FLOOD INSURANCE STUDY
FOR
TRILBY WASH
APPENDICES C, D, E & F
(BOOK 2 OF 2)

P&D Technologies

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FLOOD INSURANCE STUDY
FOR
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(BOOK 2 OF 2)

FLOOD INSURANCE STUDY
FOR
TRILBY WASH

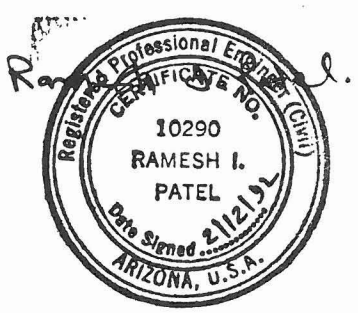
FROM THE CAP AQUEDUCT TO GRAND AVENUE NEAR CIRCLE CITY
MARICOPA COUNTY, ARIZONA

Prepared for:

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
2801 WEST DURANGO STREET
PHOENIX, ARIZONA 85009

CONTRACT FCD 90-24
P&D TECHNOLOGIES PROJECT NO. 10320.00

APPENDICES C, D, E & F
(BOOK 2 OF 2)



SUBMITTED BY:

P&D TECHNOLOGIES
1702 EAST HIGHLAND AVENUE
SUITE 200
PHOENIX, ARIZONA 85016
(602) 264-3335

FEBRUARY 6, 1992

APPENDIX C

HEC-2 OUTPUT WEST CHANNEL AT SPLIT - TRILBY WASH

==========
B O S S H E C - 2 (tm)
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Version : 2.50
Serial Number : 0010169.200

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PROGRAM ORIGIN :

Boss Hec-2 (tm) is an enhanced version of the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-2 program for water-surface profile computations. Program based upon the September 1990 version, updated on August 1991.

DISCLAIMER :

Boss Hec-2 (tm) is a complex program which requires engineering expertise to use correctly. Boss Corporation assumes absolutely no responsibility for the correct use of this program. All results obtained should be carefully examined by an experienced professional engineer to determine if they are reasonable and accurate.

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PROJECT DESCRIPTION :

PROJECT TITLE : TRILBY WASH; GRAND AVENUE TO C.A.P.
PROJECT NUMBER : P&D No. 10320.00; FCD No. 90-24
DESCRIPTION : WEST CHANNEL; ENCROACHED
ENGINEER : RAMESH I. PATEL, P.E., L.S.
DATE OF RUN : 10/21/1991
TIME OF RUN : 4:25 pm

T1 P&D No. 10320.00; FCD No. 90-24
T2 TRILBY WASH; GRAND AVENUE TO C.A.P.
T3 WEST CHANNEL; ENCROACHED

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	2	0	0	0.000000	0	0.0	0.0	1742.13	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15

USER-DEFINED SUMMARY TABLES (J3) :

110 200

NC	0.075	0.075	0.055	0.6	0.8					
NH	7	0.10	9908.7	0.06	9949.4	0.10	9982.3	0.06	10020.6	0.10
NH	10068.	0.06	10144.2	0.10	10507.3					
QT	2	3035.0	3035.0							
ET			9.1						9784.0	10198.0
X1	15.581	90	9982.3	10144.2	0.0	0.0	0.0	1.0	0.0	0
GR	1742.9	9430.9	1742.9	9431.0	1742.9	9431.1	1742.9	9431.2	1742.9	9442.3
GR	1742.6	9456.4	1742.4	9472.8	1741.6	9487.2	1740.6	9506.0	1740.6	9520.1
GR	1740.1	9533.2	1740.5	9542.0	1740.8	9552.7	1739.8	9560.8	1740.4	9572.5
GR	1741.0	9585.0	1740.8	9601.9	1741.2	9615.3	1741.0	9628.0	1740.2	9640.3
GR	1740.2	9645.8	1740.9	9657.5	1740.7	9669.5	1740.9	9681.2	1741.2	9699.2
GR	1741.1	9714.2	1740.8	9731.2	1740.8	9748.1	1741.1	9766.0	1741.4	9784.2
GR	1741.2	9803.5	1741.1	9823.3	1741.3	9843.9	1741.4	9866.8	1741.5	9888.3
GR	1741.5	9908.7	1740.7	9921.4	1740.4	9928.0	1738.5	9935.0	1740.2	9942.5
GR	1741.3	9949.4	1741.3	9956.4	1740.9	9973.0	1741.0	9982.3	1738.8	9990.9
GR	1738.8	9998.5	1738.8	10000.0	1738.8	10000.1	1739.6	10006.9	1740.8	10013.8
GR	1741.3	10020.6	1741.3	10029.9	1741.4	10047.2	1741.6	10062.2	1741.6	10068.8
GR	1740.8	10079.4	1739.3	10088.8	1737.5	10096.2	1737.2	10106.8	1737.6	10114.7
GR	1739.2	10120.4	1739.6	10126.9	1739.7	10134.4	1740.2	10144.2	1739.8	10152.9
GR	1740.1	10162.5	1740.5	10169.9	1741.3	10178.7	1741.7	10190.3	1741.8	10198.1
GR	1741.3	10209.9	1739.8	10217.8	1739.2	10222.9	1740.3	10228.6	1740.8	10238.5
GR	1741.0	10248.8	1741.2	10261.0	1740.9	10272.6	1740.8	10287.0	1741.3	10303.3
GR	1741.5	10320.1	1741.7	10341.3	1742.0	10358.8	1743.2	10375.6	1744.0	10391.2
GR	1744.9	10409.0	1744.9	10423.7	1745.2	10437.5	1745.3	10451.7	1745.7	10507.3
NH	7	0.10	9882.6	0.06	10019.0	0.10	10108.2	0.06	10169.3	0.10
NH	10290.	0.06	10420.0	0.10	10620.0					
ET			9.1						9889.0	10230.0

```
X1    15.637       58   9975.9  10019.0     285.0     300.0     295.0       1.0       0.0         0
GR    1745.6   9808.4   1745.6   9823.7    1745.6    9842.1    1745.6    9857.2    1745.6    9871.1
GR    1745.2   9882.6   1744.4   9891.7    1742.2    9901.7    1742.5    9905.6    1744.3    9926.7
GR    1742.4   9946.8   1742.7   9951.6    1744.3    9961.0    1744.7    9975.9    1744.4    9983.1
GR    1742.4   9989.9   1742.2   9998.6    1742.0   10000.0    1742.0   10000.1    1742.7   10007.2
GR    1743.9  10012.8   1745.0  10019.0    1745.2   10025.6    1745.2   10033.1    1745.9   10061.0
GR    1745.3  10090.2   1744.7  10100.0    1743.8   10108.2    1743.5   10124.4    1741.9   10130.9
GR    1739.4  10137.8   1739.4  10143.7    1739.5   10150.6    1740.3   10156.2    1741.7   10162.7
GR    1742.5  10169.3   1742.6  10175.6    1742.5   10182.0    1742.7   10188.2    1743.2   10194.5
GR    1743.7  10201.2   1744.2  10209.4    1744.7   10216.7    1744.8   10225.2    1745.0   10230.0
GR    1744.0  10255.0   1744.0  10290.0    1742.0   10335.0    1740.0   10360.0    1741.8   10380.0
GR    1742.0  10400.0   1744.0  10420.0    1744.5   10440.0    1744.0   10460.0    1743.6   10490.0
GR    1744.0  10520.0   1746.0  10550.0    1747.0   10620.0

NH         5      0.10   9929.7      0.06  10015.0      0.10  10260.0      0.06   10360.6      0.10
NH    10515.
ET                        9.1                                                     9929.0   10388.0
X1    15.683       59   9929.7  10015.0     235.0     255.0     245.0       1.0       0.0         0
GR    1748.9   9830.0   1748.0   9895.0    1747.0    9929.7    1746.0    9945.0    1745.0    9951.7
GR    1746.4   9959.0   1746.9   9966.7    1747.1    9970.6    1747.0    9978.4    1746.4    9986.0
GR    1744.4   9994.2   1744.1  10000.0    1744.1   10000.1    1744.8   10005.7    1746.0   10010.0
GR    1748.0  10015.0   1748.2  10030.0    1748.0   10040.0    1747.8   10060.0    1748.0   10080.0
GR    1748.1  10090.0   1748.0  10095.0    1748.0   10145.0    1748.3   10170.0    1748.0   10215.0
GR    1746.8  10221.0   1746.4  10235.3    1746.1   10248.0    1745.8   10260.0    1744.7   10269.6
GR    1742.9  10277.8   1741.1  10285.3    1741.0   10292.4    1741.4   10298.6    1742.5   10301.6
GR    1744.1  10305.4   1744.9  10309.8    1744.6   10315.3    1743.0   10322.5    1741.9   10329.6
GR    1741.7  10335.4   1742.0  10339.4    1743.8   10344.1    1745.2   10352.3    1745.5   10360.6
GR    1746.3  10369.4   1746.9  10378.0    1747.0   10387.5    1747.0   10397.2    1746.5   10407.9
GR    1746.2  10422.5   1746.0  10435.2    1746.2   10444.7    1746.3   10452.8    1746.5   10466.3
GR    1746.8  10470.0   1748.0  10480.0    1748.1   10502.3    1748.2   10515.0

NH         7      0.08   9977.2      0.06  10028.1      0.08  10173.3      0.06   10212.1      0.08
NH    10371.      0.06  10545.2      0.08  10795.0
QT         2    1745.0   1870.0
ET                  7.1      9.1                              10247.9   10795.0   10356.0   10580.0
N PT. 16 - START SPLIT FLOW - Q=1745 CFS WEST

X1    15.749       91  10412.0  10474.7     380.0     370.0     370.0       1.0       0.0         0
GR    1752.3   9740.0   1752.0   9778.0    1750.7    9792.6    1750.2    9800.7    1747.9    9807.2
GR    1747.7   9811.6   1749.5   9815.5    1750.8    9822.8    1750.7    9830.4    1750.9    9846.5
GR    1751.2   9856.8   1750.9   9861.1    1749.3    9869.1    1749.5    9874.1    1750.8    9882.2
GR    1750.8   9894.3   1751.0   9908.2    1750.8    9918.9    1750.9    9931.1    1751.1    9940.5
GR    1751.2   9950.4   1751.3   9958.7    1751.6    9967.6    1751.6    9977.2    1751.2    9982.7
GR    1748.7   9992.4   1748.1   9996.9    1748.2   10000.0    1748.2   10000.1    1748.6   10004.8
GR    1750.4  10008.4   1751.8  10013.5    1752.1   10028.1    1751.8   10057.5    1751.4   10081.4
GR    1751.5  10107.6   1751.5  10126.5    1750.7   10145.5    1750.3   10155.9    1750.8   10169.2
GR    1750.7  10173.3   1745.7  10183.3    1750.1   10191.9    1750.5   10196.6    1750.9   10212.1
GR    1751.4  10222.8   1752.6  10234.9    1753.1   10247.9    1752.0   10262.0    1751.8   10283.9
GR    1751.6  10293.2   1751.3  10311.3    1751.4   10324.1    1751.0   10343.2    1750.5   10356.7
GR    1749.9  10371.6   1749.6  10382.0    1748.7   10396.4    1747.8   10400.1    1748.6   10407.2
GR    1749.1  10412.0   1748.7  10416.5    1745.6   10423.6    1745.4   10427.7    1745.7   10434.1
GR    1746.8  10441.3   1747.5  10449.6    1748.3   10457.3    1748.4   10465.3    1748.5   10474.7
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GR    1748.2    10483.1    1746.7    10490.1    1746.6    10495.2    1747.4    10500.5    1747.5    10505.9
GR    1747.2    10509.3    1748.7    10518.2    1748.8    10524.7    1748.8    10531.3    1749.1    10545.2
GR    1750.5    10565.9    1750.7    10573.6    1750.7    10585.1    1750.7    10598.3    1750.0    10630.0
GR    1748.0    10690.0    1747.0    10700.0    1748.0    10710.0    1750.0    10720.0    1752.0    10730.0
GR    1753.6    10795.0

NH        7       0.08    9960.2      0.06    10026.9      0.08    10159.0      0.06    10259.3      0.08
NH    10771.      0.06    10847.3     0.08    10970.0
ET                7.1      9.1                                    10432.2               10566.0    10860.0
X1    15.842       81    10803.9    10847.3     460.0     445.0     450.0       1.0       0.0         0
GR    1758.0    9765.0    1756.5     9850.0    1757.0    9892.0    1757.3    9906.6    1757.2    9925.6
GR    1756.9    9937.2    1756.4     9943.8    1756.7    9951.4    1756.8    9960.2    1755.6    9967.1
GR    1755.5    9975.1    1755.3     9979.6    1754.4    9987.2    1754.2    10000.0   1754.2    10007.4
GR    1755.4    10011.9   1757.2     10018.1   1757.5    10026.9   1757.5    10040.2   1757.4    10052.1
GR    1757.1    10066.1   1757.1     10079.0   1756.8    10159.0   1754.6    10167.2   1755.1    10174.1
GR    1755.9    10180.2   1755.8     10185.6   1756.1    10191.4   1756.6    10201.3   1756.7    10210.5
GR    1756.6    10221.1   1756.2     10231.5   1755.0    10237.1   1754.3    10242.9   1755.6    10248.9
GR    1756.9    10259.3   1756.9     10271.8   1756.5    10287.7   1756.4    10316.1   1756.6    10329.7
GR    1757.5    10341.9   1759.4     10425.1   1759.4    10432.2   1758.3    10449.2   1757.6    10469.2
GR    1756.9    10482.2   1751.8     10626.4   1751.6    10630.7   1753.1    10639.0   1753.1    10646.7
GR    1752.4    10656.7   1751.5     10663.4   1751.1    10666.9   1752.1    10672.7   1753.7    10681.7
GR    1753.8    10690.6   1754.0     10702.1   1753.9    10720.6   1753.5    10733.7   1753.2    10744.0
GR    1753.0    10756.4   1752.7     10766.1   1752.9    10771.9   1752.2    10778.2   1751.0    10784.5
GR    1752.3    10790.4   1752.9     10796.5   1753.1    10803.9   1753.1    10812.2   1752.2    10817.3
GR    1750.7    10823.5   1749.1     10830.5   1748.6    10838.1   1749.5    10843.2   1751.4    10847.3
GR    1752.8    10855.3   1754.9     10863.8   1755.3    10868.3   1755.7    10879.9   1756.0    10885.0
GR    1756.5    10970.0

NH        5       0.08    9974.5      0.06    10068.3      0.08    10940.0      0.06    10999.0      0.08
NH    11080.
ET                7.1      9.1                                    10430.5    11009.3    10631.0    11000.0
X1    15.890       96    10940.0    10999.0     315.0     325.0     320.0       1.0       0.0         0
GR    1760.8    9704.7    1759.6     9797.4    1759.4    9804.0    1759.4    9817.7    1759.5    9832.0
GR    1759.5    9847.1    1759.5     9864.0    1759.5    9882.3    1759.7    9897.7    1759.8    9913.0
GR    1759.8    9931.3    1760.1     9948.1    1760.3    9964.6    1760.5    9974.5    1760.3    9981.4
GR    1759.7    9986.6    1757.0     9993.0    1757.0    9999.9    1756.5    10000.0   1756.5    10000.1
GR    1756.9    10004.6   1758.4     10009.8   1760.2    10017.6   1760.2    10026.5   1760.0    10037.6
GR    1759.0    10045.7   1759.0     10050.5   1758.3    10055.1   1758.8    10061.6   1760.0    10068.3
GR    1759.9    10076.1   1759.5     10087.6   1759.4    10099.9   1759.5    10111.2   1760.2    10122.4
GR    1760.8    10132.7   1760.8     10145.4   1760.2    10155.0   1759.6    10163.3   1758.1    10170.2
GR    1759.6    10177.1   1760.2     10181.9   1760.2    10190.8   1760.2    10203.7   1759.8    10213.4
GR    1759.6    10223.5   1759.1     10230.1   1758.4    10236.9   1758.6    10241.3   1759.7    10245.7
GR    1759.8    10255.7   1759.9     10268.3   1760.4    10281.9   1760.4    10293.3   1762.3    10430.5
GR    1760.9    10542.7   1756.8     10656.1   1756.1    10665.2   1757.0    10671.6   1755.6    10680.5
GR    1756.7    10687.0   1756.9     10693.2   1756.5    10707.3   1756.5    10716.4   1756.3    10728.1
GR    1756.6    10738.4   1756.8     10751.9   1757.2    10765.3   1757.4    10778.2   1757.3    10793.2
GR    1756.6    10804.7   1756.0     10814.5   1756.6    10823.6   1756.4    10833.0   1755.7    10840.5
GR    1756.4    10849.2   1756.9     10856.6   1756.8    10866.3   1756.7    10879.4   1756.8    10892.6
GR    1756.9    10906.0   1756.6     10919.6   1756.1    10931.6   1755.8    10940.0   1755.7    10949.2
GR    1755.2    10959.4   1752.3     10969.1   1752.0    10979.9   1752.1    10989.8   1754.7    10995.4
GR    1757.9    10999.0   1758.6     11009.3   1758.6    11021.9   1758.0    11040.0   1757.0    11065.0
GR    1758.0    11080.0
```

```
NH        5      0.08    9982.7      0.06   10051.2      0.08   10847.8      0.06   10998.5      0.08
NH   11147.
QT        2    1145.0    1270.0
ET               7.1       9.1                           10791.8              10817.0   11057.0
Q=1145 CFS - WEST CHANNEL

X1   15.898        97   10872.8   10998.5     285.0     320.0     300.0       1.0       0.0         0
GR   1759.0    9525.5    1759.1    9533.3    1759.8    9555.4    1759.6    9580.8    1759.8    9601.5
GR   1760.2    9620.6    1760.5    9639.7    1760.4    9647.1    1759.8    9654.4    1760.4    9666.5
GR   1761.0    9691.0    1760.6    9719.7    1760.4    9743.6    1759.7    9832.5    1760.0    9886.9
GR   1760.3    9904.5    1760.2    9919.4    1760.6    9934.2    1760.6    9949.4    1760.3    9966.1
GR   1760.5    9973.6    1760.8    9982.7    1760.0    9986.6    1757.4    9992.4    1757.4    9999.9
GR   1757.3   10000.0    1757.6   10007.1    1759.8   10011.4    1760.5   10018.1    1760.7   10030.3
GR   1760.4   10039.1    1759.0   10051.2    1759.1   10056.3    1760.1   10062.2    1760.3   10068.3
GR   1760.4   10079.1    1760.5   10087.6    1760.0   10095.9    1760.1   10104.5    1760.6   10113.8
GR   1761.2   10123.7    1761.2   10133.5    1760.7   10143.4    1759.8   10153.9    1758.7   10159.3
GR   1760.0   10166.2    1760.4   10173.3    1760.4   10185.0    1760.4   10192.2    1760.5   10208.2
GR   1760.4   10228.4    1760.4   10245.0    1760.6   10265.3    1760.5   10271.4    1760.0   10282.9
GR   1758.8   10292.1    1759.6   10298.3    1760.3   10308.7    1760.8   10320.3    1763.7   10468.7
GR   1760.7   10528.4    1763.9   10569.8    1758.4   10641.6    1760.0   10772.0    1761.1   10791.8
GR   1759.7   10825.2    1759.5   10834.6    1759.8   10847.8    1760.1   10859.8    1760.1   10872.8
GR   1759.5   10884.1    1758.5   10895.0    1756.8   10904.9    1756.9   10916.2    1757.6   10919.9
GR   1759.2   10930.7    1759.1   10935.2    1758.4   10945.3    1756.2   10954.8    1757.0   10961.0
GR   1756.8   10965.1    1754.3   10971.9    1754.6   10978.4    1755.6   10983.5    1757.9   10990.8
GR   1759.6   10998.5    1759.3   11006.7    1759.5   11017.0    1759.5   11023.2    1759.4   11036.3
GR   1759.8   11048.6    1760.2   11061.7    1761.2   11079.8    1762.2   11099.7    1762.7   11117.3
GR   1763.3   11133.8    1763.3   11147.5

NH        7      0.08    9937.6      0.06   10006.6      0.08   10797.9      0.06   10835.4      0.08
NH   10881.      0.06   10924.0      0.08   10976.9
QT        2    1120.0    1245.0
ET               7.1       9.1                           10739.8              10797.0   10942.0
Q=1120 CFS

X1   15.932        88   10797.9   10835.4     245.0     290.0     260.0       1.0       0.0         0
GR   1763.8    9750.6    1763.2    9768.5    1762.3    9781.9    1762.0    9798.8    1761.9    9810.9
GR   1761.9    9826.2    1762.2    9840.5    1762.4    9856.9    1762.6    9874.2    1762.8    9893.7
GR   1763.0    9913.0    1762.7    9928.7    1762.7    9937.6    1762.7    9945.3    1761.6    9955.0
GR   1760.5    9963.5    1760.1    9974.9    1759.7    9982.1    1760.0   10000.0    1760.0   10000.1
GR   1760.9   10002.2    1762.0   10006.6    1762.0   10016.6    1762.2   10033.3    1762.7   10055.1
GR   1762.7   10075.3    1762.7   10096.6    1762.6   10112.4    1762.3   10123.6    1761.6   10129.4
GR   1761.1   10137.8    1761.7   10141.9    1761.8   10144.9    1761.2   10150.9    1762.4   10158.8
GR   1763.0   10167.1    1762.8   10177.5    1762.8   10186.3    1762.9   10198.8    1762.8   10211.5
GR   1762.8   10234.4    1762.5   10250.6    1762.4   10265.6    1762.4   10279.5    1762.0   10286.4
GR   1761.4   10296.6    1761.9   10309.5    1762.3   10320.5    1762.1   10332.3    1762.3   10342.7
GR   1762.9   10355.7    1763.4   10368.6    1764.7   10398.1    1765.2   10421.4    1765.8   10455.8
GR   1764.0   10500.0    1765.3   10525.0    1764.0   10560.0    1762.0   10580.0    1760.0   10605.0
GR   1762.0   10620.0    1762.5   10630.0    1762.0   10640.0    1761.0   10660.0    1762.0   10700.0
GR   1764.0   10722.0    1764.4   10739.8    1764.3   10754.5    1763.9   10768.2    1763.9   10781.8
GR   1763.9   10792.7    1763.8   10797.9    1761.7   10806.9    1760.2   10814.7    1760.0   10819.8
GR   1760.7   10825.0    1763.2   10830.4    1763.8   10835.4    1764.1   10853.5    1763.8   10862.1
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GR    1763.6    10871.3    1763.4    10881.4    1762.9    10892.2    1760.7    10901.1    1760.1    10907.1
GR    1763.1    10924.0    1764.1    10953.7    1765.2    10976.9

NH        5      0.08     9964.6      0.06    10036.6      0.08    10560.4      0.06    10622.4      0.08
NH    10995.
ET               7.1       9.1                                    10378.7    10679.2    10398.0    10677.0
X1    16.021      88    10560.4    10622.4     480.0     490.0     490.0       1.0       0.0         0
GR    1770.3    9679.3    1768.5     9731.4    1768.3    9749.4    1768.3    9768.5    1768.0    9785.3
GR    1768.0    9802.3    1767.8     9813.4    1767.4    9819.2    1768.4    9828.8    1768.2    9845.1
GR    1768.2    9858.2    1767.9     9867.2    1768.4    9878.6    1768.3    9898.2    1768.3    9914.2
GR    1767.9    9922.2    1766.2     9928.9    1766.2    9932.8    1767.3    9938.1    1767.6    9944.9
GR    1768.6    9955.6    1768.7     9964.6    1768.0    9974.8    1765.6    9985.3    1765.3    9996.9
GR    1765.0   10000.0    1765.0    10000.1    1765.4   10006.9    1767.3   10013.9    1767.7   10016.8
GR    1768.1   10024.8    1768.3    10036.6    1768.2   10049.1    1768.4   10064.6    1768.7   10079.2
GR    1768.8   10098.4    1768.8    10118.7    1768.3   10134.7    1768.9   10146.8    1770.0   10159.1
GR    1769.6   10170.9    1769.0    10182.5    1768.5   10192.1    1768.3   10200.8    1769.2   10236.1
GR    1767.4   10254.1    1768.3    10261.4    1768.7   10273.0    1768.7   10284.7    1768.3   10294.4
GR    1769.0   10302.0    1768.5    10306.5    1767.2   10313.0    1767.3   10318.6    1768.9   10324.8
GR    1769.8   10341.3    1771.6    10362.5    1771.6   10378.7    1771.4   10393.6    1770.5   10407.1
GR    1769.3   10459.9    1770.3    10499.6    1770.5   10511.0    1769.5   10522.2    1769.9   10536.8
GR    1770.0   10549.3    1770.2    10560.4    1769.6   10571.8    1768.0   10580.6    1766.7   10588.4
GR    1766.6   10595.0    1768.0    10603.6    1769.7   10615.2    1769.9   10622.4    1769.4   10633.6
GR    1768.9   10647.2    1769.1    10656.0    1770.7   10670.2    1771.2   10679.5    1771.2   10688.1
GR    1770.0   10710.0    1769.7    10760.0    1770.0   10790.0    1771.3   10830.0    1770.0   10875.0
GR    1768.0   10925.0    1770.0    10970.0    1770.4   10995.0

NH        5      0.08     9969.8      0.06    10045.6      0.08    10329.9      0.06    10385.7      0.08
NH    10735.
ET               7.1       9.1                                    10258.6    10531.5    10307.0    10425.0
X1    16.112      62    10329.9    10385.7     230.0     200.0     210.0       1.0       0.0         0
GR    1775.1    9660.    1774.0     9688.    1773.0    9696.    1774.0    9703.    1776.0    9710.
GR    1776.3    9721.1    1776.1     9729.9    1775.7    9739.8    1775.3    9748.0    1774.5    9756.4
GR    1774.3    9766.4    1774.2     9777.7    1773.7    9789.8    1773.5    9804.1    1773.1    9813.5
GR    1773.9    9916.9    1773.3     9924.6    1772.5    9931.8    1772.8    9941.3    1773.5    9951.3
GR    1773.7    9960.5    1774.0     9969.8    1773.0    9975.6    1771.1    9983.4    1769.6    9991.7
GR    1769.7   10000.0    1769.7    10000.1    1769.7   10008.7    1770.3   10013.0    1772.8   10017.3
GR    1774.0   10045.6    1773.4    10069.5    1772.4   10088.5    1772.7   10109.1    1773.9   10184.8
GR    1773.2   10212.5    1773.7    10224.8    1774.5   10236.7    1774.9   10247.7    1775.0   10258.6
GR    1774.9   10269.7    1774.5    10278.7    1773.7   10289.8    1773.2   10304.3    1772.7   10317.5
GR    1772.1   10329.9    1770.9    10341.3    1769.6   10352.3    1769.3   10360.5    1769.1   10367.2
GR    1770.5   10374.2    1771.7    10385.7    1772.1   10399.3    1772.4   10424.7    1771.6   10447.3
GR    1772.1   10483.7    1774.3    10531.5    1774.0   10560.0    1772.0   10590.0    1770.0   10640.0
GR    1772.0   10710.0    1773.0    10735.0

NH        5      0.08     9978.2      0.06    10033.1      0.08    10175.9      0.06    10221.8      0.08
NH    10370.
QT        2    1120.0     2995.0
ET               7.1       9.1                                    10050.2                9926.0    10252.0
X1    16.164      53    10175.9    10221.8     380.0     410.0     400.0       1.0       0.0         0
GR    1778.0    9650.0    1778.0     9675.0    1776.0    9685.0    1774.5    9700.0    1776.0    9715.0
GR    1776.8    9725.7    1776.9     9735.7    1776.7    9748.8    1776.7    9761.9    1776.4    9776.0
GR    1776.4    9790.6    1776.4     9807.2    1776.5    9820.1    1776.4    9839.9    1776.3    9860.6
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GR   1776.4    9882.5    1776.4    9897.5    1776.9    9919.2    1777.1    9934.0    1777.3    9948.5
GR   1777.4    9964.6    1777.4    9978.2    1777.1    9985.2    1772.9    9990.6    1772.6   10000.0
GR   1772.6   10000.1    1772.9   10007.2    1773.9   10011.8    1776.6   10016.2    1777.6   10022.5
GR   1778.0   10033.1    1778.2   10050.2    1778.2   10067.1    1778.2   10084.5    1778.2   10098.0
GR   1778.2   10111.2    1777.3   10125.6    1776.9   10139.2    1777.1   10153.2    1777.3   10165.1
GR   1777.0   10175.9    1775.4   10184.7    1773.7   10194.5    1773.4   10204.3    1774.0   10210.6
GR   1776.3   10221.8    1777.2   10235.0    1777.4   10251.6    1777.4   10265.2    1777.4   10279.5
GR   1777.9   10309.8    1778.0   10320.0    1778.4   10370.0

NC     0.08      0.08      0.06       0.0       0.0
QT        2    2995.0    2995.0
ET               7.1       9.1                                            10115.5    9926.0   10080.0
Q=2995 CFS - END SPLIT FLOW

X1   16.254        45    9933.9   10039.8     475.0     475.0     485.0       1.0       0.0         0
GR   1783.8    9680.0    1783.3    9730.0    1783.7    9775.0    1782.3    9805.0    1783.2    9830.0
GR   1783.2    9918.0    1783.5    9925.7    1782.9    9933.9    1780.5    9944.3    1779.3    9956.8
GR   1778.6    9968.7    1778.4    9980.8    1777.8    9988.8    1777.2    9994.1    1776.9   10000.0
GR   1776.9   10000.1    1777.5   10007.3    1779.1   10014.1    1779.9   10023.9    1781.4   10031.2
GR   1782.1   10039.8    1782.0   10044.7    1781.7   10049.6    1782.7   10057.9    1783.0   10069.5
GR   1783.5   10082.9    1783.6   10101.1    1783.7   10115.5    1783.2   10129.9    1782.4   10144.5
GR   1781.9   10164.4    1781.6   10179.5    1781.8   10197.7    1782.3   10214.4    1782.0   10230.5
GR   1782.0   10280.0    1780.0   10360.0    1778.0   10370.0    1777.0   10380.0    1778.0   10385.0
GR   1780.0   10400.0    1780.5   10425.0    1780.2   10440.0    1782.0   10460.0    1784.0   10530.0
     STATUS: Analyzing profile 1.

  Contraction Coefficient (CCHV)                                   .600

  Expansion Coefficient (CEHV)                                     .800

     STATUS: (1490) NH card used.

     STATUS: Analyzing cross-section reach 15.581.
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Cross Section Number SECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient SLOPE (ft/ft)	Left Overbank Length XLOBL (ft)	Channel Length XLCH (ft)	Right Overbank Length XLOBR (ft)	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
Cummul-ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Travel Time TIME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONT
15.581	.090	.056	.100	4.93	1742.13	.00	1742.13
.009119	0	0	0	1742.29	.16	.00	.00
.00	603	348	238	.00	1741.00	1740.20	0
3035	1143	1468	422	883.0	9477.66	10360.62	0
.00	1.89	4.21	1.77	.000	.0	1737.20	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 15.581
Total Discharge (cfs, Q) 3035
Computed Water Surface Elevation (ft MSL, CWSEL) 1742.13

Station (ft) =	9477.7	9533.2	9560.8	9601.9	9645.8	9699.2
Flow (%) =	3.9	3.1	4.0	3.3	3.9	
Area (sq ft) =	66.8	46.8	62.4	57.7	69.4	
Vel (ft/s) =	1.78	2.02	1.92	1.75	1.71	
Depth (ft) =	1.20	1.69	1.52	1.31	1.30	

Station (ft) =	9699.2	9766.0	9843.9	9928.0	9942.5	9982.3
Flow (%) =	4.1	3.1	3.8	5.9	2.5	
Area (sq ft) =	78.4	70.6	68.8	39.6	43.4	
Vel (ft/s) =	1.59	1.33	1.68	4.53	1.78	
Depth (ft) =	1.17	.91	.82	2.73	1.09	

Station (ft) =	9982.3	10020.6	10062.2	10144.2	10162.5	10222.9
Flow (%) =	12.4	1.2	34.8	3.1	4.0	
Area (sq ft) =	90.4	30.7	227.5	39.5	67.4	
Vel (ft/s) =	4.16	1.16	4.65	2.37	1.82	
Depth (ft) =	2.36	.74	2.77	2.16	1.12	

Station (ft) =	10222.9	10261.0	10341.3	10360.6
Flow (%) =	3.4	3.3	.1	
Area (sq ft) =	54.4	72.1	5.0	
Vel (ft/s) =	1.89	1.39	.60	
Depth (ft) =	1.43	.90	.26	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.637.

STATUS: (3265) Divided flow.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.637	.060	.060	.063	5.21	1744.61	.00	.00
.007831	285	295	300	1744.83	.22	2.49	.05
6.79	95	57	671	.00	1744.70	1745.00	2
3035	256	162	2615	526.5	9889.27	10529.21	0
.02	2.69	2.82	3.90	.000	4.7	1739.40	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.637
Total Discharge (cfs, Q)	3035
Computed Water Surface Elevation (ft MSL, CWSEL)	1744.61

Station (ft) =	9889.3	9926.7	9951.6	9972.7	10019.0	10137.8
Flow (%) =	4.3	3.3	.8	5.4	7.3	
Area (sq ft) =	47.8	35.3	12.3	57.6	58.4	
Vel (ft/s) =	2.74	2.83	2.08	2.82	3.78	
Depth (ft) =	1.28	1.42	.58	1.48	.49	

Station (ft) =	10137.8	10143.7	10150.6	10156.2	10162.7	10175.6
Flow (%) =	6.7	7.7	5.3	3.9	3.1	
Area (sq ft) =	30.8	35.6	26.4	23.5	29.6	
Vel (ft/s) =	6.59	6.55	6.12	5.08	3.20	
Depth (ft) =	5.21	5.16	4.71	3.61	2.29	

Station (ft) =	10175.6	10255.0	10335.0	10360.0	10380.0	10400.0
Flow (%) =	3.1	7.9	15.3	12.8	7.6	
Area (sq ft) =	55.4	94.1	90.3	74.3	54.3	
Vel (ft/s) =	1.69	2.54	5.15	5.24	4.26	
Depth (ft) =	.70	1.18	3.61	3.71	2.71	

Station (ft) =	10400.0	10420.0	10529.2
Flow (%) =	3.2	2.2	
Area (sq ft) =	32.3	66.2	
Vel (ft/s) =	3.01	1.02	
Depth (ft) =	1.61	.61	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.683.

STATUS: (3265) Divided flow.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.683	.100	.060	.062	6.02	1747.02	.00	.00
.012455	235	245	255	1747.54	.52	2.47	.24
10.78	0	85	465	.00	1747.00	1748.00	2
3035	0	255	2779	327.6	9929.02	10471.83	0
.03	.02	2.99	5.98	.000	7.2	1741.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.683
Total Discharge (cfs, Q)	3035
Computed Water Surface Elevation (ft MSL, CWSEL)	1747.02

Station (ft) =	9929.0	10015.0	10269.6	10277.8	10285.3	10292.4
Flow (%) =	8.4	3.6	5.2	9.9	12.7	
Area (sq ft) =	85.5	45.7	26.4	37.6	42.4	
Vel (ft/s) =	2.99	2.40	5.93	7.95	9.10	
Depth (ft) =	1.14	.18	3.22	5.02	5.97	

Station (ft) =	10292.4	10298.6	10301.6	10309.8	10322.5	10329.6
Flow (%) =	10.6	3.9	4.8	6.5	8.1	
Area (sq ft) =	36.1	15.2	25.2	35.7	32.4	
Vel (ft/s) =	8.93	7.82	5.75	5.52	7.55	
Depth (ft) =	5.82	5.07	3.08	2.81	4.57	

Station (ft) =	10329.6	10335.4	10339.4	10344.1	10352.3	10435.2
Flow (%) =	8.3	5.6	4.3	3.5	3.5	
Area (sq ft) =	30.3	20.7	19.4	20.7	52.5	
Vel (ft/s) =	8.31	8.25	6.79	5.07	2.05	
Depth (ft) =	5.22	5.17	4.12	2.52	.63	

Station (ft) =	10435.2	10471.8
Flow (%) =	1.1	
Area (sq ft) =	24.9	
Vel (ft/s) =	1.35	
Depth (ft) =	.68	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.749.

STATUS: (3265) Divided flow.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10247.90
Right Encroachment Station (ft, STENCR)	10795.00
Encroachment Method (TYPE)	1
Width or Percent Target	547.100

N PT. 16 - START SPLIT FLOW - Q=1745 CFS WEST

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.749	.060	.060	.068	5.15	1750.55	.00	.00
.004240	380	370	370	1750.68	.13	2.90	.23
15.84	67	201	369	.00	1749.10	1748.50	2
1745	146	701	896	330.9	10355.18	10722.78	0
.07	2.18	3.48	2.43	.000	10.0	1745.40	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 15.749
Total Discharge (cfs, Q) 1745
Computed Water Surface Elevation (ft MSL, CWSEL) 1750.55

Station (ft) =	10355.2	10396.4	10407.2	10412.0	10474.7	10490.1
Flow (%) =	3.3	4.1	1.1	40.2	7.1	
Area (sq ft) =	33.9	25.3	8.2	201.6	40.3	
Vel (ft/s) =	1.68	2.82	2.29	3.48	3.08	
Depth (ft) =	.82	2.34	1.71	3.22	2.62	

Station (ft) =	10490.1	10495.2	10500.5	10505.9	10518.2	10531.3
Flow (%) =	4.6	4.0	3.3	6.2	3.2	
Area (sq ft) =	19.9	18.8	16.8	34.1	23.3	
Vel (ft/s) =	4.00	3.73	3.43	3.18	2.37	
Depth (ft) =	3.91	3.56	3.11	2.77	1.78	

Station (ft) =	10531.3	10565.9	10690.0	10700.0	10710.0	10722.8
Flow (%) =	3.7	8.9	4.4	4.4	1.5	
Area (sq ft) =	38.0	100.4	30.6	30.6	16.3	
Vel (ft/s) =	1.71	1.55	2.54	2.54	1.55	
Depth (ft) =	1.10	.81	3.06	3.06	1.28	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.842.

STATUS: (3265) Divided flow.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) .50

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10432.20
Right Encroachment Station (ft, STENCR)	10970.00
Encroachment Method (TYPE)	1
Width or Percent Target	-10432.200

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.842	.073	.060	.080	5.30	1753.90	.00	.00
.017234	460	450	445	1754.36	.45	3.42	.26
21.15	236	133	16	.00	1753.10	1751.40	2
1745	779	909	55	271.4	10566.73	10859.79	0
.10	3.30	6.79	3.30	.000	13.1	1748.60	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.842
Total Discharge (cfs, Q)	1745
Computed Water Surface Elevation (ft MSL, CWSEL)	1753.90

Station (ft) =	10566.7	10626.4	10639.0	10663.4	10672.7	10756.4
Flow (%) =	9.1	4.7	5.4	5.7	3.2	
Area (sq ft) =	63.0	22.5	31.0	22.5	29.5	
Vel (ft/s) =	2.53	3.62	3.04	4.38	1.92	
Depth (ft) =	1.06	1.78	1.27	2.42	.35	

Station (ft) =	10756.4	10778.2	10784.5	10790.4	10803.9	10847.3
Flow (%) =	4.7	4.7	4.2	3.0	52.1	
Area (sq ft) =	25.3	14.6	13.3	14.7	133.9	
Vel (ft/s) =	3.27	5.62	5.51	3.50	6.79	
Depth (ft) =	1.16	2.31	2.26	1.09	3.09	

Station (ft) =	10847.3	10859.8
Flow (%) =	3.2	
Area (sq ft) =	17.0	
Vel (ft/s) =	3.30	
Depth (ft) =	1.36	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.890.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.48

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10430.50
Right Encroachment Station (ft, STENCR)	11009.30
Encroachment Method (TYPE)	1
Width or Percent Target	578.800

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.890	.080	.060	.000	5.71	1757.71	.00	.00
.007865	315	320	325	1758.01	.30	3.57	.09
24.52	315	224	0	.00	1755.80	1757.90	4
1745	567	1177	0	367.8	10631.02	10998.78	0
.12	1.80	5.24	.00	.000	15.5	1752.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.890
Total Discharge (cfs, Q)	1745
Computed Water Surface Elevation (ft MSL, CWSEL)	1757.71

Station (ft) =	10631.0	10680.5	10707.3	10738.4	10804.7	10823.6
Flow (%) =	4.1	3.1	4.3	3.2	3.1	
Area (sq ft) =	42.7	29.9	39.2	42.4	26.6	
Vel (ft/s) =	1.68	1.82	1.92	1.32	2.07	
Depth (ft) =	.86	1.12	1.26	.64	1.41	

Station (ft) =	10823.6	10849.2	10892.6	10931.6	10940.0	10999.0
Flow (%) =	4.8	3.8	4.1	2.0	67.5	
Area (sq ft) =	38.2	41.3	40.8	14.8	224.6	
Vel (ft/s) =	2.17	1.60	1.73	2.40	5.24	
Depth (ft) =	1.49	.95	1.05	1.76	3.82	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.898.

STATUS: (3265) Divided flow.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10791.80
Right Encroachment Station (ft, STENCR)	11147.50
Encroachment Method (TYPE)	1
Width or Percent Target	-10791.800

Q=1145 CFS - WEST CHANNEL

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.898	.079	.060	.080	5.75	1760.05	.00	.00
.006537	285	300	320	1760.25	.20	2.17	.06
27.53	12	306	29	.00	1760.10	1759.60	3
1145	9	1105	29	224.0	10816.85	11056.78	0
.14	.76	3.61	1.02	.000	17.4	1754.30	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.898
Total Discharge (cfs, Q)	1145
Computed Water Surface Elevation (ft MSL, CWSEL)	1760.05

Station (ft) =	10816.9	10857.8	10998.5	11056.8
Flow (%) =	.8	96.6	2.6	
Area (sq ft) =	12.2	306.3	29.4	
Vel (ft/s) =	.76	3.61	1.02	
Depth (ft) =	.30	2.46	.50	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.932.

STATUS: (3265) Divided flow.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10739.80
Right Encroachment Station (ft, STENCR)	10976.90
Encroachment Method (TYPE)	1
Width or Percent Target	-10739.800

Q=1120 CFS

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.932	.000	.060	.060	4.00	1763.70	1763.70	.00
.031240	245	260	290	1764.44	.75	3.27	.44
29.09	0	76	85	.00	1763.80	1763.80	4
1120	0	537	582	111.1	10798.34	10941.74	16
.15	.00	7.06	6.80	.000	18.5	1759.70	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.932
Total Discharge (cfs, Q)	1120
Computed Water Surface Elevation (ft MSL, CWSEL)	1763.70

Station (ft) =	10798.3	10835.4	10881.4	10892.2	10901.1	10907.1
Flow (%) =	48.0	.3	1.5	9.9	17.1	
Area (sq ft) =	76.2	2.2	5.9	16.9	19.8	
Vel (ft/s) =	7.06	1.38	2.93	6.58	9.67	
Depth (ft) =	2.10	.05	.55	1.90	3.30	

Station (ft) =	10907.1	10924.0	10941.7
Flow (%) =	22.5	.7	
Area (sq ft) =	35.4	5.3	
Vel (ft/s) =	7.10	1.47	
Depth (ft) =	2.10	.30	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.021.

STATUS: (3280) For cross-section 16.02, ends have been extended vertically .68 feet in order to calculate the hydraulic cross-section properties.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.08

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10378.70
Right Encroachment Station (ft, STENCR)	10679.20
Encroachment Method (TYPE)	1
Width or Percent Target	300.500

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.021	.080	.060	.080	6.08	1771.08	.00	.00
.007244	480	490	490	1771.24	.16	6.45	.35
32.34	180	159	78	.00	1770.20	1769.90	6
1120	317	628	174	278.9	10398.37	10677.31	0
.20	1.75	3.94	2.21	.000	20.7	1765.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	16.021
Total Discharge (cfs, Q)	1120
Computed Water Surface Elevation (ft MSL, CWSEL)	1771.08

Station (ft) =	10398.4	10459.9	10499.6	10536.8	10560.4	10622.4
Flow (%) =	10.0	8.5	6.2	3.7	56.1	
Area (sq ft) =	65.0	50.9	40.1	25.1	159.6	
Vel (ft/s) =	1.73	1.87	1.73	1.65	3.94	
Depth (ft) =	1.06	1.28	1.08	1.06	2.57	

Station (ft) =	10622.4	10647.2	10656.0	10677.3
Flow (%) =	8.6	4.2	2.7	
Area (sq ft) =	42.3	18.3	18.1	
Vel (ft/s) =	2.28	2.58	1.67	
Depth (ft) =	1.71	2.08	.85	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.112.

STATUS: (3280) For cross-section 16.11, ends have been extended vertically .08 feet in order to calculate the hydraulic cross-section properties.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10258.60
Right Encroachment Station (ft, STENCR)	10531.50
Encroachment Method (TYPE)	1
Width or Percent Target	272.900

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.112	.080	.060	.080	3.98	1773.08	.00	.00
.013620	230	210	200	1773.47	.38	2.04	.18
34.04	10	150	117	.00	1772.10	1771.70	4
1120	15	842	261	197.7	10307.37	10505.07	0
.21	1.50	5.59	2.23	.000	21.8	1769.10	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	16.112
Total Discharge (cfs, Q)	1120
Computed Water Surface Elevation (ft MSL, CWSEL)	1773.08

Station (ft) =	10307.4	10329.9	10385.7	10399.3	10424.7	10447.3
Flow (%) =	1.4	75.2	3.5	3.6	5.0	
Area (sq ft) =	10.4	150.8	16.1	21.2	24.5	
Vel (ft/s) =	1.50	5.59	2.42	1.92	2.29	
Depth (ft) =	.46	2.70	1.18	.83	1.08	

Station (ft) =	10447.3	10483.7	10505.1
Flow (%) =	10.0	1.3	
Area (sq ft) =	44.9	10.5	
Vel (ft/s) =	2.49	1.35	
Depth (ft) =	1.23	.49	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.164.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10050.20
Right Encroachment Station (ft, STENCR)	10370.00
Encroachment Method (TYPE)	1
Width or Percent Target	-10050.200

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.164	.080	.060	.080	5.46	1778.06	.00	.00
.011439	380	400	410	1778.51	.45	4.99	.06
36.57	52	155	62	.00	1777.00	1776.30	5
1120	97	917	104	214.3	10113.41	10327.75	0
.23	1.85	5.92	1.67	.000	23.7	1772.60	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	16.164
Total Discharge (cfs, Q)	1120
Computed Water Surface Elevation (ft MSL, CWSEL)	1778.06

Station (ft) =	10113.4	10153.2	10175.9	10221.8	10235.0	10265.2
Flow (%) =	5.4	3.3	82.0	3.7	3.1	
Area (sq ft) =	32.6	20.1	155.1	17.3	21.7	
Vel (ft/s) =	1.87	1.83	5.92	2.38	1.60	
Depth (ft) =	.82	.89	3.38	1.31	.72	

Station (ft) =	10265.2	10327.8
Flow (%) =	2.6	
Area (sq ft) =	23.3	
Vel (ft/s) =	1.23	
Depth (ft) =	.37	

STATUS: Analyzing cross-section reach 16.254.

STATUS: (3265) Divided flow.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.73

Q=2995 CFS - END SPLIT FLOW

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.254	.080	.060	.080	6.48	1783.38	.00	.00
.010953	475	485	475	1784.04	.66	5.36	.16
40.91	46	435	31	.00	1782.90	1782.10	4
2995	50	2879	65	310.5	9721.88	10079.72	0
.25	1.07	6.62	2.04	.000	26.6	1776.90	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 16.254
Total Discharge (cfs, Q) 2995
Computed Water Surface Elevation (ft MSL, CWSEL) 1783.38

Station (ft) =	9721.9	9933.9	10039.8	10079.7
Flow (%) =	1.7	96.2	2.2	
Area (sq ft) =	47.0	435.3	31.9	
Vel (ft/s) =	1.07	6.62	2.04	
Depth (ft) =	.22	4.11	.80	

T1 P&D No. 10320.00; FCD No. 90-24
T2 TRILBY WASH; GRAND AVENUE TO C.A.P.
T3 WEST CHANNEL; ENCROACHED

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	3	0	0	0.000000	0	0.0	0.0	1742.82	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15

STATUS: Analyzing profile 2.

Contraction Coefficient (CCHV) .600

Expansion Coefficient (CEHV) .800

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.581.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	9784.00
Right Encroachment Station (ft, STENCR)	10198.00
Encroachment Method (TYPE)	1
Width or Percent Target	414.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.581	.080	.059	.100	5.62	1742.82	.00	1742.13
.007275	0	0	0	1743.04	.22	.00	.00
.00	343	460	111	.00	1741.00	1740.20	0
3035	814	1977	242	414.0	9784.00	10198.00	0
.00	2.37	4.30	2.18	.000	.0	1737.20	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.581
Total Discharge (cfs, Q)	3035
Computed Water Surface Elevation (ft MSL, CWSEL)	1742.82

Station (ft) =	9784.0	9823.3	9866.8	9921.4	9935.0	9942.5
Flow (%) =	3.6	3.7	5.1	5.4	4.1	
Area (sq ft) =	62.7	67.0	78.2	38.6	26.0	
Vel (ft/s) =	1.73	1.69	1.96	4.25	4.76	
Depth (ft) =	1.60	1.54	1.43	2.84	3.47	

Station (ft) =	9942.5	9973.0	9982.3	10020.6	10062.2	10144.2
Flow (%) =	3.9	1.1	17.0	3.1	45.0	
Area (sq ft) =	53.5	17.4	116.8	59.4	284.1	
Vel (ft/s) =	2.21	1.92	4.41	1.61	4.81	
Depth (ft) =	1.75	1.87	3.05	1.43	3.46	

Station (ft) =	10144.2	10162.5	10190.3	10198.0
Flow (%) =	4.4	3.3	.3	
Area (sq ft) =	52.1	50.9	8.2	
Vel (ft/s) =	2.54	1.97	1.22	
Depth (ft) =	2.85	1.83	1.07	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.637.

STATUS: (3265) Divided flow.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	9889.00
Right Encroachment Station (ft, STENCR)	10230.00
Encroachment Method (TYPE)	1
Width or Percent Target	341.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
---	---	---	---	---	---	---	---
15.637	.060	.060	.066	6.00	1745.40	.00	1744.61
.011057	285	295	300	1745.79	.39	2.61	.14
5.16	164	91	363	.00	1744.70	1745.00	2
3035	682	387	1964	297.2	9889.00	10230.00	0
.02	4.16	4.25	5.40	.000	2.4	1739.40	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.637
Total Discharge (cfs, Q)	3035
Computed Water Surface Elevation (ft MSL, CWSEL)	1745.40

Station (ft) =	9889.0	9901.7	9926.7	9946.8	9961.0	9975.9
Flow (%) =	3.1	7.9	5.7	4.7	1.1	
Area (sq ft) =	23.4	54.2	41.3	31.6	13.5	
Vel (ft/s) =	3.99	4.43	4.20	4.52	2.44	
Depth (ft) =	1.85	2.17	2.06	2.23	.91	

Station (ft) =	9975.9	10019.0	10124.4	10137.8	10143.7	10150.6
Flow (%) =	12.8	4.3	10.5	10.0	11.6	
Area (sq ft) =	91.2	46.6	50.4	35.4	41.1	
Vel (ft/s) =	4.25	2.79	6.33	8.60	8.56	
Depth (ft) =	2.12	.44	3.76	6.01	5.96	

Station (ft) =	10150.6	10156.2	10162.7	10169.3	10182.0	10194.5
Flow (%) =	8.2	6.5	4.1	3.8	3.2	
Area (sq ft) =	30.8	28.6	21.8	36.3	32.9	
Vel (ft/s) =	8.07	6.89	5.75	3.14	2.98	
Depth (ft) =	5.51	4.41	3.31	2.86	2.63	

Station (ft) =	10194.5	10230.0
Flow (%) =	2.5	
Area (sq ft) =	40.0	
Vel (ft/s) =	1.88	
Depth (ft) =	1.13	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.683.

STATUS: (3265) Divided flow.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	9929.00
Right Encroachment Station (ft, STENCR)	10388.00
Encroachment Method (TYPE)	1
Width or Percent Target	459.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.683	.100	.060	.062	6.63	1747.63	.00	1747.02
.007069	235	245	255	1747.99	.37	2.20	.01
8.83	0	136	519	.00	1747.00	1748.00	1
3035	0	387	2647	256.2	9929.00	10388.00	0
.03	.60	2.84	5.10	.000	4.0	1741.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.683
Total Discharge (cfs, Q)	3035
Computed Water Surface Elevation (ft MSL, CWSEL)	1747.63

Station (ft) =	9929.0	9929.7	10015.0	10269.6	10277.8	10285.3
Flow (%) =	.0	12.8	5.5	5.2	9.0	
Area (sq ft) =	.4	136.2	77.0	31.4	42.2	
Vel (ft/s) =	.60	2.84	2.17	5.02	6.47	
Depth (ft) =	.62	1.61	.30	3.83	5.63	

Station (ft) =	10285.3	10292.4	10298.6	10301.6	10309.8	10322.5
Flow (%) =	11.3	9.4	3.6	4.8	6.8	
Area (sq ft) =	46.7	39.9	17.0	30.2	43.4	
Vel (ft/s) =	7.31	7.19	6.36	4.86	4.72	
Depth (ft) =	6.58	6.43	5.68	3.69	3.42	

Station (ft) =	10322.5	10329.6	10335.4	10339.4	10344.1	10352.3
Flow (%) =	7.5	7.5	5.1	4.1	3.7	
Area (sq ft) =	36.8	33.8	23.1	22.2	25.7	
Vel (ft/s) =	6.19	6.74	6.69	5.61	4.41	
Depth (ft) =	5.18	5.83	5.78	4.73	3.13	

Station (ft) =	10352.3	10369.4	10388.0
Flow (%) =	3.1	.6	
Area (sq ft) =	34.1	15.6	
Vel (ft/s) =	2.80	1.13	
Depth (ft) =	2.00	.84	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.749.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) .58

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10356.00
Right Encroachment Station (ft, STENCR)	10580.00
Encroachment Method (TYPE)	1
Width or Percent Target	224.000

N PT. 16 - START SPLIT FLOW - Q=1745 CFS WEST

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.749	.060	.060	.061	5.10	1750.50	.00	1750.55
.008012	380	370	370	1750.79	.29	2.74	.05
13.53	64	198	186	.00	1749.10	1748.50	2
1870	189	937	742	209.3	10356.66	10565.96	0
.06	2.95	4.73	3.99	.000	6.0	1745.40	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.749
Total Discharge (cfs, Q)	1870
Computed Water Surface Elevation (ft MSL, CWSEL)	1750.50

Station (ft) =	10356.7	10396.4	10407.2	10412.0	10474.7	10483.1
Flow (%) =	3.8	5.0	1.3	50.2	3.6	
Area (sq ft) =	31.8	24.7	7.9	198.2	18.1	
Vel (ft/s) =	2.25	3.81	3.09	4.73	3.69	
Depth (ft) =	.80	2.28	1.65	3.16	2.15	

Station (ft) =	10483.1	10490.1	10495.2	10500.5	10505.9	10518.2
Flow (%) =	5.2	5.7	5.0	4.1	7.7	
Area (sq ft) =	21.4	19.6	18.6	16.5	33.4	
Vel (ft/s) =	4.59	5.45	5.07	4.66	4.31	
Depth (ft) =	3.05	3.85	3.50	3.05	2.72	

Station (ft) =	10518.2	10531.3	10545.2	10566.0
Flow (%) =	3.9	3.4	1.0	
Area (sq ft) =	22.6	21.6	14.5	
Vel (ft/s) =	3.19	2.97	1.31	
Depth (ft) =	1.73	1.55	.70	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.842.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10566.00
Right Encroachment Station (ft, STENCR)	10860.00
Encroachment Method (TYPE)	1
Width or Percent Target	294.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.842	.074	.060	.080	5.79	1754.39	.00	1753.90
.009154	460	450	445	1754.66	.27	3.87	.01
18.61	349	154	23	.00	1753.10	1751.40	4
1870	962	843	63	294.0	10566.00	10860.00	0
.09	2.75	5.45	2.77	.000	8.6	1748.60	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 15.842
Total Discharge (cfs, Q) 1870
Computed Water Surface Elevation (ft MSL, CWSEL) 1754.39

Station (ft) =	10566.0	10626.4	10639.0	10656.7	10666.9	10672.7
Flow (%) =	11.5	4.7	3.3	5.0	3.0	
Area (sq ft) =	91.9	28.5	26.3	27.2	16.2	
Vel (ft/s) =	2.34	3.07	2.33	3.42	3.49	
Depth (ft) =	1.52	2.26	1.49	2.66	2.79	

Station (ft) =	10672.7	10733.7	10766.1	10778.2	10784.5	10790.4
Flow (%) =	3.5	4.7	3.8	4.4	3.9	
Area (sq ft) =	42.0	41.7	20.8	17.6	16.2	
Vel (ft/s) =	1.56	2.13	3.40	4.64	4.57	
Depth (ft) =	.69	1.29	1.72	2.79	2.74	

Station (ft) =	10790.4	10803.9	10847.3	10860.0
Flow (%) =	3.7	45.1	3.4	
Area (sq ft) =	21.2	154.8	23.1	
Vel (ft/s) =	3.22	5.45	2.77	
Depth (ft) =	1.57	3.57	1.82	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.890.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL) 10631.00
Right Encroachment Station (ft, STENCR) 11000.00
Encroachment Method (TYPE) 1
Width or Percent Target 369.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.890	.080	.060	.000	5.57	1757.57	.00	1757.71
.011208	315	320	325	1758.00	.43	3.21	.13
22.31	273	216	0	.00	1755.80	1757.90	3
1870	545	1324	0	363.8	10634.86	10998.63	0
.10	2.00	6.12	.00	.000	11.0	1752.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 15.890
Total Discharge (cfs, Q) 1870
Computed Water Surface Elevation (ft MSL, CWSEL) 1757.57

Station (ft) =	10634.9	10680.5	10716.4	10751.9	10823.6	10849.2
Flow (%) =	3.7	3.9	4.0	4.3	4.5	
Area (sq ft) =	36.1	35.9	36.9	45.4	34.6	
Vel (ft/s) =	1.90	2.01	2.04	1.78	2.44	
Depth (ft) =	.79	1.00	1.04	.63	1.35	

Station (ft) =	10849.2	10892.6	10931.6	10940.0	10999.0
Flow (%) =	3.2	3.6	2.0	70.8	
Area (sq ft) =	35.3	35.4	13.6	216.5	
Vel (ft/s) =	1.72	1.90	2.71	6.12	
Depth (ft) =	.81	.91	1.62	3.69	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.898.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL) 10817.00
Right Encroachment Station (ft, STENCR) 11057.00
Encroachment Method (TYPE) 1
Width or Percent Target 240.000

Q=1145 CFS - WEST CHANNEL

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.898	.075	.060	.080	6.04	1760.34	.00	1760.05
.005194	285	300	320	1760.52	.17	2.36	.15
25.40	28	343	46	.00	1760.10	1759.60	2
1270	27	1187	55	240.0	10817.00	11057.00	0
.13	.97	3.46	1.18	.000	13.0	1754.30	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.898
Total Discharge (cfs, Q)	1270
Computed Water Surface Elevation (ft MSL, CWSEL)	1760.34

Station (ft) =	10817.0	10872.8	10998.5	11036.3	11057.0
Flow (%) =	2.1	93.5	3.4	1.0	
Area (sq ft) =	28.0	343.6	34.1	12.7	
Vel (ft/s) =	.97	3.46	1.25	1.00	
Depth (ft) =	.50	2.73	.90	.61	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.932.

STATUS: (3265) Divided flow.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10797.00
Right Encroachment Station (ft, STENCR)	10942.00
Encroachment Method (TYPE)	1
Width or Percent Target	145.000

Q=1120 CFS

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.932	.080	.060	.060	4.14	1763.84	1763.84	1763.70
.031278	245	260	290	1764.60	.76	2.79	.47
27.22	0	81	96	.00	1763.80	1763.80	3
1245	0	586	658	121.5	10797.00	10942.00	14
.14	.03	7.21	6.83	.000	14.1	1759.70	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 15.932
Total Discharge (cfs, Q) 1245
Computed Water Surface Elevation (ft MSL, CWSEL) 1763.84

Station (ft) =	10797.0	10835.4	10901.1	10907.1	10924.0	10942.0
Flow (%) =	47.1	12.7	16.5	22.5	1.2	
Area (sq ft) =	81.4	30.3	20.6	37.8	7.8	
Vel (ft/s) =	7.21	5.24	9.94	7.41	1.87	
Depth (ft) =	2.17	.46	3.44	2.24	.43	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.021.

STATUS: (3280) For cross-section 16.02, ends have been extended vertically .80 feet in order to calculate the hydraulic cross-section properties.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.09

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL) 10398.00
Right Encroachment Station (ft, STENCR) 10677.00
Encroachment Method (TYPE) 1
Width or Percent Target 279.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.021	.080	.060	.080	6.20	1771.20	.00	1771.08
.007182	480	490	490	1771.37	.17	6.41	.36
30.75	200	167	85	.00	1770.20	1769.90	7
1245	373	675	195	279.0	10398.00	10677.00	0
.18	1.86	4.04	2.29	.000	16.4	1765.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 16.021
Total Discharge (cfs, Q) 1245
Computed Water Surface Elevation (ft MSL, CWSEL) 1771.20

Station (ft) =	10398.0	10459.9	10499.6	10536.8	10560.4	10622.4
Flow (%) =	10.6	8.8	6.6	4.0	54.3	
Area (sq ft) =	72.5	55.7	44.6	27.9	167.1	
Vel (ft/s) =	1.83	1.97	1.83	1.77	4.04	
Depth (ft) =	1.17	1.40	1.20	1.18	2.70	

Station (ft) =	10622.4	10647.2	10656.0	10677.0
Flow (%) =	8.7	4.2	2.9	
Area (sq ft) =	45.3	19.4	20.7	
Vel (ft/s) =	2.38	2.67	1.75	
Depth (ft) =	1.83	2.20	.99	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.112.

STATUS: (3280) For cross-section 16.11, ends have been extended vertically .34 feet in order to calculate the hydraulic cross-section properties.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) .66

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10307.00
Right Encroachment Station (ft, STENCR)	10425.00
Encroachment Method (TYPE)	1
Width or Percent Target	118.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.112	.080	.060	.080	4.23	1773.33	.00	1773.08
.016591	230	210	200	1773.93	.59	2.22	.34
32.43	16	165	47	.00	1772.10	1771.70	3
1245	33	1081	130	118.0	10307.00	10425.00	0
.19	2.03	6.55	2.74	.000	17.3	1769.10	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	16.112
Total Discharge (cfs, Q)	1245
Computed Water Surface Elevation (ft MSL, CWSEL)	1773.33

Station (ft) =	10307.0	10317.5	10329.9	10385.7	10399.3	10424.7
Flow (%) =	.5	2.1	86.9	4.8	5.6	
Area (sq ft) =	4.6	11.7	165.2	19.6	27.7	
Vel (ft/s) =	1.37	2.29	6.55	3.05	2.53	
Depth (ft) =	.44	.94	2.96	1.44	1.09	

Station (ft) =	10424.7	10425.0
Flow (%) =	.0	
Area (sq ft) =	.3	
Vel (ft/s) =	.89	
Depth (ft) =	.95	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.164.

STATUS: (3280) For cross-section 16.16, ends have been extended vertically .19 feet in order to calculate the hydraulic cross-section properties.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.89

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	9926.00
Right Encroachment Station (ft, STENCR)	10252.00
Encroachment Method (TYPE)	1
Width or Percent Target	326.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.164	.065	.060	.080	5.99	1778.59	.00	1778.06
.011519	380	400	410	1779.04	.45	5.03	.09
36.13	369	179	46	.00	1777.00	1776.30	5
2995	1698	1173	123	326.0	9926.00	10252.00	0
.21	4.60	6.54	2.68	.000	19.3	1772.60	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	16.164
Total Discharge (cfs, Q)	2995
Computed Water Surface Elevation (ft MSL, CWSEL)	1778.59

Station (ft) =	9926.0	9964.6	9990.6	10000.0	10007.2	10011.8
Flow (%) =	4.2	5.7	15.8	12.1	6.3	
Area (sq ft) =	52.5	44.9	54.9	42.1	23.9	
Vel (ft/s) =	2.38	3.78	8.62	8.62	7.85	
Depth (ft) =	1.36	1.73	5.84	5.84	5.19	

Station (ft) =	10011.8	10022.5	10139.2	10165.1	10175.9	10221.8
Flow (%) =	3.7	4.3	3.4	1.3	39.2	
Area (sq ft) =	24.1	72.9	38.8	15.6	179.3	
Vel (ft/s) =	4.60	1.77	2.62	2.54	6.54	
Depth (ft) =	2.25	.62	1.50	1.44	3.91	

Station (ft) =	10221.8	10251.6	10252.0
Flow (%) =	4.1	.0	
Area (sq ft) =	45.7	.5	
Vel (ft/s) =	2.70	.89	
Depth (ft) =	1.53	1.19	

STATUS: Analyzing cross-section reach 16.254.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	9926.00
Right Encroachment Station (ft, STENCR)	10080.00
Encroachment Method (TYPE)	1
Width or Percent Target	154.000

Q=2995 CFS - END SPLIT FLOW

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.254	.080	.060	.080	6.69	1783.59	.00	1783.38
.009502	475	485	475	1784.20	.61	5.03	.13
42.18	3	457	40	.00	1782.90	1782.10	4
2995	3	2909	82	154.0	9926.00	10080.00	0
.24	.97	6.37	2.06	.000	22.0	1776.90	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	16.254
Total Discharge (cfs, Q)	2995
Computed Water Surface Elevation (ft MSL, CWSEL)	1783.59

Station (ft) =	9926.0	9933.9	10039.8	10044.7	10049.6	10057.9
Flow (%) =	.1	97.1	.6	.7	.9	
Area (sq ft) =	3.1	457.0	7.5	8.5	11.5	
Vel (ft/s) =	.97	6.37	2.41	2.61	2.24	
Depth (ft) =	.40	4.32	1.54	1.74	1.39	

Station (ft) =	10057.9	10069.5	10080.0
Flow (%) =	.4	.1	
Area (sq ft) =	8.5	4.1	
Vel (ft/s) =	1.48	.96	
Depth (ft) =	.74	.39	

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 110 : TRILBY WASH; GRAND AVENUE TO C.A.P.
WEST CHANNEL; ENCROACHED
P&D No. 10320.00; FCD No. 90-24

	Cross-Section Number SECNO	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Energy Gradient Elevation (ft MSL) EG	Water Surface Top Width (ft) TOPWID	Left Overbank Flow (cfs) QLOB	Channel Flow (cfs) QCH	Right Overbank Flow (cfs) QROB	Encroach. Target Requested PERENC	Left Encroach. Station (ft) STENCL	Left Bank Station (ft) STCHL	Right Bank Station (ft) STCHR
	15.581	1742.13	.00	1742.29	882.96	1143.91	1468.76	422.33	.00	.00	9982.30	10144.20
	15.581	1742.82	.69	1743.04	414.00	814.76	1977.59	242.64	414.00	9784.00	9982.30	10144.20
	15.637	1744.61	.00	1744.83	526.47	256.71	162.53	2615.76	.00	.00	9975.90	10019.00
	15.637	1745.40	.79	1745.79	297.21	682.61	387.98	1964.41	341.00	9889.00	9975.90	10019.00
	15.683	1747.02	.00	1747.54	327.61	.00	255.65	2779.35	.00	.00	9929.70	10015.00
	15.683	1747.63	.61	1747.99	256.22	.26	387.03	2647.70	459.00	9929.00	9929.70	10015.00
	15.749	1750.55	.00	1750.68	330.86	146.88	701.97	896.15	547.10	10247.90	10412.00	10474.70
*	15.749	1750.50	-.04	1750.79	209.30	189.95	937.81	742.24	224.00	10356.00	10412.00	10474.70
*	15.842	1753.90	.00	1754.36	271.36	779.34	909.69	55.97	-10432.20	10432.20	10803.90	10847.30
	15.842	1754.39	.49	1754.66	294.00	962.49	843.62	63.88	294.00	10566.00	10803.90	10847.30
*	15.890	1757.71	.00	1758.01	367.77	567.68	1177.32	.00	578.80	10430.50	10940.00	10999.00
	15.890	1757.57	-.13	1758.00	363.76	545.56	1324.44	.00	369.00	10631.00	10940.00	10999.00
	15.898	1760.05	.00	1760.25	223.97	9.34	1105.79	29.88	-10791.80	10791.80	10872.80	10998.50
	15.898	1760.34	.29	1760.52	240.00	27.30	1187.43	55.28	240.00	10817.00	10872.80	10998.50
*	15.932	1763.70	.00	1764.44	111.13	.00	537.92	582.08	-10739.80	10739.80	10797.90	10835.40
*	15.932	1763.84	.14	1764.60	121.55	.00	586.53	658.46	145.00	10797.00	10797.90	10835.40
*	16.021	1771.08	.00	1771.24	278.94	317.58	628.32	174.10	300.50	10378.70	10560.40	10622.40
*	16.021	1771.20	.12	1771.37	279.00	373.52	675.79	195.70	279.00	10398.00	10560.40	10622.40
	16.112	1773.08	.00	1773.47	197.70	15.65	842.52	261.82	272.90	10258.60	10329.90	10385.70
*	16.112	1773.33	.25	1773.93	118.00	33.09	1081.71	130.20	118.00	10307.00	10329.90	10385.70
	16.164	1778.06	.00	1778.51	214.34	97.77	917.92	104.31	-10050.20	10050.20	10175.90	10221.80

Cross-Section Number SECNO	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Energy Gradient Elevation (ft MSL) EG	Water Surface Top Width (ft) TOPWID	Left Overbank Flow (cfs) QLOB	Channel Flow (cfs) QCH	Right Overbank Flow (cfs) QROB	Encroach. Target Requested PERENC	Left Encroach. Station (ft) STENCL	Left Bank Station (ft) STCHL	Right Bank Station (ft) STCHR
* 16.164	1778.59	.53	1779.04	326.00	1698.22	1173.19	123.59	326.00	9926.00	10175.90	10221.80
* 16.254	1783.38	.00	1784.04	310.47	50.16	2879.84	65.00	10115.50	.00	9933.90	10039.80
16.254	1783.59	.20	1784.20	154.00	3.04	2909.27	82.69	154.00	9926.00	9933.90	10039.80

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 15.749, profile 2, conveyance change outside acceptable range.

Section 15.842, profile 1, conveyance change outside acceptable range.

Section 15.89, profile 1, conveyance change outside acceptable range.

Section 15.932, profile 1, critical depth assumed.

Section 15.932, profile 1, minimum specific energy.

Section 15.932, profile 2, critical depth assumed.

Section 15.932, profile 2, minimum specific energy.

Section 16.021, profile 1, conveyance change outside acceptable range.

Section 16.021, profile 2, conveyance change outside acceptable range.

Section 16.112, profile 2, conveyance change outside acceptable range.

Section 16.164, profile 2, conveyance change outside acceptable range.

Section 16.254, profile 1, conveyance change outside acceptable range.

12 Warning and status message(s) generated

SUMMARY PRINTOUT TABLE 200 : TRILBY WASH; GRAND AVENUE TO C.A.P.
---------- WEST CHANNEL; ENCROACHED
P&D No. 10320.00; FCD No. 90-24

Profile Number 2

Cross-Section Number	Floodway Width (ft)	Floodway Section Area (sq ft)	Floodway Mean Velocity (ft/s)	W. S. Elevation with Floodway (ft MSL)	W. S. Elevation without Floodway (ft MSL)	W. S. Elevation Diffrence (ft)
15.581	414.	915.	3.3	1742.8	1742.1	.7
15.637	341.	619.	4.9	1745.4	1744.6	.8
15.683	459.	656.	4.6	1747.6	1747.0	.6
15.749	209.	449.	4.2	1750.5	1750.5	.0
15.842	294.	527.	3.5	1754.4	1753.9	.5
15.890	364.	490.	3.8	1757.6	1757.7	-.1
15.898	240.	418.	3.0	1760.4	1760.1	.3
15.932	145.	178.	7.0	1763.8	1763.7	.1
16.021	279.	453.	2.7	1771.2	1771.1	.1
16.112	118.	229.	5.4	1773.4	1773.1	.3
16.164	326.	595.	5.0	1778.6	1778.1	.5
16.254	154.	500.	6.0	1783.6	1783.4	.2

COMPUTATION ABORTED BY USER

APPENDIX D

HEC-2 OUTPUT MIDDLE CHANNEL AT SPLIT - TRILBY WASH

==========
B O S S H E C - 2 (tm)
==========

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Version : 2.50
Serial Number : 0010169.200

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PROGRAM ORIGIN :

Boss Hec-2 (tm) is an enhanced version of the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-2 program for water-surface profile computations. Program based upon the September 1990 version, updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : TRILBY WASH; GRAND AVENUE TO C.A.P.
PROJECT NUMBER : P&D No. 10320.00; FCD No. 90-24
DESCRIPTION : MIDDLE CHANNEL; ENCROACHED
ENGINEER : RAMESH I. PATEL, P.E., L.S.
DATE OF RUN : 10/21/1991
TIME OF RUN : 5:19 pm

T1 P&D No. 10320.00; FCD No. 90-24
T2 TRILBY WASH; GRAND AVENUE TO C.A.P.
T3 MIDDLE CHANNEL; ENCROACHED

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	2	0	0	0.000000	0	0.0	0.0	1753.90	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15

USER-DEFINED SUMMARY TABLES (J3) :

110 200

NC	0.08	0.08	0.06	0.6	0.8					
NH	7	0.08	9960.2	0.06	10026.9	0.08	10159.0	0.06	10259.3	0.08
NH	10771.	0.06	10847.3	0.08	10970.0					
QT	2	1745.0	1870.0							
ET		7.1	9.1				10432.2		10566.0	10860.0

Q=1745 CFS

X1	15.842	81	10803.9	10847.3	0.0	0.0	0.0	1.0	0.0	0
GR	1758.0	9765.0	1756.5	9850.0	1757.0	9892.0	1757.3	9906.6	1757.2	9925.6
GR	1756.9	9937.2	1756.4	9943.8	1756.7	9951.4	1756.8	9960.2	1755.6	9967.1
GR	1755.5	9975.1	1755.3	9979.6	1754.4	9987.2	1754.2	10000.0	1754.2	10007.4
GR	1755.4	10011.9	1757.2	10018.1	1757.5	10026.9	1757.5	10040.2	1757.4	10052.1
GR	1757.1	10066.1	1757.1	10079.0	1756.8	10159.0	1754.6	10167.2	1755.1	10174.1
GR	1755.9	10180.2	1755.8	10185.6	1756.1	10191.4	1756.6	10201.3	1756.7	10210.5
GR	1756.6	10221.1	1756.2	10231.5	1755.0	10237.1	1754.3	10242.9	1755.6	10248.9
GR	1756.9	10259.3	1756.9	10271.8	1756.5	10287.7	1756.4	10316.1	1756.6	10329.7
GR	1757.5	10341.9	1759.4	10425.1	1759.4	10432.2	1758.3	10449.2	1757.6	10469.2
GR	1756.9	10482.2	1751.8	10626.4	1751.6	10630.7	1753.1	10639.0	1753.1	10646.7
GR	1752.4	10656.7	1751.5	10663.4	1751.1	10666.9	1752.1	10672.7	1753.7	10681.7
GR	1753.8	10690.6	1754.0	10702.1	1753.9	10720.6	1753.5	10733.7	1753.2	10744.0
GR	1753.0	10756.4	1752.7	10766.1	1752.9	10771.9	1752.2	10778.2	1751.0	10784.5
GR	1752.3	10790.4	1752.9	10796.5	1753.1	10803.9	1753.1	10812.2	1752.2	10817.3
GR	1750.7	10823.5	1749.1	10830.5	1748.6	10838.1	1749.5	10843.2	1751.4	10847.3
GR	1752.8	10855.3	1754.9	10863.8	1755.3	10868.3	1755.7	10879.9	1756.0	10885.0
GR	1756.5	10970.0								

NH	5	0.08	9974.5	0.06	10068.3	0.08	10940.0	0.06	10999.0	0.08
NH	11080.									

```
ET                7.1       9.1                                  10430.5   11009.3   10631.0   11000.0
X1     15.890      96   10656.1   10751.9     270.0     290.0     290.0       1.0       0.0         0
GR     1760.8  9704.7    1759.6    9797.4    1759.4    9804.0    1759.4    9817.7    1759.5    9832.0
GR     1759.5  9847.1    1759.5    9864.0    1759.5    9882.3    1759.7    9897.7    1759.8    9913.0
GR     1759.8  9931.3    1760.1    9948.1    1760.3    9964.6    1760.5    9974.5    1760.3    9981.4
GR     1759.7  9986.6    1757.0    9993.0    1757.0    9999.9    1756.5   10000.0    1756.5   10000.1
GR     1756.9 10004.6    1758.4   10009.8    1760.2   10017.6    1760.2   10026.5    1760.0   10037.6
GR     1759.0 10045.7    1759.0   10050.5    1758.3   10055.1    1758.8   10061.6    1760.0   10068.3
GR     1759.9 10076.1    1759.5   10087.6    1759.4   10099.9    1759.5   10111.2    1760.2   10122.4
GR     1760.8 10132.7    1760.8   10145.4    1760.2   10155.0    1759.6   10163.3    1758.1   10170.2
GR     1759.6 10177.1    1760.2   10181.9    1760.2   10190.8    1760.2   10203.7    1759.8   10213.4
GR     1759.6 10223.5    1759.1   10230.1    1758.4   10236.9    1758.6   10241.3    1759.7   10245.7
GR     1759.8 10255.7    1759.9   10268.3    1760.4   10281.9    1760.4   10293.3    1762.3   10430.5
GR     1760.9 10542.7    1756.8   10656.1    1756.1   10665.2    1757.0   10671.6    1755.6   10680.5
GR     1756.7 10687.0    1756.9   10693.2    1756.5   10707.3    1756.5   10716.4    1756.3   10728.1
GR     1756.6 10738.4    1756.8   10751.9    1757.2   10765.3    1757.4   10778.2    1757.3   10793.2
GR     1756.6 10804.7    1756.0   10814.5    1756.6   10823.6    1756.4   10833.0    1755.7   10840.5
GR     1756.4 10849.2    1756.9   10856.6    1756.8   10866.3    1756.7   10879.4    1756.8   10892.6
GR     1756.9 10906.0    1756.6   10919.6    1756.1   10931.6    1755.8   10940.0    1755.7   10949.2
GR     1755.2 10959.4    1752.3   10969.1    1752.0   10979.9    1752.1   10989.8    1754.7   10995.4
GR     1757.9 10999.0    1758.6   11009.3    1758.6   11021.9    1758.0   11040.0    1757.0   11065.0
GR     1758.0 11080.0

NH         5     0.08    9982.7      0.06   10051.2      0.08   10847.8      0.06   10998.5      0.08
NH     11147.
QT         2    600.0     600.0
ET                7.1       9.1                                  10468.7   10791.8   10621.0   10773.0
Q=600 CFS - MIDDLE CHANNEL

X1     15.898      97   10641.6   10772.0     150.0     200.0     180.0       1.0       0.0         0
GR     1759.0  9525.5    1759.1    9533.3    1759.8    9555.4    1759.6    9580.8    1759.8    9601.5
GR     1760.2  9620.6    1760.5    9639.7    1760.4    9647.1    1759.8    9654.4    1760.4    9666.5
GR     1761.0  9691.0    1760.6    9719.7    1760.4    9743.6    1759.7    9832.5    1760.0    9886.9
GR     1760.3  9904.5    1760.2    9919.4    1760.6    9934.2    1760.6    9949.4    1760.3    9966.1
GR     1760.5  9973.6    1760.8    9982.7    1760.0    9986.6    1757.4    9992.4    1757.4    9999.9
GR     1757.3 10000.0    1757.6   10007.1    1759.8   10011.4    1760.5   10018.1    1760.7   10030.3
GR     1760.4 10039.1    1759.0   10051.2    1759.1   10056.3    1760.1   10062.2    1760.3   10068.3
GR     1760.4 10079.1    1760.5   10087.6    1760.0   10095.9    1760.1   10104.5    1760.6   10113.8
GR     1761.2 10123.7    1761.2   10133.5    1760.7   10143.4    1759.8   10153.9    1758.7   10159.3
GR     1760.0 10166.2    1760.4   10173.3    1760.4   10185.0    1760.4   10192.2    1760.5   10208.2
GR     1760.4 10228.4    1760.4   10245.0    1760.6   10265.3    1760.5   10271.4    1760.0   10282.9
GR     1758.8 10292.1    1759.6   10298.3    1760.3   10308.7    1760.8   10320.3    1763.7   10468.7
GR     1760.7 10528.4    1763.9   10569.8    1758.4   10641.6    1760.0   10772.0    1761.1   10791.8
GR     1759.7 10825.2    1759.5   10834.6    1759.8   10847.8    1760.1   10859.8    1760.1   10872.8
GR     1759.5 10884.1    1758.5   10895.0    1756.8   10904.9    1756.9   10916.2    1757.6   10919.9
GR     1759.2 10930.7    1759.1   10935.2    1758.4   10945.3    1756.2   10954.8    1757.0   10961.0
GR     1756.8 10965.1    1754.3   10971.9    1754.6   10978.4    1755.6   10983.5    1757.9   10990.8
GR     1759.6 10998.5    1759.3   11006.7    1759.5   11017.0    1759.5   11023.2    1759.4   11036.3
GR     1759.8 11048.6    1760.2   11061.7    1761.2   11079.8    1762.2   11099.7    1762.7   11117.3
GR     1763.3 11133.8    1763.3   11147.5

NH         7     0.08    9937.6      0.06   10006.6      0.08   10797.9      0.06   10835.4      0.08
```

```
NH    10881.      0.06    10924.0      0.08    10976.9
ET                7.1        9.1                                10455.8    10739.8    10565.0    10716.0
X1    15.932       88    10580.0    10700.0      165.0      210.0      190.0        1.0        0.0          0
GR    1763.8    9750.6     1763.2     9768.5     1762.3     9781.9     1762.0     9798.8     1761.9     9810.9
GR    1761.9    9826.2     1762.2     9840.5     1762.4     9856.9     1762.6     9874.2     1762.8     9893.7
GR    1763.0    9913.0     1762.7     9928.7     1762.7     9937.6     1762.7     9945.3     1761.6     9955.0
GR    1760.5    9963.5     1760.1     9974.9     1759.7     9982.1     1760.0    10000.0     1760.0    10000.1
GR    1760.9   10002.2     1762.0    10006.6     1762.0    10016.6     1762.2    10033.3     1762.7    10055.1
GR    1762.7   10075.3     1762.7    10096.6     1762.6    10112.4     1762.3    10123.6     1761.6    10129.4
GR    1761.1   10137.8     1761.7    10141.9     1761.8    10144.9     1761.2    10150.9     1762.4    10158.8
GR    1763.0   10167.1     1762.8    10177.5     1762.8    10186.3     1762.9    10198.8     1762.8    10211.5
GR    1762.8   10234.4     1762.5    10250.6     1762.4    10265.6     1762.4    10279.5     1762.0    10286.4
GR    1761.4   10296.6     1761.9    10309.5     1762.3    10320.5     1762.1    10332.3     1762.3    10342.7
GR    1762.9   10355.7     1763.4    10368.6     1764.7    10398.1     1765.2    10421.4     1765.8    10455.8
GR    1764.0   10500.0     1765.3    10525.0     1764.0    10560.0     1762.0    10580.0     1760.0    10605.0
GR    1762.0   10620.0     1762.5    10630.0     1762.0    10640.0     1761.0    10660.0     1762.0    10700.0
GR    1764.0   10722.0     1764.4    10739.8     1764.3    10754.5     1763.9    10768.2     1763.9    10781.8
GR    1763.9   10792.7     1763.8    10797.9     1761.7    10806.9     1760.2    10814.7     1760.0    10819.8
GR    1760.7   10825.0     1763.2    10830.4     1763.8    10835.4     1764.1    10853.5     1763.8    10862.1
GR    1763.6   10871.3     1763.4    10881.4     1762.9    10892.2     1760.7    10901.1     1760.1    10907.1
GR    1763.1   10924.0     1764.1    10953.7     1765.2    10976.9

NH        5      0.08     9964.6      0.06    10036.6      0.08    10560.4      0.06    10622.4      0.08
NH    10995.
ET                7.1        9.1                                10159.1    10378.7    10170.0    10338.0
X1    16.021       88    10200.8    10324.8      530.0      525.0      530.0        1.0        0.0          0
GR    1770.3    9679.3     1768.5     9731.4     1768.3     9749.4     1768.3     9768.5     1768.0     9785.3
GR    1768.0    9802.3     1767.8     9813.4     1767.4     9819.2     1768.4     9828.8     1768.2     9845.1
GR    1768.2    9858.2     1767.9     9867.2     1768.4     9878.6     1768.3     9898.2     1768.3     9914.2
GR    1767.9    9922.2     1766.2     9928.9     1766.2     9932.8     1767.3     9938.1     1767.6     9944.9
GR    1768.6    9955.6     1768.7     9964.6     1768.0     9974.8     1765.6     9985.3     1765.3     9996.9
GR    1765.0   10000.0     1765.0    10000.1     1765.4    10006.9     1767.3    10013.9     1767.7    10016.8
GR    1768.1   10024.8     1768.3    10036.6     1768.2    10049.1     1768.4    10064.6     1768.7    10079.2
GR    1768.8   10098.4     1768.8    10118.7     1768.3    10134.7     1768.9    10146.8     1770.0    10159.1
GR    1769.6   10170.9     1769.0    10182.5     1768.5    10192.1     1768.3    10200.8     1769.2    10236.1
GR    1767.4   10254.1     1768.3    10261.4     1768.7    10273.0     1768.7    10284.7     1768.3    10294.4
GR    1769.0   10302.0     1768.5    10306.5     1767.2    10313.0     1767.3    10318.6     1768.9    10324.8
GR    1769.8   10341.3     1771.6    10362.5     1771.6    10378.7     1771.4    10393.6     1770.5    10407.1
GR    1769.3   10459.9     1770.3    10499.6     1770.5    10511.0     1769.5    10522.2     1769.9    10536.8
GR    1770.0   10549.3     1770.2    10560.4     1769.6    10571.8     1768.0    10580.6     1766.7    10588.4
GR    1766.6   10595.0     1768.0    10603.6     1769.7    10615.2     1769.9    10622.4     1769.4    10633.6
GR    1768.9   10647.2     1769.1    10656.0     1770.7    10670.2     1771.2    10679.5     1771.2    10688.1
GR    1770.0   10710.0     1769.7    10760.0     1770.0    10790.0     1771.3    10830.0     1770.0    10875.0
GR    1768.0   10925.0     1770.0    10970.0     1770.4    10995.0

NH        5      0.08     9969.8      0.06    10045.6      0.08    10329.9      0.06    10385.7      0.08
NH    10735.
QT        2    1875.0     1750.0
ET                7.1        9.1                                            10258.6     9917.0    10236.0
Q=1875 CFS

X1    16.112       62     9969.8    10045.6      420.0      390.0      405.0        1.0        0.0          0
```

GR	1775.1	9660.	1774.0	9688.	1773.0	9696.	1774.0	9703.	1776.0	9710.
GR	1776.3	9721.1	1776.1	9729.9	1775.7	9739.8	1775.3	9748.0	1774.5	9756.4
GR	1774.3	9766.4	1774.2	9777.7	1773.7	9789.8	1773.5	9804.1	1773.1	9813.5
GR	1773.9	9916.9	1773.3	9924.6	1772.5	9931.8	1772.8	9941.3	1773.5	9951.3
GR	1773.7	9960.5	1774.0	9969.8	1773.0	9975.6	1771.1	9983.4	1769.6	9991.7
GR	1769.7	10000.0	1769.7	10000.1	1769.7	10008.7	1770.3	10013.0	1772.8	10017.3
GR	1774.0	10045.6	1773.4	10069.5	1772.4	10088.5	1772.7	10109.1	1773.9	10184.8
GR	1773.2	10212.5	1773.7	10224.8	1774.5	10236.7	1774.9	10247.7	1775.0	10258.6
GR	1774.9	10269.7	1774.5	10278.7	1773.7	10289.8	1773.2	10304.3	1772.7	10317.5
GR	1772.1	10329.9	1770.9	10341.3	1769.6	10352.3	1769.3	10360.5	1769.1	10367.2
GR	1770.5	10374.2	1771.7	10385.7	1772.1	10399.3	1772.4	10424.7	1771.6	10447.3
GR	1772.1	10483.7	1774.3	10531.5	1774.0	10560.0	1772.0	10590.0	1770.0	10640.0
GR	1772.0	10710.0	1773.0	10735.0						

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) .600

Expansion Coefficient (CEHV) .800

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.842.

STATUS: (3265) Divided flow.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10432.20
Right Encroachment Station (ft, STENCR)	10970.00
Encroachment Method (TYPE)	1
Width or Percent Target	-10432.200

Q=1745 CFS

Cross Section Number SECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient SLOPE (ft/ft)	Left Overbank Length XLOBL (ft)	Channel Length XLCH (ft)	Right Overbank Length XLOBR (ft)	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
Cummul-ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Travel Time TIME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONT
15.842	.073	.060	.080	5.30	1753.90	.00	.00
.017539	0	0	0	1754.36	.46	.00	.00
.00	234	133	16	.00	1753.10	1751.40	0
1745	776	912	55	268.5	10567.02	10859.75	0
.00	3.32	6.84	3.32	.000	.0	1748.60	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.842
Total Discharge (cfs, Q)	1745
Computed Water Surface Elevation (ft MSL, CWSEL)	1753.90

Station (ft) =	10567.0	10626.4	10639.0	10663.4	10672.7	10756.4
Flow (%) =	9.1	4.7	5.4	5.7	3.2	
Area (sq ft) =	62.3	22.3	30.7	22.4	28.8	
Vel (ft/s) =	2.54	3.64	3.06	4.40	1.93	
Depth (ft) =	1.05	1.77	1.26	2.41	.34	

Station (ft) =	10756.4	10778.2	10784.5	10790.4	10803.9	10847.3
Flow (%) =	4.7	4.7	4.2	2.9	52.3	
Area (sq ft) =	25.1	14.5	13.3	14.6	133.5	
Vel (ft/s) =	3.27	5.65	5.54	3.51	6.84	
Depth (ft) =	1.15	2.30	2.25	1.08	3.08	

Station (ft) =	10847.3	10859.8
Flow (%) =	3.2	
Area (sq ft) =	16.8	
Vel (ft/s) =	3.32	
Depth (ft) =	1.35	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.890.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.46

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10430.50
Right Encroachment Station (ft, STENCR)	11009.30
Encroachment Method (TYPE)	1
Width or Percent Target	578.800

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.890	.080	.080	.064	5.58	1757.58	.00	.00
.008231	270	290	290	1757.81	.23	3.31	.14
2.87	8	102	384	.00	1756.80	1756.80	3
1745	7	179	1557	364.2	10634.44	10998.64	0
.02	.90	1.76	4.05	.000	2.1	1752.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 15.890
Total Discharge (cfs, Q) 1745
Computed Water Surface Elevation (ft MSL, CWSEL) 1757.58

Station (ft) =	10634.4	10656.1	10751.9	10823.6	10849.2	10892.6
Flow (%) =	.4	10.3	4.1	4.2	3.1	
Area (sq ft) =	8.5	102.3	46.5	35.0	35.9	
Vel (ft/s) =	.90	1.76	1.53	2.10	1.49	
Depth (ft) =	.39	1.07	.65	1.37	.83	

Station (ft) =	10892.6	10931.6	10949.2	10959.4	10969.1	10979.9
Flow (%) =	3.4	5.1	4.6	11.4	23.3	
Area (sq ft) =	36.0	30.6	21.8	37.2	58.7	
Vel (ft/s) =	1.64	2.90	3.72	5.35	6.94	
Depth (ft) =	.92	1.74	2.13	3.83	5.43	

Station (ft) =	10979.9	10989.8	10995.4	10998.6
Flow (%) =	22.1	7.3	.6	
Area (sq ft) =	54.8	23.4	4.7	
Vel (ft/s) =	7.03	5.47	2.36	
Depth (ft) =	5.53	4.18	1.44	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.898.

STATUS: (3235) The computed slope of the energy grade line exceeded .10, and critical depth has probably been crossed.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10468.70
Right Encroachment Station (ft, STENCR)	10791.80
Encroachment Method (TYPE)	1
Width or Percent Target	323.100

Q=600 CFS - MIDDLE CHANNEL

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.898	.080	.080	.000	5.68	1759.98	1759.98	.00
.102729	150	180	200	1760.38	.40	2.31	.14
4.22	16	101	0	.00	1758.40	1760.00	2
600	82	517	0	149.4	10620.98	10770.35	5
.03	5.08	5.09	.00	.000	3.2	1754.30	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.898
Total Discharge (cfs, Q)	600
Computed Water Surface Elevation (ft MSL, CWSEL)	1759.98

Station (ft) =	10621.0	10641.6	10772.0
Flow (%) =	13.8	86.2	
Area (sq ft) =	16.3	101.7	
Vel (ft/s) =	5.08	5.09	
Depth (ft) =	.79	.79	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.932.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)	4.07

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10455.80
Right Encroachment Station (ft, STENCR)	10739.80
Encroachment Method (TYPE)	1
Width or Percent Target	284.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.932	.080	.080	.080	3.80	1763.50	.00	.00
.006202	165	190	210	1763.58	.08	3.01	.19
5.05	11	243	12	.00	1762.00	1762.00	6
600	13	571	14	151.3	10565.08	10716.41	0
.05	1.20	2.34	1.20	.000	3.8	1759.70	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.932
Total Discharge (cfs, Q)	600
Computed Water Surface Elevation (ft MSL, CWSEL)	1763.50

Station (ft) =	10565.1	10580.0	10700.0	10716.4
Flow (%) =	2.2	95.3	2.4	
Area (sq ft) =	11.1	244.0	12.2	
Vel (ft/s) =	1.20	2.34	1.20	
Depth (ft) =	.75	2.03	.75	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.021.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)	.46

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10159.10
Right Encroachment Station (ft, STENCR)	10378.70
Encroachment Method (TYPE)	1
Width or Percent Target	219.601

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.021	.080	.080	.080	4.62	1769.62	.00	.00
.028951	530	530	525	1769.81	.19	6.14	.08
7.75	22	147	4	.00	1768.30	1768.90	7
600	68	524	7	167.8	10170.22	10338.06	0
.10	2.99	3.54	1.60	.000	5.7	1765.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 16.021
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1769.62

Station (ft) =	10170.2	10192.1	10200.8	10324.8	10338.1
Flow (%) =	5.0	6.4	87.4	1.3	
Area (sq ft) =	12.1	10.6	147.9	4.8	
Vel (ft/s) =	2.45	3.61	3.54	1.60	
Depth (ft) =	.55	1.22	1.19	.36	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.112.

STATUS: (3265) Divided flow.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 5.39

16.112	.080	.060	.080	5.41	1774.51	.00	.00
.009726	420	405	390	1774.72	.21	4.89	.02
11.60	222	205	226	.00	1774.00	1774.00	10
1875	422	962	489	510.3	9675.07	10236.92	0
.13	1.90	4.69	2.17	.000	8.9	1769.10	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 16.112
Total Discharge (cfs, Q) 1875
Computed Water Surface Elevation (ft MSL, CWSEL) 1774.51

Station (ft) =	9675.1	9804.1	9916.9	9941.3	9969.8	10045.6
Flow (%) =	3.4	11.5	4.8	2.8	51.4	
Area (sq ft) =	42.6	115.6	36.2	28.0	205.1	
Vel (ft/s) =	1.50	1.86	2.48	1.90	4.69	
Depth (ft) =	.33	1.02	1.48	.98	2.71	

Station (ft) =	10045.6	10088.5	10109.1	10184.8	10224.8	10236.9
Flow (%) =	5.7	6.2	10.1	3.8	.3	
Area (sq ft) =	49.9	40.3	91.4	39.5	4.9	
Vel (ft/s) =	2.15	2.87	2.08	1.82	1.01	
Depth (ft) =	1.16	1.96	1.21	.99	.40	

T1 P&D No. 10320.00; FCD No. 90-24
T2 TRILBY WASH; GRAND AVENUE TO C.A.P.
T3 MIDDLE CHANNEL; ENCROACHED

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	3	0	0	0.000000	0	0.0	0.0	1754.39	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	15	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15

STATUS: Analyzing profile 2.

Contraction Coefficient (CCHV) .600

Expansion Coefficient (CEHV) .800

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.842.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10566.00
Right Encroachment Station (ft, STENCR)	10860.00
Encroachment Method (TYPE)	1
Width or Percent Target	294.000

Q=1745 CFS

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.842	.074	.060	.080	5.79	1754.39	.00	1753.90
.009161	0	0	0	1754.66	.27	.00	.00
.00	349	154	23	.00	1753.10	1751.40	0
1870	962	843	63	294.0	10566.00	10860.00	0
.00	2.75	5.45	2.77	.000	.0	1748.60	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 15.842
Total Discharge (cfs, Q) 1870
Computed Water Surface Elevation (ft MSL, CWSEL) 1754.39

Station (ft) =	10566.0	10626.4	10639.0	10656.7	10666.9	10672.7
Flow (%) =	11.5	4.7	3.3	5.0	3.0	
Area (sq ft) =	91.9	28.5	26.3	27.2	16.2	
Vel (ft/s) =	2.34	3.08	2.33	3.42	3.49	
Depth (ft) =	1.52	2.26	1.49	2.66	2.79	

Station (ft) =	10672.7	10733.7	10766.1	10778.2	10784.5	10790.4
Flow (%) =	3.5	4.7	3.8	4.4	4.0	
Area (sq ft) =	41.9	41.6	20.8	17.6	16.2	
Vel (ft/s) =	1.56	2.13	3.40	4.64	4.57	
Depth (ft) =	.69	1.29	1.72	2.79	2.74	

Station (ft) =	10790.4	10803.9	10847.3	10860.0
Flow (%) =	3.7	45.1	3.4	
Area (sq ft) =	21.2	154.7	23.1	
Vel (ft/s) =	3.23	5.45	2.77	
Depth (ft) =	1.57	3.57	1.82	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.890.

STATUS: (3265) Divided flow.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10631.00
Right Encroachment Station (ft, STENCR)	11000.00
Encroachment Method (TYPE)	1
Width or Percent Target	369.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.890	.080	.080	.063	5.40	1757.40	.00	1757.58
.012481	270	290	290	1757.76	.36	3.03	.07
3.10	4	84	338	.00	1756.80	1756.80	3
1870	4	160	1704	358.3	10639.58	10998.43	0
.02	.93	1.90	5.03	.000	2.1	1752.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.890
Total Discharge (cfs, Q)	1870
Computed Water Surface Elevation (ft MSL, CWSEL)	1757.40

Station (ft) =	10639.6	10656.1	10751.9	10823.6	10849.2	10919.6
Flow (%) =	.2	8.6	3.1	3.8	3.6	
Area (sq ft) =	4.9	84.4	33.2	30.3	44.0	
Vel (ft/s) =	.93	1.90	1.77	2.36	1.52	
Depth (ft) =	.30	.88	.46	1.18	.62	

Station (ft) =	10919.6	10940.0	10949.2	10959.4	10969.1	10979.9
Flow (%) =	3.2	3.1	4.6	12.1	25.3	
Area (sq ft) =	24.7	15.2	19.9	35.4	56.7	
Vel (ft/s) =	2.39	3.86	4.31	6.37	8.35	
Depth (ft) =	1.21	1.65	1.95	3.65	5.25	

Station (ft) =	10979.9	10989.8	10995.4	10998.4
Flow (%) =	24.0	7.8	.6	
Area (sq ft) =	52.9	22.4	4.1	
Vel (ft/s) =	8.46	6.53	2.78	
Depth (ft) =	5.35	4.00	1.35	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.898.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) .23

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10621.00
Right Encroachment Station (ft, STENCR)	10773.00
Encroachment Method (TYPE)	1
Width or Percent Target	152.000

Q=600 CFS - MIDDLE CHANNEL

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.898	.080	.080	.080	6.11	1760.41	.00	1759.98
.024493	150	180	200	1760.58	.17	2.70	.12
4.43	25	157	0	.00	1758.40	1760.00	4
600	81	517	0	152.0	10621.00	10773.00	0
.03	3.26	3.29	1.24	.000	3.2	1754.30	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.898
Total Discharge (cfs, Q)	600
Computed Water Surface Elevation (ft MSL, CWSEL)	1760.41

Station (ft) =	10621.0	10641.6	10772.0	10773.0
Flow (%) =	13.6	86.3	.1	
Area (sq ft) =	25.1	157.2	.4	
Vel (ft/s) =	3.26	3.29	1.24	
Depth (ft) =	1.22	1.21	.38	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 15.932.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.59

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10565.00
Right Encroachment Station (ft, STENCR)	10716.00
Encroachment Method (TYPE)	1
Width or Percent Target	151.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
15.932	.080	.080	.080	3.55	1763.25	.00	1763.50
.009693	165	190	210	1763.36	.11	2.75	.04
5.32	7	214	8	.00	1762.00	1762.00	4
600	10	578	11	146.2	10567.52	10713.73	0
.05	1.33	2.69	1.33	.000	3.9	1759.70	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO)	15.932
Total Discharge (cfs, Q)	600
Computed Water Surface Elevation (ft MSL, CWSEL)	1763.25

Station (ft) =	10567.5	10580.0	10700.0	10713.7
Flow (%) =	1.7	96.4	1.9	
Area (sq ft) =	7.8	214.8	8.6	
Vel (ft/s) =	1.33	2.69	1.33	
Depth (ft) =	.62	1.79	.62	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.021.

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	10170.00
Right Encroachment Station (ft, STENCR)	10338.00
Encroachment Method (TYPE)	1
Width or Percent Target	168.000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.021	.080	.080	.080	4.83	1769.83	.00	1769.62
.016461	530	530	525	1769.96	.13	6.58	.02
8.00	29	173	7	.00	1768.30	1768.90	6
600	73	514	12	168.0	10170.00	10338.00	0
.10	2.51	2.97	1.62	.000	5.8	1765.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 16.021
Total Discharge (cfs, Q) 600
Computed Water Surface Elevation (ft MSL, CWSEL) 1769.83

Station (ft) =	10170.0	10192.1	10200.8	10324.8	10338.0
Flow (%) =	5.9	6.3	85.8	2.0	
Area (sq ft) =	16.7	12.4	173.3	7.5	
Vel (ft/s) =	2.13	3.02	2.97	1.62	
Depth (ft) =	.75	1.43	1.40	.57	

STATUS: (1490) NH card used.

STATUS: Analyzing cross-section reach 16.112.

STATUS: (3280) For cross-section 16.11, ends have been extended vertically 1.56 feet in order to calculate the hydraulic cross-section properties.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 3.63

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL) 9917.00
Right Encroachment Station (ft, STENCR) 10236.00
Encroachment Method (TYPE) 1
Width or Percent Target 319.000

Q=1875 CFS

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
16.112	.080	.060	.080	5.46	1774.56	.00	1774.51
.010634	420	405	390	1774.83	.26	4.76	.11
11.34	67	209	236	.00	1774.00	1774.00	6
1750	159	1041	549	319.0	9917.00	10236.00	0
.13	2.37	4.97	2.33	.000	8.0	1769.10	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 16.112
Total Discharge (cfs, Q) 1750
Computed Water Surface Elevation (ft MSL, CWSEL) 1774.56

Station (ft) =	9917.0	9941.3	9969.8	10045.6	10088.5	10109.1
Flow (%) =	5.6	3.5	59.5	6.9	7.2	
Area (sq ft) =	37.5	29.6	209.3	52.2	41.5	
Vel (ft/s) =	2.63	2.05	4.97	2.31	3.05	
Depth (ft) =	1.54	1.04	2.76	1.22	2.01	

Station (ft) =	10109.1	10184.8	10212.5	10236.0
Flow (%) =	12.2	3.1	2.0	
Area (sq ft) =	95.6	28.0	19.1	
Vel (ft/s) =	2.24	1.93	1.80	
Depth (ft) =	1.26	1.01	.81	

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 110 : TRILBY WASH; GRAND AVENUE TO C.A.P.
MIDDLE CHANNEL; ENCROACHED
P&D No. 10320.00; FCD No. 90-24

	Cross-Section Number SECNO	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Energy Gradient Elevation (ft MSL) EG	Water Surface Top Width (ft) TOPWID	Left Overbank Flow (cfs) QLOB	Channel Flow (cfs) QCH	Right Overbank Flow (cfs) QROB	Encroach. Target Requested PERENC	Left Encroach. Station (ft) STENCL	Left Bank Station (ft) STCHL	Right Bank Station (ft) STCHR
	15.842	1753.90	.00	1754.36	268.48	776.65	912.49	55.86	-10432.20	10432.20	10803.90	10847.30
	15.842	1754.39	.49	1754.66	294.00	962.38	843.74	63.88	294.00	10566.00	10803.90	10847.30
*	15.890	1757.58	.00	1757.81	364.21	7.65	179.63	1557.72	578.80	10430.50	10656.10	10751.90
	15.890	1757.40	-.18	1757.76	358.25	4.57	160.77	1704.66	369.00	10631.00	10656.10	10751.90
*	15.898	1759.98	.00	1760.38	149.37	82.70	517.30	.00	323.10	10468.70	10641.60	10772.00
*	15.898	1760.41	.43	1760.58	152.00	81.76	517.77	.47	152.00	10621.00	10641.60	10772.00
*	15.932	1763.50	.00	1763.58	151.32	13.34	571.98	14.68	284.00	10455.80	10580.00	10700.00
*	15.932	1763.25	-.25	1763.36	146.21	10.37	578.21	11.41	151.00	10565.00	10580.00	10700.00
*	16.021	1769.62	.00	1769.81	167.84	68.21	524.10	7.68	219.60	10159.10	10200.80	10324.80
	16.021	1769.83	.20	1769.96	168.00	73.13	514.75	12.12	168.00	10170.00	10200.80	10324.80
*	16.112	1774.51	.00	1774.72	510.30	422.23	962.96	489.81	10258.60	.00	9969.80	10045.60
*	16.112	1774.56	.05	1774.83	319.00	159.28	1041.03	549.69	319.00	9917.00	9969.80	10045.60

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 15.89, profile 1, conveyance change outside acceptable range.

Section 15.898, profile 1, critical depth assumed.

Section 15.898, profile 1, slope too steep.

Section 15.898, profile 1, minimum specific energy.

Section 15.898, profile 2, conveyance change outside acceptable range.

Section 15.932, profile 1, conveyance change outside acceptable range.

Section 15.932, profile 2, conveyance change outside acceptable range.

Section 16.021, profile 1, conveyance change outside acceptable range.

Section 16.112, profile 1, conveyance change outside acceptable range.

Section 16.112, profile 2, conveyance change outside acceptable range.

10 Warning and status message(s) generated

SUMMARY PRINTOUT TABLE 200 : TRILBY WASH; GRAND AVENUE TO C.A.P.
---------- MIDDLE CHANNEL; ENCROACHED
P&D No. 10320.00; FCD No. 90-24

Profile Number 2

Cross-Section Number	Floodway Width (ft)	Floodway Section Area (sq ft)	Floodway Mean Velocity (ft/s)	W. S. Elevation with Floodway (ft MSL)	W. S. Elevation without Floodway (ft MSL)	W. S. Elevation Diffrence (ft)
15.842	294.	527.	3.5	1754.4	1753.9	.5
15.890	359.	428.	4.4	1757.4	1757.6	-.2
15.898	152.	183.	3.3	1760.4	1760.0	.4
15.932	146.	231.	2.6	1763.3	1763.5	-.2
16.021	168.	210.	2.9	1769.8	1769.6	.2
16.112	319.	513.	3.4	1774.6	1774.5	.1

END OF OUTPUT

APPENDIX E

MANNING'S 'N' VALUE DETERMINATION REPORT

MANNING'S 'n' VALUE DETERMINATION REPORT
FOR
TRILBY WASH

FROM THE CAP AQUEDUCT TO GRAND AVENUE NEAR CIRCLE CITY
MARICOPA COUNTY, ARIZONA

PREPARED FOR:

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
2801 W. DURANGO ST.
PHOENIX, ARIZONA 85009

CONTRACT NO. 90-24
P&D TECHNOLOGIES PROJECT NO. 10320.00

Registered Professional Engineer (Civil)
CERTIFICATE NO.
10290
RAMESH I.
PATEL
Date Signed 3/29/91
ARIZONA, U.S.A.

SUBMITTED BY:

P & D TECHNOLOGIES
1702 EAST HIGHLAND
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(602) 264-3335

NOVEMBER 27, 1990

Revised December 18, 1990
Revised March 28, 1991

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APPENDICES

APPENDIX I:	Field Inspection Photographs (Taken November 20, 1990).	5

EXHIBITS

EXHIBIT 1:	Field Inspection Location Map.	Map Pocket
EXHIBIT 2:	Culvert "As-Built" Patton Road/Trilby Wash	Map Pocket
EXHIBIT 3:	C.A.P. Overchute "As-Built" Drawing	Map Pocket

Registered Professional Engineer (Civil)
CERTIFICATE NO.
10290
RAMESH I.
PATEL
Date Signed 3/23/91
ARIZONA, U.S.A.

MANNING'S "n" VALUE ESTIMATION FROM FIELD INSPECTION 11/20/90

1.0 INTRODUCTION

P & D Technologies was contracted by the Flood Control District of Maricopa County on August 13, 1990 to perform a Flood Insurance Study (FIS). The project consists of topographic mapping, as well as floodplain and floodway delineation of approximately 6.7 river miles of Trilby Wash. The downstream study limits being the Central Arizona Project Aqueduct (CAP), the upstream limits being Grand Avenue at Circle City. The hydrology portion of this study will be supplied by the Maricopa County Flood Control District.

The purpose of this report is to summarize the field inspection of the site made on Tuesday, November 20, 1990. The site inspection was conducted to evaluate and photograph the existing channel and overbank conditions in terms of Manning's roughness coefficient ("n"). The Manning's "n" values determined from this field inspection will be incorporated into the HEC-2 computer model.

2.0 EXISTING FIELD CONDITIONS

Weather conditions on this day were partially sunny with no visible rain over the site. The air temperature ranged from approximately 59 to 80 degrees Fahrenheit with an average up around 70. Winds were light at approximately 5 miles per hour.

The site was inspected by the following team:

Geave "Besian" Khatiblou	Maricopa County FCD
Ramesh Patel	P & D Technologies
Lisa T.M. Vomero	P & D Technologies

2.1 EXISTING DRAINAGE PATTERN

The wash drains from north to south-southeast towards McMicken Dam. The immediate study area is undeveloped with the exception of a few scattered homes. The closest residential subdivision of note is unincorporated Circle City which is accessible from Grand Avenue north of the Trilby Wash crossing (Refer to Exhibit 1). The drainage area is very flat having an average slope of roughly 0.8 percent.

The predominant soil type encountered in this reach of our study area is best characterized by Hydrologic Group "B". In addition, there is a small amount of intermixed Soil Group "C" in the northeast area of the study. Soil Group "B" is best defined as a porous soil comprised of sand, silt, and loam; while, Soil Group "C" is less porous and contains clay, loam and rock fragments. The vegetative cover density is roughly 30 to 40 percent throughout. The majority of the overbank area is well vegetated; however, the main channel bottom is predominantly void of vegetation. The type of vegetation encountered includes: Palo Verde and Mesquite (Ironwood) comprise the large trees, creosote and sage are the common bush variety and there is little to no grass cover.

2.2 DRAINAGE CHARACTERISTICS

The channel geometry of this reach of Trilby Wash changes often within short transition distances. In the area that the study begins, at the Grand Avenue bridge, the channel is well defined. It is characterized by a broad undulating channel bottom that varies approximately 3 feet in depth across its width. The banks of the Wash are composed exclusively of alluvial sediment with no rock outcroppings observed; as such, they are prone to erosion. The side slopes of the banks vary from steep, in some cases vertical, to as flat as roughly 12:1. The thalweg of the channel is characterized by meandering bends over relatively short distances. The bends are sometimes accompanied by steep vertical sides 5 to 6 feet in height on one side and small terraced benches on the opposite side at gentle slopes.

Within the main channel itself, there are signs of channel braiding. In addition, there are several areas where the channel splits and braids forming "islands" of noticeably higher ground in the middle. There is one area of a significant split flow in which a secondary channel forms and breaks away from the main channel. This occurs in Township 5 North, Range 3 West, at approximately the northern boundary of Section Line 9. Farther downstream at the southern boundary of Section Line 9 as well as in other areas of this study, the wash appears to form natural levees were secondary channels return to the main channel as well as were there is tributary inflow. Special care will be given in modelling these existing channel conditions.

2.3 EXISTING STRUCTURE(S)

There is only one significant hydraulic structure to be modelled in this reach of Trilby Wash with the exception of the CAP Canal. It occurs at the intersection of Trilby Wash and Patton Road and consists of eight (8) very large 68-inch CMP culverts. For the record, P & D staff did visit the Maricopa County Highway Department on 11/8/90 for the purpose of obtaining "as-built" plans for Patton Road were it crosses Trilby Wash; however, we were informed that there are no plans for this road improvement on file. In addition, their staff informed us that it was probably an "eye-ball overlay job" which means that to their best available knowledge those existing, newly installed CMP culverts were not sized according to any recorded method. It appeared that this portion of the road was recently improved in early 1990 because it had been newly paved and striped at the time of the first field inspection on 6/5/90. P&D's Survey Department did preform an "as-built" survey of Patton Road, a corresponding "as-built" drawing of this crossing is included as Exhibit 2.

It was noted during the field inspection that the west side of Patton Road crossing the Wash has a small dip in it. Also noted, was the fact that the west side of the Patton Road crossing of Trilby Wash had been damaged from overbank flooding and erosion. This was evidenced by a very recent patch job on the West side of the wash/roadway crossing as well as undercutting of previously placed concrete bank protection.

As a result, it appears that for purposes of modelling the Patton Road Culvert crossing and adjacent dip section appear to form a weir structure during periods of high flow. This is further illustrated by Photo Sets 17 through 19, in Appendix I.

2.4 CONSTRICTIONS/EXPANSIONS

It appears that the channel has a uniform width versus depth ratio throughout with very few areas of sudden expansion or contraction. Over the entire course of the wash, the width of the main channel varies from roughly 20 feet across to as wide as 135 feet 10 inches at the CAP flume crossing. An "as-built" drawing of the CAP overchute at Trilby Wash has been completed by P&D Technologies and is included in this report as Exhibit 3. The wash also widens at the Patton Road crossing were it measures roughly 95 feet. In general it appears that the average main channel flow width is probably 30 to 50 feet with a corresponding average depth of roughly 3 to 4 feet.

3.0 MANNING'S "n" VALUES

Manning's roughness coefficient ("n") were chosen with the aid of aerial photographs as well as several selected reference which are listed in Section 6.0 of this report.

From the site inspection Manning's "n" values were assigned. Overall, the values ranged from a low of 0.045 to a high of 0.10. The "n" values in the channel ranged from 0.045 to 0.075; the overbanks ranged from 0.065 to 0.10. In addition, this reach of the wash contained several split flow areas of varying size as well the occurrence of "islands" between the splits in the flow line. The "n" values for these island areas ranged from 0.060 to 0.10.

4.0 RESULTS

The results of this field inspection are the assignment of Manning's "n" values for use in the HEC-2 model. A representative sampling of the assigned values for the different conditions encountered are depicted by the photographs in Appendix I. In addition, the approximate area in which the photographs were taken are depicted on the Field Inspection Location Map which is included as Exhibit 1 in the Map Pocket at the end of this report.

5.0 SUMMARY

From the site inspection Manning's "n" values were assigned. Overall, the values ranged from a low of 0.045 to a high of 0.10. The "n" values in the channel ranged from 0.045 to 0.075; the overbanks ranged from 0.065 to 0.10. In addition, this reach of the wash contained several split flow areas of varying size as well the occurrence of "islands" between the splits in the flow line. The "n" values for these island areas ranged form 0.060 to 0.10. These changes in values will be incorporated into the HEC-2 Model.

It should be noted that, the Manning's "n" values are estimated based on field observations and water depth assumptions. The accuracy of these initial assumptions will be verified. If necessary, the "n" values will be adjusted during the course of HEC-2 modeling, per request from the Maricopa County Flood Control District.

The submittal of this report concludes the field inspection summary phase of the Flood Insurance Study and represents the completion of Task 4.4.1 as outlined in the Scope of Work. This summary report will be keep as part of the job file and will be turned over to ADWR for archive files as outlined in TR 90-3. In addition, as outlined in the Scope of Work, this Summary Report will be included in both the draft and final Flood Insurance Study as an Appendix.

6.0 SELECTED REFERENCES

Aldridge, B.N., and Garrett, J.M.; 1973; Roughness Coefficients for Stream Channels in Arizona: U.S. Geological Survey, Open File Report (Prepared in cooperation with the Arizona Highway Department); 87 p.; unpublished.

Arizona Department of Water Resources (A.D.W.R.); 8/90; Instructions for Organizing and Submitting Technical Documentation for Flood Studies (TR 90-3): Engineering Division, Flood Management Section; unpublished; 13 p.

Chow, Ven, T.; 1959; Open-Channel Hydraulics; McGraw Hill (Publishing Company) Civil Engineering Series; New York; pages 98 through 127.

Barnes, H.H., Jr.; 1967; Roughness Characteristics of Natural Channels: U.S. Geological Survey, Water-Supply Paper 1849; U.S. Government Printing Office; Washington, D.C.; 213 p.

National Flood Insurance Program; 5/11/90 (Rev.); Flood Insurance Rate Maps (FIRM), all or portions of the following: Map Numbers 04013C0679 E, 04013C0687 E, and 04013C1110 E; corresponding to Panel Numbers 679, 687 and 1110 of 4350, respectively; Maricopa County, Arizona and Incorporated Areas: Federal Emergency Management Agency (FEMA).

Soil Conservation Service; 1985; Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona: U.S. Department of Agriculture; U.S. Government Printing Office; No. 1985-167-S/20007.

THE ARIZONA REPUBLIC; November 20, 1990; Section "A"; Phoenix, Arizona.

The WLB Group, Inc.; 3/89; Wittmann Area Drainage Master Study Part A: Hydrology and Hydraulics; Prepared for The Flood Control District of Maricopa County; Phoenix, AZ; unpublished.

U.S.G.S. Quadrangle Maps of Arizona: Wittmann (1981) and White Tank Mountains, N.E. (1978)

APPENDIX I:

FIELD INSPECTION PHOTOGRAPHS
(Taken November 20th, 1990)

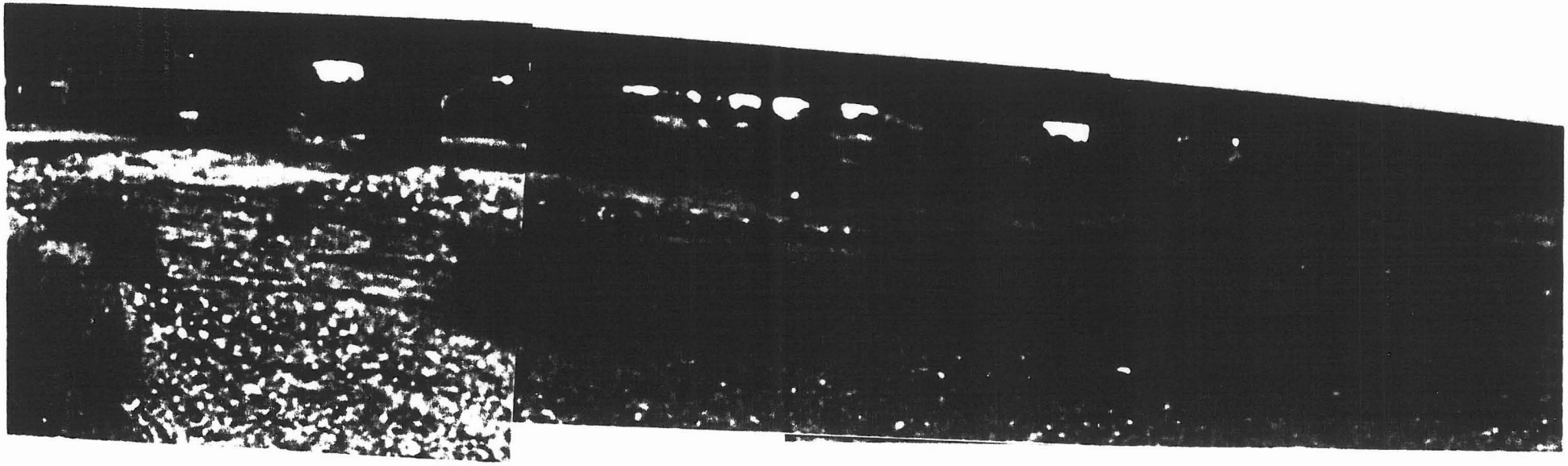


PHOTO SET 1: AT&SF Railroad crossing at Trilby Wash north of Grand Avenue, looking north upstream. (Match to previous study by the WLB Group of 0.080 for both east and west overbank and 0.050 for the main channel).

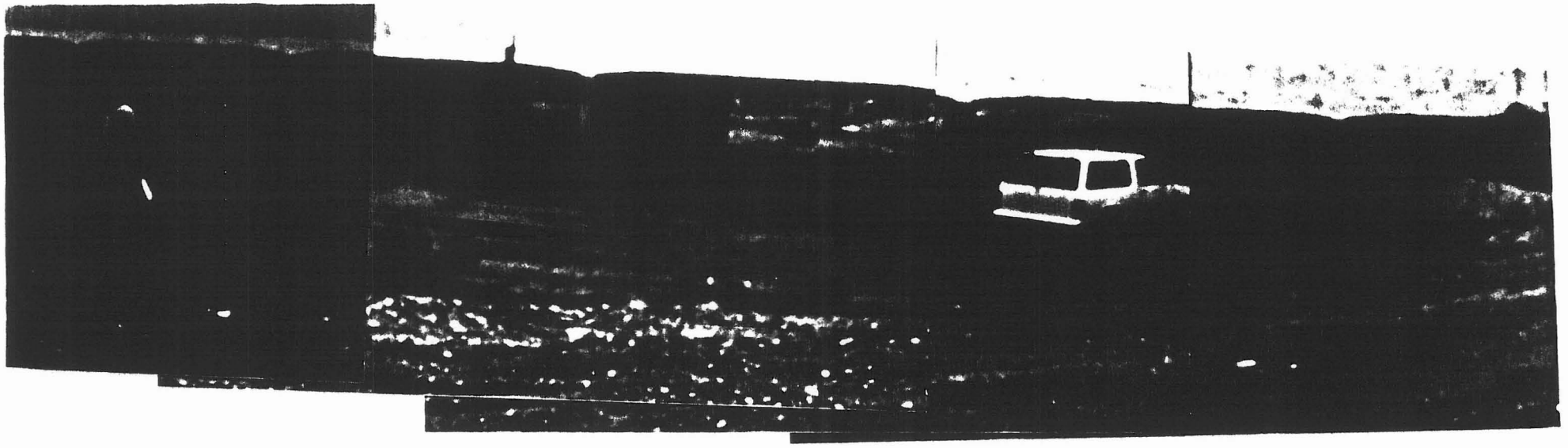


PHOTO SET 2: Grand Avenue crossing at Trilby Wash looking north upstream. (Match to previous study by The WLB Group, Inc. of 0.080 for the east and west overbank and 0.050 for the main channel).

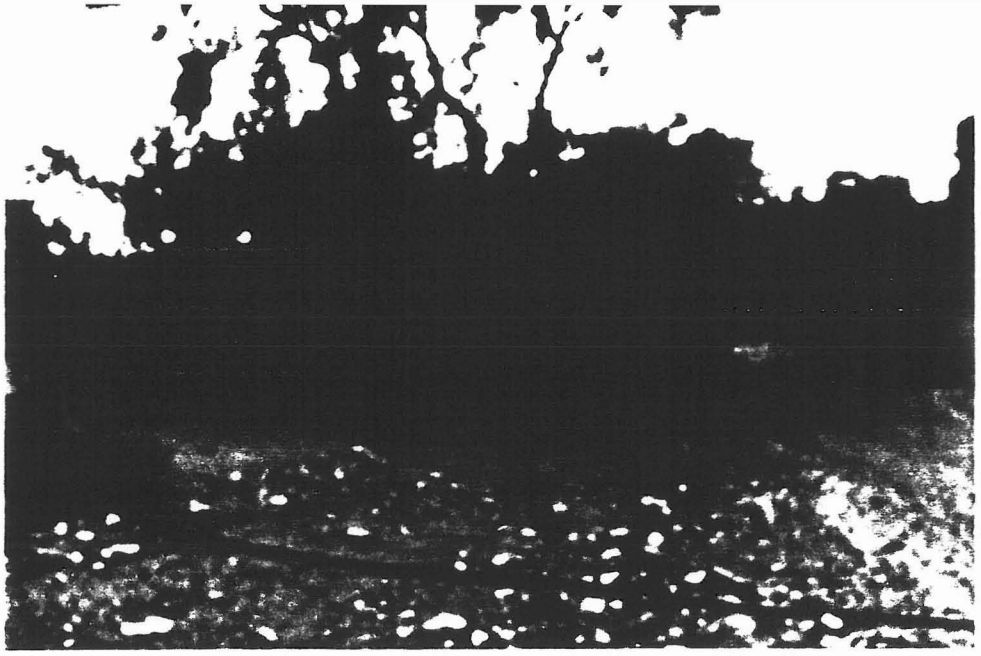
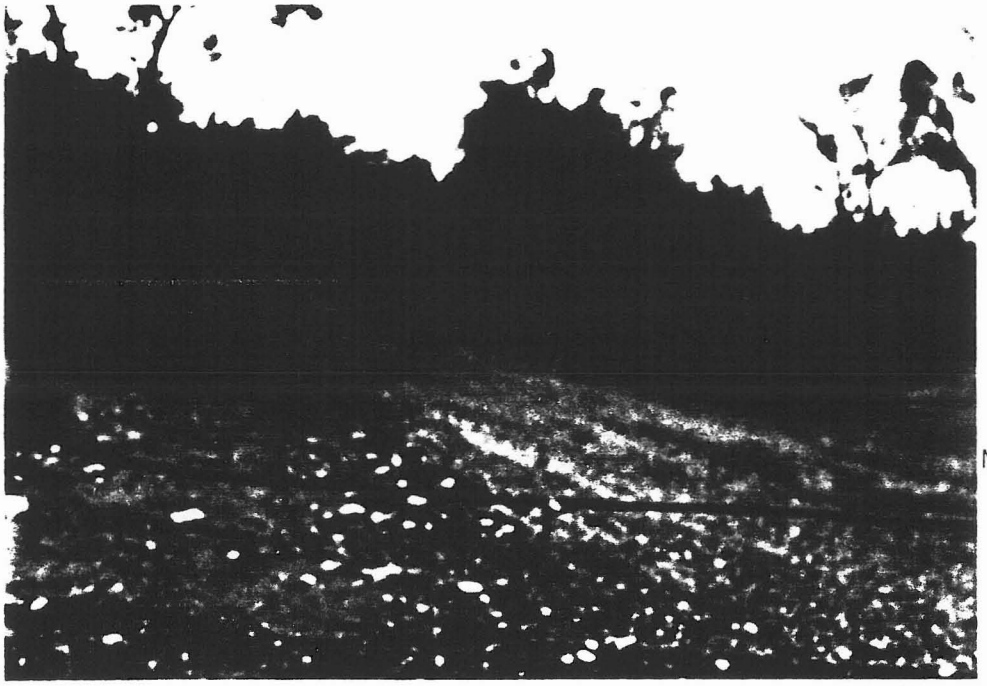


PHOTO SET 3: Dove Valley Road crossing at Trilby Wash looking north upstream. (Match to previous study by The WLB Group, Inc. of 0.080 for the east and west overbank and 0.050 for the main channel).

Mileage = 0.0

West Overbank n = 0.080



Main Channel n = 0.050

East Overbank n = 0.080

PHOTO SET 4: Dove Valley Road at Trilby Wash looking south downstream.

Mileage = 0.0

East Bank n = 0.080

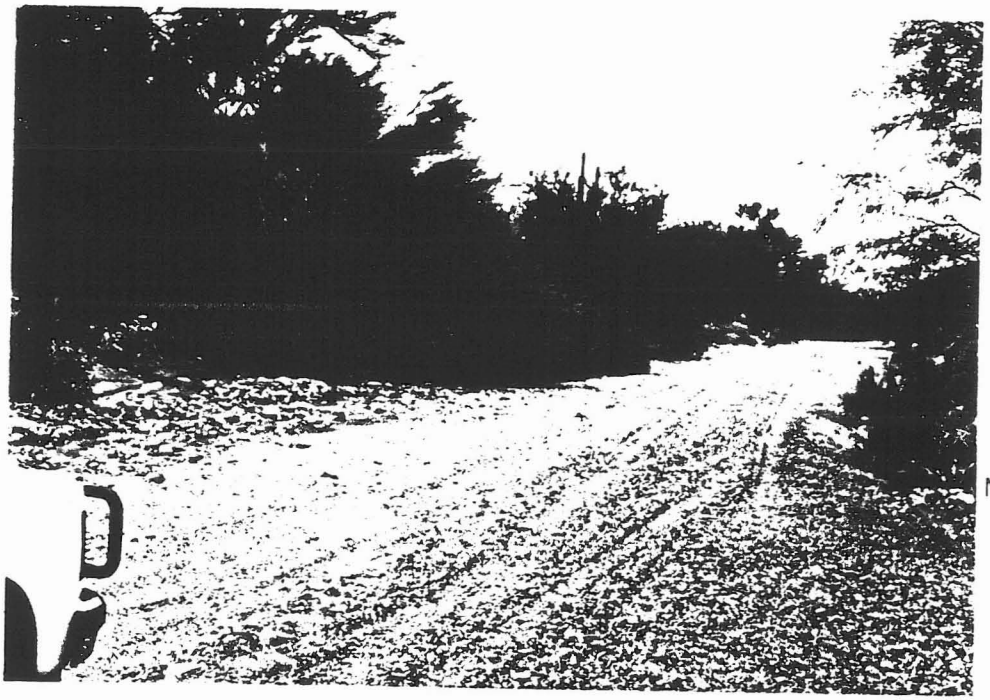
Main Channel n = 0.065

West Bank n = 0.080

PHOTO SET 5: In Trilby Wash looking south downstream.

(Mileage = 0.1)

East Bank "n" = 0.085



Main Channel "n" = 0.050

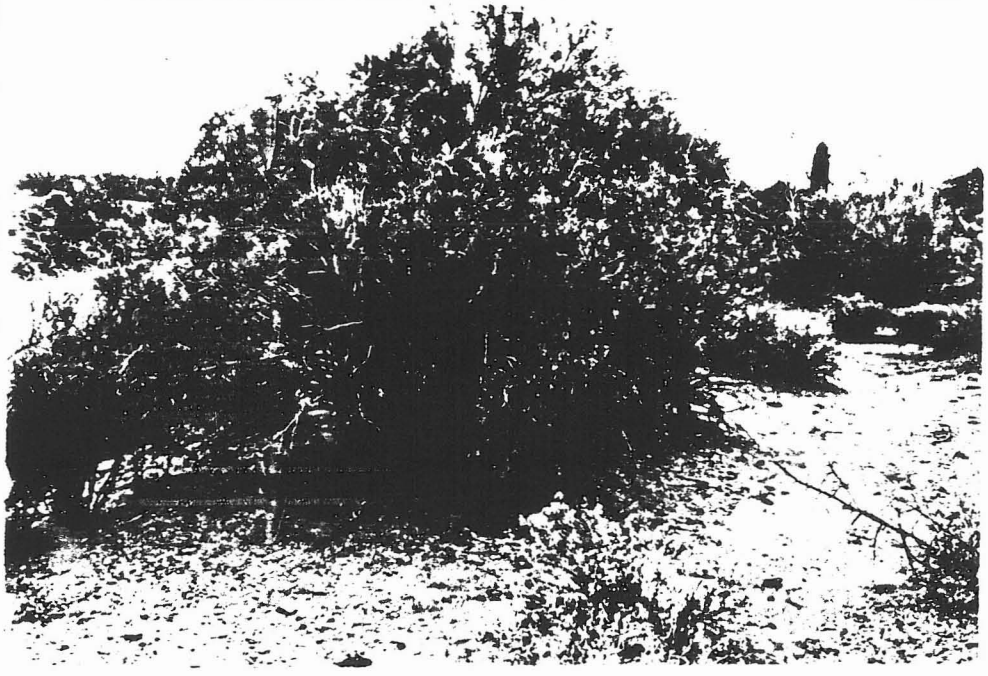
West Bank "n" = 0.085

PHOTO SET 6: In Trilby Wash looking south downstream.

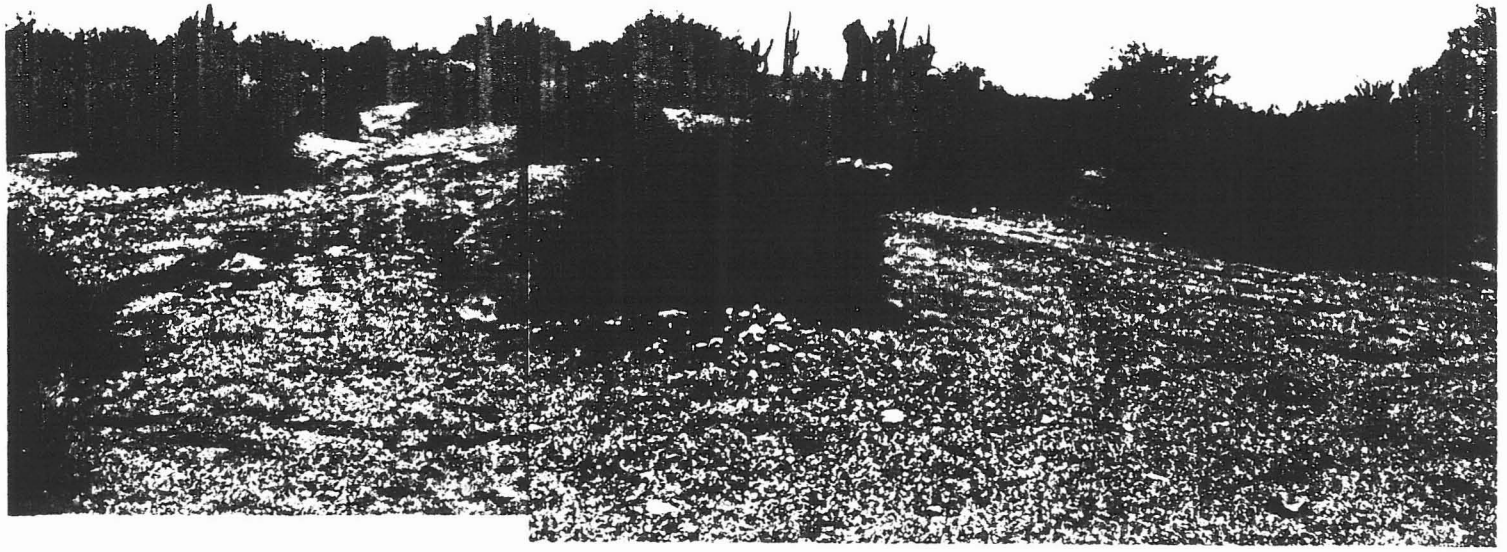
(Mileage = 0.45)

East Bank "n" = 0.080

Main Channel "n" = 0.045



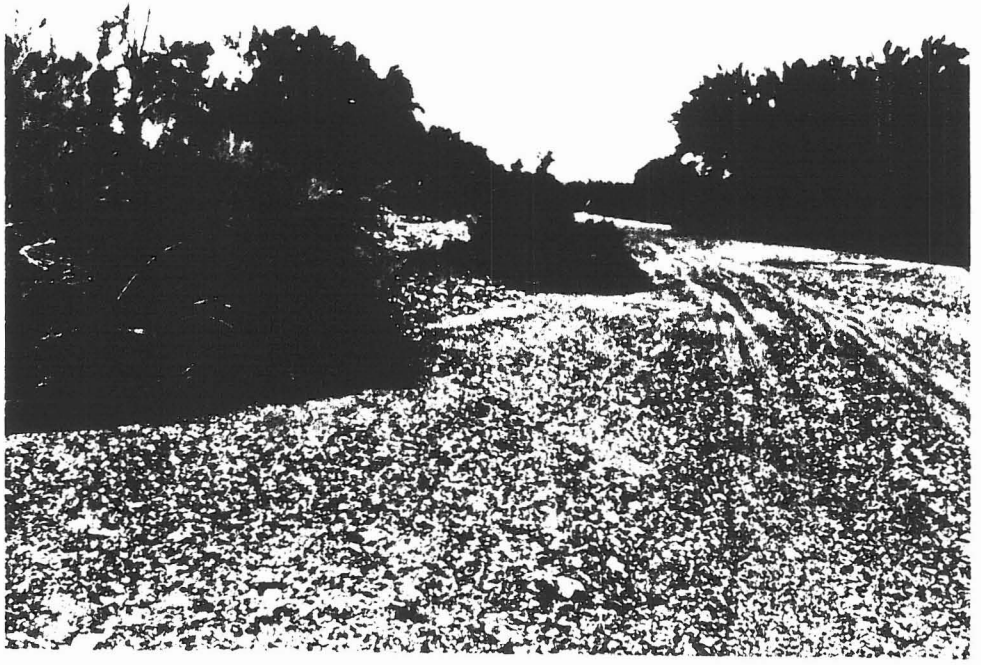
West Bank "n" = 0.080



East Bank "n" - 0.085 Main Channel "n" = 0.045 West Bank "n" =0.070

PHOTO SET 7: In Trilby Wash looking south downstream (Mileage = 0.050).

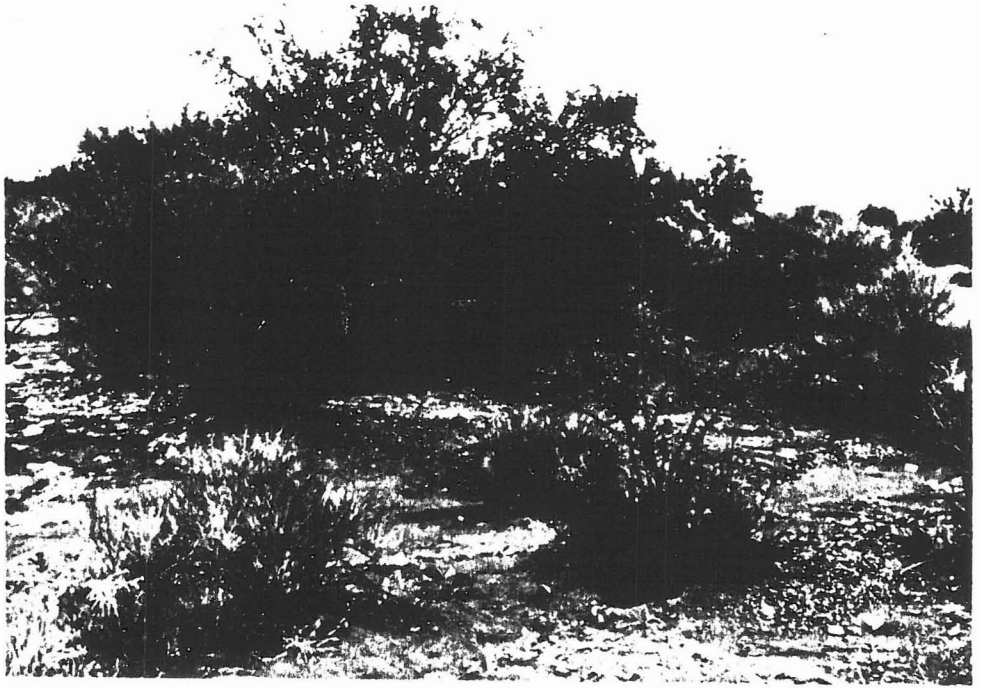
East Bank "n" 0.080



Main Channel "n" = 0.055

PHOTO SET 8: In Trilby Wash looking south downstream (Mileage = 0.72)

West Bank "n" = 0.080 looking west
and downstream across secondary wash.



West Bank "n" = 0.080 looking
north upstream.

PHOTO SET 8 (Cont.): In Trilby Wash (Mileage = 0.72).

PHOTO SET 9: At major split flow in Trilby Wash Section 9, T.5 N., R.3 W, looking south downstream.

(Mileage = 1.19)

Main Channel "n" = 0.050

West Bank "n" = 0.080

Split flow secondary channel cut in West Bank "n" = 0.050

PHOTO SET 10: Secondary Channel in West Bank of Trilby Wash looking north upstream.

(Mileage = 1.88)

Taken on the top of split flow "island".
Average "n" value of 0.060.

Taken in secondary channel looking north upstream, average "n" value of 0.060.

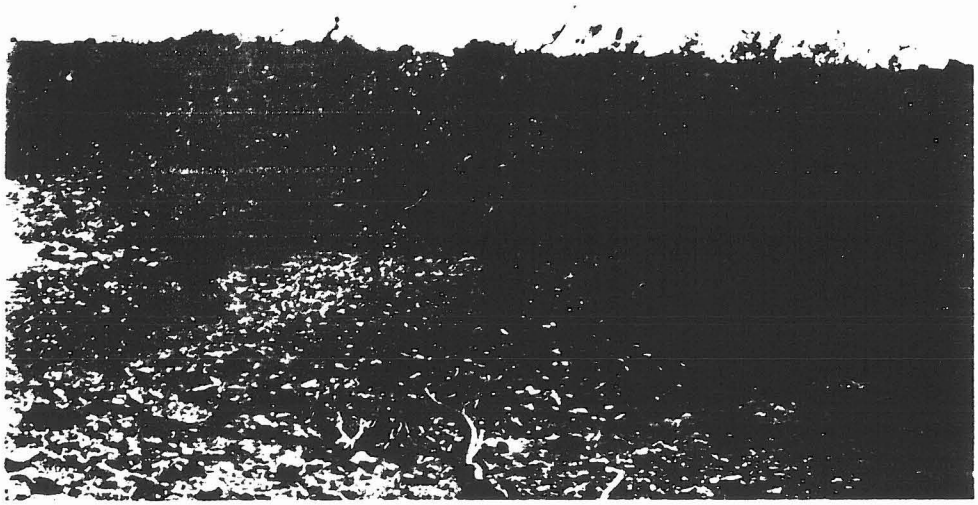
West Bank "n" = 0.10 "Island n" = 0.10 East Bank "n" = 0.10

"n" both channels 0.050

PHOTO SET 11: At split flow confluence in Trilby Wash, looking north upstream (Mileage = 2.00).

PHOTO SET 12: At Lone Mountain Road and Trilby Wash looking north upstream (Reset mileage at 0.0) Average "n" = 0.070.

PHOTO SET 13: In Trilby Wash looking south downstream.



(Mileage = 1.2)

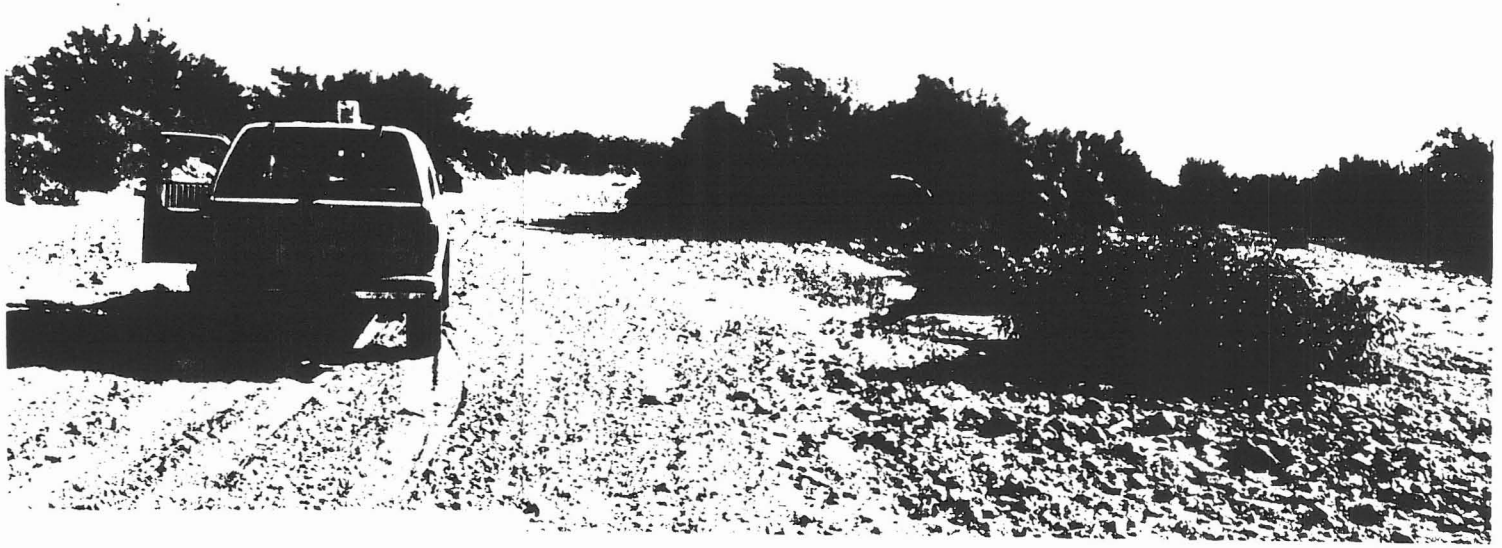
East Bank "n" = 0.080

Main Channel "n" =0.040

West Bank "n" = 0.080

East Bank "n" =0.080 Main Channel "n" = 0.055 West Bank "n" =0.095

PHOTO SET 14: In Trilby Wash looking south downstream (Mileage = 1.50).



East Bank "n" =0.085 Both Channels "n" = 0.055 "Island n" =0.090 West Bank "n" =0.085

PHOTO SET 15: In Trilby Wash looking south downstream at minor split flow condition (Mileage = 1.70).

Channel "n" = 0.055

PHOTO SET 15 (Cont.): In Trilby Wash looking north upstream in main channel (Mileage = 1.70).

PHOTO SET 16: In Trilby Wash looking south downstream. Wash is braided forming several vegetated islands. The banks are steep to vertical (note: top of east bank, far left side, middle of photograph). Mileage = 1.78

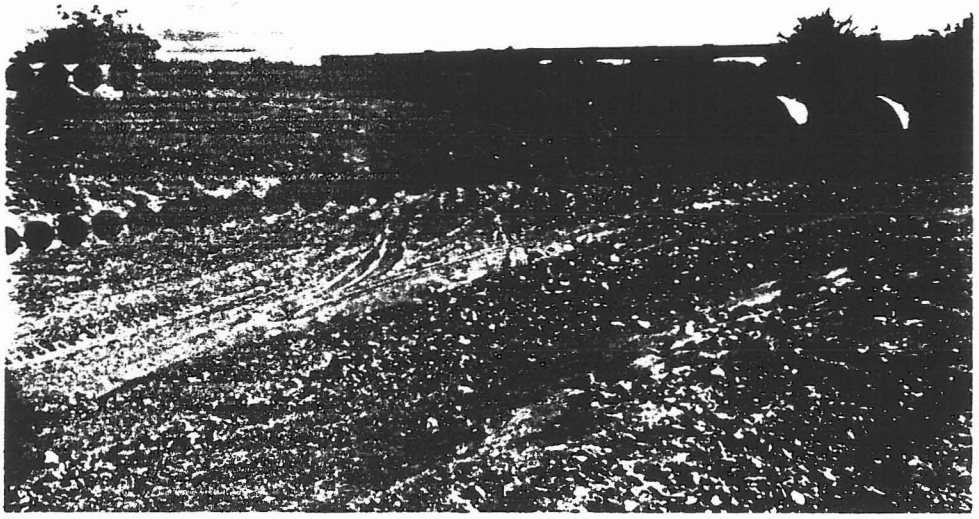


PHOTO SET 17: Patton Road crossing at Trilby Wash looking south downstream.

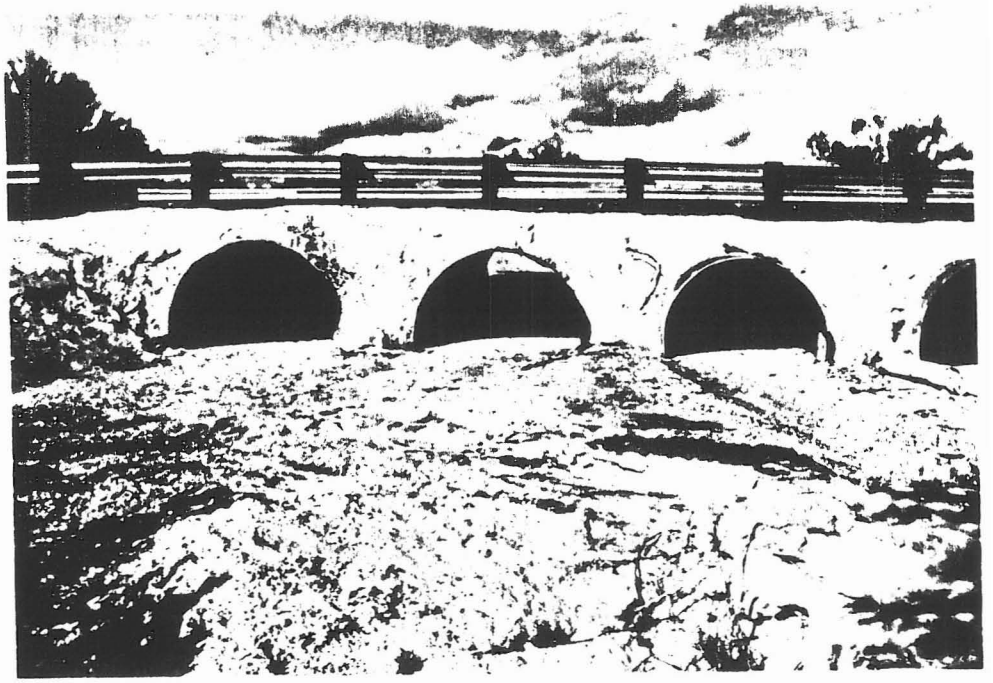
(Mileage = 2.2)

East slope "n" =0.075
East bank "n" = 0.080

Main Channel "n" = 0.050

West Bank "n" = 0.080

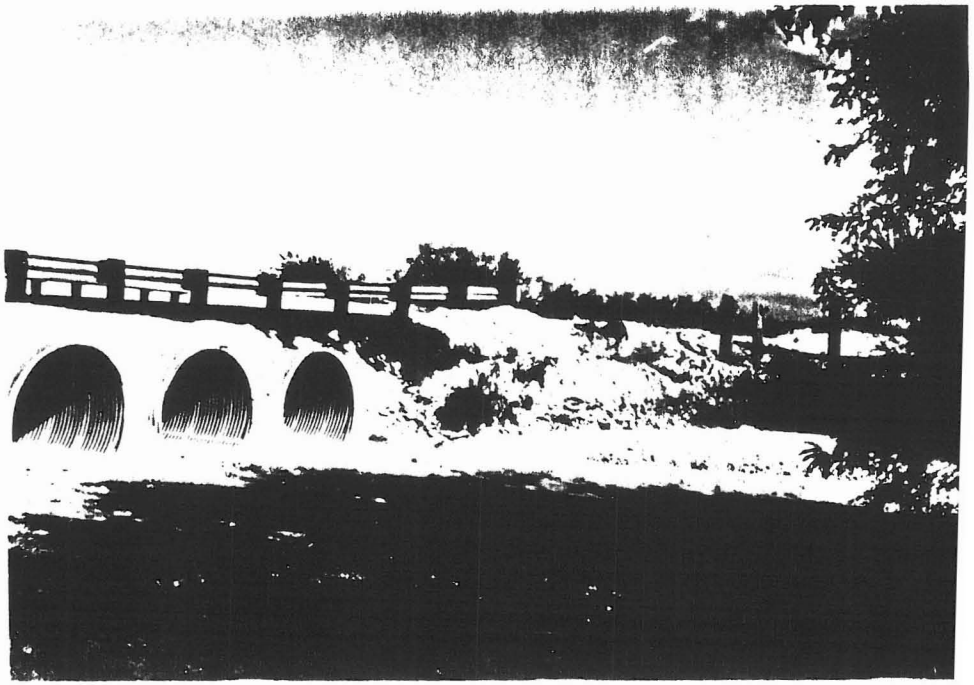
Water appears to flow over Patton Road on the west side of culvert crossing as evidenced by road and bank undercutting.



Main Channel "n" = 0.050
<u>Note:</u> sediment deposition in culverts

PHOTO SET 18: Patton Road crossing at Trilby Wash looking north upstream (Reset mileage = 0.0).

Main Channel "n" = 0.050



East Bank "n" = 0.085

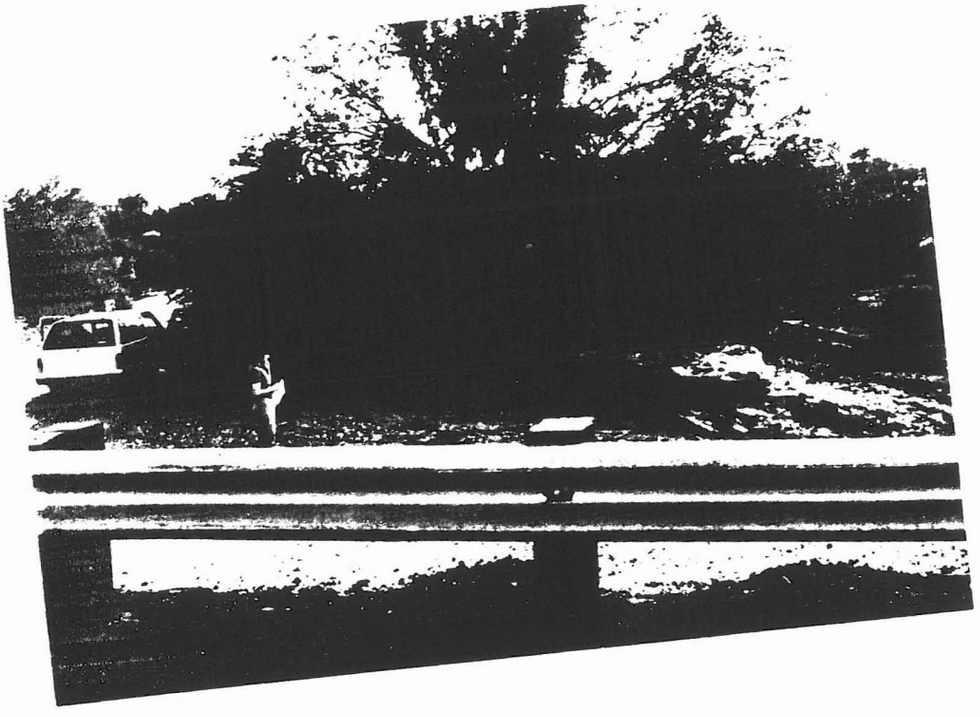
PHOTO SET 18 (Cont.): Patton Road crossing at Trilby Wash looking north upstream (Reset Mileage = 0.0).

PHOTO SET 19: Photo taken at centerline of Patton Road crossing Trilby Wash looking south downstream.

(Mileage = 0.0)

East Bank "n" = 0.085

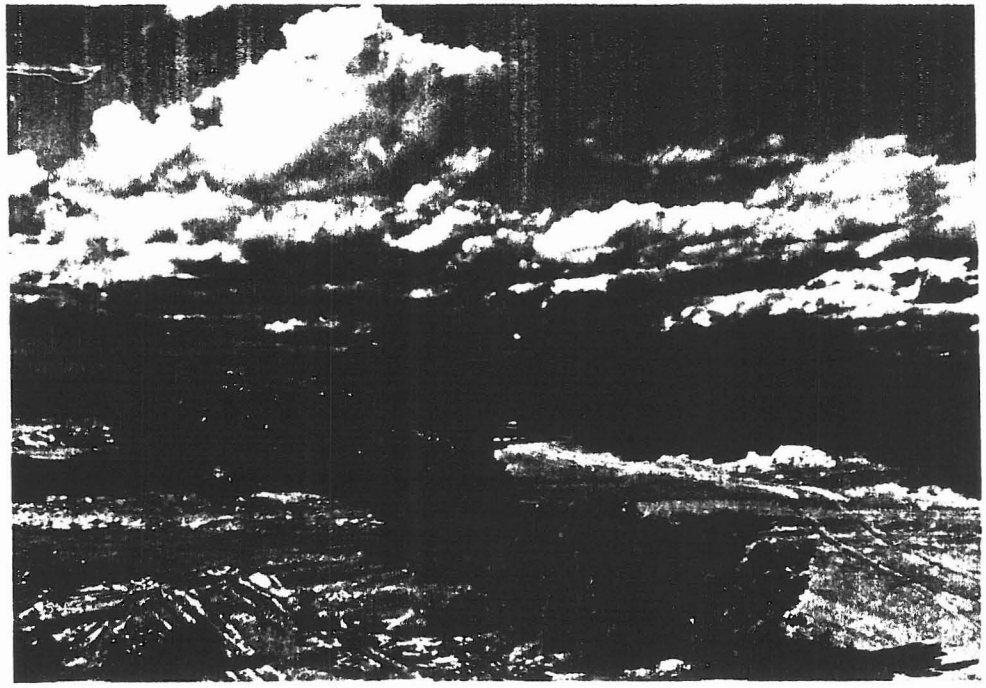
Channel "n" = 0.050



Channel "n" = 0.050
West Bank "n" = 0.085

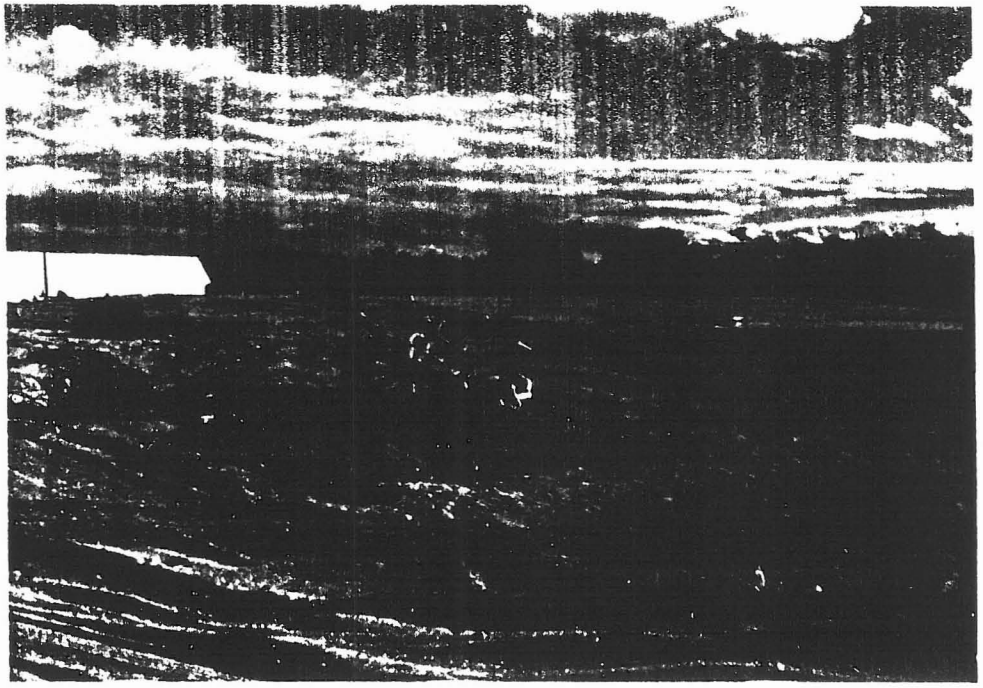
West Bank "n" = 0.085 Channel "n" = 0.055 East Bank "n" = 0.090

PHOTO SET 20: In Trilby Wash looking north upstream at typical island (Mileage = 1.09).



West Bank "n" = 0.085 Channel "n" = 0.060 East Bank "n" = 0.090

PHOTO SET 21: CAP crossing at Trilby Wash looking north upstream. Photo taken from on top of west wall of CAP Flume Structure. (Mileage = 1.25).



Prior to concrete CAP crossing, channel "n" = 0.065
At CAP crossing Flume is a concrete lined rectangle channel "n" = 0.013 (Match "n" values with previous study by The WLB Group, Inc.)

PHOTO SET 22: CAP Crossing at Trilby Wash looking south downstream (Mileage = 1.25)

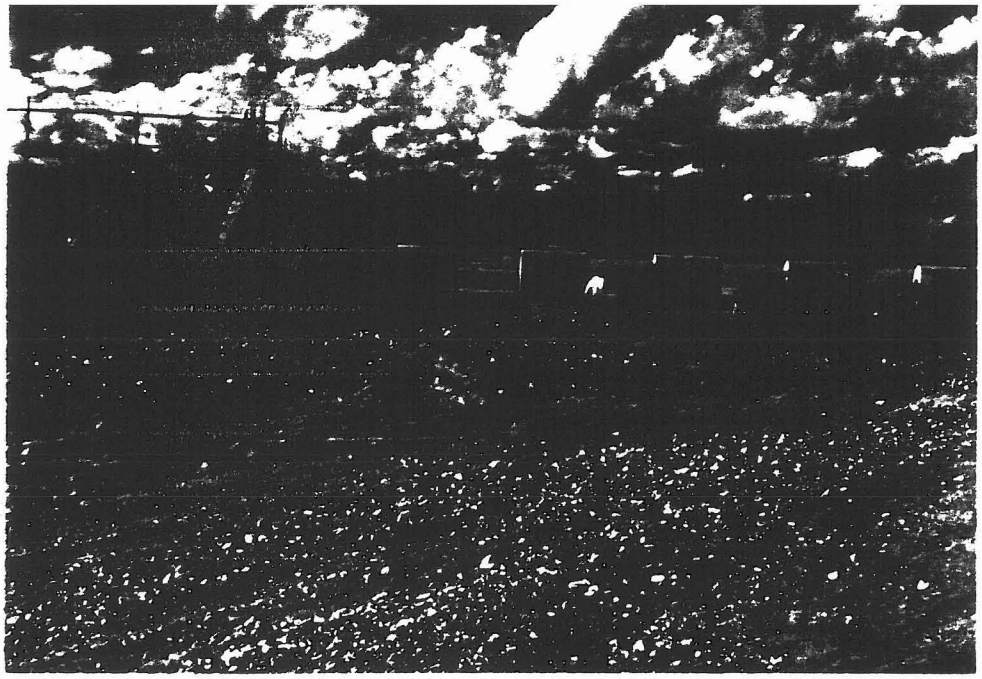
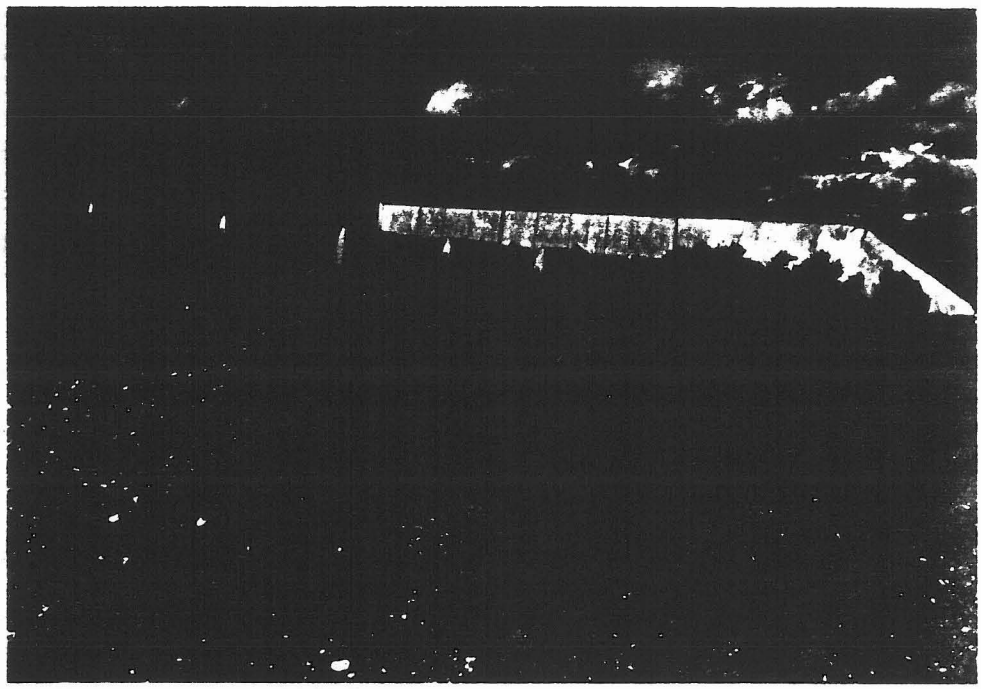
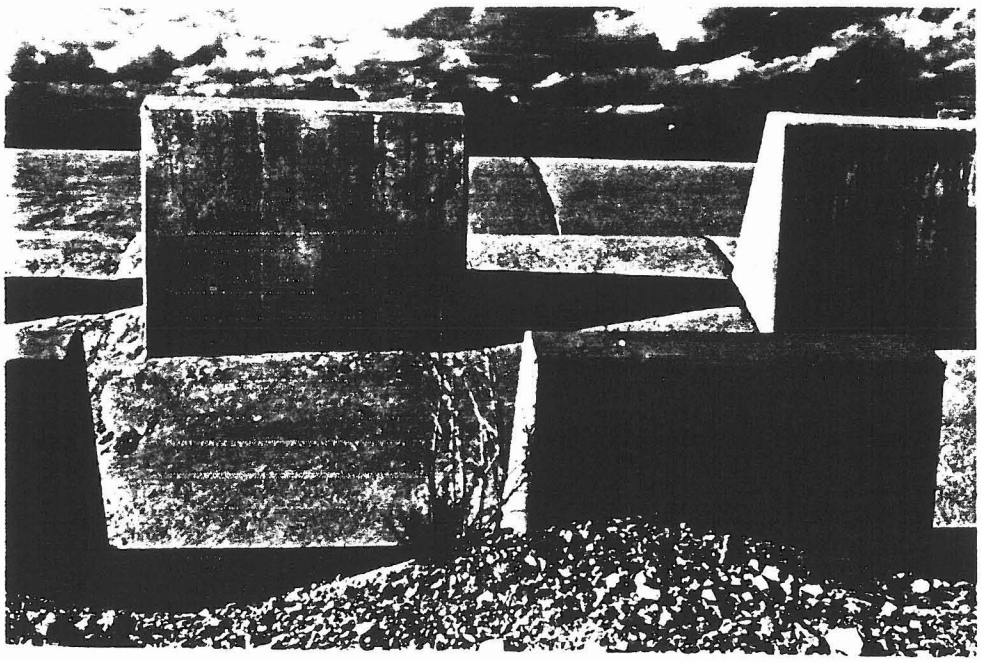


PHOTO SET 23: Downstream from concrete CAP crossing at Trilby Wash looking north upstream. (Match "n" values with previous study by The WLB Group).





Close up of energy dissipators.

PHOTO SET 24: Earthen dam stock pond on west bank of tributary to Trilby Wash located in T.5 N, R. 3 W., Section 27.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
D.E. SAGRAMOSO, CHIEF ENGINEER AND GENERAL MANAGER

TRILBY WASH FLOOD INSURANCE STUDY 6.7 RIVER MILES FROM THE CAP AQUEDUCT TO GRAND AVENUE AT CIRCLE CITY

LEGEND

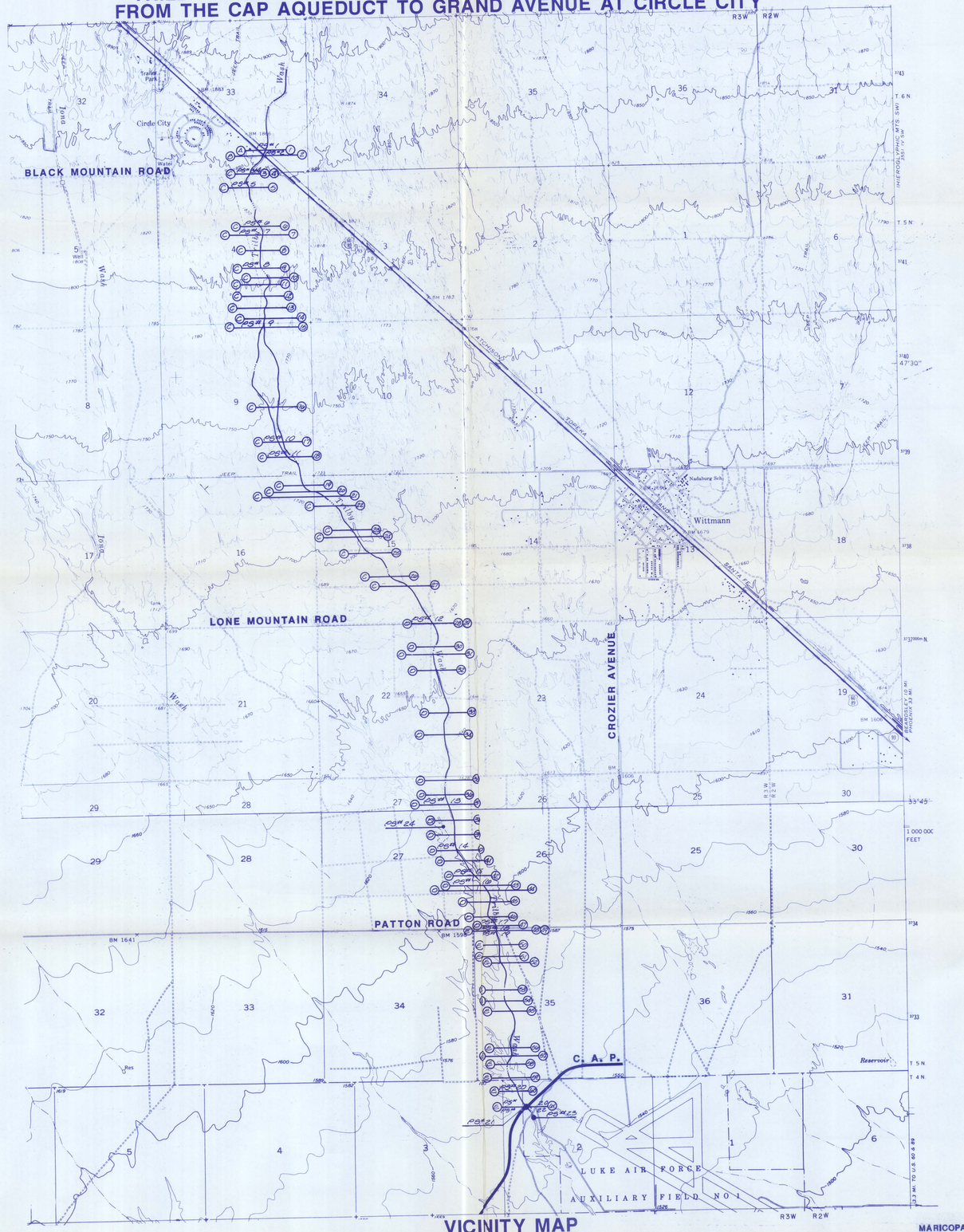
T4N	INDICATES TOWNSHIP
R3W	INDICATES RANGE
Ⓐ----○	SECTION "A" RAILROAD CROSSING
Ⓑ----○	SECTION "B" GRAND AVENUE
Ⓒ----○	"C" DENOTES APPROXIMATE MILEAGE DOWNSTREAM FROM LONE MOUNTAIN ROAD
Ⓓ----○	"D" DENOTES APPROXIMATE MILEAGE DOWNSTREAM FROM DOVE VALLEY ROAD
Ⓔ----○	"E" DENOTES APPROXIMATE MILEAGE FROM PATTON ROAD
○ PS1 ○	"PS1" DENOTES PHOTO SET NUMBER
○----①	"1" DENOTES CROSS-SECTION NUMBER

MANNING'S "n" VALUES

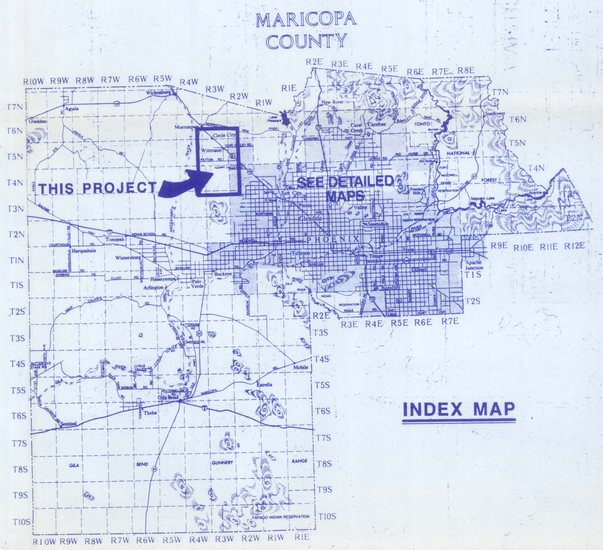
CROSS SECTION NUMBER	WEST OVERBANK	MAIN CHANNEL	EAST OVERBANK	OTHER	PHOTO SET NUMBER
1	Match with previous study at Railroad Crossing				1
2	0.080	0.050	0.080	at Grand Ave.	2
3	0.080	0.050	0.080	**Black Mtn. Rd.**	3
4	0.080	0.065	0.080	**Black Mtn. Rd.**	4
5	0.085	0.050	0.085		5
6	0.080	0.045	0.080		6
7	0.070	0.045	0.085		7
8	0.080	0.045	0.070		-
9	0.080	0.055	0.080		8
10	0.080	0.050	0.080		-
11	0.075	0.050	0.080		-
12	0.080	0.050	0.065		-
13	0.080	0.065	0.080		-
14	0.080	0.050	0.080		-
15	0.080	0.050 (2)	0.080	island "n" = 0.080	9
16	0.080	0.060	0.080		-
17	0.10	0.060	0.10		10
18	0.10	0.050 (2)	0.10	island "n" = 0.10	11
19	0.075	0.075	0.075		-
20	0.085	0.055	0.085		-
21	0.070	0.065	0.070		-
22	0.080	0.050	0.080		-
23	0.085	0.050 (2)	0.085	island "n" = 0.085	-
24	0.085	0.050	0.085		-
25	0.085	0.050 (2)	0.085	island "n" = 0.090	-
26	0.085	0.050	0.085		-
27	0.080	0.050	0.080		-
28	0.070	0.070	0.070	At Lone Mtn. Rd.	12
29	0.080	0.050	0.080		-
30	0.090	0.055	0.080		-
31	0.085	0.055	0.075		-
32	0.085	0.055	0.085		-
33	0.085	0.060	0.085		-
34	0.080	0.060	0.080		-
35	0.080	0.050	0.080		-
36	0.080	0.040	0.080		13
37	0.080	0.040	0.080		-
38	0.080	0.060	0.080		-
39	0.080	0.050	0.080		-
40	0.095	0.055	0.080		-
41	0.085	0.060	0.085		-
42	0.085	0.055 (2)	0.085	island "n" = 0.090	15
43	0.080	0.055	0.080		16
44	0.080	0.055	0.085		-
45	0.070	0.050	0.085		-
46	0.085	0.055	0.080		-
47	0.080	0.050	0.080	east slope "n" = 0.075	17
48	0.080	0.050	0.080	Patton Road	18
49	0.085	0.050	0.085	Patton Road	19
50	0.085	0.060	0.080		-
51	0.085	0.070	0.080		-
52	0.085	0.050	0.085		-
53	0.085	0.050 (2)	0.085	island "n" = 0.090	-
54	0.085	0.055	0.085		-
55	0.085	0.055 (2)	0.085	island "n" = 0.090	-
56	0.090	0.055	0.080		-
57	0.090	0.055 (2)	0.080	island "n" = 0.090	-
58	0.090	0.050	0.085		-
59	0.090	0.055 (2)	0.085	island "n" = 0.090	-
60	0.090	0.055	0.085		20-23*
61	Match with previous study				

(2) Denotes presence of both a main and secondary channel having the same "n" value.

* Note: PHOTO SET 24 (Last one) is taken at the earthen dam stock pond on the west bank of tributary to Trilby Wash in T.5 N., R.3W., Section 27.



VICINITY MAP



INDEX MAP

N

2000 1000 0 2000

SCALE: 1" = 2000'

MARICOPA COUNTY, UNINCORPORATED AREAS, ARIZONA

Ramesh S. Patel
10290
RAMESH S. PATEL
11/21/89
ARIZONA U.S.A.

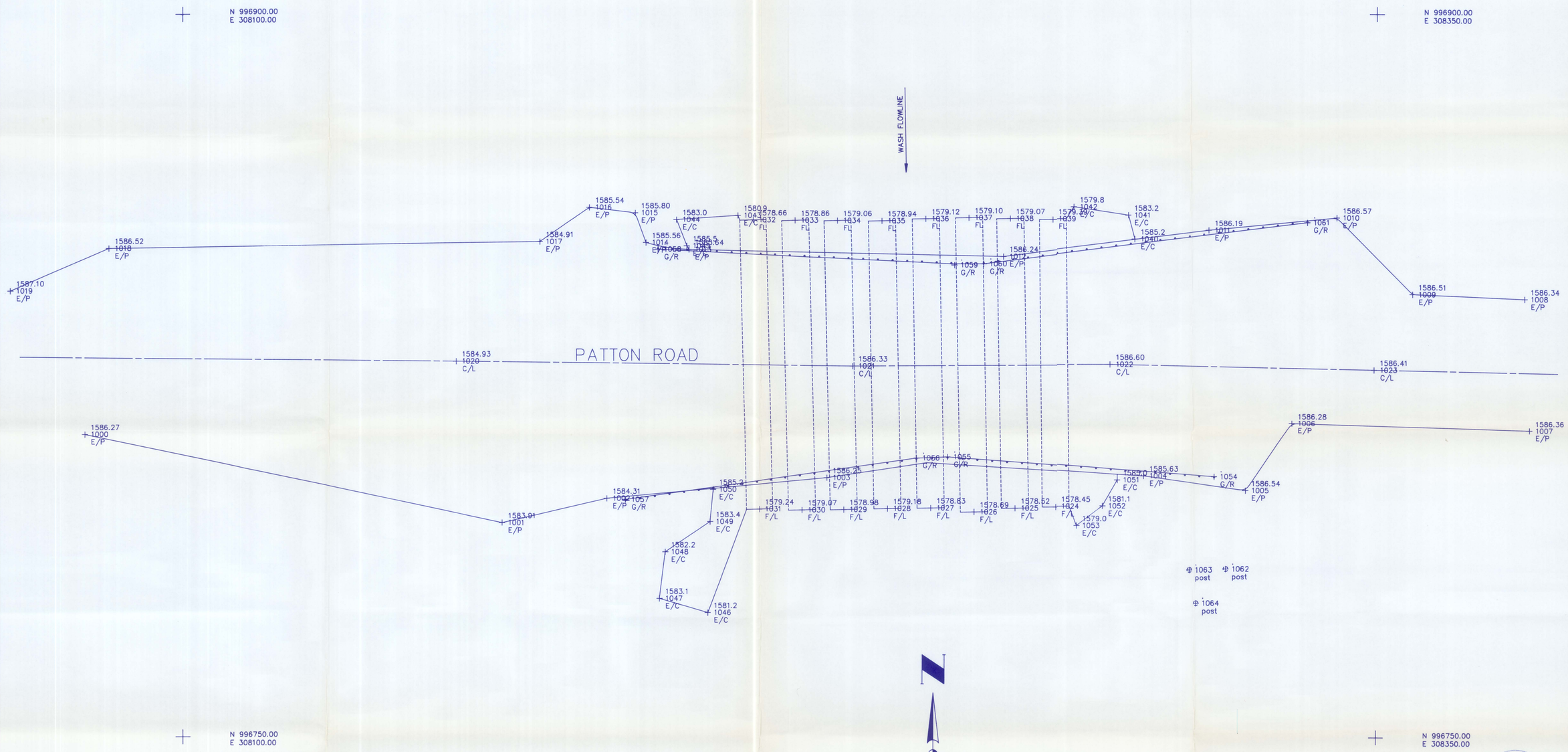
EXHIBIT 1

P&D Technologies
1702 East Highland Ave., Suite 410
Phoenix, AZ 85016 602•264•3335

FIELD INSPECTION LOCATION MAP

JOB # 10320.00

TOPOGRAPHIC SURVEY OF 8 – 68 INCH CMP'S ON TRILBY WASH CROSSING PATTON ROAD



LEGEND

E/P	EDGE OF PAVEMENT
C/L	CENTERLINE OF PAVEMENT
F/L	FLOW LINE OF PIPE
G/R	GUARD RAIL
E/C	EDGE OF CONCRETE

SCALE: 1"=10'

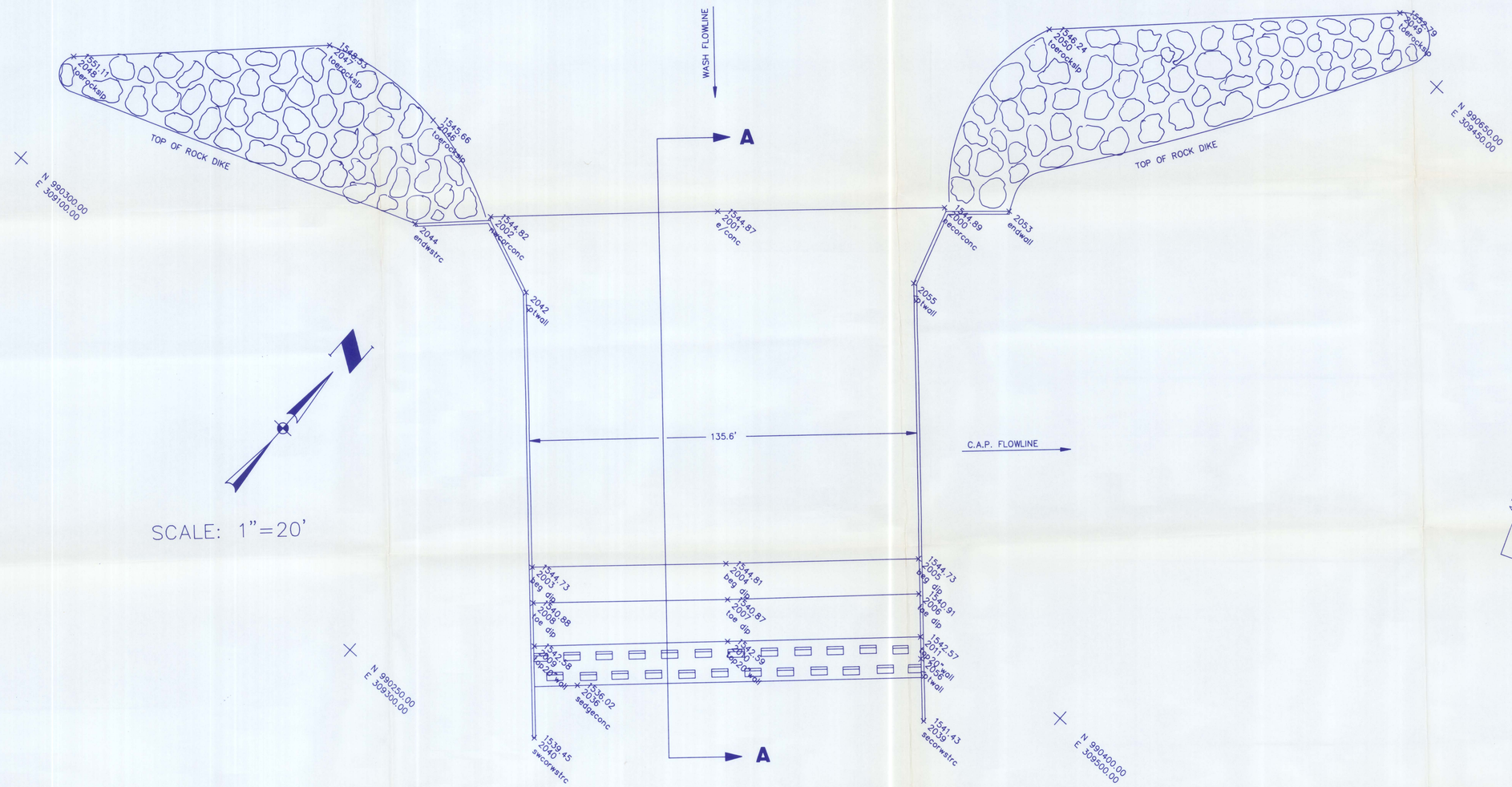
MARICOPA COUNTY, UNINCORPORATED AREAS, ARIZONA

FILE: PATTON.DWG

EXHIBIT 2

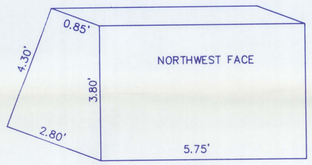
DRAFTED BY: THOMAS ROPE	P&D Technologies An Ashland Technology Company 1702 East Highland, Suite 410, Phoenix, Arizona 85016 Telephone (602) 264-3335
DATE PREPARED: NOVEMBER 12, 1990	
PROJECT ENGINEER: RAMESH PATEL	CULVERT AS-BUILTS PATTON RD/TRILBY WASH
SURVEY SUPERVISOR: THOMAS ROPE	
PROJECT MANAGER: RAMESH PATEL	JOB NO. 10320 — SHEET 1 OF 1

TOPOGRAPHIC SURVEY OF C.A.P. OVERCHUTE ON TRILBY WASH



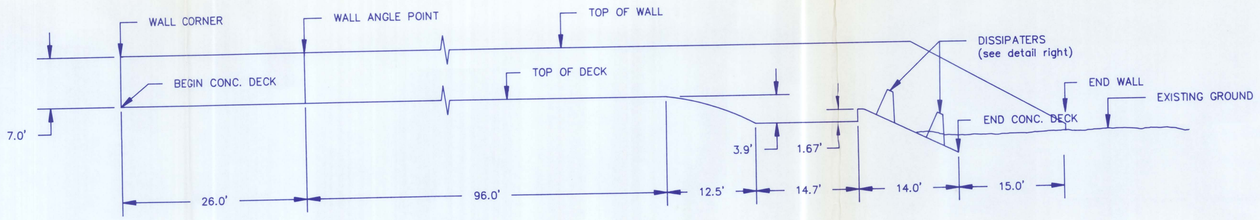
SCALE: 1"=20'

DISSIPATER DETAIL (TYPICAL)



SECTION A–A

SCALE: 1"=10"



MARICOPA COUNTY, UNINCORPORATED AREAS, ARIZONA

FILE: CAP.DWG **EXHIBIT 3**

DRAFTED BY: THOMAS ROPE	P&D Technologies An Ashland Technology Company 1702 East Highland, Suite 410, Phoenix, Arizona 85016 Telephone (602) 264-3335
DATE PREPARED: NOVEMBER 13, 1990	
PROJECT ENGINEER: RAMESH PATEL	C.A.P. OVERCHUTE TRILBY WASH
SURVEY SUPERVISOR: THOMAS ROPE	
PROJECT MANAGER: RAMESH PATEL	PROJECT NO. 10320 — SHEET 1 OF 1

APPENDIX F

SUMMARY OF EXISTING DATA

SUMMARY OF EXISTING DATA
FOR
TRILBY WASH

FROM THE CAP AQUEDUCT TO GRAND AVENUE NEAR CIRCLE CITY
MARICOPA COUNTY, ARIZONA

PREPARED FOR:

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
2801 W. DURANGO ST.
PHOENIX, ARIZONA 85009

CONTRACT NO. 90-24
P&D TECHNOLOGIES PROJECT NO. 10320.00

Registered Professional Engineer (Civil)
CERTIFICATE NO.
10290
RAMESH I.
PATEL
Date Signed 3/29/91
ARIZONA, U.S.A.

SUBMITTED BY:

P & D TECHNOLOGIES
1702 EAST HIGHLAND
SUITE 200
PHOENIX, AZ 85016
(602) 264-3335

NOVEMBER 12, 1990

Revised March 28, 1991

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2.0	DATA COLLECTION AND RECONNAISSANCE	1
	2.A LITERATURE SEARCH	1
	2.B INFORMATION SEARCH	2
	2.C FIELD RECONNAISSANCE	3
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ATTACHMENTS

ATTACHMENT 1:	Contact Memo Index	7
	(Contact Memos Begin)	9

Ramesh I. Patel.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
10290
RAMESH I.
PATEL
Date Signed 3/29/91
ARIZONA, U.S.A.

SUMMARY OF EXISTING DATA

1.0 INTRODUCTION

P & D Technologies was contracted by the Flood Control District of Maricopa County on August 13, 1990 to perform a Flood Insurance Study (FIS). The project consists of topographic mapping, as well as floodplain and floodway delineation of approximately 6.7 River Miles of Trilby Wash. The downstream study limits being the Central Arizona Project Aqueduct (CAP), the upstream limits being Grand Avenue at Circle City. The hydrology portion of this study will be supplied by the Flood Control District of Maricopa County. P & D Technologies will be responsible for developing the Hydraulics using the Army Corps of Engineer'S HEC-2 Computer Model. From this information the floodplain and floodway will be delineated for the 100-year peak flood. This study will be completed in accordance with both FEMA's and ADWR's requirements. Public Notification of this project was given via individual letters to adjacent landowners on August 14th, 1990; as well as, newspaper publications in both the Arizona Republic on 8/19/90 and the Daily Sun News from 8/22/90 to 9/5/90. To date, no written response has been received regarding this study at either the Flood Control District's or P & D Technologies' Offices.

2.0 DATA COLLECTION AND RECONNAISSANCE

As instructed in FEMA 37, entitled: "Flood Insurance Study Guidelines and Specifications for Study Contractors" (1985), this data collection section is subdivided into three parts, they are: literature search, information search and field reconnaissance. Each one has a written description of work completed which follows.

2.A LITERATURE SEARCH

We have collected a total of 22 documents which are all referenced in the Bibliography portion of this report. The documentation covers a wide range of information from previous studies and maps to the latest computer manuals for specific problems in floodplain delineation. There are only 8 documents that specifically relate to the 6.7 mile reach of our project in terms of historic data, they include:

1. Harris-Toups, Associates; 1/79; Flood Insurance Study Approximate Study for the Unincorporated Area of Maricopa County, Arizona: Prepared for the U.S. Department of Housing and Urban Development, Federal Insurance Administration; unpublished.

2. National Flood Insurance Program; 4/15/88; Flood Insurance Rate Maps (FIRM), all or portions of the following: Map Numbers 04013C1125 D and 04013C0695 D; corresponding to Panel Numbers 1125 and 695 of 4350, respectively; Maricopa County, Arizona and Incorporated Areas: Federal Emergency Management Agency (FEMA).

3. National Flood Insurance Program; 5/11/90 (Rev.); Flood Insurance Rate Maps (FIRM), all or portions of the following: Map Numbers 04013C0679 E, 04013C0687 E, and 04013C1110 E; corresponding to Panel Numbers 679, 687 and 1110 of 4350, respectively; Maricopa County, Arizona and Incorporated Areas: Federal Emergency Management Agency (FEMA).

4. The WLB Group, Inc.; 4/21/88; 100-Year HEC-1 Computer Models for the Wittmann Area Drainage Master Study; Prepared for The Flood Control District of Maricopa County; Phoenix, AZ; unpublished.

5. The WLB Group, Inc.; 3/89; Wittmann Area Drainage Master Study Part A: Hydrology and Hydraulics; Prepared for The Flood Control District of Maricopa County; Phoenix, AZ; unpublished.

6. The WLB Group, Inc.; 3/89; Wittmann Area Drainage Master Study Part B: Stormwater Management Plans; Prepared for The Flood Control District of Maricopa County; Phoenix, AZ; unpublished.

7. The WLB Group, Inc.; 3/89; Addendum to the Wittmann ADMS, Effects of Floodplain Encroachment and Channelization on Stormwater Runoff: Prepared for The Flood Control District of Maricopa County; Phoenix, AZ; unpublished.

8. U.S.G.S. Quadrangle Maps of Arizona: Wittmann (1981) and White Tank Mountains, N.E. (1978)

The most significant historic documents specifically relating to our study area, representing the above listed items 1 through 7, were obtained from the Flood Control District of Maricopa County (Arizona).

2.B INFORMATION SEARCH

In addition to the data we received from the FCD as well as the information we had available in-house, we called a variety of governmental agencies as well as private sector companies to see if any other data was available. For your perusal we have listed the Agencies contacted below:

1. Arizona Department of Water Resources (ADWR);
2. Arizona State Land Department
3. Bureau of Land Management (BLM);
4. Bureau of Reclamation (BOR);
5. Central Arizona Water Conservation District (CAWCD);
6. Cooper Aerial Mapping Company;
7. Federal Emergency Management Agency (FEMA);
8. Kenney Aerial Mapping Company;
9. Luke Air Force Base, Engineering Division;
10. Maricopa County Highway Department;
11. Soil Conservation Service (SCS);
12. U.S. Army Corps of Engineers;
13. U.S. Geological Survey (USGS); and finally,
14. WLB Group (Private Consultant).

In addition, a memo has been completed for each contact made in order to document information received. A copy of each memo is included for your perusal in this report as Attachment 1.

2.C FIELD RECONNAISSANCE

To date, one field inspection has already been made to determine the existing general condition of the floodplain. Extensive field reconnaissance including the establishment of ground control has also been completed. The field data was delivered to Cooper Aerial for mapping on October 15, 1990. The ground control was completed by the Survey Department of P & D Technologies. Another field inspection is slated for Tuesday, November 20, 1990 for the purpose of determining the Manning's "n" values to be used in the HEC-2 computer model as well as to pin-point the location of cross-sections for field survey verification.
As currently understood, there is only one significant hydraulic structure to be modelled in this reach of Trilby Wash with the exception of the CAP Canal. It occurs at the intersection of Trilby Wash and Patton Road and consists of several large 68" CMP culverts. For the record, P & D staff did visit the Maricopa County Highway Department on 11/8/90 for the purpose of obtaining "as-built" plans for Patton Road were it crosses Trilby Wash; however, we were informed that there are no plans for this road improvement on file. It appeared that this portion of the road was recently improved in early 1990 because it had been newly paved and stripped at the time of the first field inspection on 6/5/90. Their staff informed us that it was probably an "eye-ball" overlay job. Which means that to their best available knowledge those existing, newly installed CMP culverts were not sized according to any recorded method.

3.0 RESULTS

For your convenience, we have summarized below only the pertinent information that specifically relates to this study reach of Trilby Wash. In addition, pertinent Trilby Wash information contained within the "Contact Memos" is condensed below for your reading convenience.

Data From	Information Obtained (As best Available)	Refer to Page
Kevin Adams BOR	-CAP flume design Q = 6,903 cfs -Energy dissipator design velocity at downstream side of CAP should be less than or equal to 3 f/s -BOR assumed no channel storage for this reach of the wash	11
Dave Gunn CAWCD	-Various portions of the CAP are flown every (3) weeks; therefore, some photography over the CAP is available -Photography has been taken since approximately 1981 -However, no photography was found which depicts the Trilby Wash/CAP flume crossing	19
John Cahoon Cooper Aerial	-Two sets of historic photography exists, 1977 and 1986 -Scale of 1" = 2000' -However, photographs were not taken during a flood event	20

Cindy Croxdale FEMA	-Only LOMR on record is the Wittmann ADMS currently in the 90 day appeal period -No other requests for map amendments or revisions are currently on file for this project area	21
Mark Gavin WLB	-No actual stream or rainfall gage data is available for this site -Sizing of CAP flumes/overchutes may not have accounted for split flow conditions upstream	29

4.0 SUMMARY

In summary, it is evident that there is not a lot of information available in terms of historical data for this particular reach of the Trilby Wash. The historic data that is available will be incorporated into the Flood Insurance Study.

The submittal of this report concludes the data collection phase of the Flood Insurance Study as well as the completion of Task 1.0 as outlined in the Scope of Work. Should any other information be found at a later time it will be incorporated in the study provided that time allows. The historical data referenced in this report will be keep as part of the job file and will be turned over to ADWR for archive files as outlined in TR 90-3. In addition, as noted in Section 2.A. of this report, the Flood Control District of Maricopa County also has copies of this historic data.

5.0 BIBLIOGRAPHY

1. Arizona Department of Water Resources (A.D.W.R.); 8/90; Instructions for Organizing and Submitting Technical Documentation for Flood Studies (TR 90-3): Engineering Division, Flood Management Section; unpublished; 13 p.

2. Chow, Ven, T.; 1959; Open-Channel Hydraulics: McGraw-Hill (Publishing Company) Civil Engineering Series; New York; 680 p.

3. Bonner, Vernon, R.; 1/88; Floodway Determination Using Computer Program HEC-2, Training Document No. 5: The Hydrologic Engineering Center, Water Resources Support Center, U.S. Army, Corps of Engineers; Davis, CA; 82 p.

4. Federal Emergency Management Agency; 9/85; Flood Insurance Study Guidelines and Specifications for Study Contractors, FEMA 37: Federal Insurance Administration.

5. Harris-Toups, Associates; 1/79; Flood Insurance Study Approximate Study for the Unincorporated Area of Maricopa County, Arizona: Prepared for the U.S. Department of Housing and Urban Development, Federal Insurance Administration; unpublished.

5.0 BIBLIOGRAPHY (Continued)

6. Hoggan, Daniel, H.; 1989; Computer Assisted Floodplain Hydrology and Hydraulics, Featuring the U.S. Army Corps of Engineers' HEC-1 and HEC-2 Software Systems: McGraw-Hill Publishing Company; New York; 518 p.

7. Hoggan, Daniel, H.; 1989; Computer Assisted Floodplain Hydrology and Hydraulics, Featuring the U.S. Army Corps of Engineers' HEC-1 and HEC-2 Software Systems, Authors's Appendix B - Workshop Problem Solutions: McGraw-Hill Publishing Company; New York; 54 p.

8. National Flood Insurance Program; 4/15/88; Flood Insurance Rate Maps (FIRM), all or portions of the following: Map Numbers 04013C1125 D and 04013C0695 D; corresponding to Panel Numbers 1125 and 695 of 4350, respectively; Maricopa County, Arizona and Incorporated Areas: Federal Emergency Management Agency (FEMA).

9. National Flood Insurance Program; 5/11/90 (Rev.); Flood Insurance Rate Maps (FIRM), all or portions of the following: Map Numbers 04013C0679 E, 04013C0687 E, and 04013C1110 E; corresponding to Panel Numbers 679, 687 and 1110 of 4350, respectively; Maricopa County, Arizona and Incorporated Areas: Federal Emergency Management Agency (FEMA).

10. National Oceanic and Atmospheric Administration (NOAA); 1973; Precipitation-Frequency Atlas of the Western United States, Volume VIII-Arizona: U.S. Department of Commerce; Silver Springs, MD; 41 p.

11. Soil Conservation Service; 1985; Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona: U.S. Department of Agriculture; U.S. Government Printing Office; No. 1985-167-S/20007.

12. The WLB Group, Inc.; 4/21/88; 100-Year HEC-1 Computer Models for the Wittmann Area Drainage Master Study: Prepared for The Flood Control District of Maricopa County; Phoenix, AZ; unpublished.

13. The WLB Group, Inc.; 3/89; Wittmann Area Drainage Master Study Part A: Hydrology and Hydraulics: Prepared for The Flood Control District of Maricopa County; Phoenix, AZ; unpublished.

14. The WLB Group, Inc.; 3/89; Wittmann Area Drainage Master Study Part B: Stormwater Management Plans: Prepared for The Flood Control District of Maricopa County; Phoenix, AZ; unpublished.

15. The WLB Group, Inc.; 3/89; Addendum to the Wittmann ADMS, Effects of Floodplain Encroachment and Channelization on Stormwater Runoff: Prepared for The Flood Control District of Maricopa County; Phoenix, AZ; unpublished.

16. U.S. Army, Corps of Engineers, Los Angles District; 11/53; Design Memorandum No. 1 Hydrology and Hydraulic Design for Trilby Wash Detention Basin and Outlet Channel: Department of the Army; Los Angeles, CA; unpublished

17. U.S. Army, Corps of Engineers, Los Angles District; 1/73; Trilby Wash Detention Basin Lower Agua Fria River, Maricopa County, Arizona: Department of the Army; Los Angeles, CA; unpublished

5.0 BIBLIOGRAPHY (Continued)

18. U.S. Army, Corps of Engineers, Water Resources Support Center, The Hydrologic Engineering Center; 4/82; Application of the HEC-2 Split Flow Option, Training Document No. 18: Department of the Army; Davis, CA; 19 p.

19. U.S. Army, Corps of Engineers, Water Resources Support Center, The Hydrologic Engineering Center; 11/87; COED Corps of Engineers Editor: Department of the Army; Davis, CA.

20. U.S. Army, Corps of Engineers, Water Resources Support Center, The Hydrologic Engineering Center; Version 9/88 (Updated 6/90); HEC-2 Water Surface Profiles, User's Manual: Department of the Army; Davis, CA; 40 p.

21. U.S. Army, Corps of Engineers, Water Resources Support Center, The Hydrologic Engineering Center; 2/90; Computing Water Surface Profiles with HEC-2 on a Personal Computer, Training Document No. 26: Department of the Army; Davis, CA; 61 p.

22. U.S.G.S. Quadrangle Maps of Arizona: Wittmann (1981) and White Tank Mountains, N.E. (1978); Denver, Colorado.

ATTACHMENT 1: CONTACT MEMO INDEX

ITEM NUMBER	DATE	SOURCE OF INFORMATION	DESCRIPTION OF INFORMATION OBTAINED	PAGE NUMBER
1	11/07/90	D. Creighton ADWR	General Historic Data	9
2	11/09/90	D. Helms Hydro/Flood Control AZ State Land Dept.	No data on file	10
3	11/09/90	S. McCafferty AZ State Land Dept./Rights-of-Way	Area of study maintained by the Maricopa County Highway Dept.	11
4	11/09/90	B. Long BLM	No data on file	12
5	11/09/90	K. Adams B.O.R.	Limited design data re: overchute -Sta 609+00 -no chnl. storage -overchute size 135'10"X 8'6" high -CAP flume design Q = 6,903 cfs -Energy dissipator velocity down-stream of CAP < or equal to 3 fps	13
6	11/07/90	J. Mcintyre Central AZ Water Conserv. Dist. CAWCD	Referred to D. Gunn also @ CAWCD	20
7	11/09/90	D. Gunn CAWCD	-Various portions of the CAP are flown every (3) weeks; therefore, some photography over the CAP is available -Photography has been taken since approx. 1981 -However, no photography was found which depicts the Trilby Wash/CAP flume crossing	21

ITEM NUMBER	DATE	SOURCE OF INFORMATION	DESCRIPTION OF INFORMATION OBTAINED	PAGE NUMBER
8	11/07/90	J. Cahoon Cooper Aerial	Two sets of historic photography exists, 1977 and 1986; however, photographs were not taken during a flood event	22
9	11/07/90 3/28/91	C. Croxdale FEMA "	-Only LOMR on record Wittmann ADMS; in 90 day appeal (11/17/90) -No other requests for LOMA or LOMR are currently on file for this project area -Referred to Baker Engineering	23
10	3/28/91	Michelle Monday Baker Engineering	Maps approved; effective 9/4/91	24
11	11/12/90	E. Hodgins Kenny Aerial	No photos of site on file	25
12	11/13/90	Mr. Hoit Luke AFB/Eng.	No information exists	26
13	11/08/90	B. Warburton Maricopa County Highway Dept.	No as-built plan or hydrology on file for Patton Road crossing	27
14	11/07/90	H. Milsaps SCS	No new work in area	29
15	11/07/90	B. Hall Chief of Design US Army Corps of Eng./CA.	Historical data only, for McMiken Dam	30
16	11/07/90	C. Louie USGS	No data on file	31
17	11/07/90	M. Gavin The WLB Group	-No actual stream or rainfall gage data is available for this site -Sizing of CAP flumes/overchutes may not have accounted for split flow conditions upstream	32

Phone Memo

P&D

Conversation With DAVE CREIGHTON Date 11/7/90

Representing ADWR Project Number 10320

Phone Number 542-1541 Subject TRILBY WASH

Items Discussed EXISTING DATA

1953 TRILBY WASH DAM WAS STARTED (WHICH IS THE SAME AS T. W. DETENTION BASIN AND MC MIKEN DAM)

IN THE 70'S CRACKS WERE FOUND IN THE DAM DURING AN INSPECTION

THE US ARMY CORP BREACHED IT

MCFCD REPAIRED IT

GAUGE MAY HAVE BEEN INSTALLED @ DAM.

NO OTHER INFO. ON FILE

Action To Be Taken NONE

By CMV Copies To File

Phone Memo

Conversation With DEMPSEY HELMS Date 11/9/90

Representing HYDRO. / FLOOD CONTROL AZ STATE LAND DEPT. Project Number 10320

Phone Number 542-2671 Subject TRILBY WASH

Items Discussed EXISTING DATA

- LEFT MESSAGE 11/9/90

- NO INFORMATION ON FILE 11/13/90

Action To Be Taken NONE

By JDW Copies To FILE

Phone Memo

P&D

Conversation With SHIELA McCAFFERTY Date 11/9/90

Representing RIGHTS-OF-WAY AZ STATE LAND DEPT. Project Number 10320

Phone Number 542-3681 Subject TRILBY WASH

Items Discussed EXISTING DATA — PATTON RD.

— LEFT MESSAGE 11/9/90

— CALLED AGAIN 11/13/90 NOT IN

11/14/90 AREA IN QUESTION MAINTAINED BY MARICOPA COUNTY HIGHWAY DEPT. (MCHD)

Action To Be Taken NONE (MCHD HIGHWAY INSPECTED 11/8/90)

By LTMU Copies To FILE

Phone Memo 4

P&D

Conversation With BARRY LONG Date 11/9/90

Representing BLM Project Number 10320

Phone Number 863-4464 Subject TRILBY WASH

Items Discussed EXISTING DATA

- TO HIS KNOWLEDGE THE MAJORITY OF LAND BELONGS TO THE STATE AND IS STATE TRUST LAND.

- THERE IS NO INFORMATION ON TRILBY WASH FROM HIS OFFICE

Action To Be Taken CALL STATE LAND DEPT.

By LTMV Copies To File

Phone Memo

Conversation With	KEVIN ADAMS	Date	11/9/90
Representing	B.O.R.	Project Number	10320
Phone Number	870-2493	Subject	TRILBY WASH
Items Discussed	DESIGN INFO FOR CAP @ "		

- SHOULD HAVE DESIGN Q AND V INFO. WILL DO RESEARCH AND FAX ANY APPLICABLE DATA...

FAX REC. 11/9/90 (ORIGINALS TO FOLLOW IN MAIL)

SEE ATTACHED

Action To Be Taken REVIEW INFO.

By LTMV

Copies To File

(INFORMAL)
FAXOGRAM

E : 11/9/90

: LISA VOMERO

NO : 241-1334

N NO:

M : KEVIN ADAMS

BUREAU OF RECLAMATION, ARIZONA PROJECTS OFFICE
OFFICE ENGINEERING, CONSTRUCTION OFFICE
P.O. BOX 9980
PHOENIX, AZ 85068

..O : FTS 765-1137 or (602) 870-2137

NO: 870-2493

E : Hydrology Parameters - Hayden Rhodes Reach 8

TAL PAGES (including cover sheet): 6

MENTS : For your information

BUREAU OF RECLAMATION
Arizona Projects Office

K. Kevin Adams, P.E.
Chief, Design Data Branch

23636 N. 7th Street
P.O. Box 9980
Phoenix, Arizona 85068

Bus. (602) 870-2493
FTS 765-1493
Engineering Division

KEY MAP

EXPLANATION

- OPEN AQUEDUCT AND BRIDGE
- CHECK
- OVERCHUTE
- WASH SIPHON
- DRAINAGE INLET
- FLOATWELL
- DIKE
- DRAINAGE DITCH
- CATTLE CROSSING
- OBSERVATION WELL

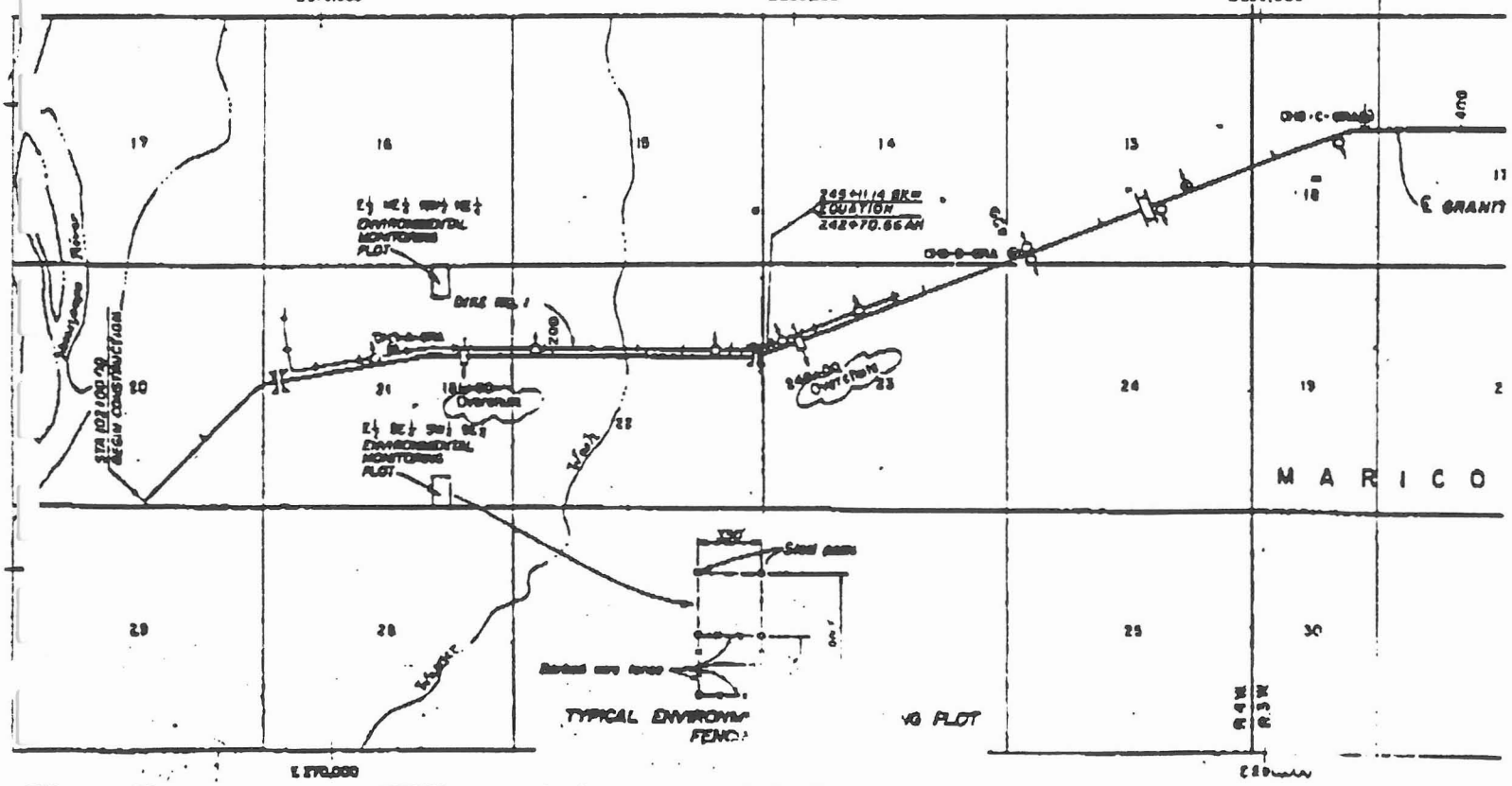
CROSS DRAINAGE STRUCTURES

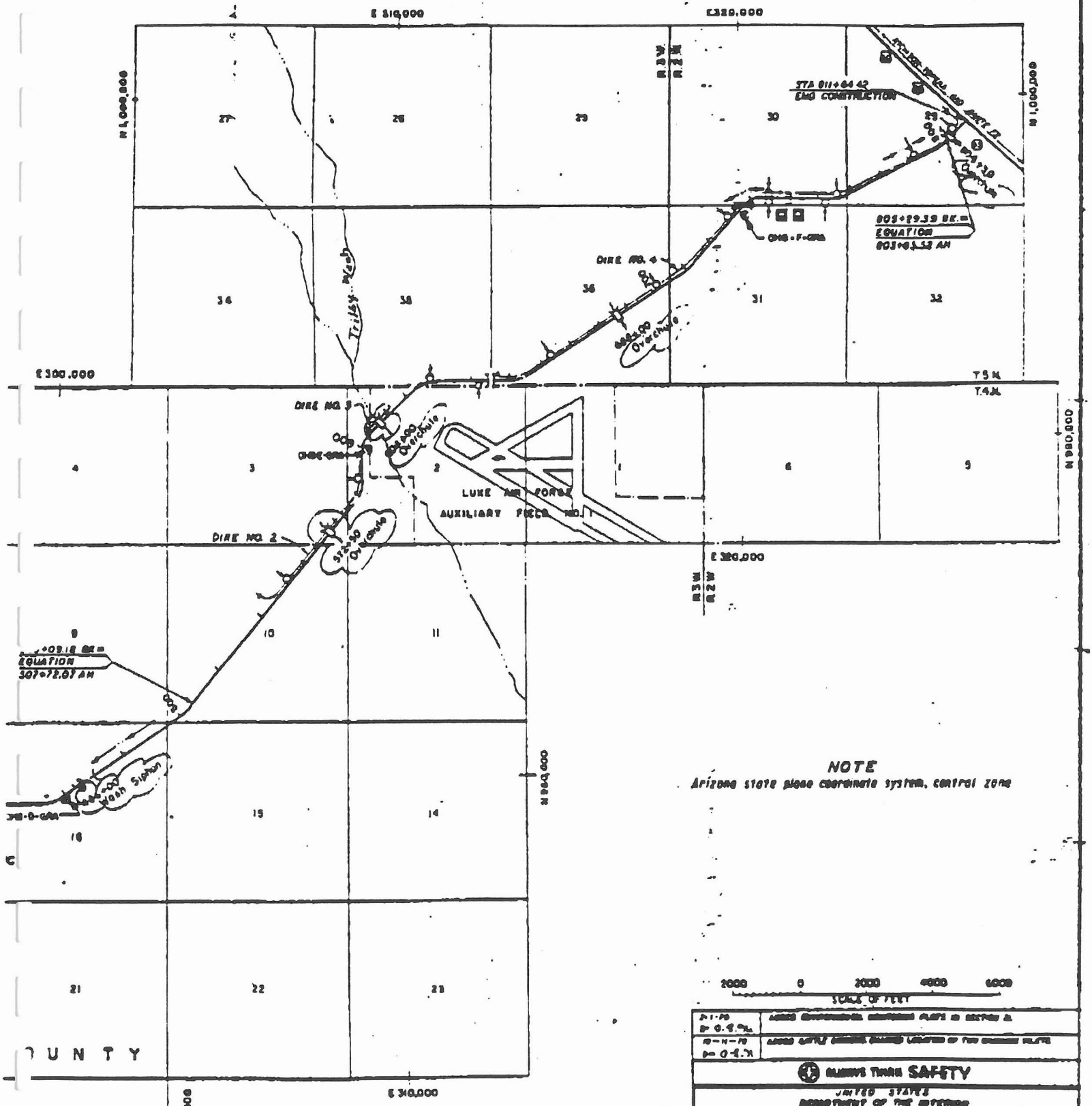
STATION	SIZE	PEAK Q IN (cfs)	STORAGE CAPACITY (acre ft)	PEAK Q OUT (cfs)	DESIGN STORM
[illegible]	18'x8'-6" OVERCHUTE	3350	304	265	[illegible] SPECIAL STORM
[illegible]+00	18'x8'-6" OVERCHUTE			306	"
[illegible]+00	[illegible] SIPHON	3365	137	2300	"
578+00	47'-4" x 8'-6" OVERCHUTE	[illegible]	102	[illegible]	"
609+00	[illegible] OVERCHUTE	[illegible]	0	[illegible]	"
[illegible]+00	[illegible] OVERCHUTE	2234	193	[illegible]	"
[illegible]+00	[illegible] OVERCHUTE	3713	51	[illegible]	"

6903.

Trilby Wash 609+00 ASSUME: NO STORAGE

135' 10" x 8' 6"




E 310,000
E 320,000
E 300,000
E 330,000
N 1,000,000
N 990,000
N 980,000
N 970,000
R 3 W
R 2 W
T 5 N
T 4 N
STA 811+64.42
END CONSTRUCTION
DIKE NO. 4
DIKE NO. 3
DIKE NO. 2
LUKE AIR FORCE
AUXILIARY FIELD NO. 1
Trilby Wash
Wash Siphon
EQUATION
NOTE
Arizona state plane coordinate system, central zone
2000 0 2000 4000 6000
SCALE OF FEET
SAFETY
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
GRANITE REEF DIVISION-ARIZONA
GRANITE REEF AQUEDUCT
REACH 8
LOCATION MAP
344-330-18

INPUT DATA FOR FLOOD ROUTING
HAYDEN-RHODES AQUEDUCT REACH 8

STATION	STRUCT. TYPE	SIZE	INVERT ELEV.	CREST ELEV.	STORAGE CAPACITY DATA ELEV.	AC.FT	ELEV.	AC.FT.
181+00	Flume	18'W	1548.50	1554.0	1546	0	1548	92
248+00	Flume	18'W	1547.95		1550	464	1552	1266
466+00	Wash S	67'W	1535.6	1545.09	1536	0	1538	9
					1540	33	1542	97
					1544	436	1546	912
					1548	1539	1550	2334
572+50	Flume	47'-4"W	1545.19	1552.0	1545.2	0	1546	7
					1548	31	1550	69
					1552	288	1554	518
3Y 4 609+00	Flume	135'10"	1544.90	1553.4	No routing this structure.			
688+00	Flume	87'2"W	1544.67	1534.0	1545	0	1546	10
					1548	31	1550	292
					1552	498		
804+50	Flume	67'6"W	1543.23	1551.7	1546	0	1548	3
					1550	18	1552	114
					1554	413		

INPUT DATA FOR UNIT HYGROGRAPHS
HAYDEN-RHODES AQUEDUCT - REACH 8

STATION	AREA Sq.Mi.	GRAPH SCS/PV	CHANNEL Miles	CENTROID Miles	SLOPE ft/mi.	CURVE No.	PRECIPITATION 100-yr	50-yr	3-hr
181+00 248+00	12.7	SCS	6.10	2.64	35	78	3.14	2.74	
466+00	13.5	SCS	7.70	3.80	36	78	3.30	2.90	
572+50	7.00	SCS	7.10	2.40	36	78	3.30	2.90	
609+00	57.8	SCS	21.2	7.40	36	78	2.98	2.60	
688+00	17.50	SCS	12.30	4.50	36	78	3.10	2.72	
804+50	20.8	SCS	12.00	5.60	41	78	3.09	2.70	

Phone Memo 6

P&D

Conversation With JIM MCINTYRE Date 11/7/90

Representing CENTRAL AZ WATER CONSERV. DISTRICT Project Number 10320

Phone Number 870-2343 Subject TRILBY WASH

Items Discussed EXISTING INFO @ CAP

- REFERRED ME TO:

1.) CLIFF GATLAN 870-2854
+/OR
DAVE GUN 870-2857

2.) JES WARREN 870-2823

Action To Be Taken CALL OTHERS - ABOVE

By LTMV Copies To File

Phone Memo 7

P&D

Conversation With DAVE GUNN Date 11/9/90

Representing CAWCD Project Number 10320

Phone Number 870-2857 Subject TRILBY WASH

Items Discussed TRILBY WASH @ CAP

- DOESN'T HAVE ANY DESIGN INFORMATION ON CAP REFERRED TO: KEVIN ADAMS @ BOR 870-2493

- DID TELL ME THAT THE CAP IS FLOWN EVERY THREE WEEKS AND HAS BEEN SINCE APPROX. 1981

- HE WILL RESEARCH EXISTING PHOTO'S FOR AREA, IF ANY AND CALL BACK...

- NO PHOTOS OF OUR AREA ON FILE 11/13/90

Action To Be Taken CALL K. ADAMS 870-2493

By LTM Copies To File

Phone Memo 8

P&D

Conversation With JOHN CAHOON Date 11/7/90

Representing Cooper Aerial Project Number 10320

Phone Number 266-2279 Subject TRUBY WASH

Items Discussed EXISTING PHOTO. INFO

Q - IS THERE ANY PAST PHOTOGRAPHY OF THIS AREA DURING A [redacted] FLOOD EVENT?

A - THERE'S SOME PHOTOGRAPHY AVAILABLE @ 1" = 2000', BUT NOT DURING A FLOOD EVENT, FOR:

1977 - SHOWING NICMIKEN DAM W/ STANDING WATER COVERING AN AREA ROUGHLY 300' x 200'

1986 - AREA LOOKS DRY

Action To Be Taken NONE

By LTM✓ Copies To

Phone Memo

P&D

Conversation With CINDY CROXDALE Date 11/7/90 - 3/28/91

Representing FEMA Project Number 10320

Phone Number (202) 646-3445 FAX/# 58 Subject TRILBY WASH

Items Discussed EXISTING DATA

Q - Any LOMR or LOMA Requested for this wash?

A - One, from MCFCD on 5/2/89 re:

Wittmann Area Drainage Master Study.

(Master Listing is all inclusive and extends from the time the approx. study was completed in 1/79.)

- FEMA concurred w/ request for map revision from MCFCD in a letter dated 11/7/89. This info. is now on preliminary FEMA maps and is in the 90 day appeal period. To the best of her knowledge no other requests or appeals have been rec., especially in our area of interest.

- For the record "This is the best available technical information to date".

Action To Be Taken NONE

CALLED 3/28/91 TO CHECK FDMS STATUS

RETERRED TO MICHELLE SUNDAY @

BACKED ENG.

By LTMV Copies To Gil

Phone Memo 10

P&D

Conversation With MICHELLE MONDAY Date 3/28/91

Representing BAKER ENGINEERING Project Number 10320

Phone Number (703) 838-2400 Subject TRILBY WASH

Items Discussed CURRENT STATUS WITTMAN ADMS

- SUBMITTAL HAS BEEN APPROVED WITH ONLY MINOR REVISIONS; WILL BECOME EFFECTIVE 9/4/91.

- NOTE: PREVIOUS STUDIES MUST MATCH W/IN 0.5'

Action To Be Taken [illegible]

By

Copies To

Phone Memo

Conversation With ERIC HODGINS Date 11/12/90

Representing KENNEY AERIAL MAP. Project Number 10320.

Phone Number 258-6471 Subject TRILBY WASH

Items Discussed EXISTING PHOTOGRAPHY

- WILL CHECK AND CALL BACK

- 11/13/90 MARGE DUNLAP
  NO PHOTO. OF THIS SITE
  ON FILE

Action To Be Taken NONE

By LTMV Copies To File

Phone Memo [12]

P&D

CALLED 2/8/91

Conversation With MR. HOIT Dates CALLED: 11/6,7,8,9/90

Representing LUKE AFB/ENG. Project Number 10320

Phone Number 856-3635/7634 Subject TRILBY WASH

Items Discussed EXISTING DATA

- LEFT MESSAGES

- LEFT MESSAGE AGAIN 11/13/90

call 2/8/91 EXT 6137 Hor 7634

NO INFORMATION ON FILE

Action To Be Taken CALL BACK #2/8/91 COMPLETE/NONE

By LTMV Copies To File

1702 East Highland
Suite 410
Phoenix, Arizona 85016
602-264-3335

MEETING MEMO 13

By LTMV Date 11/8/90 Client FCD Sheet No. 1 Of 2

Conversation With BARB WARBURTON Date 11/8/90

Representing MC. HIGHWAY DEPT 3325 W. DURANGO Project Number 10320

Phone Number 233-8794 Subject TRILBY WASH

Items Discussed AS-BUILT PLANS / AL 233-8672

- RESEARCHED CENTRAL FILES FOR AS-BUILT PLANS OF ROADWAYS CROSSING TRILBY WASH. ONLY MAJOR ROADWAY CROSSING IS PATTON RD. WEST OF CROZIER

- THERE ARE NO AS-BUILT PLANS OR IMPROVEMENT PLANS ON FILE FOR THIS PORTION OF THE ROADWAY (SEE ATTACHED COPY OF CARD FILE ON PATTON ROAD FROM THE HIGHWAY DEPT.

- THIS IS THOUGHT TO BE AN "OVER-LAY" "EYE BALL" JOB BY M.C. OPERATION.

Action To Be Taken NONE

SHE SUGGESTED THAT MAYBE AL DESHAZO COULD TELL ME MORE ABOUT THE OVERLAY; HOWEVER, THERE ARE NO PLANS

By LTMV Copies To File

RD 1 OF ____ PATTON ROAD

.D. C.F.

98-22 11/77

FROM	TO	W.O. #	Tracing. Dwr. #	R/W Strip Map Tube #	On Micro Film	Map Key #	Proj. File #	Field Book #	Box # in Whse.	REMARKS
Avenue	207th Avenue	49000 & 49001								
ozier Road	203rd Avenue	68095	25		*		*	*		
243rd Ave.	Crozier	68591								NOTHING ON FILE 11/8/90
3Mi. W.of Crozier	3Mi. W. of Croz.	69610								
9th Ave.	267th Ave.	83416								

Phone Memo

P&D

Conversation With HARRY MILSARS Date 11/7/90

Representing SCS Project Number 10320.

Phone Number 640-2547 Subject TRILBY WASH

Items Discussed EXISTING DATA

- TO THE BEST OF HIS KNOWLEDGE NO "NEW" WORK HAS BEEN COMPLETED IN THE AREA - WILL SEND "CURRENT PROJECT STATUS" MAP

- REFER TO: "SOIL SURVEY (MAPS) OF AGUILA - CAREFREE AREA, PARTS OF MARICOPA AND PINAL COUNTIES, AZ": USDA, SCS; 1985

Action To Be Taken NONE

By LTMV Copies To

Phone Memo

Conversation With BOB HALL (CHIEF OF DESIGN) Date 11/7/90

Representing U.S. ARMY CORPS/LA Project Number 10320

Phone Number (213) 894-5466 Subject TRUJBY WASH

Items Discussed EXISTING DATA

- MC MICKEN DAM HAD CRACKED DUE TO LAND SUBSIDENCE IN THE AREA (1970's)

- ARMY CORPS BREACHED THE DAM TO MITIGATE THE POTENTIAL FOR FAILURE

- TO THE BEST OF HIS KNOWLEDGE MCFCD REPAIRED IT AND NO FURTHER WORK WAS DONE ON IT OR THE AREA BY THE CORPS

ADDITIONAL REFERENCE:

HYDROLOGY - DENNIS MARRICE, CHIEF

~~Action To Be Taken~~ (213) 894-4753

By LTMV Copies To File

Phone Memo

Conversation With CORA LOUIE

Date 11/7/90

Representing USGS

Project Number 10320

Phone Number 379-3086

Subject TRILBY WASH

Items Discussed EXISTING DATA

NO INFO. ON FILE FOR TRILBY WASH, IN THE AREA OF CIRCLE CITY

Action To Be Taken NONE

By LTMV

Copies To File

Phone Memo 17

P&D

Conversation With MARK GAVIN Date 11/7/90

Representing THE WLB GROUP Project Number 10320

Phone Number 279-7427 Subject TRILBY WASH

Items Discussed EXISTING DATA

- NO ACTUAL STREAM GAUGE DATA WAS USED IN THEIR STUDY MODEL
- NO RAIN GAUGES ARE PRESENT EITHER - TO HIS KNOWLEDGE
- MAPPING OF WITTMANN AREA DRAINAGE MASTER STUDY WAS DONE @ 400 SCALE + IS BEST DESCRIBED as approx.
- NOTE: It appears from previous work done that there are "splits or islands" in the wash. It is unclear whether or not these were taken into account in the sizing of the CAP Canal Overchute.

Action To Be Taken NONE

By LTMV Copies To File