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48TH STREET & CHANDLER BOULEVARD

MASTER DRAINAGE REPORT

August, 1990
Revised July, 1991

Prepared for:

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Registered Professional Engineer (Civil)
CERTIFICATE NO. 22208
JACK K. MOODY
Date Signed 7/15/91
ARIZONA U.S.A.

Prepared by:

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CVL

MASTER DRAINAGE REPORT
48TH STREET & CHANDLER BOULEVARD

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1.0 INTRODUCTION

Coe & Van Loo Consultants, Inc. (CVL), has been contracted by CHI Construction Co. to provide site engineering services for the master planned development named 48th Street and Chandler Boulevard The purpose of this report is to set forth drainage requirements for this development. This master drainage plan has been developed for use in the site infrastructure development and individual parcel engineering.

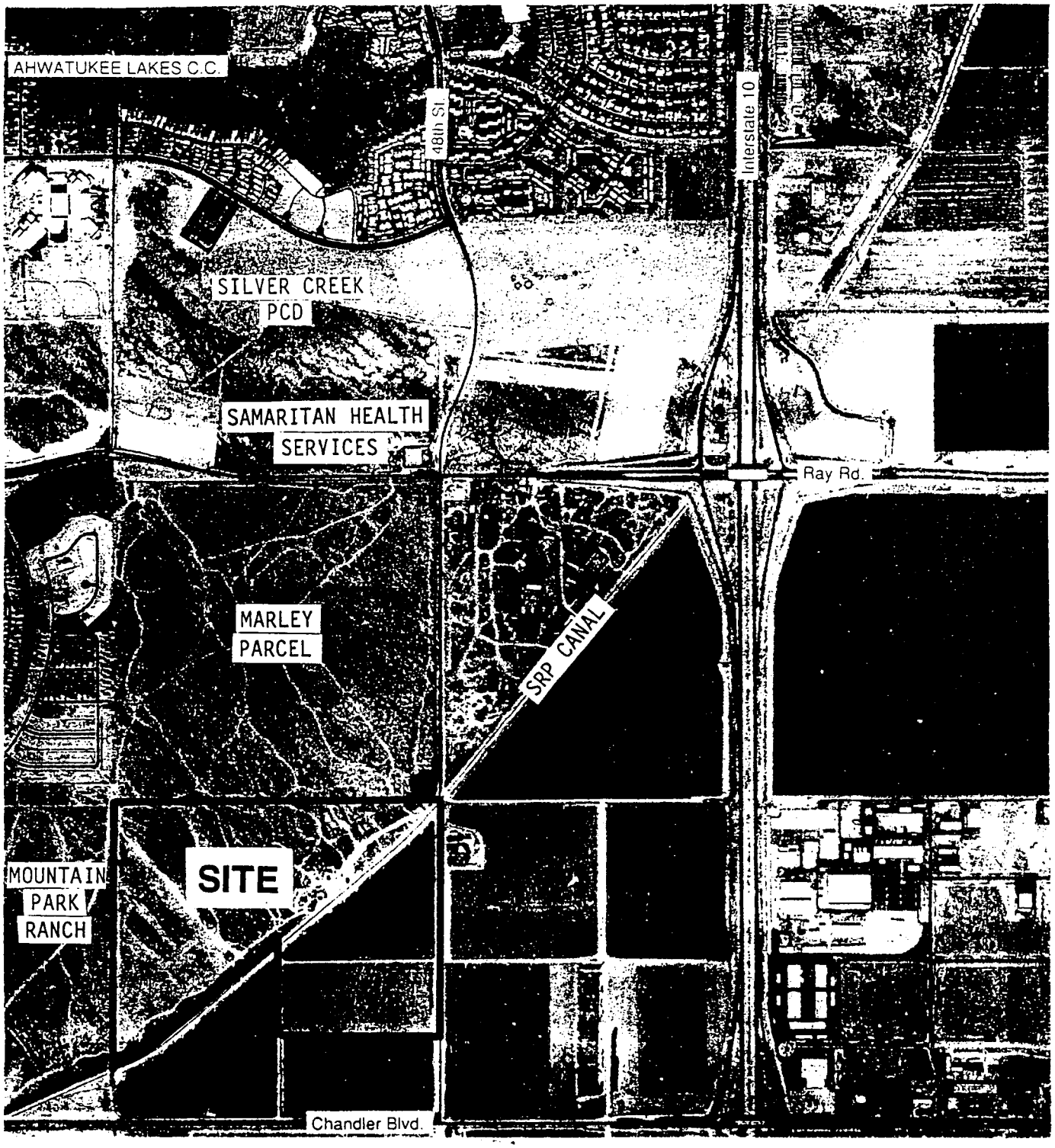
The site is located in the City of Phoenix, near the intersection of 48th Street and Chandler Boulevard More specifically, the site is located in the southeast quarter of Section 30 (T1S, R4E) and involves a total area of approximately 106 acres. Presently, the land within the proposed development is unimproved desert and agricultural land that has irrigation ditches and berms. The site generally slopes southeasterly at about 1.0 percent; however, the Highline Canal extends from the northeast corner to the southwest corner of the site. In addition, a portion of the site has been tiered for crop fields, as indicated in Plate 1.

2.0 HYDROLOGY

The Soil Conservation Service (SCS) computer model, TR-20 was used to compute the 10-year 24-hour and 100-year 24-hour peak discharges. The TR-20 model uses the method of analysis described in detail in the SCS National Engineering handbook, Section 4, Hydrology, 1972 (Ref. 1). This method allows the prediction of storm water runoff, for an individual watershed using rainfall duration and intensity data. The TR-20 model provides an effective means for computing the storm runoff from complex watersheds.

The 10-year and 100-year storm events are modeled using the NOAA storm distribution per the City of Phoenix Design Manual (Ref. 2). In addition, the point rainfall values used in this study were also obtained from the design manual (Ref. 2).

Curve numbers and times of concentration have been computed using soils maps of the area and City of Phoenix Guidelines (Ref. 2). The curve numbers, as a function of land use, used in this study are listed in Table 2.1. Time of concentration computations, routing worksheets, flow split computations, street capacity computations and precipitation data are given in Appendix A.



VICINITY MAP

48TH STREET & CHANDLER BLVD. SITE

PLATE 1 JOB NO. 1260-01-0

COE & VAN LOO

Planning
Civil Engineering
Landscape Architecture
Hydrology
Sanitary Engineering
Surveying
Highway Engineering

N

N.T.S.

1" = 1200'

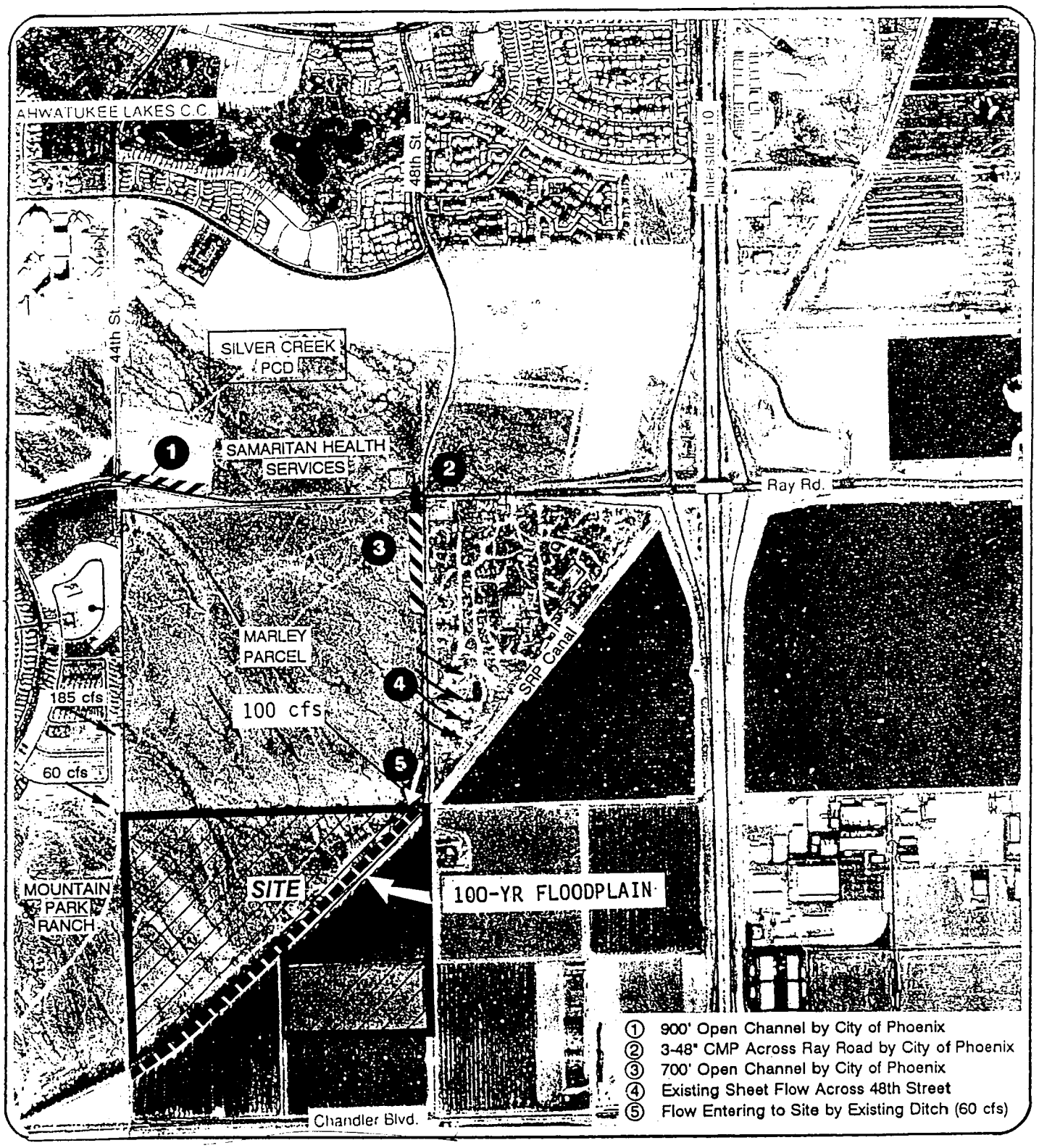
The computed off-site peak discharges impacting the site are indicated in Plate 2 and the TR-20 output files and schematic diagrams are given in Appendix A.

3.0 EXISTING DRAINAGE CONDITIONS

The project site is primarily impacted by off-site flows along the northern boundary. Several small natural washes cross the northern boundary and continue south across the site to the Highline Canal. In addition, approximately 880 cfs concentrates in 48th Street and an adjacent earthen channel where it continues south toward the project site. However, as the flow approaches the Highline Canal, 48th Street and the adjacent channel do not have adequate capacity; therefore, the majority of this flow breaks out to the east. This flow continues southeast to the Highline Canal, where it weir flows over the canal banks to continue southeast across the adjacent farm fields. The earthen channel along the west side of 48th Street does direct some flow west where it impacts the project site. However, due to the small size, flat slope, and dense vegetation in the channel, its capacity is limited to approximately 60 cfs as it impacts the project site. Detailed topography supplemented with field shots were used to evaluate the effects of the 100-year storm in this area. Refer to Appendix B for weir flow calculations and a HEC-2 backwater analysis of this area.

As indicated in Plate 2, the project site borders Mountain Park Ranch (MPR). The Mountain Park Ranch parcel adjacent to the project site is currently under development and the main drainage facilities, which drain the parcel to the south, are in place. Therefore, the project site is not impacted by storm runoff along the western property line.

South of the Highline Canal and adjacent to the project site, flow concentrates in 48th Street and flows south. Some of this flow will break out to the east over farm fields, but the majority will continue to Chandler Boulevard. At the intersection of 48th Street and Chandler Boulevard, the initial flow will continue south through a 24-inch concrete pipe to outlet into an earthen tailwater ditch that carries it south. Since the 24-inch pipe has limited capacity, the majority of the 100-year flow will surface flow over the intersection at approximately 1 to 1.5 feet deep, and continue south and east. Some of this flow will concentrate in the tailwater ditch and continue south, some will continue east along Chandler Boulevard, and some will sheet flow to the southeast across farm fields.



EXISTING DRAINAGE CONDITION

48TH STREET & CHANDLER BLVD. SITE

PLATE 2

Job No. 1260-01-0

COE & VAN LOO

Planning
Civil Engineering
Landscape Architecture
Hydrology
Sanitary Engineering
Surveying
Highway Engineering

N

1"=1200'

Plate 2 indicates the general location of the 100 year floodplain within the project site, as designated by the Federal Emergency Management Agency (FEMA). The floodplain is caused by the ponding of storm runoff behind the Highline Canal. The Flood Insurance Rate Map (FIRM) for the project site is included in Appendix D.

4.0 PROPOSED ON-SITE DRAINAGE SYSTEM

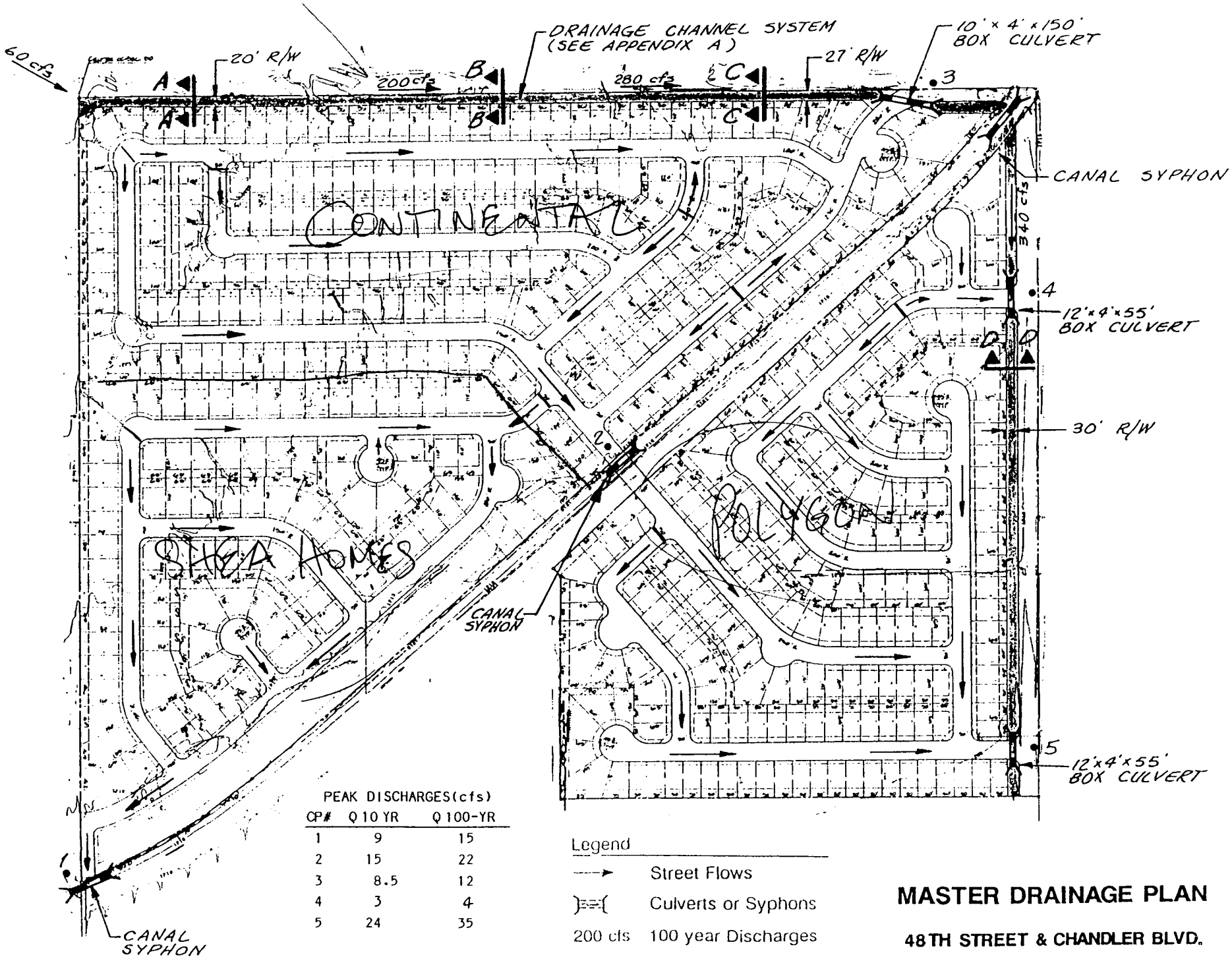
A lined channel along the north property line is proposed to collect and convey and offsite flow east to 48th Street. At that location, the Highline Canal is to be piped (syphon) so the channel can cross and turn south. The channel continues on the west side of 48th Street, collecting local onsite flow. At the south end of the site, approximately 700 feet north of Chandler Boulevard, this channel ends and allows the flow to go into 48th Street to continue south in a manner similar to the existing condition. The proposed on-site drainage system is shown schematically on Plate 3, including off-site and conceptual street flows. The indicated street flows represent runoff from the street right-of-way only, since on-lot retention is to be provided. Hydraulic computations for the channels, culverts, and street flows are in the appendix.

With the improvement of 48th Street across the canal, some additional flow, approximately 20 cfs, will break out due to the backwater from the canal in the 100-year storm. This flow will continue south within the improved half street. In the future, when the full street is developed, this flow will double to 40 cfs.

Under existing conditions, storm drainage flows southeasterly across the site and toward the intersection of 48th Street and Chandler Boulevard The proposed drainage system collects and routes off-site and on-site flows, to the Southeast corner of the project site, and therefore essentially maintains existing flow patterns. In addition, the combined 100 year street flow leaving the site does not exceed the 100-year discharge generated on-site for existing conditions due to the onsite retention provided.

5.0 ON-SITE RETENTION REQUIREMENTS

As indicated in Plate 3, the proposed development involves only single family residential lots. On-site retention for the 100-year, 2-hour event will be provided by back and/or front yard on-lot retention and will be in accordance with City of Phoenix policy.



PEAK DISCHARGES(cfs)

CP#	Q 10 YR	Q 100-YR
1	9	15
2	15	22
3	8.5	12
4	3	4
5	24	35

Legend

⟶	Street Flows
}==(	Culverts or Syphons
200 cfs	100 year Discharges

MASTER DRAINAGE PLAN

48TH STREET & CHANDLER BLVD.

PLATE 3

6.0 48TH STREET AND CHANDLER BOULEVARD INTERSECTION

As previously mentioned, a concentrated flow of approximately 440 cfs is conveyed toward Chandler Boulevard. 48th Street and adjacent swales have the capacity to convey approximately 380 cfs to the intersection of 48th Street and Chandler Boulevard. The remainder of the flow will break out to the east and sheet flow across the adjacent farm fields. A small portion of this sheet flow will be intercepted by a tailwater ditch immediately north of Chandler Boulevard, and the remainder will continue across Chandler Boulevard and the farm field to the south. At the intersection of 48th Street and Chandler Boulevard, approximately 20 cfs will flow through a 24-inch concrete irrigation pipe to outlet to an earthen tailwater ditch. The remainder of the flow will surface flow over the intersection and continue south and east, thus causing the street flooding problem. South of the intersection, more flow will concentrate in the previously mentioned tailwater ditch, until its capacity of about 100 cfs is collected and carried to the south. Some of the flow will continue east along Chandler Boulevard and eventually turn south to cross the farm land. The remainder of the flow will continue south and east across the farmland.

The street flooding that occurs at the intersection of 48th Street and Chandler Boulevard is an existing problem, not one created by the development of this project. With the development of this project, much effort has been made to discharge flows in a manner similar to the existing conditions, and not worsen the problem, although the problem still exists. At the request of the City of Phoenix, several alternatives have been investigated to help mitigate the street flooding in the more frequent floods. These alternatives are simply local improvements to the flooding situation, and are by no means a complete solution to the overall problem. Based on the analysis presented in this report, it is our opinion that this development is not creating the problem or worsening the problem, and the problem is not within the development; therefore, it is beyond the scope of this report to evaluate an overall drainage solution. It is suggested that the City of Phoenix conduct an Area Drainage Master Study to evaluate the regional drainage situation.

There are no easy solutions to the street flooding since there are numerous irrigation structures in the area, and there is not much right-of-way beyond the existing pavement. Any alternative would require the City of Phoenix to coordinate with Salt River Project, and the adjacent land owners.

Several mitigation measures intended to reduce the street flooding problems have been analyzed. Alternatives one through five follow:

ALTERNATIVE ONE:

Increase the size and therefore the capacity of the 24-inch concrete pipe that crosses Chandler Boulevard and discharges into the existing tailwater ditch. This ditch has a capacity of approximately 100 cfs that it carries to the south. Erosion on the sides of this tailwater ditch indicate that it currently collects stormwater that has crossed Chandler Boulevard. By increasing the capacity of a pipe drainage system to approximately 100 cfs, this would reduce the flow crossing the street accordingly. This would greatly reduce street flooding in the more frequent storms. When the capacity of this pipe is exceeded, the remaining discharge would sheet flow across the intersection.

Possible difficulties would be: 1) obtaining the rights for use of the earthen ditch and existing structures, 2) actual installation of the pipes relative to public access, 3) possible flooding of the intersection as the result of a large storm, 4) this could increase the magnitude of the flow in the tailwater ditch, in the more frequent storms, and 5) the cost of construction.

ALTERNATIVE TWO:

Enlarge the capacity of the tailwater ditch south of Chandler Boulevard and increase the capacity of the pipe crossing Chandler Boulevard accordingly. This is similar to alternative one, although it would reduce the street flooding even further.

Possible difficulties would be: 1) obtaining the right to enlarge and use the existing tailwater ditch, 2) this would increase the concentrated flow that goes south, instead of sheet flowing to the southeast, 3) actual installation of the pipes relative to public access, 4) possible flooding of the intersection as a result of a large storm, and 5) the cost of construction.

ALTERNATIVE THREE:

Increase the size of the ditch that is east of 48th Street and immediately north of Chandler Boulevard. This could distribute flow to the east and allow it to sheet flow over

Chandler Boulevard. This ditch terminates at an inlet structure at the northwest corner of the intersection of Chandler Boulevard and Interstate-10. A 24-in. RCP pipe carries the combined drainage beneath Chandler Boulevard, to a cleanout box on the south side, then is piped further to the south to an undetermined outlet, presumably in the vicinity of Pecos Road.

If the earthen drainage ditch is redesigned to a larger capacity, increased flows could be carried to the inlet structure for transport beneath Chandler Boulevard. For larger discharges the flows would slowly back up to the west and then sheet flow across Chandler Boulevard.

Possible difficulties would be: 1) acquisition of rights-of-way, 2) partial flooding of the field to the north of Chandler Boulevard and 3) possible traffic hazards due to sheet flow across Chandler Boulevard.

ALTERNATIVE FOUR:

Reconstruct a portion of 48th Street to have a dip section to allow a portion of the flow coming south along 48th Street to turn east along Chandler Boulevard to flow east in the existing earthen ditch. This would tend to relieve some flows across Chandler Boulevard which currently occur at the intersection. This would allow the flow to go east and sheet flow across Chandler Boulevard.

Possible difficulties would be: 1) allowing the flow to cross the existing irrigation structures, 2) possible traffic hazards due to sheet flow across Chandler Boulevard, 3) flooding of 48th Street as the flow crosses.

ALTERNATIVE FIVE:

A combination of the previous alternatives.

It is recommended that if one of these alternatives are chosen, a more detailed analysis be performed to further evaluate the impact of the chosen alternative.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This report provides the necessary off-site and on-site drainage information required to develop and evaluate site plans and drainage reports for individual parcels. It is recommended that the City of Phoenix require drainage reports for each individual parcel, as they are developed, to verify compliance with the drainage criteria specified in this report.

The analysis presented in this report indicate that:

A: The off-site flow entering the development combined with the local on-site flow can safely be conveyed through the development. A drainage system comprised of channels, streets and possibly storm drains will be provided.

B. The streets will be designed to handle a 10-year storm below the top of the sidewalk elevation. Where the flow value exceeds the street carrying capacity, a supplemental storm drain will be provided.

C. No street will be allowed to concentrate flow in excess of 100-cfs in the event of a 100-year storm.

D. Retention will be provided for the 100-year 2-hour storm with on-lot retention.

It is recommended that the results of this report be used as the guidelines in implementing local drainage from the individual parcels within the development. It is further recommended that:

1. Finished floor elevations be kept above the 100-year flood elevations.
2. Each individual parcel be required a grading and drainage plan conforming to the approved Master Drainage Report prior to its development.
3. As per the Master Drainage Plan (Plate 3) there are some areas where one parcel outlets to the adjoining parcel on the downstream side. In conditions such as this, if the downstream parcel is developed first, it will be the responsibility of its developer to address any problems associated with the upstream undeveloped parcel.
4. The City of Phoenix conduct an Area Drainage Master Study for the area to evaluate and mitigate the regional drainage problems.

8.0 REFERENCES

1. U.S. Department of Agriculture, Soil Conservation Service, *National Engineering Handbook, Section 4, Hydrology*, Washington, D.C., August, 1972.
2. City of Phoenix, *Storm Drain Design Manual: Subdivision Drainage Design*, Engineering Department, September 1985.
3. U.S. Department of Agriculture, Soil Conservation Service, Technical Release 55, *Urban Hydrology for Small Watersheds*, Washington D.C., January, 1975.
4. Arizona Department of Transportation, *Hydrologic Design for Highway Drainage in Arizona*, Phoenix, Arizona, December, 1968.

APPENDIX A

TR-20 INPUT PARAMETERS

&

TR-20 OUTPUT

Rainfall Table

(Percent total rainfall/100 by 0.5 hour increments for 24 hour storm)

.000	.004	.008	.013	.018
.022	.026	.031	.035	.040
.044	.048	.053	.057	.062
.066	.071	.075	.080	.093
.107	.120	.14	.17	.50
.83	.86	.88	.893	.907
.92	.924	.928	.933	.937
.942	.947	.951	.956	.96
.964	.969	.973	.978	.982
.987	.991	.995	1.00	1.00

PHOENIX WBO RECORDS*

(24-hour duration storm)

Return Periods, Years	Precipitation, Inches
1	1.02
2	1.44
5	2.10
10	2.53
25	3.12
50	3.57
100	4.04

*Technical Memorandum WBTM WR-44

Rainfall Data from Ref. 2.

CURVE NUMBERS BY ZONING
FOR USE WITH SCS OR TR-20 METHODS OF
DETERMINING RUNOFF IN THE CITY OF PHOENIX

ZONING	TYPE B	TYPE C	TYPE D
RE-43) S-1)	77	83	86
RE-35	79	84	87
RE-25	79	84	87
E1-18	80	84	87
R1-14	80	85	88
R1-10	81	85	89
R1-8	82	87	90
R1-6	84	88	90
R-3	85	88	90
R-4) R-40) R-5)	86	89	91
A-1) A-2)	85	91	93
C-1) C-2) C-3)	92	94	95
CO	88	91	93
PSC	95	95	95
HR	95	95	95
R4A	87	90	92
Hillside (over 10% sloping).	98	98	98

SOURCE: REF. 2

48TH STREET &
CHANDLER BLVD. SITE

TABLE 2.1 JOB NO. 1260-01-0

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Landscape Architecture
Hydrology
Sanitary Engineering
Surveying
Highway Engineering

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PLANNING • ENGINEERING
LANDSCAPE ARCHITECTURE

Project 48th & Chandler
Project No. [illegible]
Sheet No. _____ of _____
Calculated by DWD Date 8/95
Checked by _____ Date _____

Time of Concentration Computations

Basin #(1)	Flow Length (ft)	Average Velocity (fps)	Time of Concentration(2) (hrs)
[illegible]	7450	3	0.69
[illegible]0	3700	2	0.5
311	3700	2	0.5
320	[illegible]	2.	0.43
306	1000	2	0.14

(1) Off-site Basins that are not a part of Mountain Park Ranch

(2) SCS "Upland Method" $T_c = \frac{\text{Flow Length}}{\text{Velocity}}$

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Project 48th & Chandler
Project No. 1260-015
Sheet No. _____ of _____
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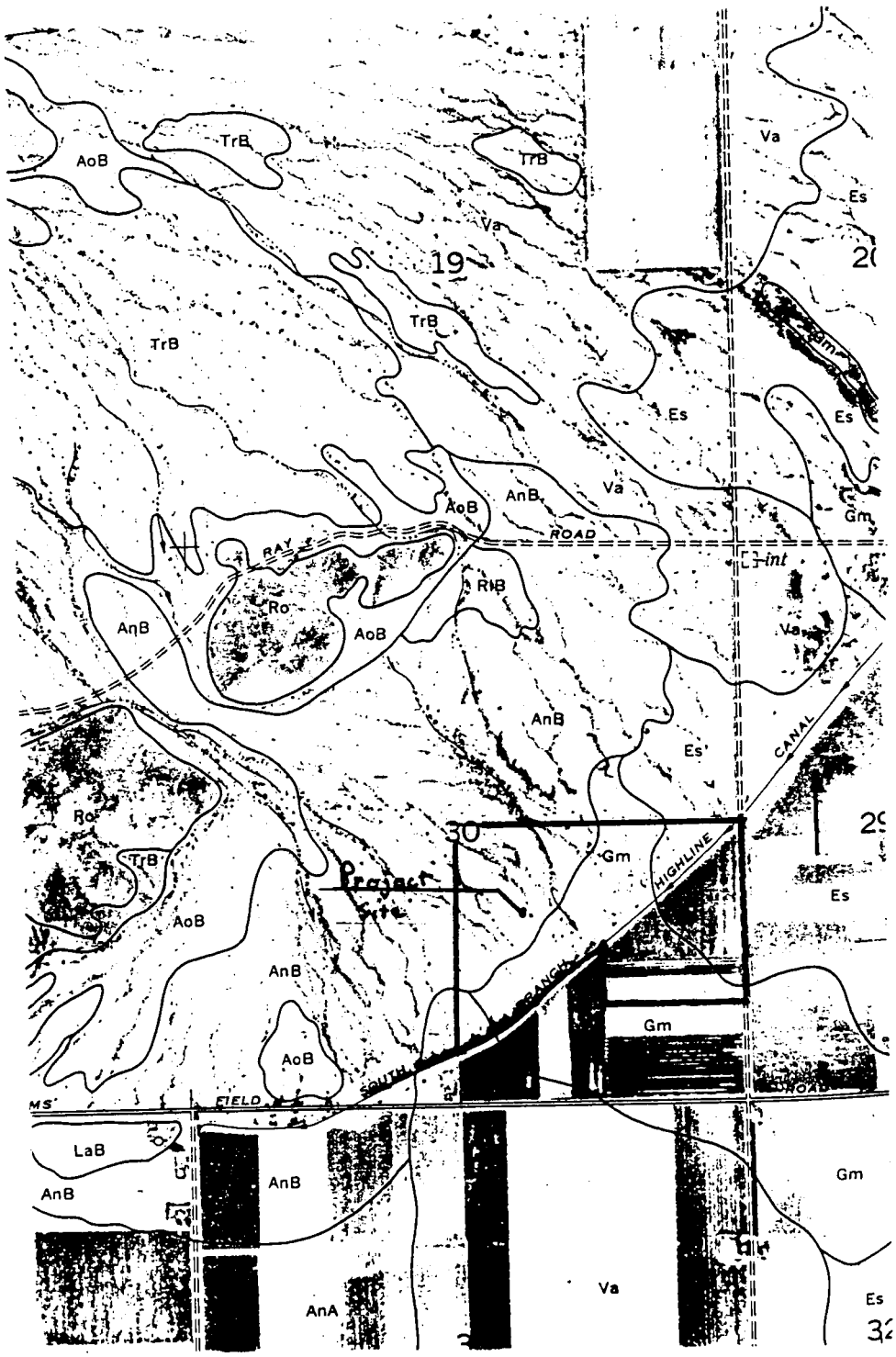
Checked by _____ Date _____

Soil Map: (from Ref. 1.)



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Project 48th & Chandler Rd
Project No. 1260-010
Sheet No. _____ of _____
Calculated by _____ Date _____
Checked by _____ Date _____

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, or C, shows the slope. Most symbols without a slope letter are those of nearly level soils, but some are for land types that have a considerable range of slope.

SYMBOL	NAME	Type
Af	Agualt fine sandy loam	
Al	Agualt loam	
Am	Alluvial land	
AnA	Antho sandy loam, 0 to 1 percent slopes	
AnB	Antho sandy loam, 1 to 3 percent slopes	B
AnB	Antho gravelly sandy loam, 1 to 3 percent slopes	
Av	Avondale clay loam	
Cg	Carrizo gravelly loamy sand	
Cf	Carrizo fine sandy loam	
Cc	Cashion clay	
CeC	Cave gravelly loam, 1 to 5 percent slopes	
Cl	Corline clay loam	
Es	Estrella loam	B
Gf	Gilman fine sandy loam	
Gl	Gilman loam	B
Gc	Glencoe clay loam	
Gr	Gravelly alluvial land	
LaA	Laveen loam, 0 to 1 percent slopes	
LaB	Laveen loam, 1 to 3 percent slopes	
LeA	Laveen clay loam, 0 to 1 percent slopes	
Ms	Mohall sandy loam	
Ml	Mohall loam	
Pm	Pimer clay loam	
PnA	Pinal gravelly loam, 0 to 1 percent slopes	
PnC	Pinal gravelly loam, 1 to 3 percent slopes	
Ps	Pinal loam, moderately deep variant	
PvA	Pinamt very gravelly loam, 0 to 1 percent slopes	
PvC	Pinamt very gravelly loam, 3 to 5 percent slopes	
RlA	Rillito gravelly loam, 0 to 1 percent slopes	
RlB	Rillito gravelly loam, 1 to 3 percent slopes	
Rc	Rock land	
Rb	Rough broken land	
TrB	Tremant gravelly loam, 1 to 3 percent slopes	
Tx	Trix clay loam	
Vs	Valencia sandy loam	
Ve	Vecont clay	
Vf	Vint loamy fine sand	

From Ref 1

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Project 48 St. & Chandler
Project No. 1260-010
Sheet No. _____ of _____
Calculated by DWD Date 7-6-90
Checked by _____ Date _____

Capacity Calculations for Diversion 309

Section: 48th St. 0.5 mi S. of Ray Rd.: half Street + road [illegible]

Assumptions

$$Q = \frac{1.486}{n} R^{2/3} S^{1/2} A \text{ , for } n = 0.025 \quad S = 0.0026$$

Elev*	Q (cfs)	Area (ft²)	WP (ft)	V (fps)
1216.[illegible]	0	0	0	—
1218.0	38	14.8	19	2.6
1[illegible]	58	26	41	2.2

* Section shown on next page

∴ Therefore the peak flow that impacts the NE corner of the site along 48th St. is ≈ 60 cfs

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Project 48th & Chandler
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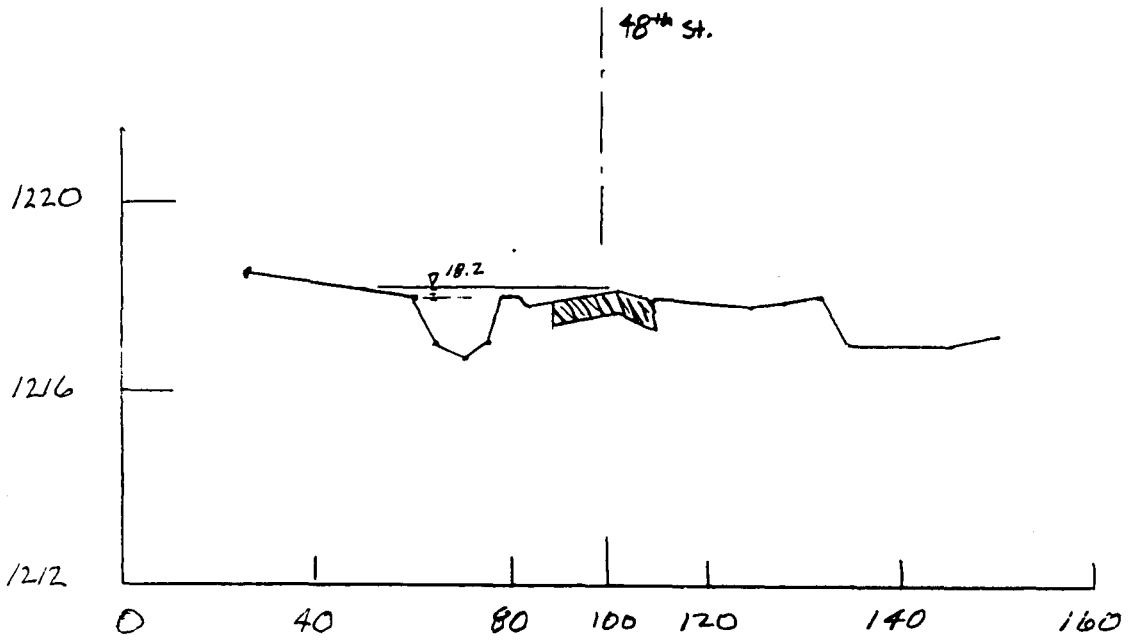


48th Street Looking North
(Approx 400' north of Highline Canal

4550 NORTH 12TH STREET • PHOENIX, ARIZONA 85014 • PHONE (602) 264-6831

EXECUTIVE CONTROL CARD OPERATION LIST

LISTING OF DATA IN CORE

J O HANDLER: EXISTING CONDITIONS

		VELOCITY INCREMENT				
1 CTABLE		0.2000				
8	0.0000	0.0800	0.1800	0.2500	0.3200
8	0.3700	0.4100	0.4500	0.4900	0.5100
8	0.5400	0.5700	0.5900	0.6100	0.6300
8	0.6500	0.6600	0.6700	0.6900	0.7000
8	0.7100	0.7200	0.7300	0.7400	0.7500
8	0.7600	0.7700	0.7700	0.7800	0.7900
8	0.7900	0.8000	0.8100	0.8100	0.8200
8	0.8200	0.8300	0.8300	0.8400	0.8400
8	0.8400	0.8500	0.8500	0.8600	0.8600
8	0.8600	0.8600	0.8700	0.8700	0.8700
8	0.8800	0.8800	0.8800	0.8900	0.8900
8	0.8900	0.8900	0.8900	0.8900	0.9000
8	0.9000	0.9000	0.9000	0.9000	0.9100
8	0.9100	0.9100	0.9100	0.9100	0.9100
8	0.9200	0.9200	0.9200	0.9200	0.9200
8	0.9200	0.9200	0.9200	0.9300	0.9300
9 ENDTBL					

	XSECTN NO.	DRAINAGE AREA
2 XSECTN	1	1.0000

	ELEVATION	DISCHARGE	END AREA
8	0.0000	0.0000	0.0000
8	1.0000	125.0000	62.0000
8	2.0000	250.0000	125.0000
9 ENDTBL			

	XSECTN NO.	DRAINAGE AREA
2 XSECTN	2	1.0000

	ELEVATION	DISCHARGE	END AREA
8	0.0000	0.0000	0.0000
8	1.0000	375.0000	186.0000
8	2.0000	750.0000	375.0000
9 ENDTBL			

	XSECTN NO.	DRAINAGE AREA
2 XSECTN	4	1.0000

	ELEVATION	DISCHARGE	END AREA
8	0.0000	0.0000	0.0000
8	1.0000	150.0000	75.0000
8	2.0000	300.0000	150.0000
9 ENDTBL			

```
        XSECTN NO.      DRAINAGE AREA
2 XSECTN     5              1.0000

                        ELEVATION   DISCHARGE    END AREA
8                          0.0000      0.0000      0.0000
8                          1.0000    350.0000    175.0000
8                          2.0000    700.0000    350.0000
9 ENDTBL

        XSECTN NO.      DRAINAGE AREA
2 XSECTN    11              1.0000

                        ELEVATION   DISCHARGE    END AREA
8                          0.0000      0.0000      0.0000
8                          1.0000     80.0000     40.0000
8                          2.0000    160.0000     80.0000
9 ENDTBL

        XSECTN NO.      DRAINAGE AREA
2 XSECTN    12              1.0000

                        ELEVATION   DISCHARGE    END AREA
8                          0.0000      0.0000      0.0000
8                          1.0000     20.0000     10.0000
8                          2.0000     40.0000     20.0000
9 ENDTBL

        XSECTN NO.      DRAINAGE AREA
2 XSECTN    50              1.0000

                        ELEVATION   DISCHARGE    END AREA
8                         30.5000      0.1000      0.1000
8                         31.0000     39.0000      8.8000
8                         32.0000     96.0000     29.0000
8                         32.5000    360.0000     94.0000
8                         33.0000    860.0000    159.0000
9 ENDTBL

        XSECTN NO.      DRAINAGE AREA
2 XSECTN    51              1.0000

                        ELEVATION   DISCHARGE    END AREA
8                         30.5000      0.1000      0.1000
8                         31.0000     15.0000      6.3000
8                         32.0000    303.0000     65.0000
8                         32.5000    603.0000    113.0000
8                         33.0000   1075.0000    161.0000
9 ENDTBL

        XSECTN NO.      DRAINAGE AREA
2 XSECTN   135              1.0000

                        ELEVATION   DISCHARGE    END AREA
8                          0.0000      0.0000      0.0000
8                          1.0000     20.0000     10.0000
8                          2.0000     40.0000     20.0000
8                          3.0000     80.0000     40.0000
9 ENDTBL
```

```
        XSECTN NO.      DRAINAGE AREA
2 XSECTN   136              1.0000

                         ELEVATION   DISCHARGE    END AREA
8                           0.0000      0.0000      0.0000
8                           1.0000    113.0000     40.0000
8                           2.0000    227.0000     80.0000
8                           3.0000    400.0000    160.0000
9 ENDTBL

        XSECTN NO.      DRAINAGE AREA
2 XSECTN   190              1.0000

                         ELEVATION   DISCHARGE    END AREA
8                           0.0000      0.0000      0.0000
8                           1.0000    450.0000    225.0000
8                           2.0000    900.0000    300.0000
8                           3.0000   1350.0000    325.0000
9 ENDTBL

        XSECTN NO.      DRAINAGE AREA
2 XSECTN   191              1.0000

                         ELEVATION   DISCHARGE    END AREA
8                           0.0000      0.0000      0.0000
8                           1.0000    835.0000    417.0000
8                           2.0000   1670.0000    557.0000
8                           3.0000   2502.0000    626.0000
9 ENDTBL

        STRUCT NO.
3 STRUCT      10

                         ELEVATION   DISCHARGE     STORAGE
8                          15.5000      0.0000      0.0000
8                          16.0000      0.1000      0.0400
8                          16.5000      0.2000      0.2200
8                          17.0000     40.0000      0.8000
8                          17.5000    671.0000      1.8400
8                          18.0000   1833.0000      3.2000
9 ENDTBL

                     TIME INCREMENT
4 DIMHYD

8              0.0000      0.0300      0.1000      0.1900      0.3100
8              0.4700      0.6600      0.8200      0.9300      0.9900
8              1.0000      0.9900      0.9300      0.8600      0.7800
8              0.6800      0.5600      0.4600      0.3900      0.3300
8              0.2800      0.2410      0.2070      0.1740      0.1470
8              0.1260      0.1070      0.0910      0.0770      0.0660
8              0.0550      0.0470      0.0400      0.0340      0.0290
8              0.0250      0.0210      0.0180      0.0150      0.0130
8              0.0110      0.0090      0.0080      0.0070      0.0060
8              0.0050      0.0040      0.0030      0.0020      0.0010
8              0.0000      0.0000      0.0000      0.0000      0.0000
9 ENDTBL

  COMPUTED PEAK K FACTOR =  484.00
```

```
                    TIME INCREMENT
5 RAINFL 1                0.5000

8              0.0000    0.0050    0.0110    0.0160    0.0220
8              0.0280    0.0350    0.0410    0.0480    0.0560
8              0.0630    0.0710    0.0800    0.0890    0.0980
8              0.1090    0.1200    0.1330    0.1470    0.1630
8              0.1310    0.2040    0.2350    0.2830    0.6630
8              0.7350    0.7720    0.7990    0.8200    0.8380
8              0.8540    0.8680    0.8800    0.8910    0.9020
8              0.9120    0.9210    0.9290    0.9370    0.9450
8              0.9520    0.9590    0.9650    0.9720    0.9780
8              0.9840    0.9890    0.9950    1.0000    1.0000
9 ENDTBL

                    TIME INCREMENT
5 RAINFL 4                0.5000

8              0.0000    0.0040    0.0080    0.0130    0.0180
8              0.0220    0.0260    0.0310    0.0350    0.0400
8              0.0440    0.0480    0.0530    0.0570    0.0620
8              0.0660    0.0710    0.0750    0.0800    0.0930
8              0.1070    0.1200    0.1400    0.1700    0.6000
8              0.8600    0.8600    0.8800    0.8930    0.9070
8              0.9200    0.9240    0.9280    0.9330    0.9370
8              0.9420    0.9470    0.9510    0.9560    0.9600
8              0.9640    0.9690    0.9730    0.9780    0.9820
8              0.9870    0.9910    0.9950    1.0000    1.0000
9 ENDTBL
```

STANDARD CONTROL INSTRUCTIONS

6	RUNOFF	1	110		5	0.4800	90.0000	0.64000	0	0	0	0	1
6	REACH	3	111	5	6	8600.0000	0.7100	0.00000	0	0	0	0	1
6	RUNOFF	1	112		5	1.2600	90.0000	0.79000	0	0	0	0	1
6	ADDHYD	4	113	5	6	7		0	0	0	0	0	1
6	REACH	3	114	7	5	3500.0000	0.7100	0.00000	0	0	0	0	1
6	RUNOFF	1	115		6	0.3460	86.0000	0.25000	0	0	0	0	1
6	ADDHYD	4	116	5	6	7		0	0	0	0	0	1
6	REACH	3	117	7	4	250.0000	0.7900	0.00000	0	0	0	0	1
6	RUNOFF	1	1		6	0.3800	90.0000	0.24000	0	0	0	0	1
6	DIVERT	6	1	6	3	1	0.0000	0.2500	2.00000	0	0	0	0	1
6	REACH	3	3	3	5	2500.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	120		6	0.4200	86.0000	0.41000	0	0	0	0	1
6	ADDHYD	4	4	5	6	7		0	0	0	0	0	1
6	DIVERT	6	4	7	6	3	0.0000	0.3000	5.00000	0	0	0	0	1
6	REACH	3	6	6	5	1000.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	7		6	0.0270	82.0000	0.16000	0	0	0	0	1
6	ADDHYD	4	8	5	6	7		0	0	0	0	0	1
6	REACH	3	9	7	5	2700.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	118		7	0.0927	84.0000	0.30000	0	0	0	0	1
6	ADDHYD	4	10	5	7	6		0	0	0	0	0	1
6	ADDHYD	4	119	4	6	7		0	0	0	0	0	1
6	REACH	3	120	7	5	750.0000	0.7900	0.00000	0	0	0	0	1
6	RUNOFF	1	121		6	0.0209	85.0000	0.23000	0	0	0	0	1
6	ADDHYD	4	122	5	6	7		0	0	0	0	0	1
6	REACH	3	123	7	2	300.0000	0.7900	0.00000	0	0	0	0	1
6	RUNOFF	1	126		6	0.0482	84.0000	0.35000	0	0	0	0	1
6	ADDHYD	4	128	2	6	7		0	0	0	0	0	1
6	REACH	3	129	7	2	600.0000	0.7600	0.00000	0	0	0	0	1
6	DIVERT	6	11	3	6	1	0.0000	0.8000	12.00000	0	0	0	0	1
6	REACH	3	13	6	5	2700.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	201		6	0.0860	82.0000	0.35000	0	0	0	0	1
6	ADDHYD	4	14	5	6	7		0	0	0	0	0	1
6	REACH	3	202	7	5	2400.0000	0.7900	0.00000	0	0	0	0	1
6	RUNOFF	1	130		6	0.0660	84.0000	0.31000	0	0	0	0	1
6	ADDHYD	4	131	5	6	7		0	0	0	0	0	1
6	REACH	3	131	7	5	850.0000	0.7900	0.00000	0	0	0	0	1
6	RUNOFF	1	132		6	0.0357	84.0000	0.27000	0	0	0	0	1
6	ADDHYD	4	133	5	6	7		0	0	0	0	0	1
6	REACH	3	134	7	5	400.0000	0.7900	0.00000	0	0	0	0	1
6	DIVERT	6	135	5	7	3	0.0000	0.1600	136.00000	0	0	0	0	1
6	REACH	3	137	7	5	1200.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	138		6	0.0407	85.0000	0.22000	0	0	0	0	1
6	ADDHYD	4	139	5	6	7		0	0	0	0	0	1
6	ADDHYD	4	140	7	2	4		0	0	0	0	0	1
6	RUNOFF	1	150		6	0.0978	84.6000	0.26000	0	0	0	0	1
6	REACH	3	151	6	5	1300.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	152		6	0.0800	85.6000	0.24000	0	0	0	0	1
6	ADDHYD	4	153	5	6	7		0	0	0	0	0	1
6	REACH	3	154	7	5	500.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	155		6	0.0188	86.5000	0.20000	0	0	0	0	1
6	ADDHYD	4	156	5	6	2		0	0	0	0	0	1
6	RUNOFF	1	160		6	0.2390	84.4000	0.37000	0	0	0	0	1
6	REACH	3	161	6	5	550.0000	0.7600	0.00000	0	0	0	0	1
6	ADDHYD	4	162	2	5	7		0	0	0	0	0	1
6	REACH	3	163	7	5	1500.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	164		6	0.0369	95.0000	0.32000	0	0	0	0	1
6	ADDHYD	4	165	6	5	7		0	0	0	0	0	1
6	ADDHYD	4	166	7	4	5		0	0	0	0	0	1
6	DIVERT	6	167	5	6	1	275.0000	0.7000	0.00000	0	0	0	0	1
6	REACH	3	181	6	2	2100.0000	0.7900	0.00000	0	0	0	0	1

6	RUNOFF	1	182		6	0.0486	85.5000	0.24000	0	0	0	0	1
6	REACH	3	183	6	5	1600.0000	0.7100	0.00000	0	0	0	0	1
6	RUNOFF	1	184		6	0.0659	84.3000	0.27000	0	0	0	0	1
6	ADDHYD	4	185	5	6 7			0	0	0	0	0	1
6	ADDHYD	4	186	7	2 6			0	0	0	0	0	1
6	REACH	3	187	6	5	1000.0000	0.7900	0.00000	0	0	0	0	1
6	RUNOFF	1	188		6	0.0334	82.8000	0.31000	0	0	0	0	1
6	ADDHYD	4	189	5	6 7			0	0	0	0	0	1
6	DIVERT	6	190	7	2 6	0.0000	0.4500	191.00000	0	0	0	0	1
6	REACH	3	192	6	5	2400.0000	0.7900	0.00000	0	0	0	0	1
6	RUNOFF	1	193		6	0.1368	95.0000	0.30000	0	0	0	0	1
6	ADDHYD	4	194	5	6 1			0	0	0	0	0	1
6	RUNOFF	1	195		6	0.0879	85.0000	0.34000	0	0	0	0	1
6	REACH	3	196	6	5	600.0000	0.7100	0.00000	0	0	0	0	1
6	RUNOFF	1	197		6	0.0564	84.1000	0.24000	0	0	0	0	1
6	ADDHYD	4	198	5	6 7			0	0	0	0	0	1
6	REACH	3	315	7	5	1400.0000	0.5400	0.00000	0	0	0	0	1
6	RUNOFF	1	199		6	0.0466	84.0000	0.31000	0	0	0	0	1
6	REACH	3	316	6	7	600.0000	0.5400	0.00000	0	0	0	0	1
6	ADDHYD	4	317	5	7 6			0	0	0	0	0	1
6	REACH	3	314	6	2	2000.0000	0.6500	0.00000	0	0	0	0	1
6	RUNOFF	1	125		1	0.0627	84.0000	0.38000	0	0	0	0	1
6	RUNOFF	1	205		6	0.0406	84.0000	0.30000	0	0	0	0	1
6	REACH	3	206	6	4	1400.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	207		6	0.0431	85.0000	0.33000	0	0	0	0	1
6	REACH	3	204	3	5	1400.0000	0.7600	0.00000	0	0	0	0	1
6	ADDHYD	4	208	5	6 7			0	0	0	0	0	1
6	ADDHYD	4	209	4	7 6			0	0	0	0	0	1
6	REACH	3	209	6	5	900.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	210		6	0.0204	85.0000	0.28000	0	0	0	0	1
6	ADDHYD	4	211	5	6 7			0	0	0	0	0	1
6	RUNOFF	1	212		5	0.0131	88.0000	0.20000	0	0	0	0	1
6	ADDHYD	4	213	7	5 6			0	0	0	0	0	1
6	SAVMOV	5	299	6	7								
6	RUNOFF	1	214		5	0.0449	85.0000	0.27000	0	0	0	0	1
6	ADDHYD	4	300	7	5 6			0	0	0	0	0	1
6	REACH	3	302	6	5	2600.0000	0.6500	0.00000	0	0	0	0	1
6	RUNOFF	1	304		7	0.5100	81.0000	0.69000	0	0	0	0	1
6	ADDHYD	4	305	7	5 6			0	0	0	0	0	1
6	REACH	3	308	6	7	2600.0000	0.7100	0.00000	0	0	0	0	1
6	RUNOFF	1	310		5	0.1250	77.0000	0.50000	0	0	0	0	1
6	ADDHYD	4	309	5	7 6			0	0	0	0	0	1
6	DIVERT	6	309	6	1 7	60.0000	0.5000	310.00000	0	0	0	0	1
6	RUNOFF	1	306		5	0.0200	77.0000	0.14000	0	0	0	0	1
6	ADDHYD	4	307	7	5 6			0	0	0	0	0	1
6	RESVOR	2	10	6	7	15.5000		0	0	0	0	0	1
6	RUNOFF	1	311		5	0.1250	77.0000	0.50000	0	0	0	0	1
6	ADDHYD	4	313	5	2 6			0	0	0	0	0	1
6	ADDHYD	4	318	1	6 7			0	0	0	0	0	1
6	REACH	3	319	7	6	2000.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	320		5	0.1700	77.0000	0.43000	0	0	0	0	1
6	ADDHYD	4	321	6	5 1			0	0	0	0	0	1
6	REACH	3	220	2	5	1000.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	221		6	0.0871	84.0000	0.27000	0	0	0	0	1
6	ADDHYD	4	222	5	6 7			0	0	0	0	0	1
6	REACH	3	223	7	5	550.0000	0.7600	0.00000	0	0	0	0	1
6	RUNOFF	1	224		6	0.0056	77.0000	0.18000	0	0	0	0	1
6	ADDHYD	4	225	5	6 7			0	0	0	0	0	1
6	REACH	3	226	7	2	2800.0000	0.7300	0.00000	0	0	0	0	1
6	RUNOFF	1	227		6	0.0396	95.0000	0.28000	0	0	0	0	1
6	REACH	3	228	6	5	1050.0000	0.7100	0.00000	0	0	0	0	1
6	RUNOFF	1	229		6	0.0193	88.0000	0.20000	0	0	0	0	1
6	ADDHYD	4	230	5	6 7			0	0	0	0	0	1
6	REACH	3	231	7	5	1800.0000	0.7100	0.00000	0	0	0	0	1

```
6 ADDHYD 4 232   5 2 3                                  0 0 0 0 0 1
6 RUNOFF 1 240       6       0.0584     85.0000     0.25000 0 0 0 0 1
6 REACH  3 241   6   5     800.0000      0.7100     0.00000 0 0 0 0 1
6 RUNOFF 1 242       6       0.0466     84.7000     0.18000 0 0 0 0 1
6 ADDHYD 4 243   5 6 7                                  0 0 0 0 0 1
6 REACH  3 244   7   5    1100.0000      0.7100     0.00000 0 0 0 0 1
6 RUNOFF 1 245       6       0.0896     81.8000     0.38000 0 0 0 0 1
6 ADDHYD 4 246   5 6 7                                  0 0 0 0 0 1
6 ADDHYD 4 247   7 3 2                                  0 0 0 0 0 1
6 RUNOFF 1 250       6       0.0674     84.7000     0.12000 0 0 0 0 1
6 REACH  3 251   6   5     350.0000      0.7100     0.00000 0 0 0 0 1
6 RUNOFF 1 252       6       0.0325     84.6000     0.20000 0 0 0 0 1
6 ADDHYD 4 253   5 6 7                                  0 0 0 0 0 1
6 RUNOFF 1 254       6       0.0977     85.0000     0.23000 0 0 0 0 1
6 REACH  3 255   6   5     700.0000      0.7100     0.00000 0 0 0 0 1
6 ADDHYD 4 256   5 7 6                                  0 0 0 0 0 1
6 ADDHYD 4 260   6 2 1                                  0 0 0 0 0 1
  ENDATA


END OF LISTING
```

```
                                                                                                PASS=  1
EXECUTIVE CONTROL CARD          OPERATION  INCREM,     MAIN TIME INCREMENT=  0.20
EXECUTIVE CONTROL CARD          OPERATION  COMPUT,     FROM XSECTN/STRUCT 110/  0     TO XSECTN/STRUCT 260/  0
      STARTING TIME=  0.00     RAIN DEPTH=  2.53     RAIN DURATION=  1.00     RAIN TABLE NO.= 1     SOIL CONDITION= 2
      ALTERNATE NO.= 1         STORM NO.= 1


 ENDCMP
```

```
                                                                                                PASS=  2
EXECUTIVE CONTROL CARD          OPERATION  COMPUT,     FROM XSECTN/STRUCT 110/  0     TO XSECTN/STRUCT 260/  0
      STARTING TIME=  0.00     RAIN DEPTH=  4.00     RAIN DURATION=  1.00     RAIN TABLE NO.= 1     SOIL CONDITION= 2
      ALTERNATE NO.= 1         STORM NO.= 2


  ENDCMP
```

SUMMARY TABLE 1

O	ALT	STORM	ID	DA SQ-MI.	RAIN TBLE	AMC	DELTA-T HRS.	TZERO HRS.	PRECIP IN.	PRECIP DURATION	PEAK-Q CFS	PEAK-TIME	PEAK-ELEV	RUNOFF IN.	CSM
	1	1	110	0.48	1	2	0.20	0.00	2.53	24.00	306.01	12.22	0.00	1.57	637.53
	1	1	111	0.48	1	2	0.20	0.00	2.53	24.00	256.45	12.77	0.00	1.57	534.26
	1	1	112	1.26	1	2	0.20	0.00	2.53	24.00	699.78	12.30	0.00	1.57	555.38
	1	1	113	1.74	1	2	0.20	0.00	2.53	24.00	840.46	12.42	0.00	1.57	483.03
	1	1	114	1.74	1	2	0.20	0.00	2.53	24.00	803.13	12.66	0.00	1.57	461.57
	1	1	115	0.35	1	2	0.20	0.00	2.53	24.00	254.20	11.98	0.00	1.27	734.70
	1	1	116	2.09	1	2	0.20	0.00	2.53	24.00	854.95	12.63	0.00	1.52	409.85
	1	1	117	2.09	1	2	0.20	0.00	2.53	24.00	852.01	12.64	0.00	1.52	408.44
	1	1	1	0.38	1	2	0.20	0.00	2.53	24.00	344.09	11.97	0.00	1.57	905.49
	1	1	1	0.09	1	2	0.20	0.00	2.53	24.00	86.02	11.97	0.00	1.57	905.49
	1	1	3	0.09	1	2	0.20	0.00	2.53	24.00	74.85	12.07	0.00	1.57	787.88
	1	1	120	0.42	1	2	0.20	0.00	2.53	24.00	257.73	12.09	0.00	1.27	613.63
	1	1	4	0.51	1	2	0.20	0.00	2.53	24.00	332.33	12.09	2.22	1.33	645.30
	1	1	4	0.15	1	2	0.20	0.00	2.53	24.00	99.70	12.09	0.00	1.33	645.30
	1	1	6	0.15	1	2	0.20	0.00	2.53	24.00	95.05	12.13	0.00	1.33	615.20
	1	1	7	0.03	1	2	0.20	0.00	2.53	24.00	17.71	11.96	0.00	1.00	655.82
	1	1	8	0.18	1	2	0.20	0.00	2.53	24.00	108.14	12.08	0.00	1.28	595.80
	1	1	9	0.18	1	2	0.20	0.00	2.53	24.00	99.03	12.23	0.00	1.28	545.59
	1	1	118	0.09	1	2	0.20	0.00	2.53	24.00	56.80	12.02	0.00	1.14	612.76
	1	1	10	0.27	1	2	0.20	0.00	2.53	24.00	143.28	12.15	0.00	1.23	522.53
	1	1	119	2.36	1	2	0.20	0.00	2.53	24.00	921.41	12.59	0.00	1.49	390.39
	1	1	120	2.36	1	2	0.20	0.00	2.53	24.00	914.33	12.61	0.00	1.49	387.40
	1	1	121	0.02	1	2	0.20	0.00	2.53	24.00	14.81	11.98	0.00	1.20	708.59
	1	1	122	2.38	1	2	0.20	0.00	2.53	24.00	917.45	12.61	0.00	1.48	385.30
	1	1	123	2.38	1	2	0.20	0.00	2.53	24.00	914.56	12.62	0.00	1.48	384.09
	1	1	126	0.05	1	2	0.20	0.00	2.53	24.00	28.12	12.06	0.00	1.14	583.39
	1	1	128	2.43	1	2	0.20	0.00	2.53	24.00	922.82	12.61	0.00	1.48	379.87
	1	1	129	2.43	1	2	0.20	0.00	2.53	24.00	916.64	12.63	0.00	1.48	377.33
	1	1	11	0.29	1	2	0.20	0.00	2.53	24.00	186.11	12.09	0.00	1.33	645.30
	1	1	13	0.29	1	2	0.20	0.00	2.53	24.00	170.59	12.22	0.00	1.32	591.50
	1	1	201	0.09	1	2	0.20	0.00	2.53	24.00	44.29	12.06	0.00	1.02	515.04
	1	1	14	0.37	1	2	0.20	0.00	2.53	24.00	209.00	12.19	0.00	1.25	558.23
	1	1	202	0.37	1	2	0.20	0.00	2.53	24.00	194.63	12.28	0.00	1.25	519.86
	1	1	130	0.07	1	2	0.20	0.00	2.53	24.00	40.05	12.03	0.00	1.14	606.80
	1	1	131	0.44	1	2	0.20	0.00	2.53	24.00	222.04	12.24	0.00	1.24	504.17
	1	1	131	0.44	1	2	0.20	0.00	2.53	24.00	216.54	12.26	0.00	1.24	491.68
	1	1	132	0.04	1	2	0.20	0.00	2.53	24.00	22.72	12.00	0.00	1.14	636.49
	1	1	133	0.48	1	2	0.20	0.00	2.53	24.00	229.75	12.24	0.00	1.23	482.57
	1	1	134	0.48	1	2	0.20	0.00	2.53	24.00	227.23	12.25	0.00	1.23	477.28
	1	1	135	0.08	1	2	0.20	0.00	2.53	24.00	34.06	12.25	0.00	1.15	447.18
	1	1	137	0.08	1	2	0.20	0.00	2.53	24.00	32.57	12.30	0.00	1.15	427.61
	1	1	138	0.04	1	2	0.20	0.00	2.53	24.00	29.29	11.97	0.00	1.19	719.54
	1	1	139	0.12	1	2	0.20	0.00	2.53	24.00	52.59	12.06	0.00	1.17	449.94
	1	1	140	2.55	1	2	0.20	0.00	2.53	24.00	947.25	12.61	0.00	1.46	372.03
	1	1	150	0.10	1	2	0.20	0.00	2.53	24.00	65.32	11.99	0.00	1.17	667.86
	1	1	151	0.10	1	2	0.20	0.00	2.53	24.00	60.06	12.04	0.00	1.17	614.15
	1	1	152	0.08	1	2	0.20	0.00	2.53	24.00	57.86	11.98	0.00	1.24	723.25
	1	1	153	0.18	1	2	0.20	0.00	2.53	24.00	117.21	12.01	0.00	1.20	659.21
	1	1	154	0.18	1	2	0.20	0.00	2.53	24.00	113.46	12.02	0.00	1.20	638.15
	1	1	155	0.02	1	2	0.20	0.00	2.53	24.00	15.09	11.96	0.00	1.29	802.48
	1	1	156	0.20	1	2	0.20	0.00	2.53	24.00	128.09	12.01	0.00	1.21	651.51
	1	1	160	0.24	1	2	0.20	0.00	2.53	24.00	139.07	12.07	0.00	1.17	581.87
	1	1	161	0.24	1	2	0.20	0.00	2.53	24.00	134.71	12.09	0.00	1.17	563.62
	1	1	162	0.44	1	2	0.20	0.00	2.53	24.00	259.99	12.05	0.00	1.19	596.86
	1	1	163	0.44	1	2	0.20	0.00	2.53	24.00	235.49	12.11	0.00	1.19	540.62
	1	1	164	0.04	1	2	0.20	0.00	2.53	24.00	38.18	12.00	0.00	2.04	1034.60
	1	1	165	0.47	1	2	0.20	0.00	2.53	24.00	273.50	12.09	0.00	1.25	578.83
	1	1	166	3.02	1	2	0.20	0.00	2.53	24.00	1054.40	12.39	0.00	1.43	349.29
	1	1	167	2.11	1	2	0.20	0.00	2.53	24.00	279.64	13.90	0.00	1.26	132.34
	1	1	181	2.11	1	2	0.20	0.00	2.53	24.00	277.87	13.90	0.00	1.26	131.50
	1	1	182	0.05	1	2	0.20	0.00	2.53	24.00	34.96	11.98	0.00	1.23	719.29

1	1	183	0.05	1	2	0.20	0.00	2.53	24.00	30.54	12.05	0.00	1.23	628.38
1	1	184	0.07	1	2	0.20	0.00	2.53	24.00	42.68	12.00	0.00	1.16	647.71
1	1	185	0.11	1	2	0.20	0.00	2.53	24.00	72.86	12.02	0.00	1.19	636.29
1	1	186	2.23	1	2	0.20	0.00	2.53	24.00	349.44	12.06	0.00	1.25	156.87
1	1	187	2.23	1	2	0.20	0.00	2.53	24.00	343.41	12.09	0.00	1.25	154.16
1	1	188	0.03	1	2	0.20	0.00	2.53	24.00	18.84	12.03	0.00	1.07	564.17
1	1	189	2.26	1	2	0.20	0.00	2.53	24.00	361.85	12.08	0.00	1.25	160.04
1	1	190	1.02	1	2	0.20	0.00	2.53	24.00	126.72	12.08	0.00	0.97	124.55
1	1	192	1.24	1	2	0.20	0.00	2.53	24.00	226.87	12.22	0.00	1.48	182.44
1	1	193	0.14	1	2	0.20	0.00	2.53	24.00	144.10	11.99	0.00	2.04	1053.34
1	1	194	1.38	1	2	0.20	0.00	2.53	24.00	355.94	12.06	0.00	1.53	257.86
1	1	195	0.09	1	2	0.20	0.00	2.53	24.00	54.81	12.05	0.00	1.21	623.57
1	1	196	0.09	1	2	0.20	0.00	2.53	24.00	52.47	12.07	0.00	1.21	596.98
1	1	197	0.06	1	2	0.20	0.00	2.53	24.00	37.50	11.99	0.00	1.14	664.95
1	1	198	0.14	1	2	0.20	0.00	2.53	24.00	88.76	12.03	0.00	1.18	615.14
1	1	315	0.14	1	2	0.20	0.00	2.53	24.00	72.70	12.21	0.00	1.18	503.82
1	1	199	0.05	1	2	0.20	0.00	2.53	24.00	28.28	12.03	0.00	1.14	606.80
1	1	316	0.05	1	2	0.20	0.00	2.53	24.00	25.70	12.08	0.00	1.14	551.57
1	1	317	0.19	1	2	0.20	0.00	2.53	24.00	96.41	12.18	0.00	1.17	505.01
1	1	314	0.19	1	2	0.20	0.00	2.53	24.00	85.84	12.34	0.00	1.17	449.68
1	1	125	0.06	1	2	0.20	0.00	2.53	24.00	35.25	12.08	0.00	1.14	562.15
1	1	205	0.04	1	2	0.20	0.00	2.53	24.00	24.88	12.02	0.00	1.14	612.76
1	1	206	0.04	1	2	0.20	0.00	2.53	24.00	22.79	12.07	0.00	1.14	561.22
1	1	207	0.04	1	2	0.20	0.00	2.53	24.00	27.16	12.04	0.00	1.21	630.08
1	1	204	0.40	1	2	0.20	0.00	2.53	24.00	184.08	12.32	0.00	1.24	460.28
1	1	208	0.44	1	2	0.20	0.00	2.53	24.00	203.28	12.27	0.00	1.24	458.85
1	1	209	0.48	1	2	0.20	0.00	2.53	24.00	221.85	12.25	0.00	1.23	458.72
1	1	209	0.48	1	2	0.20	0.00	2.53	24.00	216.55	12.28	0.00	1.23	447.76
1	1	210	0.02	1	2	0.20	0.00	2.53	24.00	13.67	12.01	0.00	1.20	669.93
1	1	211	0.50	1	2	0.20	0.00	2.53	24.00	224.12	12.27	0.00	1.23	444.67
1	1	212	0.01	1	2	0.20	0.00	2.53	24.00	11.34	11.96	0.00	1.40	865.64
1	1	213	0.52	1	2	0.20	0.00	2.53	24.00	227.76	12.26	0.00	1.23	440.43
1	1	214	0.04	1	2	0.20	0.00	2.53	24.00	30.27	12.00	0.00	1.20	674.24
1	1	300	0.56	1	2	0.20	0.00	2.53	24.00	245.79	12.22	55.96	1.23	437.33
1	1	302	0.56	1	2	0.20	0.00	2.53	24.00	227.83	12.46	0.00	1.23	405.37
1	1	304	0.51	1	2	0.20	0.00	2.53	24.00	182.44	12.28	0.00	0.96	357.73
1	1	305	1.07	1	2	0.20	0.00	2.53	24.00	397.52	12.38	0.00	1.10	370.82
1	1	308	1.07	1	2	0.20	0.00	2.53	24.00	375.41	12.56	0.00	1.10	350.19
1	1	310	0.13	1	2	0.20	0.00	2.53	24.00	40.32	12.19	0.00	0.76	322.55
1	1	309	1.20	1	2	0.20	0.00	2.53	24.00	397.54	12.53	0.00	1.07	332.11
1	1	309	0.60	1	2	0.20	0.00	2.53	24.00	60.34	14.30	0.00	1.18	100.82
1	1	306	0.02	1	2	0.20	0.00	2.53	24.00	9.95	11.97	0.00	0.75	497.52
1	1	307	0.62	1	2	0.20	0.00	2.53	24.00	339.53	12.52	0.00	0.95	548.95
1	1	-10	0.62	1	2	0.20	0.00	2.53	24.00	353.07	12.58	17.25	0.97	570.84
1	1	311	0.13	1	2	0.20	0.00	2.53	24.00	40.32	12.19	0.00	0.76	322.55
1	1	313	0.32	1	2	0.20	0.00	2.53	24.00	123.47	12.27	0.00	1.01	390.87
1	1	318	0.91	1	2	0.20	0.00	2.53	24.00	183.47	12.27	0.00	1.12	200.65
1	1	319	0.91	1	2	0.20	0.00	2.53	24.00	175.86	12.39	0.00	1.12	192.32
1	1	320	0.17	1	2	0.20	0.00	2.53	24.00	57.50	12.16	0.00	0.76	338.26
1	1	321	1.08	1	2	0.20	0.00	2.53	24.00	223.02	12.28	0.00	1.06	205.66
1	1	220	0.19	1	2	0.20	0.00	2.53	24.00	83.96	12.39	0.00	1.17	439.79
1	1	221	0.09	1	2	0.20	0.00	2.53	24.00	55.44	12.00	0.00	1.14	636.49
1	1	222	0.28	1	2	0.20	0.00	2.53	24.00	110.97	12.21	0.00	1.16	399.17
1	1	223	0.28	1	2	0.20	0.00	2.53	24.00	110.02	12.24	0.00	1.16	395.75
1	1	224	0.01	1	2	0.20	0.00	2.53	24.00	2.61	11.98	0.00	0.75	465.57
1	1	225	0.28	1	2	0.20	0.00	2.53	24.00	110.94	12.23	0.00	1.15	391.18
1	1	226	0.28	1	2	0.20	0.00	2.53	24.00	105.93	12.42	0.00	1.15	373.51
1	1	227	0.04	1	2	0.20	0.00	2.53	24.00	42.79	11.97	0.00	2.04	1080.66
1	1	228	0.04	1	2	0.20	0.00	2.53	24.00	40.09	12.02	0.00	2.04	1012.41
1	1	229	0.02	1	2	0.20	0.00	2.53	24.00	16.71	11.96	0.00	1.40	865.64
1	1	230	0.06	1	2	0.20	0.00	2.53	24.00	56.41	11.99	0.00	1.83	957.67
1	1	231	0.06	1	2	0.20	0.00	2.53	24.00	49.38	12.09	0.00	1.83	838.37
1	1	232	0.34	1	2	0.20	0.00	2.53	24.00	143.65	12.27	0.00	1.27	419.40
1	1	240	0.06	1	2	0.20	0.00	2.53	24.00	40.60	11.99	0.00	1.20	695.27

1	1	241	0.06	1	2	0.20	0.00	2.53	24.00	38.08	12.02	0.00	1.20	652.04
1	1	242	0.05	1	2	0.20	0.00	2.53	24.00	34.76	11.96	0.00	1.17	745.89
1	1	243	0.10	1	2	0.20	0.00	2.53	24.00	72.28	11.98	0.00	1.18	688.33
1	1	244	0.10	1	2	0.20	0.00	2.53	24.00	65.71	12.02	0.00	1.19	625.77
1	1	245	0.09	1	2	0.20	0.00	2.53	24.00	43.87	12.09	0.00	1.01	489.61
1	1	246	0.19	1	2	0.20	0.00	2.53	24.00	108.79	12.05	0.00	1.11	559.05
1	1	247	0.54	1	2	0.20	0.00	2.53	24.00	233.10	12.15	0.00	1.21	434.00
1	1	250	0.07	1	2	0.20	0.00	2.53	24.00	53.57	11.94	0.00	1.17	794.85
1	1	251	0.07	1	2	0.20	0.00	2.53	24.00	52.15	11.95	0.00	1.17	773.73
1	1	252	0.03	1	2	0.20	0.00	2.53	24.00	23.57	11.97	0.00	1.16	725.24
1	1	253	0.10	1	2	0.20	0.00	2.53	24.00	75.68	11.95	0.00	1.17	757.52
1	1	254	0.10	1	2	0.20	0.00	2.53	24.00	69.23	11.98	0.00	1.20	708.59
1	1	255	0.10	1	2	0.20	0.00	2.53	24.00	65.50	12.00	0.00	1.20	670.42
1	1	256	0.20	1	2	0.20	0.00	2.53	24.00	140.46	11.97	0.00	1.18	710.81
1	1	260	0.73	1	2	0.20	0.00	2.53	24.00	359.94	12.05	0.00	1.20	489.92
1	2	110	0.48	1	2	0.20	0.00	4.00	24.00	569.06	12.21	0.00	2.97	1185.53
1	2	111	0.48	1	2	0.20	0.00	4.00	24.00	477.64	12.75	0.00	2.96	995.08
1	2	112	1.26	1	2	0.20	0.00	4.00	24.00	1324.52	12.29	0.00	2.96	1051.21
1	2	113	1.74	1	2	0.20	0.00	4.00	24.00	1569.11	12.40	0.00	2.96	901.79
1	2	114	1.74	1	2	0.20	0.00	4.00	24.00	1499.80	12.64	0.00	2.96	861.95
1	2	115	0.35	1	2	0.20	0.00	4.00	24.00	508.39	11.97	0.00	2.57	1469.35
1	2	116	2.09	1	2	0.20	0.00	4.00	24.00	1598.49	12.61	0.00	2.90	766.29
1	2	117	2.09	1	2	0.20	0.00	4.00	24.00	1593.30	12.62	0.00	2.90	763.81
1	2	1	0.38	1	2	0.20	0.00	4.00	24.00	632.71	11.96	0.00	2.97	1665.03
1	2	1	0.09	1	2	0.20	0.00	4.00	24.00	158.18	11.96	0.00	2.97	1665.03
1	2	3	0.09	1	2	0.20	0.00	4.00	24.00	139.46	12.06	0.00	2.96	1468.05
1	2	120	0.42	1	2	0.20	0.00	4.00	24.00	522.64	12.07	0.00	2.58	1244.37
1	2	4	0.51	1	2	0.20	0.00	4.00	24.00	661.90	12.07	4.41	2.65	1285.24
1	2	4	0.15	1	2	0.20	0.00	4.00	24.00	198.57	12.07	0.00	2.65	1285.24
1	2	6	0.15	1	2	0.20	0.00	4.00	24.00	188.07	12.11	0.00	2.65	1217.29
1	2	7	0.03	1	2	0.20	0.00	4.00	24.00	38.01	11.94	0.00	2.18	1407.87
1	2	8	0.18	1	2	0.20	0.00	4.00	24.00	218.73	12.06	0.00	2.58	1205.11
1	2	9	0.18	1	2	0.20	0.00	4.00	24.00	199.44	12.21	0.00	2.58	1098.87
1	2	118	0.09	1	2	0.20	0.00	4.00	24.00	119.68	12.00	0.00	2.40	1290.99
1	2	10	0.27	1	2	0.20	0.00	4.00	24.00	293.03	12.12	0.00	2.52	1068.68
1	2	119	2.36	1	2	0.20	0.00	4.00	24.00	1731.96	12.57	0.00	2.85	733.82
1	2	120	2.36	1	2	0.20	0.00	4.00	24.00	1720.32	12.58	0.00	2.85	728.89
1	2	121	0.02	1	2	0.20	0.00	4.00	24.00	30.20	11.96	0.00	2.47	1444.79
1	2	122	2.38	1	2	0.20	0.00	4.00	24.00	1726.41	12.58	0.00	2.85	725.05
1	2	123	2.38	1	2	0.20	0.00	4.00	24.00	1721.65	12.59	0.00	2.85	723.05
1	2	126	0.05	1	2	0.20	0.00	4.00	24.00	59.54	12.04	0.00	2.40	1235.27
1	2	128	2.43	1	2	0.20	0.00	4.00	24.00	1738.56	12.58	0.00	2.84	715.66
1	2	129	2.43	1	2	0.20	0.00	4.00	24.00	1728.50	12.60	0.00	2.84	711.52
1	2	11	0.29	1	2	0.20	0.00	4.00	24.00	370.66	12.07	0.00	2.65	1285.24
1	2	13	0.29	1	2	0.20	0.00	4.00	24.00	339.03	12.20	0.00	2.64	1175.57
1	2	201	0.09	1	2	0.20	0.00	4.00	24.00	98.52	12.04	0.00	2.23	1145.59
1	2	14	0.37	1	2	0.20	0.00	4.00	24.00	422.75	12.17	0.00	2.55	1129.14
1	2	202	0.37	1	2	0.20	0.00	4.00	24.00	396.59	12.25	0.00	2.54	1059.27
1	2	130	0.07	1	2	0.20	0.00	4.00	24.00	84.47	12.01	0.00	2.40	1279.78
1	2	131	0.44	1	2	0.20	0.00	4.00	24.00	454.31	12.22	0.00	2.52	1031.57
1	2	131	0.44	1	2	0.20	0.00	4.00	24.00	443.85	12.24	0.00	2.52	1007.83
1	2	132	0.04	1	2	0.20	0.00	4.00	24.00	47.68	11.99	0.00	2.40	1335.70
1	2	133	0.48	1	2	0.20	0.00	4.00	24.00	471.82	12.22	0.00	2.51	991.01
1	2	134	0.48	1	2	0.20	0.00	4.00	24.00	467.00	12.23	0.00	2.51	980.88
1	2	135	0.08	1	2	0.20	0.00	4.00	24.00	77.56	12.23	0.00	2.43	1018.15
1	2	137	0.08	1	2	0.20	0.00	4.00	24.00	74.67	12.28	0.00	2.43	980.17
1	2	138	0.04	1	2	0.20	0.00	4.00	24.00	59.61	11.96	0.00	2.47	1464.55
1	2	139	0.12	1	2	0.20	0.00	4.00	24.00	113.40	12.06	0.00	2.44	970.27
1	2	140	2.55	1	2	0.20	0.00	4.00	24.00	1793.76	12.57	0.00	2.82	704.49
1	2	150	0.10	1	2	0.20	0.00	4.00	24.00	135.02	11.98	0.00	2.45	1380.56
1	2	151	0.10	1	2	0.20	0.00	4.00	24.00	125.56	12.02	0.00	2.44	1283.80
1	2	152	0.08	1	2	0.20	0.00	4.00	24.00	116.61	11.97	0.00	2.53	1457.63
1	2	153	0.18	1	2	0.20	0.00	4.00	24.00	240.76	11.99	0.00	2.48	1354.13
1	2	154	0.18	1	2	0.20	0.00	4.00	24.00	233.86	12.01	0.00	2.48	1315.29

1	2	155	0.02	1	2	0.20	0.00	4.00	24.00	29.63	11.95	0.00	2.60	1575.93
1	2	156	0.20	1	2	0.20	0.00	4.00	24.00	262.63	12.00	0.00	2.49	1335.87
1	2	160	0.24	1	2	0.20	0.00	4.00	24.00	292.14	12.05	0.00	2.44	1222.36
1	2	161	0.24	1	2	0.20	0.00	4.00	24.00	283.51	12.07	0.00	2.43	1186.24
1	2	162	0.44	1	2	0.20	0.00	4.00	24.00	541.59	12.03	0.00	2.46	1243.32
1	2	163	0.44	1	2	0.20	0.00	4.00	24.00	498.49	12.09	0.00	2.46	1144.36
1	2	164	0.04	1	2	0.20	0.00	4.00	24.00	64.07	11.99	0.00	3.54	1736.18
1	2	165	0.47	1	2	0.20	0.00	4.00	24.00	559.12	12.08	0.00	2.54	1183.33
1	2	166	3.02	1	2	0.20	0.00	4.00	24.00	2116.14	12.26	0.00	2.78	701.02
1	2	167	2.11	1	2	0.20	0.00	4.00	24.00	275.76	14.70	0.00	1.93	130.50
1	2	181	2.11	1	2	0.20	0.00	4.00	24.00	275.47	14.70	0.00	1.93	130.37
1	2	182	0.05	1	2	0.20	0.00	4.00	24.00	70.61	11.97	0.00	2.52	1452.83
1	2	183	0.05	1	2	0.20	0.00	4.00	24.00	62.74	12.04	0.00	2.52	1290.90
1	2	184	0.07	1	2	0.20	0.00	4.00	24.00	88.96	11.99	0.00	2.42	1349.87
1	2	185	0.11	1	2	0.20	0.00	4.00	24.00	150.90	12.01	0.00	2.46	1317.91
1	2	186	2.23	1	2	0.20	0.00	4.00	24.00	425.90	12.01	0.00	1.95	191.20
1	2	187	2.23	1	2	0.20	0.00	4.00	24.00	418.52	12.03	0.00	1.95	187.88
1	2	188	0.03	1	2	0.20	0.00	4.00	24.00	40.90	12.01	0.00	2.29	1224.67
1	2	189	2.26	1	2	0.20	0.00	4.00	24.00	459.34	12.03	0.00	1.96	203.16
1	2	190	1.02	1	2	0.20	0.00	4.00	24.00	160.86	12.03	0.00	1.52	158.10
1	2	192	1.24	1	2	0.20	0.00	4.00	24.00	285.82	12.13	0.00	2.31	229.85
1	2	193	0.14	1	2	0.20	0.00	4.00	24.00	241.68	11.98	0.00	3.53	1766.64
1	2	194	1.38	1	2	0.20	0.00	4.00	24.00	519.25	12.02	0.00	2.43	376.17
1	2	195	0.09	1	2	0.20	0.00	4.00	24.00	113.26	12.03	0.00	2.49	1288.56
1	2	196	0.09	1	2	0.20	0.00	4.00	24.00	108.83	12.05	0.00	2.49	1238.09
1	2	197	0.06	1	2	0.20	0.00	4.00	24.00	78.15	11.97	0.00	2.39	1385.62
1	2	198	0.14	1	2	0.20	0.00	4.00	24.00	184.68	12.01	0.00	2.45	1279.82
1	2	315	0.14	1	2	0.20	0.00	4.00	24.00	151.77	12.19	0.00	2.44	1051.78
1	2	199	0.05	1	2	0.20	0.00	4.00	24.00	59.64	12.01	0.00	2.40	1279.78
1	2	316	0.05	1	2	0.20	0.00	4.00	24.00	54.72	12.06	0.00	2.39	1174.17
1	2	317	0.19	1	2	0.20	0.00	4.00	24.00	201.65	12.15	0.00	2.43	1056.33
1	2	314	0.19	1	2	0.20	0.00	4.00	24.00	180.19	12.32	0.00	2.43	943.90
1	2	125	0.06	1	2	0.20	0.00	4.00	24.00	74.79	12.06	0.00	2.40	1192.81
1	2	205	0.04	1	2	0.20	0.00	4.00	24.00	52.41	12.00	0.00	2.40	1290.99
1	2	206	0.04	1	2	0.20	0.00	4.00	24.00	48.50	12.05	0.00	2.39	1194.49
1	2	207	0.04	1	2	0.20	0.00	4.00	24.00	56.08	12.02	0.00	2.49	1301.11
1	2	204	0.40	1	2	0.20	0.00	4.00	24.00	375.48	12.29	0.00	2.53	938.88
1	2	208	0.44	1	2	0.20	0.00	4.00	24.00	412.66	12.25	0.00	2.52	931.47
1	2	209	0.48	1	2	0.20	0.00	4.00	24.00	452.13	12.22	0.00	2.51	934.87
1	2	209	0.48	1	2	0.20	0.00	4.00	24.00	442.28	12.26	0.00	2.51	914.51
1	2	210	0.02	1	2	0.20	0.00	4.00	24.00	28.06	11.99	0.00	2.49	1375.40
1	2	211	0.50	1	2	0.20	0.00	4.00	24.00	458.22	12.24	0.00	2.51	909.12
1	2	212	0.01	1	2	0.20	0.00	4.00	24.00	21.60	11.94	0.00	2.74	1648.50
1	2	213	0.52	1	2	0.20	0.00	4.00	24.00	465.61	12.23	0.00	2.52	900.39
1	2	214	0.04	1	2	0.20	0.00	4.00	24.00	62.09	11.98	0.00	2.49	1382.96
1	2	300	0.56	1	2	0.20	0.00	4.00	24.00	503.76	12.19	56.73	2.51	896.33
1	2	302	0.56	1	2	0.20	0.00	4.00	24.00	466.96	12.43	0.00	2.51	830.85
1	2	304	0.51	1	2	0.20	0.00	4.00	24.00	421.16	12.26	0.00	2.13	825.81
1	2	305	1.07	1	2	0.20	0.00	4.00	24.00	857.61	12.33	0.00	2.33	799.99
1	2	308	1.07	1	2	0.20	0.00	4.00	24.00	809.63	12.51	0.00	2.33	755.24
1	2	310	0.13	1	2	0.20	0.00	4.00	24.00	102.59	12.16	0.00	1.81	820.73
1	2	309	1.20	1	2	0.20	0.00	4.00	24.00	876.09	12.48	0.00	2.28	731.89
1	2	309	0.60	1	2	0.20	0.00	4.00	24.00	60.17	16.70	0.00	1.82	100.53
1	2	306	0.02	1	2	0.20	0.00	4.00	24.00	23.99	11.95	0.00	1.78	1199.41
1	2	307	0.62	1	2	0.20	0.00	4.00	24.00	820.59	12.48	0.00	2.70	1326.72
1	2	-10	0.62	1	2	0.20	0.00	4.00	24.00	824.71	12.48	17.57	2.69	1333.38
1	2	311	0.13	1	2	0.20	0.00	4.00	24.00	102.59	12.16	0.00	1.81	820.73
1	2	313	0.32	1	2	0.20	0.00	4.00	24.00	277.18	12.25	0.00	2.19	877.45
1	2	318	0.91	1	2	0.20	0.00	4.00	24.00	337.18	12.25	0.00	1.95	368.75
1	2	319	0.91	1	2	0.20	0.00	4.00	24.00	318.51	12.35	0.00	1.95	348.32
1	2	320	0.17	1	2	0.20	0.00	4.00	24.00	145.38	12.12	0.00	1.82	855.19
1	2	321	1.08	1	2	0.20	0.00	4.00	24.00	443.44	12.24	0.00	1.93	408.92
1	2	220	0.19	1	2	0.20	0.00	4.00	24.00	176.27	12.36	0.00	2.43	923.38
1	2	221	0.09	1	2	0.20	0.00	4.00	24.00	116.34	11.99	0.00	2.40	1335.70

1	2	222	0.28	1	2	0.20	0.00	4.00	24.00	235.08	12.19	0.00	2.42	845.63
1	2	223	0.28	1	2	0.20	0.00	4.00	24.00	233.04	12.21	0.00	2.42	838.27
1	2	224	0.01	1	2	0.20	0.00	4.00	24.00	6.40	11.96	0.00	1.78	1142.05
1	2	225	0.28	1	2	0.20	0.00	4.00	24.00	235.39	12.20	0.00	2.41	830.00
1	2	226	0.28	1	2	0.20	0.00	4.00	24.00	224.53	12.38	0.00	2.40	791.72
1	2	227	0.04	1	2	0.20	0.00	4.00	24.00	71.72	11.97	0.00	3.53	1811.12
1	2	228	0.04	1	2	0.20	0.00	4.00	24.00	67.37	12.01	0.00	3.52	1701.38
1	2	229	0.02	1	2	0.20	0.00	4.00	24.00	31.82	11.94	0.00	2.74	1648.50
1	2	230	0.06	1	2	0.20	0.00	4.00	24.00	98.33	11.99	0.00	3.27	1669.46
1	2	231	0.06	1	2	0.20	0.00	4.00	24.00	86.63	12.08	0.00	3.26	1470.84
1	2	232	0.34	1	2	0.20	0.00	4.00	24.00	292.12	12.26	0.00	2.55	852.91
1	2	240	0.06	1	2	0.20	0.00	4.00	24.00	83.01	11.97	0.00	2.48	1421.43
1	2	241	0.06	1	2	0.20	0.00	4.00	24.00	78.48	12.00	0.00	2.48	1343.87
1	2	242	0.05	1	2	0.20	0.00	4.00	24.00	70.64	11.94	0.00	2.42	1515.86
1	2	243	0.10	1	2	0.20	0.00	4.00	24.00	148.01	11.97	0.00	2.45	1409.58
1	2	244	0.10	1	2	0.20	0.00	4.00	24.00	136.13	12.01	0.00	2.46	1296.46
1	2	245	0.09	1	2	0.20	0.00	4.00	24.00	98.28	12.06	0.00	2.21	1096.85
1	2	246	0.19	1	2	0.20	0.00	4.00	24.00	233.31	12.03	0.00	2.34	1198.93
1	2	247	0.54	1	2	0.20	0.00	4.00	24.00	481.68	12.13	0.00	2.48	896.82
1	2	250	0.07	1	2	0.20	0.00	4.00	24.00	107.33	11.93	0.00	2.43	1592.36
1	2	251	0.07	1	2	0.20	0.00	4.00	24.00	104.91	11.94	0.00	2.44	1556.48
1	2	252	0.03	1	2	0.20	0.00	4.00	24.00	48.20	11.95	0.00	2.42	1483.01
1	2	253	0.10	1	2	0.20	0.00	4.00	24.00	153.03	11.94	0.00	2.43	1531.88
1	2	254	0.10	1	2	0.20	0.00	4.00	24.00	141.16	11.96	0.00	2.47	1444.79
1	2	255	0.10	1	2	0.20	0.00	4.00	24.00	134.48	11.99	0.00	2.47	1376.46
1	2	256	0.20	1	2	0.20	0.00	4.00	24.00	286.12	11.96	0.00	2.45	1448.00
1	2	260	0.73	1	2	0.20	0.00	4.00	24.00	745.92	12.03	0.00	2.47	1015.28

SUMMARY TABLE 3

	DISCHARGE,CFS									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
OXSEC/STRUC NO.-10 ALTERNATE 1	353.07	824.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 1 ALTERNATE 1	86.02	158.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 3 ALTERNATE 1	74.85	139.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 4 ALTERNATE 1	99.70	198.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 6 ALTERNATE 1	95.05	188.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 7 ALTERNATE 1	17.71	38.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 8 ALTERNATE 1	108.14	218.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 9 ALTERNATE 1	99.03	199.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 10 ALTERNATE 1	143.28	293.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 11 ALTERNATE 1	186.11	370.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 13 ALTERNATE 1	170.59	339.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO. 14 ALTERNATE 1	209.00	422.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.110 ALTERNATE 1	306.01	569.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.111 ALTERNATE 1	256.45	477.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.112 ALTERNATE 1	699.78	1324.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.113 ALTERNATE 1	840.46	1569.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.114 ALTERNATE 1	803.13	1499.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.115 ALTERNATE 1	254.20	508.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.116 ALTERNATE 1	854.95	1598.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.117 ALTERNATE 1	852.01	1593.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.118 ALTERNATE 1	56.80	119.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.119 ALTERNATE 1	921.41	1731.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.120 ALTERNATE 1	914.33	1720.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.121 ALTERNATE 1	14.81	30.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.122 ALTERNATE 1	917.45	1726.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.123 ALTERNATE 1	914.56	1721.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.125 ALTERNATE 1	35.25	74.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.126 ALTERNATE 1	28.12	59.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.128 ALTERNATE 1	922.82	1738.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.129										

ALTERNATE 1	916.64	1728.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.130										
ALTERNATE 1	40.05	84.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.131										
ALTERNATE 1	216.54	443.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.132										
ALTERNATE 1	22.72	47.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.133										
ALTERNATE 1	229.75	471.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.134										
ALTERNATE 1	227.23	467.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.135										
ALTERNATE 1	34.06	77.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.137										
ALTERNATE 1	32.57	74.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.138										
ALTERNATE 1	29.29	59.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.139										
ALTERNATE 1	52.59	113.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.140										
ALTERNATE 1	947.25	1793.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.150										
ALTERNATE 1	65.32	135.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.151										
ALTERNATE 1	60.06	125.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.152										
ALTERNATE 1	57.86	116.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.153										
ALTERNATE 1	117.21	240.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.154										
ALTERNATE 1	113.46	233.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.155										
ALTERNATE 1	15.09	29.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.156										
ALTERNATE 1	128.09	262.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.160										
ALTERNATE 1	139.07	292.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.161										
ALTERNATE 1	134.71	283.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.162										
ALTERNATE 1	259.99	541.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.163										
ALTERNATE 1	235.49	498.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.164										
ALTERNATE 1	38.18	64.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.165										
ALTERNATE 1	273.50	559.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.166										
ALTERNATE 1	1054.40	2116.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.167										
ALTERNATE 1	279.64	275.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.181										
ALTERNATE 1	277.87	275.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.182										
ALTERNATE 1	34.96	70.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.183										
ALTERNATE 1	30.54	62.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.184										
ALTERNATE 1	42.68	88.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.185										
ALTERNATE 1	72.86	150.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.186										
ALTERNATE 1	349.44	425.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.187										

ALTERNATE 1	343.41	418.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.188										
ALTERNATE 1	18.84	40.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.189										
ALTERNATE 1	361.85	459.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.190										
ALTERNATE 1	126.72	160.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.192										
ALTERNATE 1	226.87	285.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.193										
ALTERNATE 1	144.10	241.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.194										
ALTERNATE 1	355.94	519.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.195										
ALTERNATE 1	54.81	113.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.196										
ALTERNATE 1	52.47	108.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.197										
ALTERNATE 1	37.50	78.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.198										
ALTERNATE 1	88.76	184.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.199										
ALTERNATE 1	28.28	59.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.201										
ALTERNATE 1	44.29	98.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.202										
ALTERNATE 1	194.63	396.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.204										
ALTERNATE 1	184.08	375.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.205										
ALTERNATE 1	24.88	52.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.206										
ALTERNATE 1	22.79	48.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.207										
ALTERNATE 1	27.16	56.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.208										
ALTERNATE 1	203.28	412.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.209										
ALTERNATE 1	216.55	442.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.210										
ALTERNATE 1	13.67	28.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.211										
ALTERNATE 1	224.12	458.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.212										
ALTERNATE 1	11.34	21.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.213										
ALTERNATE 1	227.76	465.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.214										
ALTERNATE 1	30.27	62.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.220										
ALTERNATE 1	83.96	176.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.221										
ALTERNATE 1	55.44	116.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.222										
ALTERNATE 1	110.97	235.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.223										
ALTERNATE 1	110.02	233.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.224										
ALTERNATE 1	2.61	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.225										
ALTERNATE 1	110.94	235.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.226										
ALTERNATE 1	105.93	224.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXSEC/STRUC NO.227										

ALTERNATE 1 OXSEC/STRUC NO.228	42.79	71.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.229	40.09	67.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.230	16.71	31.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.231	56.41	98.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.232	49.38	86.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.240	143.65	292.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.241	40.60	83.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.242	38.08	78.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.243	34.76	70.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.244	72.28	148.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.245	65.71	136.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.246	43.87	98.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.247	108.79	233.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.250	233.10	481.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.251	53.57	107.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.252	52.15	104.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.253	23.57	48.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.254	75.68	153.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.255	69.23	141.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.256	65.50	134.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.260	140.46	286.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.300	359.94	745.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.302	245.79	503.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.304	227.83	466.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.305	182.44	421.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.306	397.52	857.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.307	9.95	23.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.308	339.53	820.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.309	375.41	809.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.310	60.34	60.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.311	40.32	102.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALTERNATE 1 OXSEC/STRUC NO.313	40.32	102.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ALTERNATE	1	123.47	277.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0XSEC/STRUC NO.314											
ALTERNATE	1	85.84	180.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JXSEC/STRUC NO.315											
ALTERNATE	1	72.70	151.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
)XSEC/STRUC NO.316											
ALTERNATE	1	25.70	54.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0XSEC/STRUC NO.317											
ALTERNATE	1	96.41	201.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
)XSEC/STRUC NO.318											
ALTERNATE	1	183.47	337.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0XSEC/STRUC NO.319											
ALTERNATE	1	175.86	318.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
)XSEC/STRUC NO.320											
ALTERNATE	1	57.50	145.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0XSEC/STRUC NO.321											
ALTERNATE	1	223.02	443.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ENDJOB CARD ENCOUNTERED. END OF JOB.

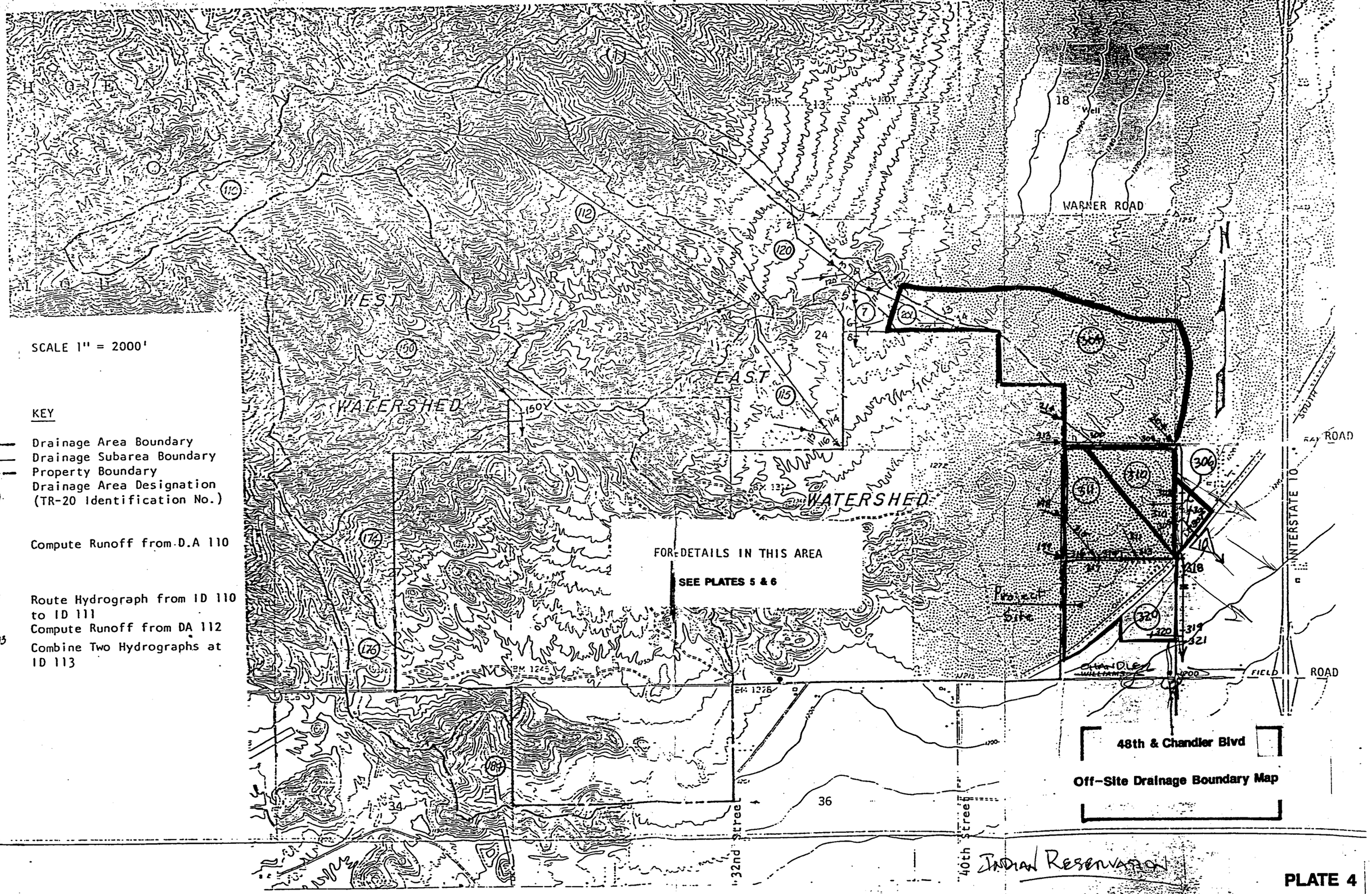
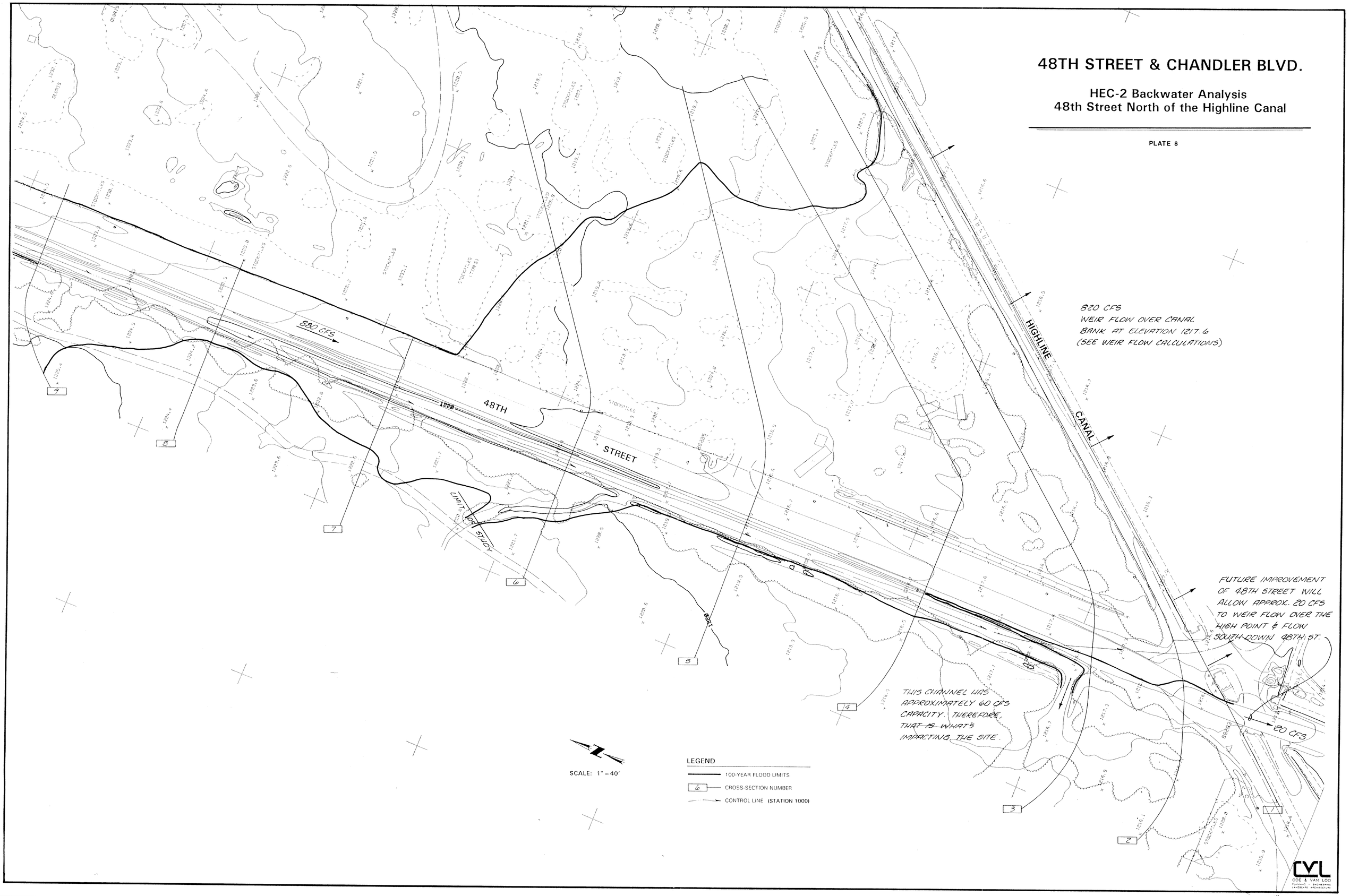

SCALE 1" = 2000'
KEY
Drainage Area Boundary
Drainage Subarea Boundary
Property Boundary
Drainage Area Designation (TR-20 Identification No.)
Compute Runoff from D.A 110
Route Hydrograph from ID 110 to ID 111
Compute Runoff from DA 112
Combine Two Hydrographs at ID 113
WEST WATERSHED
EAST WATERSHED
FOR DETAILS IN THIS AREA
SEE PLATES 5 & 6
WARNER ROAD
ROAD
INTERSTATE 10
FIELD ROAD
Project Site
32nd Street
40th Street
INDIAN RESERVATION
48th & Chandler Blvd
Off-Site Drainage Boundary Map

PLATE 4

48TH STREET & CHANDLER BLVD.

HEC-2 Backwater Analysis
48th Street North of the Highline Canal

PLATE 8

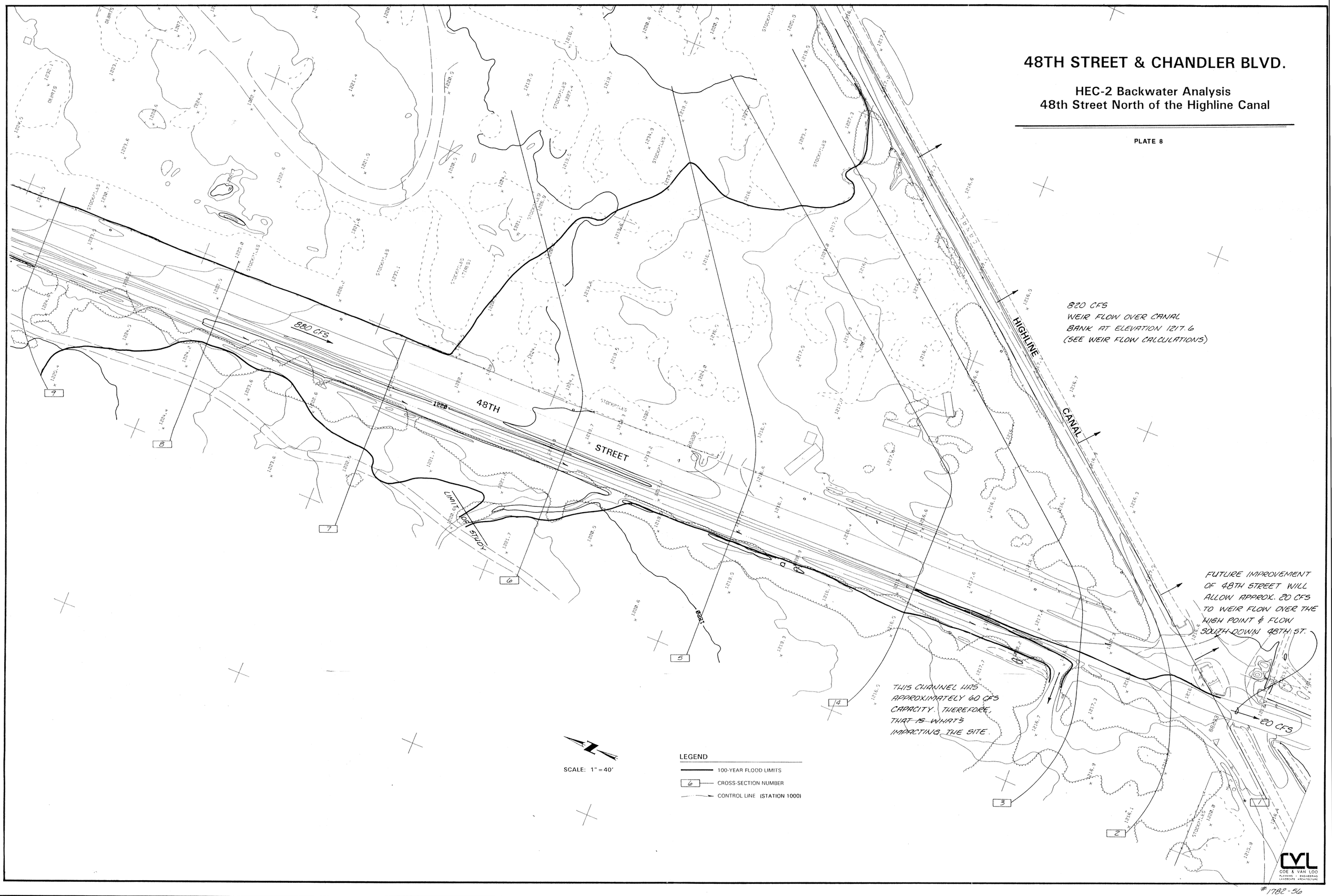


#1782-56

48TH STREET & CHANDLER BLVD.

HEC-2 Backwater Analysis
48th Street North of the Highline Canal

PLATE 8



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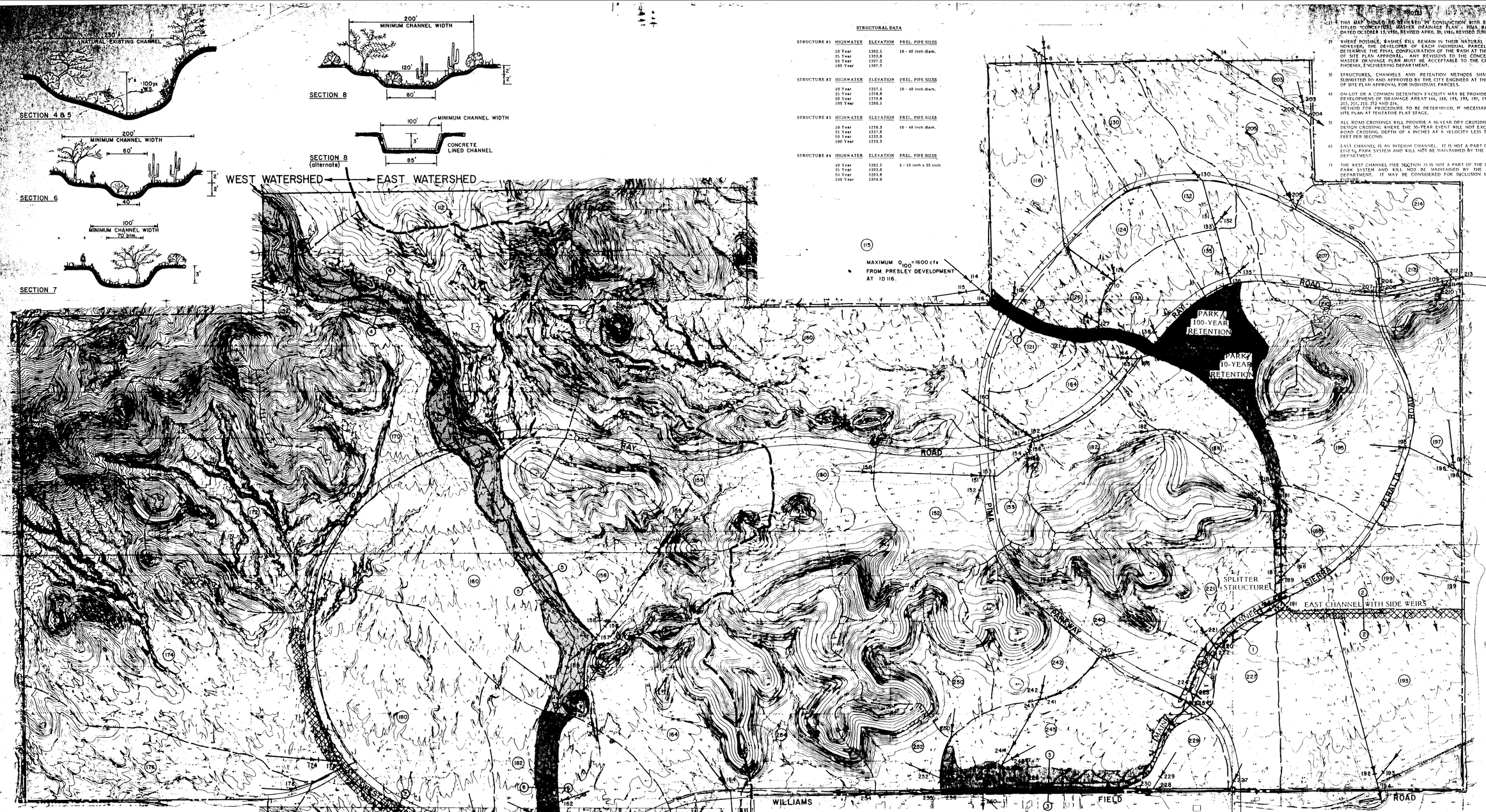


STRUCTURAL DATA

	HIGHWATER	ELEVATION	PREL. PIPE SIZES
STRUCTURE #1	10 Year	1302.1	18 - 48 inch diam.
	25 Year	1303.6	
	50 Year	1307.2	
	100 Year	1307.7	
STRUCTURE #2	10 Year	1257.1	18 - 48 inch diam.
	25 Year	1258.8	
	50 Year	1259.8	
	100 Year	1260.3	
STRUCTURE #3	10 Year	1276.3	18 - 48 inch diam.
	25 Year	1277.9	
	50 Year	1232.0	
	100 Year	1233.2	
STRUCTURE #4	10 Year	1202.7	5 - 19 inch x 30 inch
	25 Year	1203.0	
	50 Year	1203.8	
	100 Year	1204.0	

Notes

1) THIS MAP SHOULD BE REVIEWED IN CONJUNCTION WITH REPORT TITLED "CONCEPTUAL MASTER DRAINAGE PLAN - PIMA RANCH", DATED OCTOBER 15, 1980, REVISED APRIL 30, 1981, REVISED JUNE, 1982.

2) WHERE POSSIBLE, WASHES WILL REMAIN IN THEIR NATURAL STATE. HOWEVER, THE DEVELOPER OF EACH INDIVIDUAL PARCEL WILL DETERMINE THE FINAL CONFIGURATION OF THE WASH AT THE TIME OF SITE PLAN APPROVAL. ANY REVISIONS TO THE CONCEPTUAL MASTER DRAINAGE PLAN MUST BE ACCEPTABLE TO THE CITY OF PHOENIX, ENGINEERING DEPARTMENT.

3) STRUCTURES, CHANNELS AND RETENTION METHODS SHALL BE SUBMITTED TO AND APPROVED BY THE CITY ENGINEER AT THE TIME OF SITE PLAN APPROVAL FOR INDIVIDUAL PARCELS.

4) ON-LOT OR A COMMON DETENTION FACILITY MAY BE PROVIDED FOR DEVELOPMENT OF DRAINAGE AREAS 166, 168, 193, 195, 197, 199, 203, 205, 207, 210, 212 AND 214. METHOD FOR PROCEDURE TO BE DETERMINED, IF NECESSARY, ON SITE PLAN AT TENTATIVE PLAT STAGE.

5) ALL ROAD CROSSINGS WILL PROVIDE A 50-YEAR DRY CROSSING OR A DESIGN CROSSING WHERE THE 50-YEAR EVENT WILL NOT EXCEED A ROAD CROSSING DEPTH OF 6 INCHES AT A VELOCITY LESS THAN 5 FEET PER SECOND.

6) EAST CHANNEL IS AN INTERIM CHANNEL. IT IS NOT A PART OF THE LINEAL PARK SYSTEM AND WILL NOT BE MAINTAINED BY THE PARKS DEPARTMENT.

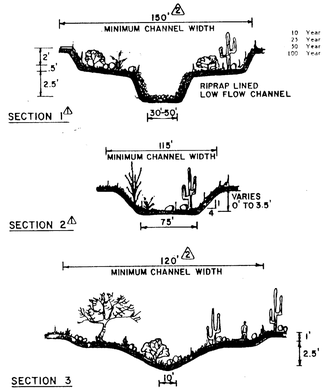
7) THE WEST CHANNEL (SEE SECTION 7) IS NOT A PART OF THE LINEAL PARK SYSTEM AND WILL NOT BE MAINTAINED BY THE PARKS DEPARTMENT. IT MAY BE CONSIDERED FOR INCLUSION IN THE FUTURE.

LEGEND

- WATERSHED BOUNDARY
- DRAINAGE SUBAREA BOUNDARY
- PROPERTY BOUNDARY
- (169) DRAINAGE AREA DESIGNATION (TR-20 IDENTIFICATION NO.)
- PROPOSED CHANNEL - DEDICATED
- NATURAL WASHES - DEDICATED
- (7)—(7) CHANNEL CROSS-SECTION
- PROPOSED CULVERT
- DIRECTION OF RUNOFF
- (3) DETENTION BASIN

FLOW CONDITIONS AT STRUCTURE NO. 4

	PRE-DEV.	POST DEV.
10 Year	470 cfs	230 cfs
25 Year	1070	740
50 Year	2720	2500
100 Year	3150	3000



FLOW CONDITIONS

	PRE-DEV	POST-DEV
10 Year	263 cfs	167 -/- cfs
25 Year	537	277 -/-
50 Year	976	967 -/-
100 Year	1109	1086 -/-

SUBMITTED BY: Robert H. Murphy, Registered Civil Engineer — Date 10-16-80

APPROVED BY: Roger Gwillim, For City Engineer — Date 12-08-80

James A. Colley, City Parks Director — Date 12-04-80

REVISIONS SUBMITTED BY: Ashok C. Patel, Registered Civil Engineer — Date 05-23-81

REVISIONS APPROVED BY: Roger Gwillim, For City Engineer — Date 06-26-81

James A. Colley, City Parks Director — Date 06-26-81

REVISIONS RESUBMITTED: Ashok C. Patel, Registered Civil Engineer — Date 6/16/82

REVISIONS △1 APPROVED BY: Roger Gwillim, For City Engineer 7/15/82 — James A. Colley, City Parks Director — Date 6-22-82

△2 Roger Gwillim, For City Engineer — James A. Colley, City Parks Director — Date 6-2-83

△1 REVISED JUNE 1982
REVISED TO INCORPORATE AMENDED LAND USE PLAN MARCH 1982.

△2 REVISED DEC. 1982
REVISED CHANNEL WIDTH.

REVISED APRIL 30, 1981
DAM SITE REPLACED BY RETENTION BASINS
SPLITTER STRUCTURE AND EAST CHANNEL ADDED
40th STREET REALIGNED
DRAINAGE AREAS REVISED

PIMA RANCH

CONCEPTUAL MASTER DRAINAGE PLAN

48TH ST. & CHANDLER BLVD.
MASTER DRAINAGE REPORT
PLATE 5

NO NOTICE

#1782-56

APPENDIX B

OFFSITE HYDRAULIC CALCULATIONS

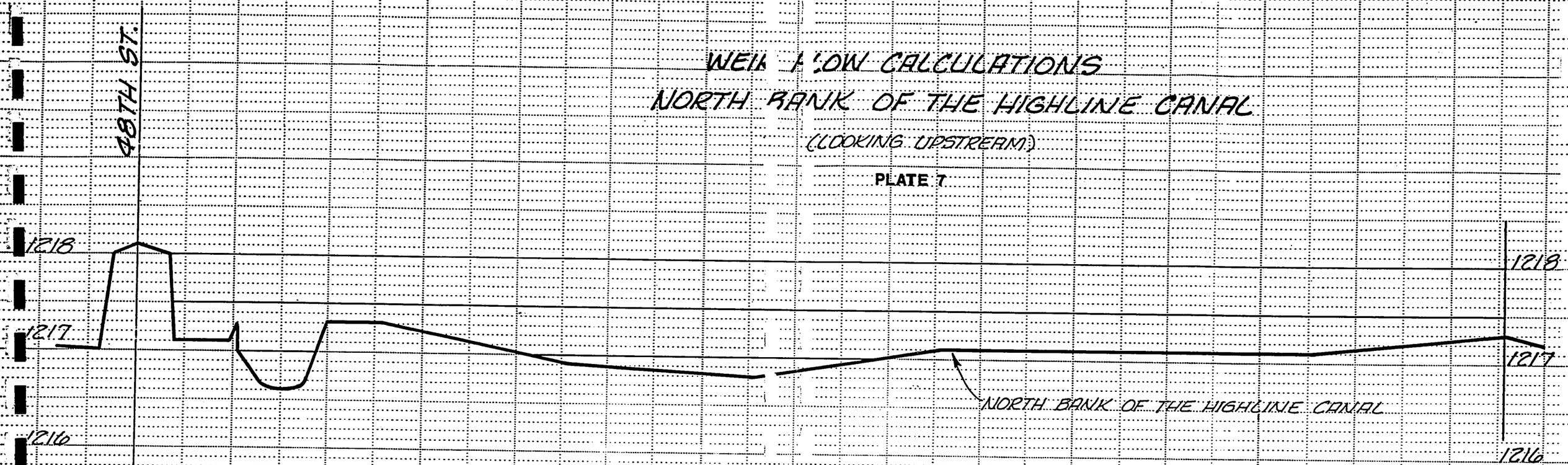
&

HEC-2 OUTPUT

CVL

WEIR FLOW CALCULATIONS
NORTH BANK OF THE HIGHLINE CANAL
(LOOKING UPSTREAM)

PLATE 7



WEIR FLOW EQUATION

$Q = CAH^{1/2}$

C = WEIR COEFFICIENT = 2.7

A = CROSS SECTIONAL AREA

H = AVERAGE HEAD = $\frac{A}{\text{TOP WIDTH}}$

ELEVATION	WEIR FLOW (cfs)
1216.5	0
1217.0	40
1217.5	671
1218.0	1883

SCALE: 1" = 50' HORIZ
1" = 1' VERT.

CVL

```
*****************************************************
*  WATER SURFACE PROFILES                           *
*  DEVELOPED BY THE COE                             *
*  VERSION OF SEPTEMBER 1988                        *
*  ERROR: 01,02,03                                  *
*  RUN DATE     7/15/91   TIME   11: 3:28           *
*****************************************************
```


```
****************************************
*  DODSON & ASSOCIATES, INC.
*  HYDROLOGIST AND CIVIL ENGINEERS
*  5629 FM 1960 WEST SUITE 314          *
*  HOUSTON, TEXAS  77069                *
*  (713) 440-3787 Fax (713) 440-4742
****************************************
```


```
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
```

END OF BANNER

THIS RUN EXECUTED 7/15/91 11: 3:28

```
**************************************************
  HEC2 RELEASE DATED SEP 88 UPDATED SEPT 1989


  ERROR CORR -  01,02,03
  MODIFICATION -
**************************************************


T1      48th STREET & CHANDLER BOULEVARD BACKWATER ANALYSIS     (1785-560)
T2      FLOW IN 48th ST. AT THE HIGHLINE CANAL
T3      100-YR FLOW,    EXISTING CONDITION    JUNE,1990    (FILE NAME - H2-48TH)

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0         2         0         0         0         0         0         0       17.6        0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     -1         0        -1         0         0         0        -1         0         0         0


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        43         1         8        42         3         2        26         5        39
     53         4        54

NC     .065      .065      .030        .1        .3
QT        1       820
ET        1       9.1                                                                          350      1075
         BACKWATER ANALYSIS OF FLOW IN 48th ST. UPSTREAM OF THE HIGHLINE CANAL.
         PREPARED BY COE & VAN LOO CONSULTING ENGINEERS, JUNE 1991
         TOPOGRAPHIC MAPPING PREPARED BY AERIAL MAPPING COMPANY, INC. 1990.
         THE CONTROL LINE IS STATION 1000.
         ALL SECTIONS ARE STATIONED LOOKING DOWNSTREAM.
         NORTH BANK OF THE HIGHLINE CANAL
X1        1        21       975      1022         0         0         0
GR     16.8       250      17.3       350      17.1       450      17.1       550      17.1       650
GR     16.8       750      16.9       850      17.3       950      17.3       975        17       985
GR     16.6       990      16.6      1000      16.6      1010        17      1022      17.1      1031
GR     17.1      1058        18      1065      18.1      1075        18      1088        17      1100
GR     17.1      1170

ET        2       9.1                                                                          360    1056.1
X1        2        17       960      1056        16        80        24
GR     16.1       260      16.6       360      16.1       460        16       560      15.9       660
GR     15.5       760      16.2       860      16.5       960        17       986      16.7      1000
GR       17      1005        18      1036      18.4      1056        18      1077        17      1085
GR     16.7      1135      16.1      1205
```

ET	3	9.1							403	1022.1
X1	3	26	945	1022	50	105	86			
GR	19.5	317	27	403	18	434	17	436	17.5	460
GR	17	472	16.5	496	17	516	17	540	16.5	590
GR	16.6	705	16.1	772	16.5	806	17	940	17.2	945
GR	16.6	952	17.2	967	16.9	982	17.6	1000	18	1020
GR	19	1022	18	1042	17	1108	16.8	1126	17	1145
GR	17.5	1200								
QT	1	880								
X1	4	28	931	1009	70	210	190			
GR	20	380	19	415	18	545	17	613	17	708
GR	16.8	728	17	748	17	858	16.9	868	17	883
GR	17	897	17	918	18	923	16.6	927	17.9	931
GR	17.7	940	18	962	18	973	17.7	983	18	986
GR	19	988	18	990	17	994	16.7	1000	17	1005
GR	18	1009	18.5	1045	18.8	1130				
ET	5	9.1							515	1014
X1	5	21	953	1010	150	200	200			
GR	20	515	19	640	18.3	703	18.5	735	18.2	815
GR	18.5	900	18.6	953	18.9	968	18.3	982	19	985
GR	19.7	987	19	988	18	991	17.5	1000	18	1008
GR	19	1010	20	1014	19	1021	19	1027	20	1100
GR	20.2	1135								
ET	6	9.1							725	1116
X1	6	27	935	1008	170	200	200			
GR	20	645	20.1	695	28.8	725	20.6	765	19.8	815
GR	19.9	850	19.8	895	20	915	24	927	20.1	935
GR	19.1	981	20	984	21	986	20	988	19	991
GR	18	996	17.7	1000	18	1004	19	1007	20	1008
GR	21	1037	20	1050	19.3	1053	20	1056	21	1067
GR	21	1080	21.5	1116						
X1	7	19	938	1006	200	200	200			
GR	24	931	21	938	20.9	950	21	970	20.5	979
GR	21	984	21.8	986	21	988	20	990	19	993
GR	18.4	1000	19	1003	20	1006	21	1008	22	1010
GR	21	1015	22	1035	22.5	1095	23	1145		
X1	8	14	938	1008	200	200	200			
GR	29	925	23	938	22.1	980	22.9	985	22	988
GR	21	990	20	994	20	1000	20	1002	21	1007
GR	22	1008	23	1010	24	1022	24.4	1125		
X1	9	20	937	1009	200	200	200			
GR	31	922	25	937	24	958	23.7	979	24	984
GR	24.5	987	24	990	23	992	22	994	21	998
GR	20.9	1000	21	1004	22	1007	23	1009	24	1010
GR	25	1011	24	1014	24	1018	25	1094	25.5	1145

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


*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV=     .100 CEHV=     .300
*SECNO 1.000
3280 CROSS SECTION      1.00 EXTENDED       .50 FEET


3470 ENCROACHMENT STATIONS=      350.0    1075.0  TYPE=      1  TARGET=      725.000
         BACKWATER ANALYSIS OF FLOW IN 48th ST. UPSTREAM OF THE HIGHLINE CANAL.
         PREPARED BY COE & VAN LOO CONSULTING ENGINEERS, JUNE 1991
         TOPOGRAPHIC MAPPING PREPARED BY AERIAL MAPPING COMPANY, INC. 1990.
         THE CONTROL LINE IS STATION 1000.
         ALL SECTIONS ARE STATIONED LOOKING DOWNSTREAM.
         NORTH BANK OF THE HIGHLINE CANAL
    1.000     1.00    17.60    17.51      .00    17.72      .12      .00      .00    17.30
     820.     601.     187.      32.     338.      38.      19.       0.       0.    17.00
      .00     1.78     4.91     1.64     .065     .030     .065     .000    16.60   350.00
  .013035       0.       0.       0.        0        9        0      .00   711.89  1061.89


*SECNO 2.000
3280 CROSS SECTION      2.00 EXTENDED      1.65 FEET


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  5.01


3470 ENCROACHMENT STATIONS=      360.0    1056.1  TYPE=      1  TARGET=      696.100
    2.000     2.25    17.75    16.40      .00    17.76      .01      .03      .01    16.50
     820.     771.      49.       0.    1025.      52.       0.       0.       0.    18.40
      .01      .75      .94      .00     .065     .030     .000     .000    15.50   360.00
  .000519      16.      24.      80.        2       15        0      .00   668.27  1028.27


*SECNO 3.000
3280 CROSS SECTION      3.00 EXTENDED       .29 FEET


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .44
```

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


3470 ENCROACHMENT STATIONS=      403.0     1022.1  TYPE=      1  TARGET=      619.100
    3.000     1.69     17.79     17.07       .00     17.82       .03       .05       .01     17.20
     820.     742.       78.       0.      570.       41.        0.        1.        1.     19.00
      .02     1.30      1.89       .00      .065      .030      .000      .000     16.10    434.42
  .002641      50.       86.      105.         2        18         0       .00    575.19   1009.61


*SECNO 4.000

3265 DIVIDED FLOW


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .64

    4.000     1.51     18.11     17.62       .00     18.17       .07       .34       .01     17.90
     880.     804.       76.       0.      394.       32.        0.        2.        2.     18.00
      .03     2.04      2.40       .28      .065      .030      .065      .000     16.60    531.20
  .007433      70.      190.      210.         2        17         0       .00    481.87   1016.64


*SECNO 5.000

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=      515.0     1014.0  TYPE=      1  TARGET=      499.000
    5.000     1.88     19.38     19.09       .00     19.53       .15      1.33       .02     18.60
     880.     622.      258.       0.      298.       55.        0.        4.        4.     19.00
      .04     2.09      4.72       .71      .065      .030      .065      .000     17.50    593.33
  .009448     150.      200.      200.         3         8         0       .00    416.77   1011.49


*SECNO 6.000

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=      725.0     1116.0  TYPE=      1  TARGET=      391.000
    6.000     3.11     20.81     20.68       .00     21.17       .36      1.58       .06     20.10
     880.     233.      612.       35.      128.      109.       25.        5.        5.     20.00
      .06     1.82      5.63      1.41      .065      .030      .065      .000     17.70    763.94
  .007680     170.      200.      200.         2        17         0       .00    276.63   1065.00
```

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

*SECNO 7.000

7.000	3.84	22.24	22.17	.00	22.93	.69	1.67	.10	21.00
880.	3.	830.	48.	2.	121.	27.	6.	6.	20.00
.06	1.50	6.86	1.76	.065	.030	.065	.000	18.40	935.10
.009079	200.	200.	200.	2	11	0	.00	128.90	1064.01

*SECNO 8.000

8.000	3.89	23.89	23.67	.00	24.51	.61	1.57	.01	23.00
880.	1.	868.	11.	1.	137.	8.	7.	7.	22.00
.07	1.04	6.33	1.50	.065	.030	.065	.000	20.00	936.05
.006821	200.	200.	200.	1	10	0	.00	84.73	1020.78

*SECNO 9.000

9.000	4.46	25.36	25.12	.00	25.79	.43	1.27	.02	25.00
880.	0.	751.	129.	0.	133.	83.	7.	7.	23.00
.08	.53	5.66	1.55	.065	.030	.065	.000	20.90	936.09
.005887	200.	200.	200.	2	8	0	.00	194.87	1130.96

THIS RUN EXECUTED 7/15/91 11: 3:37

****
HEC2 RELEASE DATED SEP 88 UPDATED SEPT 1989

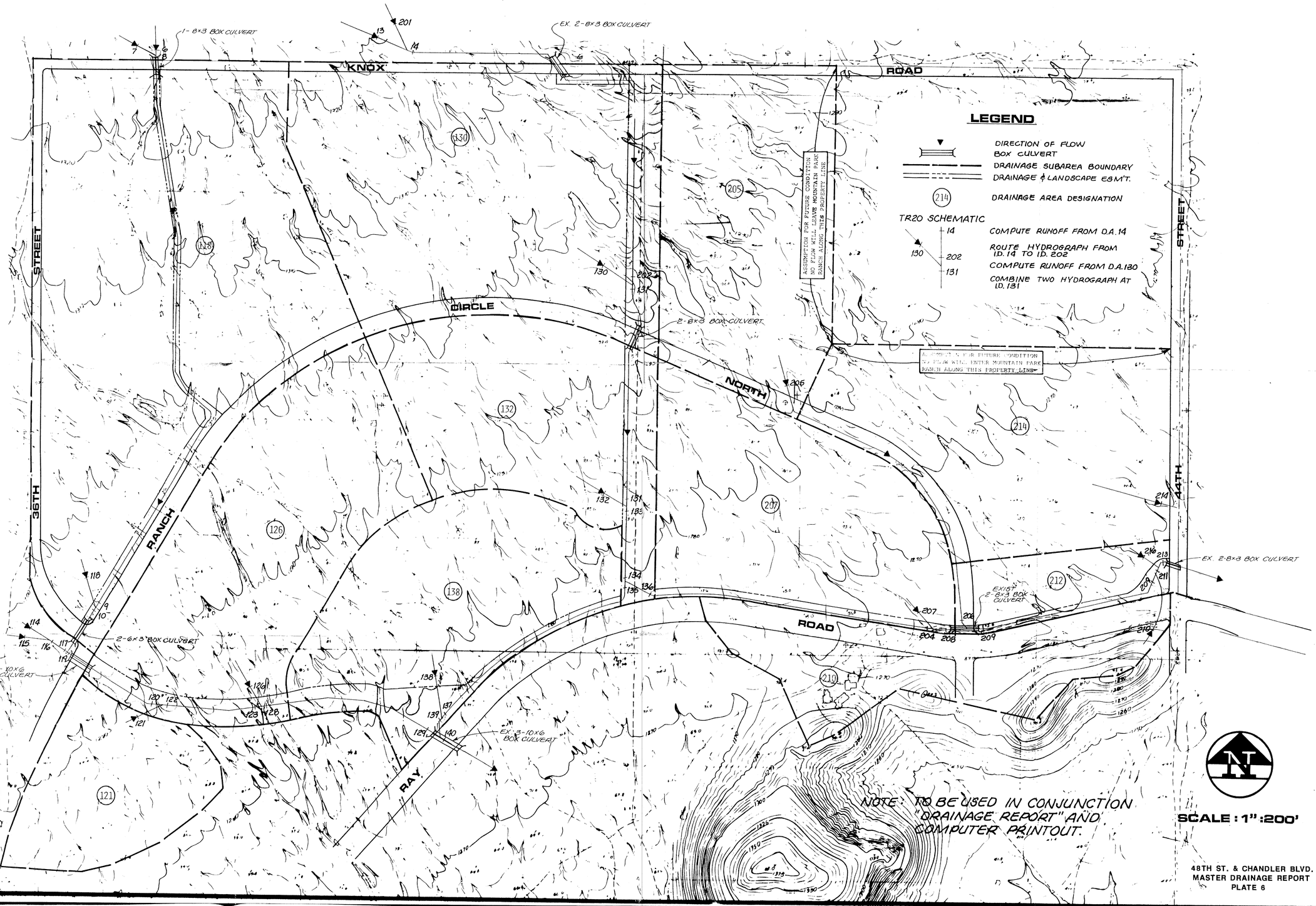
ERROR CORR - 01,02,03
MODIFICATION -
****

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

100-YR FLOW, EXISTING

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	DEPTH	ELMIN	EG	CRIWS	VCH	10*KS	XLCH	SSTA	TOPWID	ENDST
	1.000	820.00	17.60	1.00	16.60	17.72	17.51	4.91	130.35	.00	350.00	711.89	1061.89
*	2.000	820.00	17.75	2.25	15.50	17.76	16.40	.94	5.19	24.00	360.00	668.27	1028.27
*	3.000	820.00	17.79	1.69	16.10	17.82	17.07	1.89	26.41	86.00	434.42	575.19	1009.61
*	4.000	880.00	18.11	1.51	16.60	18.17	17.62	2.40	74.33	190.00	531.20	481.87	1016.64
	5.000	880.00	19.38	1.88	17.50	19.53	19.09	4.72	94.48	200.00	593.33	416.77	1011.49
	6.000	880.00	20.81	3.11	17.70	21.17	20.68	5.63	76.80	200.00	763.94	276.63	1065.00
	7.000	880.00	22.24	3.84	18.40	22.93	22.17	6.86	90.79	200.00	935.10	128.90	1064.01
	8.000	880.00	23.89	3.89	20.00	24.51	23.67	6.33	68.21	200.00	936.05	84.73	1020.78
	9.000	880.00	25.36	4.46	20.90	25.79	25.12	5.66	58.87	200.00	936.09	194.87	1130.96



MOUNTAIN PARK RANCH

COE & VAN LOO CONSULTING ENGINEERS INC.

PHOENIX ARIZONA

DESIGNED	
DRAWN	
CHECKED	
DATE	

REVISIONS	DATE	BY

FLOOD CONTROL PHASE III

SHEET 1 OF 1

#1782-56

1260-010-2

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 2.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 3.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 4.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

APPENDIX C

ONSITE HYDROLOGY

&

HYDRAULIC CALCULATIONS

CVL

COE & VAN LOO
PLANNING • ENGINEERING
LANDSCAPE ARCHITECTURE

Project 48th & Chaparral Blvd
Project No. 1260-010
Sheet No. _____ of _____
Calculated by DWD Date 3/20
Checked by _____ Date _____

Street Flow Computations Using the Rational Eq.

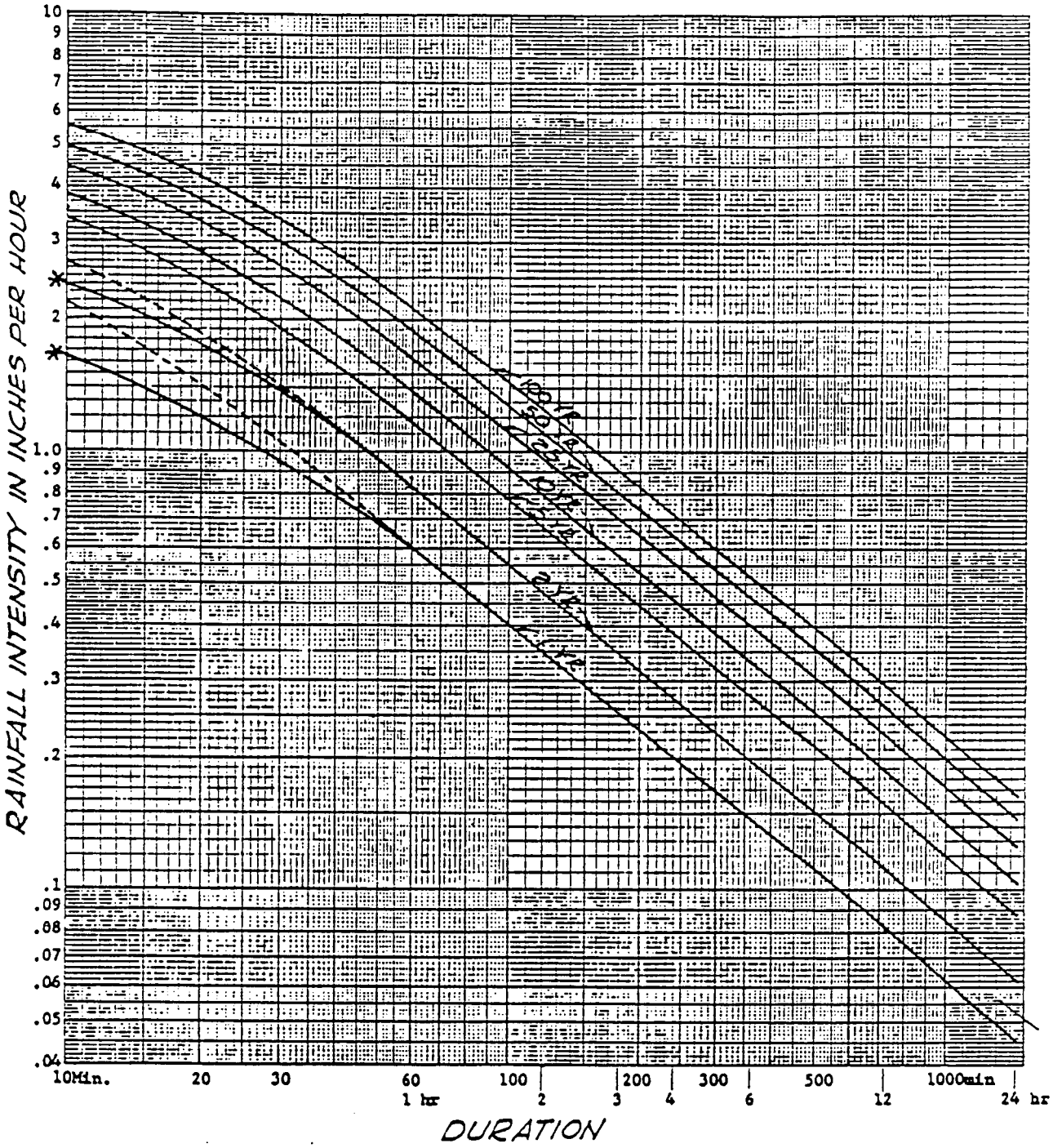
CP#	Area[1] (Ac)	Length (ft)	Ave. Vel. (fps)	Typical Street Slope	T.C. (min)	i_{10}[3] (in/hr)	i_{100}[3] (in/hr)	Q_{10}[2] (cfs)	Q_{100}[2] (cfs)	Comments[4]
1	5.3	2700	1.5	0.002	30	2.2	3.35	9	15	4" Rolled Curb
2	[illegible]	1950	2.5	0.005	13	3.5	5.1	15	22	4" Rolled Curb
3	3.0	2500	3	0.006	14	3.4	5	8.5	12	4" Rolled Curb
4	0.8	400	1.5	0.002	10	3.9	5.5	3	4	4" Rolled Curb OK
5	11.1	3600	2.5	0.006	24	2.5	3.8	24	35	Major [illegible] or storm drain near 48th Street

(1) Area within Street R/W

(2) $Q = CiA$ for $C = (0.82 \cdot 0.95) + (.18 \cdot 0.35) = 0.84$
Pavement — unpaved R/W (Desert)

(3) per Rainfall vs Duration Graph (Ref 2)

(4) See "Residential Street Capacity" Table

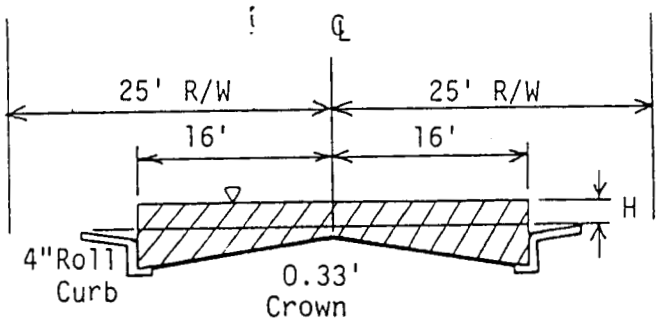


RAINFALL INTENSITY-DURATION-FREQUENCY RELATION
FOR PHOENIX, ARIZONA
(Partial Duration Series)

Curves are based on methods of U.S. Weather Bureau Technical Papers Nos. 28 and 40 and rainfall data prepared by U.S. Weather Bureau Office of Hydrology for the Soil Conservation Service, March 1967

* Curves revised June 1975 to reflect new information from WR-44.

RESIDENTIAL STREET CAPACITY
(50′ RIGHT OF WAY)



SLOPE %	H = 0 A = 7.15		H = 0.1 A = 10.35		H = 0.17* A = 12.59		H = 0.3 A = 16.75		H = 0.4 A = 19.95		H = 0.5 A = 23.15	
	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q
0.15	1.39	9.96	1.78	18.46	2.00	25.6	2.46	41.2	2.76	55.1	3.05	70.6
0.20	1.61	11.51	2.06	21.31	2.35	29.5	2.84	47.5	3.19	63.6	3.52	81.5
0.25	1.80	12.86	2.30	23.83	2.62	33.0	3.17	53.2	3.57	71.1	3.94	91.1
0.30	1.97	14.10	2.52	26.10	2.87	36.2	3.47	58.2	3.91	77.9	4.31	99.8
0.35	2.13	15.22	2.72	28.20	3.10	39.1	3.75	62.9	4.22	84.2	4.66	107.8
0.4	2.28	16.27	2.91	30.14	3.32	41.8	4.01	67.2	4.51	90.0	5.00	115.3
0.5	2.54	18.19	3.26	33.70	3.71	46.7	4.49	75.2	5.04	100.6	5.57	128.9
0.6	2.79	19.93	3.57	36.92	4.06	51.2	4.92	82.3	5.52	110.2	6.10	141.2
0.7	3.01	21.53	3.85	39.87	4.39	55.3	5.31	88.9	6.00	119.0	6.59	152.5
0.8	3.22	23.01	4.12	42.63	4.69	59.1	5.68	95.1	6.38	127.2	7.04	163.0
0.9	3.41	24.41	4.37	45.21	5.00	62.7	6.02	100.8	6.76	135.0	7.47	172.9
1.0	3.60	25.73	4.60	47.65	5.11	64.4	6.35	106.3	7.13	142.3	7.87	182.3
1.5	4.41	31.51	5.64	58.37	6.38	80.3						
2.0	5.09	36.39	6.51	67.40	7.37	92.8						
2.5	5.69	40.68	7.28	75.36	8.24	103.7						
3.0	6.23	44.56	8.00	82.55	9.03	113.6						

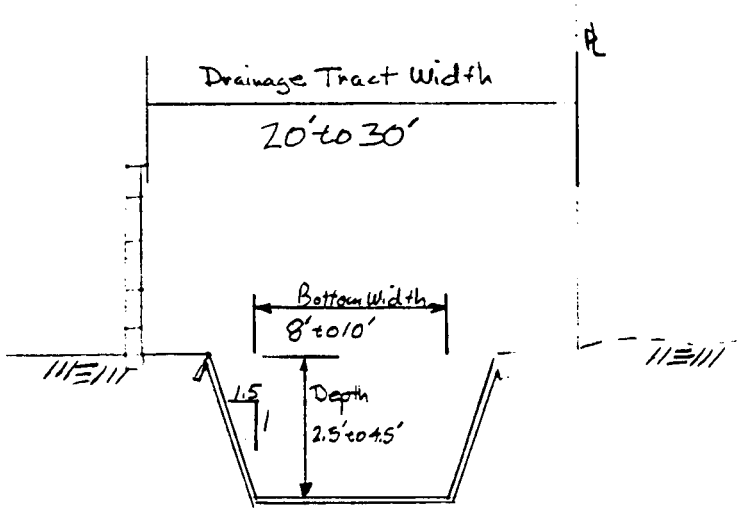
* = 6" vertical curb.
H = Height above top of sidewalk in feet.
A = Area in square feet.
V = Velocity in feet per second.
Q = Flow in cubic feet per second.
n = 0.015

1/9/65

COE & VAN LOO
LANNING • ENGINEERING
LANDSCAPE ARCHITECTURE

Project 48th St & Cheney [illegible]
Project No. 1260.[illegible]
Sheet No. 1 of
Calculated by DWC Date [illegible]
Checked by Date

- On-Site Drainage System : Typical Section



- Drainage System Configuration – As indicated in Plate

Sec.	Q_{100} (1) (cfs)	Bot. Width (ft)	Flow Depth (2) (ft)	Freeboard (3) (ft)	Channel Depth (ft)	Top Width (ft)	Comments
A-A	60	8	1.1	1.3	2.5	15.5	
B-B	200	10	1.83	1.6	3.5	20.5	
C-C	280	10	2.2	1.8	4.0	22.0	
—	280	10	2.75	—	—	—	10'x4' Box Culvert
D-D	340	10	2.45	1.9	4.5	23.5	
—	340	12	2.7	—	—	—	12'x4' non-ALCT Std. Box Culvert

(1) Peak Discharges per TR-20 model
(2) Flow Depth per following Rating Curves
(3) $FB = \sqrt{1.5d}$, d = flow depth ; supercritical flow (Ref 2)

4550 NORTH 12TH STREET • PHOENIX, ARIZONA 85014 • PHONE (602) 264-6831

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

August 16, 1990
48th STREET & CHANDLER BLVD
BOX CULVERT: Open Channel Flow
CVL# 1260-010

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Channel Bottom Slope (feet per foot).....	0.0062
Manning's Roughness Coefficient (n-value).....	0.0170
Channel Side Slope - Left Side (horizontal/vertical)....	0.00
Channel Side Slope - Right Side (horizontal/vertical)...	0.00
Channel Bottom Width (feet).....	12.0

==========

PROGRAM RESULTS:

Depth (ft)	Flow Rate (cfs)	Velocity (fps)	Froude Number	Velocity Head(ft)	Energy Head(ft)	Flow Area (sq ft)	Top Width (ft)
1.0	74.5	6.21	1.094	0.599	1.599	12.0	12.0
1.3	105.6	7.04	1.110	0.770	2.020	15.0	12.0
1.5	139.9	7.77	1.118	0.938	2.438	18.0	12.0
1.8	177.0	8.43	1.123	1.103	2.853	21.0	12.0
2.0	216.5	9.02	1.124	1.263	3.263	24.0	12.0
2.3	258.1	9.56	1.123	1.418	3.668	27.0	12.0
2.5	301.5	10.05	1.120	1.569	4.069	30.0	12.0
2.8	346.7	10.51	1.116	1.714	4.464	33.0	12.0
3.0	393.3	10.93	1.112	1.854	4.854	36.0	12.0
3.3	441.3	11.32	1.106	1.988	5.238	39.0	12.0
3.5	490.5	11.68	1.100	2.118	5.618	42.0	12.0
3.8	540.9	12.02	1.094	2.243	5.993	45.0	12.0
4.0	592.2	12.34	1.087	2.364	6.364	48.0	12.0
4.3	644.5	12.64	1.080	2.480	6.730	51.0	12.0
4.5	697.6	12.92	1.073	2.591	7.091	54.0	12.0
4.8	751.5	13.18	1.066	2.699	7.449	57.0	12.0
5.0	806.1	13.44	1.059	2.803	7.803	60.0	12.0

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 7015 W. Tidwell, #107, Houston, TX 77092
(713) 895-8322. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

August 16, 1990
48th STREET & CHANDLER BLVD
BOX CULVERT: Open Channel Flow
CVL# 1260-010

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Channel Bottom Slope (feet per foot).....	0.0062
Manning's Roughness Coefficient (n-value).....	0.0170
Channel Side Slope - Left Side (horizontal/vertical)....	0.00
Channel Side Slope - Right Side (horizontal/vertical)...	0.00
Channel Bottom Width (feet).....	10.0

==========

PROGRAM RESULTS:

Depth (ft)	Flow Rate (cfs)	Velocity (fps)	Froude Number	Velocity Head(ft)	Energy Head(ft)	Flow Area (sq ft)	Top Width (ft)
1.0	61.0	6.10	1.074	0.577	1.577	10.0	10.0
1.3	86.0	6.88	1.085	0.736	1.986	12.5	10.0
1.5	113.6	7.57	1.089	0.890	2.390	15.0	10.0
1.8	143.2	8.18	1.090	1.040	2.790	17.5	10.0
2.0	174.6	8.73	1.088	1.184	3.184	20.0	10.0
2.3	207.6	9.23	1.084	1.321	3.571	22.5	10.0
2.5	241.9	9.68	1.078	1.454	3.954	25.0	10.0
2.8	277.4	10.09	1.072	1.580	4.330	27.5	10.0
3.0	314.0	10.47	1.065	1.701	4.701	30.0	10.0
3.3	351.5	10.82	1.057	1.816	5.066	32.5	10.0
3.5	389.9	11.14	1.049	1.927	5.427	35.0	10.0
3.8	429.0	11.44	1.041	2.032	5.782	37.5	10.0
4.0	468.8	11.72	1.033	2.133	6.133	40.0	10.0
4.3	509.3	11.98	1.024	2.230	6.480	42.5	10.0
4.5	550.3	12.23	1.016	2.322	6.822	45.0	10.0
4.8	591.9	12.46	1.008	2.411	7.161	47.5	10.0
5.0	633.9	12.68	0.999	2.496	7.496	50.0	10.0

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TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 7015 W. Tidwell, #107, Houston, TX 77092
(713) 895-8322. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

August 16, 1990
48th STREET & CHANDLER BLVD
CHANNEL WITH 8' BOTTOM WIDTH
CVL# 1260-010

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Channel Bottom Slope (feet per foot).....	0.0062
Manning's Roughness Coefficient (n-value).....	0.0170
Channel Side Slope - Left Side (horizontal/vertical)....	1.50
Channel Side Slope - Right Side (horizontal/vertical)...	1.50
Channel Bottom Width (feet).....	8.0

==========

PROGRAM RESULTS:

Depth (ft)	Flow Rate (cfs)	Velocity (fps)	Froude Number	Velocity Head(ft)	Energy Head(ft)	Flow Area (sq ft)	Top Width (ft)
1.0	57.2	6.02	1.142	0.563	1.563	9.5	11.0
1.3	84.2	6.82	1.173	0.723	1.973	12.3	11.7
1.5	115.9	7.54	1.198	0.883	2.383	15.4	12.5
1.8	152.4	8.20	1.219	1.043	2.793	18.6	13.2
2.0	193.7	8.80	1.237	1.203	3.203	22.0	14.0
2.3	239.8	9.37	1.254	1.363	3.613	25.6	14.7
2.5	291.0	9.91	1.268	1.524	4.024	29.4	15.5
2.8	347.2	10.41	1.281	1.684	4.434	33.3	16.3
3.0	408.7	10.90	1.293	1.845	4.845	37.5	17.0
3.3	475.6	11.37	1.305	2.006	5.256	41.8	17.7
3.5	547.9	11.82	1.315	2.168	5.668	46.4	18.5
3.8	625.9	12.25	1.325	2.330	6.080	51.1	19.2
4.0	709.5	12.67	1.334	2.493	6.493	56.0	20.0
4.3	799.0	13.08	1.343	2.656	6.906	61.1	20.7
4.5	894.5	13.48	1.352	2.820	7.320	66.4	21.5
4.8	996.2	13.87	1.360	2.985	7.735	71.8	22.2
5.0	1104.0	14.25	1.368	3.151	8.151	77.5	23.0

==========

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TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

August 16, 1990
48th STREET & CHANDLER BLVD
CHANNEL WITH 10' BOTTOM WIDTH
CVL# 1260-010

==========

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Channel Bottom Slope (feet per foot).....	0.0062
Manning's Roughness Coefficient (n-value).....	0.0170
Channel Side Slope - Left Side (horizontal/vertical)....	1.50
Channel Side Slope - Right Side (horizontal/vertical)...	1.50
Channel Bottom Width (feet).....	10.0

==========

PROGRAM RESULTS:

Depth (ft)	Flow Rate (cfs)	Velocity (fps)	Froude Number	Velocity Head(ft)	Energy Head(ft)	Flow Area (sq ft)	Top Width (ft)
1.0	70.8	6.15	1.153	0.588	1.588	11.5	13.0
1.3	103.7	6.99	1.185	0.758	2.008	14.8	13.8
1.5	142.2	7.74	1.212	0.930	2.430	18.4	14.5
1.8	186.2	8.43	1.234	1.103	2.853	22.1	15.2
2.0	235.6	9.06	1.253	1.275	3.275	26.0	16.0
2.3	290.6	9.66	1.269	1.448	3.698	30.1	16.7
2.5	351.1	10.21	1.284	1.620	4.120	34.4	17.5
2.8	417.4	10.74	1.298	1.793	4.543	38.8	18.2
3.0	489.4	11.25	1.310	1.965	4.965	43.5	19.0
3.3	567.3	11.73	1.322	2.138	5.388	48.3	19.7
3.5	651.1	12.20	1.332	2.311	5.811	53.4	20.5
3.8	741.1	12.65	1.342	2.484	6.234	58.6	21.3
4.0	837.3	13.08	1.352	2.658	6.658	64.0	22.0
4.3	939.8	13.50	1.361	2.832	7.082	69.6	22.7
4.5	1048.7	13.91	1.369	3.006	7.506	75.4	23.5
4.8	1164.2	14.31	1.377	3.181	7.931	81.3	24.2
5.0	1286.4	14.70	1.385	3.356	8.356	87.5	25.0

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APPENDIX D

FEMA MAP

APPROXIMATE SCALE IN FEET

3050 0

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 2640 OF 4350

CONTAINS

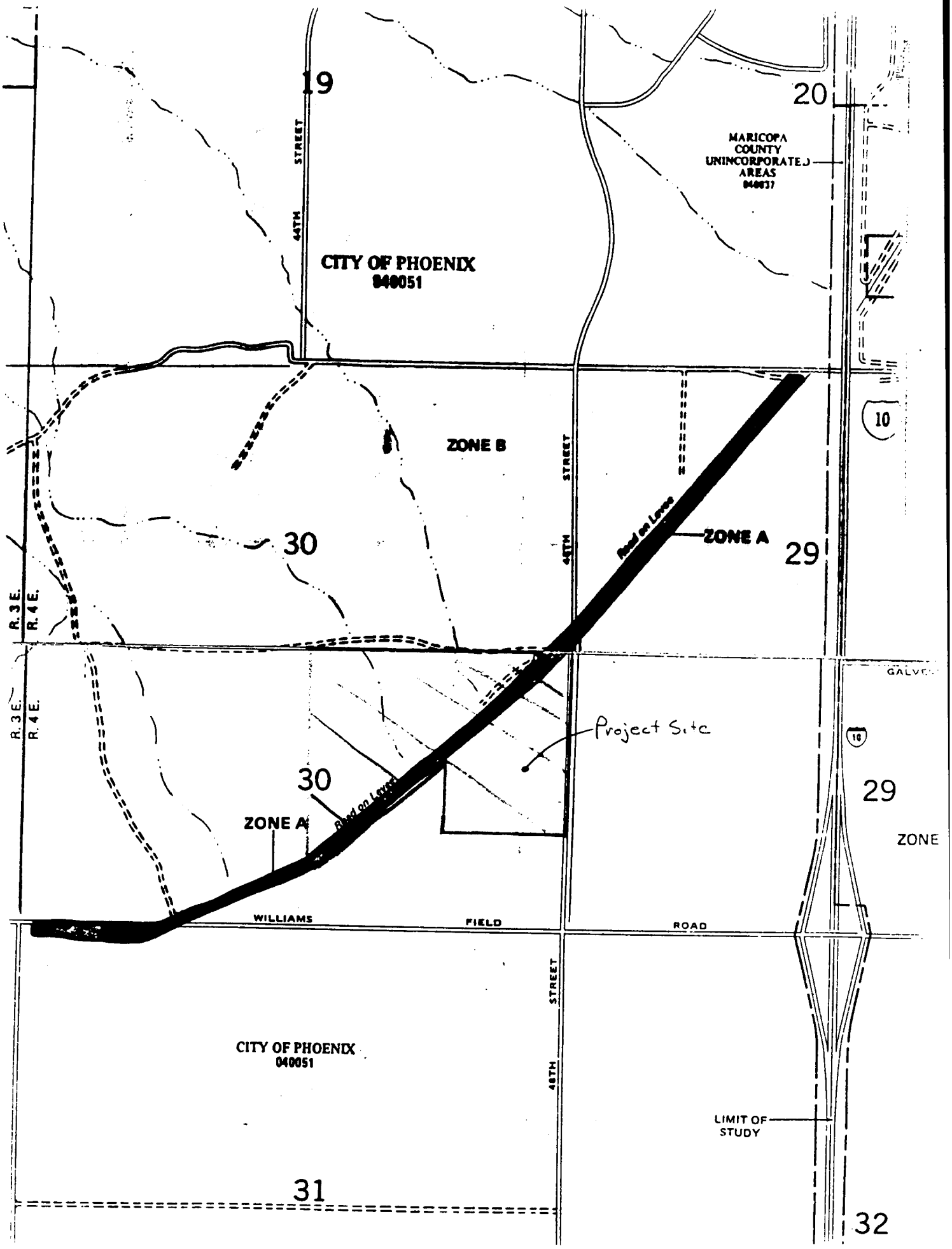
COMMUNITY	NUMBER	PANEL	SUFFIX
CHANDLER, CITY OF	040040	2640	0
MARICOPA COUNTY UNINCORPORATED AREAS	040037	2640	0
PHOENIX, CITY OF	040051	2640	0

MAP NUMBER
04013C2640 D

EFFECTIVE DATE:
APRIL 15, 1988

Federal Emergency Management Agency

30 40 50 60


19
20
MARICOPA COUNTY UNINCORPORATED AREAS
040037
44TH STREET
CITY OF PHOENIX
040051
ZONE B
10
30
ZONE A
29
R. 3 E.
R. 4 E.
Project Site
30
ZONE A
29
ZONE
WILLIAMS FIELD ROAD
CITY OF PHOENIX
040051
LIMIT OF STUDY
31
32