947.50	1372.10	1372.10	1052.50	.00
*	103.500	800.00	1373.15	.31	1373.71	1.58	.00	947.50	1372.10	1372.10	1052.50	.00
*	103.500	1500.00	1373.76	.61	1374.52	2.39	.00	947.50	1372.10	1372.10	1052.50	.00
*	105.700	50.00	1373.50	.00	1373.65	.00	.00	947.50	1373.40	1373.60	1052.50	.00
*	105.700	100.00	1373.68	.18	1373.87	.23	.00	947.50	1373.40	1373.60	1052.50	.00
*	105.700	500.00	1374.28	.60	1374.65	1.01	.00	947.50	1373.40	1373.60	1052.50	.00
*	105.700	1000.00	1374.70	.42	1375.23	1.59	.00	947.50	1373.40	1373.60	1052.50	.00
*	105.700	2000.00	1375.32	.62	1376.15	2.51	.00	947.50	1373.40	1373.60	1052.50	.00
*	107.800	13.00	1374.70	.00	1374.75	.00	.00	947.50	1375.00	1374.90	1052.50	.00
*	107.800	25.00	1374.82	.11	1374.87	.12	.00	947.50	1375.00	1374.90	1052.50	.00

*	107.800	125.00	1375.25	.43	1375.35	.59	.00	947.50	1375.00	1374.90	1052.50	.00
*	107.800	250.00	1375.71	.46	1375.82	1.06	.00	947.50	1375.00	1374.90	1052.50	.00
*	107.800	500.00	1376.49	.78	1376.61	1.86	.00	947.50	1375.00	1374.90	1052.50	.00
*	109.900	3.00	1375.72	.00	1375.77	.00	.00	947.50	1376.30	1376.10	1052.50	.00
*	109.900	6.00	1375.78	.06	1375.84	.07	.00	947.50	1376.30	1376.10	1052.50	.00
*	109.900	31.00	1375.97	.19	1376.07	.30	.00	947.50	1376.30	1376.10	1052.50	.00
*	109.900	63.00	1376.09	.12	1376.22	.45	.00	947.50	1376.30	1376.10	1052.50	.00
*	109.900	125.00	1376.68	.59	1376.72	.95	.00	947.50	1376.30	1376.10	1052.50	.00
*	111.950	3.00	1376.84	.00	1376.88	.00	.00	947.50	1377.50	1377.20	1052.50	.00
*	111.950	6.00	1376.93	.08	1376.96	.09	.00	947.50	1377.50	1377.20	1052.50	.00
	111.950	31.00	1377.14	.22	1377.21	.34	.00	947.50	1377.50	1377.20	1052.50	.00
	111.950	63.00	1377.26	.12	1377.37	.49	.00	947.50	1377.50	1377.20	1052.50	.00
*	111.950	125.00	1377.38	.12	1377.58	.70	.00	947.50	1377.50	1377.20	1052.50	.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION SECNO=     99.200  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     99.200  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     99.200  PROFILE=  5  CRITICAL DEPTH ASSUMED

CAUTION SECNO=    101.350  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    101.350  PROFILE=  3  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    101.350  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    101.350  PROFILE=  4  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    101.350  PROFILE=  4  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    101.350  PROFILE=  5  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    101.350  PROFILE=  5  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    101.350  PROFILE=  5  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=    103.500  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    103.500  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    103.500  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    103.500  PROFILE=  2  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    103.500  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    103.500  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    103.500  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    103.500  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    103.500  PROFILE=  4  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    103.500  PROFILE=  4  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    103.500  PROFILE=  5  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    103.500  PROFILE=  5  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    103.500  PROFILE=  5  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=    105.700  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  2  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    105.700  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  4  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  4  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    105.700  PROFILE=  5  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  5  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  5  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=    107.800  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    107.800  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    107.800  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    107.800  PROFILE=  4  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    107.800  PROFILE=  5  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    109.900  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    109.900  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    109.900  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    109.900  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
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CAUTION SECNO=    109.900  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    109.900  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    109.900  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    109.900  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    109.900  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    109.900  PROFILE=  4  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    109.900  PROFILE=  4  20 TRIALS ATTEMPTED TO BALANCE WSEL
WARNING SECNO=    109.900  PROFILE=  5  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    111.950  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    111.950  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=    111.950  PROFILE=  5  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    111.950  PROFILE=  5  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    111.950  PROFILE=  5  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    13MAY94    TIME   08:45:10 *
 *****************************************
```

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**********************************
 *  U.S. ARMY CORPS OF ENGINEERS
 *  HYDROLOGIC ENGINEERING CENTER
 *  609 SECOND STREET, SUITE D
 *  DAVIS, CALIFORNIA 95616-4687
 *          (916) 756-1104
**********************************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                  X     X
XXXXXXX  XXXX     X          XXXXX   XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX              XXXXXXX
```

1

13MAY94 08:45:10 PAGE 1

THIS RUN EXECUTED 13MAY94 08:45:10

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************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
************************************
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```
T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623
T2      RATING CURVE FOR TATUM FLOW SPLIT AT CLINTON
T3      TATUM BLVD SUPCRIT                          FILENAME: 11623H2F
T4
T4      1. CROSS SECTIONS ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
T4
T4      2. CROSS SECTION GR STATIONING USES MEDIAN LINE OF TATUM BLVD
T4         AS STA 10+00
T4
T4      3. CENTERLINE INTERSECTION OF DESERT COVE AVE AND TATUM BLVD
T4         CORRESPONDS TO CROSS SECTION LOCATION STATION 100+00
T4
T4      4. CROSS SECTION GR DATA BASED ON VAL-TEC, INC. RESULTS OF SURVEY
T4         DATED 4/1992. DATUM IS CITY OF PHOENIX.
T4
T4      5. STARTING WATER SURFACE ELEVATION BASED CRITICAL DEPTH
T4
T4
```

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		2		1	-1					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1		-1							15

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

38	43	1	2	13	55	16	14	26	17
15	56	18		38	43	1	25	42	8
39	27	53	54	28	4	37		38	43
1	50	3	61	27	21	23	24	22	28

J5 LPRNT NUMSEC ********REQUESTED SECTION NUMBERS********

-10 -10

1

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NC	0.020	0.020	0.016	0.1	0.3					
QT	5	3	6	31	63	125				
X1	111.95	11	947.5	1052.5	205	205	205			
GR	1379.5	937.5	1377.5	947.5	1377.4	953.0	1376.9	953.1	1377.3	1007.5
GR	1377.8	1007.6	1377.6	1011.6	1377.1	1011.7	1376.6	1046.9	1377.1	1047.0
GR	1377.2	1052.5								
X1	109.90	11	947.5	1052.5	210	210	210			
GR	1378.3	937.5	1376.3	947.5	1376.2	953.0	1375.7	953.1	1376.1	1005.0
GR	1376.6	1005.1	1376.5	1012.0	1376.0	1012.1	1375.5	1046.9	1376.0	1047.0
GR	1376.1	1052.5								
QT	5	13	25	125	250	500				
X1	107.80	11	947.5	1052.5	210	210	210			
GR	1377.0	937.5	1375.0	947.5	1374.9	953.0	1374.4	953.1	1375.0	990.0
GR	1375.5	990.1	1375.6	1000.0	1375.1	1000.1	1374.3	1046.9	1374.8	1047.0
GR	1374.9	1052.5								
QT	5	50	100	500	1000	2000				
X1	105.70	13	947.5	1052.5	220	220	220			
GR	1375.4	937.5	1373.4	947.5	1373.3	953.0	1372.8	953.1	1373.9	1000.0
GR	1374.4	1000.1	1374.4	1011.0	1373.9	1011.1	1373.0	1046.9	1373.5	1047.0

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GR   1373.6     1052.5     1373.9     1073.0     1373.9     1110.0

QT        5         50        100        500        800       1500
X1   103.50         14      947.5     1052.5        215        215        215
GR   1374.1      937.5     1372.1      947.5     1372.0      953.0     1371.5      953.1     1372.0      987.0
GR   1372.5      987.1     1372.5     1012.0     1372.0     1012.1     1371.5     1046.9     1372.0     1047.0
GR   1372.1     1052.5     1373.0     1067.0     1374.0     1111.0     1374.1     1128.0

X1   101.35         14      947.5     1052.5        215        215        215
GR   1372.6      937.5     1370.6      947.5     1370.5      953.0     1370.0      953.1     1370.8      987.0
GR   1371.3      987.1     1371.3      999.9     1370.8     1000.0     1370.0     1046.9     1370.5     1047.0
GR   1370.6     1052.5     1371.0     1065.0     1372.0     1102.0     1372.6     1132.0

X1    99.20         14      947.5     1052.5
GR   1371.7      937.5     1369.7      947.5     1369.6      953.0     1369.1      953.1     1369.8     1000.0
GR   1370.3     1000.1     1370.3     1010.9     1369.8     1011.0     1368.8     1046.9     1369.3     1047.0
GR   1369.4     1052.5     1370.0     1067.0     1370.1     1107.0     1370.7     1200.0
1
   13MAY94      08:45:10                                                                                    PAGE    3

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

FLOW DISTRIBUTION FOR SECNO=    111.95          CWSEL=   1376.81

STA=    1032.    1053.
  PER Q=    100.0
   AREA=      1.6
    VEL=      1.9
  DEPTH=       .1

FLOW DISTRIBUTION FOR SECNO=    109.90          CWSEL=   1375.72

STA=     953.    1053.
  PER Q=    100.0
   AREA=      1.7
    VEL=      1.8
  DEPTH=       .1

FLOW DISTRIBUTION FOR SECNO=    107.80          CWSEL=   1374.66

STA=     953.    1053.
  PER Q=    100.0
   AREA=      5.8
    VEL=      2.3
  DEPTH=       .2

FLOW DISTRIBUTION FOR SECNO=    105.70          CWSEL=   1373.50

STA=     947.     948.    1053.
  PER Q=       .0    100.0
   AREA=       .0     16.1
    VEL=       .1      3.1
  DEPTH=       .0       .3

FLOW DISTRIBUTION FOR SECNO=    103.50          CWSEL=   1371.97

STA=     953.    1053.
  PER Q=    100.0
   AREA=     15.6
    VEL=      3.2
  DEPTH=       .2

1
   13MAY94      08:45:10                                                                                    PAGE    4

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

FLOW DISTRIBUTION FOR SECNO=    101.35          CWSEL=   1370.58

STA=     949.    1053.
  PER Q=    100.0
   AREA=     17.3
    VEL=      2.9
  DEPTH=       .3

FLOW DISTRIBUTION FOR SECNO=     99.20          CWSEL=   1369.53

STA=     953.    1053.    1056.
  PER Q=     99.6       .4
   AREA=     16.6       .2
    VEL=      3.0       .9
  DEPTH=       .3       .1

1
   13MAY94      08:45:10                                                                                    PAGE    5

T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
```

```
                3                    1        -1
J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
     2                   -1                                                                      15
FLOW DISTRIBUTION FOR SECNO=    111.95          CWSEL=   1376.88

STA=    1027.    1053.
  PER Q=    100.0
   AREA=      2.9
    VEL=      2.1
  DEPTH=       .1

FLOW DISTRIBUTION FOR SECNO=    109.90          CWSEL=   1375.78

STA=     953.    1053.
  PER Q=    100.0
   AREA=      3.2
    VEL=      1.9
  DEPTH=       .1

FLOW DISTRIBUTION FOR SECNO=    107.80          CWSEL=   1374.75

STA=     953.    1053.
  PER Q=    100.0
   AREA=      9.7
    VEL=      2.6
  DEPTH=       .2

FLOW DISTRIBUTION FOR SECNO=    105.70          CWSEL=   1373.69

STA=     946.     948.    1053.    1058.
  PER Q=       .3     99.5       .2
   AREA=       .2     28.8       .3
    VEL=      1.4      3.5       .7
  DEPTH=       .1       .4       .0

FLOW DISTRIBUTION FOR SECNO=    103.50          CWSEL=   1372.10

STA=     948.    1053.
  PER Q=    100.0
   AREA=     24.4
    VEL=      4.1
  DEPTH=       .3

1
   13MAY94      08:45:10                                                                          PAGE    6

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=    101.35          CWSEL=   1370.74

STA=     947.     948.    1053.    1057.
  PER Q=       .0     99.7       .3
   AREA=       .0     29.7       .3
    VEL=       .1      3.4       .9
  DEPTH=       .1       .3       .1

FLOW DISTRIBUTION FOR SECNO=     99.20          CWSEL=   1369.70

STA=     947.    1053.    1060.
  PER Q=     98.3      1.7
   AREA=     29.0      1.1
    VEL=      3.4      1.6
  DEPTH=       .3       .2

1
   13MAY94      08:45:10                                                                          PAGE    7

T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623
J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
                4                    1        -1
J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
     3                   -1                                                                      15
FLOW DISTRIBUTION FOR SECNO=    111.95          CWSEL=   1377.11

STA=     953.    1053.
  PER Q=    100.0
   AREA=     12.4
    VEL=      2.5
  DEPTH=       .2

FLOW DISTRIBUTION FOR SECNO=    109.90          CWSEL=   1375.97

STA=     953.    1053.
  PER Q=    100.0
   AREA=     12.4
```

```
    VEL=      2.5
  DEPTH=       .2

FLOW DISTRIBUTION FOR SECNO=    107.80          CWSEL=   1375.10

STA=     947.     948.    1053.
  PER Q=       .0    100.0
   AREA=       .0     35.9
    VEL=       .1      3.5
  DEPTH=       .1       .4

FLOW DISTRIBUTION FOR SECNO=    105.70          CWSEL=   1374.29

STA=     943.     948.    1053.    1073.    1110.
  PER Q=      1.0     85.7      6.5      6.8
   AREA=      2.0     83.3     11.0     14.3
    VEL=      2.6      5.1      3.0      2.4
  DEPTH=       .4       .9       .5       .4

FLOW DISTRIBUTION FOR SECNO=    103.50          CWSEL=   1372.63

STA=     945.     948.    1053.    1061.
  PER Q=       .4     98.2      1.4
   AREA=       .7     70.5      2.3
    VEL=      3.0      7.0      3.0
  DEPTH=       .3       .7       .3

1
   13MAY94      08:45:10                                                                                    PAGE    8

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=    101.35          CWSEL=   1371.32

STA=     944.     948.    1053.    1065.    1077.
  PER Q=       .7     94.3      4.5       .6
   AREA=      1.3     83.1      6.5      1.9
    VEL=      2.7      5.7      3.5      1.6
  DEPTH=       .4       .8       .5       .2

FLOW DISTRIBUTION FOR SECNO=     99.20          CWSEL=   1370.26

STA=     945.     948.    1053.    1067.    1107.    1130.
  PER Q=       .3     91.1      5.5      2.8       .3
   AREA=       .8     80.1      8.0      8.0      1.7
    VEL=      2.1      5.7      3.4      1.8       .9
  DEPTH=       .3       .9       .5       .2       .1

1
   13MAY94      08:45:10                                                                                    PAGE    9

T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                5                   1        -1

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     4                   -1                                                                      15

FLOW DISTRIBUTION FOR SECNO=    111.95          CWSEL=   1377.24

STA=     953.    1053.
  PER Q=    100.0
   AREA=     22.0
    VEL=      2.9
  DEPTH=       .3

FLOW DISTRIBUTION FOR SECNO=    109.90          CWSEL=   1376.09

STA=     953.    1053.
  PER Q=    100.0
   AREA=     22.4
    VEL=      2.8
  DEPTH=       .2

FLOW DISTRIBUTION FOR SECNO=    107.80          CWSEL=   1375.32

STA=     946.     948.    1053.
  PER Q=       .1     99.9
   AREA=       .3     56.4
    VEL=      1.5      4.4
  DEPTH=       .2       .6

FLOW DISTRIBUTION FOR SECNO=    105.70          CWSEL=   1374.69

STA=     941.     948.    1053.    1073.    1110.
  PER Q=      1.4     78.8      8.5     11.3
   AREA=      4.2    124.8     19.3     29.3
    VEL=      3.4      6.3      4.4      3.8
  DEPTH=       .6      1.2       .9       .8

FLOW DISTRIBUTION FOR SECNO=    103.50          CWSEL=   1372.83
```

```
STA=     944.     948.    1053.    1064.
  PER Q=       .6     97.3      2.0
   AREA=      1.3     90.6      4.2
    VEL=      3.8      8.6      3.9
  DEPTH=       .4       .9       .4

1
   13MAY94      08:45:10                                                                                                PAGE   10

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=    101.35          CWSEL=   1371.55

STA=     943.     948.    1053.    1065.    1085.
  PER Q=       .9     92.2      5.3      1.6
   AREA=      2.3    107.6      9.4      5.6
    VEL=      3.3      6.8      4.5      2.3
  DEPTH=       .5      1.0       .8       .3

FLOW DISTRIBUTION FOR SECNO=     99.20          CWSEL=   1370.47

STA=     944.     948.    1053.    1067.    1107.    1164.
  PER Q=       .5     84.5      6.3      6.3      2.3
   AREA=      1.5    102.5     11.1     16.7     10.5
    VEL=      2.8      6.6      4.5      3.0      1.8
  DEPTH=       .4      1.0       .8       .4       .2

1
   13MAY94      08:45:10                                                                                                PAGE   11

T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                 6                   1        -1

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     15                  -1                                                                      15

FLOW DISTRIBUTION FOR SECNO=    111.95          CWSEL=   1377.38

STA=     953.    1053.
  PER Q=    100.0
   AREA=     35.3
    VEL=      3.5
  DEPTH=       .4

FLOW DISTRIBUTION FOR SECNO=    109.90          CWSEL=   1376.23

STA=     951.    1053.
  PER Q=    100.0
   AREA=     35.0
    VEL=      3.6
  DEPTH=       .4

FLOW DISTRIBUTION FOR SECNO=    107.80          CWSEL=   1375.69

STA=     944.     948.    1053.
  PER Q=       .5     99.5
   AREA=      1.2     92.8
    VEL=      2.3      5.4
  DEPTH=       .3       .9

FLOW DISTRIBUTION FOR SECNO=    105.70          CWSEL=   1375.32

STA=     938.     948.    1053.    1073.    1110.
  PER Q=      1.9     75.0      9.3     13.8
   AREA=      9.2    190.3     32.1     52.4
    VEL=      4.1      7.9      5.8      5.3
  DEPTH=      1.0      1.8      1.6      1.4

FLOW DISTRIBUTION FOR SECNO=    103.50          CWSEL=   1373.21

STA=     942.     948.    1053.    1067.    1076.
  PER Q=      1.0     95.2      3.7       .1
   AREA=      3.1    131.8      9.6      1.0
    VEL=      5.0     10.8      5.7      1.7
  DEPTH=       .6      1.3       .7       .1

1
   13MAY94      08:45:10                                                                                                PAGE   12

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=    101.35          CWSEL=   1371.93

STA=     941.     948.    1053.    1065.    1099.
```

PER Q=	1.3	89.0	6.0	3.7
AREA=	4.4	147.4	14.1	16.0
VEL=	4.4	9.1	6.3	3.5
DEPTH=	.7	1.4	1.1	.5

FLOW DISTRIBUTION FOR SECNO= 99.20 CWSEL= 1370.78

STA=	942.	948.	1053.	1067.	1107.	1200.
PER Q=	.7	76.6	6.4	9.1	7.1	
AREA=	2.9	135.0	15.6	29.1	35.2	
VEL=	3.8	8.5	6.1	4.7	3.0	
DEPTH=	.5	1.3	1.1	.7	.4	

THIS RUN EXECUTED 13MAY94 08:45:13

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

TATUM BLVD SUPCRIT

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
*	111.950	3.00	1376.81	1376.81	.00	.00	.00	3.00	1.88	16.00	.00	.00	.
*	111.950	6.00	1376.88	1376.88	.00	.00	.00	6.00	2.10	16.00	.00	.00	.
*	111.950	31.00	1377.11	1377.11	.00	.00	.00	31.00	2.51	16.00	.00	.00	.
*	111.950	63.00	1377.24	1377.24	.00	.00	.00	63.00	2.87	16.00	.00	.00	.
*	111.950	125.00	1377.38	1377.38	.00	.00	.00	125.00	3.54	16.00	.00	.00	.
*	109.900	3.00	1375.72	1375.72	.00	.00	.00	3.00	1.78	16.00	.00	.00	.
*	109.900	6.00	1375.78	1375.78	.00	.00	.00	6.00	1.87	16.00	.00	.00	.
*	109.900	31.00	1375.97	1375.97	.00	.00	.00	31.00	2.49	16.00	.00	.00	.
*	109.900	63.00	1376.09	1376.09	.00	.00	.00	63.00	2.81	16.00	.00	.00	.
	109.900	125.00	1376.23	1376.23	.00	.00	.00	125.00	3.57	16.00	.00	.00	.
*	107.800	13.00	1374.66	1374.66	.00	.00	.00	13.00	2.25	16.00	.00	.00	.
*	107.800	25.00	1374.75	1374.75	.00	.00	.00	25.00	2.58	16.00	.00	.00	.
*	107.800	125.00	1375.10	1375.10	.00	.05	20.00	125.00	3.48	16.00	.00	.00	.
*	107.800	250.00	1375.32	1375.32	.37	1.47	20.00	249.63	4.43	16.00	.00	.00	.
*	107.800	500.00	1375.69	1375.69	2.69	2.28	20.00	497.31	5.36	16.00	.00	.00	.
*	105.700	50.00	1373.50	1373.50	.00	.06	20.00	50.00	3.11	16.00	.00	.00	.
*	105.700	100.00	1373.69	1373.69	.29	1.44	20.00	99.54	3.46	16.00	.17	.65	20.
*	105.700	500.00	1374.29	1374.29	5.07	2.59	20.00	428.36	5.15	16.00	66.57	2.64	20.
*	105.700	1000.00	1374.69	1374.69	14.05	3.36	20.00	788.44	6.32	16.00	197.52	4.06	20.
*	105.700	2000.00	1375.32	1375.32	37.79	4.11	20.00	1499.91	7.88	16.00	462.30	5.47	20.
	103.500	50.00	1371.97	1372.00	.00	.00	.00	50.00	3.20	16.00	.00	.00	.
	103.500	100.00	1372.10	1372.15	.00	.00	.00	100.00	4.09	16.00	.00	.00	.
*	103.500	500.00	1372.63	1372.84	2.12	2.99	20.00	490.97	6.96	16.00	6.91	3.03	20.
*	103.500	800.00	1372.83	1373.16	5.02	3.84	20.00	778.60	8.59	16.00	16.37	3.88	20.
*	103.500	1500.00	1373.21	1373.76	15.65	5.03	20.00	1427.35	10.83	16.00	57.00	5.34	20.

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
*	101.350	50.00	1370.58	1370.58	.00	.00	.00	50.00	2.90	16.00	.00	.00	.
*	101.350	100.00	1370.74	1370.74	.00	.05	20.00	99.72	3.36	16.00	.27	.92	20.
	101.350	500.00	1371.32	1371.39	3.44	2.67	20.00	471.28	5.67	16.00	25.28	3.03	20.
	101.350	800.00	1371.55	1371.69	7.42	3.28	20.00	737.31	6.85	16.00	55.27	3.68	20.
	101.350	1500.00	1371.93	1372.26	19.43	4.39	20.00	1335.00	9.06	16.00	145.57	4.83	20.
*	99.200	50.00	1369.53	1369.53	.00	.00	.00	49.82	3.00	16.00	.18	.91	20.
*	99.200	100.00	1369.70	1369.70	.00	.00	.00	98.28	3.39	16.00	1.72	1.57	20.
	99.200	500.00	1370.26	1370.35	1.62	2.14	20.00	455.44	5.69	16.00	42.95	2.43	20.
	99.200	800.00	1370.47	1370.61	4.17	2.83	20.00	676.01	6.59	16.00	119.82	3.12	20.
	99.200	1500.00	1370.78	1371.03	11.05	3.80	20.00	1149.36	8.51	16.00	339.59	4.25	20.

TATUM BLVD SUPCRIT

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	AREA	ELMIN	DEPTH	XLCH	STENCL	SSTA	ENDST	STENCR	TOPWID	TW
*	111.950	3.00	1376.81	1.59	1376.60	.21	.00	.00	1031.94	1046.94	.00	15.00	.
*	111.950	6.00	1376.88	2.85	1376.60	.28	.00	.00	1026.89	1046.96	.00	20.07	.
*	111.950	31.00	1377.11	12.36	1376.60	.51	.00	.00	953.06	1047.70	.00	64.96	.
*	111.950	63.00	1377.24	21.97	1376.60	.64	.00	.00	953.03	1052.50	.00	86.86	.

*	111.950	125.00	1377.38	35.31	1376.60	.78	.00	.00	953.00	1052.50	.00	95.37	.
*	109.900	3.00	1375.72	1.69	1375.50	.22	205.00	.00	953.10	1046.94	.00	17.64	.
*	109.900	6.00	1375.78	3.20	1375.50	.28	205.00	.00	953.08	1046.96	.00	30.27	.
*	109.900	31.00	1375.97	12.43	1375.50	.47	205.00	.00	953.05	1046.99	.00	67.84	.
*	109.900	63.00	1376.09	22.42	1375.50	.59	205.00	.00	953.02	1052.22	.00	91.45	.
	109.900	125.00	1376.23	35.01	1375.50	.73	205.00	.00	951.30	1052.50	.00	94.17	.
*	107.800	13.00	1374.66	5.78	1374.30	.36	210.00	.00	953.05	1046.97	.00	36.81	.
*	107.800	25.00	1374.75	9.70	1374.30	.45	210.00	.00	953.03	1046.99	.00	47.95	.
*	107.800	125.00	1375.10	35.91	1374.30	.80	210.00	.00	946.99	1052.50	.00	95.43	.
*	107.800	250.00	1375.32	56.63	1374.30	1.02	210.00	.00	945.92	1052.50	.00	96.59	.
*	107.800	500.00	1375.69	94.02	1374.30	1.39	210.00	.00	944.07	1052.50	.00	108.43	.
*	105.700	50.00	1373.50	16.11	1372.80	.70	210.00	.00	947.02	1047.00	.00	55.57	.
*	105.700	100.00	1373.69	29.26	1372.80	.89	210.00	.00	946.07	1058.38	.00	83.57	.
*	105.700	500.00	1374.29	110.47	1372.80	1.49	210.00	.00	943.07	1110.00	.00	155.98	1.
*	105.700	1000.00	1374.69	177.64	1372.80	1.89	210.00	.00	941.03	1110.00	.00	168.97	1.
*	105.700	2000.00	1375.32	284.01	1372.80	2.52	210.00	.00	937.92	1110.00	.00	172.08	1.
	103.500	50.00	1371.97	15.62	1371.50	.47	220.00	.00	953.00	1047.00	.00	65.60	.
	103.500	100.00	1372.10	24.42	1371.50	.60	220.00	.00	947.67	1052.33	.00	79.60	1.
*	103.500	500.00	1372.63	73.52	1371.50	1.13	220.00	.00	944.84	1061.07	.00	116.23	2.
*	103.500	800.00	1372.83	96.17	1371.50	1.33	220.00	.00	943.88	1064.16	.00	120.27	2.
*	103.500	1500.00	1373.21	145.58	1371.50	1.71	220.00	.00	941.92	1076.48	.00	134.56	2.
*	101.350	50.00	1370.58	17.27	1370.00	.58	215.00	.00	948.71	1051.29	.00	67.16	1.
*	101.350	100.00	1370.74	30.01	1370.00	.74	215.00	.00	946.81	1056.81	.00	90.72	1.
	101.350	500.00	1371.32	92.69	1370.00	1.32	215.00	.00	943.91	1076.75	.00	132.84	2.
	101.350	800.00	1371.55	124.94	1370.00	1.55	215.00	.00	942.74	1085.41	.00	142.67	2.
	101.350	1500.00	1371.93	181.93	1370.00	1.93	215.00	.00	940.85	1099.41	.00	158.56	3.
*	99.200	50.00	1369.53	16.79	1368.80	.73	215.00	.00	953.01	1055.55	.00	63.38	1.
*	99.200	100.00	1369.70	30.10	1368.80	.90	215.00	.00	947.49	1059.78	.00	91.13	1.
	99.200	500.00	1370.26	98.54	1368.80	1.46	215.00	.00	944.75	1130.20	.00	174.63	3.
	99.200	800.00	1370.47	142.44	1368.80	1.67	215.00	.00	943.66	1164.14	.00	220.49	3.
	99.200	1500.00	1370.78	217.82	1368.80	1.98	215.00	.00	942.11	1200.00	.00	257.89	4.

TATUM BLVD SUPCRIT

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	DIFWSP	EG	DIFEG	STENCL	STCHL	XLBEL	RBEL	STCHR	STENCR
*	111.950	3.00	1376.81	.00	1376.87	.00	.00	947.50	1377.50	1377.20	1052.50	.00
*	111.950	6.00	1376.88	.07	1376.95	.09	.00	947.50	1377.50	1377.20	1052.50	.00
*	111.950	31.00	1377.11	.23	1377.21	.34	.00	947.50	1377.50	1377.20	1052.50	.00
*	111.950	63.00	1377.24	.13	1377.37	.50	.00	947.50	1377.50	1377.20	1052.50	.00
*	111.950	125.00	1377.38	.14	1377.58	.71	.00	947.50	1377.50	1377.20	1052.50	.00
*	109.900	3.00	1375.72	.00	1375.77	.00	.00	947.50	1376.30	1376.10	1052.50	.00
*	109.900	6.00	1375.78	.06	1375.84	.07	.00	947.50	1376.30	1376.10	1052.50	.00
*	109.900	31.00	1375.97	.19	1376.07	.30	.00	947.50	1376.30	1376.10	1052.50	.00
*	109.900	63.00	1376.09	.13	1376.22	.45	.00	947.50	1376.30	1376.10	1052.50	.00
	109.900	125.00	1376.23	.13	1376.43	.66	.00	947.50	1376.30	1376.10	1052.50	.00
*	107.800	13.00	1374.66	.00	1374.74	.00	.00	947.50	1375.00	1374.90	1052.50	.00
*	107.800	25.00	1374.75	.09	1374.85	.12	.00	947.50	1375.00	1374.90	1052.50	.00
*	107.800	125.00	1375.10	.35	1375.29	.55	.00	947.50	1375.00	1374.90	1052.50	.00
*	107.800	250.00	1375.32	.22	1375.62	.89	.00	947.50	1375.00	1374.90	1052.50	.00
*	107.800	500.00	1375.69	.37	1376.13	1.39	.00	947.50	1375.00	1374.90	1052.50	.00
*	105.700	50.00	1373.50	.00	1373.65	.00	.00	947.50	1373.40	1373.60	1052.50	.00
*	105.700	100.00	1373.69	.19	1373.87	.22	.00	947.50	1373.40	1373.60	1052.50	.00
*	105.700	500.00	1374.29	.60	1374.65	1.01	.00	947.50	1373.40	1373.60	1052.50	.00
*	105.700	1000.00	1374.69	.41	1375.23	1.59	.00	947.50	1373.40	1373.60	1052.50	.00
*	105.700	2000.00	1375.32	.62	1376.15	2.51	.00	947.50	1373.40	1373.60	1052.50	.00
	103.500	50.00	1371.97	.00	1372.13	.00	.00	947.50	1372.10	1372.10	1052.50	.00
	103.500	100.00	1372.10	.13	1372.36	.23	.00	947.50	1372.10	1372.10	1052.50	.00
*	103.500	500.00	1372.63	.53	1373.37	1.25	.00	947.50	1372.10	1372.10	1052.50	.00
*	103.500	800.00	1372.83	.20	1373.95	1.82	.00	947.50	1372.10	1372.10	1052.50	.00
*	103.500	1500.00	1373.21	.38	1374.96	2.83	.00	947.50	1372.10	1372.10	1052.50	.00
*	101.350	50.00	1370.58	.00	1370.71	.00	.00	947.50	1370.60	1370.60	1052.50	.00
*	101.350	100.00	1370.74	.16	1370.91	.20	.00	947.50	1370.60	1370.60	1052.50	.00
	101.350	500.00	1371.32	.58	1371.80	1.09	.00	947.50	1370.60	1370.60	1052.50	.00
	101.350	800.00	1371.55	.23	1372.24	1.53	.00	947.50	1370.60	1370.60	1052.50	.00
	101.350	1500.00	1371.93	.38	1373.10	2.39	.00	947.50	1370.60	1370.60	1052.50	.00
*	99.200	50.00	1369.53	.00	1369.67	.00	.00	947.50	1369.70	1369.40	1052.50	.00
*	99.200	100.00	1369.70	.17	1369.88	.21	.00	947.50	1369.70	1369.40	1052.50	.00
	99.200	500.00	1370.26	.56	1370.72	1.06	.00	947.50	1369.70	1369.40	1052.50	.00
	99.200	800.00	1370.47	.21	1371.06	1.40	.00	947.50	1369.70	1369.40	1052.50	.00
	99.200	1500.00	1370.78	.31	1371.70	2.04	.00	947.50	1369.70	1369.40	1052.50	.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION SECNO=    111.950  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    111.950  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    111.950  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    111.950  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    111.950  PROFILE=  5  CRITICAL DEPTH ASSUMED

CAUTION SECNO=    109.900  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    109.900  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    109.900  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    109.900  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    109.900  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    109.900  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    109.900  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    109.900  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    109.900  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    109.900  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    109.900  PROFILE=  4  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    109.900  PROFILE=  4  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=    107.800  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    107.800  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    107.800  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    107.800  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    107.800  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    107.800  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    107.800  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    107.800  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    107.800  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    107.800  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    107.800  PROFILE=  4  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    107.800  PROFILE=  4  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    107.800  PROFILE=  5  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    107.800  PROFILE=  5  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    107.800  PROFILE=  5  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=    105.700  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    105.700  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    105.700  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    105.700  PROFILE=  4  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  4  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  4  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    105.700  PROFILE=  5  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    105.700  PROFILE=  5  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    105.700  PROFILE=  5  20 TRIALS ATTEMPTED TO BALANCE WSEL
1
   13MAY94      08:45:10                                                                    PAGE   18


WARNING SECNO=    103.500  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    103.500  PROFILE=  4  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    103.500  PROFILE=  5  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    101.350  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    101.350  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    101.350  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=    101.350  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    101.350  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    101.350  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=     99.200  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     99.200  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     99.200  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     99.200  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     99.200  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     99.200  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

APPENDIX D

HEC-2 WATER SURFACE PROFILES
INDIAN BEND WASH
SHEA BOULEVARD

```
1*****************************************
*  HEC-2 WATER SURFACE PROFILES           *
*                                         *
*  Version   4.6.2;  May 1991             *
*                                         *
*  RUN DATE    13MAY94    TIME   09:13:54 *
*****************************************
```

```
*********************************
*  U.S. ARMY CORPS OF ENGINEERS
*  HYDROLOGIC ENGINEERING CENTER
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616-4687
*        (916) 756-1104
*********************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX              XXXXXXX
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1
   13MAY94      09:13:54                                                                    PAGE    1
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                                                                    THIS RUN EXECUTED 13MAY94    09:13:54
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************


T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623
T2      INDIAN BEND WASH FROM SHEA TO PROJECT         FILENAME: 11623H2D
T3      INDIAN BEND WASH
T4
T4      ******************************************************************
T4      NOTE: THIS MODEL IS INTENDED FOR USE IN ESTIMATING THE STARTING
T4      HYDRAULIC CONDITIONS FOR PROPOSED STORM DRAINS ASSOCIATED WITH
T4      THIS PROJECT WHICH WILL DISCHARGE TO THE INDIAND BEND WASH.
T4      THIS MODEL IS NOT A FLOOD INSURANCE OR FLOODPLAIN DELINATION STUDY.
T4      ******************************************************************
T4
T4      1. CROSS SECTION DATA DEVELOPED FROM SCI SURVEY NOTES (PGS. 9, 10,
T4         11, 12 AND 13).  DATUM IS CITY OF PHOENIX.
T4
T4      2. CROSS SECTIONS ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM.
T4
T4      3. CROSS SECTION GR STATION 10+00 CORRESPONDS TO STANLEY SURVEY
T4         BASELINE WHICH IS APPROX CENTERLINE OF WASH (SEE EXHIBIT B
T4         AND SURVEY NOTES).
T4
T4      4. "n" VALUES RANGE FROM 0.030 TO 0.035. "n" @ X-SECTION 12.094 IS
T4         WEIGHTED BASED ON WETTED PERIMETER TO REFLECT PRESENCE OF LAKE.
T4
T4      5. STARTING WATER SURFACE ELEVATION BASED ON ERIE & ASSOCIATES, INC.
T4         FEMA STUDY AND HYDRAULIC GRADING PLAN (WHICH ARE BASED ON CITY OF
T4         PHOENIX DATUM)
T4
T4      6. FLOW RATE:  FEMA  10-YR   3,100 CFS  STARTING W.S. = 1349.4
T4                     FEMA  50-YR  10,000 CFS        "       = 1353.3
T4                     FEMA 100-YR  14,500 CFS        "       = 1355.1
T4                     USCE 100-YR  21,000 CFS        "       = 1357.5
T4                     FEMA 500-YR  31,000 CFS        "       = 1360.5
T4                     OCT. 1993 HIGH WATER MARK = APPROX. 7000 CFS
T4

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

              2                                                              1349.4

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

     1                 -1                                                                15

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38       43        1        2       13       55       16       14       26       17
1
   13MAY94      09:13:54                                                                    PAGE    2

    15       56       18                38       43        1       25       42        8
    39       27       53       54       28        4       37                38       43
     1       50        3       61       27       21       23       24       22       28

J5  LPRNT    NUMSEC                 ********REQUESTED SECTION NUMBERS********

   -10      -10

NC   0.030    0.030    0.030     0.1      0.3
QT       6     3100    10000    14500    21000    31000     7000
X1  11.860        9    855.0   1270.0
GR  1365.0    855.0   1350.0    900.0   1349.5    910.0   1345.0   1000.0   1345.7   1048.0
GR  1350.0   1080.0   1355.0   1095.0   1358.0   1110.0   1365.0   1270.0
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X1   11.862        7     870.7    1086.4       13       13       13
GR   1359.5    870.7    1348.6     886.8   1348.4    949.2   1347.7   1000.0   1348.7   1037.7
GR   1349.3   1071.5    1357.6    1086.4

X1   11.900        7     772.0    1280.0      186      186      186
GR   1365.0    772.0    1360.0     820.0   1355.0    838.0   1350.0    862.0   1350.0   1222.0
GR   1355.0   1260.0    1360.0    1280.0

X1   11.907        8     803.4    1268.2       36       36       36
GR   1360.5    803.4    1352.1     836.6   1351.5    913.8   1350.8     1000   1351.5   1103.2
GR   1351.9   1194.0    1351.9    1238.9   1360.9   1268.2

X1   11.969       11     816.2    1233.9      325      325      325
GR   1362.4    816.2    1355.5     830.6   1353.5    837.9   1352.6    922.7   1352.0   1000.0
GR   1352.8   1122.4    1351.2    1143.0   1352.5   1165.9   1352.9   1211.8   1353.5   1233.9
GR   1359.4   1262.9

NC    0.035    0.035     0.035       0.1      0.3
X1   12.039       17     824.8    1269.8      370      370      370
GR   1362.6    824.8    1358.9     837.5   1358.9    844.9   1362.1    862.8   1359.2    897.0
GR   1359.9    928.7    1353.7     964.9   1353.0   1000.0   1353.1   1017.2   1353.4   1055.8
GR   1353.6   1111.9    1353.5    1191.1   1352.2   1207.1   1354.0   1228.6   1357.3   1239.8
GR   1357.4   1247.9    1361.8    1269.8

NC    0.035    0.035     0.029       0.1      0.3
X1   12.094       24     609.0    1245.0      290      290      290
GR   1363.2    609.0    1361.2     626.2   1361.3    634.1   1361.9    648.1   1359.4    684.3
GR   1355.6    711.4    1353.7     826.1   1355.1    843.1   1353.4    870.0   1353.0    872.8
GR   1353.0   1000.0    1353.0    1033.0   1353.0   1034.0   1353.6   1041.3   1354.8   1119.5
GR   1354.4   1128.6    1354.4    1136.7   1354.3   1163.3   1351.6   1185.2   1352.3   1196.4
GR   1354.0   1212.6    1359.5    1231.2   1359.6   1241.2   1361.0   1245.0
1
   13MAY94      09:13:54                                                                    PAGE    3


NC    0.035    0.035     0.035       0.1      0.3
X1   12.159       28     608.7    1244.3      346      346      346
GR   1362.3    608.7    1363.7     658.0   1360.5    674.9   1363.0    686.6   1359.8    707.9
GR   1359.7    715.6    1360.1     718.5   1359.9    723.0   1357.8    738.0   1355.3    865.2
GR   1353.6    877.1    1352.9     940.1   1351.9   1000.0   1351.6   1013.3   1353.8   1014.1
GR   1357.0   1073.9    1360.9    1086.2   1357.9   1105.7   1357.6   1118.1   1360.3   1134.8
GR   1356.4   1146.8    1356.3    1153.2   1356.1   1168.0   1353.6   1180.8   1354.1   1196.4
GR   1360.5   1224.3    1360.6    1234.3   1361.3   1244.3

X1   12.226       22     700.1    1300.0      365      345      355
GR   1363.9    700.1    1363.4     708.2   1363.7    721.1   1363.3    753.8   1358.6    785.3
GR   1356.2    870.3    1356.9     898.8   1354.8   1000.0   1352.3   1002.2   1352.0   1013.4
GR   1353.6   1018.7    1354.1    1073.7   1355.6   1082.7   1355.8   1131.2   1354.8   1151.6
GR   1356.1   1164.0    1356.7    1185.9   1360.5   1207.6   1360.4   1221.8   1360.4   1274.3
GR   1360.7   1290.0    1361.1    1300.0
1
   13MAY94      09:13:54                                                                    PAGE    4

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

FLOW DISTRIBUTION FOR SECNO=     11.86          CWSEL=   1349.40

STA=     912.    1270.
  PER Q=    100.0
   AREA=    438.9
    VEL=      7.1
  DEPTH=      2.7

FLOW DISTRIBUTION FOR SECNO=     11.86          CWSEL=   1350.45

STA=     884.    1086.
  PER Q=    100.0
   AREA=    381.3
    VEL=      8.1
  DEPTH=      2.0

FLOW DISTRIBUTION FOR SECNO=     11.90          CWSEL=   1352.14

STA=     852.    1280.
  PER Q=    100.0
   AREA=    794.3
    VEL=      3.9
  DEPTH=      2.1

FLOW DISTRIBUTION FOR SECNO=     11.91          CWSEL=   1352.70

STA=     834.    1268.
  PER Q=    100.0
   AREA=    491.0
    VEL=      6.3
  DEPTH=      1.2

FLOW DISTRIBUTION FOR SECNO=     11.97          CWSEL=   1354.60

STA=     834.    1234.    1239.
  PER Q=     99.9       .1
   AREA=    814.1      3.0
    VEL=      3.8      1.6
  DEPTH=      2.0       .5
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

FLOW DISTRIBUTION FOR SECNO= 12.04 CWSEL= 1355.66

STA= 953. 1270.
PER Q= 100.0
AREA= 625.0
VEL= 5.0
DEPTH= 2.2

FLOW DISTRIBUTION FOR SECNO= 12.09 CWSEL= 1356.37

STA= 706. 1245.
PER Q= 100.0
AREA= 1305.7
VEL= 2.4
DEPTH= 2.5

FLOW DISTRIBUTION FOR SECNO= 12.16 CWSEL= 1356.66

STA= 795. 1244.
PER Q= 100.0
AREA= 782.7
VEL= 4.0
DEPTH= 2.3

FLOW DISTRIBUTION FOR SECNO= 12.23 CWSEL= 1357.71

STA= 817. 1300.
PER Q= 100.0
AREA= 801.4
VEL= 3.9
DEPTH= 2.1

T1 WESTCOR TATUM AND SHEA STANLEY CONSULTANTS PROJECT # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		3							1353.3	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	2		-1							

T1 WESTCOR TATUM AND SHEA STANLEY CONSULTANTS PROJECT # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		4							1355.1	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	3		-1							

T1 WESTCOR TATUM AND SHEA STANLEY CONSULTANTS PROJECT # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		5							1357.5	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	4		-1							

T1 WESTCOR TATUM AND SHEA STANLEY CONSULTANTS PROJECT # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		6							1360.5	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	5		-1							

1

T1 WESTCOR TATUM AND SHEA STANLEY CONSULTANTS PROJECT # 11623

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		7			-1					
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	6		-1							

1

THIS RUN EXECUTED 13MAY94 09:13:56

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

INDIAN BEND WASH

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
	11.860	3100.00	1349.40	.00	.00	.00	.00	3100.00	7.06	30.00	.00	.00	.
	11.860	10000.00	1353.30	.00	.00	.00	.00	10000.00	8.56	30.00	.00	.00	.
	11.860	14500.00	1355.10	.00	.00	.00	.00	14500.00	9.43	30.00	.00	.00	.
	11.860	21000.00	1357.50	.00	.00	.00	.00	21000.00	10.16	30.00	.00	.00	.
	11.860	31000.00	1360.50	.00	.00	.00	.00	31000.00	10.88	30.00	.00	.00	.
*	11.860	7000.00	1350.60	1350.60	.00	.00	.00	7000.00	10.74	30.00	.00	.00	.
*	11.862	3100.00	1350.45	1350.45	.00	.00	.00	3100.00	8.13	30.00	.00	.00	.
*	11.862	10000.00	1352.85	1352.85	.00	.00	.00	10000.00	11.83	30.00	.00	.00	.
*	11.862	14500.00	1354.42	.00	.00	.00	.00	14500.00	12.51	30.00	.00	.00	.
	11.862	21000.00	1356.98	.00	.00	.00	.00	21000.00	12.44	30.00	.00	.00	.
	11.862	31000.00	1359.86	.00	.00	.00	.00	31000.00	13.46	30.00	.00	.00	.
*	11.862	7000.00	1351.92	1351.92	.00	.00	.00	7000.00	10.55	30.00	.00	.00	.
*	11.900	3100.00	1352.14	.00	.00	.00	.00	3100.00	3.90	30.00	.00	.00	.
*	11.900	10000.00	1355.30	.00	.00	.00	.00	10000.00	4.81	30.00	.00	.00	.
*	11.900	14500.00	1356.99	.00	.00	.00	.00	14500.00	5.16	30.00	.00	.00	.
*	11.900	21000.00	1359.38	.00	.00	.00	.00	21000.00	5.42	30.00	.00	.00	.
*	11.900	31000.00	1362.59	.00	.00	.00	.00	31000.00	5.76	30.00	.00	.00	.
*	11.900	7000.00	1354.01	.00	.00	.00	.00	7000.00	4.53	30.00	.00	.00	.
*	11.907	3100.00	1352.70	1352.70	.00	.00	.00	3100.00	6.31	30.00	.00	.00	.
*	11.907	10000.00	1355.13	.00	.00	.00	.00	10000.00	6.64	30.00	.00	.00	.
*	11.907	14500.00	1356.88	.00	.00	.00	.00	14500.00	6.43	30.00	.00	.00	.
	11.907	21000.00	1359.30	.00	.00	.00	.00	21000.00	6.30	30.00	.00	.00	.
	11.907	31000.00	1362.52	.00	.00	.00	.00	31000.00	6.42	30.00	.00	.00	.
*	11.907	7000.00	1353.68	.00	.00	.00	.00	7000.00	7.80	30.00	.00	.00	.
*	11.969	3100.00	1354.60	.00	.00	.00	.00	3095.37	3.80	30.00	4.63	1.57	30.
	11.969	10000.00	1356.21	.00	.00	.00	.00	9937.22	6.79	30.00	62.78	3.49	30.
	11.969	14500.00	1357.48	.00	.00	.00	.00	14346.43	7.25	30.00	153.57	3.95	30.
	11.969	21000.00	1359.61	.00	.00	.00	.00	20615.13	7.24	30.00	384.87	4.22	30.
	11.969	31000.00	1362.69	.00	.00	.00	.00	30104.59	7.29	30.00	895.41	4.95	30.
*	11.969	7000.00	1355.69	.00	.00	.00	.00	6967.89	5.57	30.00	32.11	2.74	30.

1

	SECNO	Q	CWSEL	CRIWS	QLOB	VLOB	K*XNL	QCH	VCH	K*XNCH	QROB	VROB	K*X
*	12.039	3100.00	1355.66	.00	.00	.00	.00	3100.00	4.96	35.00	.00	.00	.
	12.039	10000.00	1357.63	.00	.00	.00	.00	10000.00	8.37	35.00	.00	.00	.
*	12.039	14500.00	1358.47	.00	.00	.00	.00	14500.00	9.93	35.00	.00	.00	.
*	12.039	21000.00	1360.08	.00	.00	.00	.00	21000.00	10.41	35.00	.00	.00	.
*	12.039	31000.00	1362.90	.00	.00	.00	.00	31000.00	9.63	35.00	.00	.00	.
	12.039	7000.00	1356.90	.00	.00	.00	.00	7000.00	7.16	35.00	.00	.00	.
*	12.094	3100.00	1356.37	.00	.00	.00	.00	3100.00	2.37	29.00	.00	.00	.
*	12.094	10000.00	1359.00	.00	.00	.00	.00	10000.00	3.71	29.00	.00	.00	.
*	12.094	14500.00	1360.29	.00	.00	.00	.00	14500.00	4.25	29.00	.00	.00	.
*	12.094	21000.00	1361.98	.00	.00	.00	.00	21000.00	4.75	29.00	.00	.00	.
*	12.094	31000.00	1364.34	.00	.00	.00	.00	31000.00	5.24	29.00	.00	.00	.
*	12.094	7000.00	1358.00	.00	.00	.00	.00	7000.00	3.24	29.00	.00	.00	.
*	12.159	3100.00	1356.66	.00	.00	.00	.00	3100.00	3.96	35.00	.00	.00	.
*	12.159	10000.00	1359.22	.00	.00	.00	.00	10000.00	5.46	35.00	.00	.00	.
*	12.159	14500.00	1360.49	.00	.00	.00	.00	14500.00	5.90	35.00	.00	.00	.
*	12.159	21000.00	1362.17	.00	.00	.00	.00	21000.00	6.21	35.00	.00	.00	.
*	12.159	31000.00	1364.49	.00	.00	.00	.00	31000.00	6.45	35.00	.00	.00	.
*	12.159	7000.00	1358.25	.00	.00	.00	.00	7000.00	5.02	35.00	.00	.00	.
	12.226	3100.00	1357.71	.00	.00	.00	.00	3100.00	3.87	35.00	.00	.00	.

12.226	10000.00	1360.14	.00	.00	.00	.00	10000.00	5.56	35.00	.00	.00	.
12.226	14500.00	1361.38	.00	.00	.00	.00	14500.00	5.97	35.00	.00	.00	.
12.226	21000.00	1362.87	.00	.00	.00	.00	21000.00	6.50	35.00	.00	.00	.
12.226	31000.00	1365.02	.00	.00	.00	.00	31000.00	6.92	35.00	.00	.00	.
12.226	7000.00	1359.26	.00	.00	.00	.00	7000.00	4.92	35.00	.00	.00	.

INDIAN BEND WASH

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	AREA	ELMIN	DEPTH	XLCH	STENCL	SSTA	ENDST	STENCR	TOPWID	TW
	11.860	3100.00	1349.40	438.95	1345.00	4.40	.00	.00	912.00	1075.54	.00	163.54	.
	11.860	10000.00	1353.30	1168.68	1345.00	8.30	.00	.00	890.10	1089.90	.00	199.80	.
	11.860	14500.00	1355.10	1538.04	1345.00	10.10	.00	.00	884.70	1095.50	.00	210.80	.
	11.860	21000.00	1357.50	2067.00	1345.00	12.50	.00	.00	877.50	1107.50	.00	230.00	.
	11.860	31000.00	1360.50	2848.81	1345.00	15.50	.00	.00	868.50	1167.14	.00	298.64	.
*	11.860	7000.00	1350.60	651.53	1345.00	5.60	.00	.00	898.19	1081.81	.00	183.61	.
*	11.862	3100.00	1350.45	381.26	1347.70	2.75	13.00	.00	884.07	1073.57	.00	189.50	.
*	11.862	10000.00	1352.85	845.00	1347.70	5.15	13.00	.00	880.53	1077.87	.00	197.34	.
*	11.862	14500.00	1354.42	1159.40	1347.70	6.72	13.00	.00	878.20	1080.69	.00	202.49	.
	11.862	21000.00	1356.98	1688.20	1347.70	9.28	13.00	.00	874.42	1085.29	.00	210.86	.
	11.862	31000.00	1359.86	2303.54	1347.70	12.16	13.00	.00	870.70	1086.40	.00	215.70	.
*	11.862	7000.00	1351.92	663.33	1347.70	4.22	13.00	.00	881.90	1076.20	.00	194.31	.
*	11.900	3100.00	1352.14	794.32	1350.00	2.14	186.00	.00	851.78	1238.18	.00	386.39	1.
*	11.900	10000.00	1355.30	2078.80	1350.00	5.30	186.00	.00	836.95	1261.17	.00	424.22	1.
*	11.900	14500.00	1356.99	2809.61	1350.00	6.99	186.00	.00	830.84	1267.96	.00	437.12	1.
*	11.900	21000.00	1359.38	3875.32	1350.00	9.38	186.00	.00	822.24	1277.51	.00	455.27	1.
*	11.900	31000.00	1362.59	5382.99	1350.00	12.59	186.00	.00	795.15	1280.00	.00	484.85	1.
*	11.900	7000.00	1354.01	1543.70	1350.00	4.01	186.00	.00	842.75	1252.48	.00	409.74	1.
*	11.907	3100.00	1352.70	491.00	1350.80	1.90	36.00	.00	834.23	1241.50	.00	407.27	1.
*	11.907	10000.00	1355.13	1506.53	1350.80	4.33	36.00	.00	824.59	1249.45	.00	424.86	1.
*	11.907	14500.00	1356.88	2255.78	1350.80	6.08	36.00	.00	817.72	1255.10	.00	437.39	1.
	11.907	21000.00	1359.30	3335.72	1350.80	8.50	36.00	.00	808.15	1262.99	.00	454.84	1.
	11.907	31000.00	1362.52	4828.45	1350.80	11.72	36.00	.00	803.40	1268.20	.00	464.80	1.
*	11.907	7000.00	1353.68	897.87	1350.80	2.88	36.00	.00	830.32	1244.72	.00	414.41	1.
*	11.969	3100.00	1354.60	817.03	1351.20	3.40	325.00	.00	833.90	1239.29	.00	405.39	4.
	11.969	10000.00	1356.21	1480.52	1351.20	5.01	325.00	.00	829.12	1247.21	.00	418.08	4.
	11.969	14500.00	1357.48	2017.14	1351.20	6.28	325.00	.00	826.47	1253.45	.00	426.97	5.
	11.969	21000.00	1359.61	2937.47	1351.20	8.41	325.00	.00	822.05	1262.90	.00	440.85	5.
	11.969	31000.00	1362.69	4310.87	1351.20	11.49	325.00	.00	816.20	1262.90	.00	446.70	5.
*	11.969	7000.00	1355.69	1262.13	1351.20	4.49	325.00	.00	830.22	1244.63	.00	414.41	4.
*	12.039	3100.00	1355.66	624.97	1352.20	3.46	370.00	.00	953.42	1234.26	.00	280.84	7.
	12.039	10000.00	1357.63	1195.17	1352.20	5.43	370.00	.00	941.98	1249.02	.00	307.05	7.
*	12.039	14500.00	1358.47	1460.18	1352.20	6.27	370.00	.00	937.01	1253.26	.00	316.24	8.
*	12.039	21000.00	1360.08	2017.36	1352.20	7.88	370.00	.00	833.45	1261.24	.00	392.65	8.
*	12.039	31000.00	1362.90	3220.32	1352.20	10.70	370.00	.00	824.80	1269.80	.00	445.00	9.
	12.039	7000.00	1356.90	978.09	1352.20	4.70	370.00	.00	946.22	1238.44	.00	292.22	7.

	SECNO	Q	CWSEL	AREA	ELMIN	DEPTH	XLCH	STENCL	SSTA	ENDST	STENCR	TOPWID	TW
*	12.094	3100.00	1356.37	1305.69	1351.60	4.77	290.00	.00	705.91	1220.61	.00	514.70	10.
*	12.094	10000.00	1359.00	2697.76	1351.60	7.40	290.00	.00	687.13	1229.52	.00	542.39	10.
*	12.094	14500.00	1360.29	3412.81	1351.60	8.69	290.00	.00	671.45	1243.07	.00	571.61	11.
*	12.094	21000.00	1361.98	4418.24	1351.60	10.38	290.00	.00	619.48	1245.00	.00	625.52	12.
*	12.094	31000.00	1364.34	5916.54	1351.60	12.74	290.00	.00	609.00	1245.00	.00	636.00	12.
*	12.094	7000.00	1358.00	2159.13	1351.60	6.40	290.00	.00	694.28	1226.13	.00	531.85	10.
*	12.159	3100.00	1356.66	782.68	1351.60	5.06	346.00	.00	795.36	1207.62	.00	334.08	13.
*	12.159	10000.00	1359.22	1832.95	1351.60	7.62	346.00	.00	727.86	1218.72	.00	464.63	14.
*	12.159	14500.00	1360.49	2459.69	1351.60	8.89	346.00	.00	703.28	1224.27	.00	517.08	15.
*	12.159	21000.00	1362.17	3381.98	1351.60	10.57	346.00	.00	666.10	1244.30	.00	568.76	16.
*	12.159	31000.00	1364.49	4807.81	1351.60	12.89	346.00	.00	608.70	1244.30	.00	635.60	17.
*	12.159	7000.00	1358.25	1395.20	1351.60	6.65	346.00	.00	734.81	1214.48	.00	435.03	14.
	12.226	3100.00	1357.71	801.40	1352.00	5.71	355.00	.00	817.01	1191.64	.00	374.63	16.
	12.226	10000.00	1360.14	1799.96	1352.00	8.14	355.00	.00	775.01	1205.52	.00	430.52	18.
	12.226	14500.00	1361.38	2428.01	1352.00	9.38	355.00	.00	766.64	1300.00	.00	533.36	19.
	12.226	21000.00	1362.87	3229.43	1352.00	10.87	355.00	.00	756.66	1300.00	.00	543.34	21.
	12.226	31000.00	1365.02	4482.31	1352.00	13.02	355.00	.00	700.10	1300.00	.00	599.90	22.
	12.226	7000.00	1359.26	1423.65	1352.00	7.26	355.00	.00	780.94	1200.47	.00	419.53	17.

INDIAN BEND WASH

SUMMARY PRINTOUT

SECNO	Q	CWSEL	DIFWSP	EG	DIFEG	STENCL	STCHL	XLBEL	RBEL	STCHR	STENCR
11.860	3100.00	1349.40	.00	1350.17	.00	.00	855.00	1365.00	1365.00	1270.00	.00
11.860	10000.00	1353.30	3.90	1354.44	4.26	.00	855.00	1365.00	1365.00	1270.00	.00
11.860	14500.00	1355.10	1.80	1356.48	6.31	.00	855.00	1365.00	1365.00	1270.00	.00

	11.860	21000.00	1357.50	2.40	1359.10	8.93	.00	855.00	1365.00	1365.00	1270.00	.00
	11.860	31000.00	1360.50	3.00	1362.34	12.16	.00	855.00	1365.00	1365.00	1270.00	.00
*	11.860	7000.00	1350.60	-9.90	1352.39	2.22	.00	855.00	1365.00	1365.00	1270.00	.00
*	11.862	3100.00	1350.45	.00	1351.48	.00	.00	870.70	1359.50	1357.60	1086.40	.00
*	11.862	10000.00	1352.85	2.40	1355.02	3.55	.00	870.70	1359.50	1357.60	1086.40	.00
*	11.862	14500.00	1354.42	1.57	1356.84	5.37	.00	870.70	1359.50	1357.60	1086.40	.00
	11.862	21000.00	1356.98	2.56	1359.38	7.90	.00	870.70	1359.50	1357.60	1086.40	.00
	11.862	31000.00	1359.86	2.88	1362.67	11.19	.00	870.70	1359.50	1357.60	1086.40	.00
*	11.862	7000.00	1351.92	-7.93	1353.65	2.17	.00	870.70	1359.50	1357.60	1086.40	.00
*	11.900	3100.00	1352.14	.00	1352.37	.00	.00	772.00	1365.00	1360.00	1280.00	.00
*	11.900	10000.00	1355.30	3.16	1355.66	3.28	.00	772.00	1365.00	1360.00	1280.00	.00
*	11.900	14500.00	1356.99	1.69	1357.40	5.03	.00	772.00	1365.00	1360.00	1280.00	.00
*	11.900	21000.00	1359.38	2.39	1359.83	7.46	.00	772.00	1365.00	1360.00	1280.00	.00
*	11.900	31000.00	1362.59	3.21	1363.10	10.73	.00	772.00	1365.00	1360.00	1280.00	.00
*	11.900	7000.00	1354.01	-8.57	1354.33	1.96	.00	772.00	1365.00	1360.00	1280.00	.00
*	11.907	3100.00	1352.70	.00	1353.32	.00	.00	803.40	1360.50	1360.90	1268.20	.00
*	11.907	10000.00	1355.13	2.43	1355.82	2.50	.00	803.40	1360.50	1360.90	1268.20	.00
*	11.907	14500.00	1356.88	1.74	1357.52	4.20	.00	803.40	1360.50	1360.90	1268.20	.00
	11.907	21000.00	1359.30	2.42	1359.91	6.60	.00	803.40	1360.50	1360.90	1268.20	.00
	11.907	31000.00	1362.52	3.23	1363.16	9.85	.00	803.40	1360.50	1360.90	1268.20	.00
*	11.907	7000.00	1353.68	-8.84	1354.63	1.31	.00	803.40	1360.50	1360.90	1268.20	.00
*	11.969	3100.00	1354.60	.00	1354.82	.00	.00	816.20	1362.40	1353.50	1233.90	.00
	11.969	10000.00	1356.21	1.61	1356.92	2.10	.00	816.20	1362.40	1353.50	1233.90	.00
	11.969	14500.00	1357.48	1.27	1358.29	3.47	.00	816.20	1362.40	1353.50	1233.90	.00
	11.969	21000.00	1359.61	2.13	1360.41	5.59	.00	816.20	1362.40	1353.50	1233.90	.00
	11.969	31000.00	1362.69	3.08	1363.50	8.68	.00	816.20	1362.40	1353.50	1233.90	.00
*	11.969	7000.00	1355.69	-7.00	1356.17	1.34	.00	816.20	1362.40	1353.50	1233.90	.00
*	12.039	3100.00	1355.66	.00	1356.04	.00	.00	824.80	1362.60	1361.80	1269.80	.00
	12.039	10000.00	1357.63	1.96	1358.71	2.67	.00	824.80	1362.60	1361.80	1269.80	.00
*	12.039	14500.00	1358.47	.85	1360.01	3.96	.00	824.80	1362.60	1361.80	1269.80	.00
*	12.039	21000.00	1360.08	1.60	1361.76	5.72	.00	824.80	1362.60	1361.80	1269.80	.00
*	12.039	31000.00	1362.90	2.82	1364.34	8.30	.00	824.80	1362.60	1361.80	1269.80	.00
	12.039	7000.00	1356.90	-6.00	1357.69	1.65	.00	824.80	1362.60	1361.80	1269.80	.00

	SECNO	Q	CWSEL	DIFWSP	EG	DIFEG	STENCL	STCHL	XLBEL	RBEL	STCHR	STENCR
*	12.094	3100.00	1356.37	.00	1356.46	.00	.00	609.00	1363.20	1361.00	1245.00	.00
*	12.094	10000.00	1359.00	2.63	1359.22	2.75	.00	609.00	1363.20	1361.00	1245.00	.00
*	12.094	14500.00	1360.29	1.29	1360.57	4.11	.00	609.00	1363.20	1361.00	1245.00	.00
*	12.094	21000.00	1361.98	1.69	1362.33	5.87	.00	609.00	1363.20	1361.00	1245.00	.00
*	12.094	31000.00	1364.34	2.37	1364.77	8.31	.00	609.00	1363.20	1361.00	1245.00	.00
*	12.094	7000.00	1358.00	-6.34	1358.16	1.70	.00	609.00	1363.20	1361.00	1245.00	.00
*	12.159	3100.00	1356.66	.00	1356.91	.00	.00	608.70	1362.30	1361.30	1244.30	.00
*	12.159	10000.00	1359.22	2.56	1359.68	2.77	.00	608.70	1362.30	1361.30	1244.30	.00
*	12.159	14500.00	1360.49	1.27	1361.03	4.13	.00	608.70	1362.30	1361.30	1244.30	.00
*	12.159	21000.00	1362.17	1.67	1362.77	5.86	.00	608.70	1362.30	1361.30	1244.30	.00
*	12.159	31000.00	1364.49	2.32	1365.13	8.23	.00	608.70	1362.30	1361.30	1244.30	.00
*	12.159	7000.00	1358.25	-6.24	1358.64	1.73	.00	608.70	1362.30	1361.30	1244.30	.00
	12.226	3100.00	1357.71	.00	1357.95	.00	.00	700.10	1363.90	1361.10	1300.00	.00
	12.226	10000.00	1360.14	2.42	1360.62	2.67	.00	700.10	1363.90	1361.10	1300.00	.00
	12.226	14500.00	1361.38	1.25	1361.94	3.99	.00	700.10	1363.90	1361.10	1300.00	.00
	12.226	21000.00	1362.87	1.49	1363.53	5.58	.00	700.10	1363.90	1361.10	1300.00	.00
	12.226	31000.00	1365.02	2.15	1365.77	7.82	.00	700.10	1363.90	1361.10	1300.00	.00
	12.226	7000.00	1359.26	-5.76	1359.63	1.69	.00	700.10	1363.90	1361.10	1300.00	.00

SUMMARY OF ERRORS AND SPECIAL NOTES

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CAUTION SECNO=     11.860  PROFILE=  6  CRITICAL DEPTH ASSUMED

CAUTION SECNO=     11.862  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.862  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.862  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     11.862  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.862  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.862  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
WARNING SECNO=     11.862  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=     11.862  PROFILE=  6  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.862  PROFILE=  6  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.862  PROFILE=  6  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     11.900  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.900  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.900  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.900  PROFILE=  4  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.900  PROFILE=  5  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.900  PROFILE=  6  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     11.907  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.907  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.907  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
WARNING SECNO=     11.907  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.907  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
```

```
WARNING SECNO=     11.907  PROFILE=  6  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     11.969  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.969  PROFILE=  6  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     12.039  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.039  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.039  PROFILE=  4  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.039  PROFILE=  5  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

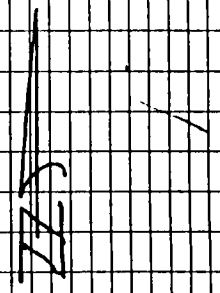
WARNING SECNO=     12.094  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.094  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.094  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.094  PROFILE=  4  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.094  PROFILE=  5  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.094  PROFILE=  6  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

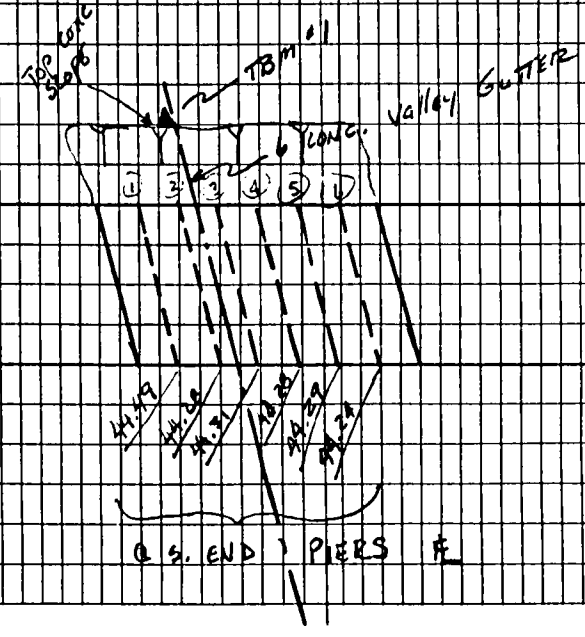
WARNING SECNO=     12.159  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.159  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.159  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.159  PROFILE=  4  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.159  PROFILE=  5  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.159  PROFILE=  6  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
```

PIER #1						44.49
	5.29	49.78				
#2					5.45	44.33
#3					5.48	44.30
#4					5.53	44.25
#5					5.54	44.24
#6					5.54	44.24
TBM #1					1.51	48.27

S. END PIER #1 (PER SHEET 1 OF 1, 52nd ST./SHEA HYDRAULIC GRADING PLAN, ERIE & ASSOC JAN. 1988)

TOP CONC. SLOPE @ W. SIDE V/GUTT





X-SEC'S

TBM "A" 48.27

8.57 56.84

57.58	49.28	48.70	47.68	48.40	48.62	59.52
T/B 86.1	TOE 11.5	CONC 37.7	℄	CONC 50.8	TOE 113.5	T/B 129.3

0+85.84
(TOP CONC SLOPE)

6+32.84 4.83 52.01

3+12.84 6.07 50.77

① 60.90	51.96	51.90	51.48	50.77	51.46	52.1	60.48
T/B 263.2	TOE 238.9	℄ S/W 194.2	CONC 103.2	℄	CONC 86.5	TOE 143.4	T/B 196.6

3+07.84

59.40	53.5	52.92	52.5	51.7	52.8	52.01	52.6	53.5	55.5	62.40
T/B 262.9	TOE 233.9	℄ S/W 211.8	NG GB 65.9	NG TOE 143.6	NG GB 122.4	℄	NG 77.90	TOE 162.1	WATER LEVEL 164.4	T/B 183.84

6+32.84

per 5' B. LOT LINE

CONTD p. 12

LT ℄ RT

Top conc slope - w. side V/6

HI = 5.86 HT = 5.86

SET NAIL ON ℄

℄ CONC VG

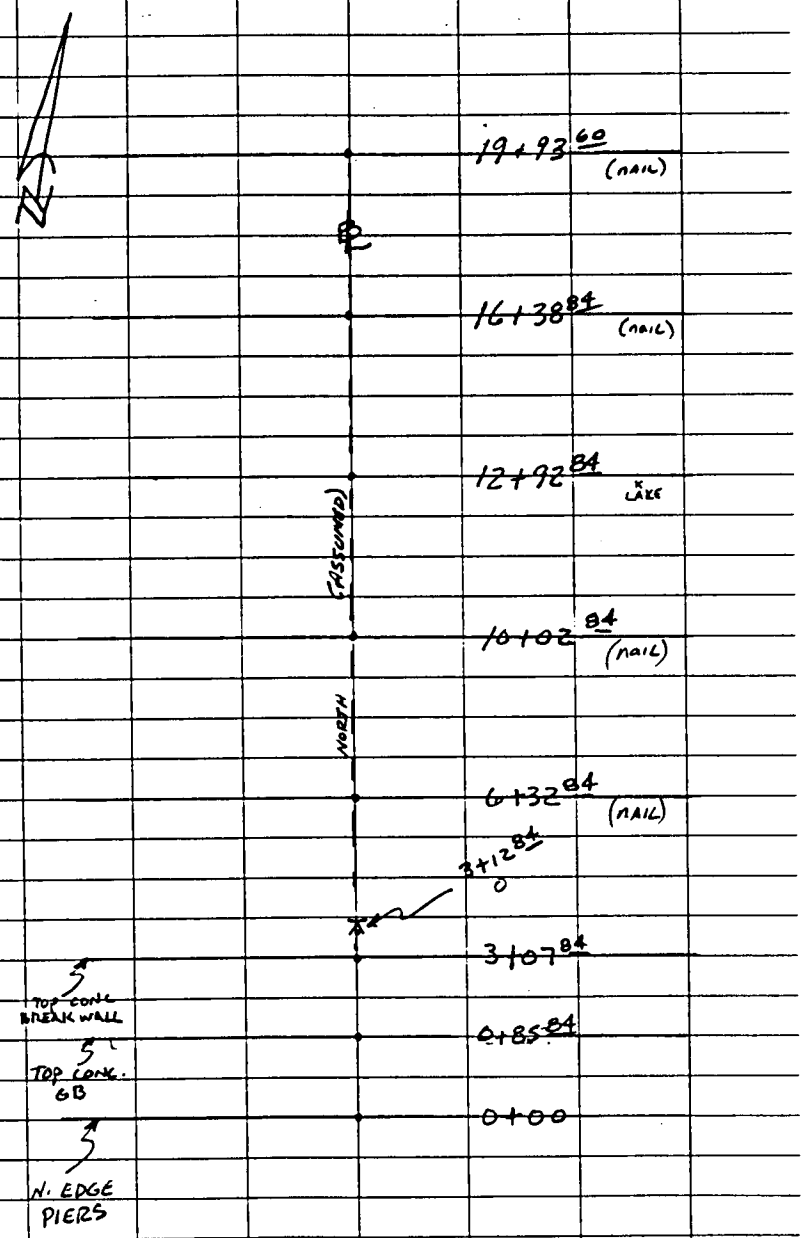
LT

60.84	51.2	50.40	49.70	48.86
T/B 263.2	TOE 238.7	℄ S/W 192.50	NG 88.7	℄

2+77

* CHECK X-SEC

②



(11)

SCALED DIST. FOR X-SEC PER PLAN (PER S.B.) FROM CONC WALL SPILLWAY S.B. & V.G. GOING NORTH

PLAN SCALE	FIELD FIT
325'	325' ✓
695'	695 ✓
985'	(WATER) ✓
1325'	1331' ✓
1685'	1681

* SET FROM 5' N. OF CONC WALL - & V.G.

227' S. TO TOP CONC GB

312.84 S. TO N. END PIERS

B

52^{2}	53^{5}	53^{64}	53^{4}	53^{08}	53^{02}	53^{87}	59^{9}	59^{2}	62^{10}
GB 207	T/B 191^{1}	℄ CART PATH 111^{9}	NG 55^{8}	℄ VG N-S 17^{2}	B 10+02.84	TOE 35^{1}	T/B 71^{3}	GB 103^{0}	T/B 137^{8}
54^{0}	57^{30}	57^{40}	61^{80}						
TOE 228	℄ B ↑ W. SIDE S/W 239^{8}	TOE ↑ W. SIDE S/W 247^{86}	T/B 269^{8}						

6+32.84

					52.01
	6.54	58.55			
				4.91	53.64
	5.53	59.17			
16+38.84				7.21	51.96
	10.72	62.68			
TBM #3				0.86	61.82

54^{36}	54^{8}	53^{6}	52^{4}	51^{3}	- LAKE -		51^{8}	53^{4}	55^{1}
EDGE S/W 128	GB 119^{5}	GB 41^{3}	T/B LAKE 34^{0}	TOE (LAKE) 33^{8}	B 12+92.84		WATER LINE 127^{2}	T/B ℄ LAKE 130^{0}	T/B 156^{9}

↓

54^{36}	54^{3}	51^{64}	53^{3}	54^{0}	59^{54}
EDGE S/W 136	GB 163^{9}	TOE (SWALE) 185^{2}	T/B (SWALE) 196^{4}	TOE 212^{6}	T/B EDGE S/W 231^{20}

B

58^{96}	58^{96}	62^{62}					
TOE ↑ EDGE S/W 155	TOE ↑ EDGE S/W 162^{50}	T/B 175^{24}					

NAIL @ B (p. 10)

NAIL @ B

1/2" REBAR FROM PREVIOUS TOPO (BK #585 p. 62) (+0.01)

53^{7}	55^{6}	59^{4}	61^{9}	61^{24}	61^{18}	63^{18}
TOE 173^{9}	TOE 288^{6}	GB 315^{9}	T/B 351^{9}	TOE ↑ EDGE S/W 365^{9}	TOE ↑ EDGE S/W 373^{8}	NG @ FACE 391^{0}

HI = 5.42

53.8	51.6		51.96	52.96	53.6	55.3
T/B	TOE		Ø	GB	TOE	T/B
14.1	13.2		16+38.84	59.9	122.9	134.8

57.0	60.9	57.9	57.6	60.32	56.4	56.3	56.1	53.6	54.1	60.50
TOE	T/B	TOE	TOE	T/B	TOE & EDGE S/W	Ø S/W	T/B	TOE	TOE	T/B & E. EDGE S/W
73.7	86.2	105.7	118.1	134.8	146.8	153.2	168.2	180.2	196.4	224.28

55.6	54.1	53.6	52.0	52.3	54.82	56.94	56.18	58.60	63.32
T/B	TOE	T/B	TOE	TOE	Ø	NG GB	GB	TOE	T/B
82.7	73.7	18.3	13.4	2.7	19+93.60	101.2	129.7	214.96	246.2

Tee

55.8	54.8	56.10	56.7
T/B SWALE	TOE SWALE	T/B SWALE	TOE Tee
131.2	151.6	164.2	185.9

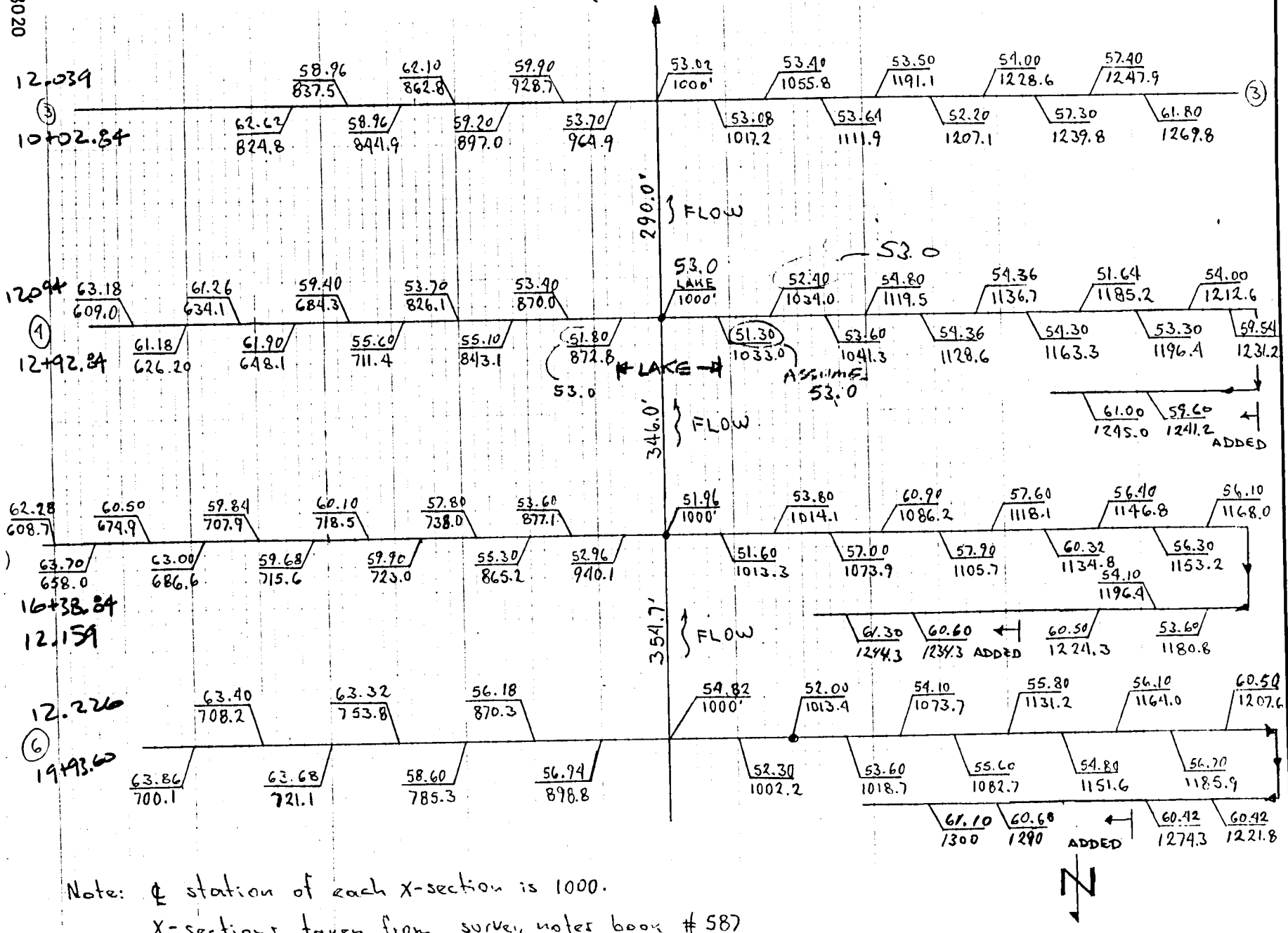
60.42	60.42	60.5
E. EDGE S/W & T/B	T/B Tee	T/B Tee
274.3	321.8	207.6

57.8	59.9	60.1	59.68	59.84	63.9	60.5	63.7	62.28
TOE	T/B	T/B	TOE	TOE	T/B	TOE	T/B	NG @ FACE
262.7	277.0	281.5	EDGE S/W 284.42	& EDGE S/W 292.1	313.2	325.1	342.4	391.28

63.68	63.40	63.86
T/B & EDGE S/W 278.94	EDGE S/W 291.80	END @ FACE 299.92

SC 3020

(continued)

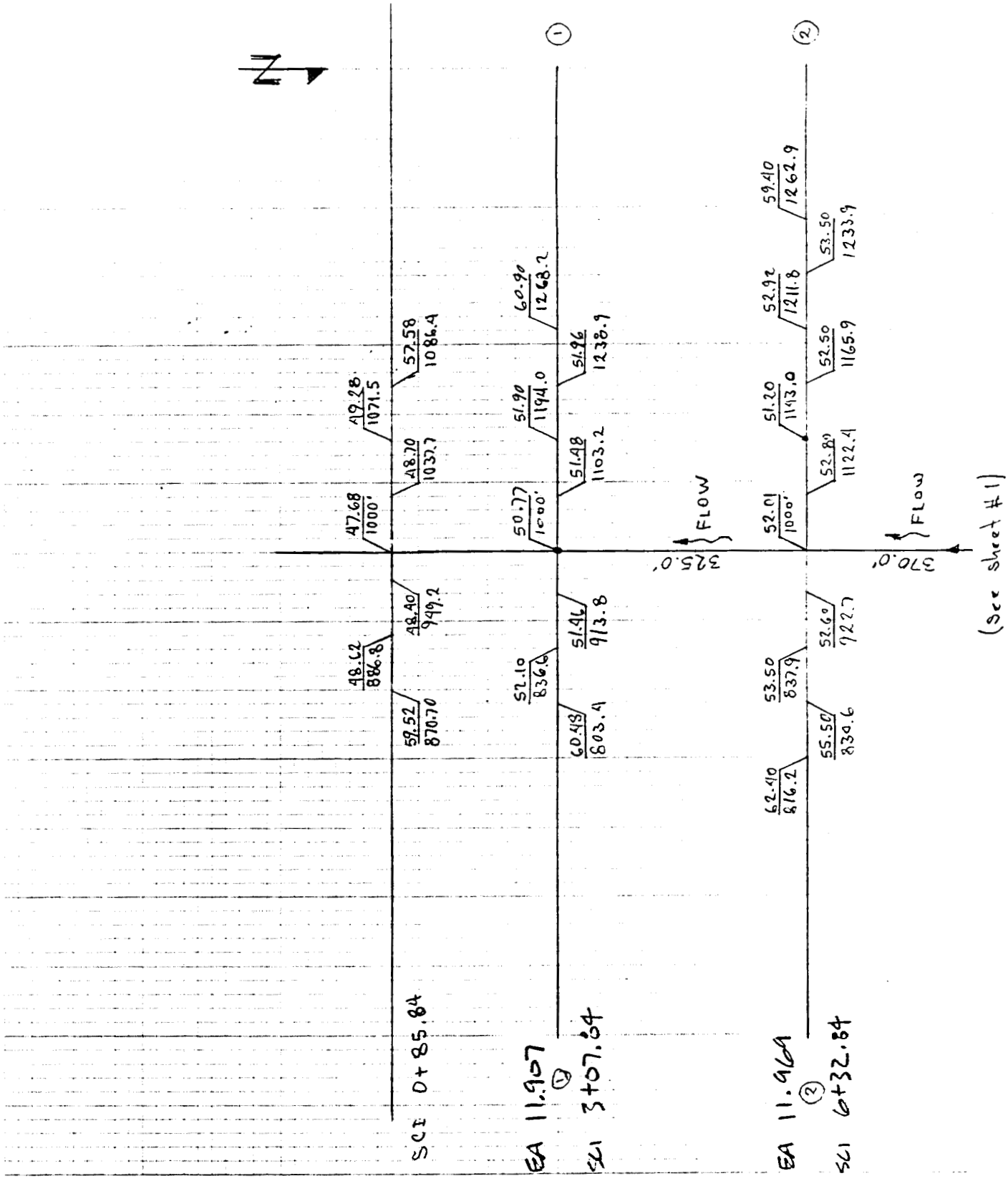


Note: ℄ station of each X-section is 1000.

X-sections taken from survey notes book # 587

DESIGNED BY ....J.R.B.... DATE 2/10/94 SHEET NO. 1 OF 2 PAGE NO. ....
CHECKED BY .... DATE .... JOB NO. ....
REVIEWED BY .... DATE .... SUBJECT: WESTCOR
APPROVED BY .... DATE .... X-Sections (Indian Bend Wash)

DESIGNED BY JRB DATE 2/10/94 SHEET NO. 2 PAGE NO.
CHECKED BY DATE OF 2 JOB NO.
REVIEWED BY DATE SUBJECT: WESTCOR
APPROVED BY DATE X-sections (Indian Bend Wash)



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1*****************************************
*  HEC-2 WATER SURFACE PROFILES           *
*                                         *
*  Version   4.6.2;  May 1991             *
*                                         *
*  RUN DATE    13MAY94    TIME   08:59:57 *
*****************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS
*  HYDROLOGIC ENGINEERING CENTER
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616-4687
*        (916) 756-1104
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X       X     X            X     X
X     X  X       X                        X
XXXXXXX  XXXX    X          XXXXX    XXXXX
X     X  X       X                  X
X     X  X       X     X            X
X     X  XXXXXXX   XXXXX            XXXXXXX
```

1
13MAY94 08:59:57 PAGE 1

THIS RUN EXECUTED 13MAY94 08:59:57

```
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************
```

```
T1      WESTCOR TATUM AND SHEA       STANLEY CONSULTANTS PROJECT # 11623
T2      100-YEAR WATER SURFACE PROFILE FOR SHEA BLVD.
T3      SHEA BLVD SUBCRIT                          FILENAME: 11623H2G
T4
T4      1. CROSS SECTIONS ORIENTED LEFT TO RIGHT LOOKING DOWNSTREAM
T4
T4      2. CROSS SECTION GR STATIONING USES MEDIAN LINE OF SHEA BLVD
T4         AS STA 10+00
T4
T4      3. CENTERLINE INTERSECTION OF 50TH STREET AND SHEA BLVD
T4         CORRESPONDS TO CROSS SECTION LOCATION STATION 100+00
T4
T4      4. CROSS SECTION GR DATA BASED ON VAL-TEC, INC. RESULTS OF SURVEY
T4         DATED 4/1992. DATUM IS CITY OF PHOENIX.
T4
T4      5. STARTING WATER SURFACE ELEVATION BASED ON SLOPE-AREA METHOD
T4         USING ESTIMATED SLOPE OF 0.011 FT/FT
T4

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

              2                         0.011

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

     1                -1

J5  LPRNT     NUMSEC                 ********REQUESTED SECTION NUMBERS********

    -10       -10

NC    0.025     0.035     0.016     0.1       0.3
QT        1       247
X1  100.00          7     939.9    1038.6
GR   1367.5     939.9    1367.0     940.0    1366.5     970.0    1366.7    1000.0    1366.2    1033.0
GR   1366.7    1033.1    1366.8    1038.6

ET                9.1                                                                945.0    1041.6
X1  102.00         10     965.9    1041.6     200       200      200
GR   1370.0     917.0    1368.0     928.0    1368.0     934.0    1369.1     945.0    1368.6     965.9
GR   1368.1     966.0    1368.5    1000.0    1368.0    1038.0    1368.5    1038.1    1368.6    1041.6
```

1
13MAY94 08:59:57 PAGE 2

```
QT        1        98
X1  104.00          8     959.9    1045.6     200       200      200
GR   1370.3     930.0    1370.2     950.0    1370.3     959.9    1369.8     960.0    1370.3    1000.0
GR   1369.8    1040.0    1370.3    1040.1    1370.4    1045.6

X1  106.00         11     955.1    1050.6     200       200      200
GR   1371.5     925.0    1372.1     943.0    1372.0     955.0    1371.5     955.1    1372.3     993.0
GR   1372.8     993.1    1372.8    1006.9    1372.3    1007.0    1371.5    1045.0    1372.0    1045.1
GR   1372.1    1050.6

X1  108.00         11     942.0    1052.6     200       200      200
GR   1373.3     925.0    1373.8     942.0    1373.7     950.9    1373.2     951.0    1374.0     992.0
GR   1374.5     992.1    1374.5    1009.9    1374.0    1010.0    1373.7    1047.0    1373.2    1047.1
GR   1373.8    1052.6

X1  110.00         12     942.4    1052.6     200       200      200
GR   1375.0     903.0    1375.4     935.0    1375.5     942.4    1375.4     947.9    1374.9     948.0
GR   1375.7    1008.0    1376.2    1008.1    1376.2    1012.9    1375.7    1013.0    1375.0    1047.0
```

```
GR   1375.5     1047.1     1375.6     1052.6

X1   112.00        11      942.4     1052.6       200        200        200
GR   1377.0      888.0     1377.4      942.4    1377.3      947.9     1376.8      948.0     1377.5     1008.0
GR   1378.0     1008.1     1378.0     1012.9    1377.5     1013.0     1376.8     1047.0     1377.3     1047.1
GR   1377.4     1052.6
1
   13MAY94      08:59:57                                                                                PAGE    3


                                                                                THIS RUN EXECUTED 13MAY94    08:59:58
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

SHEA BLVD SUBCRIT

SUMMARY PRINTOUT TABLE  150

      SECNO     XLCH     ELTRD     ELLC     ELMIN      Q      CWSEL    CRIWS     EG      10*KS    VCH     AREA     .01
*   100.000     .00       .00      .00     1366.20   247.00  1367.18  1367.18  1367.47   46.90   4.36    56.60    36.
*   102.000   200.00       .00      .00     1368.00   247.00  1368.98  1368.98  1369.31   41.34   4.63    55.54    38.
*   104.000   200.00       .00      .00     1369.80    98.00  1370.40  1370.40  1370.56   51.92   3.21    33.38    13.
*   106.000   200.00       .00      .00     1371.50    98.00  1372.19  1372.19  1372.35   58.34   3.37    32.28    12.
*   108.000   200.00       .00      .00     1373.20    98.00  1373.97  1373.97  1374.12   66.46   3.21    31.74    12.
*   110.000   200.00       .00      .00     1374.90    98.00  1375.53  1375.53  1375.67   67.82   3.23    33.73    11.
*   112.000   200.00       .00      .00     1376.80    98.00  1377.42  1377.42  1377.54   53.59   2.92    39.08    13.
1
   13MAY94      08:59:57                                                                                PAGE    4

SHEA BLVD SUBCRIT

SUMMARY PRINTOUT TABLE  150

      SECNO       Q       CWSEL    DIFWSP   DIFWSX   DIFKWS   TOPWID    XLCH
*   100.000    247.00   1367.18     .00      .00      .00     98.64     .00
*   102.000    247.00   1368.98     .00     1.80      .00     91.59   200.00
*   104.000     98.00   1370.40     .00     1.42      .00    115.60   200.00
*   106.000     98.00   1372.19     .00     1.79      .00    101.29   200.00
*   108.000     98.00   1373.97     .00     1.78      .00    104.81   200.00
*   110.000     98.00   1375.53     .00     1.56      .00    120.25   200.00
*   112.000     98.00   1377.42     .00     1.89      .00    149.27   200.00
1
   13MAY94      08:59:57                                                                                PAGE    5


 SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO=    100.000  PROFILE=  1  CRITICAL DEPTH ASSUMED

CAUTION SECNO=    102.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    102.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    102.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=    104.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    104.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    104.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=    106.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    106.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    108.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    108.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    110.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    110.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    112.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    112.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
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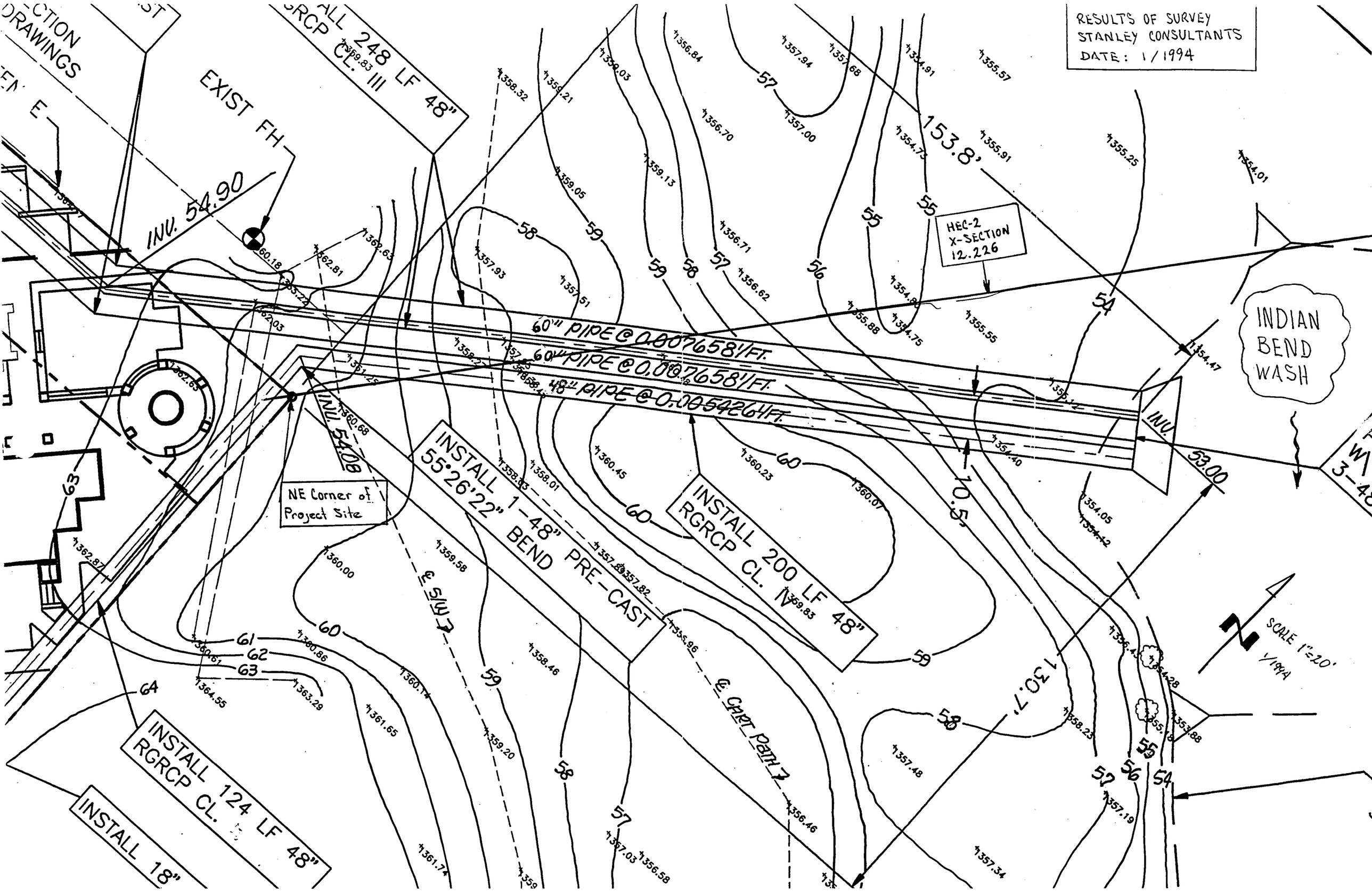
RESULTS OF SURVEY
STANLEY CONSULTANTS
DATE: 1/1994
SECTION DRAWINGS
EXIST FH
INV. 54.90
ALL 248 LF 48" RCP CL. III
153.8'
HEC-2 X-SECTION 12.226
INDIAN BEND WASH
60" PIPE @ 0.007658'/FT.
60" PIPE @ 0.007658'/FT.
48" PIPE @ 0.005426'/FT.
INV. 53.00
INV. 54.08
NE Corner of Project Site
INSTALL 55°26'22" BEND
INSTALL 1-48" PRE-CAST
INSTALL 200 LF 48" RGRCP CL. IV
130.7'
℄ Chat Path 7
℄ Mjs 3
SCALE 1"=20'
1/1994
INSTALL 124 LF 48" RGRCP CL.
INSTALL 18"

APPENDIX E

HYDRAULIC GRADE LINE ANALYSIS PROPOSED 2-60" STORM DRAIN PIPES FROM TATUM BLVD. TO INDIAN BEND WASH

DESIGNED BY JRB	DATE 4/4/94	SHEET NO.	PAGE NO.
CHECKED BY	DATE	OF	JOB NO. 11623
REVIEWED BY	DATE	SUBJECT: WESTCOR TATUM/SHEA	
APPROVED BY	DATE		

SUMMARY OF DESIGN PARAMETERS FOR STORM DRAINS:

- RCP pipe "n" = 0.013
- Contraction and expansion coefficients are taken from King and Brater handbook of hydraulics tables 6-7 and 6-10. For ratio of d_2/d_1 as applied to manholes with connecting pipes, use $(A_2/A_1)^{1/2}$ where A_2 is the effective area of the manhole estimated as a 4'x4' square. A_1 would be the area of the connecting pipe.
- Bend loss coefficient @ manhole from King and Brater Handbook of Hydraulics Chapter 6, Fig 6-5:

Bend	Loss Coeff.
0	0
45°	0.23

- Friction slope estimated from fig. 5 of concrete pipe design manual.

Discussion

It was assumed that the off-site discharge and on-site discharge do not occur at the same time. Therefore the pipe system was evaluated assuming the design flow is being contributed by the off-site drainage.

FLOW FOR CIRCULAR PIPE FLOWING FULL
BASED ON MANNING'S EQUATION n=0.013

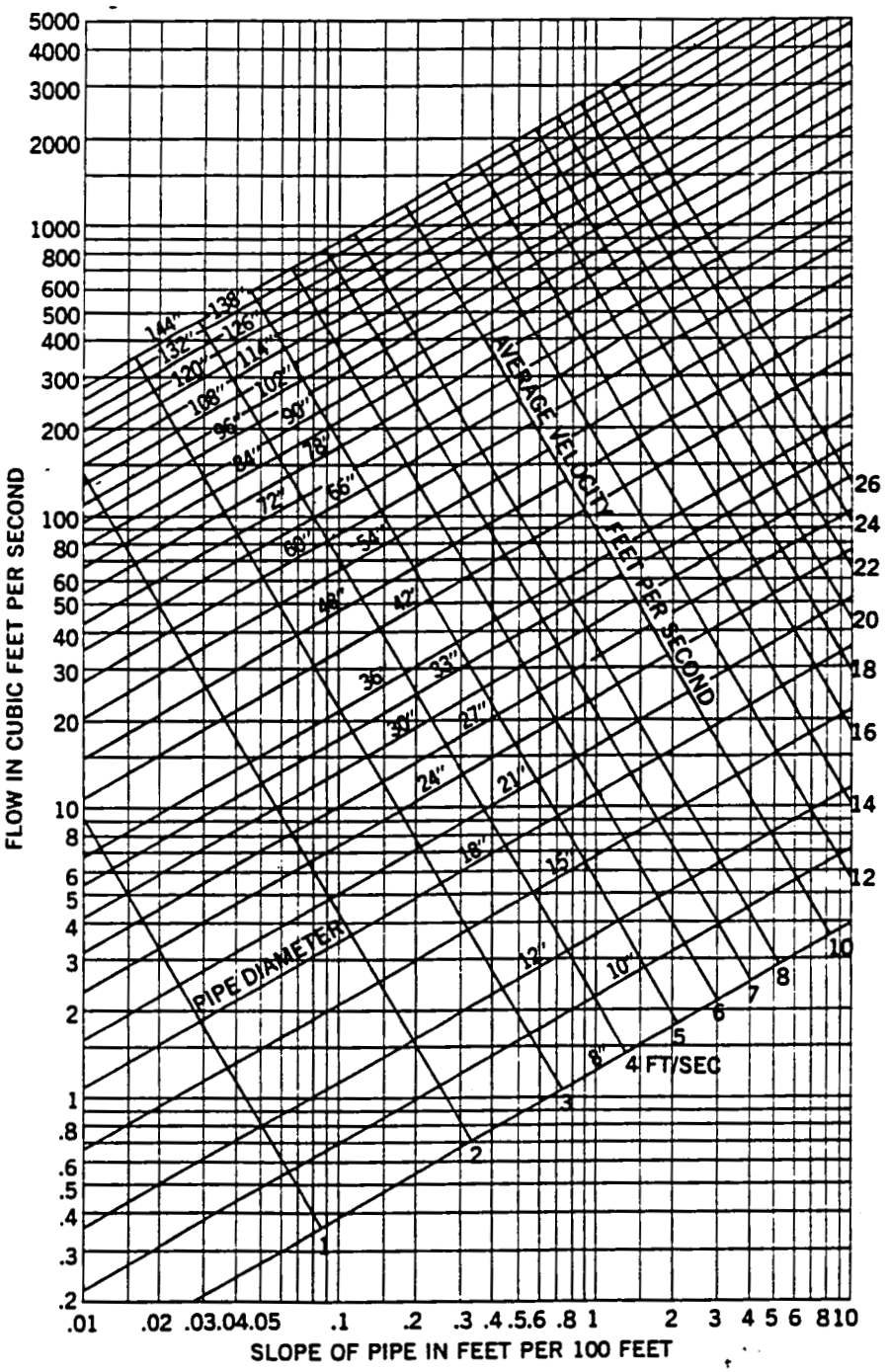

Table 6-7. Values of K_2 for Determining Loss of Head Due to Sudden Enlargement in Pipes, from the Formula

$$H_2 = K_2(V_1^2/2g)$$

d_2/d_1 = ratio of larger pipe to smaller pipe V_1 = velocity in smaller pipe

$\frac{d_2}{d_1}$	Velocity, V_1, in feet per second												
	2	3	4	5	6	7	8	10	12	15	20	30	40
1.2	.11	.10	.10	.10	.10	.10	.10	.09	.09	.09	.09	.09	.08
1.4	.26	.26	.25	.24	.24	.24	.24	.23	.23	.22	.22	.21	.20
1.6	.40	.39	.38	.37	.37	.36	.36	.35	.35	.34	.33	.32	.32
1.8	.51	.49	.48	.47	.47	.46	.46	.45	.44	.43	.42	.41	.40
2.0	.60	.58	.56	.55	.55	.54	.53	.52	.52	.51	.50	.48	.47
2.5	.74	.72	.70	.69	.68	.67	.66	.65	.64	.63	.62	.60	.58
3.0	.83	.80	.78	.77	.76	.75	.74	.73	.72	.70	.69	.67	.65
4.0	.92	.89	.87	.85	.84	.83	.82	.80	.79	.78	.76	.74	.72
5.0	.96	.93	.91	.89	.88	.87	.86	.84	.83	.82	.80	.77	.75
10.0	1.00	.99	.96	.95	.93	.92	.91	.89	.88	.86	.84	.82	.80
∞	1.00	1.00	.98	.96	.95	.94	.93	.91	.90	.88	.86	.83	.81

Table 6-10. Values of K_3 for Determining Loss of Head Due to Sudden Contraction, from the Formula $H_3 = K_3(V_2^2/2g)$

d_2/d_1 = ratio of larger to smaller diameter V_2 = velocity in smaller pipe

$\frac{d_2}{d_1}$	Velocity, V_2, in feet per second												
	2	3	4	5	6	7	8	10	12	15	20	30	40
1.1	.03	.04	.04	.04	.04	.04	.04	.04	.04	.04	.05	.05	.06
1.2	.07	.07	.07	.07	.07	.07	.07	.08	.08	.08	.09	.10	.11
1.4	.17	.17	.17	.17	.17	.17	.17	.18	.18	.18	.18	.19	.20
1.6	.26	.26	.26	.26	.26	.26	.26	.26	.26	.25	.25	.25	.24
1.8	.34	.34	.34	.34	.34	.34	.33	.33	.32	.32	.31	.29	.27
2.0	.38	.38	.37	.37	.37	.37	.36	.36	.35	.34	.33	.31	.29
2.2	.40	.40	.40	.39	.39	.39	.39	.38	.37	.37	.35	.33	.30
2.5	.42	.42	.42	.41	.41	.41	.40	.40	.39	.38	.37	.34	.31
3.0	.44	.44	.44	.43	.43	.43	.42	.42	.41	.40	.39	.36	.33
4.0	.47	.46	.46	.46	.45	.45	.45	.44	.43	.42	.41	.37	.34
5.0	.48	.48	.47	.47	.47	.46	.46	.45	.45	.44	.42	.38	.35
10.0	.49	.48	.48	.48	.48	.47	.47	.46	.46	.45	.43	.40	.36
∞	.49	.49	.48	.48	.48	.47	.47	.47	.46	.45	.44	.41	.38

FROM: HANDBOOK OF HYDRAULICS, KING & BRATER

TATUM & DESERT COVE PROPOSED 2-60" PIPES FLOWING FULL

$Q = 212$ cfs

$V = 212/19.63 = 10.8$ fps

$V^2/2g = 1.81$

POINT	STATION	REACH DESCRIPTION	ENERGY GRADE LINE ELEVATION	HYDRAULIC GRADE LINE ELEVATION	HEAD LOSS CALCULATION
1 OUTLET 60"	@ INDIAN BEND WASH	Q = 212 cfs	1359.70 X-SECT 12.226 HEC-2 MODEL	1359.30 @ Q=7000 CFS HEC-2 MODEL	INV. EL. = 1353.00
		LOSS @ PIPE OUTLET INTO THE INDIAN BEND WASH*			$K_{EXIT} = K_{CONTR.} + K_{EXP.}$ = 0.06 + 0.09 LOSS = 0.15 x 1.81 = 0.27'
1	17+63		1361.38	1359.57	
		FRICTION LOSS L = 248'			$S_f = 0.0060$ LOSS = 0.0060 x 248' = 1.49'
2	15+15		1362.87	1361.06	
		LOSSES IN MH $(A_2/A_1)^{0.5} = (19.63/16)^{0.5} = 1.11$			$K_{BEND} = 0.23$ $K_{CONTR.} = 0.04$ $K_{EXP.} = 0.09$ LOSS = 0.36 x 1.81 = 0.65'
2 MH	"		1363.52	1361.71	
		FRICTION LOSS L = 574'			$S_f = 0.0060$ LOSS = 0.0060 x 574 = 3.44'
3	9+41		1366.96	1365.15	
		LOSSES IN MH $(A_2/A_1)^{0.5} = 1.11$			$K_{EXP.} = 0.09$ $K_{CONTR.} = 0.04$ LOSS = 0.13 x 1.81 = 0.24'
3 MH	"		1367.20	1365.39	
		FRICTION LOSS L = 575'			$S_f = 0.0060$ LOSS = 0.0060 x 575 = 3.45'
4	3+66		1370.65	1368.84	
		LOSSES IN MH			$K_{BEND} = 0.23$ $K_{CONTR.} = 0.04$ $K_{EXP.} = 0.09$ LOSS = 0.36 x 1.81 = 0.65'
4	"		1371.30	1369.49	
		FRICTION LOSS L = 52'			$LOSS_f = 0.0060 \times 52' = 0.31'$
		LOSSES IN MH			$LOSS_{MH} = 0.36 \times 1.81 = 0.65'$
5 MH	3+14		1372.26	1370.45	
		FRICTION LOSS L = 314'			$LOSS_f = 0.0060 \times 314' = 1.88'$
		ENTRANCE LOSS $K_e = 0.5$**			$LOSS_{ENTRANCE} = 0.5 \times 0.87 = 0.44'$
6	0+00		1374.58	1372.77	

* IT WAS ASSUMED THAT AT THE OUTLET A HEADWALL, WINGWALLS AND A TRASH RACK WILL BE PLACED. THEREFORE FOR EXIT LOSSES A CONTRACTION/EXPANTION TRANSITION WAS ASSUMED. THE FOLLOWING RELATIONSHIP WAS USED: $A_2 = 28.27$ FT² (60" PIPE AREA) AND A 25% AREA REDUCTION DUE TO DEBRIS AND RACK'S BARS $A_1 = 28.27(0.75)$ $(A_2/A_1)^{1/2} = [19.63/(0.75)(19.63)]^{1/2} = 1.15$

** IT WAS ASSUMED THAT THE PIPE ENTRANCE WILL HAVE HEADWALL, WINGWALLS AND A TRASH RACK. $K_e = 0.5$ (FROM TABLE 12 OF "HYDRAULIC DESIGN OF HIGHWAY CULVERTS" HEC-5, 1985)

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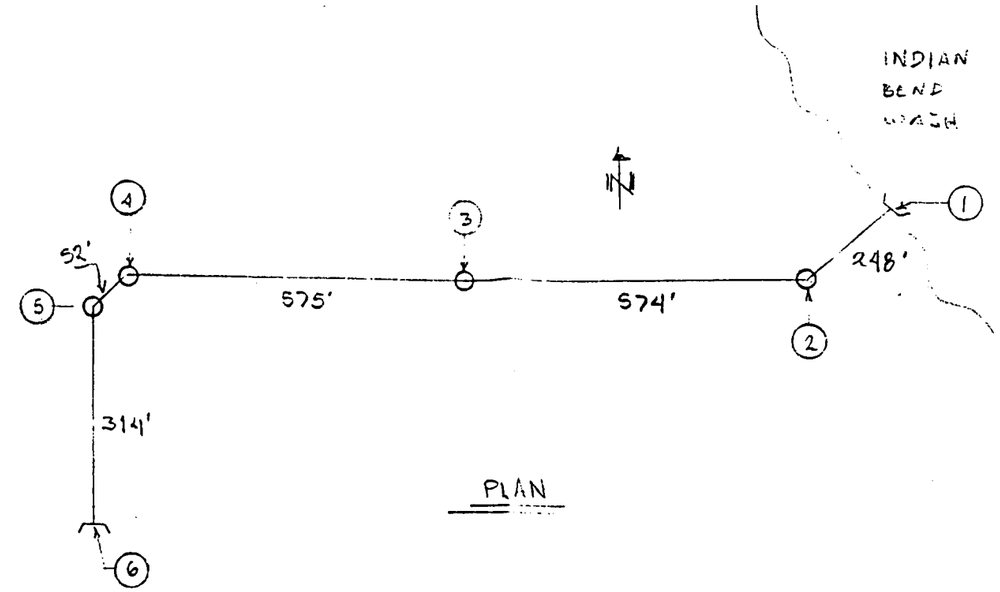
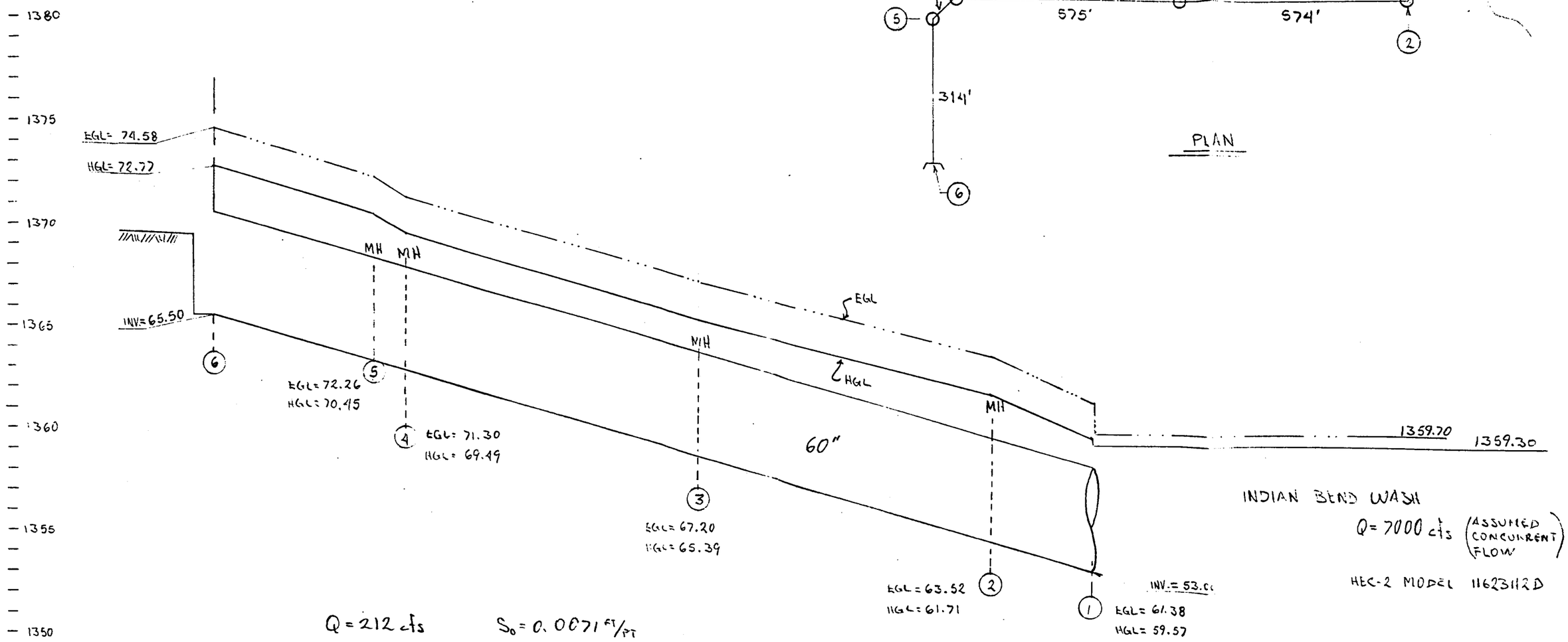
JOB WESTCOR TATUM/SHEA 811623
SHEET NO. ____ OF ____
CALCULATED BY JRB DATE 8/94
CHECKED BY ____ DATE ____
SCALE ____



PLAN



PIPE PROFILE

PROJECT: WESTCOR TATUM/SHEA	STATION:	CULVERT DESIGN FORM
	SHEET ___ OF ___	DESIGNER/DATE: JRB / 4/91
		REVIEWER/DATE: ___ / ___

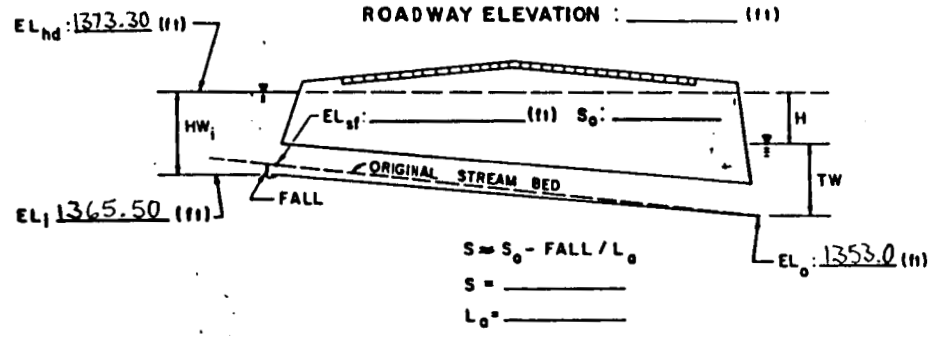
HYDROLOGICAL DATA

SEE ADD'L. SHTS.

- ☐ METHOD: ___
- ☐ DRAINAGE AREA: ___ ☐ STREAM SLOPE: ___
- ☐ CHANNEL SHAPE: ___
- ☐ ROUTING: ___ ☐ OTHER: ___

DESIGN FLOWS/TAILWATER

R.I. (YEARS)	FLOW (cfs)	TW (ft)



CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE - ENTRANCE	TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N (1)	HEADWATER CALCULATIONS: INLET CONTROL HW_i/D (2)	HW_i	FALL (3)	EL_{hi} (4)	OUTLET CONTROL TW (5)	d_c	$\frac{d_c+D}{2}$	h_o (6)	k_e	H (7)	EL_{ho} (8)	CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
RGRCP-CIRC.-2-60"- SQ. EDGE W/HEADWALL	400	200	1.56	7.80	1373.3											
" - " - 2-60"- GROOVE END W/HEADWALL	450	225	1.56	7.80	1373.3											

TECHNICAL FOOTNOTES:

(1) USE Q/NB FOR BOX CULVERTS

(2) HW_i/D = HW/D OR HW_i/D FROM DESIGN CHARTS

(3) FALL = HW_i - (EL_{hd} - EL_{sf}); FALL IS ZERO FOR CULVERTS ON GRADE

(4) EL_{hi} = HW_i + EL_i (INVERT OF INLET CONTROL SECTION)

(5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL.

(6) h_o = TW or (d_c + D/2) (WHICHEVER IS GREATER)

(7) $H = \left[1 + k_e + (29n^2 L)/R^{1.33}\right] V^2/2g$

(8) $EL_{ho} = EL_o + H + h_o$

SUBSCRIPT DEFINITIONS:

- a. APPROXIMATE
- f. CULVERT FACE
- hd. DESIGN HEADWATER
- hi. HEADWATER IN INLET CONTROL
- ho HEADWATER IN OUTLET CONTROL
- i. INLET CONTROL SECTION
- o. OUTLET
- sf. STREAMBED AT CULVERT FACE
- tw. TAILWATER

COMMENTS / DISCUSSION:

HW ELEVATION (1373.30) WAS TAKEN FROM HEC-2 MODEL FOR TATUM BLVD.

CULVERT BARREL SELECTED:

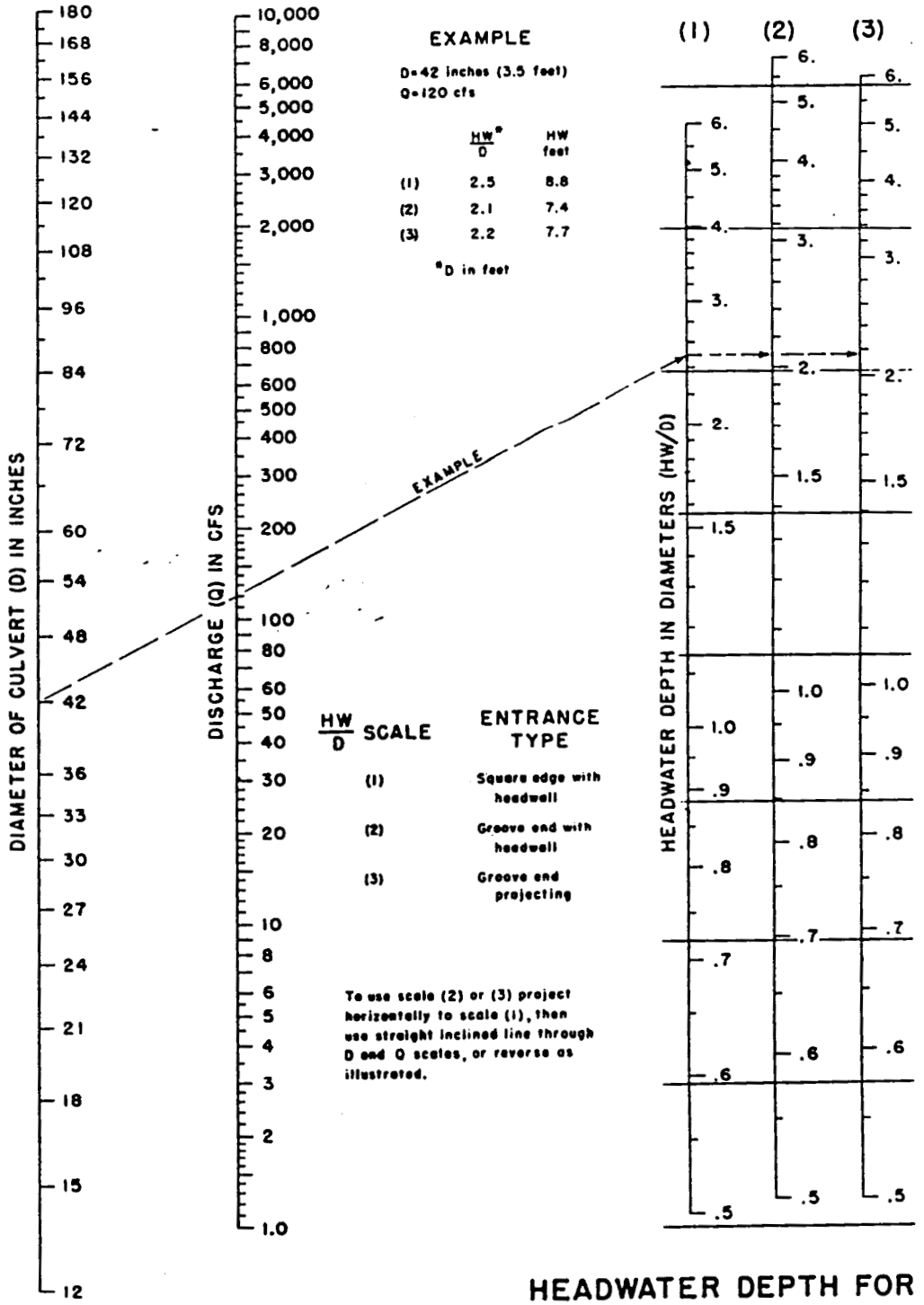
SIZE: ___

SHAPE: ___

MATERIAL: ___

ENTRANCE: ___

CHART 2



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

APPENDIX F
ON-SITE DRAINAGE

DESIGNED BY JRB	DATE 4/6/94	SHEET NO.	PAGE NO.
CHECKED BY	DATE	OF	JOB NO. 11623
REVIEWED BY	DATE	SUBJECT: WESTCOR TATUM/SUCA	
APPROVED BY	DATE		

ON-SITE HYDROLOGY

NOTES:

- Areas were calculated by planimeter.
- Procedures outlined in the "Storm Drain Design Manual" of the City of Phoenix for the rational method were used to calculate the runoff rates.

$$Q = CIA$$

where: Q = maximum rate of runoff (cfs)

C = runoff coefficient for commercial areas = 0.90 used

I = average intensity of rainfall for 100-yr storm (in/hr)

Assumed time of concentration T_c = 10 min.

Therefore $I = 1.15 \times 6 = 6.90$ in/hr (See PREFRE printout)

SUB-BASIN	AREA (acre)	Q=CIA (cfs)	DISCHARGE OUTFLOW (cfs)
A	8.00	50	15 *
B	9.17	57	15 *
C	2.41	15	15
D	2.28	14	14
E	1.78	11	11
F	2.20	14	14
G	1.92	12	12
H	7.21	—	40 *
	34.97		136

* Assumes metered discharge from detention basins.

Detained runoff (100-yr, 2-hr duration storm)

From the Depth-Duration-Frequency "PREFRE" computer program rainfall depth = 2.77 in

therefore: detained volume = $\frac{2.77}{12}$ x (sub-basin area)

SUB-BASIN	AREA (FT^2)	FLOW TO BE DETAINED (FT^3)
A	348,400	80,422
B	399,500	92,218

PREPRE OUTPUT

FILE: 11623FRE.W

1

*** O U T P U T D A T A ***

REVISED JUNE 1988 TO UPDATE COMPUTATION OF SHORT-DURATION VALUES

PRECIPITATION FREQUENCY VALUES FOR WESTCOR TATUM/SHEA JOB #11623
PRIMARY ZONE NUMBER- - 7
SHORT-DURATION ZONE NUMBER- 8

LATITUDE 33.50N LONGITUDE 111.90W ELEVATION 1800 FEET

POINT VALUES

RETURN PERIOD

DURATION	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	
5-MIN	.31	.42	.49	.59	.67	.75	.93	5-MIN
10-MIN	.47	.64	.75	.91	1.03	1.15	1.43	10-MIN
15-MIN	.57	.80	.95	1.15	1.32	1.47	1.84	15-MIN
30-MIN	.76	1.07	1.28	1.56	1.78	2.00	2.51	30-MIN
1-HR	.93	1.32	1.58	1.94	2.22	2.50	3.14	1-HR
2-HR	1.05	1.48	1.77	2.16	2.47	2.77	3.47	2-HR
3-HR	1.14	1.59	1.89	2.31	2.63	2.95	3.70	3-HR
6-HR	1.30	1.79	2.13	2.59	2.95	3.30	4.12	6-HR
12-HR	1.50	2.04	2.41	2.91	3.31	3.70	4.60	12-HR
24-HR	1.70	2.29	2.69	3.24	3.67	4.10	5.09	24-HR

* IF YOUR SITE IS IN ARIZONA OR NEW MEXICO, PLEASE CONSULT THE FOLLOWING PAPER FOR REVISED DEPTH-AREA VALUES:
  DEPTH-AREA RATIOS IN THE SEMI-ARID SOUTHWEST UNITED STATES
  NOAA TECHNICAL MEMORANDUM NWS HYDRO-40
  ZEHR AND MYERS
  AUGUST 1984

INPUT DATA

PROJECT NAME-WESTCOR TATUM/SHEA JOB #11623
ZONE- 7 SHORT-DURATION ZONE- 8
LATITUDE- 33.50 LONGITUDE- 111.90 ELEVATION- 1800
2-YR, 6-HR PCPN- 1.30 100-YR, 6-HR PCPN- 3.30
2-YR, 24-HR PCPN- 1.70 100-YR, 24-HR PCPN- 4.10

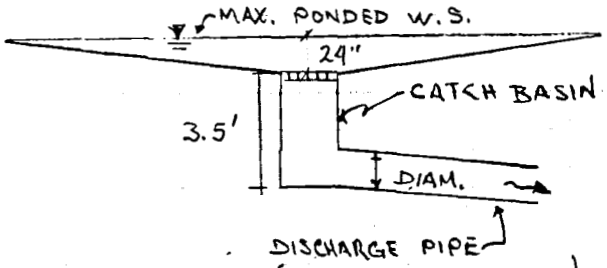
* * * * E N D O F R U N * * * *

DESIGNED BY JRB DATE 4/6/94 SHEET NO. PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCAR TATUM/SHEA
APPROVED BY DATE

Calculation of outflow discharge rate of inlets (TRIBUTARY AREAS A & B SEE EXHIBIT D)

Notes:

- Assumed inlet control conditions
- The following headwater was assumed:



Inlet to discharge pipe operates as an orifice

$Q_i = 0.67 A (2gd)^{0.5}$ *

where: A = area of clear opening (ft^2)
g = acceleration of gravity
d = headwater

* REFERENCE: HYDROLOGIC AND HYDRAULIC TRAINING SESSION by ADOT. 1973.

For a 6" Ø pipe

$A = r^2\pi = (0.25')^2\pi = 0.20\ ft^2$

$d = (3.5' + 2') - (0.5'/2) = 5.25'$

$\therefore\ Q_i = 0.67(0.20)\left[2(32.2)(5.25)\right]^{0.5} = 2.50\ cfs$

For a 12" Ø pipe

$A = r^2\pi = (0.5')^2\pi = 0.79\ ft^2$

$d = (3.5' + 2') - (1'/2) = 5.0'$

$\therefore\ Q_i = 0.67(0.79)\left[2(32.2)(5.0')\right]^{0.5} = 9.50\ cfs$

For a 8" Ø pipe

$A = r^2\pi = (0.33')^2\pi = 0.35\ ft^2$

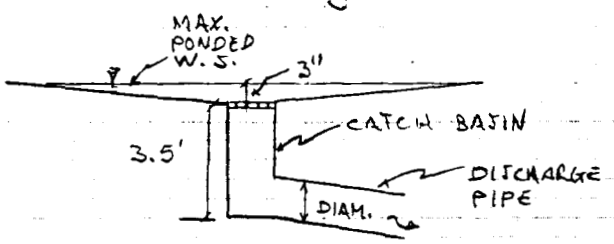
$d = (3.5' + 2') - (0.67'/2) = 5.17'$

$\therefore\ Q = 0.67(0.35)\left[2(32.2)(5.17')\right]^{0.5} = \underline{4.28\ cfs}$

DESIGNED BY JRD	DATE 5/16/94	SHEET NO.	PAGE NO.
CHECKED BY	DATE	OF	JOB NO. 1163.3
REVIEWED BY	DATE	SUBJECT: WESTCOR TAYLOR/SHEA	
APPROVED BY	DATE		

Calculation of outflow discharge rate of inlets (TRIBUTARY AREAS D & E SEE EXHIBIT D)

- Notes:
  - Assumed inlet control conditions
  - The following headwater was assumed:



For a 18" Ø pipe

$A = r^2\pi = (0.75)^2\pi = 1.77 \text{ ft}^2$

$d = (3.5' + 3/12) - (1.50'/2) = 3.0'$

$\therefore\ Q_i = 0.67(1.77)\left[2(32.2)(3.00)\right]^{0.5} = \underline{16.50 \text{ cfs}}$

For a 12" Ø pipe

$A = r^2\pi = (0.5)^2\pi = 0.79 \text{ ft}^2$

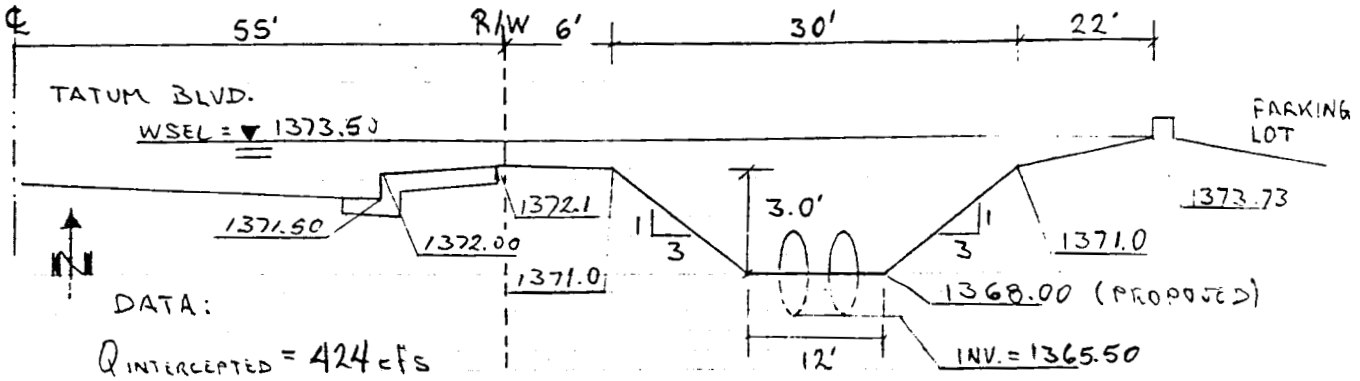
$d = (3.5' + 4/12) - (1'/2) = 3.33'$

$\therefore\ Q_i = 0.67(0.79)\left[2(32.2)(3.33')\right]^{0.5} = 7.70 \text{ cfs}$

SC 3020

DESIGNED BY ...RB...	DATE ...1/8/94...	SHEET NO.	PAGE NO. .....
CHECKED BY	DATE	OF	JOB NO. ...11623...
REVIEWED BY	DATE	SUBJECT: ...WEST COR. TATUM/SIEA...	
APPROVED BY	DATE	.....	

Calculations for the channel along the east side of Tatum Blvd. from Clinton Street to inlet of 2-60" pipes.



DATA:

$Q_{INTERCEPTED} = 424$ cfs

$n_{SHORT\ GRASS} = 0.025$

$S = 1'/200' = 0.0050'/FT$ (ASSUMED)

Side slope = $S_s : 1 = 3:1$

X-SECTION A-A
(See Exhibit D)
SCHEMATIC SECTION

Using Manning's formula

$V = (1.49/n) R^{2/3} S_o^{1/2}$

$Q = AV$

FlowMaster computer program, version 3.21 1990 was used.

Solving for depth we get:

Depth = 3.0'

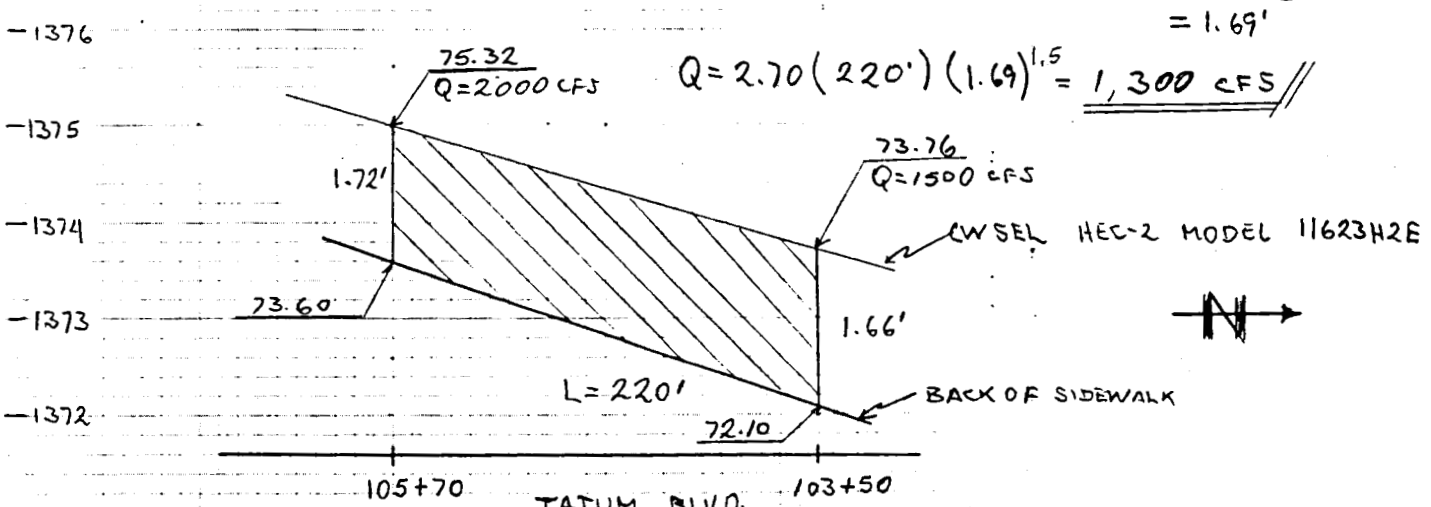
Flow Top Width = 29.98' ≈ 30'

WIER FLOW IS ASSUMED TO OCCUR ON TATUM BLVD. ADJACENTLY TO THE PROPOSED CHANNEL.

$Q = CLH^{3/2}$ where $C = 2.70$

$H_{AVERAGE} = \frac{1.72 + 1.66}{2} = 1.69'$

$Q = 2.70(220')(1.69)^{1.5} = \underline{1,300 \text{ CFS}}$



SC 3020 NOTE: The proposed channel will take about 450 cfs and the remaining flow

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: WESTCOR TATUM/SHEA

Comment: EAST SIDE OF TATUM (CLINTON TO INLET 2-48")

Solve For Depth

Given Input Data:

Bottom Width.....	12.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.025
Channel Slope....	0.0050 ft/ft
Discharge.....	424.00 cfs

Computed Results:

Depth.....	3.00 ft
Velocity.....	6.74 fps
Flow Area.....	62.88 sf
Flow Top Width...	29.98 ft
Wetted Perimeter.	30.95 ft
Critical Depth...	2.69 ft
Critical Slope...	0.0076 ft/ft
Froude Number....	0.82 (flow is Subcritical)

Open Channel Flow Module, Version 3.21 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

50TH STREET PIPE

PROJECT SITE — KICK ENGINEERING

Q = 44 cfs + 10 cfs = 54 cfs

POINT	STATION	REACH DESCRIPTION	ENERGY GRADE LINE ELEVATION	HYDRAULIC GRADE LINE ELEVATION	HEAD LOSS CALCULATION
1 OUTLET 48"	@ INDIAN BEND WASH	Q=44+40 = 84 cfs, V=8.7 fps	1359.70 X-SECT. 12.226 HEC-2 MODEL	1359.30 @ Q=7000 CFS	INV. EL. = 1353.00
		LOSS @ PIPE OUTLET INTO THE INDIAN BEND WASH * $V^2/2g = 0.70$			$K_{EXIT} = K_{CONTR.} + K_{EXP.} = 0.06 + 0.09$ LOSS = 0.15 x 0.70 = 0.11'
1	17+57	FRICTION LOSS Q=84 cfs L=200' x 48"Ø V=6.7 fps	1360.11	1359.41	$S_F = 0.0031$ LOSS = 0.0031 x 200' = 0.62'
2	15+57	LOSSES IN MH $(A_2/A_1)^{0.5} = (16/12.57)^{0.5} = 1.13$	1360.73	1360.03	$K_{BEND} = 0.23$ $K_{CONTR.} = 0.05$ $K_{EXP.} = 0.10$ LOSS = 0.38 x 0.70 = 0.27'
2	"	FRICTION LOSS Q=84 cfs L=125' x 48"Ø	1361.00	1360.30	$S_F = 0.0031$ LOSS = 0.0031 x 125' = 0.39'
3	14+32	LOSSES IN MH $(A_2/A_1)^{0.5} = 1.13$	1361.39	1360.69	$K_{EXP.} = 0.10$ $K_{CONTR.} = 0.05$ LOSS = 0.15 x 0.70 = 0.11'
3	"	FRICTION LOSS Q = 44 cfs L = 526' x 42"Ø V = 4.6 fps	1361.50	1360.80	$S_F = 0.0018$ LOSS = 0.0018 x 526 = 0.95'
4	9+06	LOSSES IN MH $(A_2/A_1)^{0.5} (16/9.62)^{0.5} = 1.29$	$V^2/2g = 0.33$ 1362.08	1361.75	$K_{BEND} = 0.30$ (90°) $K_{CONTR} = 0.12$ $K_{EXP.} = 0.17$ LOSS = 0.59 x 0.33 = 0.19'
4	"	FRICTION LOSS Q = 44 cfs L = 40' x 36"Ø V = 6.2 fps	1362.27	1361.94	$S_F = 0.0039$ LOSS = 0.0039 x 40' = 0.16'
5	8+66	LOSSES IN MH $(A_2/A_1)^{0.5} (16/7.07)^{0.5} = 1.50$	$V^2/2g = 0.6$ 1362.70	1362.10	$K_{BEND} = 0.30$ (90°) $K_{CONTR} = 0.21$ $K_{EXP.} = 0.30$ LOSS = 0.81 x 0.6 = 0.49'
5	"		1363.19	1362.59	

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JOB WESTLOCK INDIAN BEND WASH FLOOD
SHEET NO. ____ OF ____
CALCULATED BY JRB DATE 5/6/94
CHECKED BY ____ DATE ____
SCALE ____

50TH STREET PIPE (continued)

POINT	STATION	REACH DESCRIPTION	ENERGY GRADE LINE ELEVATION	HYDRAULIC GRADE LINE ELEVATION	HEAD LOSS CALCULATION
5	8+66		1363.19	1362.59	
		FRICTION LOSS Q = 30 cfs			S_f = 0.0045
		L = 390' x 30"Ø V = 6.1 fps			LOSS = 0.0045 x 390 = 1.76'
6	4+76		$V^2/2g$ = 0.58 1364.93	1364.35	K_{BEND} = 0.30 (90°) $K_{CONTR.}$ = 0.39
		LOSSES IN MH			$K_{EXP.}$ = 0.97
		$(A_2/A_1)^{0.5} = (16/4.91)^{0.5} = 1.80$			LOSS = 1.11 x 0.58 = 0.64'
6	"		1365.57	1364.99	S_f = 0.0036
		FRICTION LOSS Q = 15 cfs			
		L = 238' x 24"Ø V = 4.8 fps			LOSS = 0.0036 x 238' = 0.86'
7	2+38		$V^2/2g$ = 0.36 1366.21	1365.85	$K_{EXP.}$ = 0.62 $K_{CONTR.}$ = 0.39
		LOSSES IN MH			
		$(A_2/A_1)^{0.5} = (16/3.15)^{0.5} = 2.25$			LOSS = 1.01 x 0.36' = 0.36'
7	"		1366.57	1366.21	S_f = 0.0036
		FRICTION LOSS			
		L = 238' x 24"Ø			LOSS = 0.0036 x 238' = 0.86'
8	0+00		1367.43	1367.07	$K_{EXP.}$ = 0.62 $K_{CONTR.}$ = 0.39
		LOSSES IN MH			
		$(A_2/A_1)^{0.5}$ = 2.25			LOSS = 1.01 x 0.36' = 0.36'
8	"		1367.79	1367.43	

STANLEY CONSULTANTS
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PHOENIX, AZ 85016 • (602) 279-0901

JOB _____ SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Table 6-7. Values of K_2 for Determining Loss of Head Due to Sudden Enlargement in Pipes, from the Formula

$$H_2 = K_2(V_1^2/2g)$$

d_2/d_1 = ratio of larger pipe to smaller pipe V_1 = velocity in smaller pipe

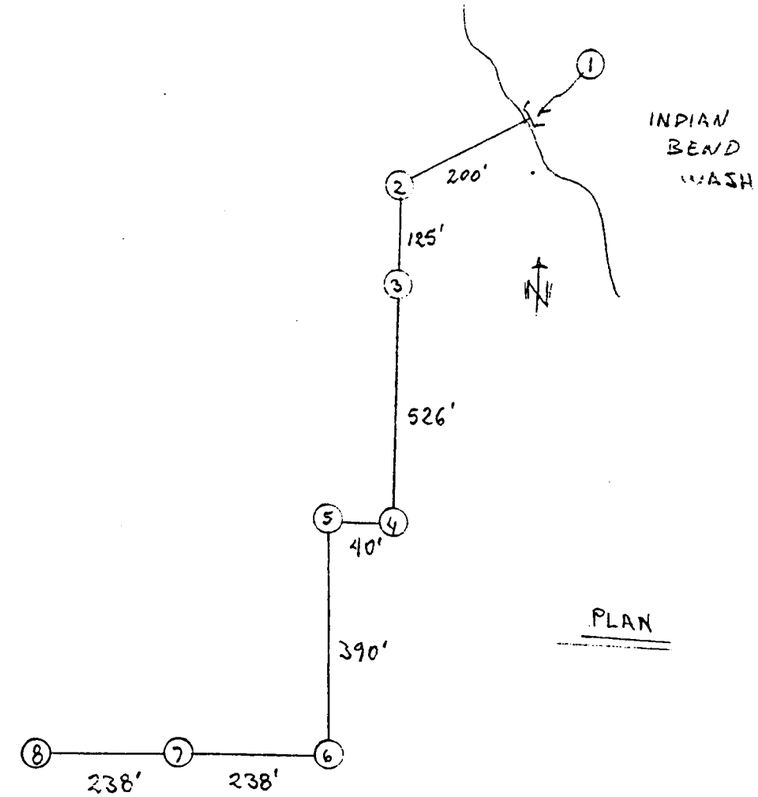
$\frac{d_2}{d_1}$	Velocity, V_1, in feet per second												
	2	3	4	5	6	7	8	10	12	15	20	30	40
1.2	.11	.10	.10	.10	.10	.10	.10	.09	.09	.09	.09	.09	.08
1.4	.26	.26	.25	.24	.24	.24	.24	.23	.23	.22	.22	.21	.20
1.6	.40	.39	.38	.37	.37	.36	.36	.35	.35	.34	.33	.32	.32
1.8	.51	.49	.48	.47	.47	.46	.46	.45	.44	.43	.42	.41	.40
2.0	.60	.58	.56	.55	.55	.54	.53	.52	.52	.51	.50	.48	.47
2.5	.74	.72	.70	.69	.68	.67	.66	.65	.64	.63	.62	.60	.58
3.0	.83	.80	.78	.77	.76	.75	.74	.73	.72	.70	.69	.67	.65
4.0	.92	.89	.87	.85	.84	.83	.82	.80	.79	.78	.76	.74	.72
5.0	.96	.93	.91	.89	.88	.87	.86	.84	.83	.82	.80	.77	.75
10.0	1.00	.99	.96	.95	.93	.92	.91	.89	.88	.86	.84	.82	.80
∞	1.00	1.00	.98	.96	.95	.94	.93	.91	.90	.88	.86	.83	.81

Table 6-10. Values of K_3 for Determining Loss of Head Due to Sudden Contraction, from the Formula $H_3 = K_3(V_2^2/2g)$

d_1/d_2 = ratio of larger to smaller diameter V_2 = velocity in smaller pipe

$\frac{d_1}{d_2}$	Velocity, V_2, in feet per second												
	2	3	4	5	6	7	8	10	12	15	20	30	40
1.1	.03	.04	.04	.04	.04	.04	.04	.04	.04	.04	.05	.05	.06
1.2	.07	.07	.07	.07	.07	.07	.07	.08	.08	.08	.09	.10	.11
1.4	.17	.17	.17	.17	.17	.17	.17	.18	.18	.18	.18	.19	.20
1.6	.26	.26	.26	.26	.26	.26	.26	.26	.26	.25	.25	.25	.24
1.8	.34	.34	.34	.34	.34	.34	.33	.33	.32	.32	.31	.29	.27
2.0	.38	.38	.37	.37	.37	.37	.36	.36	.35	.34	.33	.31	.29
2.2	.40	.40	.40	.39	.39	.39	.39	.38	.37	.37	.35	.33	.30
2.5	.42	.42	.42	.41	.41	.41	.40	.40	.39	.38	.37	.34	.31
3.0	.44	.44	.44	.43	.43	.43	.42	.42	.41	.40	.39	.36	.33
4.0	.47	.46	.46	.46	.45	.45	.45	.44	.43	.42	.41	.37	.34
5.0	.48	.48	.47	.47	.47	.46	.46	.45	.45	.44	.42	.38	.35
10.0	.49	.48	.48	.48	.48	.47	.47	.46	.46	.45	.43	.40	.36
∞	.49	.49	.48	.48	.48	.47	.47	.47	.46	.45	.44	.41	.38

FROM: HANDBOOK OF HYDRAULICS, KING & BRATER



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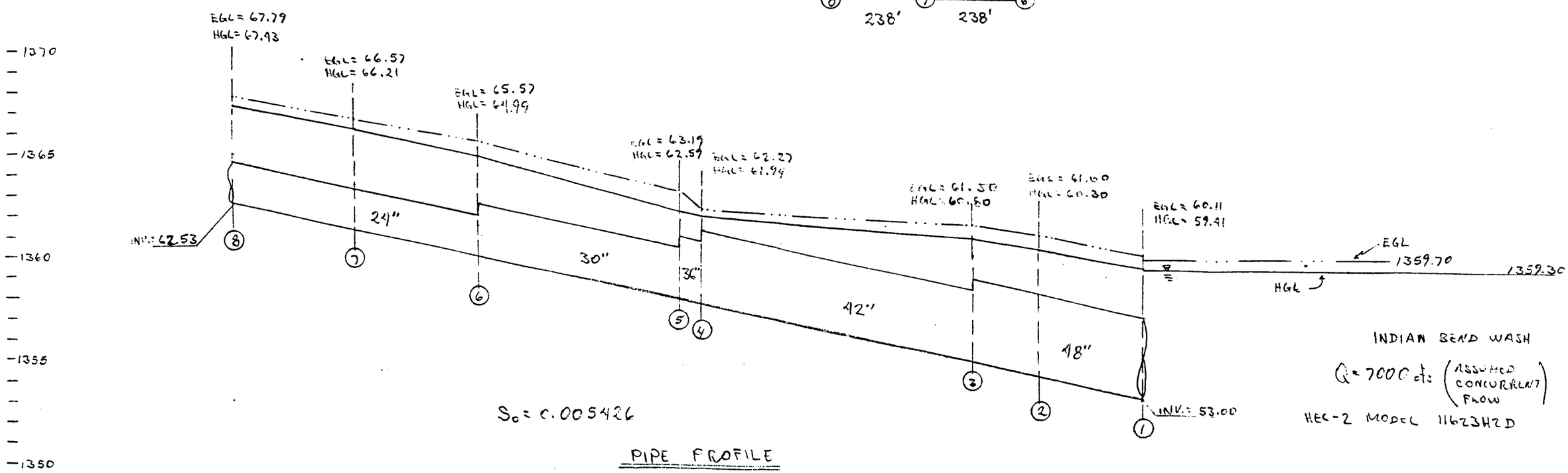


$S_o = 0.005426$

PIPE PROFILE

INDIAN BEND WASH

Q = 7000 cfs (ASSUMED CONCURRENT FLOW)

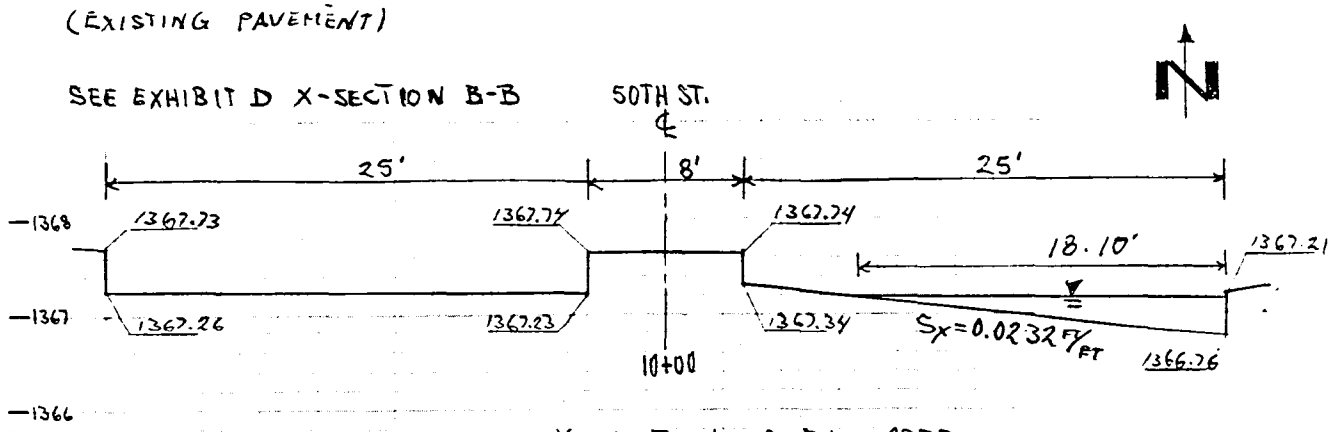
HEC-2 MODEL 11623H2D

DESIGNED BY JRB DATE 5/6/94 SHEET NO. PAGE NO.
CHECKED BY DATE OF JOB NO. 4623
REVIEWED BY DATE SUBJECT: WESTCOR TATUM/SHEA
APPROVED BY DATE

50TH STREET

(EXISTING PAVEMENT)

SEE EXHIBIT D X-SECTION B-B



X-SECTION 50TH STREET
GRADE BREAK WETWEEN SHEA BLVD. & 50TH STREET

FROM THE HEC-2 BACKWATER MODEL 11623N2G THE CWSEL @ ℄ 50TH STREET IS 1367.18

A BROAD CRESTED WIER WITH C=2.75 ON 50TH STREET WAS ASSUMED.

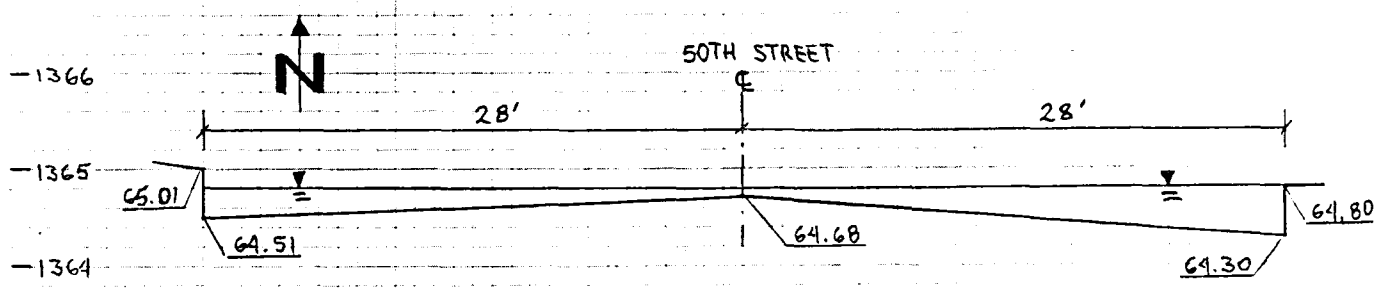
$$Q = CLH^{3/2}$$

$$L = \frac{1}{S_x}(y) = \frac{y}{0.0232} = 18.10'$$

ELEV	H	L	Q
1366.76	0	0	0
1367.18	0.42/2	18.10'	5 cfs

THEREFORE APPROXIMATELY 5 CFS OVERFLOW 50TH STREET (OFF-SITE DRAINAGE)

CROSS SECTION C-C FLOW CAPACITY (SEE EXHIBIT D)



X-SECTION IN SUMP CONDITION (APPROXIMATE PROPOSED GRADING)

$$Q = VA = \frac{1.49}{n} R^{2/3} S_o^{1/2} A$$

$$A = \frac{(0.30' + 0.12')}{2} \times 28' + \frac{(0.50' + 0.12')}{2} \times 28' = 14.56 \text{ FT}^2$$

DESIGNED BY JRB DATE 5/16/94 SHEET NO. PAGE NO.
CHECKED BY DATE OF JOB NO. 11623
REVIEWED BY DATE SUBJECT: WESTCOR TATUM / SHEA
APPROVED BY DATE

$R = \frac{A}{P} \Rightarrow P = 28' + 28' + 0.29' + 0.50' = 56.79'$

$\therefore R = \frac{14.56\ FT^2}{56.79\ FT} = 0.26'$

$Q = \frac{1.49}{0.016}(0.26)^{0.67}(0.0020)^{0.5}(14.56) = 24.6 \approx \underline{25\ cfs}$

Therefore the flow capacity of x-section C-C is 25 cfs.
The runoff of the tributary area C (exhibit D) is 15 cfs.

CATCH BASINS ON 50TH STREET (ON-SITE RUNOFF)

Catch basins were sized using the CB2-2 computer program from ADOT (Highway Development Group, Urban Highway Section).

These two catch basins will collect the runoff flow from area C (15 cfs). Also, they will have some extra interception capacity to collect bypass from area D.

Proposed Catch Basins - Curb opening with grate in sump.
From the CB2-2 program we get:
2 Catch Basins Type M-1, L=3 with grate.

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAY DEVELOPMENT GROUP
URBAN HIGHWAY SECTION

05-17-1994

PROJECT NAME- WESTCOR TATUM/SHEA TRACS NO.- _____
HIGHWAY NAME- 50TH STREET DESIGNER - JRB
LOCATION - NORTH END OF STREET CHECKER - _____ PAGE _____
APPROACHING THE CUL-DE-SAC.

CURB OPENING W/ GRATE--IN SUMP

GUTTER FLOW HYDRAULICS

GUTTER DESCRIPTION

Roadway Cross-Slope-Ft./Ft.--Sx	=	0.020	→ TYPICAL CROSS SLOPE.
Shoulder Width-Ft.--	=	10.000	
Shoulder Slope-Ft./Ft.--Ss	=	0.020	
Gutter Width-Ft.--W	=	1.420	
Gutter Slope-Ft./Ft.--Sw	=	0.059	
Gutter Depression-Inches--	=	1.002	
Depth at Curb Line-Inches--d	=	0.000	

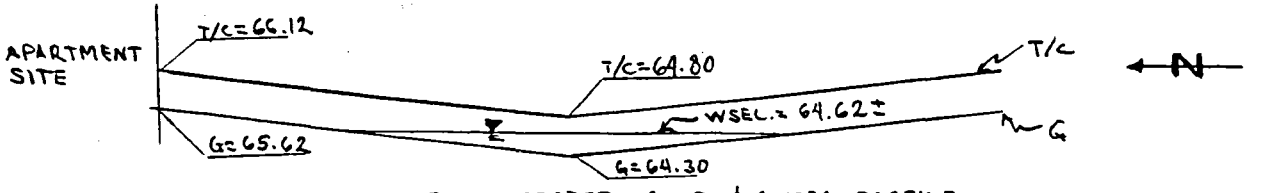
GRATE TYPE: ADOT STD.--C15.92

Grate Length--Ft.	=	3.350	
Grate Width---Ft.	=	2.000	
Grate Area--Sq. Ft.	=	5.590	
Effective Perimeter--Ft.	=	7.350	
CLOGGING FACTOR--GRATE	=	0.750	→ ASSUMES 25% CLOGGED.
CLOGGING FACTOR--CURB OPEN.	=	0.750	
Local Gutter Depression-Inches	=	2.000	
Flow-CFS--Q	=	7.500	→ 2- PROPOSED CATCH BASINS; $Q_{INTERCEPTED}$ = 15 CFS

LENGTH	Q(Curb Op)	Q(Grate)	d(inches)	SPREAD,Ft.
3.083	3.997	3.503	7.091	18.460
6.583 ✓	5.329 ✓	2.170 ✓	* 5.823 ✓	13.176 ✓
9.583	5.900	1.600	5.157	10.400
13.583	6.353	1.146	4.481	7.584
20.583	7.188	0.312	3.827	4.857

* WATER DEPTH INCLUDES THE 2 INCHES OF GUTTER DEPRESSION.

NOTE: WATER PONDING DEPTH IS LOWER THAN ADJACENT TOP OF CURB ELEVATION, AND LOWER THAN DRIVEWAY ENTRANCE TO APARTMENT SITE.



50TH STREET CURB & GUTTER PROFILE

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAY DEVELOPMENT GROUP
URBAN HIGHWAY SECTION

05-17-1994

PROJECT NAME- WESTCOR TATUM/SHEA TRACS NO.-
HIGHWAY NAME- DESERT COVE AVE. DESIGNER - JRB
LOCATION - CUL-DE-SAC IN SUMP. CHECKER - PAGE

GRATE INLET--IN SUMP

GUTTER FLOW HYDRAULICS

GUTTER DESCRIPTION

Roadway Cross-Slope-Ft./Ft.--Sx	=	0.020	→ TYPICAL CROSS SLOPE.
Shoulder Width-Ft.--	=	10.000	
Shoulder Slope-Ft./Ft.--Ss	=	0.020	
Gutter Width-Ft.--W	=	1.420	
Gutter Slope-Ft./Ft.--Sw	=	0.059	
Gutter Depression-Inches--	=	1.002	
Depth at Curb Line-Inches--d	=	6.036	

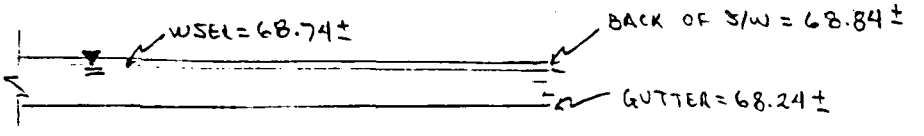
GRATE TYPE: ADOT STD.--C15.92

Grate Length--Ft.	=	3.350	
Grate Width---Ft.	=	2.000	
Grate Area--Sq. Ft.	=	5.590	
Effective Perimeter--Ft.	=	7.350	
CLOGGING FACTOR--GRATE	=	0.750	→ ASSUMES 25% CLOGGED
Local Gutter Depression-Inches	=	2.000	
Depth at Curb Line-Inches--d	=	6.036	
Depth at C.G. of Grate Flow--In.	=	6.173	→ WATER DEPTH INCLUDES THE 2-IN GUTTER DEPRESSION.
SPREAD-Ft.--T	=	22.394	→ AT CUL-DE-SAC
Depth for WEIR FLOW, inches	=	8.036	
Depth for ORIFICE FLOW, inches	=	0.103	

Q(INLET) = 4.670 cfs is Based on WEIR flow

SAY 3 GRATE INLETS ⇒ $Q_{INTERCEPTED}$ = 14 CFS.

NOTE: WATER PONDING DEPTH IS LOWER THAN THE ADJACENT DRIVEWAY ENTRANCE TO APARTMENT SITE AND TO THE DRIVEWAY ENTRANCE TO THE ANASAZI TERRACE APARTMENTS.



DESERT COVE AVE.
AT CUL-DE-SAC.

N