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Supplement to Williams Gateway Airport Hydrology Study and Master Drainage Plan

GAI 53115

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1.0 INTRODUCTION

This document has been prepared as a supplement to the *Williams Gateway Airport Hydrology Study and Drainage Master Plan* prepared by Gilbertson Associates, dated October 2001. This supplement presents the basis for design of storm water management improvements in response to an updated land use plan for the northwest portion of the airport. Salient elements of this plan include; The proposed WINGS development, Fire Protection System, and a reconfigured (linear), Detention Basin Northwest.

Williams Gateway Airport, (WGA) is located in the City of Mesa, approximately 20 miles southeast of the City of Phoenix. The town of Gilbert borders the airport to the west, and the Town of Queen Creek to the south. The study area presented in this report is bounded to the north by the Powerline Floodway, to the east by Ellsworth Road, to the south by the Pecos Road alignment, and to the west by, the soon to be completed, Sossaman Road. **Figure 1** shows the location of WGA.

2.0 Proposed Drainage Improvements

Depicted on **Figure 2** are the improvements associated with the WINGS project. Drainage infrastructure required by this development includes a reconfigured detention basin and two storm drains conveying water to this basin. **Appendix V** contains the current project reduced size plans for *Phase 1 Grading and Drainage Improvements for the North Apron Area.* **Appendix III** provides the StormCAD analysis involved in modifying two of the three storm drains ultimately contributing to Basin Northwest. Modifications were not made at this time to the storm drain serving Drainage Basin 17-N since this storm drain is not included in this project. Drainage Basin 17-N was included in the attached StormCAD model due to the fact that it conveys water to Detention Basin Northwest, see **Appendix IV**. Detention basin outfall will be conveyed to a previously constructed connection and remains consistent with the above referenced Plan (**Ref. 3**).

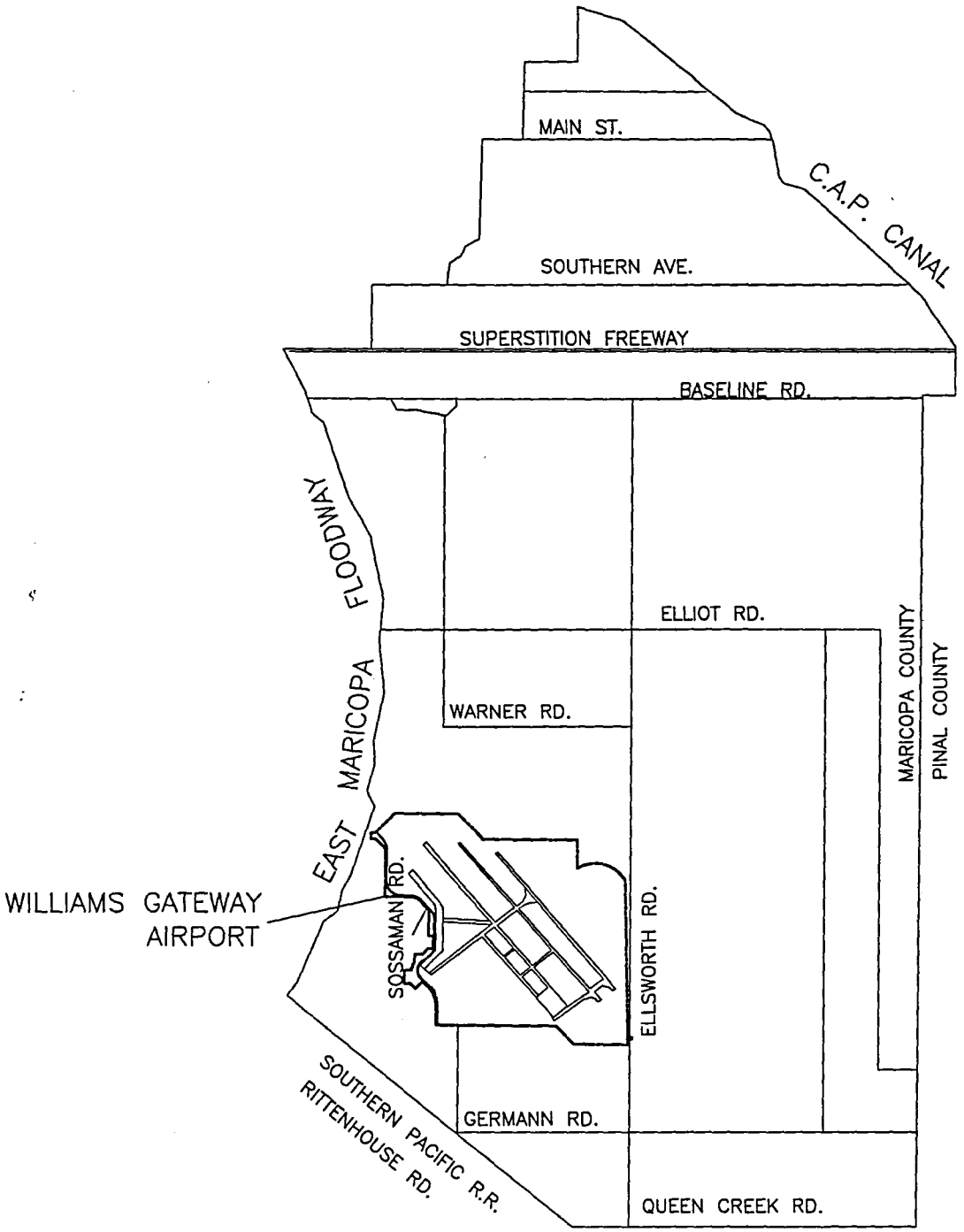
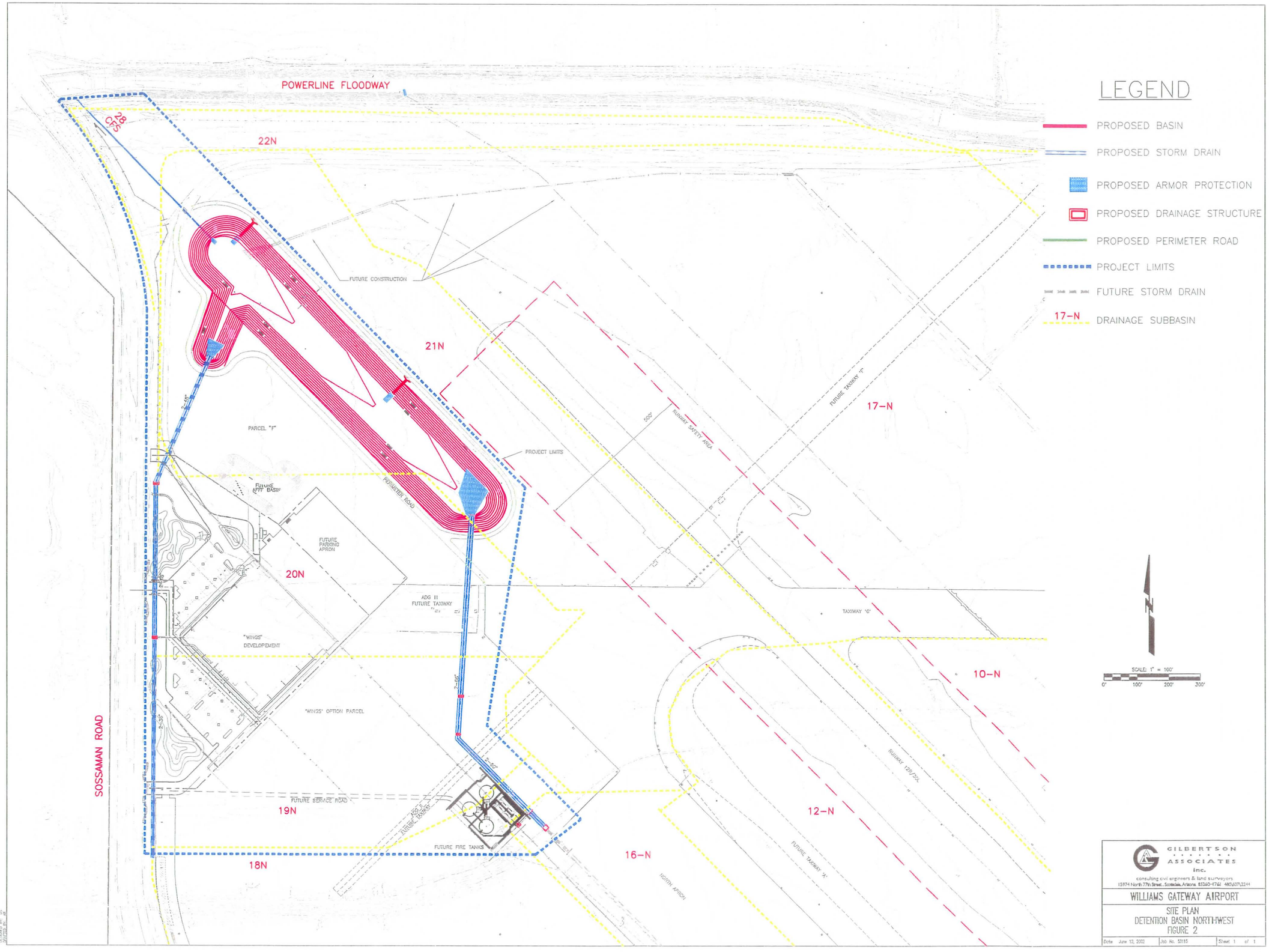


FIGURE 1
WILLIAMS GATEWAY AIRPORT

VICINITY MAP

FILE NAME: K:\D\D\531\HYDRO\VICMAP
DATE PLOTTED: 10/1/01



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WILLIAMS GATEWAY AIRPORT

SITE PLAN
DETENTION BASIN NORTHWEST
FIGURE 2

Date June 12, 2002 | Job No. 53115 | Sheet 1 of 1

3.0 MAPPING INFORMATION

The available mapping utilized in this study were as follows:

1. **Aerial Mapping:** Aerial mapping conducted on March 29, 2001. A topographic map of the project site with contour interval of 1 foot and scale of 1"=100' was utilized for on-site drainage basin delineation.

4.0 HYDROLOGIC ANALYSIS

4.1 General

The following outlines the design criteria used to develop this hydrologic analysis:

- Hydrologic calculations were completed for the 100-Year storm frequency
- Storm duration of 6 hours was investigated
- Rainfall depth-duration-frequency data were generated using the PREFRE computer program (**Ref. 2**) and the Maricopa County Isopluvial Maps
- The Clark Unit Hydrograph method was utilized to estimate runoff rates
- Time of Concentration was determined using the guidelines presented in the *Drainage Design Manual* (**Ref. 1**)
- Rainfall losses were estimated using the Green and Ampt Infiltration Equation
- Storm water runoff impacting the project site was estimated assuming *"undeveloped conditions"* for off-site areas
- U.S. Army Corps of Engineers HEC-1 computer program was utilized for hydrograph generation.

Only the Developed Conditions, 100-year, 6-hour HEC-1 code was modified from the original analysis and is therefore included in this report, see **Appendix II**.

4.2 Precipitation

Rainfall depths for the study area were selected from isopluvial maps found in the Maricopa County, Drainage Manual (**Ref. 1**). Precipitation frequency values were generated then using PREFRE computer program (**Ref. 2**). Results can be found in **Appendix I**.

5.0 FAA and USDA

Coordination with the Federal Aviation Administration and the United States Department of Agriculture were accomplished during preparation of the *Williams Gateway Airport Hydrology Study and Master Drainage Plan.* An update of the current project was forwarded to both agencies for concurrence. Their replies are contained in **Appendix V I**.

6.0 IMPLEMENTATION

Construction of all proposed drainage improvements and the dedication of all proposed drainage easements will the responsibility of WGA. Proposed drainage easements are shown on the improvement plans. Construction of the proposed drainage improvements may occur concurrent with other proposed site development. Maintenance of culverts, channels and other drainage improvements will be the responsibility of WGA..

7.0 CONCLUSIONS

The proposed drainage infrastructure improvements included in this study will provide a conveyance system for storm water management for the site developments depicted in **Fig.2**.

8.0 REFERENCES

1. Maricopa County, Arizona. ***"Drainage Design Manual, Volume I"***. Revised January 1995.

2. Bureau of Reclamation, Colorado. ***"Computation of Precipitation Frequency-Duration Values in the Western United States"***. August 1988..

3. Gilbertson Associates Inc.***"Williams Gateway Airport-Hydrology Study and Master Drainage Plan"***. October 2001.

Appendix I

Prefre-Rainfall data

1

*** O U T P U T D A T A ***
REVISED JUNE 1988 TO UPDATE COMPUTATION OF SHORT-DURATION VALUES

PRECIPITATION FREQUENCY VALUES FOR Williams Gateway Airport
PRIMARY ZONE NUMBER= 7
SHORT-DURATION ZONE NUMBER= 8

POINT VALUES

RETURN PERIOD

DURATION	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	
5-MIN	.28	.39	.46	.56	.64	.71	.89	5-MIN
10-MIN	.42	.59	.70	.86	.98	1.10	1.37	10-MIN
15-MIN	.52	.74	.89	1.09	1.25	1.41	1.77	15-MIN
30-MIN	.68	.99	1.20	1.47	1.69	1.91	2.40	30-MIN
1-HR	.83	1.22	1.48	1.84	2.11	2.38	3.01	1-HR
2-HR	.92	1.34	1.62	2.00	2.30	2.59	3.27	2-HR
3-HR	.99	1.42	1.72	2.12	2.43	2.73	3.44	3-HR
6-HR	1.10	1.58	1.89	2.33	2.67	3.00	3.77	6-HR
12-HR	1.23	1.74	2.09	2.57	2.93	3.30	4.14	12-HR
24-HR	1.35	1.91	2.29	2.80	3.20	3.60	4.52	24-HR

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

INPUT DATA

PROJECT NAME=Williams Gateway Airport
ZONE= 7 SHORT-DURATION ZONE= 8
LATITUDE= .00 LONGITUDE= 100.00 ELEVATION= 0
2-YR, 6-HR PCPN= 1.10 100-YR, 6-HR PCPN= 3.00
2-YR, 24-HR PCPN= 1.35 100-YR, 24-HR PCPN= 3.60

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

Appendix II

HEC-1 (Developed)

```
****************************************
*                                      *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   06JUN02  TIME  10:40:29  *
*                                      *
****************************************
```

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

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

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

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

Developed

100-yr, 6-hr

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

  1           ID       WILLIAMS GATEWAY AIRPORT HYDROLOGY                DATE:SEPT.18, 2001
  2           ID       PREPARED BY: GILBERTSON ASSOCIATES                JOB# 53111
  3           ID
  4           ID       FILE NAME:531CP6 .DAT
  5           ID       ************************************************************************
  6           ID       0. PROPOSED CONDITIONS WATERSHED.
  7           ID       1. HYPOTHETICAL STORM DISTRIBUTION PATTERN USING THE MCFCD MANUAL.
  8           ID       2. 100-YR, 6-HR RAINFALL EVENT.
  9           ID       3. GREEN AND AMPT INFILTRATION EQUATION FOR RAINFALL EXCESS.
 10           ID       4. CLARK UNIT HYDROGRAPH METHOD TO ESTIMATE RAINFALL EXCESS.
 11           ID       5. KINEMATIC WAVE TECHNIQUE FOR CHANNEL ROUTING.
 12           ID       6. LEVEL-POOL FOR RESERVOIR ROUTING.
 13           ID       7. HEC-1 LARGE ARRAY VERSION 4.1 (JUNE 1998).
 14           ID       8. INCREASED PIPE CAPACITIES TO FACILITATE 24-HR FLOODWAY IMPACT
 15           ID       ************************************************************************
 16           ID
              *DIAGRAM
 17           IT       1                    360
 18           IO       5
              *

 19           KK      1N
 20           KM   SUB-BASIN 1N
 21           KM     L = 1.27  Kb = .048  Adj. Slope =   16.0
 22           BA    .327
 23           IN      15
 24           PB   2.868
 25           PC    .000    .012    .018    .027    .040    .051    .062    .073    .084    .095
 26           PC    .108    .123    .144    .189    .275    .460    .684    .819    .886    .927
 27           PC    .948    .962    .974    .988   1.000
 28           LG    .350    .300   8.000    .060     3.0
 29           UC    .979    .828
 30           UA       0       3       5       8      12      20      43      75      90      96
 31           UA     100
              *

 32           KK      C2
 33           KM   ROUTE THROUGH PONDING AREA WITH CULVERT C2 AS THE LOW FLOW OUTLET
 34           KM   LOW FLOW OUTLET: SINGLE 48" CMP
 35           RS       1    STOR       0
 36           SA    0.43    2.81    6.11   11.65   16.90
 37           SQ       0     5.0    17.0    37.0    60.0
 38           SE    1364    1365    1366    1367    1368
 39           ST    1368      50       3     1.5
              *

 40           KK  RPOWER
 41           KM   ROUTE OUTFLOW FROM C2 THROUGH THE POWERLINE FLOODWAY
 42           RK    3900   .0028    .035            TRAP      50       3
              *
```

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

  43          KK     2NA
  44          KM   SUB-BASIN 2NA
  45          KM     L =  .71  Kb = .052  Adj. Slope =   18.0
  46          BA    .181
  47          LG    .350    .250   9.700    .040   1.000
  48          UC    .667    .475
  49          UA       0       3       5       8      12      20      43      75      90      96
  50          UA     100
              *

  51          KK    R2NA
  52          KM   ROUTE HYDROGRAPH FROM SUB-BASIN 2NA TO CP2NB
  53          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
  54          RK    2700   .0028    .035            TRAP       1       4
              *

  55          KK     2NB
  56          KM   SUB-BASIN 2NB
  57          KM     L =  .51  Kb = .056  Adj. Slope =   14.0
  58          BA    .067
  59          LG    .330    .230   9.700    .040   6.000
  60          UC    .625    .598
  61          UA       0       3       5       8      12      20      43      75      90      96
  62          UA     100
              *

  63          KK   CP2NB
  64          KM   COMBINE HYDROGRAPHS R2NA & 2NB
  65          HC       2
              *

  66          KK  RCP2NB
  67          KM   ROUTE COMBINED HYDROGRAPHS TO CP2NC
  68          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
  69          RK    2100   .0028    .035            TRAP       1       4
              *

  70          KK     2NC
  71          KM   SUB-BASIN 2NC
  72          KM     L =  .56  Kb = .054  Adj. Slope =   25.0
  73          BA    .116
  74          LG    .340    .260   8.800    .040    5.00
  75          UC    .525    .388
  76          UA       0       3       5       8      12      20      43      75      90      96
  77          UA     100
              *

  78          KK   CP2NC
  79          KM   COMBINE HYDROGRAPHS RCP2NB & 2NC
  80          HC       2
              *
```

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

  81          KK  RCP2NC
  82          KM   ROUTE COMBINED HYDROGRAPHS TO CP2NC
  83          RK    510   .0027    .040            TRAP       5       4
              *

  84          KK     2ND
  85          KM   SUB-BASIN 2ND
  86          KM     L =  .38  Kb = .058  Adj. Slope =   29.0
  87          BA    .064
  88          LG    .350    .290   8.400    .050   5.000
  89          UC    .429    .320
  90          UA       0       3       5       8      12      20      43      75      90      96
  91          UA     100
              *

  92          KK   CP2ND
  93          KM   COMBINE HYDROGRAPHS RCP2NC & 2ND
  94          HC       2
              *

  95          KK      C4
  96          KM   ROUTE THROUGH PONDING AREA WITH CULVERT C4 AS THE LOW FLOW OUTLET
  97          KM     LOW FLOW OUTLET: DOUBLE 53"x34" RCP
  98          RS       1    STOR       0
  99          SA   0.014   0.117   0.281   1.234   2.457   4.540
 100          SQ       0    12.0    62.0   119.0   165.0   204.0
 101          SE    1352    1353    1354    1355    1356    1357
 102          ST    1357      20       3     1.5
              *

 103          KK  RCP2ND
 104          KM   ROUTE OUTFLOW FROM CULVERT C4 THROUGH EXISTING CHANNNEL
 105          RK    1050    .002    .040            TRAP      10      10
              *

 106          KK  RCP2ND
 107          KM   ROUTE COMBINED HYDROGRAPHS THROUGH IMPROVED CHANNEL TO POND AREA (CULVERT C6)
 108          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 109          RK    1100    .011    .035            TRAP      10       4
              *

 110          KK     2NE
 111.         KM   SUB-BASIN 2NE
 112          KM     L =  .81  Kb = .052  Adj. Slope =   19.0
 113          BA    .111
 114          LG    .320    .320   6.800    .100   17.00
 115          UC    .729    .771
 116          UA       0       3       5       8      12      20      43      75      90      96
 117          UA     100
              *
```

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

 118          KK    R2NE
 119          KM   ROUTE HYDROGRAPH FROM SUB-BASIN 2NE
 120          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 121          RK     945    .015    .035            TRAP      38       4
              *

 122          KK     2NF
 123          KM   SUB-BASIN 2NF
 124          KM     L =  .24  Kb = .033  Adj. Slope =   17.0
 125          BA    .020
 126          LG    .220    .140   9.700    .040  43.000
 127          UC    .283    .271
 128          UA       0       3       5       8      12      20      43      75      90      96
 129          UA     100
              *

 130          KK   CP2NF
 131          KM   COMBINE HYDROGRAPHS R2NE & 2NF
 132          HC       2
              *

 133          KK  RCP2NF
 134          KM   ROUTE COMBINED HYDROGRAPHS TO CP2NG
 135          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 136          RK    2141    .015    .035            TRAP      38       4
              *

 137          KK     2NG
 138          KM   SUB-BASIN 2NG
 139          KM     L =  .44  Kb = .052  Adj. Slope =   16.0
 140          BA    .039
 141          LG    .260    .170   9.700    .040   42.00
 142          UC    .512    .581
 143          UA       0       3       5       8      12      20      43      75      90      96
 144          UA     100
              *

 145          KK   CP2NG
 146          KM   COMBINE HYDROGRAPHS RCP2NF & 2NG
 147          HC       2
              *

 148          KK  RCP2NG
 149          KM   ROUTE COMBINED HYDROGRAPHS TO CP2NH
 150          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 151          RK     880    .015    .035            TRAP      38       4
              *

 152          KK     2NH
 153          KM   SUB-BASIN 2NH
 154          KM     L =  .21  Kb = .053  Adj. Slope =   10.0
 155          BA    .018
 156          LG    .230    .150   9.700    .040   49.00
 157          UC    .404    .383
```

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

 158          UA       0       3       5       8      12      20      43      75      90      96
 159          UA     100
              *

 160          KK   CP2NH
 161          KM   COMBINE HYDROGRAPHS RCP2NG & 2NH
 162          HC       2
              *

 163          KK  RCP2NH
 164          KM   ROUTE COMBINED HYDROGRAPHS TO CP4N
 165          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 166          RK    1290    .014    .035            TRAP      38       4
              *

 167          KK      4N
 168          KM   SUB-BASIN 4N
 169          KM     L =  .32  Kb = .051  Adj. Slope =   31.0
 170          BA    .031
 171          LG    .240    .160   9.700    .040   43.00
 172          UC    .342    .327
 173          UA       0       3       5       8      12      20      43      75      90      96
 174          UA     100
              *

 175          KK    CP4N
 176          KM   COMBINE HYDROGRAPHS RCP2NH & 4N
 177          HC       2
              *

 178          KK   RCP4N
 179          KM   ROUTE COMBINED HYDROGRAPHS TO CP3N (POND AREA FOR CULVERT C6)
 180          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 181          RK     760   .0105    .035            TRAP      38       4
              *

 182          KK      3N
 183          KM   SUB-BASIN 3N
 184          KM     L =  .57  Kb = .052  Adj. Slope =   23.0
 185          BA    .138
 186          LG    .330    .280   8.400    .050    5.00
 187          UC    .542    .369
 188          UA       0       3       5       8      12      20      43      75      90      96
 189          UA     100
              *

 190          KK    CP3N
 191          KM   COMBINE HYDROGRAPHS RCP2ND, RCP4N & 3N
 192          HC       3
              *
```

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

 193          KK   DET3N
 194          KM   ROUTE THROUGH PONDING AREA WITH CULVERT C6 AS THE LOW FLOW OUTLET
 195          KM   LOW FLOW OUTLET:QUADRUPLE 36" RCP
 196          RS       1    STOR       0
 197          SA      .3      .7     1.8     3.3     5.8     7.3     8.0
 198          SQ       0      25      75     132     200     250     284
 199          SE    1345    1346    1347    1348    1349    1350    1351
 200          ST    1351      20       3     1.5
              *

 201          KK  CPOWER
 202          KM   COMBINE HYDROGRAPHS RPOWER & C6
 203          HC       2
              *

 204          KK  RPOWER
 205          KM   ROUTE OUTFLOW FROM C2 THROUGH THE POWERLINE FLOODWAY
 206          RK    1400   .0023    .035            TRAP      50       3
              *

 207          KK      5N
 208          KM   SUB-BASIN 5N
 209          KM     L =  .44  Kb = .055  Adj. Slope =   20.0
 210          BA    .084
 211          LG     .33     .33    4.70     .23  13.000
 212          UC    .563    .416
 213          UA       0       3       5       8      12      20      43      75      90      96
 214          UA     100
              *

 215          KK     RC7
 216          KM   ROUTE HYDROGRAPH (OUTFLOW FROM PIPE) TO CP6NA
 217          RK    1550    .005    .040            TRAP      10      50
              *

 218          KK     6NA
 219          KM   SUB-BASIN 6NA
 220          KM     L =  .45  Kb = .029  Adj. Slope =   20.0
 221          BA    .091
 222          LG     .30     .30    5.00     .20   28.00
 223          UC    .375    .258
 224          UA       0       3       5       8      12      20      43      75      90      96
 225          UA     100
              *

 226          KK   CP6NA
 227          KM   COMBINE HYDROGRAPHS RC7 & 6NA
 228          HC       2
              *
```

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

 229          KK  RCP6NA
 230          KM   ROUTE COMBINED HYDROGRAPHS TO CP6NB
 231          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 232          RK     985    .015    .035            TRAP      10       5
              *

 233          KK     6NB
 234          KM   SUB-BASIN 6NB
 235          KM     L =  .23  Kb = .031  Adj. Slope =   17.0
 236          BA    .045
 237          LG    .280    .270   7.000    .090   22.00
 238          UC    .275    .160
 239          UA       0       3       5       8      12      20      43      75      90      96
 240          UA     100
              *

 241          KK   CP6NB
 242          KM   COMBINE HYDROGRAPHS CP6NA & 6NB
 243          HC       2
              *

 244          KK  RCP6NB
 245          KM   ROUTE COMBINED HYDROGRAPHS TO CP6NC
 246          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 247          RK    2150    .015    .035            TRAP      10       5
              *

 248          KK     6NC
 249          KM   SUB-BASIN 6NC
 250          KM     L =  .44  Kb = .029  Adj. Slope =   23.0
 251          BA    .086
 252          LG    .300    .200   9.700    .040   21.00
 253          UC    .333    .229
 254          UA       0       3       5       8      12      20      43      75      90      96
 255          UA     100
              *

 256          KK   CP6NC
 257          KM   COMBINE HYDROGRAPHS RCP6NB & 6NC
 258          HC       2
              *

 259          KK  RCP6NC
 260          KM   ROUTE COMBINED HYDROGRAPHS TO CP7NA
 261          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 262          RK     905    .015    .035            TRAP      10       5
              *

 263          KK     7NA
 264          KM   SUB-BASIN 7NA
 265          KM     L =  .23  Kb = .031  Adj. Slope =    9.0
 266          BA    .044
 267          LG    .280    .190   9.700    .040  23.000
 268          UC    .333    .200
```

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

 269          UA       0       3       5       8      12      20      43      75      90      96
 270          UA     100
              *

 271          KK   CP7NA
 272          KM   COMBINE HYDROGRAPHS RCP6NC & 7NA
 273          HC       2
              *

 274          KK  RCP7NA
 275          KM   ROUTE COMBINED HYDROGRAPHS TO CP7NB
 276          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 277          RK    1470    .013    .035            TRAP      10       5
              *

 278          KK     7NB
 279          KM   SUB-BASIN 7NB
 280          KM     L =  .32  Kb = .030  Adj. Slope =   25.0
 281          BA    .063
 282          LG    .290    .200   9.700    .040   26.00
 283          UC    .279    .174
 284          UA       0       3       5       8      12      20      43      75      90      96
 285          UA     100
              *

 286          KK     7NC
 287          KM   SUB-BASIN 7NC
 288          KM     L =  .10  Kb = .034  Adj. Slope =   20.0
 289          BA    .012
 290          LG    .230    .150   9.700    .040  41.000
 291          UC    .175    .105
 292          UA       0       3       5       8      12      20      43      75      90      96
 293          UA     100
              *

 294          KK   CP7NB
 295          KM   COMBINE HYDROGRAPHS RCP7NA, 7NB & 7NC
 296          HC       3
              *

 297          KK      8N
 298          KM   SUB-BASIN 8N
 299          KM     L =  .42  Kb = .054  Adj. Slope =   17.0
 300          BA    .072
 301          LG    .310    .230   8.800    .040   17.00
 302          UC    .508    .391
 303          UA       0       3       5       8      12      20      43      75      90      96
 304          UA     100
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 305          KK   CP8N
 306          KM   COMBINE HYDROGRAPHS CP7NB & 8N
 307          HC      2
              *

 308          KK   DET8N
 309          KM   ROUTE THROUGH PONDING AREA WITH CULVERT C10 AS THE LOW FLOW OUTLET
 310          KM   LOW FLOW OUTLET: TRIPLE 36" RCP
 311          RS      1    STOR      0
 312          SA   0.05      .8      1     2.5     3.9     5.6     6.7     7.1
 313          SQ      0    17.5     50     100     149     180     208     235
 314          SE   1340    1341   1342    1343    1344    1345    1346    1347
 315          ST   1347      20      3     1.5
              *

 316          KK  CPOWER
 317          KM   COMBINE HYDROGRAPHS RPOWER & C10
 318          HC      2
              *

 319          KK  RPOWER
 320          KM   ROUTE OUTFLOW FROM C10 THROUGH THE POWERLINE FLOODWAY
 321          RK   3600   .0023    .035            TRAP      50       3
              *

 322          KK      9N
 323          KM   SUB-BASIN 9N
 324          BA    .194
 325          LG    .300    .310   6.600    .110  15.000
 326          UC    .286    .168
 327          UA       0       3       5       8      12      20      43      75      90      96
 328          UA     100
              *

 329          KK  DETMID
 330          KM   DETENTION BASIN
 331          KM   LOW FLOW OUTLET: SINGLE 24" CIRCULAR PIPE
 332          RS      1    STOR     -1
 333          SA      0     0.2   0.886     2.2    4.18     6.2     7.9     8.6     8.9
 334          SQ      0       2     4.5     7.4      10    13.5      16    17.5    19.2
 335          SE  1352.0  1352.5  1353.0  1353.5  1354.0  1354.5  1355.0  1355.5  1356.0
 336          ST  1356.0      20      3     1.5
              *

 337          KK   RDET1
 338          KM   ROUTE OUTFLOW FROM DETENTION BASIN TO CP10N
 339          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY GILBERTSON ASSOC. (1998)
 340          RK   3166   .0048    .012            CIRC       2
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 341          KK     10N
 342          KM   SUB-BASIN 10N
 343          BA    .227
 344          LG    .300    .200   9.700    .040  18.000
 345          UC    .257    .134
 346          UA       0       3       5       8      12      20      43      75      90      96
 347          UA     100
              *

 348          KK   CP10N
 349          KM   COMBINE HYDROGRAPHS RDET & 10N
 350          HC       2
              *

 351          KK     11N
 352          KM   SUB-BASIN 11N
 353          KM     L =  .42  Kb = .030  Adj. Slope =   14.0
 354          BA    .069
 355          LG    .250    .240   5.000    .200  50.000
 356          UC    .251    .195
 357          UA       0       3       5       8      12      20      43      75      90      96
 358          UA     100
              *

 359          KK    13NI
 360          KM   PARTIAL RUNOFF FROM SUB-BASIN 13N, EAST HALF 13NA-I
 361          BA   .0184
 362          LG    .050    .000   5.000    .200 100.000
 363          UC    .165    .150
 364          UA       0       5      16      30      65      77      84      90      94      97
 365          UA     100
              *

 366          KK   CP11N
 367          KM   COMBINE 11N AND 13N
 368          HC       2
              *

 369          KK     12N
 370          KM   SUB-BASIN 12N
 371          BA    .043
 372          LG    .270    .200   8.800    .040   42.00
 373          UC     .22    .188
 374          UA       0       3       5       8      12      20      43      75      90      96
 375          UA     100
              *

 376          KK   CP12N
 377          KM   COMBINE HYDROGRAPHS RCP11N AND 12N
 378          HC       2
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 379          KK   CPALL
 380          KM   COMBINE CP12N AND CP10N
 381          HC       2
              *

 382          KK    DETN
 383          KM   DETENTION BASIN NORTH
 384          KM   LOW FLOW OUTLET:30"RCP
 385          RS       1    STOR       0
 386          SA    .183    1.35    3.87     5.6    6.53    7.08    7.65    8.26    8.78    9.52
 387          SQ       2      10      19      21      22      24      25      26    26.5      27
 388          SE    1334    1335    1336    1337    1338    1339    1340    1341    1342    1343
 389          ST    1343      20       3     1.5
              *

 390          KK   RDETN
 391          KM   ROUTE DETN TO CPOWER
 392          RD    3000  .00143    .013            CIRC     2.5
              *

 393          KK   CPDET
 394          KM   COMBINE RDETN AND CPOWER
 395          HC       2
              *

 396          KK     13N
 397          KM   RUNOFF FROM BASIN 13N
 398          BA    .017
 399          LG     .05    .000   5.000    .200   100.0
 400          UC    .197    .191
 401          UA       0       3       5       8      12      20      43      75      90      96
 402          UA     100
              *

 403          KK     14N
 404          KM   SUB-BASIN 14N
 405          BA    .017
 406          LG    .050    .000   7.600    .070 100.000
 407          UC    .154    .135
 408          UA       0       5      16      30      65      77      84      90      94      97
 409          UA     100
              *

 410          KK   CP14N
 411          KM   COMBINE HYDROGRAPHS R13N & 14N
 412          HC       2
              *

 413          KK  RCP14N
 414          KM   ROUTE COMBINED HYDROGRAPHS TO CP15N
 415          RK     600   .0033    .012            TRAP       1     150
              *
```

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

416           KK     15N
417           KM   SUB-BASIN 15N
418           KM     L =  .19  Kb = .034  Adj. Slope =   26.0
419           BA    .014
420           LG    .050    .000   9.700    .040    95.0
421           UC    .130    .101
422           UA       0       5      16      30      65      77      84      90      94      97
423           UA     100
              *

424           KK   CP15N
425           KM   COMBINE HYDROGRAPHS RCP14N & 15N
426           HC       2
              *

427           KK  RCP15N
428           KM   ROUTE COMBINED HYDROGRAPHS TO CP16N
429           RK     790   .0033    .012            CIRC       4
              *

430           KK     16N
431           KM   SUB-BASIN 16NC,16ND&16NE
432           BA   .0145
433           LG    .050    .000   9.700    .040    95.0
434           UC    .169    .176
435           UA       0       5      16      30      65      77      84      90      94      97
436           UA     100
              *

437           KK   CP16N
438           KM   COMBINE HYDROGRAPHS RCP15N & 16N
439           HC       2
              *

440           KK  RCP16N
441           KM   ROUTE COMBINED HYDROGRAPHS TO DETENTION BASIN
442           RK     550   .0027    .012            CIRC       4
              *

443           KK    10NW
444           KM   RUNOFF FROM SUB-BASIN 10-NW
445           BA   .0125
446           LG    .300    .200     9.7     .04      18
447           UC   .0864   .0486
448           UA       0       3       5       8      12      20      43       5      90      96
449           UA     100
              *

450           KK    12NL
451           KM   RUNOFF FROM PARCELS 12L
452           BA    .030
453           LG    .270    .200   8.800    .040   42.00
454           UC    .153   .1077
455           UA       0       5      16      30      65      77      84      90      94      97
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 456          UA     100
              *

 457          KK   CP12L
 458          KM   COMBINE 12L AND 10NW
 459          HC       2
              *

 460          KK  RCP12N
 461          KM   ROUTE CP12L TO CP12N
 462          RK     570    .013    .012           CIRC       3
              *

 463          KK   CP12N
 464          KM   COMBINE HYDROGRAPHS CP12L AND RCP16N
 465          HC       2
              *

 466          KK  RCP12N
 467          KM   ROUTE CP12N TO CP21NB
 468          RK     850   .0035    .012           CIRC     4.5
              *

 469          KK   21-NB
 470          KM   RUNOFF FROM SUB-BASIN 21NB
 471          BA     .01
 472          LG    .050    .000   9.700    .040    95.0
 473          UC    .127    .118
 474          UA       0       5      16      30      65      77      84      90      94      97
 475          UA     100
              *

 476          KK  CP21NB
 477          KM   COMBINE HYDROGRAPHS RCP12N & 21-NB
 478          HC       2
              *

 479          KK  RCP20N
 480          KM   ROUTE RCP20N TO CPALL
 481          RK     200    .005    .012           CIRC     4.5
              *

 482          KK     17N
 483          KM   SUB-BASIN 17N
 484          BA    .119
 485          LG    .300    .210   9.700    .040  17.000
 486          UC    .594     .56
 487          UA       0       3       5       8      12      20      43      75      90      96
 488          UA     100
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

489           KK    R17N
490           KM   ROUTE 17N TO CPALL
491           RK     450   .0033    .012            CIRC     4.5
              *

492           KK    16N2
493           KM   SUB-BASIN 16NA&16NB
494           BA   .0106
495           LG    .050       0     9.7     .04      95
496           UC    .193     .24
497           UA       0       5      16      30      65      77      84      90      94      97
498           UA     100
              *

499           KK     18N
500           KM   SUB-BASIN 18N
501           BA    .034
502           LG    .050    .000   9.700    .040    95.0
503           UC    .206    .161
504           UA       0       5      16      30      65      77      84      90      94      97
505           UA     100
              *

506           KK   CP18N
507           KM   COMBINE 16N2 AND 18N
508           HC       2
              *

509           KK  RCP18N
510           KM   ROUTE RUNOFF FROM SUB-BASIN 18N
511           RK     750    .002    .012            CIRC       4
              *

512           KK     19N
513           KM   SUB-BASIN 19N
514           KM     L =  .25  Kb = .035  Adj. Slope =    8.0
515           BA    .011
516           LG    .050    .000   9.700    .040    95.0
517           UC     .15    .098
518           UA       0       5      16      30      65      77      84      90      94      97
519           UA     100
              *

520           KK   CP19N
521           KM   COMBINE HYDROGRAPHS RCP18N & 19N
522           HC       2
              *

523           KK     20N
524           KM   SUB-BASIN 20N
525           BA    .016
526           LG    .050    .000   9.700    .040    95.0
527           UC    .166   .1612
528           UA       0       5      16      30      65      77      84      90      94      97
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 529          UA     100
              *

 530          KK   CP20M
 531          KM   COMBINE HYDROGRAPHS RCP19N & 20N-C
 532          HC       2
              *

 533          KK  RCP20M
 534          KM   ROUTE CP20M TO CPALL
 535          RK     200   .0025    .012            CIRC       4
              *

 536          KK     21N
 537          KM   SUB-BASIN 21N
 538          BA    .048
 539          LG    .190    .110   9.700    .040    45.0
 540          UC    .184   .1205
 541          UA       0       3       5       8      12      20      43      75      90      96
 542          UA     100
              *

 543          KK   CPALL
 544          KM   COMBINE HYDROGRAPHS RCP20N,RCP21NB,R17N & 21N
 545          HC       4
              *

 546          KK   DETNW
 547          KM   DETENTION BASIN LOCATED TO THE NORTH OF THE NORTH APRON
 548          KM   LOW FLOW OUTLET: SINGLE 24" RCP
 549          RS       1    STOR       0
 550          SA   .0001     .55    1.52    2.56    3.59    3.98    4.36    4.75    5.53    5.93
 551          SQ      .1       4      12      17      19      21      22      24      27      30
 552          SE    1322    1323    1324    1325    1326    1327    1328    1329    1331    1333
 553          ST    1333      14       3     1.5
              *

 554          KK  CPOWER
 555          KM   COMBINE HYDROGRAPHS RPOWER & DET
 556          HC       2
              *

 557          KK     22N
 558          KM   SUB-BASIN 22N
 559          KM   OFF-ROAD FLOWS THAT ENTER THE STORM DRAIN SYSTEM ON SOSSAMAN RD.
 560          KM   6-HOUR RAINFALL, PATTERN NO. 2.44 WAS USED TO FIND TC & R FOR THIS BASIN
 561          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .956
 562          KM     L =  .53  Kb = .033  Adj. Slope =   19.0
 563          BA   .0076
 564          LG    .350    .250   9.700    .040    .000
 565          UC    .298    .922
 566          UA       0       3       5       8      12      20      43      75      90      96
 567          UA     100
              *
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Modified from Master

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

 568          KK  CPOWER
 569          KM   COMBINE 22N INTO POWER FLOODWAY
 570          HC       2
              *  ******************************************
              *  START DRAINAGE FOR AREA SOUTH OF TAXIWAY K
              *  ******************************************

 571          KK      1S
 572          KM   SUB-BASIN 1S
 573          BA    .113
 574          LG    .330    .330   4.650    .240   5.000
 575          UC    .542    .542
 576          UA       0       3       5       8      12      20      43      75      90      96
 577          UA     100
              *

 578          KK     R1S
 579          KM     ROUTE HYDROGRAPH FROM SUB-BASIN 1S TO CP3S
 580          RK    2129   0.004    0.04            TRAP      30      10
              *

 581          KK     6SB
 582          KM   RUNOFF FROM 6-SB THROUGH 6-SE
 583          BA   .0913
 584          LG    .280    .280    5.00    .200   24.00
 585          UC     .26   .1366
 586          UA       0       3       5       8      12      20      43      75      90      96
 587          UA     100
              *

 588          KK      2S
 589          KM   SUB-BASIN 2S
 590          BA    .037
 591          LG    .280    .270   4.650    .240  24.000
 592          UC    .202    .126
 593          UA       0       3       5       8      12      20      43      75      90      96
 594          UA     100
              *

 595          KK    CP2S
 596          KM   COMBINE 6SB AND 2S
 597          HC       2
              *

 598          KK     R2S
 599          KM   ROUTE HYDROGRAPH FROM SUB-BASIN 2S TO CP3S
 600          RK    1200   0.002    0.04            TRAP      30      10
              *
```

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

601           KK    CP2S
602           KM   COMBINE CP2S AND 1S
603           HC       2
              *

604           KK      3S
605           KM   SUB-BASIN 3S
606           BA    .056
607           LG    .350    .350   4.650    .240    .000
608           UC    .182    .111
609           UA       0       3       5       8      12      20      43      75      90      96
610           UA     100
              *

611           KK    CP3S
612           KM   COMBINE HYDROGRAPHS CP2S & 3S
613           HC       2
              *

614           KK      4S
615           KM   SUB-BASIN 4S
616           BA    .027
617           LG    .350    .350   4.650    .240    .000
618           UC    .636    1.74
619           UA       0       3       5       8      12      20      43      75      90      96
620           UA     100
              *

621           KK    CP4S
622           KM   COMBINE HYDROGRAPHS CP3S AND 4S
623           HC       2
              *

624           KK     10S
625           KM   SUB-BASIN 10S
626           BA    .101
627           LG     .35     .35    4.65     .24     1.0
628           UC    .455    .443
629           UA       0       3       5       8      12      20      43      75      90      96
630           UA     100
              *

631           KK   CP10S
632           KM   COMBINE 10S, AND CP4S
633           HC       2
              *  ***************************************
              *  NEW DRAINAGE LINE TO DETENTION SOUTH
              *  ***************************************
```

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

 634          KK     6SA
 635          KM   SUB-BASIN 6S
 636          BA    .048
 637          LG    .280    .280   5.000    .200  24.000
 638          UC    .255    .168
 639          UA       0       3       5       8      12      20      43      75      90      96
 640          UA     100
              *

 641          KK      7S
 642          KM   SUB-BASIN 7S
 643          BA    .036
 644          LG    .160    .130   4.800    .220  35.000
 645          UC    .218    .139
 646          UA       0       3       5       8      12      20      43      75      90      96
 647          UA     100
              *

 648          KK    CP7S
 649          KM   COMBINE HYDROGRAPHS 6SA AND 7S
 650          HC       2
              *

 651          KK      9S
 652          KM   SUB-BASIN 9S
 653          BA    .045
 654          LG    .350    .350   4.650    .240     5.0
 655          UC    .291    .222
 656          UA       0       3       5       8      12      20      43      75      90      96
 657          UA     100
              *

 658          KK    CP9S
 659          KM   COMBINE HYDROGRAPHS CP7S AND 9S
 660          HC       2
              *

 661          KK     11S
 662          KM   SUB-BASIN 11S
 663          BA    .024
 664          LG    .350    .350   4.650    .240    9.00
 665          UC    .297    .281
 666          UA       0       3       5       8      12      20      43      75      90      96
 667          UA     100
              *

 668          KK   CP11S
 669          KM   COMBINE HYDROGRAPHS CP9S AND 11S
 670          HC       2
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

671           KK      8S
672           KM   SUB-BASIN 8S
673           BA    .032
674           LG     .27     .26    5.00     .20  33.000
675           UC   .2926    .244
676           UA      0       3       5       8      12      20      43      75      90      96
677           UA     100
              *

678           KK     R8S
679           KM   ROUTE 8S TO CP12SM
680           RD    4500    .003    .013            CIRC       8
              *

681           KK    12SM
682           KM   SUB-BASIN 12S
683           BA   .1071
684           LG     .35     .35    4.65     .24    90.0
685           UC    .339    .293
686           UA      0       3       5       8      12      20      43      75      90      96
687           UA     100
              *

688           KK  CP12SM
689           KM   COMBINE CP11S, 8S, AND 12SM
690           HC      3
              *  ***********************************
              *  SECOND LINE TO DETENTION SOUTH
              *  ***********************************

691           KK    14SA
692           KM   RUNOFF FROM EAST HALF OF 14S
693           BA    .035
694           LG    .250    .240    5.00    .200    55.0
695           UC    .148   .1033
696           UA      0       3       5       8      12      20      43      75      90      96
697           UA     100
              *

698           KK   R14SA
699           KM   ROUTE 14SA TO 13S
700           RD    4000   .0025    .013            CIRC       8
              *

701           KK    12SA
702           KM   SUB-BASIN 12SA RUNOFF
703           BA    .188
704           LG     .35     .35    4.65     .24    90.0
705           UC   .2704   .1466
706           UA      0       3       5       8      12      20      43      75      90      96
707           UA     100
              *
```

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

 708          KK     13S
 709          KM   SUB-BASIN 13S
 710          BA    .009
 711          LG    .350    .350   4.650    .240    90.0
 712          UC    .133    .118
 713          UA       0       3       5       8      12      20      43      75      90      96
 714          UA     100
              *

 715          KK   CP13S
 716          KM   COMBINE HYDROGRAPHS 12SA,14SA,CP12SM AND 13S
 717          HC       4
              *

 718          KK   CPDET
 719          KM   COMBINE HYDROGRAPHS CP10S AND CP13S
 720          HC       2
              *

 721          KK  DETSOU
 722          KM   DETENTION BASIN LOCATED ALONG THE SOUTH PROPERTY BOUNDARY, JUST EAST OF
 723          KM   THE FUTURE SOSSAMAN ROAD
 724          KM   LOW FLOW OUTLET: DOUBLE 48" RCP
 725          RS       1    STOR       0
 726          SA     .11     .70    2.01    3.34    4.82    7.22    7.76    8.31    8.88   10.07
 727          SQ       0      20      52      94     143     230     263     295     320     354
 728          SE    1339    1340    1341    1342    1343    1345    1346    1347    1348    1350
 729          ST    1350      20       3     1.5
              *  ****************************************
              *  START OF DETENTION WEST DRAINAGE BASINS
              *  ****************************************

 730          KK     14SD
 731          KM   SUB-BASIN 14SC AND 14SD
 732          BA   .0294
 733          LG    .250    .240   5.000    .200   70.00
 734          UC    .147    .101
 735          UA       0       3       5       8      12      20      43      75      90      96
 736          UA     100
              *

 737          KK     22S
 738          KM   SUB-BASIN 22S
 739          BA   .0097
 740          LG    .170    .150   5.000    .200    85.0
 741          UC    .112    .086
 742          UA       0       5      16      30      65      77      84      90      94      97
 743          UA     100
              *
```

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

 744          KK   CP22S
 745          KM   COMBINE 22S AND 14SD
 746          HC      2
              *

 747          KK     15S
 748          KM   SUB-BASIN 15S
 749          BA   .0525
 750          LG    .050    .000   4.800    .220    95.0
 751          UC    .199   .1336
 752          UA       0       5      16      30      65      77      84      90      94      97
 753          UA     100
              *

 754          KK   CP15S
 755          KM   COMBINE 15S AND CP22S
 756          HC      2
              *

 757          KK     16S
 758          KM   SUB-BASIN 16S
 759          BA   .0027
 760          LG    .050    .000   5.000    .200 100.000
 761          UC    .125     .19
 762          UA       0       5      16      30      65      77      84      90      94      97
 763          UA     100
              *

 764          KK   CP16S
 765          KM   COMBINE FLOWS FROM CP15S, 16S
 766          HC      2
              *

 767          KK     17S
 768          KM   SUB-BASIN 17S
 769          BA    .024
 770          LG    .050    .000   4.650    .240    95.0
 771          UC   .2018   .1909
 772          UA       0       5      16      30      65      77      84      90      94      97
 773          UA     100
              *

 774          KK     18S
 775          KM   SUB-BASIN 18S
 776          BA    .005
 777          LG    .050    .000   4.650    .240 100.000
 778          UC    .141    .189
 779          UA       0       5      16      30      65      77      84      90      94      97
 780          UA     100
              *
```

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

 781          KK   CP18S
 782          KM   COMBINE FLOWS FROM 17S, 18S AND UPSTREAM STORMDRAIN (RCP16S)
 783          HC      3
              *

 784          KK    20S
 785          KM   SUB-BASIN 20S
 786          BA    .002
 787          LG    .050    .000   4.650    .240 100.000
 788          UC    .118    .160
 789          UA      0       5      16      30      65      77      84      90      94      97
 790          UA    100
              *

 791          KK   CP20S
 792          KM   COMBINE FLOWS FROM 20S AND CP18S
 793          HC      2
              *  ************************************
              *  NEW LINE GOING TO DETENTION WEST
              *  ************************************

 794          KK    23S
 795          KM   SUB-BASIN 23S
 796          BA    .052
 797          LG    .200    .180   5.000    .200    70.0
 798          UC     .27    .251
 799          UA      0       5      16      30      65      77      84      90      94      97
 800          UA    100
              *

 801          KK   25SF
 802          KM   SUB-BASIN 25SF
 803          BA   .0188
 804          LG    .050    .000   5.000    .200 100.000
 805          UC    .179    .183
 806          UA      0       5      16      30      65      77      84      90      94      97
 807          UA    100
              *

 808          KK   CP23S
 809          KM   COMBINE 25SF AND 23S
 810          HC      2
              *

 811          KK    24S
 812          KM   SUB-BASIN 24S
 813          BA    .036
 814          LG    .070    .020   4.650    .240  95.000
 815          UC     .28    .275
 816          UA      0       5      16      30      65      77      84      90      94      97
 817          UA    100
              *
```

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

 818          KK   CP24S
 819          KM   COMBINE FLOWS FROM 24S AND CP23S
 820          HC       2
              *

 821          KK    21S
 822          KM   SUB-BASIN 21S
 823          BA   .0046
 824          LG    .050    .000   4.650    .240 100.000
 825          UC    .154    .199
 826          UA       0       5      16      30      65      77      84      90      94      97
 827          UA     100
              *

 828          KK   CP24S
 829          KM   COMBINE FLOWS CP24S AND 21S
 830          HC       2
              *

 831          KK   28SA
 832          KM   SUB-BASIN 28S
 833          BA    .008
 834          LG    .050    .000   4.650    .240    40.0
 835          UC    .147    .148
 836          UA       0       5      16      30      65      77      84      90      94      97
 837          UA     100
              *

 838          KK   CP28S
 839          KM   COMBINE CP24S AND 28SA
 840          HC       2
              *   ************************************
              *   NEW LINE FOR DETENTION WEST
              *   ************************************

 841          KK   25SA
 842          KM   SUB-BASIN 25SA
 843          BA   .0164
 844          LG    .050    .000   5.000    .200 100.000
 845          UC    .228    .258
 846          UA       0       5      16      30      65      77      84      90      94      97
 847          UA     100
              *

 848          KK    26S
 849          KM   SUB-BASIN 26S
 850          BA    .025
 851          LG    .050    .000   4.650    .240 100.000
 852          UC    .255    .260
 853          UA       0       5      16      30      65      77      84      90      94      97
 854          UA     100
              *
```

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

 855          KK   CP26S
 856          KM   COMBINE FLOWS FROM 26S AND 25SA
 857          HC       2
              *

 858          KK     L39
 859          KM   SUB-BASIN L39
 860          BA    .005
 861          LG    .050    .000   4.650    .240 100.000
 862          UC    .165    .203
 863          UA       0       5      16      30      65      77      84      90      94      97
 864          UA     100
              *

 865          KK   CPL39
 866          KM   COMBINE FLOWS FROM L39 AND CP26S
 867          HC       2
              *

 868          KK     L40
 869          KM   SUB-BASIN L40
 870          BA    .004
 871          LG    .050    .000   4.650    .240 100.000
 872          UC    .085    .073
 873          UA       0       5      16      30      65      77      84      90      94      97
 874          UA     100
              *

 875          KK   CPL40
 876          KM   COMBINE FLOWS FROM L40 AND CPL39
 877          HC       2
              *

 878          KK   CP21S
 879          KM   COMBINE FLOWS FROM CP20S, CP28S AND CPL40
 880          HC       3
              *

 881          KK    DETW
 882          KM   DETENTION BASIN ON WEST SIDE OF WGA
 883          KM   OUTLET: 2X54" RCP WITH INVERT AT 1336, 348LF AND 8X5 AT 1335.47, 182LF
 884          RS       1    STOR       0
 885          SA     .11   .5941  1.7488  3.0062  4.3547  6.1125  6.6595  7.2261    7.60    8.14
 886          SQ       0      25      45      95     145     210     250     300     320     355
 887          SE    1336    1337    1338    1339    1340    1341    1342    1343    1344    1345
 888          ST    1345      20       3     1.5
              *

 889          KK   CPOUT
 890          KM   COMBINE FLOWS FROM RCPOUT AND RCPOUT
 891          HC       2
              *
```

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

 892          KK   RCP02
 893          KM   ROUTE DETSOUTH AND DETWEST TO RITTENHOUSE FLOODWAY VIA 2X96"
 894          RD    5260    .001    .013            CIRC      16
              *
 895          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

                1N
                 V
                 V
                C2
                 V
                 V
 40          RPOWER
                 .
                 .
 43              .        2NA
                 .         V
                 .         V
                 .       R2NA
                 .         .
                 .         .
                 .         .        2NB
                 .         .          .
                 .         .          .
                 .      CP2NB............
                 .         V
                 .         V
                 .     RCP2NB
                 .         .
                 .         .
 70              .         .        2NC
                 .         .          .
                 .         .          .
 78              .      CP2NC............
                 .         V
                 .         V
                 .     RCP2NC
                 .         .
                 .         .
                 .         .        2ND
                 .         .          .
                 .         .          .
                 .      CP2ND............
                 .         V
                 .         V
 95              .        C4
                 .         V
                 .         V
 103             .     RCP2ND
                 .         V
                 .         V
 106             .     RCP2ND
                 .         .
                 .         .
                 .         .        2NE
                 .         .         V
                 .         .         V
                 .         .       R2NE
                 .         .          .
                 .         .          .
                 .         .          .        2NF
                 .         .          .          .
                 .         .          .          .
 130             .         .      CP2NF............
```

```
          .          .          V
          .          .          V
133       .          .     RCP2NF
          .          .          .
          .          .          .
137       .          .          .         2NG
          .          .          .           .
          .          .          .           .
145       .          .      CP2NG............
          .          .          V
          .          .          V
48        .          .     RCP2NG
          .          .          .
          .          .          .
52        .          .          .         2NH
          .          .          .           .
          .          .          .           .
50        .          .      CP2NH............
          .          .          V
          .          .          V
163       .          .     RCP2NH
          .          .          .
          .          .          .
167       .          .          .          4N
          .          .          .           .
          .          .          .           .
75        .          .       CP4N............
          .          .          V
          .          .          V
78        .          .      RCP4N
          .          .          .
          .          .          .
32        .          .          .          3N
          .          .          .           .
          .          .          .           .
190       .       CP3N........................
          .          V
          .          V
193       .      DET3N
          .          .
          .          .
201    CPOWER............
          V
          V
04     RPOWER
          .
          .
07        .         5N
          .          V
          .          V
15        .        RC7
          .          .
          .          .
218       .          .        6NA
          .          .          .
          .          .          .
226       .      CP6NA............
          .          V
          .          V
229       .     RCP6NA
          .          .
          .          .
53        .          .        6NB
          .          .          .
          .          .          .
```

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241          .       CP6NB............
             .          V
             .          V
244          .      RCP6NB
             .          .
             .          .
248          .          .         6NC
             .          .           .
             .          .           .
256          .       CP6NC............
             .          V
             .          V
259          .      RCP6NC
             .          .
             .          .
263          .          .         7NA
             .          .           .
             .          .           .
271          .       CP7NA............
             .          V
             .          V
274          .      RCP7NA
             .          .
             .          .
278          .          .         7NB
             .          .           .
             .          .           .
286          .          .           .         7NC
             .          .           .           .
             .          .           .           .
294          .       CP7NB.......................
             .          .
             .          .
297          .          .          8N
             .          .           .
             .          .           .
305          .        CP8N............
             .          V
             .          V
308          .       DET8N
             .          .
             .          .
316     CPOWER............
             V
             V
319     RPOWER
             .
             .
322          .         9N
             .          V
             .          V
329          .      DETMID
             .          V
             .          V
337          .       RDET1
             .          .
             .          .
341          .          .         10N
             .          .           .
             .          .           .
348          .       CP10N...........
             .          .
             .          .
351          .          .         11N
             .          .           .
```

```
359          .          .          .
             .          .          .       13NI
             .          .          .          .
             .          .          .          .
366          .          .      CP11N...........
             .          .          .
             .          .          .
369          .          .          .        12N
             .          .          .          .
             .          .          .          .
376          .          .      CP12N...........
             .          .          .
             .          .          .
379          .      CPALL...........
             .          V
             .          V
382          .       DETN
             .          V
             .          V
390          .      RDETN
             .          .
             .          .
393      CPDET...........
             .
             .
396          .        13N
             .          .
             .          .
403          .          .        14N
             .          .          .
             .          .          .
410          .      CP14N...........
             .          V
             .          V
413          .     RCP14N
             .          .
             .          .
416          .          .        15N
             .          .          .
             .          .          .
424          .      CP15N...........
             .          V
             .          V
427          .     RCP15N
             .          .
             .          .
430          .          .        16N
             .          .          .
             .          .          .
437          .      CP16N...........
             .          V
             .          V
440          .     RCP16N
             .          .
             .          .
443          .          .       10NW
             .          .          .
             .          .          .
450          .          .          .       12NL
             .          .          .          .
             .          .          .          .
457          .          .      CP12L...........
             .          .          V
             .          .          V
460          .          .     RCP12N
```

```
                .          .          .
                .          .          .
 63             .      CP12N...........
                .          V
                .          V
466             .      RCP12N
                .          .
                .          .
469             .          .      21-NB
                .          .          .
                .          .          .
-76             .      CP21NB..........
                .          V
                .          V
 79             .      RCP20N
                .          .
                .          .
 82             .          .        17N
                .          .          V
                .          .          V
-89             .          .       R17N
                .          .          .
                .          .          .
492             .          .          .       16N2
                .          .          .          .
                .          .          .          .
499             .          .          .          .        18N
                .          .          .          .          .
                .          .          .          .          .
 06             .          .          .      CP18N...........
                .          .          .          V
                .          .          .          V
 09             .          .          .     RCP18N
                .          .          .          .
                .          .          .          .
 12             .          .          .          .        19N
                .          .          .          .          .
                .          .          .          .          .
520             .          .          .      CP19N...........
                .          .          .          .
                .          .          .          .
523             .          .          .          .        20N
                .          .          .          .          .
                .          .          .          .          .
-30             .          .          .      CP20M...........
                .          .          .          V
                .          .          .          V
 33             .          .          .     RCP20M
                .          .          .          .
                .          .          .          .
 36             .          .          .          .        21N
                .          .          .          .          .
                .          .          .          .          .
-43             .      CPALL...................................
                .          V
                .          V
546             .      DETNW
                .          .
                .          .
554         CPOWER..........
                .
                .
-57             .        22N
                .          .
                .          .
```

```
568   CPOWER............
          .
          .
571       .        1S
          .         V
          .         V
578       .       R1S
          .         .
          .         .
581       .         .       6SB
          .         .         .
          .         .         .
588       .         .         .         2S
          .         .         .          .
          .         .         .          .
595       .         .      CP2S............
          .         .         V
          .         .         V
598       .         .       R2S
          .         .         .
          .         .         .
601       .      CP2S............
          .         .
          .         .
604       .         .        3S
          .         .         .
          .         .         .
611       .      CP3S............
          .         .
          .         .
614       .         .        4S
          .         .         .
          .         .         .
621       .      CP4S............
          .         .
          .         .
624       .         .       10S
          .         .         .
          .         .         .
631       .     CP10S............
          .         .
          .         .
634       .         .       6SA
          .         .         .
          .         .         .
641       .         .         .         7S
          .         .         .          .
          .         .         .          .
648       .         .      CP7S............
          .         .         .
          .         .         .
651       .         .         .         9S
          .         .         .          .
          .         .         .          .
658       .         .      CP9S............
          .         .         .
          .         .         .
661       .         .         .        11S
          .         .         .          .
          .         .         .          .
668       .         .     CP11S............
          .         .         .
          .         .         .
671       .         .         .         8S
          .         .         .          V
```

```
                .         .         .         V
678             .         .         .       R8S
                .         .         .         .
                .         .         .         .
681             .         .         .         .       12SM
                .         .         .         .         .
                .         .         .         .         .
688             .         .     CP12SM.......................
                .         .         .
                .         .         .
691             .         .         .      14SA
                .         .         .         V
                .         .         .         V
698             .         .         .     R14SA
                .         .         .         .
                .         .         .         .
701             .         .         .         .       12SA
                .         .         .         .         .
                .         .         .         .         .
708             .         .         .         .         .         13S
                .         .         .         .         .           .
                .         .         .         .         .           .
715             .         .     CP13S...................................
                .         .         .
                .         .         .
718             .     CPDET............
                .         V
                .         V
721             .     DETSOU
                .         .
                .         .
730             .         .     14SD
                .         .         .
                .         .         .
737             .         .         .      22S
                .         .         .         .
                .         .         .         .
744             .         .     CP22S............
                .         .         .
                .         .         .
747             .         .         .      15S
                .         .         .         .
                .         .         .         .
754             .         .     CP15S............
                .         .         .
                .         .         .
757             .         .         .      16S
                .         .         .         .
                .         .         .         .
764             .         .     CP16S............
                .         .         .
                .         .         .
767             .         .         .      17S
                .         .         .         .
                .         .         .         .
774             .         .         .         .       18S
                .         .         .         .         .
                .         .         .         .         .
781             .         .     CP18S.......................
                .         .         .
                .         .         .
784             .         .         .      20S
                .         .         .         .
                .         .         .         .
791             .         .     CP20S............
```

```
                .          .          .
                .          .          .
'94             .          .          .        23S
                .          .          .         .
                .          .          .         .
801             .          .          .         .        25SF
                .          .          .         .          .
                .          .          .         .          .
808             .          .          .      CP23S............
                .          .          .         .
                .          .          .         .
J11             .          .          .         .         24S
                .          .          .         .          .
                .          .          .         .          .
118             .          .          .      CP24S............
                .          .          .         .
                .          .          .         .
321             .          .          .         .         21S
                .          .          .         .          .
                .          .          .         .          .
928             .          .          .      CP24S............
                .          .          .         .
                .          .          .         .
831             .          .          .         .        28SA
                .          .          .         .          .
                .          .          .         .          .
838             .          .          .      CP28S............
                .          .          .         .
                .          .          .         .
341             .          .          .         .        25SA
                .          .          .         .          .
                .          .          .         .          .
348             .          .          .         .          .        26S
                .          .          .         .          .          .
                .          .          .         .          .          .
355             .          .          .         .      CP26S............
                .          .          .         .          .
                .          .          .         .          .
858             .          .          .         .          .        L39
                .          .          .         .          .          .
                .          .          .         .          .          .
865             .          .          .         .      CPL39............
                .          .          .         .          .
                .          .          .         .          .
868             .          .          .         .          .        L40
                .          .          .         .          .          .
                .          .          .         .          .          .
875             .          .          .         .      CPL40............
                .          .          .         .          .
                .          .          .         .          .
878             .          .       CP21S........................
                .          .          V
                .          .          V
881             .          .       DETW
                .          .          .
                .          .          .
889             .       CPOUT............
                .          V
                .          V
892             .       RCPO2
```

**) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*  ************************************                    ****************************************
*                                    *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998            *                    *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1              *                    *         609 SECOND STREET            *
*                                    *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   06JUN02  TIME  10:40:29 *                    *          (916) 756-1104              *
*                                    *                    *                                      *
****************************************                    ****************************************
```

```
                    WILLIAMS GATEWAY AIRPORT HYDROLOGY          DATE:SEPT.18, 2001
                    PREPARED BY: GILBERTSON ASSOCIATES          JOB# 53111

                    FILE NAME:531CP6 .DAT
                    ***************************************************************************
                    0. PROPOSED CONDITIONS WATERSHED.
                    1. HYPOTHETICAL STORM DISTRIBUTION PATTERN USING THE MCFCD MANUAL.
                    2. 100-YR, 6-HR RAINFALL EVENT.
                    3. GREEN AND AMPT INFILTRATION EQUATION FOR RAINFALL EXCESS.
                    4. CLARK UNIT HYDROGRAPH METHOD TO ESTIMATE RAINFALL EXCESS.
                    5. KINEMATIC WAVE TECHNIQUE FOR CHANNEL ROUTING.
                    6. LEVEL-POOL FOR RESERVOIR ROUTING.
                    7. HEC-1 LARGE ARRAY VERSION 4.1 (JUNE 1998).
                    8. INCREASED PIPE CAPACITIES TO FACILITATE 24-HR FLOODWAY IMPACT
                    ***************************************************************************


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

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         360  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME        0559  ENDING TIME
                     ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL     .02 HOURS
                     TOTAL TIME BASE    5.98 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT
        WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO
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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	1N	206.	4.83	46.	46.	46.	.33		
ROUTED TO	C2	44.	5.98	9.	9.	9.	.33	1367.31	5.98
ROUTED TO	RPOWER	41.	5.98	4.	4.	4.	.33		
HYDROGRAPH AT	2NA	163.	4.50	32.	32.	32.	.18		
ROUTED TO	R2NA	163.	4.67	31.	31.	31.	.18		
HYDROGRAPH AT	2NB	56.	4.53	12.	12.	12.	.07		
2 COMBINED AT	CP2NB	217.	4.63	43.	43.	43.	.25		
ROUTED TO	RCP2NB	217.	4.75	42.	42.	42.	.25		
HYDROGRAPH AT	2NC	117.	4.37	22.	22.	22.	.12		
2 COMBINED AT	CP2NC	309.	4.67	64.	64.	64.	.36		
ROUTED TO	RCP2NC	309.	4.68	63.	63.	63.	.36		
HYDROGRAPH AT	2ND	68.	4.28	12.	12.	12.	.06		
2 COMBINED AT	CP2ND	356.	4.63	75.	75.	75.	.43		
ROUTED TO	C4	248.	5.10	68.	68.	68.	.43	1357.53	5.10
ROUTED TO	RCP2ND	248.	5.18	65.	65.	65.	.43		
ROUTED TO	RCP2ND	248.	5.20	63.	63.	63.	.43		
HYDROGRAPH AT	2NE	73.	4.65	17.	17.	17.	.11		
ROUTED TO	R2NE	73.	4.68	17.	17.	17.	.11		
HYDROGRAPH AT	2NF	26.	4.17	5.	5.	5.	.02		
2 COMBINED AT	CP2NF	88.	4.57	22.	22.	22.	.13		
ROUTED TO	RCP2NF	88.	4.67	21.	21.	21.	.13		
HYDROGRAPH AT	2NG	37.	4.42	9.	9.	9.	.04		
2 COMBINED AT	CP2NG	122.	4.60	30.	30.	30.	.17		
ROUTED TO	RCP2NG	122.	4.63	29.	29.	29.	.17		
HYDROGRAPH AT	2NH	21.	4.27	4.	4.	4.	.02		
2 COMBINED AT	CP2NH	139.	4.60	34.	34.	34.	.19		
ROUTED TO	RCP2NH	138.	4.65	33.	33.	33.	.19		
HYDROGRAPH AT	4N	37.	4.22	8.	8.	8.	.03		
2 COMBINED AT	CP4N	164.	4.58	41.	41.	41.	.22		

ROUTED TO	RCP4N	164.	4.62	40.	40.	40.	.22		
HYDROGRAPH AT	3N	138.	4.37	25.	25.	25.	.14		
3 COMBINED AT	CP3N	468.	4.62	129.	129.	129.	.78		
ROUTED TO	DET3N	287.	5.67	83.	83.	83.	.78	1351.05	5.67
2 COMBINED AT	CPOWER	323.	5.93	87.	87.	87.	1.11		
ROUTED TO	RPOWER	323.	5.98	81.	81.	81.	1.11		
HYDROGRAPH AT	5N	64.	4.40	11.	11.	11.	.08		
ROUTED TO	RC7	64.	4.60	11.	11.	11.	.08		
HYDROGRAPH AT	6NA	97.	4.23	16.	16.	16.	.09		
2 COMBINED AT	CP6NA	137.	4.47	27.	27.	27.	.17		
ROUTED TO	RCP6NA	136.	4.48	27.	27.	27.	.17		
HYDROGRAPH AT	6NB	59.	4.15	9.	9.	9.	.05		
2 COMBINED AT	CP6NB	175.	4.38	36.	36.	36.	.22		
ROUTED TO	RCP6NB	175.	4.45	35.	35.	35.	.22		
HYDROGRAPH AT	6NC	110.	4.20	19.	19.	19.	.09		
2 COMBINED AT	CP6NC	272.	4.32	54.	54.	54.	.31		
ROUTED TO	RCP6NC	272.	4.33	54.	54.	54.	.31		
HYDROGRAPH AT	7NA	58.	4.18	10.	10.	10.	.04		
2 COMBINED AT	CP7NA	323.	4.30	63.	63.	63.	.35		
ROUTED TO	RCP7NA	323.	4.33	63.	63.	63.	.35		
HYDROGRAPH AT	7NB	86.	4.15	14.	14.	14.	.06		
HYDROGRAPH AT	7NC	18.	4.07	3.	3.	3.	.01		
3 COMBINED AT	CP7NB	410.	4.27	80.	80.	80.	.43		
HYDROGRAPH AT	8N	75.	4.35	15.	15.	15.	.07		
2 COMBINED AT	CP8N	483.	4.28	95.	95.	95.	.50		
ROUTED TO	DET8N	219.	4.95	74.	74.	74.	.50	1346.42	4.95
2 COMBINED AT	CPOWER	514.	5.58	156.	156.	156.	1.61		
ROUTED TO	RPOWER	514.	5.75	133.	133.	133.	1.61		
HYDROGRAPH AT	9N	238.	4.15	33.	33.	33.	.19		
ROUTED TO	DETMID	18.	5.03	7.	7.	7.	.19	1355.60	5.05
ROUTED TO	RDET1	18.	5.13	7.	7.	7.	.19		
HYDROGRAPH AT	10N	321.	4.12	48.	48.	48.	.23		

2 COMBINED AT	CP10N	334.	4.13	55.	55.	55.	.42		
HYDROGRAPH AT	11N	89.	4.13	15.	15.	15.	.07		
HYDROGRAPH AT	13NI	28.	4.03	6.	6.	6.	.02		
2 COMBINED AT	CP11N	114.	4.12	21.	21.	21.	.09		
HYDROGRAPH AT	12N	60.	4.12	10.	10.	10.	.04		
2 COMBINED AT	CP12N	174.	4.12	31.	31.	31.	.13		
2 COMBINED AT	CPALL	508.	4.12	87.	87.	87.	.55		
ROUTED TO	DETN	26.	5.98	14.	14.	14.	.55	1340.95	5.98
ROUTED TO	RDETN	26.	5.97	14.	14.	14.	.55		
2 COMBINED AT	CPDET	540.	5.75	146.	146.	146.	2.16		
HYDROGRAPH AT	13N	25.	4.10	5.	5.	5.	.02		
HYDROGRAPH AT	14N	27.	4.03	5.	5.	5.	.02		
2 COMBINED AT	CP14N	51.	4.05	10.	10.	10.	.03		
ROUTED TO	RCP14N	51.	4.08	10.	10.	10.	.03		
HYDROGRAPH AT	15N	23.	4.02	4.	4.	4.	.01		
2 COMBINED AT	CP15N	72.	4.05	15.	15.	15.	.05		
ROUTED TO	RCP15N	72.	4.05	15.	15.	15.	.05		
HYDROGRAPH AT	16N	22.	4.05	4.	4.	4.	.01		
2 COMBINED AT	CP16N	94.	4.05	19.	19.	19.	.06		
ROUTED TO	RCP16N	94.	4.07	19.	19.	19.	.06		
HYDROGRAPH AT	10NW	19.	4.00	3.	3.	3.	.01		
HYDROGRAPH AT	12NL	46.	4.02	7.	7.	7.	.03		
2 COMBINED AT	CP12L	65.	4.02	10.	10.	10.	.04		
ROUTED TO	RCP12N	65.	4.02	10.	10.	10.	.04		
2 COMBINED AT	CP12N	158.	4.03	29.	29.	29.	.11		
ROUTED TO	RCP12N	158.	4.05	29.	29.	29.	.11		
HYDROGRAPH AT	21-NB	16.	4.02	3.	3.	3.	.01		
2 COMBINED AT	CP21NB	173.	4.05	32.	32.	32.	.12		
ROUTED TO	RCP20N	173.	4.05	32.	32.	32.	.12		
HYDROGRAPH AT	17N	106.	4.48	24.	24.	24.	.12		
ROUTED TO	R17N	106.	4.48	24.	24.	24.	.12		
HYDROGRAPH AT	16N2	15.	4.07	3.	3.	3.	.01		
HYDROGRAPH AT	18N	52.	4.05	10.	10.	10.	.03		

2 COMBINED AT	CP18N	67.	4.05	13.	13.	13.	.04		
ROUTED TO	RCP18N	66.	4.07	13.	13.	13.	.04		
HYDROGRAPH AT	19N	18.	4.02	3.	3.	3.	.01		
2 COMBINED AT	CP19N	84.	4.05	17.	17.	17.	.06		
HYDROGRAPH AT	20N	24.	4.03	5.	5.	5.	.02		
2 COMBINED AT	CP20M	108.	4.05	22.	22.	22.	.07		
ROUTED TO	RCP20M	108.	4.05	22.	22.	22.	.07		
HYDROGRAPH AT	21N	73.	4.08	12.	12.	12.	.05		
4 COMBINED AT	CPALL	413.	4.07	90.	90.	90.	.35		
ROUTED TO	DETNW	29.	5.98	16.	16.	16.	.35	1332.28	5.98
2 COMBINED AT	CPOWER	569.	5.75	162.	162.	162.	2.51		
HYDROGRAPH AT	22N	5.	4.42	1.	1.	1.	.01		
2 COMBINED AT	CPOWER	570.	5.75	163.	163.	163.	2.52		
HYDROGRAPH AT	1S	71.	4.43	13.	13.	13.	.11		
ROUTED TO	R1S	71.	4.65	12.	12.	12.	.11		
HYDROGRAPH AT	6SB	114.	4.13	16.	16.	16.	.09		
HYDROGRAPH AT	2S	46.	4.10	6.	6.	6.	.04		
2 COMBINED AT	CP2S	159.	4.12	22.	22.	22.	.13		
ROUTED TO	R2S	159.	4.22	22.	22.	22.	.13		
2 COMBINED AT	CP2S	179.	4.30	34.	34.	34.	.24		
HYDROGRAPH AT	3S	61.	4.08	6.	6.	6.	.06		
2 COMBINED AT	CP3S	218.	4.28	40.	40.	40.	.30		
HYDROGRAPH AT	4S	8.	4.67	2.	2.	2.	.03		
2 COMBINED AT	CP4S	223.	4.28	42.	42.	42.	.32		
HYDROGRAPH AT	10S	68.	4.33	11.	11.	11.	.10		
2 COMBINED AT	CP10S	289.	4.30	53.	53.	53.	.43		
HYDROGRAPH AT	6SA	58.	4.13	8.	8.	8.	.05		
HYDROGRAPH AT	7S	49.	4.10	8.	8.	8.	.04		
2 COMBINED AT	CP7S	106.	4.12	16.	16.	16.	.08		
HYDROGRAPH AT	9S	42.	4.17	5.	5.	5.	.05		
2 COMBINED AT	CP9S	148.	4.13	21.	21.	21.	.13		
HYDROGRAPH AT	11S	21.	4.18	3.	3.	3.	.02		

2 COMBINED AT	CP11S	168.	4.13	24.	24.	24.	.15		
HYDROGRAPH AT	8S	36.	4.18	6.	6.	6.	.03		
ROUTED TO	R8S	36.	4.32	6.	6.	6.	.03		
HYDROGRAPH AT	12SM	136.	4.22	30.	30.	30.	.11		
3 COMBINED AT	CP12SM	332.	4.17	60.	60.	60.	.29		
HYDROGRAPH AT	14SA	50.	4.05	8.	8.	8.	.04		
ROUTED TO	R14SA	50.	4.17	8.	8.	8.	.04		
HYDROGRAPH AT	12SA	277.	4.13	53.	53.	53.	.19		
HYDROGRAPH AT	13S	14.	4.05	3.	3.	3.	.01		
4 COMBINED AT	CP13S	668.	4.15	124.	124.	124.	.52		
2 COMBINED AT	CPDET	933.	4.17	177.	177.	177.	.95		
ROUTED TO	DETSOU	317.	4.87	121.	121.	121.	.95	1347.89	4.87
HYDROGRAPH AT	14SD	44.	4.05	7.	7.	7.	.03		
HYDROGRAPH AT	22S	15.	4.00	3.	3.	3.	.01		
2 COMBINED AT	CP22S	59.	4.02	10.	10.	10.	.04		
HYDROGRAPH AT	15S	81.	4.03	16.	16.	16.	.05		
2 COMBINED AT	CP15S	141.	4.03	26.	26.	26.	.09		
HYDROGRAPH AT	16S	4.	4.03	1.	1.	1.	.00		
2 COMBINED AT	CP16S	145.	4.03	27.	27.	27.	.09		
HYDROGRAPH AT	17S	35.	4.05	7.	7.	7.	.02		
HYDROGRAPH AT	18S	7.	4.03	2.	2.	2.	.00		
3 COMBINED AT	CP18S	187.	4.03	35.	35.	35.	.12		
HYDROGRAPH AT	20S	3.	4.02	1.	1.	1.	.00		
2 COMBINED AT	CP20S	190.	4.03	36.	36.	36.	.13		
HYDROGRAPH AT	23S	67.	4.08	13.	13.	13.	.05		
HYDROGRAPH AT	25SF	28.	4.05	6.	6.	6.	.02		
2 COMBINED AT	CP23S	94.	4.07	19.	19.	19.	.07		
HYDROGRAPH AT	24S	48.	4.10	11.	11.	11.	.04		
2 COMBINED AT	CP24S	142.	4.08	30.	30.	30.	.11		
HYDROGRAPH AT	21S	7.	4.03	1.	1.	1.	.00		
2 COMBINED AT	CP24S	149.	4.08	31.	31.	31.	.11		
HYDROGRAPH AT	28SA	12.	4.03	2.	2.	2.	.01		
2 COMBINED AT	CP28S	160.	4.07	33.	33.	33.	.12		

HYDROGRAPH AT	25SA	23.	4.08	5.	5.	5.	.02		
HYDROGRAPH AT	26S	34.	4.08	8.	8.	8.	.03		
2 COMBINED AT	CP26S	57.	4.08	13.	13.	13.	.04		
HYDROGRAPH AT	L39	7.	4.05	2.	2.	2.	.00		
2 COMBINED AT	CPL39	64.	4.08	14.	14.	14.	.05		
HYDROGRAPH AT	L40	7.	4.00	1.	1.	1.	.00		
2 COMBINED AT	CPL40	70.	4.05	15.	15.	15.	.05		
3 COMBINED AT	CP21S	419.	4.05	84.	84.	84.	.30		
ROUTED TO	DETW	221.	4.48	78.	78.	78.	.30	1341.27	4.48
2 COMBINED AT	CPOUT	531.	4.68	198.	198.	198.	1.24		
ROUTED TO	RCPO2	529.	4.83	187.	187.	187.	1.24		

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

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
RPOWER	MANE	1.00	40.53	359.11	.11	1.00	40.51	359.00	.11

C TINUITY SUMMARY (AC-FT) - INFLOW= .4410E+01 EXCESS= .0000E+00 OUTFLOW= .1913E+01 BASIN STORAGE= .2484E+01 PERCENT ERROR= .3

R2NA	MANE	1.00	162.57	279.67	1.59	1.00	162.53	280.00	1.59

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1595E+02 EXCESS= .0000E+00 OUTFLOW= .1534E+02 BASIN STORAGE= .5994E+00 PERCENT ERROR= .0

RCP2NB	MANE	1.00	216.92	284.48	1.56	1.00	216.85	285.00	1.55

C TINUITY SUMMARY (AC-FT) - INFLOW= .2133E+02 EXCESS= .0000E+00 OUTFLOW= .2059E+02 BASIN STORAGE= .7447E+00 PERCENT ERROR= .0

RCP2NC	MANE	.73	308.75	280.76	1.61	1.00	308.74	281.00	1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3140E+02 EXCESS= .0000E+00 OUTFLOW= .3125E+02 BASIN STORAGE= .1794E+00 PERCENT ERROR= -.1

RCP2ND	MANE	1.00	247.89	310.38	1.40	1.00	247.86	311.00	1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3370E+02 EXCESS= .0000E+00 OUTFLOW= .3204E+02 BASIN STORAGE= .1651E+01 PERCENT ERROR= .0

RCP2ND	MANE	.80	247.85	312.14	1.38	1.00	247.85	312.00	1.37

C TINUITY SUMMARY (AC-FT) - INFLOW= .3198E+02 EXCESS= .0000E+00 OUTFLOW= .3144E+02 BASIN STORAGE= .5359E+00 PERCENT ERROR= .0

R2NE	MANE	1.00	73.19	281.36	1.41	1.00	73.19	281.00	1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8431E+01 EXCESS= .0000E+00 OUTFLOW= .8318E+01 BASIN STORAGE= .1245E+00 PERCENT ERROR= -.1

RCP2NF	MANE	1.00	87.95	280.20	1.48	1.00	87.94	280.00	1.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1075E+02 EXCESS= .0000E+00 OUTFLOW= .1033E+02 BASIN STORAGE= .4298E+00 PERCENT ERROR= -.1

RCP2NG	MANE	.93	122.26	277.92	1.61	1.00	122.25	278.00	1.61

C TINUITY SUMMARY (AC-FT) - INFLOW= .1474E+02 EXCESS= .0000E+00 OUTFLOW= .1458E+02 BASIN STORAGE= .1608E+00 PERCENT ERROR= -.1

RCP2NH	MANE	1.00	138.45	278.38	1.64	1.00	138.41	279.00	1.64

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C  TINUITY SUMMARY (AC-FT) - INFLOW= .1678E+02 EXCESS= .0000E+00 OUTFLOW= .1648E+02 BASIN STORAGE= .3010E+00 PERCENT ERROR=    .0

          RCP4N  MANE        .83    164.27    276.46      1.72      1.00    164.24    277.00        1.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2022E+02 EXCESS= .0000E+00 OUTFLOW= .2007E+02 BASIN STORAGE= .1797E+00 PERCENT ERROR=   -.2

         RPOWER  MANE       1.00    323.48    359.42       .68      1.00    323.46    359.00         .68

C  TINUITY SUMMARY (AC-FT) - INFLOW= .4302E+02 EXCESS= .0000E+00 OUTFLOW= .4028E+02 BASIN STORAGE= .2843E+01 PERCENT ERROR=   -.2

            RC7  MANE       1.00     64.05    275.32      1.22      1.00     64.05    276.00        1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5675E+01 EXCESS= .0000E+00 OUTFLOW= .5465E+01 BASIN STORAGE= .2106E+00 PERCENT ERROR=    .0

         RCP6NA  MANE        .83    136.49    269.23      1.42      1.00    136.46    269.00        1.42

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1332E+02 EXCESS= .0000E+00 OUTFLOW= .1326E+02 BASIN STORAGE= .5702E-01 PERCENT ERROR=    .0

         RCP6NB  MANE       1.00    175.10    266.64      1.48      1.00    175.09    267.00        1.48

C  TINUITY SUMMARY (AC-FT) - INFLOW= .1757E+02 EXCESS= .0000E+00 OUTFLOW= .1741E+02 BASIN STORAGE= .1819E+00 PERCENT ERROR=   -.1

         RCP6NC  MANE        .73    271.87    260.62      1.62      1.00    271.80    260.00        1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2656E+02 EXCESS= .0000E+00 OUTFLOW= .2650E+02 BASIN STORAGE= .7329E-01 PERCENT ERROR=    .0

         RCP7NA  MANE        .97    323.38    259.48      1.67      1.00    323.36    260.00        1.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3128E+02 EXCESS= .0000E+00 OUTFLOW= .3116E+02 BASIN STORAGE= .1393E+00 PERCENT ERROR=    .0

         RPOWER  MANE       1.00    514.10    344.98       .77      1.00    514.10    345.00         .76

C  TINUITY SUMMARY (AC-FT) - INFLOW= .7690E+02 EXCESS= .0000E+00 OUTFLOW= .6569E+02 BASIN STORAGE= .1116E+02 PERCENT ERROR=    .1

          RDET1  MANE       1.00     17.83    309.04       .34      1.00     17.83    309.00         .34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3626E+01 EXCESS= .0000E+00 OUTFLOW= .3484E+01 BASIN STORAGE= .1509E+00 PERCENT ERROR=   -.2

          RDETN  MANE       1.00     25.94    359.00       .23      1.00     25.94    359.00         .23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7136E+01 EXCESS= .0000E+00 OUTFLOW= .6767E+01 BASIN STORAGE= .3640E+00 PERCENT ERROR=    .1
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          RCP14N  MANE        1.21     51.02    244.69      2.81      1.00     50.98    245.00        2.81

C  TINUITY SUMMARY (AC-FT) - INFLOW= .5111E+01 EXCESS= .0000E+00 OUTFLOW= .5092E+01 BASIN STORAGE= .2199E-01 PERCENT ERROR=   -.1

          RCP15N  MANE         .58     72.45    243.29      2.81      1.00     72.39    243.00        2.81

C  TINUITY SUMMARY (AC-FT) - INFLOW= .7194E+01 EXCESS= .0000E+00 OUTFLOW= .7186E+01 BASIN STORAGE= .9767E-02 PERCENT ERROR=    .0

          RCP16N  MANE         .31     94.18    243.52      2.80      1.00     94.13    244.00        2.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9354E+01 EXCESS= .0000E+00 OUTFLOW= .9346E+01 BASIN STORAGE= .9112E-02 PERCENT ERROR=    .0

          RCP12N  MANE         .21     64.58    241.43      2.18      1.00     64.52    241.00        2.18

C  TINUITY SUMMARY (AC-FT) - INFLOW= .4934E+01 EXCESS= .0000E+00 OUTFLOW= .4933E+01 BASIN STORAGE= .1757E-02 PERCENT ERROR=    .0

          RCP12N  MANE         .49    157.71    242.93      2.55      1.00    157.70    243.00        2.55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1428E+02 EXCESS= .0000E+00 OUTFLOW= .1426E+02 BASIN STORAGE= .1496E-01 PERCENT ERROR=    .0

          RCP20N  MANE         .08    173.25    243.16      2.57      1.00    173.20    243.00        2.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1576E+02 EXCESS= .0000E+00 OUTFLOW= .1576E+02 BASIN STORAGE= .3353E-02 PERCENT ERROR=    .0

            R17N  MANE         .23    106.18    269.36      1.84      1.00    106.17    269.00        1.84

C  TINUITY SUMMARY (AC-FT) - INFLOW= .1172E+02 EXCESS= .0000E+00 OUTFLOW= .1170E+02 BASIN STORAGE= .1491E-01 PERCENT ERROR=    .0

          RCP18N  MANE         .58     66.51    244.23      2.80      1.00     66.49    244.00        2.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6673E+01 EXCESS= .0000E+00 OUTFLOW= .6664E+01 BASIN STORAGE= .1053E-01 PERCENT ERROR=    .0

          RCP20M  MANE         .26    108.05    243.06      2.80      1.00    108.04    243.00        2.80

C  TINUITY SUMMARY (AC-FT) - INFLOW= .1071E+02 EXCESS= .0000E+00 OUTFLOW= .1071E+02 BASIN STORAGE= .3113E-02 PERCENT ERROR=    .0

             R1S  MANE        1.12     71.36    278.43      1.02      1.00     71.34    279.00        1.02

C  TINUITY SUMMARY (AC-FT) - INFLOW= .6556E+01 EXCESS= .0000E+00 OUTFLOW= .6155E+01 BASIN STORAGE= .4022E+00 PERCENT ERROR=    .0

             R2S  MANE        1.00    158.76    253.64      1.56      1.00    158.60    253.00        1.56

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1079E+02 EXCESS= .0000E+00 OUTFLOW= .1070E+02 BASIN STORAGE= .1216E+00 PERCENT ERROR=   -.3
```

```
          R8S  MANE        1.00     36.11    259.00      1.73      1.00     36.11    259.00        1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2991E+01 EXCESS= .0000E+00 OUTFLOW= .2961E+01 BASIN STORAGE= .3266E-01 PERCENT ERROR=   -.1

          R14SA  MANE        1.00     49.97    250.00      2.11      1.00     49.97    250.00        2.11

C  TINUITY SUMMARY (AC-FT) - INFLOW= .3982E+01 EXCESS= .0000E+00 OUTFLOW= .3938E+01 BASIN STORAGE= .4687E-01 PERCENT ERROR=   -.1

          RCPO2  MANE        1.00    529.04    290.00      1.40      1.00    529.04    290.00        1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9834E+02 EXCESS= .0000E+00 OUTFLOW= .9289E+02 BASIN STORAGE= .5412E+01 PERCENT ERROR=    .0
```

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION C2
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1364.00	1368.00	1368.00
STORAGE	0.	29.	29.
OUTFLOW	0.	60.	60.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1367.31	.00	18.	44.	.00	5.98	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION C4
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1352.00	1357.00	1357.00
STORAGE	0.	6.	6.
OUTFLOW	0.	204.	204.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1357.53	.53	9.	248.	.98	5.10	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DET3N
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1345.00	1351.00	1351.00
STORAGE	0.	23.	23.
OUTFLOW	0.	284.	284.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1351.05	.05	23.	287.	.45	5.67	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DET8N
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1340.00	1347.00	1347.00
STORAGE	0.	24.	24.
OUTFLOW	0.	235.	235.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1346.42	.00	20.	219.	.00	4.95	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETMID
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1352.00	1356.00	1356.00
STORAGE	0.	17.	17.
OUTFLOW	0.	19.	19.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1355.60	.00	14.	18.	.00	5.05	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETN
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1334.00	1343.00	1343.00
STORAGE	0.	54.	54.
OUTFLOW	2.	27.	27.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1340.95	.00	36.	26.	.00	5.98	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETNW
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1322.00	1333.00	1333.00
STORAGE	0.	40.	40.
OUTFLOW	0.	30.	30.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1332.28	.00	36.	29.	.00	5.98	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETSOU
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1339.00	1350.00	1350.00
STORAGE	0.	63.	63.
OUTFLOW	0.	354.	354.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1347.89	.00	43.	317.	.00	4.87	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETW
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1336.00	1345.00	1345.00
STORAGE	0.	41.	41.
OUTFLOW	0.	355.	355.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1341.27	.00	14.	221.	.00	4.48	.00

* NORMAL END OF HEC-1 ***

Appendix III

HY-8 (Det-NW Outlet)

CURRENT DATE: 06-06-2002 FILE DATE: 06-06-2002
CURRENT TIME: 10:30:17 FILE NAME: 53111-NW - Outlet

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

SITE DATA			CULVERT SHAPE, MATERIAL, INLET					
INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE	
1322.00	1320.06	605.50	1 RCP	2.00	2.00	.012	CONVENTIONAL	

SUMMARY OF CULVERT FLOWS (cfs) FILE: 53111-NW DATE: 06-06-2002

EV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
322.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1322.93	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.00	1
323.34	6.0	6.0	0.0	0.0	0.0	0.0	0.0	0.00	1
323.69	9.0	9.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1324.01	12.0	12.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1324.40	15.0	15.0	0.0	0.0	0.0	0.0	0.0	0.00	1
325.58	18.0	18.0	0.0	0.0	0.0	0.0	0.0	0.00	1
326.76	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1329.09	24.0	24.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1331.03	27.0	27.0	0.0	0.0	0.0	0.0	0.0	0.00	1
332.97	30.0	29.7	0.0	0.0	0.0	0.0	0.0	0.00	14
333.00	29.8	29.8	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: 53111-NW DATE: 06-06-2002

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1322.00	0.000	0.00	0.00	0.00
1322.93	0.000	3.00	0.00	0.00
1323.34	0.000	6.00	0.00	0.00
1323.69	0.000	9.00	0.00	0.00
1324.01	0.000	12.00	0.00	0.00
1324.40	0.000	15.00	0.00	0.00
1325.58	0.000	18.00	0.00	0.00
1326.76	0.000	20.00	0.00	0.00
1329.09	0.000	24.00	0.00	0.00
1331.03	0.000	27.00	0.00	0.00
1332.97	-0.009	30.00	0.29	0.97

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

C RENT DATE: 06-06-2002 FILE DATE: 06-06-2002
CURRENT TIME: 10:30:17 FILE NAME: 53111-NW

PERFORMANCE CURVE FOR CULVERT 1 - 1(2.00 (ft) BY 2.00 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1322.00	0.00	0.00	0-NF	0.00	0.00	0.00	-0.36	0.00	0.00
3.00	1322.93	0.80	0.93	2-M2c	0.63	0.60	0.60	-0.32	3.75	1.24
6.00	1323.34	1.24	1.34	2-M2c	0.92	0.86	0.86	-0.30	4.63	1.64
9.00	1323.69	1.60	1.69	2-M2c	1.17	1.07	1.07	-0.28	5.28	1.93
12.00	1324.01	1.92	2.01	2-M2c	1.44	1.24	1.24	-0.27	5.85	2.16
15.00	1324.40	2.26	2.40	2-M2c	2.00	1.40	1.40	-0.26	6.41	2.36
18.00	1325.58	2.64	3.58	2-M2c	2.00	1.52	1.52	-0.24	7.03	2.54
20.00	1326.76	2.94	4.76	2-M2c	2.00	1.60	1.60	-0.24	7.40	2.65
24.00	1329.09	3.64	7.09	2-M2c	2.00	1.72	1.72	-0.22	8.37	2.85
27.00	1331.03	4.26	9.03	2-M2c	2.00	1.81	1.81	-0.21	9.02	2.98
29.71	1332.96	4.88	10.96	2-M2c	2.00	1.89	1.89	-0.20	9.73	3.11

El. inlet face invert 1322.00 ft El. outlet invert 1320.06 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1322.00 ft
OUTLET STATION	605.50 ft
OUTLET ELEVATION	1320.06 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0032
CULVERT LENGTH ALONG SLOPE	605.50 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	2.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

CUI :NT DATE: 06-06-2002 FILE DATE: 06-06-2002
CURRENT TIME: 10:30:17 FILE NAME: 53111-NW

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áá; áááááááááááááááááááááá TAILWATER ááááááááááááááááááááááááá
áá

** *** REGULAR CHANNEL CROSS SECTION ****************

BOTTOM WIDTH	60.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.010
MANNING'S n (.01-0.1)	0.014
CHANNEL INVERT ELEVATION	1319.70 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1320.06 ft

** *** UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1319.70	0.000	0.00	0.00	0.00
3.00	1319.74	1.092	0.04	1.24	0.03
6.00	1319.76	1.170	0.06	1.64	0.04
9.00	1319.78	1.218	0.08	1.93	0.05
12.00	1319.79	1.253	0.09	2.16	0.06
15.00	1319.81	1.281	0.11	2.36	0.07
18.00	1319.82	1.304	0.12	2.54	0.07
20.00	1319.82	1.318	0.13	2.65	0.08
24.00	1319.84	1.342	0.14	2.85	0.09
27.00	1319.85	1.357	0.15	2.98	0.09
30.00	1319.86	1.371	0.16	3.11	0.10

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áá ıááááááááááááááááááááá ROADWAY OVERTOPPING DATA ááááááááááááááááááááááááá
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ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH	14.00 ft
CREST LENGTH	200.00 ft
OVERTOPPING CREST ELEVATION	1333.00 ft

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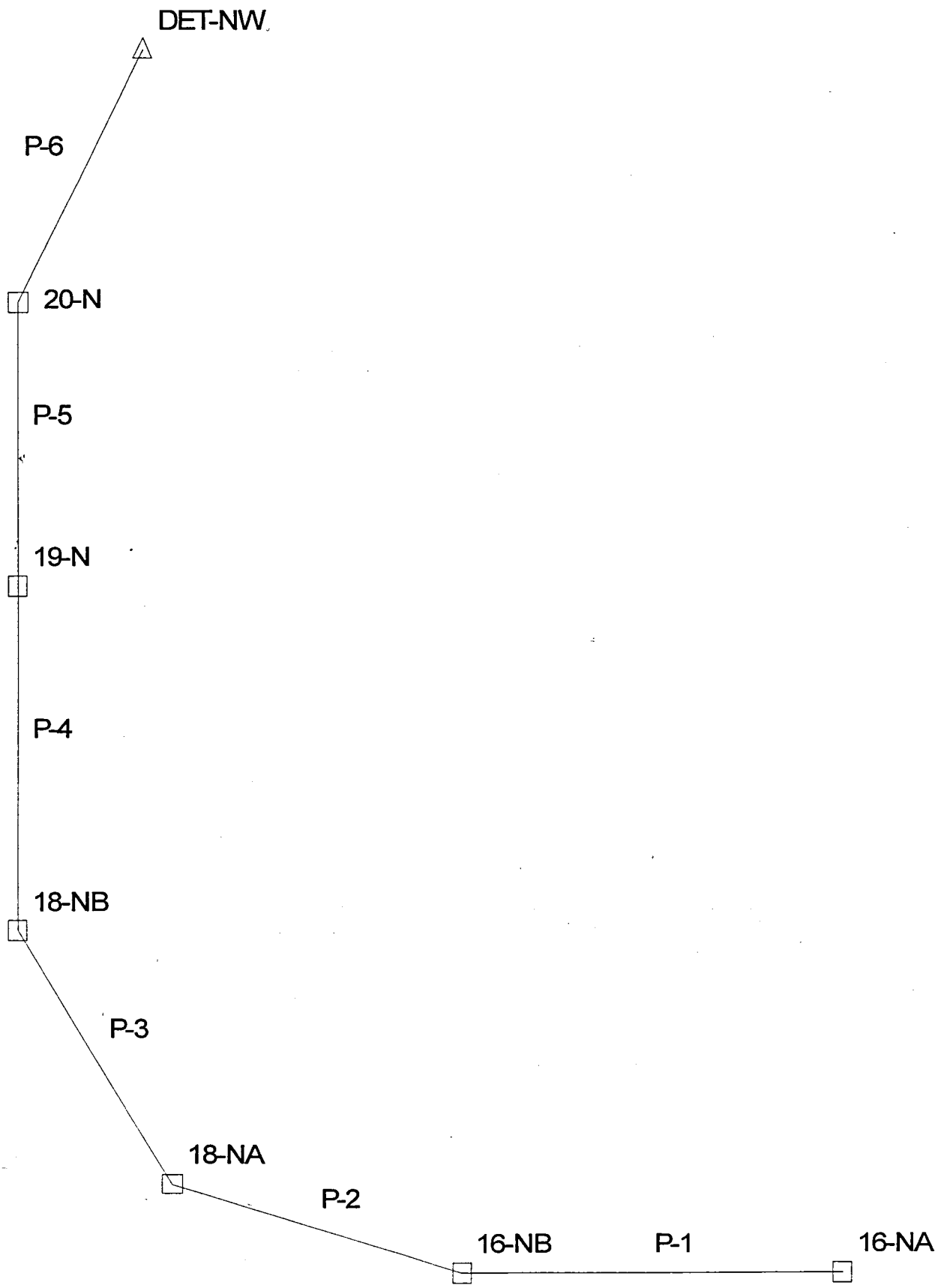
Appendix IV

StormCAD Analysis

Scenario: Base



Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	System Q (cfs)	L (ft)	S (ft/ft)	Size	#	n	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr Elev. (ft)	Dn. Gr. Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)	Exc. Cap.?
P-1	16-NA	16-NB	11.50	487.83	0.003423	30 inch	1	0.012	26.00	1,330.28	1,328.61	1,336.20	1,334.10	3.42	2.99	1,333.43	1,333.10	false
P-2	16-NB	18-NA	21.46	505.11	0.003405	30 inch	1	0.012	25.93	1,328.61	1,326.89	1,334.10	1,332.30	2.99	2.91	1,333.10	1,331.92	false
P-3	18-NA	18-NB	46.38	574.00	0.000993	36 inch	2	0.012	45.54	1,326.89	1,326.32	1,332.30	1,331.30	2.41	1.98	1,331.89	1,331.30	true
P-4	18-NB	19-N	79.32	685.45	0.001065	36 inch	2	0.012	47.16	1,326.32	1,325.59	1,331.30	1,331.80	1.98	3.21	1,331.51	1,329.44	true
P-5	19-N	20-N	119.15	481.79	0.001038	48 inch	2	0.012	100.26	1,325.59	1,325.09	1,331.80	1,332.60	2.21	3.51	1,329.37	1,328.74	true
P-6	20-N	DET-NW	139.66	429.04	0.001049	48 inch	2	0.012	100.79	1,325.09	1,324.64	1,332.60	1,333.00	3.51	4.36	1,328.63	1,327.17	true

Scenario: Base

Node Report

Label	Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
16-NA	0.00	11.50	1,336.20	1,336.20	1,333.45	1,333.43
16-NB	0.00	21.46	1,334.10	1,334.10	1,333.10	1,333.10
18-NA	0.00	46.38	1,332.30	1,332.30	1,331.92	1,331.89
18-NB	0.00	79.32	1,331.30	1,331.30	1,331.30	1,331.30
19-N	0.00	119.15	1,331.80	1,331.80	1,329.44	1,329.37
20-N	0.00	139.66	1,332.60	1,332.60	1,328.74	1,328.63
DET-NW		135.93	1,333.00	1,333.00	1,327.17	1,327.17

3.0 MAPPING INFORMATION

The available mapping utilized in this study were as follows:

1. **Aerial Mapping:** Aerial mapping conducted on March 29, 2001. A topographic map of the project site with contour interval of 1 foot and scale of 1"=100' was utilized for on-site drainage basin delineation.

4.0 HYDROLOGIC ANALYSIS

4.1 General

The following outlines the design criteria used to develop this hydrologic analysis:

- Hydrologic calculations were completed for the 100-Year storm frequency
- Storm duration of 6 hours was investigated
- Rainfall depth-duration-frequency data were generated using the PREFRE computer program (**Ref. 2**) and the Maricopa County Isopluvial Maps
- The Clark Unit Hydrograph method was utilized to estimate runoff rates
- Time of Concentration was determined using the guidelines presented in the *Drainage Design Manual* (**Ref. 1**)
- Rainfall losses were estimated using the Green and Ampt Infiltration Equation
- Storm water runoff impacting the project site was estimated assuming *"undeveloped conditions"* for off-site areas
- U.S. Army Corps of Engineers HEC-1 computer program was utilized for hydrograph generation.

Only the Developed Conditions, 100-year, 6-hour HEC-1 code was modified from the original analysis and is therefore included in this report, see **Appendix II**.

4.2 Precipitation

Rainfall depths for the study area were selected from isopluvial maps found in the Maricopa County, Drainage Manual (**Ref. 1**). Precipitation frequency values were generated then using PREFRE computer program (**Ref. 2**). Results can be found in **Appendix I**.

5.0 FAA and USDA

Coordination with the Federal Aviation Administration and the United States Department of Agriculture were accomplished during preparation of the *Williams Gateway Airport Hydrology Study and Master Drainage Plan.* An update of the current project was forwarded to both agencies for concurrence. Their replies are contained in **Appendix V I**.

6.0 IMPLEMENTATION

Construction of all proposed drainage improvements and the dedication of all proposed drainage easements will the responsibility of WGA. Proposed drainage easements are shown on the improvement plans. Construction of the proposed drainage improvements may occur concurrent with other proposed site development. Maintenance of culverts, channels and other drainage improvements will be the responsibility of WGA..

7.0 CONCLUSIONS

The proposed drainage infrastructure improvements included in this study will provide a conveyance system for storm water management for the site developments depicted in **Fig.2**.

8.0 REFERENCES

1. Maricopa County, Arizona. ***"Drainage Design Manual, Volume I"***. Revised January 1995.

2. Bureau of Reclamation, Colorado. ***"Computation of Precipitation Frequency-Duration Values in the Western United States"***. August 1988..

3. Gilbertson Associates Inc.***"Williams Gateway Airport-Hydrology Study and Master Drainage Plan"***. October 2001.

Appendix I

Prefre-Rainfall data

1

*** O U T P U T D A T A ***
REVISED JUNE 1988 TO UPDATE COMPUTATION OF SHORT-DURATION VALUES

PRECIPITATION FREQUENCY VALUES FOR Williams Gateway Airport
PRIMARY ZONE NUMBER= 7
SHORT-DURATION ZONE NUMBER= 8

POINT VALUES

RETURN PERIOD

DURATION	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	
5-MIN	.28	.39	.46	.56	.64	.71	.89	5-MIN
10-MIN	.42	.59	.70	.86	.98	1.10	1.37	10-MIN
15-MIN	.52	.74	.89	1.09	1.25	1.41	1.77	15-MIN
30-MIN	.68	.99	1.20	1.47	1.69	1.91	2.40	30-MIN
1-HR	.83	1.22	1.48	1.84	2.11	2.38	3.01	1-HR
2-HR	.92	1.34	1.62	2.00	2.30	2.59	3.27	2-HR
3-HR	.99	1.42	1.72	2.12	2.43	2.73	3.44	3-HR
6-HR	1.10	1.58	1.89	2.33	2.67	3.00	3.77	6-HR
12-HR	1.23	1.74	2.09	2.57	2.93	3.30	4.14	12-HR
24-HR	1.35	1.91	2.29	2.80	3.20	3.60	4.52	24-HR

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

INPUT DATA

PROJECT NAME=Williams Gateway Airport
ZONE= 7 SHORT-DURATION ZONE= 8
LATITUDE= .00 LONGITUDE= 100.00 ELEVATION= 0
2-YR, 6-HR PCPN= 1.10 100-YR, 6-HR PCPN= 3.00
2-YR, 24-HR PCPN= 1.35 100-YR, 24-HR PCPN= 3.60

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

Appendix II

HEC-1 (Developed)

```
****************************************
*                                      *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998              *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   06JUN02  TIME  10:40:29  *
*                                      *
****************************************
```

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

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

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

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

Developed

100-yr, 6-hr

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

  1           ID       WILLIAMS GATEWAY AIRPORT HYDROLOGY                DATE:SEPT.18, 2001
  2           ID       PREPARED BY: GILBERTSON ASSOCIATES                JOB# 53111
  3           ID
  4           ID       FILE NAME:531CP6 .DAT
  5           ID       ************************************************************************
  6           ID       0. PROPOSED CONDITIONS WATERSHED.
  7           ID       1. HYPOTHETICAL STORM DISTRIBUTION PATTERN USING THE MCFCD MANUAL.
  8           ID       2. 100-YR, 6-HR RAINFALL EVENT.
  9           ID       3. GREEN AND AMPT INFILTRATION EQUATION FOR RAINFALL EXCESS.
 10           ID       4. CLARK UNIT HYDROGRAPH METHOD TO ESTIMATE RAINFALL EXCESS.
 11           ID       5. KINEMATIC WAVE TECHNIQUE FOR CHANNEL ROUTING.
 12           ID       6. LEVEL-POOL FOR RESERVOIR ROUTING.
 13           ID       7. HEC-1 LARGE ARRAY VERSION 4.1 (JUNE 1998).
 14           ID       8. INCREASED PIPE CAPACITIES TO FACILITATE 24-HR FLOODWAY IMPACT
 15           ID       ************************************************************************
 16           ID
              *DIAGRAM
 17           IT       1                    360
 18           IO       5
              *

 19           KK      1N
 20           KM   SUB-BASIN 1N
 21           KM     L = 1.27  Kb = .048  Adj. Slope =   16.0
 22           BA    .327
 23           IN      15
 24           PB   2.868
 25           PC    .000    .012    .018    .027    .040    .051    .062    .073    .084    .095
 26           PC    .108    .123    .144    .189    .275    .460    .684    .819    .886    .927
 27           PC    .948    .962    .974    .988   1.000
 28           LG    .350    .300   8.000    .060     3.0
 29           UC    .979    .828
 30           UA       0       3       5       8      12      20      43      75      90      96
 31           UA     100
              *

 32           KK      C2
 33           KM   ROUTE THROUGH PONDING AREA WITH CULVERT C2 AS THE LOW FLOW OUTLET
 34           KM   LOW FLOW OUTLET: SINGLE 48" CMP
 35           RS       1    STOR       0
 36           SA    0.43    2.81    6.11   11.65   16.90
 37           SQ       0     5.0    17.0    37.0    60.0
 38           SE    1364    1365    1366    1367    1368
 39           ST    1368      50       3     1.5
              *

 40           KK  RPOWER
 41           KM   ROUTE OUTFLOW FROM C2 THROUGH THE POWERLINE FLOODWAY
 42           RK    3900   .0028    .035            TRAP      50       3
              *
```

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

  43          KK     2NA
  44          KM   SUB-BASIN 2NA
  45          KM     L =  .71  Kb = .052  Adj. Slope =   18.0
  46          BA    .181
  47          LG    .350    .250   9.700    .040   1.000
  48          UC    .667    .475
  49          UA       0       3       5       8      12      20      43      75      90      96
  50          UA     100
              *

  51          KK    R2NA
  52          KM   ROUTE HYDROGRAPH FROM SUB-BASIN 2NA TO CP2NB
  53          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
  54          RK    2700   .0028    .035            TRAP       1       4
              *

  55          KK     2NB
  56          KM   SUB-BASIN 2NB
  57          KM     L =  .51  Kb = .056  Adj. Slope =   14.0
  58          BA    .067
  59          LG    .330    .230   9.700    .040   6.000
  60          UC    .625    .598
  61          UA       0       3       5       8      12      20      43      75      90      96
  62          UA     100
              *

  63          KK   CP2NB
  64          KM   COMBINE HYDROGRAPHS R2NA & 2NB
  65          HC       2
              *

  66          KK  RCP2NB
  67          KM   ROUTE COMBINED HYDROGRAPHS TO CP2NC
  68          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
  69          RK    2100   .0028    .035            TRAP       1       4
              *

  70          KK     2NC
  71          KM   SUB-BASIN 2NC
  72          KM     L =  .56  Kb = .054  Adj. Slope =   25.0
  73          BA    .116
  74          LG    .340    .260   8.800    .040    5.00
  75          UC    .525    .388
  76          UA       0       3       5       8      12      20      43      75      90      96
  77          UA     100
              *

  78          KK   CP2NC
  79          KM   COMBINE HYDROGRAPHS RCP2NB & 2NC
  80          HC       2
              *
```

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

  81          KK  RCP2NC
  82          KM   ROUTE COMBINED HYDROGRAPHS TO CP2NC
  83          RK    510   .0027    .040            TRAP       5       4
              *

  84          KK     2ND
  85          KM   SUB-BASIN 2ND
  86          KM     L =  .38  Kb = .058  Adj. Slope =   29.0
  87          BA    .064
  88          LG    .350    .290   8.400    .050   5.000
  89          UC    .429    .320
  90          UA       0       3       5       8      12      20      43      75      90      96
  91          UA     100
              *

  92          KK   CP2ND
  93          KM   COMBINE HYDROGRAPHS RCP2NC & 2ND
  94          HC       2
              *

  95          KK      C4
  96          KM   ROUTE THROUGH PONDING AREA WITH CULVERT C4 AS THE LOW FLOW OUTLET
  97          KM     LOW FLOW OUTLET: DOUBLE 53"x34" RCP
  98          RS       1    STOR       0
  99          SA   0.014   0.117   0.281   1.234   2.457   4.540
 100          SQ       0    12.0    62.0   119.0   165.0   204.0
 101          SE    1352    1353    1354    1355    1356    1357
 102          ST    1357      20       3     1.5
              *

 103          KK  RCP2ND
 104          KM   ROUTE OUTFLOW FROM CULVERT C4 THROUGH EXISTING CHANNNEL
 105          RK    1050    .002    .040            TRAP      10      10
              *

 106          KK  RCP2ND
 107          KM   ROUTE COMBINED HYDROGRAPHS THROUGH IMPROVED CHANNEL TO POND AREA (CULVERT C6)
 108          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 109          RK    1100    .011    .035            TRAP      10       4
              *

 110          KK     2NE
 111.         KM   SUB-BASIN 2NE
 112          KM     L =  .81  Kb = .052  Adj. Slope =   19.0
 113          BA    .111
 114          LG    .320    .320   6.800    .100   17.00
 115          UC    .729    .771
 116          UA       0       3       5       8      12      20      43      75      90      96
 117          UA     100
              *
```

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

 118          KK    R2NE
 119          KM   ROUTE HYDROGRAPH FROM SUB-BASIN 2NE
 120          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 121          RK     945    .015    .035            TRAP      38       4
              *

 122          KK     2NF
 123          KM   SUB-BASIN 2NF
 124          KM     L =  .24  Kb = .033  Adj. Slope =   17.0
 125          BA    .020
 126          LG    .220    .140   9.700    .040  43.000
 127          UC    .283    .271
 128          UA       0       3       5       8      12      20      43      75      90      96
 129          UA     100
              *

 130          KK   CP2NF
 131          KM   COMBINE HYDROGRAPHS R2NE & 2NF
 132          HC       2
              *

 133          KK  RCP2NF
 134          KM   ROUTE COMBINED HYDROGRAPHS TO CP2NG
 135          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 136          RK    2141    .015    .035            TRAP      38       4
              *

 137          KK     2NG
 138          KM   SUB-BASIN 2NG
 139          KM     L =  .44  Kb = .052  Adj. Slope =   16.0
 140          BA    .039
 141          LG    .260    .170   9.700    .040   42.00
 142          UC    .512    .581
 143          UA       0       3       5       8      12      20      43      75      90      96
 144          UA     100
              *

 145          KK   CP2NG
 146          KM   COMBINE HYDROGRAPHS RCP2NF & 2NG
 147          HC       2
              *

 148          KK  RCP2NG
 149          KM   ROUTE COMBINED HYDROGRAPHS TO CP2NH
 150          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 151          RK     880    .015    .035            TRAP      38       4
              *

 152          KK     2NH
 153          KM   SUB-BASIN 2NH
 154          KM     L =  .21  Kb = .053  Adj. Slope =   10.0
 155          BA    .018
 156          LG    .230    .150   9.700    .040   49.00
 157          UC    .404    .383
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 158          UA       0       3       5       8      12      20      43      75      90      96
 159          UA     100
              *

 160          KK   CP2NH
 161          KM   COMBINE HYDROGRAPHS RCP2NG & 2NH
 162          HC       2
              *

 163          KK  RCP2NH
 164          KM   ROUTE COMBINED HYDROGRAPHS TO CP4N
 165          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 166          RK    1290    .014    .035            TRAP      38       4
              *

 167          KK      4N
 168          KM   SUB-BASIN 4N
 169          KM     L =  .32  Kb = .051  Adj. Slope =   31.0
 170          BA    .031
 171          LG    .240    .160   9.700    .040   43.00
 172          UC    .342    .327
 173          UA       0       3       5       8      12      20      43      75      90      96
 174          UA     100
              *

 175          KK    CP4N
 176          KM   COMBINE HYDROGRAPHS RCP2NH & 4N
 177          HC       2
              *

 178          KK   RCP4N
 179          KM   ROUTE COMBINED HYDROGRAPHS TO CP3N (POND AREA FOR CULVERT C6)
 180          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 181          RK     760   .0105    .035            TRAP      38       4
              *

 182          KK      3N
 183          KM   SUB-BASIN 3N
 184          KM     L =  .57  Kb = .052  Adj. Slope =   23.0
 185          BA    .138
 186          LG    .330    .280   8.400    .050    5.00
 187          UC    .542    .369
 188          UA       0       3       5       8      12      20      43      75      90      96
 189          UA     100
              *

 190          KK    CP3N
 191          KM   COMBINE HYDROGRAPHS RCP2ND, RCP4N & 3N
 192          HC       3
              *
```

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

 193          KK   DET3N
 194          KM   ROUTE THROUGH PONDING AREA WITH CULVERT C6 AS THE LOW FLOW OUTLET
 195          KM   LOW FLOW OUTLET:QUADRUPLE 36" RCP
 196          RS       1    STOR       0
 197          SA      .3      .7     1.8     3.3     5.8     7.3     8.0
 198          SQ       0      25      75     132     200     250     284
 199          SE    1345    1346    1347    1348    1349    1350    1351
 200          ST    1351      20       3     1.5
              *

 201          KK  CPOWER
 202          KM   COMBINE HYDROGRAPHS RPOWER & C6
 203          HC       2
              *

 204          KK  RPOWER
 205          KM   ROUTE OUTFLOW FROM C2 THROUGH THE POWERLINE FLOODWAY
 206          RK    1400   .0023    .035            TRAP      50       3
              *

 207          KK      5N
 208          KM   SUB-BASIN 5N
 209          KM     L =  .44  Kb = .055  Adj. Slope =   20.0
 210          BA    .084
 211          LG     .33     .33    4.70     .23  13.000
 212          UC    .563    .416
 213          UA       0       3       5       8      12      20      43      75      90      96
 214          UA     100
              *

 215          KK     RC7
 216          KM   ROUTE HYDROGRAPH (OUTFLOW FROM PIPE) TO CP6NA
 217          RK    1550    .005    .040            TRAP      10      50
              *

 218          KK     6NA
 219          KM   SUB-BASIN 6NA
 220          KM     L =  .45  Kb = .029  Adj. Slope =   20.0
 221          BA    .091
 222          LG     .30     .30    5.00     .20   28.00
 223          UC    .375    .258
 224          UA       0       3       5       8      12      20      43      75      90      96
 225          UA     100
              *

 226          KK   CP6NA
 227          KM   COMBINE HYDROGRAPHS RC7 & 6NA
 228          HC       2
              *
```

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

 229          KK  RCP6NA
 230          KM   ROUTE COMBINED HYDROGRAPHS TO CP6NB
 231          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 232          RK     985    .015    .035            TRAP      10       5
              *

 233          KK     6NB
 234          KM   SUB-BASIN 6NB
 235          KM     L =  .23  Kb = .031  Adj. Slope =   17.0
 236          BA    .045
 237          LG    .280    .270   7.000    .090   22.00
 238          UC    .275    .160
 239          UA       0       3       5       8      12      20      43      75      90      96
 240          UA     100
              *

 241          KK   CP6NB
 242          KM   COMBINE HYDROGRAPHS CP6NA & 6NB
 243          HC       2
              *

 244          KK  RCP6NB
 245          KM   ROUTE COMBINED HYDROGRAPHS TO CP6NC
 246          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 247          RK    2150    .015    .035            TRAP      10       5
              *

 248          KK     6NC
 249          KM   SUB-BASIN 6NC
 250          KM     L =  .44  Kb = .029  Adj. Slope =   23.0
 251          BA    .086
 252          LG    .300    .200   9.700    .040   21.00
 253          UC    .333    .229
 254          UA       0       3       5       8      12      20      43      75      90      96
 255          UA     100
              *

 256          KK   CP6NC
 257          KM   COMBINE HYDROGRAPHS RCP6NB & 6NC
 258          HC       2
              *

 259          KK  RCP6NC
 260          KM   ROUTE COMBINED HYDROGRAPHS TO CP7NA
 261          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 262          RK     905    .015    .035            TRAP      10       5
              *

 263          KK     7NA
 264          KM   SUB-BASIN 7NA
 265          KM     L =  .23  Kb = .031  Adj. Slope =    9.0
 266          BA    .044
 267          LG    .280    .190   9.700    .040  23.000
 268          UC    .333    .200
```

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

 269          UA       0       3       5       8      12      20      43      75      90      96
 270          UA     100
              *

 271          KK   CP7NA
 272          KM   COMBINE HYDROGRAPHS RCP6NC & 7NA
 273          HC       2
              *

 274          KK  RCP7NA
 275          KM   ROUTE COMBINED HYDROGRAPHS TO CP7NB
 276          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY KIMLEY-HORN (NOV. 1997)
 277          RK    1470    .013    .035            TRAP      10       5
              *

 278          KK     7NB
 279          KM   SUB-BASIN 7NB
 280          KM     L =  .32  Kb = .030  Adj. Slope =   25.0
 281          BA    .063
 282          LG    .290    .200   9.700    .040   26.00
 283          UC    .279    .174
 284          UA       0       3       5       8      12      20      43      75      90      96
 285          UA     100
              *

 286          KK     7NC
 287          KM   SUB-BASIN 7NC
 288          KM     L =  .10  Kb = .034  Adj. Slope =   20.0
 289          BA    .012
 290          LG    .230    .150   9.700    .040  41.000
 291          UC    .175    .105
 292          UA       0       3       5       8      12      20      43      75      90      96
 293          UA     100
              *

 294          KK   CP7NB
 295          KM   COMBINE HYDROGRAPHS RCP7NA, 7NB & 7NC
 296          HC       3
              *

 297          KK      8N
 298          KM   SUB-BASIN 8N
 299          KM     L =  .42  Kb = .054  Adj. Slope =   17.0
 300          BA    .072
 301          LG    .310    .230   8.800    .040   17.00
 302          UC    .508    .391
 303          UA       0       3       5       8      12      20      43      75      90      96
 304          UA     100
              *
```

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

 305          KK   CP8N
 306          KM   COMBINE HYDROGRAPHS CP7NB & 8N
 307          HC      2
              *

 308          KK   DET8N
 309          KM   ROUTE THROUGH PONDING AREA WITH CULVERT C10 AS THE LOW FLOW OUTLET
 310          KM   LOW FLOW OUTLET: TRIPLE 36" RCP
 311          RS      1    STOR      0
 312          SA   0.05      .8      1     2.5     3.9     5.6     6.7     7.1
 313          SQ      0    17.5     50     100     149     180     208     235
 314          SE   1340    1341   1342    1343    1344    1345    1346    1347
 315          ST   1347      20      3     1.5
              *

 316          KK  CPOWER
 317          KM   COMBINE HYDROGRAPHS RPOWER & C10
 318          HC      2
              *

 319          KK  RPOWER
 320          KM   ROUTE OUTFLOW FROM C10 THROUGH THE POWERLINE FLOODWAY
 321          RK   3600   .0023    .035            TRAP      50       3
              *

 322          KK      9N
 323          KM   SUB-BASIN 9N
 324          BA    .194
 325          LG    .300    .310   6.600    .110  15.000
 326          UC    .286    .168
 327          UA       0       3       5       8      12      20      43      75      90      96
 328          UA     100
              *

 329          KK  DETMID
 330          KM   DETENTION BASIN
 331          KM   LOW FLOW OUTLET: SINGLE 24" CIRCULAR PIPE
 332          RS      1    STOR     -1
 333          SA      0     0.2   0.886     2.2    4.18     6.2     7.9     8.6     8.9
 334          SQ      0       2     4.5     7.4      10    13.5      16    17.5    19.2
 335          SE  1352.0  1352.5  1353.0  1353.5  1354.0  1354.5  1355.0  1355.5  1356.0
 336          ST  1356.0      20      3     1.5
              *

 337          KK   RDET1
 338          KM   ROUTE OUTFLOW FROM DETENTION BASIN TO CP10N
 339          KM   DATA OBTAINED FROM IMPROVEMENT PLANS PREPARED BY GILBERTSON ASSOC. (1998)
 340          RK   3166   .0048    .012            CIRC       2
              *
```

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

 341          KK     10N
 342          KM   SUB-BASIN 10N
 343          BA    .227
 344          LG    .300    .200   9.700    .040  18.000
 345          UC    .257    .134
 346          UA       0       3       5       8      12      20      43      75      90      96
 347          UA     100
              *

 348          KK   CP10N
 349          KM   COMBINE HYDROGRAPHS RDET & 10N
 350          HC       2
              *

 351          KK     11N
 352          KM   SUB-BASIN 11N
 353          KM     L =  .42  Kb = .030  Adj. Slope =   14.0
 354          BA    .069
 355          LG    .250    .240   5.000    .200  50.000
 356          UC    .251    .195
 357          UA       0       3       5       8      12      20      43      75      90      96
 358          UA     100
              *

 359          KK    13NI
 360          KM   PARTIAL RUNOFF FROM SUB-BASIN 13N, EAST HALF 13NA-I
 361          BA   .0184
 362          LG    .050    .000   5.000    .200 100.000
 363          UC    .165    .150
 364          UA       0       5      16      30      65      77      84      90      94      97
 365          UA     100
              *

 366          KK   CP11N
 367          KM   COMBINE 11N AND 13N
 368          HC       2
              *

 369          KK     12N
 370          KM   SUB-BASIN 12N
 371          BA    .043
 372          LG    .270    .200   8.800    .040   42.00
 373          UC     .22    .188
 374          UA       0       3       5       8      12      20      43      75      90      96
 375          UA     100
              *

 376          KK   CP12N
 377          KM   COMBINE HYDROGRAPHS RCP11N AND 12N
 378          HC       2
              *
```

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

 379          KK   CPALL
 380          KM   COMBINE CP12N AND CP10N
 381          HC       2
              *

 382          KK    DETN
 383          KM   DETENTION BASIN NORTH
 384          KM   LOW FLOW OUTLET:30"RCP
 385          RS       1    STOR       0
 386          SA    .183    1.35    3.87     5.6    6.53    7.08    7.65    8.26    8.78    9.52
 387          SQ       2      10      19      21      22      24      25      26    26.5      27
 388          SE    1334    1335    1336    1337    1338    1339    1340    1341    1342    1343
 389          ST    1343      20       3     1.5
              *

 390          KK   RDETN
 391          KM   ROUTE DETN TO CPOWER
 392          RD    3000  .00143    .013            CIRC     2.5
              *

 393          KK   CPDET
 394          KM   COMBINE RDETN AND CPOWER
 395          HC       2
              *

 396          KK     13N
 397          KM   RUNOFF FROM BASIN 13N
 398          BA    .017
 399          LG     .05    .000   5.000    .200   100.0
 400          UC    .197    .191
 401          UA       0       3       5       8      12      20      43      75      90      96
 402          UA     100
              *

 403          KK     14N
 404          KM   SUB-BASIN 14N
 405          BA    .017
 406          LG    .050    .000   7.600    .070 100.000
 407          UC    .154    .135
 408          UA       0       5      16      30      65      77      84      90      94      97
 409          UA     100
              *

 410          KK   CP14N
 411          KM   COMBINE HYDROGRAPHS R13N & 14N
 412          HC       2
              *

 413          KK  RCP14N
 414          KM   ROUTE COMBINED HYDROGRAPHS TO CP15N
 415          RK     600   .0033    .012            TRAP       1     150
              *
```

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

416           KK     15N
417           KM   SUB-BASIN 15N
418           KM     L =  .19  Kb = .034  Adj. Slope =   26.0
419           BA    .014
420           LG    .050    .000   9.700    .040    95.0
421           UC    .130    .101
422           UA       0       5      16      30      65      77      84      90      94      97
423           UA     100
              *

424           KK   CP15N
425           KM   COMBINE HYDROGRAPHS RCP14N & 15N
426           HC       2
              *

427           KK  RCP15N
428           KM   ROUTE COMBINED HYDROGRAPHS TO CP16N
429           RK     790   .0033    .012            CIRC       4
              *

430           KK     16N
431           KM   SUB-BASIN 16NC,16ND&16NE
432           BA   .0145
433           LG    .050    .000   9.700    .040    95.0
434           UC    .169    .176
435           UA       0       5      16      30      65      77      84      90      94      97
436           UA     100
              *

437           KK   CP16N
438           KM   COMBINE HYDROGRAPHS RCP15N & 16N
439           HC       2
              *

440           KK  RCP16N
441           KM   ROUTE COMBINED HYDROGRAPHS TO DETENTION BASIN
442           RK     550   .0027    .012            CIRC       4
              *

443           KK    10NW
444           KM   RUNOFF FROM SUB-BASIN 10-NW
445           BA   .0125
446           LG    .300    .200     9.7     .04      18
447           UC   .0864   .0486
448           UA       0       3       5       8      12      20      43       5      90      96
449           UA     100
              *

450           KK    12NL
451           KM   RUNOFF FROM PARCELS 12L
452           BA    .030
453           LG    .270    .200   8.800    .040   42.00
454           UC    .153   .1077
455           UA       0       5      16      30      65      77      84      90      94      97
```

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

 456          UA     100
              *

 457          KK   CP12L
 458          KM   COMBINE 12L AND 10NW
 459          HC       2
              *

 460          KK  RCP12N
 461          KM   ROUTE CP12L TO CP12N
 462          RK     570    .013    .012           CIRC       3
              *

 463          KK   CP12N
 464          KM   COMBINE HYDROGRAPHS CP12L AND RCP16N
 465          HC       2
              *

 466          KK  RCP12N
 467          KM   ROUTE CP12N TO CP21NB
 468          RK     850   .0035    .012           CIRC     4.5
              *

 469          KK   21-NB
 470          KM   RUNOFF FROM SUB-BASIN 21NB
 471          BA     .01
 472          LG    .050    .000   9.700    .040    95.0
 473          UC    .127    .118
 474          UA       0       5      16      30      65      77      84      90      94      97
 475          UA     100
              *

 476          KK  CP21NB
 477          KM   COMBINE HYDROGRAPHS RCP12N & 21-NB
 478          HC       2
              *

 479          KK  RCP20N
 480          KM   ROUTE RCP20N TO CPALL
 481          RK     200    .005    .012           CIRC     4.5
              *

 482          KK     17N
 483          KM   SUB-BASIN 17N
 484          BA    .119
 485          LG    .300    .210   9.700    .040  17.000
 486          UC    .594     .56
 487          UA       0       3       5       8      12      20      43      75      90      96
 488          UA     100
              *
```

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

489           KK    R17N
490           KM   ROUTE 17N TO CPALL
491           RK     450   .0033    .012            CIRC     4.5
              *

492           KK    16N2
493           KM   SUB-BASIN 16NA&16NB
494           BA   .0106
495           LG    .050       0     9.7     .04      95
496           UC    .193     .24
497           UA       0       5      16      30      65      77      84      90      94      97
498           UA     100
              *

499           KK     18N
500           KM   SUB-BASIN 18N
501           BA    .034
502           LG    .050    .000   9.700    .040    95.0
503           UC    .206    .161
504           UA       0       5      16      30      65      77      84      90      94      97
505           UA     100
              *

506           KK   CP18N
507           KM   COMBINE 16N2 AND 18N
508           HC       2
              *

509           KK  RCP18N
510           KM   ROUTE RUNOFF FROM SUB-BASIN 18N
511           RK     750    .002    .012            CIRC       4
              *

512           KK     19N
513           KM   SUB-BASIN 19N
514           KM     L =  .25  Kb = .035  Adj. Slope =    8.0
515           BA    .011
516           LG    .050    .000   9.700    .040    95.0
517           UC     .15    .098
518           UA       0       5      16      30      65      77      84      90      94      97
519           UA     100
              *

520           KK   CP19N
521           KM   COMBINE HYDROGRAPHS RCP18N & 19N
522           HC       2
              *

523           KK     20N
524           KM   SUB-BASIN 20N
525           BA    .016
526           LG    .050    .000   9.700    .040    95.0
527           UC    .166   .1612
528           UA       0       5      16      30      65      77      84      90      94      97
```

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

 529          UA     100
              *

 530          KK   CP20M
 531          KM   COMBINE HYDROGRAPHS RCP19N & 20N-C
 532          HC       2
              *

 533          KK  RCP20M
 534          KM   ROUTE CP20M TO CPALL
 535          RK     200   .0025    .012            CIRC       4
              *

 536          KK     21N
 537          KM   SUB-BASIN 21N
 538          BA    .048
 539          LG    .190    .110   9.700    .040    45.0
 540          UC    .184   .1205
 541          UA       0       3       5       8      12      20      43      75      90      96
 542          UA     100
              *

 543          KK   CPALL
 544          KM   COMBINE HYDROGRAPHS RCP20N,RCP21NB,R17N & 21N
 545          HC       4
              *

 546          KK   DETNW
 547          KM   DETENTION BASIN LOCATED TO THE NORTH OF THE NORTH APRON
 548          KM   LOW FLOW OUTLET: SINGLE 24" RCP
 549          RS       1    STOR       0
 550          SA   .0001     .55    1.52    2.56    3.59    3.98    4.36    4.75    5.53    5.93
 551          SQ      .1       4      12      17      19      21      22      24      27      30
 552          SE    1322    1323    1324    1325    1326    1327    1328    1329    1331    1333
 553          ST    1333      14       3     1.5
              *

 554          KK  CPOWER
 555          KM   COMBINE HYDROGRAPHS RPOWER & DET
 556          HC       2
              *

 557          KK     22N
 558          KM   SUB-BASIN 22N
 559          KM   OFF-ROAD FLOWS THAT ENTER THE STORM DRAIN SYSTEM ON SOSSAMAN RD.
 560          KM   6-HOUR RAINFALL, PATTERN NO. 2.44 WAS USED TO FIND TC & R FOR THIS BASIN
 561          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .956
 562          KM     L =  .53  Kb = .033  Adj. Slope =   19.0
 563          BA   .0076
 564          LG    .350    .250   9.700    .040    .000
 565          UC    .298    .922
 566          UA       0       3       5       8      12      20      43      75      90      96
 567          UA     100
              *
```

Modified from Master

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

 568          KK  CPOWER
 569          KM   COMBINE 22N INTO POWER FLOODWAY
 570          HC       2
              *  ******************************************
              *  START DRAINAGE FOR AREA SOUTH OF TAXIWAY K
              *  ******************************************

 571          KK      1S
 572          KM   SUB-BASIN 1S
 573          BA    .113
 574          LG    .330    .330   4.650    .240   5.000
 575          UC    .542    .542
 576          UA       0       3       5       8      12      20      43      75      90      96
 577          UA     100
              *

 578          KK     R1S
 579          KM     ROUTE HYDROGRAPH FROM SUB-BASIN 1S TO CP3S
 580          RK    2129   0.004    0.04            TRAP      30      10
              *

 581          KK     6SB
 582          KM   RUNOFF FROM 6-SB THROUGH 6-SE
 583          BA   .0913
 584          LG    .280    .280    5.00    .200   24.00
 585          UC     .26   .1366
 586          UA       0       3       5       8      12      20      43      75      90      96
 587          UA     100
              *

 588          KK      2S
 589          KM   SUB-BASIN 2S
 590          BA    .037
 591          LG    .280    .270   4.650    .240  24.000
 592          UC    .202    .126
 593          UA       0       3       5       8      12      20      43      75      90      96
 594          UA     100
              *

 595          KK    CP2S
 596          KM   COMBINE 6SB AND 2S
 597          HC       2
              *

 598          KK     R2S
 599          KM   ROUTE HYDROGRAPH FROM SUB-BASIN 2S TO CP3S
 600          RK    1200   0.002    0.04            TRAP      30      10
              *
```

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

601           KK    CP2S
602           KM   COMBINE CP2S AND 1S
603           HC       2
              *

604           KK      3S
605           KM   SUB-BASIN 3S
606           BA    .056
607           LG    .350    .350   4.650    .240    .000
608           UC    .182    .111
609           UA       0       3       5       8      12      20      43      75      90      96
610           UA     100
              *

611           KK    CP3S
612           KM   COMBINE HYDROGRAPHS CP2S & 3S
613           HC       2
              *

614           KK      4S
615           KM   SUB-BASIN 4S
616           BA    .027
617           LG    .350    .350   4.650    .240    .000
618           UC    .636    1.74
619           UA       0       3       5       8      12      20      43      75      90      96
620           UA     100
              *

621           KK    CP4S
622           KM   COMBINE HYDROGRAPHS CP3S AND 4S
623           HC       2
              *

624           KK     10S
625           KM   SUB-BASIN 10S
626           BA    .101
627           LG     .35     .35    4.65     .24     1.0
628           UC    .455    .443
629           UA       0       3       5       8      12      20      43      75      90      96
630           UA     100
              *

631           KK   CP10S
632           KM   COMBINE 10S, AND CP4S
633           HC       2
              *  ***************************************
              *  NEW DRAINAGE LINE TO DETENTION SOUTH
              *  ***************************************
```

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

 634          KK     6SA
 635          KM   SUB-BASIN 6S
 636          BA    .048
 637          LG    .280    .280   5.000    .200  24.000
 638          UC    .255    .168
 639          UA       0       3       5       8      12      20      43      75      90      96
 640          UA     100
              *

 641          KK      7S
 642          KM   SUB-BASIN 7S
 643          BA    .036
 644          LG    .160    .130   4.800    .220  35.000
 645          UC    .218    .139
 646          UA       0       3       5       8      12      20      43      75      90      96
 647          UA     100
              *

 648          KK    CP7S
 649          KM   COMBINE HYDROGRAPHS 6SA AND 7S
 650          HC       2
              *

 651          KK      9S
 652          KM   SUB-BASIN 9S
 653          BA    .045
 654          LG    .350    .350   4.650    .240     5.0
 655          UC    .291    .222
 656          UA       0       3       5       8      12      20      43      75      90      96
 657          UA     100
              *

 658          KK    CP9S
 659          KM   COMBINE HYDROGRAPHS CP7S AND 9S
 660          HC       2
              *

 661          KK     11S
 662          KM   SUB-BASIN 11S
 663          BA    .024
 664          LG    .350    .350   4.650    .240    9.00
 665          UC    .297    .281
 666          UA       0       3       5       8      12      20      43      75      90      96
 667          UA     100
              *

 668          KK   CP11S
 669          KM   COMBINE HYDROGRAPHS CP9S AND 11S
 670          HC       2
              *
```

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

671           KK      8S
672           KM   SUB-BASIN 8S
673           BA    .032
674           LG     .27     .26    5.00     .20  33.000
675           UC   .2926    .244
676           UA      0       3       5       8      12      20      43      75      90      96
677           UA     100
              *

678           KK     R8S
679           KM   ROUTE 8S TO CP12SM
680           RD    4500    .003    .013            CIRC       8
              *

681           KK    12SM
682           KM   SUB-BASIN 12S
683           BA   .1071
684           LG     .35     .35    4.65     .24    90.0
685           UC    .339    .293
686           UA      0       3       5       8      12      20      43      75      90      96
687           UA     100
              *

688           KK  CP12SM
689           KM   COMBINE CP11S, 8S, AND 12SM
690           HC      3
              *  ***********************************
              *  SECOND LINE TO DETENTION SOUTH
              *  ***********************************

691           KK    14SA
692           KM   RUNOFF FROM EAST HALF OF 14S
693           BA    .035
694           LG    .250    .240    5.00    .200    55.0
695           UC    .148   .1033
696           UA      0       3       5       8      12      20      43      75      90      96
697           UA     100
              *

698           KK   R14SA
699           KM   ROUTE 14SA TO 13S
700           RD    4000   .0025    .013            CIRC       8
              *

701           KK    12SA
702           KM   SUB-BASIN 12SA RUNOFF
703           BA    .188
704           LG     .35     .35    4.65     .24    90.0
705           UC   .2704   .1466
706           UA      0       3       5       8      12      20      43      75      90      96
707           UA     100
              *
```

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

 708          KK     13S
 709          KM   SUB-BASIN 13S
 710          BA    .009
 711          LG    .350    .350   4.650    .240    90.0
 712          UC    .133    .118
 713          UA       0       3       5       8      12      20      43      75      90      96
 714          UA     100
              *

 715          KK   CP13S
 716          KM   COMBINE HYDROGRAPHS 12SA,14SA,CP12SM AND 13S
 717          HC       4
              *

 718          KK   CPDET
 719          KM   COMBINE HYDROGRAPHS CP10S AND CP13S
 720          HC       2
              *

 721          KK  DETSOU
 722          KM   DETENTION BASIN LOCATED ALONG THE SOUTH PROPERTY BOUNDARY, JUST EAST OF
 723          KM   THE FUTURE SOSSAMAN ROAD
 724          KM   LOW FLOW OUTLET: DOUBLE 48" RCP
 725          RS       1    STOR       0
 726          SA     .11     .70    2.01    3.34    4.82    7.22    7.76    8.31    8.88   10.07
 727          SQ       0      20      52      94     143     230     263     295     320     354
 728          SE    1339    1340    1341    1342    1343    1345    1346    1347    1348    1350
 729          ST    1350      20       3     1.5
              *  ****************************************
              *  START OF DETENTION WEST DRAINAGE BASINS
              *  ****************************************

 730          KK     14SD
 731          KM   SUB-BASIN 14SC AND 14SD
 732          BA   .0294
 733          LG    .250    .240   5.000    .200   70.00
 734          UC    .147    .101
 735          UA       0       3       5       8      12      20      43      75      90      96
 736          UA     100
              *

 737          KK     22S
 738          KM   SUB-BASIN 22S
 739          BA   .0097
 740          LG    .170    .150   5.000    .200    85.0
 741          UC    .112    .086
 742          UA       0       5      16      30      65      77      84      90      94      97
 743          UA     100
              *
```

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

 744          KK   CP22S
 745          KM   COMBINE 22S AND 14SD
 746          HC      2
              *

 747          KK     15S
 748          KM   SUB-BASIN 15S
 749          BA   .0525
 750          LG    .050    .000   4.800    .220    95.0
 751          UC    .199   .1336
 752          UA       0       5      16      30      65      77      84      90      94      97
 753          UA     100
              *

 754          KK   CP15S
 755          KM   COMBINE 15S AND CP22S
 756          HC      2
              *

 757          KK     16S
 758          KM   SUB-BASIN 16S
 759          BA   .0027
 760          LG    .050    .000   5.000    .200 100.000
 761          UC    .125     .19
 762          UA       0       5      16      30      65      77      84      90      94      97
 763          UA     100
              *

 764          KK   CP16S
 765          KM   COMBINE FLOWS FROM CP15S, 16S
 766          HC      2
              *

 767          KK     17S
 768          KM   SUB-BASIN 17S
 769          BA    .024
 770          LG    .050    .000   4.650    .240    95.0
 771          UC   .2018   .1909
 772          UA       0       5      16      30      65      77      84      90      94      97
 773          UA     100
              *

 774          KK     18S
 775          KM   SUB-BASIN 18S
 776          BA    .005
 777          LG    .050    .000   4.650    .240 100.000
 778          UC    .141    .189
 779          UA       0       5      16      30      65      77      84      90      94      97
 780          UA     100
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 781          KK   CP18S
 782          KM   COMBINE FLOWS FROM 17S, 18S AND UPSTREAM STORMDRAIN (RCP16S)
 783          HC      3
              *

 784          KK    20S
 785          KM   SUB-BASIN 20S
 786          BA    .002
 787          LG    .050    .000   4.650    .240 100.000
 788          UC    .118    .160
 789          UA      0       5      16      30      65      77      84      90      94      97
 790          UA    100
              *

 791          KK   CP20S
 792          KM   COMBINE FLOWS FROM 20S AND CP18S
 793          HC      2
              *  ************************************
              *  NEW LINE GOING TO DETENTION WEST
              *  ************************************

 794          KK    23S
 795          KM   SUB-BASIN 23S
 796          BA    .052
 797          LG    .200    .180   5.000    .200    70.0
 798          UC     .27    .251
 799          UA      0       5      16      30      65      77      84      90      94      97
 800          UA    100
              *

 801          KK   25SF
 802          KM   SUB-BASIN 25SF
 803          BA   .0188
 804          LG    .050    .000   5.000    .200 100.000
 805          UC    .179    .183
 806          UA      0       5      16      30      65      77      84      90      94      97
 807          UA    100
              *

 808          KK   CP23S
 809          KM   COMBINE 25SF AND 23S
 810          HC      2
              *

 811          KK    24S
 812          KM   SUB-BASIN 24S
 813          BA    .036
 814          LG    .070    .020   4.650    .240  95.000
 815          UC     .28    .275
 816          UA      0       5      16      30      65      77      84      90      94      97
 817          UA    100
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 818          KK   CP24S
 819          KM   COMBINE FLOWS FROM 24S AND CP23S
 820          HC       2
              *

 821          KK    21S
 822          KM   SUB-BASIN 21S
 823          BA   .0046
 824          LG    .050    .000   4.650    .240 100.000
 825          UC    .154    .199
 826          UA       0       5      16      30      65      77      84      90      94      97
 827          UA     100
              *

 828          KK   CP24S
 829          KM   COMBINE FLOWS CP24S AND 21S
 830          HC       2
              *

 831          KK   28SA
 832          KM   SUB-BASIN 28S
 833          BA    .008
 834          LG    .050    .000   4.650    .240    40.0
 835          UC    .147    .148
 836          UA       0       5      16      30      65      77      84      90      94      97
 837          UA     100
              *

 838          KK   CP28S
 839          KM   COMBINE CP24S AND 28SA
 840          HC       2
              *   ************************************
              *   NEW LINE FOR DETENTION WEST
              *   ************************************

 841          KK   25SA
 842          KM   SUB-BASIN 25SA
 843          BA   .0164
 844          LG    .050    .000   5.000    .200 100.000
 845          UC    .228    .258
 846          UA       0       5      16      30      65      77      84      90      94      97
 847          UA     100
              *

 848          KK    26S
 849          KM   SUB-BASIN 26S
 850          BA    .025
 851          LG    .050    .000   4.650    .240 100.000
 852          UC    .255    .260
 853          UA       0       5      16      30      65      77      84      90      94      97
 854          UA     100
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 855          KK   CP26S
 856          KM   COMBINE FLOWS FROM 26S AND 25SA
 857          HC       2
              *

 858          KK     L39
 859          KM   SUB-BASIN L39
 860          BA    .005
 861          LG    .050    .000   4.650    .240 100.000
 862          UC    .165    .203
 863          UA       0       5      16      30      65      77      84      90      94      97
 864          UA     100
              *

 865          KK   CPL39
 866          KM   COMBINE FLOWS FROM L39 AND CP26S
 867          HC       2
              *

 868          KK     L40
 869          KM   SUB-BASIN L40
 870          BA    .004
 871          LG    .050    .000   4.650    .240 100.000
 872          UC    .085    .073
 873          UA       0       5      16      30      65      77      84      90      94      97
 874          UA     100
              *

 875          KK   CPL40
 876          KM   COMBINE FLOWS FROM L40 AND CPL39
 877          HC       2
              *

 878          KK   CP21S
 879          KM   COMBINE FLOWS FROM CP20S, CP28S AND CPL40
 880          HC       3
              *

 881          KK    DETW
 882          KM   DETENTION BASIN ON WEST SIDE OF WGA
 883          KM   OUTLET: 2X54" RCP WITH INVERT AT 1336, 348LF AND 8X5 AT 1335.47, 182LF
 884          RS       1    STOR       0
 885          SA     .11   .5941  1.7488  3.0062  4.3547  6.1125  6.6595  7.2261    7.60    8.14
 886          SQ       0      25      45      95     145     210     250     300     320     355
 887          SE    1336    1337    1338    1339    1340    1341    1342    1343    1344    1345
 888          ST    1345      20       3     1.5
              *

 889          KK   CPOUT
 890          KM   COMBINE FLOWS FROM RCPOUT AND RCPOUT
 891          HC       2
              *
```

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

 892          KK   RCP02
 893          KM   ROUTE DETSOUTH AND DETWEST TO RITTENHOUSE FLOODWAY VIA 2X96"
 894          RD    5260    .001    .013            CIRC      16
              *
 895          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

                1N
                 V
                 V
                C2
                 V
                 V
 40          RPOWER
                 .
                 .
 43              .        2NA
                 .         V
                 .         V
                 .       R2NA
                 .         .
                 .         .
                 .         .        2NB
                 .         .          .
                 .         .          .
                 .      CP2NB............
                 .         V
                 .         V
                 .     RCP2NB
                 .         .
                 .         .
 70              .         .        2NC
                 .         .          .
                 .         .          .
 78              .      CP2NC............
                 .         V
                 .         V
                 .     RCP2NC
                 .         .
                 .         .
                 .         .        2ND
                 .         .          .
                 .         .          .
                 .      CP2ND............
                 .         V
                 .         V
 95              .        C4
                 .         V
                 .         V
 103             .     RCP2ND
                 .         V
                 .         V
 106             .     RCP2ND
                 .         .
                 .         .
                 .         .        2NE
                 .         .         V
                 .         .         V
                 .         .       R2NE
                 .         .          .
                 .         .          .
                 .         .          .        2NF
                 .         .          .          .
                 .         .          .          .
 130             .         .      CP2NF............
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          .          .          V
          .          .          V
133       .          .     RCP2NF
          .          .          .
          .          .          .
137       .          .          .         2NG
          .          .          .           .
          .          .          .           .
145       .          .      CP2NG............
          .          .          V
          .          .          V
48        .          .     RCP2NG
          .          .          .
          .          .          .
52        .          .          .         2NH
          .          .          .           .
          .          .          .           .
50        .          .      CP2NH............
          .          .          V
          .          .          V
163       .          .     RCP2NH
          .          .          .
          .          .          .
167       .          .          .          4N
          .          .          .           .
          .          .          .           .
75        .          .       CP4N............
          .          .          V
          .          .          V
78        .          .      RCP4N
          .          .          .
          .          .          .
32        .          .          .          3N
          .          .          .           .
          .          .          .           .
190       .       CP3N........................
          .          V
          .          V
193       .      DET3N
          .          .
          .          .
201    CPOWER............
          V
          V
04     RPOWER
          .
          .
07        .         5N
          .          V
          .          V
15        .        RC7
          .          .
          .          .
218       .          .        6NA
          .          .          .
          .          .          .
226       .      CP6NA............
          .          V
          .          V
229       .     RCP6NA
          .          .
          .          .
53        .          .        6NB
          .          .          .
          .          .          .
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241          .       CP6NB............
             .          V
             .          V
244          .      RCP6NB
             .          .
             .          .
248          .          .         6NC
             .          .           .
             .          .           .
256          .       CP6NC............
             .          V
             .          V
259          .      RCP6NC
             .          .
             .          .
263          .          .         7NA
             .          .           .
             .          .           .
271          .       CP7NA............
             .          V
             .          V
274          .      RCP7NA
             .          .
             .          .
278          .          .         7NB
             .          .           .
             .          .           .
286          .          .           .         7NC
             .          .           .           .
             .          .           .           .
294          .       CP7NB.......................
             .          .
             .          .
297          .          .          8N
             .          .           .
             .          .           .
305          .        CP8N............
             .          V
             .          V
308          .       DET8N
             .          .
             .          .
316     CPOWER............
             V
             V
319     RPOWER
             .
             .
322          .         9N
             .          V
             .          V
329          .      DETMID
             .          V
             .          V
337          .       RDET1
             .          .
             .          .
341          .          .         10N
             .          .           .
             .          .           .
348          .       CP10N...........
             .          .
             .          .
351          .          .         11N
             .          .           .
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359          .          .          .
             .          .          .       13NI
             .          .          .          .
             .          .          .          .
366          .          .      CP11N...........
             .          .          .
             .          .          .
369          .          .          .        12N
             .          .          .          .
             .          .          .          .
376          .          .      CP12N...........
             .          .          .
             .          .          .
379          .      CPALL...........
             .          V
             .          V
382          .       DETN
             .          V
             .          V
390          .      RDETN
             .          .
             .          .
393      CPDET...........
             .
             .
396          .        13N
             .          .
             .          .
403          .          .        14N
             .          .          .
             .          .          .
410          .      CP14N...........
             .          V
             .          V
413          .     RCP14N
             .          .
             .          .
416          .          .        15N
             .          .          .
             .          .          .
424          .      CP15N...........
             .          V
             .          V
427          .     RCP15N
             .          .
             .          .
430          .          .        16N
             .          .          .
             .          .          .
437          .      CP16N...........
             .          V
             .          V
440          .     RCP16N
             .          .
             .          .
443          .          .       10NW
             .          .          .
             .          .          .
450          .          .          .       12NL
             .          .          .          .
             .          .          .          .
457          .          .      CP12L...........
             .          .          V
             .          .          V
460          .          .     RCP12N
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                .          .          .
                .          .          .
 63             .      CP12N...........
                .          V
                .          V
466             .      RCP12N
                .          .
                .          .
469             .          .      21-NB
                .          .          .
                .          .          .
-76             .      CP21NB..........
                .          V
                .          V
 79             .      RCP20N
                .          .
                .          .
 82             .          .        17N
                .          .          V
                .          .          V
-89             .          .       R17N
                .          .          .
                .          .          .
492             .          .          .       16N2
                .          .          .          .
                .          .          .          .
499             .          .          .          .        18N
                .          .          .          .          .
                .          .          .          .          .
 06             .          .          .      CP18N...........
                .          .          .          V
                .          .          .          V
 09             .          .          .     RCP18N
                .          .          .          .
                .          .          .          .
 12             .          .          .          .        19N
                .          .          .          .          .
                .          .          .          .          .
520             .          .          .      CP19N...........
                .          .          .          .
                .          .          .          .
523             .          .          .          .        20N
                .          .          .          .          .
                .          .          .          .          .
-30             .          .          .      CP20M...........
                .          .          .          V
                .          .          .          V
 33             .          .          .     RCP20M
                .          .          .          .
                .          .          .          .
 36             .          .          .          .        21N
                .          .          .          .          .
                .          .          .          .          .
-43             .      CPALL...................................
                .          V
                .          V
546             .      DETNW
                .          .
                .          .
554         CPOWER..........
                .
                .
-57             .        22N
                .          .
                .          .
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568   CPOWER............
          .
          .
571       .        1S
          .         V
          .         V
578       .       R1S
          .         .
          .         .
581       .         .       6SB
          .         .         .
          .         .         .
588       .         .         .         2S
          .         .         .          .
          .         .         .          .
595       .         .      CP2S............
          .         .         V
          .         .         V
598       .         .       R2S
          .         .         .
          .         .         .
601       .      CP2S............
          .         .
          .         .
604       .         .        3S
          .         .         .
          .         .         .
611       .      CP3S............
          .         .
          .         .
614       .         .        4S
          .         .         .
          .         .         .
621       .      CP4S............
          .         .
          .         .
624       .         .       10S
          .         .         .
          .         .         .
631       .     CP10S............
          .         .
          .         .
634       .         .       6SA
          .         .         .
          .         .         .
641       .         .         .         7S
          .         .         .          .
          .         .         .          .
648       .         .      CP7S............
          .         .         .
          .         .         .
651       .         .         .         9S
          .         .         .          .
          .         .         .          .
658       .         .      CP9S............
          .         .         .
          .         .         .
661       .         .         .        11S
          .         .         .          .
          .         .         .          .
668       .         .     CP11S............
          .         .         .
          .         .         .
671       .         .         .         8S
          .         .         .          V
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                .         .         .         V
678             .         .         .       R8S
                .         .         .         .
                .         .         .         .
681             .         .         .         .       12SM
                .         .         .         .         .
                .         .         .         .         .
688             .         .     CP12SM.......................
                .         .         .
                .         .         .
691             .         .         .      14SA
                .         .         .         V
                .         .         .         V
698             .         .         .     R14SA
                .         .         .         .
                .         .         .         .
701             .         .         .         .       12SA
                .         .         .         .         .
                .         .         .         .         .
708             .         .         .         .         .         13S
                .         .         .         .         .           .
                .         .         .         .         .           .
715             .         .     CP13S...................................
                .         .         .
                .         .         .
718             .     CPDET............
                .         V
                .         V
721             .     DETSOU
                .         .
                .         .
730             .         .     14SD
                .         .         .
                .         .         .
737             .         .         .      22S
                .         .         .         .
                .         .         .         .
744             .         .     CP22S............
                .         .         .
                .         .         .
747             .         .         .      15S
                .         .         .         .
                .         .         .         .
754             .         .     CP15S............
                .         .         .
                .         .         .
757             .         .         .      16S
                .         .         .         .
                .         .         .         .
764             .         .     CP16S............
                .         .         .
                .         .         .
767             .         .         .      17S
                .         .         .         .
                .         .         .         .
774             .         .         .         .       18S
                .         .         .         .         .
                .         .         .         .         .
781             .         .     CP18S.......................
                .         .         .
                .         .         .
784             .         .         .      20S
                .         .         .         .
                .         .         .         .
791             .         .     CP20S............
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                .          .          .
                .          .          .
'94             .          .          .        23S
                .          .          .         .
                .          .          .         .
801             .          .          .         .        25SF
                .          .          .         .          .
                .          .          .         .          .
808             .          .          .      CP23S............
                .          .          .         .
                .          .          .         .
J11             .          .          .         .         24S
                .          .          .         .          .
                .          .          .         .          .
118             .          .          .      CP24S............
                .          .          .         .
                .          .          .         .
321             .          .          .         .         21S
                .          .          .         .          .
                .          .          .         .          .
928             .          .          .      CP24S............
                .          .          .         .
                .          .          .         .
831             .          .          .         .        28SA
                .          .          .         .          .
                .          .          .         .          .
838             .          .          .      CP28S............
                .          .          .         .
                .          .          .         .
341             .          .          .         .        25SA
                .          .          .         .          .
                .          .          .         .          .
348             .          .          .         .          .        26S
                .          .          .         .          .          .
                .          .          .         .          .          .
355             .          .          .         .      CP26S............
                .          .          .         .          .
                .          .          .         .          .
858             .          .          .         .          .        L39
                .          .          .         .          .          .
                .          .          .         .          .          .
865             .          .          .         .      CPL39............
                .          .          .         .          .
                .          .          .         .          .
868             .          .          .         .          .        L40
                .          .          .         .          .          .
                .          .          .         .          .          .
875             .          .          .         .      CPL40............
                .          .          .         .          .
                .          .          .         .          .
878             .          .       CP21S........................
                .          .          V
                .          .          V
881             .          .       DETW
                .          .          .
                .          .          .
889             .       CPOUT............
                .          V
                .          V
892             .       RCPO2
```

**) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*  ************************************                    ****************************************
*                                    *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998            *                    *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1              *                    *         609 SECOND STREET            *
*                                    *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   06JUN02  TIME  10:40:29 *                    *          (916) 756-1104              *
*                                    *                    *                                      *
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                    WILLIAMS GATEWAY AIRPORT HYDROLOGY          DATE:SEPT.18, 2001
                    PREPARED BY: GILBERTSON ASSOCIATES          JOB# 53111

                    FILE NAME:531CP6 .DAT
                    ***************************************************************************
                    0. PROPOSED CONDITIONS WATERSHED.
                    1. HYPOTHETICAL STORM DISTRIBUTION PATTERN USING THE MCFCD MANUAL.
                    2. 100-YR, 6-HR RAINFALL EVENT.
                    3. GREEN AND AMPT INFILTRATION EQUATION FOR RAINFALL EXCESS.
                    4. CLARK UNIT HYDROGRAPH METHOD TO ESTIMATE RAINFALL EXCESS.
                    5. KINEMATIC WAVE TECHNIQUE FOR CHANNEL ROUTING.
                    6. LEVEL-POOL FOR RESERVOIR ROUTING.
                    7. HEC-1 LARGE ARRAY VERSION 4.1 (JUNE 1998).
                    8. INCREASED PIPE CAPACITIES TO FACILITATE 24-HR FLOODWAY IMPACT
                    ***************************************************************************


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

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         360  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME        0559  ENDING TIME
                     ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL     .02 HOURS
                     TOTAL TIME BASE    5.98 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT
        WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO
```

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	1N	206.	4.83	46.	46.	46.	.33		
ROUTED TO	C2	44.	5.98	9.	9.	9.	.33	1367.31	5.98
ROUTED TO	RPOWER	41.	5.98	4.	4.	4.	.33		
HYDROGRAPH AT	2NA	163.	4.50	32.	32.	32.	.18		
ROUTED TO	R2NA	163.	4.67	31.	31.	31.	.18		
HYDROGRAPH AT	2NB	56.	4.53	12.	12.	12.	.07		
2 COMBINED AT	CP2NB	217.	4.63	43.	43.	43.	.25		
ROUTED TO	RCP2NB	217.	4.75	42.	42.	42.	.25		
HYDROGRAPH AT	2NC	117.	4.37	22.	22.	22.	.12		
2 COMBINED AT	CP2NC	309.	4.67	64.	64.	64.	.36		
ROUTED TO	RCP2NC	309.	4.68	63.	63.	63.	.36		
HYDROGRAPH AT	2ND	68.	4.28	12.	12.	12.	.06		
2 COMBINED AT	CP2ND	356.	4.63	75.	75.	75.	.43		
ROUTED TO	C4	248.	5.10	68.	68.	68.	.43	1357.53	5.10
ROUTED TO	RCP2ND	248.	5.18	65.	65.	65.	.43		
ROUTED TO	RCP2ND	248.	5.20	63.	63.	63.	.43		
HYDROGRAPH AT	2NE	73.	4.65	17.	17.	17.	.11		
ROUTED TO	R2NE	73.	4.68	17.	17.	17.	.11		
HYDROGRAPH AT	2NF	26.	4.17	5.	5.	5.	.02		
2 COMBINED AT	CP2NF	88.	4.57	22.	22.	22.	.13		
ROUTED TO	RCP2NF	88.	4.67	21.	21.	21.	.13		
HYDROGRAPH AT	2NG	37.	4.42	9.	9.	9.	.04		
2 COMBINED AT	CP2NG	122.	4.60	30.	30.	30.	.17		
ROUTED TO	RCP2NG	122.	4.63	29.	29.	29.	.17		
HYDROGRAPH AT	2NH	21.	4.27	4.	4.	4.	.02		
2 COMBINED AT	CP2NH	139.	4.60	34.	34.	34.	.19		
ROUTED TO	RCP2NH	138.	4.65	33.	33.	33.	.19		
HYDROGRAPH AT	4N	37.	4.22	8.	8.	8.	.03		
2 COMBINED AT	CP4N	164.	4.58	41.	41.	41.	.22		

ROUTED TO	RCP4N	164.	4.62	40.	40.	40.	.22		
HYDROGRAPH AT	3N	138.	4.37	25.	25.	25.	.14		
3 COMBINED AT	CP3N	468.	4.62	129.	129.	129.	.78		
ROUTED TO	DET3N	287.	5.67	83.	83.	83.	.78	1351.05	5.67
2 COMBINED AT	CPOWER	323.	5.93	87.	87.	87.	1.11		
ROUTED TO	RPOWER	323.	5.98	81.	81.	81.	1.11		
HYDROGRAPH AT	5N	64.	4.40	11.	11.	11.	.08		
ROUTED TO	RC7	64.	4.60	11.	11.	11.	.08		
HYDROGRAPH AT	6NA	97.	4.23	16.	16.	16.	.09		
2 COMBINED AT	CP6NA	137.	4.47	27.	27.	27.	.17		
ROUTED TO	RCP6NA	136.	4.48	27.	27.	27.	.17		
HYDROGRAPH AT	6NB	59.	4.15	9.	9.	9.	.05		
2 COMBINED AT	CP6NB	175.	4.38	36.	36.	36.	.22		
ROUTED TO	RCP6NB	175.	4.45	35.	35.	35.	.22		
HYDROGRAPH AT	6NC	110.	4.20	19.	19.	19.	.09		
2 COMBINED AT	CP6NC	272.	4.32	54.	54.	54.	.31		
ROUTED TO	RCP6NC	272.	4.33	54.	54.	54.	.31		
HYDROGRAPH AT	7NA	58.	4.18	10.	10.	10.	.04		
2 COMBINED AT	CP7NA	323.	4.30	63.	63.	63.	.35		
ROUTED TO	RCP7NA	323.	4.33	63.	63.	63.	.35		
HYDROGRAPH AT	7NB	86.	4.15	14.	14.	14.	.06		
HYDROGRAPH AT	7NC	18.	4.07	3.	3.	3.	.01		
3 COMBINED AT	CP7NB	410.	4.27	80.	80.	80.	.43		
HYDROGRAPH AT	8N	75.	4.35	15.	15.	15.	.07		
2 COMBINED AT	CP8N	483.	4.28	95.	95.	95.	.50		
ROUTED TO	DET8N	219.	4.95	74.	74.	74.	.50	1346.42	4.95
2 COMBINED AT	CPOWER	514.	5.58	156.	156.	156.	1.61		
ROUTED TO	RPOWER	514.	5.75	133.	133.	133.	1.61		
HYDROGRAPH AT	9N	238.	4.15	33.	33.	33.	.19		
ROUTED TO	DETMID	18.	5.03	7.	7.	7.	.19	1355.60	5.05
ROUTED TO	RDET1	18.	5.13	7.	7.	7.	.19		
HYDROGRAPH AT	10N	321.	4.12	48.	48.	48.	.23		

2 COMBINED AT	CP10N	334.	4.13	55.	55.	55.	.42		
HYDROGRAPH AT	11N	89.	4.13	15.	15.	15.	.07		
HYDROGRAPH AT	13NI	28.	4.03	6.	6.	6.	.02		
2 COMBINED AT	CP11N	114.	4.12	21.	21.	21.	.09		
HYDROGRAPH AT	12N	60.	4.12	10.	10.	10.	.04		
2 COMBINED AT	CP12N	174.	4.12	31.	31.	31.	.13		
2 COMBINED AT	CPALL	508.	4.12	87.	87.	87.	.55		
ROUTED TO	DETN	26.	5.98	14.	14.	14.	.55	1340.95	5.98
ROUTED TO	RDETN	26.	5.97	14.	14.	14.	.55		
2 COMBINED AT	CPDET	540.	5.75	146.	146.	146.	2.16		
HYDROGRAPH AT	13N	25.	4.10	5.	5.	5.	.02		
HYDROGRAPH AT	14N	27.	4.03	5.	5.	5.	.02		
2 COMBINED AT	CP14N	51.	4.05	10.	10.	10.	.03		
ROUTED TO	RCP14N	51.	4.08	10.	10.	10.	.03		
HYDROGRAPH AT	15N	23.	4.02	4.	4.	4.	.01		
2 COMBINED AT	CP15N	72.	4.05	15.	15.	15.	.05		
ROUTED TO	RCP15N	72.	4.05	15.	15.	15.	.05		
HYDROGRAPH AT	16N	22.	4.05	4.	4.	4.	.01		
2 COMBINED AT	CP16N	94.	4.05	19.	19.	19.	.06		
ROUTED TO	RCP16N	94.	4.07	19.	19.	19.	.06		
HYDROGRAPH AT	10NW	19.	4.00	3.	3.	3.	.01		
HYDROGRAPH AT	12NL	46.	4.02	7.	7.	7.	.03		
2 COMBINED AT	CP12L	65.	4.02	10.	10.	10.	.04		
ROUTED TO	RCP12N	65.	4.02	10.	10.	10.	.04		
2 COMBINED AT	CP12N	158.	4.03	29.	29.	29.	.11		
ROUTED TO	RCP12N	158.	4.05	29.	29.	29.	.11		
HYDROGRAPH AT	21-NB	16.	4.02	3.	3.	3.	.01		
2 COMBINED AT	CP21NB	173.	4.05	32.	32.	32.	.12		
ROUTED TO	RCP20N	173.	4.05	32.	32.	32.	.12		
HYDROGRAPH AT	17N	106.	4.48	24.	24.	24.	.12		
ROUTED TO	R17N	106.	4.48	24.	24.	24.	.12		
HYDROGRAPH AT	16N2	15.	4.07	3.	3.	3.	.01		
HYDROGRAPH AT	18N	52.	4.05	10.	10.	10.	.03		

2 COMBINED AT	CP18N	67.	4.05	13.	13.	13.	.04		
ROUTED TO	RCP18N	66.	4.07	13.	13.	13.	.04		
HYDROGRAPH AT	19N	18.	4.02	3.	3.	3.	.01		
2 COMBINED AT	CP19N	84.	4.05	17.	17.	17.	.06		
HYDROGRAPH AT	20N	24.	4.03	5.	5.	5.	.02		
2 COMBINED AT	CP20M	108.	4.05	22.	22.	22.	.07		
ROUTED TO	RCP20M	108.	4.05	22.	22.	22.	.07		
HYDROGRAPH AT	21N	73.	4.08	12.	12.	12.	.05		
4 COMBINED AT	CPALL	413.	4.07	90.	90.	90.	.35		
ROUTED TO	DETNW	29.	5.98	16.	16.	16.	.35	1332.28	5.98
2 COMBINED AT	CPOWER	569.	5.75	162.	162.	162.	2.51		
HYDROGRAPH AT	22N	5.	4.42	1.	1.	1.	.01		
2 COMBINED AT	CPOWER	570.	5.75	163.	163.	163.	2.52		
HYDROGRAPH AT	1S	71.	4.43	13.	13.	13.	.11		
ROUTED TO	R1S	71.	4.65	12.	12.	12.	.11		
HYDROGRAPH AT	6SB	114.	4.13	16.	16.	16.	.09		
HYDROGRAPH AT	2S	46.	4.10	6.	6.	6.	.04		
2 COMBINED AT	CP2S	159.	4.12	22.	22.	22.	.13		
ROUTED TO	R2S	159.	4.22	22.	22.	22.	.13		
2 COMBINED AT	CP2S	179.	4.30	34.	34.	34.	.24		
HYDROGRAPH AT	3S	61.	4.08	6.	6.	6.	.06		
2 COMBINED AT	CP3S	218.	4.28	40.	40.	40.	.30		
HYDROGRAPH AT	4S	8.	4.67	2.	2.	2.	.03		
2 COMBINED AT	CP4S	223.	4.28	42.	42.	42.	.32		
HYDROGRAPH AT	10S	68.	4.33	11.	11.	11.	.10		
2 COMBINED AT	CP10S	289.	4.30	53.	53.	53.	.43		
HYDROGRAPH AT	6SA	58.	4.13	8.	8.	8.	.05		
HYDROGRAPH AT	7S	49.	4.10	8.	8.	8.	.04		
2 COMBINED AT	CP7S	106.	4.12	16.	16.	16.	.08		
HYDROGRAPH AT	9S	42.	4.17	5.	5.	5.	.05		
2 COMBINED AT	CP9S	148.	4.13	21.	21.	21.	.13		
HYDROGRAPH AT	11S	21.	4.18	3.	3.	3.	.02		

2 COMBINED AT	CP11S	168.	4.13	24.	24.	24.	.15		
HYDROGRAPH AT	8S	36.	4.18	6.	6.	6.	.03		
ROUTED TO	R8S	36.	4.32	6.	6.	6.	.03		
HYDROGRAPH AT	12SM	136.	4.22	30.	30.	30.	.11		
3 COMBINED AT	CP12SM	332.	4.17	60.	60.	60.	.29		
HYDROGRAPH AT	14SA	50.	4.05	8.	8.	8.	.04		
ROUTED TO	R14SA	50.	4.17	8.	8.	8.	.04		
HYDROGRAPH AT	12SA	277.	4.13	53.	53.	53.	.19		
HYDROGRAPH AT	13S	14.	4.05	3.	3.	3.	.01		
4 COMBINED AT	CP13S	668.	4.15	124.	124.	124.	.52		
2 COMBINED AT	CPDET	933.	4.17	177.	177.	177.	.95		
ROUTED TO	DETSOU	317.	4.87	121.	121.	121.	.95	1347.89	4.87
HYDROGRAPH AT	14SD	44.	4.05	7.	7.	7.	.03		
HYDROGRAPH AT	22S	15.	4.00	3.	3.	3.	.01		
2 COMBINED AT	CP22S	59.	4.02	10.	10.	10.	.04		
HYDROGRAPH AT	15S	81.	4.03	16.	16.	16.	.05		
2 COMBINED AT	CP15S	141.	4.03	26.	26.	26.	.09		
HYDROGRAPH AT	16S	4.	4.03	1.	1.	1.	.00		
2 COMBINED AT	CP16S	145.	4.03	27.	27.	27.	.09		
HYDROGRAPH AT	17S	35.	4.05	7.	7.	7.	.02		
HYDROGRAPH AT	18S	7.	4.03	2.	2.	2.	.00		
3 COMBINED AT	CP18S	187.	4.03	35.	35.	35.	.12		
HYDROGRAPH AT	20S	3.	4.02	1.	1.	1.	.00		
2 COMBINED AT	CP20S	190.	4.03	36.	36.	36.	.13		
HYDROGRAPH AT	23S	67.	4.08	13.	13.	13.	.05		
HYDROGRAPH AT	25SF	28.	4.05	6.	6.	6.	.02		
2 COMBINED AT	CP23S	94.	4.07	19.	19.	19.	.07		
HYDROGRAPH AT	24S	48.	4.10	11.	11.	11.	.04		
2 COMBINED AT	CP24S	142.	4.08	30.	30.	30.	.11		
HYDROGRAPH AT	21S	7.	4.03	1.	1.	1.	.00		
2 COMBINED AT	CP24S	149.	4.08	31.	31.	31.	.11		
HYDROGRAPH AT	28SA	12.	4.03	2.	2.	2.	.01		
2 COMBINED AT	CP28S	160.	4.07	33.	33.	33.	.12		

HYDROGRAPH AT	25SA	23.	4.08	5.	5.	5.	.02		
HYDROGRAPH AT	26S	34.	4.08	8.	8.	8.	.03		
2 COMBINED AT	CP26S	57.	4.08	13.	13.	13.	.04		
HYDROGRAPH AT	L39	7.	4.05	2.	2.	2.	.00		
2 COMBINED AT	CPL39	64.	4.08	14.	14.	14.	.05		
HYDROGRAPH AT	L40	7.	4.00	1.	1.	1.	.00		
2 COMBINED AT	CPL40	70.	4.05	15.	15.	15.	.05		
3 COMBINED AT	CP21S	419.	4.05	84.	84.	84.	.30		
ROUTED TO	DETW	221.	4.48	78.	78.	78.	.30	1341.27	4.48
2 COMBINED AT	CPOUT	531.	4.68	198.	198.	198.	1.24		
ROUTED TO	RCPO2	529.	4.83	187.	187.	187.	1.24		

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

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
RPOWER	MANE	1.00	40.53	359.11	.11	1.00	40.51	359.00	.11

C TINUITY SUMMARY (AC-FT) - INFLOW= .4410E+01 EXCESS= .0000E+00 OUTFLOW= .1913E+01 BASIN STORAGE= .2484E+01 PERCENT ERROR= .3

R2NA	MANE	1.00	162.57	279.67	1.59	1.00	162.53	280.00	1.59

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1595E+02 EXCESS= .0000E+00 OUTFLOW= .1534E+02 BASIN STORAGE= .5994E+00 PERCENT ERROR= .0

RCP2NB	MANE	1.00	216.92	284.48	1.56	1.00	216.85	285.00	1.55

C TINUITY SUMMARY (AC-FT) - INFLOW= .2133E+02 EXCESS= .0000E+00 OUTFLOW= .2059E+02 BASIN STORAGE= .7447E+00 PERCENT ERROR= .0

RCP2NC	MANE	.73	308.75	280.76	1.61	1.00	308.74	281.00	1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3140E+02 EXCESS= .0000E+00 OUTFLOW= .3125E+02 BASIN STORAGE= .1794E+00 PERCENT ERROR= -.1

RCP2ND	MANE	1.00	247.89	310.38	1.40	1.00	247.86	311.00	1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3370E+02 EXCESS= .0000E+00 OUTFLOW= .3204E+02 BASIN STORAGE= .1651E+01 PERCENT ERROR= .0

RCP2ND	MANE	.80	247.85	312.14	1.38	1.00	247.85	312.00	1.37

C TINUITY SUMMARY (AC-FT) - INFLOW= .3198E+02 EXCESS= .0000E+00 OUTFLOW= .3144E+02 BASIN STORAGE= .5359E+00 PERCENT ERROR= .0

R2NE	MANE	1.00	73.19	281.36	1.41	1.00	73.19	281.00	1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8431E+01 EXCESS= .0000E+00 OUTFLOW= .8318E+01 BASIN STORAGE= .1245E+00 PERCENT ERROR= -.1

RCP2NF	MANE	1.00	87.95	280.20	1.48	1.00	87.94	280.00	1.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1075E+02 EXCESS= .0000E+00 OUTFLOW= .1033E+02 BASIN STORAGE= .4298E+00 PERCENT ERROR= -.1

RCP2NG	MANE	.93	122.26	277.92	1.61	1.00	122.25	278.00	1.61

C TINUITY SUMMARY (AC-FT) - INFLOW= .1474E+02 EXCESS= .0000E+00 OUTFLOW= .1458E+02 BASIN STORAGE= .1608E+00 PERCENT ERROR= -.1

RCP2NH	MANE	1.00	138.45	278.38	1.64	1.00	138.41	279.00	1.64

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C  TINUITY SUMMARY (AC-FT) - INFLOW= .1678E+02 EXCESS= .0000E+00 OUTFLOW= .1648E+02 BASIN STORAGE= .3010E+00 PERCENT ERROR=    .0

          RCP4N  MANE        .83    164.27    276.46      1.72      1.00    164.24    277.00        1.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2022E+02 EXCESS= .0000E+00 OUTFLOW= .2007E+02 BASIN STORAGE= .1797E+00 PERCENT ERROR=   -.2

         RPOWER  MANE       1.00    323.48    359.42       .68      1.00    323.46    359.00         .68

C  TINUITY SUMMARY (AC-FT) - INFLOW= .4302E+02 EXCESS= .0000E+00 OUTFLOW= .4028E+02 BASIN STORAGE= .2843E+01 PERCENT ERROR=   -.2

            RC7  MANE       1.00     64.05    275.32      1.22      1.00     64.05    276.00        1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5675E+01 EXCESS= .0000E+00 OUTFLOW= .5465E+01 BASIN STORAGE= .2106E+00 PERCENT ERROR=    .0

         RCP6NA  MANE        .83    136.49    269.23      1.42      1.00    136.46    269.00        1.42

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1332E+02 EXCESS= .0000E+00 OUTFLOW= .1326E+02 BASIN STORAGE= .5702E-01 PERCENT ERROR=    .0

         RCP6NB  MANE       1.00    175.10    266.64      1.48      1.00    175.09    267.00        1.48

C  TINUITY SUMMARY (AC-FT) - INFLOW= .1757E+02 EXCESS= .0000E+00 OUTFLOW= .1741E+02 BASIN STORAGE= .1819E+00 PERCENT ERROR=   -.1

         RCP6NC  MANE        .73    271.87    260.62      1.62      1.00    271.80    260.00        1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2656E+02 EXCESS= .0000E+00 OUTFLOW= .2650E+02 BASIN STORAGE= .7329E-01 PERCENT ERROR=    .0

         RCP7NA  MANE        .97    323.38    259.48      1.67      1.00    323.36    260.00        1.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3128E+02 EXCESS= .0000E+00 OUTFLOW= .3116E+02 BASIN STORAGE= .1393E+00 PERCENT ERROR=    .0

         RPOWER  MANE       1.00    514.10    344.98       .77      1.00    514.10    345.00         .76

C  TINUITY SUMMARY (AC-FT) - INFLOW= .7690E+02 EXCESS= .0000E+00 OUTFLOW= .6569E+02 BASIN STORAGE= .1116E+02 PERCENT ERROR=    .1

          RDET1  MANE       1.00     17.83    309.04       .34      1.00     17.83    309.00         .34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3626E+01 EXCESS= .0000E+00 OUTFLOW= .3484E+01 BASIN STORAGE= .1509E+00 PERCENT ERROR=   -.2

          RDETN  MANE       1.00     25.94    359.00       .23      1.00     25.94    359.00         .23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7136E+01 EXCESS= .0000E+00 OUTFLOW= .6767E+01 BASIN STORAGE= .3640E+00 PERCENT ERROR=    .1
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          RCP14N  MANE        1.21     51.02    244.69      2.81      1.00     50.98    245.00        2.81

C  TINUITY SUMMARY (AC-FT) - INFLOW= .5111E+01 EXCESS= .0000E+00 OUTFLOW= .5092E+01 BASIN STORAGE= .2199E-01 PERCENT ERROR=   -.1

          RCP15N  MANE         .58     72.45    243.29      2.81      1.00     72.39    243.00        2.81

C  TINUITY SUMMARY (AC-FT) - INFLOW= .7194E+01 EXCESS= .0000E+00 OUTFLOW= .7186E+01 BASIN STORAGE= .9767E-02 PERCENT ERROR=    .0

          RCP16N  MANE         .31     94.18    243.52      2.80      1.00     94.13    244.00        2.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9354E+01 EXCESS= .0000E+00 OUTFLOW= .9346E+01 BASIN STORAGE= .9112E-02 PERCENT ERROR=    .0

          RCP12N  MANE         .21     64.58    241.43      2.18      1.00     64.52    241.00        2.18

C  TINUITY SUMMARY (AC-FT) - INFLOW= .4934E+01 EXCESS= .0000E+00 OUTFLOW= .4933E+01 BASIN STORAGE= .1757E-02 PERCENT ERROR=    .0

          RCP12N  MANE         .49    157.71    242.93      2.55      1.00    157.70    243.00        2.55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1428E+02 EXCESS= .0000E+00 OUTFLOW= .1426E+02 BASIN STORAGE= .1496E-01 PERCENT ERROR=    .0

          RCP20N  MANE         .08    173.25    243.16      2.57      1.00    173.20    243.00        2.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1576E+02 EXCESS= .0000E+00 OUTFLOW= .1576E+02 BASIN STORAGE= .3353E-02 PERCENT ERROR=    .0

            R17N  MANE         .23    106.18    269.36      1.84      1.00    106.17    269.00        1.84

C  TINUITY SUMMARY (AC-FT) - INFLOW= .1172E+02 EXCESS= .0000E+00 OUTFLOW= .1170E+02 BASIN STORAGE= .1491E-01 PERCENT ERROR=    .0

          RCP18N  MANE         .58     66.51    244.23      2.80      1.00     66.49    244.00        2.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6673E+01 EXCESS= .0000E+00 OUTFLOW= .6664E+01 BASIN STORAGE= .1053E-01 PERCENT ERROR=    .0

          RCP20M  MANE         .26    108.05    243.06      2.80      1.00    108.04    243.00        2.80

C  TINUITY SUMMARY (AC-FT) - INFLOW= .1071E+02 EXCESS= .0000E+00 OUTFLOW= .1071E+02 BASIN STORAGE= .3113E-02 PERCENT ERROR=    .0

             R1S  MANE        1.12     71.36    278.43      1.02      1.00     71.34    279.00        1.02

C  TINUITY SUMMARY (AC-FT) - INFLOW= .6556E+01 EXCESS= .0000E+00 OUTFLOW= .6155E+01 BASIN STORAGE= .4022E+00 PERCENT ERROR=    .0

             R2S  MANE        1.00    158.76    253.64      1.56      1.00    158.60    253.00        1.56

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1079E+02 EXCESS= .0000E+00 OUTFLOW= .1070E+02 BASIN STORAGE= .1216E+00 PERCENT ERROR=   -.3
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          R8S  MANE        1.00     36.11    259.00      1.73      1.00     36.11    259.00        1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2991E+01 EXCESS= .0000E+00 OUTFLOW= .2961E+01 BASIN STORAGE= .3266E-01 PERCENT ERROR=   -.1

          R14SA  MANE        1.00     49.97    250.00      2.11      1.00     49.97    250.00        2.11

C  TINUITY SUMMARY (AC-FT) - INFLOW= .3982E+01 EXCESS= .0000E+00 OUTFLOW= .3938E+01 BASIN STORAGE= .4687E-01 PERCENT ERROR=   -.1

          RCPO2  MANE        1.00    529.04    290.00      1.40      1.00    529.04    290.00        1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9834E+02 EXCESS= .0000E+00 OUTFLOW= .9289E+02 BASIN STORAGE= .5412E+01 PERCENT ERROR=    .0
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SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION C2
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1364.00	1368.00	1368.00
STORAGE	0.	29.	29.
OUTFLOW	0.	60.	60.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1367.31	.00	18.	44.	.00	5.98	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION C4
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1352.00	1357.00	1357.00
STORAGE	0.	6.	6.
OUTFLOW	0.	204.	204.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1357.53	.53	9.	248.	.98	5.10	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DET3N
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1345.00	1351.00	1351.00
STORAGE	0.	23.	23.
OUTFLOW	0.	284.	284.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1351.05	.05	23.	287.	.45	5.67	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DET8N
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1340.00	1347.00	1347.00
STORAGE	0.	24.	24.
OUTFLOW	0.	235.	235.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1346.42	.00	20.	219.	.00	4.95	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETMID
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1352.00	1356.00	1356.00
STORAGE	0.	17.	17.
OUTFLOW	0.	19.	19.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1355.60	.00	14.	18.	.00	5.05	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETN
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1334.00	1343.00	1343.00
STORAGE	0.	54.	54.
OUTFLOW	2.	27.	27.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1340.95	.00	36.	26.	.00	5.98	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETNW
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1322.00	1333.00	1333.00
STORAGE	0.	40.	40.
OUTFLOW	0.	30.	30.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1332.28	.00	36.	29.	.00	5.98	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETSOU
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1339.00	1350.00	1350.00
STORAGE	0.	63.	63.
OUTFLOW	0.	354.	354.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1347.89	.00	43.	317.	.00	4.87	.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION DETW
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1336.00	1345.00	1345.00
STORAGE	0.	41.	41.
OUTFLOW	0.	355.	355.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1341.27	.00	14.	221.	.00	4.48	.00

* NORMAL END OF HEC-1 ***

Appendix III

HY-8 (Det-NW Outlet)

CURRENT DATE: 06-06-2002 FILE DATE: 06-06-2002
CURRENT TIME: 10:30:17 FILE NAME: 53111-NW - Outlet

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

SITE DATA			CULVERT SHAPE, MATERIAL, INLET					
INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE	
1322.00	1320.06	605.50	1 RCP	2.00	2.00	.012	CONVENTIONAL	

SUMMARY OF CULVERT FLOWS (cfs) FILE: 53111-NW DATE: 06-06-2002

EV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
322.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1322.93	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.00	1
323.34	6.0	6.0	0.0	0.0	0.0	0.0	0.0	0.00	1
323.69	9.0	9.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1324.01	12.0	12.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1324.40	15.0	15.0	0.0	0.0	0.0	0.0	0.0	0.00	1
325.58	18.0	18.0	0.0	0.0	0.0	0.0	0.0	0.00	1
326.76	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1329.09	24.0	24.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1331.03	27.0	27.0	0.0	0.0	0.0	0.0	0.0	0.00	1
332.97	30.0	29.7	0.0	0.0	0.0	0.0	0.0	0.00	14
333.00	29.8	29.8	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: 53111-NW DATE: 06-06-2002

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1322.00	0.000	0.00	0.00	0.00
1322.93	0.000	3.00	0.00	0.00
1323.34	0.000	6.00	0.00	0.00
1323.69	0.000	9.00	0.00	0.00
1324.01	0.000	12.00	0.00	0.00
1324.40	0.000	15.00	0.00	0.00
1325.58	0.000	18.00	0.00	0.00
1326.76	0.000	20.00	0.00	0.00
1329.09	0.000	24.00	0.00	0.00
1331.03	0.000	27.00	0.00	0.00
1332.97	-0.009	30.00	0.29	0.97

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

C RENT DATE: 06-06-2002 FILE DATE: 06-06-2002
CURRENT TIME: 10:30:17 FILE NAME: 53111-NW

PERFORMANCE CURVE FOR CULVERT 1 - 1(2.00 (ft) BY 2.00 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1322.00	0.00	0.00	0-NF	0.00	0.00	0.00	-0.36	0.00	0.00
3.00	1322.93	0.80	0.93	2-M2c	0.63	0.60	0.60	-0.32	3.75	1.24
6.00	1323.34	1.24	1.34	2-M2c	0.92	0.86	0.86	-0.30	4.63	1.64
9.00	1323.69	1.60	1.69	2-M2c	1.17	1.07	1.07	-0.28	5.28	1.93
12.00	1324.01	1.92	2.01	2-M2c	1.44	1.24	1.24	-0.27	5.85	2.16
15.00	1324.40	2.26	2.40	2-M2c	2.00	1.40	1.40	-0.26	6.41	2.36
18.00	1325.58	2.64	3.58	2-M2c	2.00	1.52	1.52	-0.24	7.03	2.54
20.00	1326.76	2.94	4.76	2-M2c	2.00	1.60	1.60	-0.24	7.40	2.65
24.00	1329.09	3.64	7.09	2-M2c	2.00	1.72	1.72	-0.22	8.37	2.85
27.00	1331.03	4.26	9.03	2-M2c	2.00	1.81	1.81	-0.21	9.02	2.98
29.71	1332.96	4.88	10.96	2-M2c	2.00	1.89	1.89	-0.20	9.73	3.11

El. inlet face invert 1322.00 ft El. outlet invert 1320.06 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1322.00 ft
OUTLET STATION	605.50 ft
OUTLET ELEVATION	1320.06 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0032
CULVERT LENGTH ALONG SLOPE	605.50 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	2.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

CUI :NT DATE: 06-06-2002 FILE DATE: 06-06-2002
CURRENT TIME: 10:30:17 FILE NAME: 53111-NW

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áá; ááááááááááááááááááááá TAILWATER áááááááááááááááááááááááááá
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** *** REGULAR CHANNEL CROSS SECTION ****************

BOTTOM WIDTH	60.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.010
MANNING'S n (.01-0.1)	0.014
CHANNEL INVERT ELEVATION	1319.70 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1320.06 ft

** *** UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1319.70	0.000	0.00	0.00	0.00
3.00	1319.74	1.092	0.04	1.24	0.03
6.00	1319.76	1.170	0.06	1.64	0.04
9.00	1319.78	1.218	0.08	1.93	0.05
12.00	1319.79	1.253	0.09	2.16	0.06
15.00	1319.81	1.281	0.11	2.36	0.07
18.00	1319.82	1.304	0.12	2.54	0.07
20.00	1319.82	1.318	0.13	2.65	0.08
24.00	1319.84	1.342	0.14	2.85	0.09
27.00	1319.85	1.357	0.15	2.98	0.09
30.00	1319.86	1.371	0.16	3.11	0.10

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áá ááááááááááááááááááááááá ROADWAY OVERTOPPING DATA áááááááááááááááááááááááááá
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ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH	14.00 ft
CREST LENGTH	200.00 ft
OVERTOPPING CREST ELEVATION	1333.00 ft

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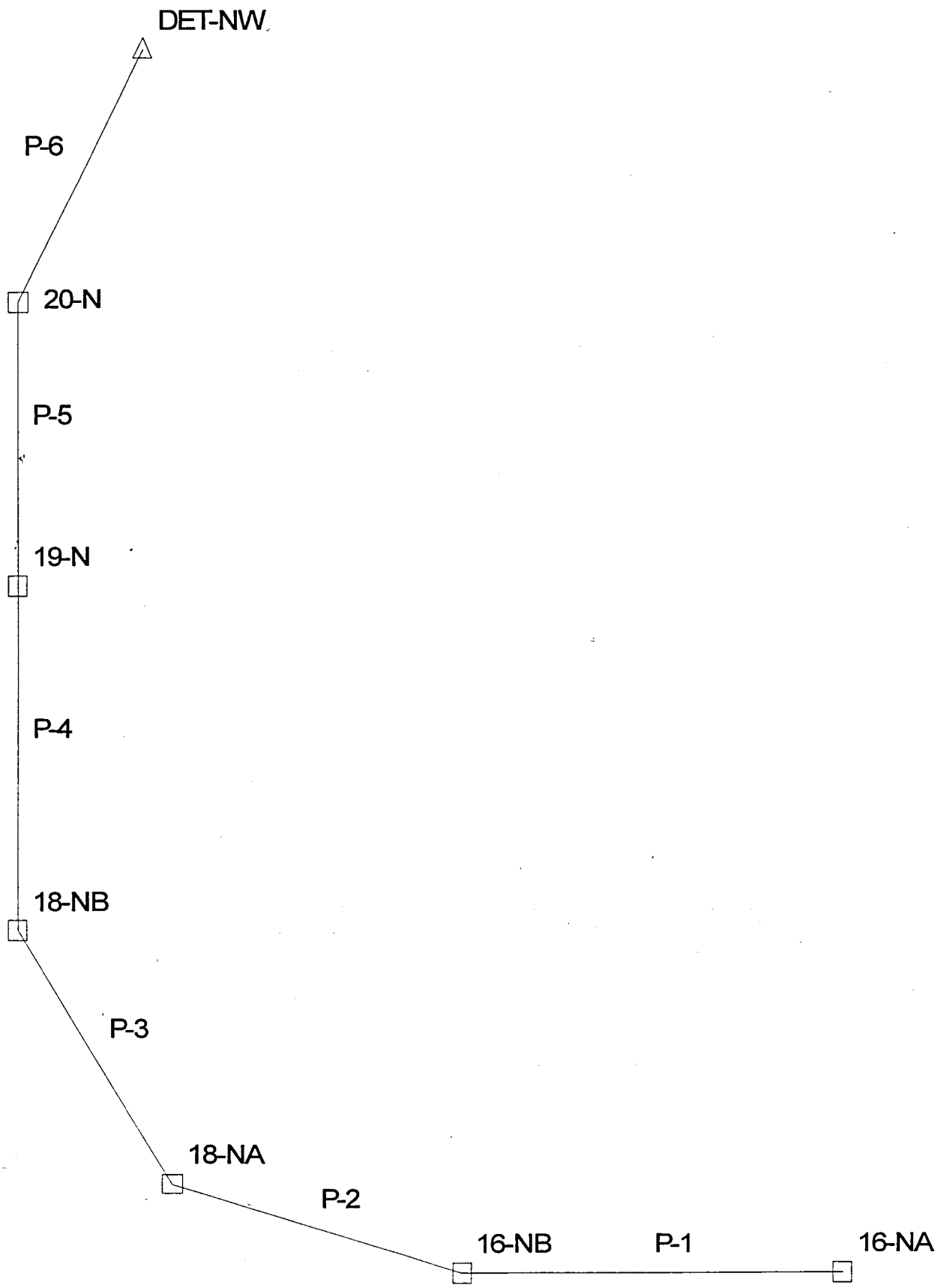
Appendix IV

StormCAD Analysis

Scenario: Base



Scenario: Base

Pipe Report

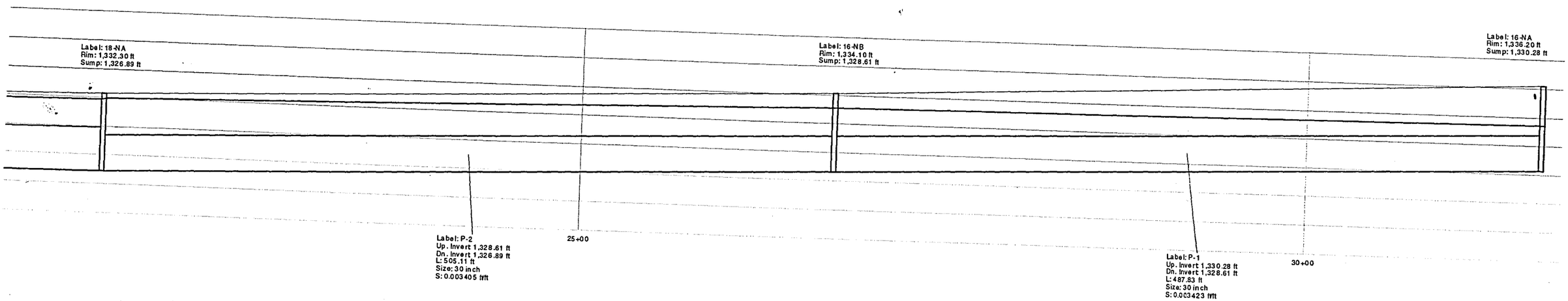
Label	Up. Node	Dn. Node	System Q (cfs)	L (ft)	S (ft/ft)	Size	#	n	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr Elev. (ft)	Dn. Gr. Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)	Exc. Cap.?
P-1	16-NA	16-NB	11.50	487.83	0.003423	30 inch	1	0.012	26.00	1,330.28	1,328.61	1,336.20	1,334.10	3.42	2.99	1,333.43	1,333.10	false
P-2	16-NB	18-NA	21.46	505.11	0.003405	30 inch	1	0.012	25.93	1,328.61	1,326.89	1,334.10	1,332.30	2.99	2.91	1,333.10	1,331.92	false
P-3	18-NA	18-NB	46.38	574.00	0.000993	36 inch	2	0.012	45.54	1,326.89	1,326.32	1,332.30	1,331.30	2.41	1.98	1,331.89	1,331.30	true
P-4	18-NB	19-N	79.32	685.45	0.001065	36 inch	2	0.012	47.16	1,326.32	1,325.59	1,331.30	1,331.80	1.98	3.21	1,331.51	1,329.44	true
P-5	19-N	20-N	119.15	481.79	0.001038	48 inch	2	0.012	100.26	1,325.59	1,325.09	1,331.80	1,332.60	2.21	3.51	1,329.37	1,328.74	true
P-6	20-N	DET-NW	139.66	429.04	0.001049	48 inch	2	0.012	100.79	1,325.09	1,324.64	1,332.60	1,333.00	3.51	4.36	1,328.63	1,327.17	true

Scenario: Base

Node Report

Label	Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
16-NA	0.00	11.50	1,336.20	1,336.20	1,333.45	1,333.43
16-NB	0.00	21.46	1,334.10	1,334.10	1,333.10	1,333.10
18-NA	0.00	46.38	1,332.30	1,332.30	1,331.92	1,331.89
18-NB	0.00	79.32	1,331.30	1,331.30	1,331.30	1,331.30
19-N	0.00	119.15	1,331.80	1,331.80	1,329.44	1,329.37
20-N	0.00	139.66	1,332.60	1,332.60	1,328.74	1,328.63
DET-NW		135.93	1,333.00	1,333.00	1,327.17	1,327.17

Profile
Scenario: Base



Title: WILLIAMS GATEWAY AIRPORT
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06/07/02 07:57:57 AM

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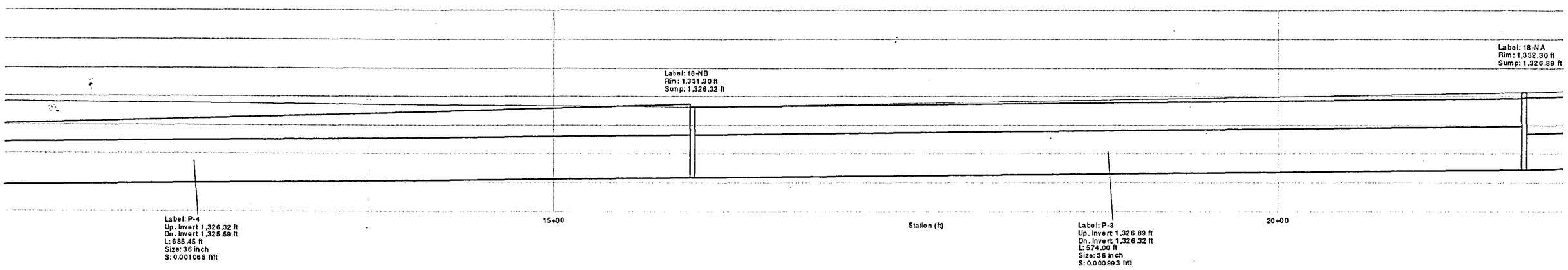
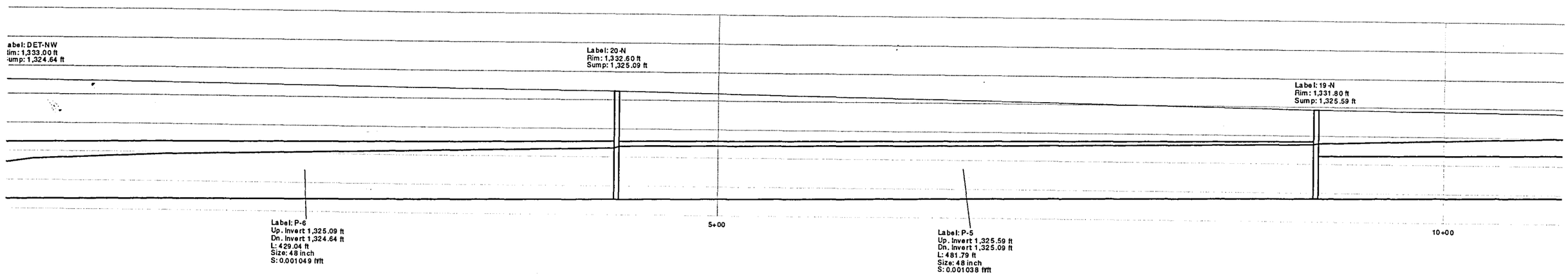
Gilbertson Associates, Inc.

Project Engineer: Gilbertson Associates, Inc.
StormCAD v4.1.1 [4.2014]

Profile
Scenario: Base



Profile
Scenario: Base



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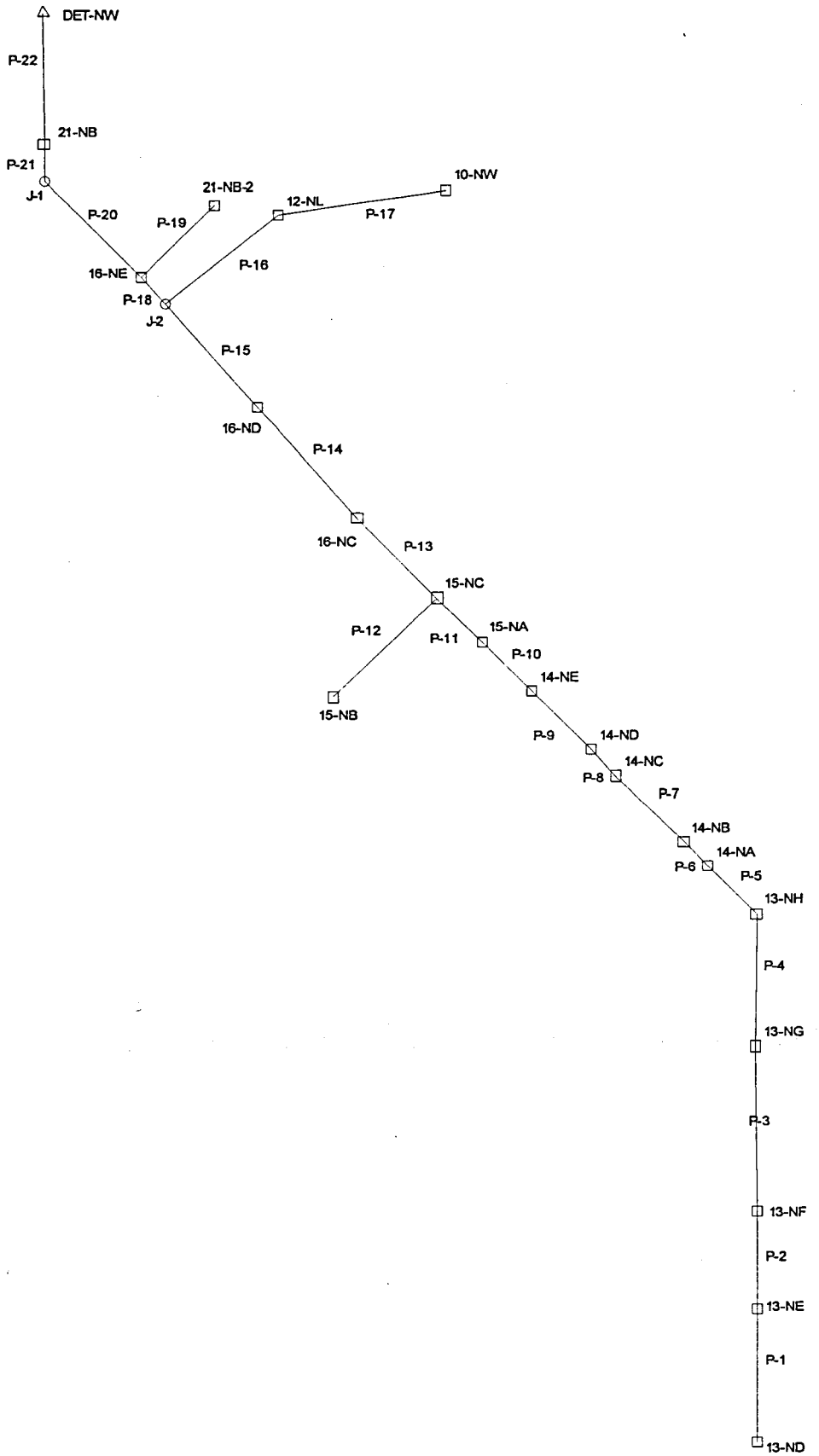
Gilbertson Associates, Inc.

Project Engineer: Gilbertson Associates, Inc.
StormCAD v4.1.1 [4.2014]

Scenario: Base



Scenario: Base

Pipe Report

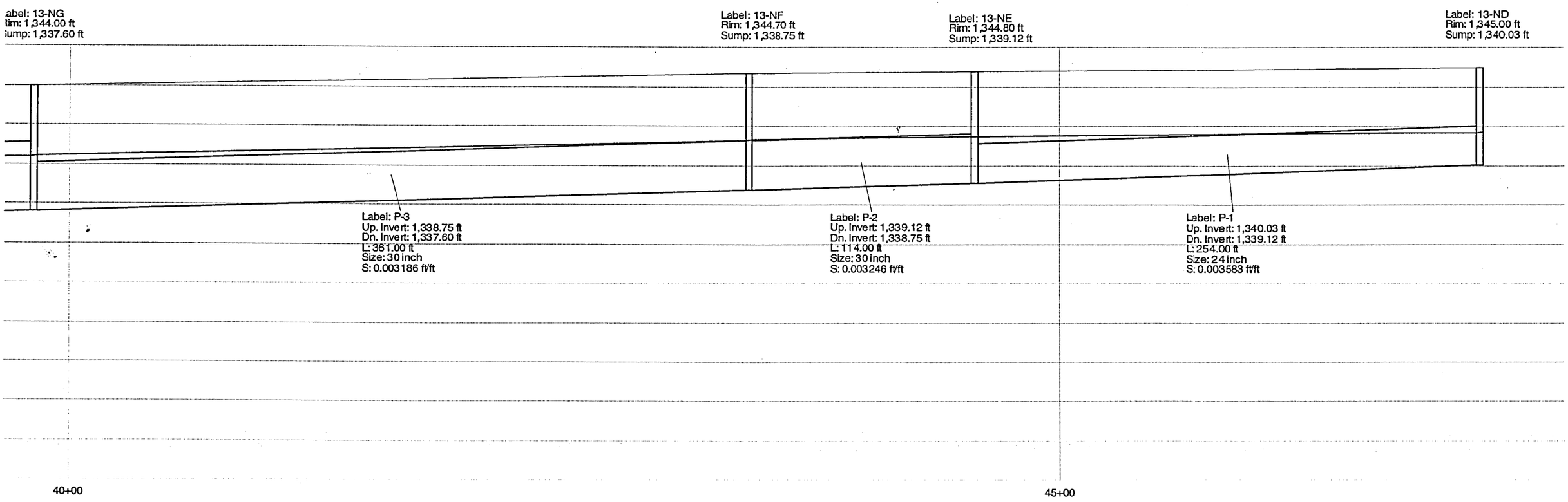
Label	Up. Node	Dn. Node	System Q (cfs)	L (ft)	S (ft/ft)	Size	#	n	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr Elev. (ft)	Dn. Gr. Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)	Exc. Cap.?
P-1	13-ND	13-NE	6.71	254.00	0.003583	24 inch	1	0.013	13.54	1,340.03	1,339.12	1,345.00	1,344.80	2.97	3.68	1,341.69	1,341.49	false
P-2	13-NE	13-NF	15.12	114.00	0.003246	30 inch	1	0.013	23.37	1,339.12	1,338.75	1,344.80	1,344.70	3.18	3.45	1,341.46	1,341.31	false
P-3	13-NF	13-NG	19.02	361.00	0.003186	30 inch	1	0.013	23.15	1,338.75	1,337.60	1,344.70	1,344.00	3.45	3.90	1,341.26	1,340.43	false
P-4	13-NG	13-NH	31.13	293.25	0.003205	42 inch	1	0.013	56.96	1,337.60	1,336.66	1,344.00	1,343.60	2.90	3.44	1,340.38	1,340.15	false
P-5	13-NH	14-NA	40.14	273.75	0.003215	42 inch	1	0.013	57.04	1,336.66	1,335.78	1,343.60	1,342.85	3.44	3.57	1,340.09	1,339.60	false
P-6	14-NA	14-NB	48.39	188.00	0.003191	48 inch	1	0.013	81.14	1,335.78	1,335.18	1,342.85	1,342.40	3.07	3.22	1,339.55	1,339.34	false
P-7	14-NB	14-NC	71.83	283.00	0.003216	48 inch	1	0.013	81.45	1,335.18	1,334.27	1,342.40	1,341.35	3.22	3.08	1,339.23	1,338.47	false
P-8	14-NC	14-ND	79.75	105.00	0.003238	48 inch	1	0.013	81.73	1,334.27	1,333.93	1,341.35	1,341.20	3.08	3.27	1,338.34	1,337.99	false
P-9	14-ND	14-NE	82.72	272.00	0.003199	48 inch	1	0.013	81.23	1,333.93	1,333.06	1,341.20	1,340.20	3.27	3.14	1,337.84	1,336.98	true
P-10	14-NE	15-NA	89.13	395.00	0.003190	54 inch	1	0.013	111.06	1,332.56	1,331.30	1,340.20	1,339.30	3.14	3.50	1,336.98	1,336.11	false
P-11	15-NA	15-NC	97.71	184.00	0.003207	54 inch	1	0.013	111.35	1,331.30	1,330.71	1,339.30	1,338.80	3.50	3.59	1,336.11	1,335.62	false
P-12	15-NB	15-NC	14.35	210.00	0.015667	24 inch	1	0.013	28.31	1,334.00	1,330.71	1,338.00	1,338.80	2.00	6.09	1,336.47	1,335.62	false
P-13	15-NC	16-NC	214.19	368.00	0.003207	54 inch	2	0.013	222.70	1,330.71	1,329.53	1,338.80	1,337.63	3.59	3.60	1,335.47	1,334.34	false
P-14	16-NC	16-ND	223.53	382.00	0.003194	54 inch	2	0.013	222.25	1,329.53	1,328.31	1,337.63	1,336.25	3.60	3.44	1,334.18	1,332.91	true
P-15	16-ND	J-2	230.81	148.00	0.003176	54 inch	2	0.013	221.62	1,328.31	1,327.84	1,336.25	1,335.80	3.44	3.46	1,332.91	1,332.38	true
P-16	12-NL	J-2	20.67	658.50	0.005011	54 inch	2	0.013	278.41	1,331.00	1,327.70	1,336.30	1,335.80	0.80	3.60	1,332.37	1,332.38	false
P-17	10-NW	12-NL	13.29	950.00	0.001579	60 inch	1	0.013	103.48	1,332.50	1,331.00	1,339.69	1,336.30	2.19	0.30	1,333.71	1,332.39	false
P-18	J-2	16-NE	237.06	68.24	0.001465	60 inch	2	0.013	199.39	1,327.34	1,327.24	1,335.80	1,335.80	3.46	3.56	1,332.27	1,332.14	true
P-19	21-NB-2	16-NE	3.00	470.00	0.008723	30 inch	1	0.024	20.75	1,332.72	1,328.62	1,336.80	1,335.80	1.58	4.68	1,333.36	1,332.14	false
P-20	16-NE	J-1	245.50	335.15	0.001373	60 inch	2	0.013	192.96	1,327.24	1,326.78	1,335.80	1,335.80	3.56	4.02	1,332.02	1,331.33	true
P-21	J-1	21-NB	242.74	121.85	0.001395	60 inch	2	0.013	194.55	1,326.78	1,326.61	1,335.80	1,336.01	4.02	4.40	1,331.12	1,330.85	true
P-22	21-NB	DET-NW	264.48	564.92	0.001398	66 inch	2	0.013	251.14	1,326.61	1,325.82	1,336.01	1,333.00	3.90	1.68	1,330.85	1,329.02	true

Scenario: Base

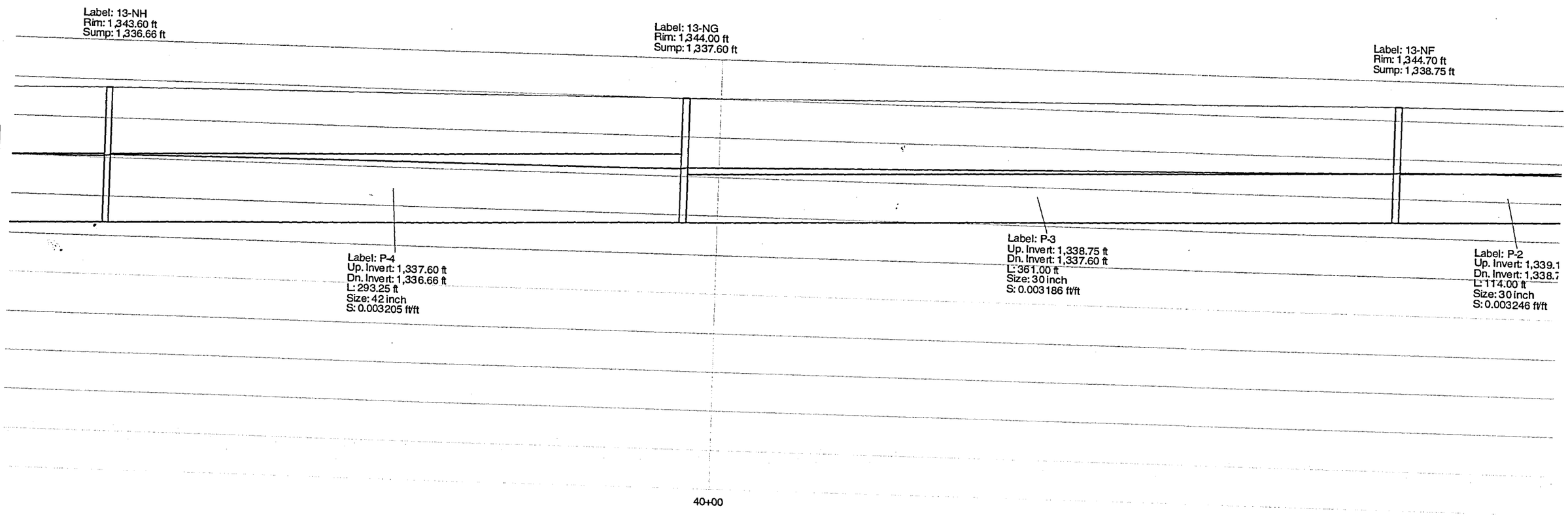
Node Report

Label	Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
13-ND	0.00	6.71	1,345.00	1,345.00	1,341.70	1,341.69
13-NE	0.00	15.12	1,344.80	1,344.80	1,341.49	1,341.46
13-NF	0.00	19.02	1,344.70	1,344.70	1,341.31	1,341.26
13-NG	0.00	31.13	1,344.00	1,344.00	1,340.43	1,340.38
13-NH	0.00	40.14	1,343.60	1,343.60	1,340.15	1,340.09
14-NA	0.00	48.39	1,342.85	1,342.85	1,339.60	1,339.55
14-NB	17.18	71.83	1,342.40	1,342.40	1,339.34	1,339.23
14-NC	0.00	79.75	1,341.35	1,341.35	1,338.47	1,338.34
14-ND	0.00	82.72	1,341.20	1,341.20	1,337.99	1,337.84
14-NE	0.00	89.13	1,340.20	1,340.20	1,336.98	1,336.98
15-NA	0.00	97.71	1,339.30	1,339.30	1,336.11	1,336.11
15-NB	0.00	14.35	1,338.00	1,338.00	1,336.47	1,336.47
15-NC	101.30	214.19	1,338.80	1,338.80	1,335.62	1,335.47
10-NW	0.00	13.29	1,339.69	1,339.69	1,333.71	1,333.71
16-NC	0.00	223.53	1,337.63	1,337.63	1,334.34	1,334.18
12-NL	0.00	20.67	1,336.30	1,336.30	1,332.39	1,332.37
16-ND	0.00	230.81	1,336.25	1,336.25	1,332.91	1,332.91
21-NB-2	3.00	3.00	1,336.80	1,336.80	1,333.36	1,333.36
J-2		237.06	1,335.80	1,335.80	1,332.38	1,332.27
16-NE	0.00	245.50	1,335.80	1,335.80	1,332.14	1,332.02
J-1		242.74	1,335.80	1,335.80	1,331.33	1,331.12
21-NB	0.00	264.48	1,336.01	1,336.01	1,330.85	1,330.85
DET-NW		260.00	1,333.00	1,333.00	1,329.02	1,329.02

Profile
Scenario: Base



Profile
Scenario: Base



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Project Engineer: Gilbertson Associates, Inc.
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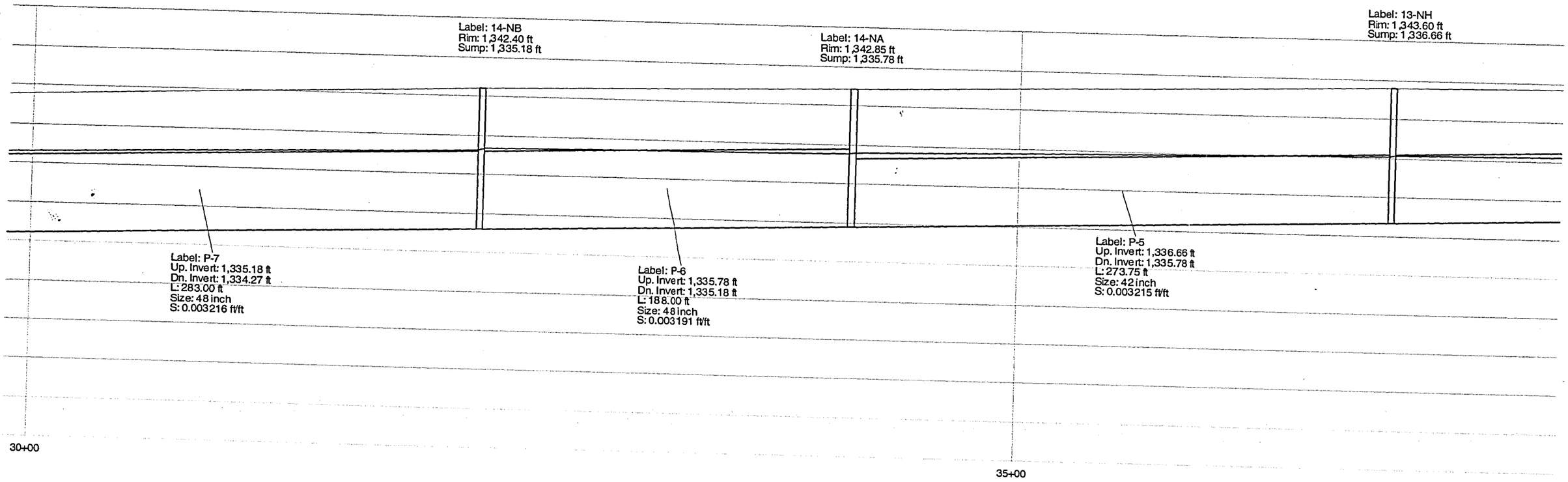
Profile
Scenario: Base



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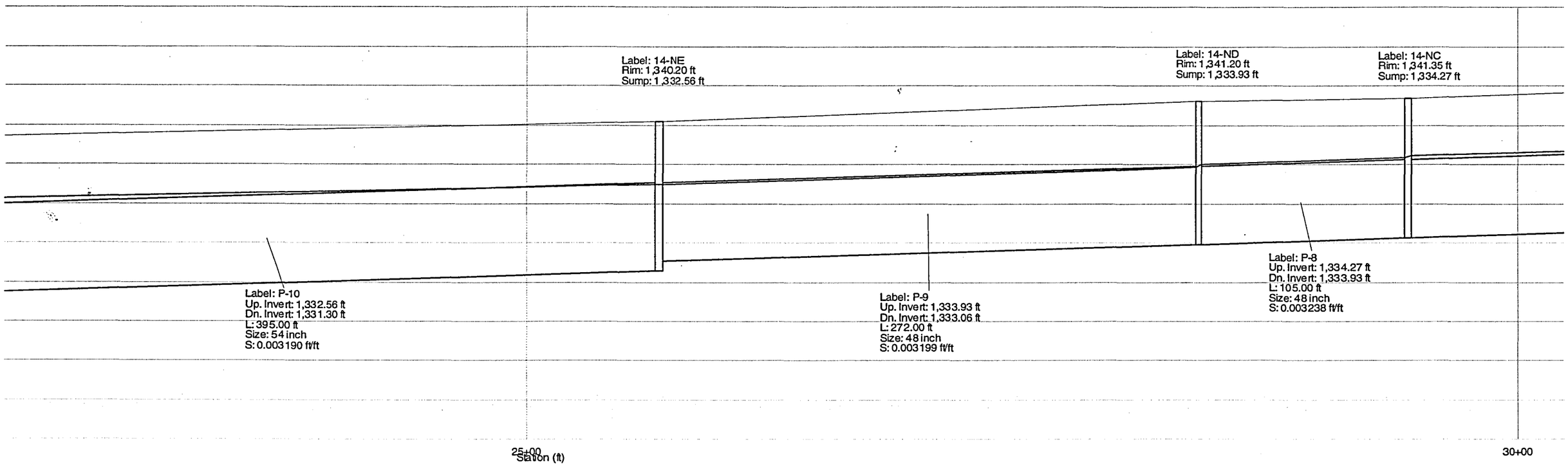

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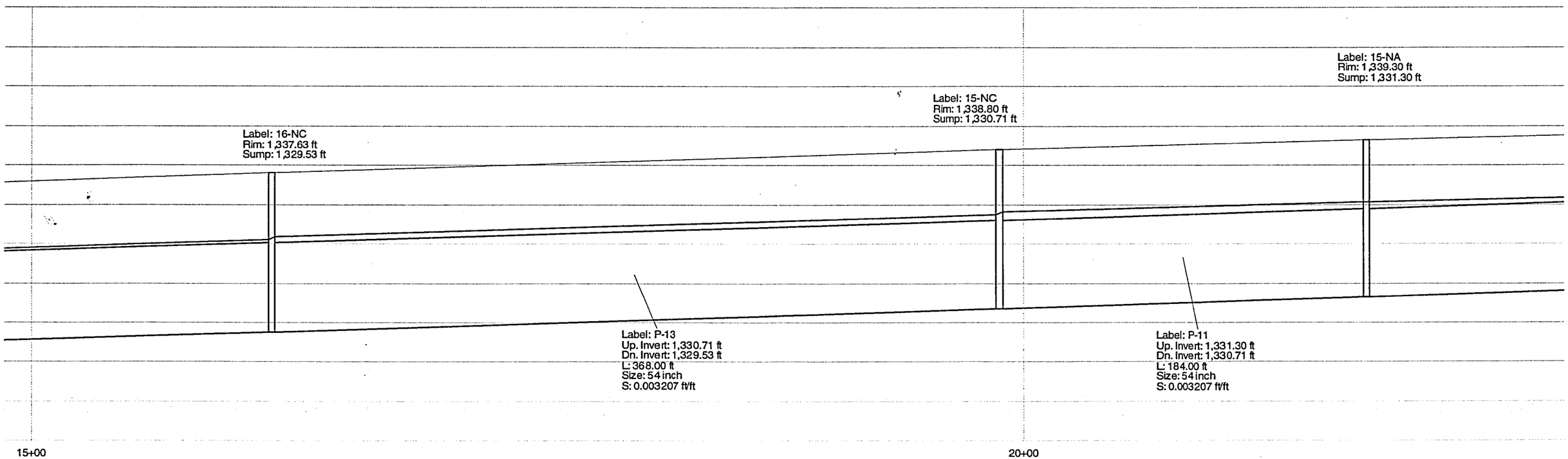

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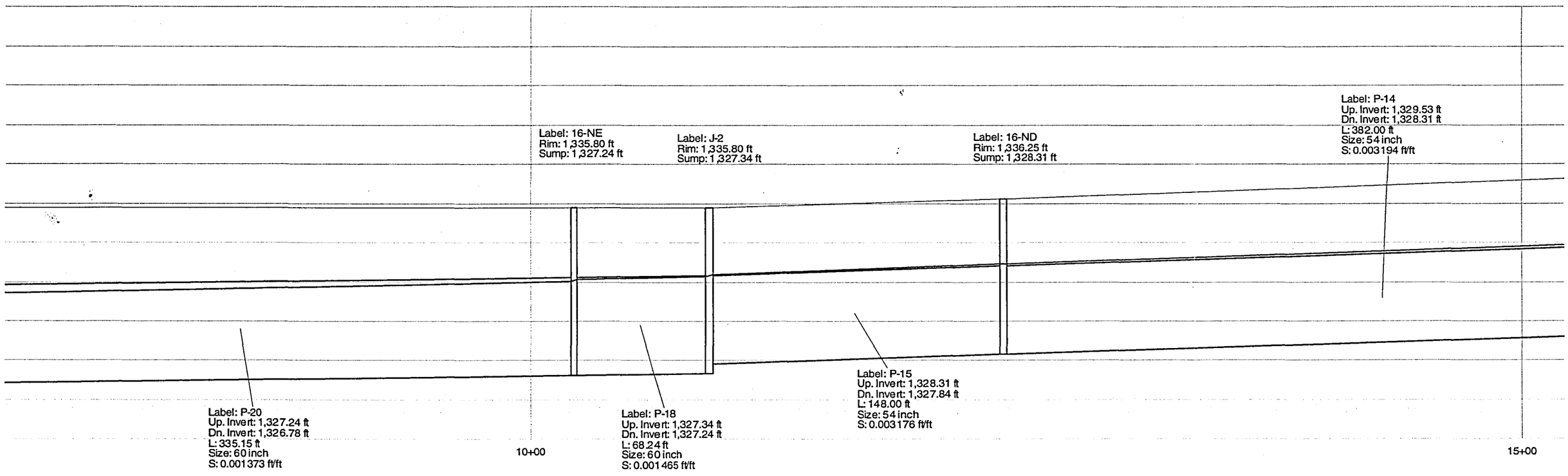

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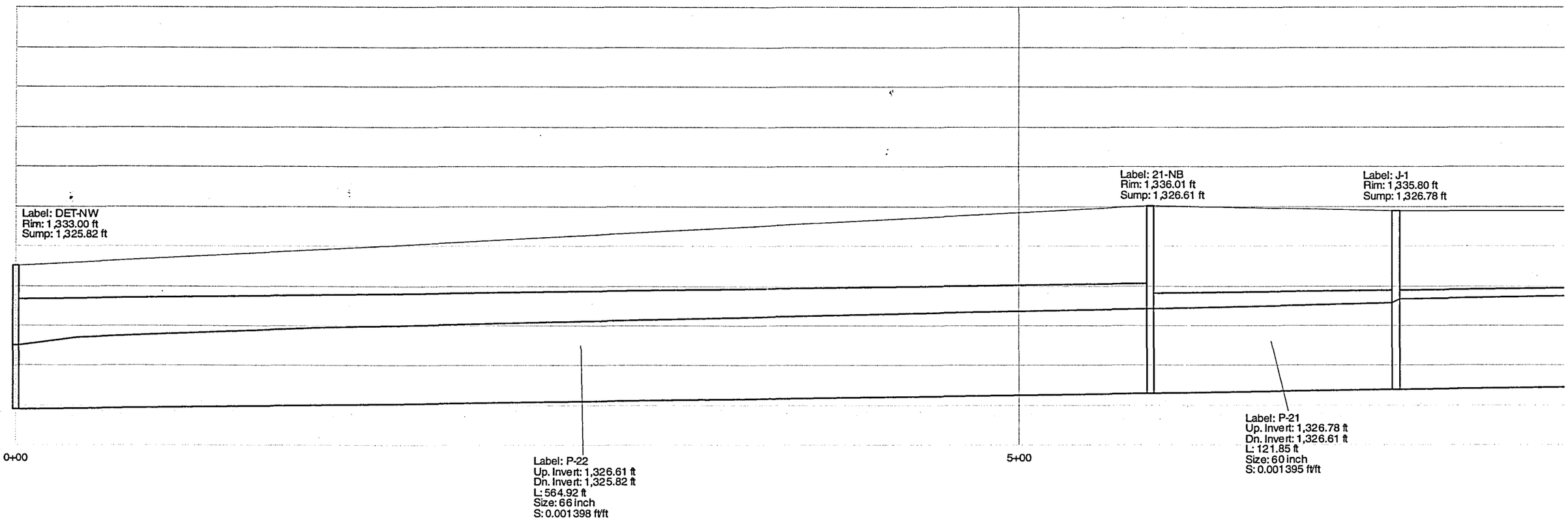

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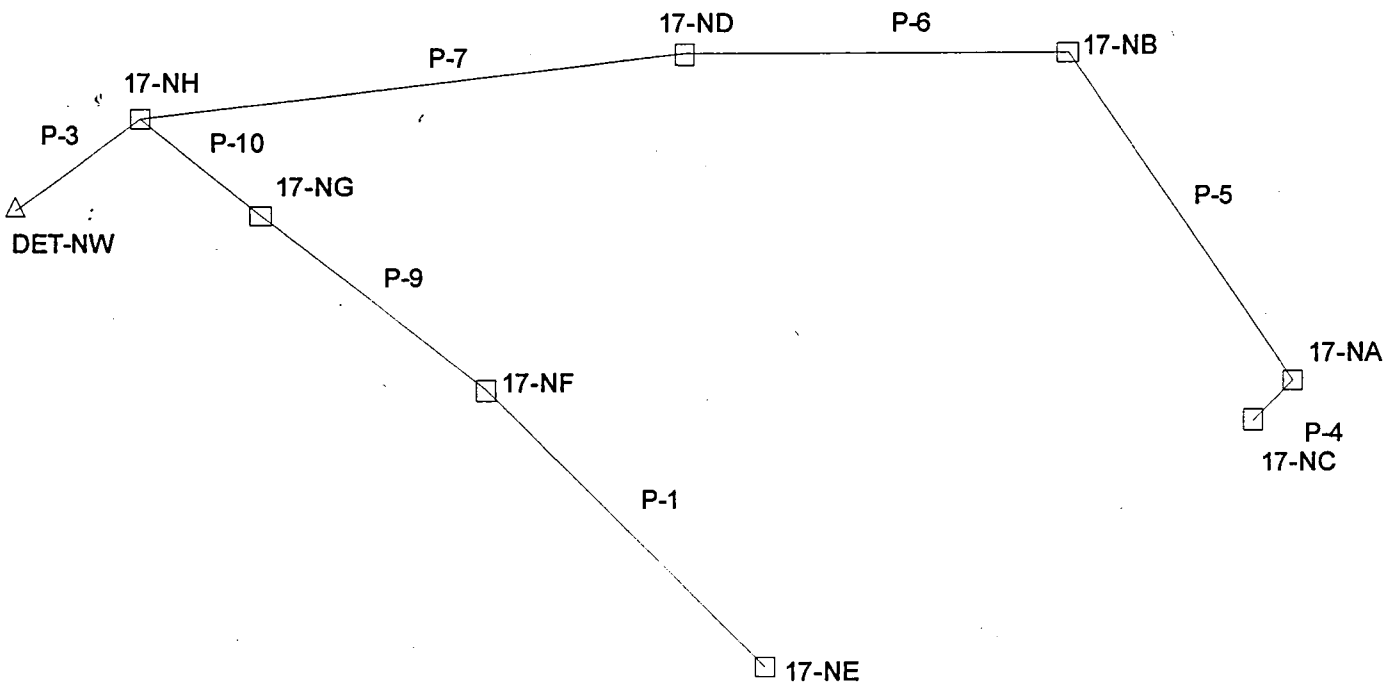
Was not Modified
from Master



Scenario: Base

Pipe Report

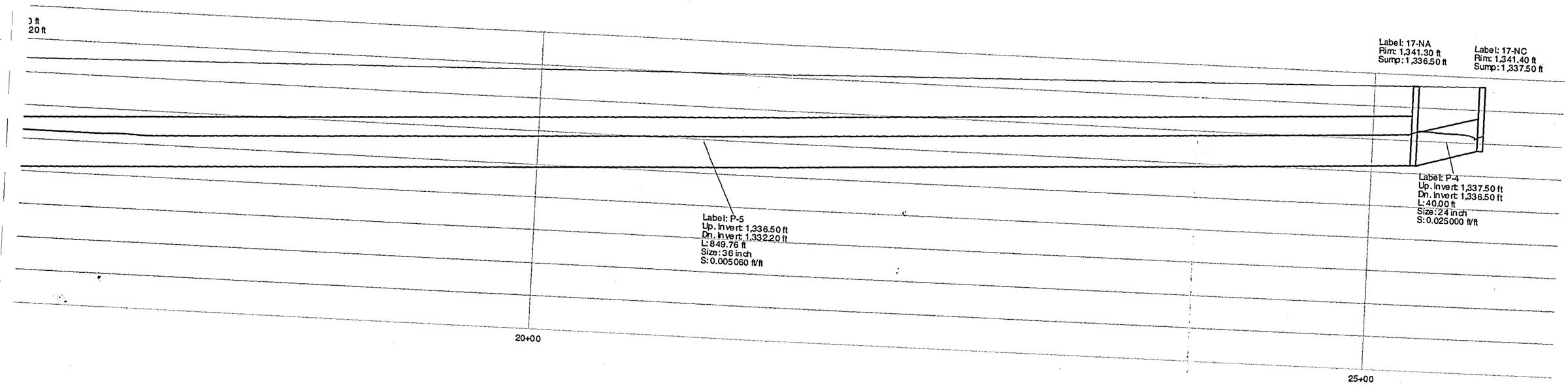
Label	Up. Node	Dn. Node	System Q (cfs)	L (ft)	S (ft/ft)	Size	#	n	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr Elev. (ft)	Dn. Gr. Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)	Exc. Cap.?
P-1	17-NE	17-NF	24.62	640.00	0.004000	30 inch	1	0.012	28.10	1,334.10	1,331.54	1,339.20	1,338.00	2.60	3.96	1,335.91	1,333.87	false
P-3	17-NH	DET-NW	93.76	414.00	0.002995	36 inch	2	0.012	79.09	1,325.24	1,324.00	1,334.90	1,332.70	6.66	5.70	1,328.20	1,326.23	true
P-4	17-NC	17-NA	5.84	40.00	0.025000	24 inch	1	0.013	35.77	1,337.50	1,336.50	1,341.40	1,341.30	1.90	2.80	1,338.35	1,338.54	false
P-5	17-NA	17-NB	33.37	849.76	0.005060	36 inch	1	0.013	47.44	1,336.50	1,332.20	1,341.30	1,338.80	1.80	3.60	1,338.38	1,334.47	false
P-6	17-NB	17-ND	40.89	416.40	0.011816	36 inch	1	0.012	78.54	1,332.20	1,327.28	1,338.80	1,337.70	3.60	7.42	1,334.28	1,329.96	false
P-7	17-ND	17-NH	46.55	845.00	0.002414	42 inch	1	0.012	53.55	1,327.28	1,325.24	1,337.70	1,334.90	6.92	6.16	1,329.84	1,328.34	false
P-9	17-NF	17-NG	29.34	600.00	0.004000	30 inch	1	0.012	28.10	1,331.04	1,328.64	1,338.00	1,334.50	4.46	3.36	1,333.76	1,331.14	true
P-10	17-NG	17-NH	46.46	350.00	0.004000	36 inch	1	0.012	45.70	1,328.64	1,327.24	1,334.50	1,334.90	2.86	4.66	1,331.14	1,329.46	true

Scenario: Base

Node Report

Label	Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
17-NC	0.00	5.84	1,341.40	1,341.40	1,338.42	1,338.35
17-NE	0.00	24.62	1,339.20	1,339.20	1,336.04	1,335.91
17-NA	0.00	33.37	1,341.30	1,341.30	1,338.54	1,338.38
17-NF	0.00	29.34	1,338.00	1,338.00	1,333.87	1,333.76
17-NB	0.00	40.89	1,338.80	1,338.80	1,334.47	1,334.28
17-NG	0.00	46.46	1,334.50	1,334.50	1,331.14	1,331.14
17-ND	0.00	46.55	1,337.70	1,337.70	1,329.96	1,329.84
17-NH	0.00	93.76	1,334.90	1,334.90	1,328.34	1,328.20
DET-NW		91.49	1,332.70	1,332.70	1,326.23	1,326.23

Profile
Scenario: Base



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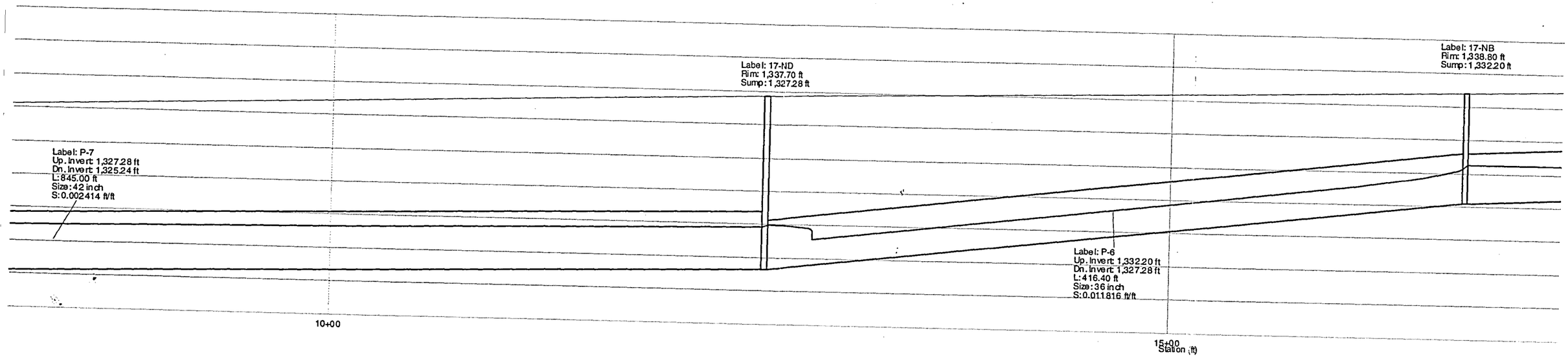
Profile
Scenario: Base



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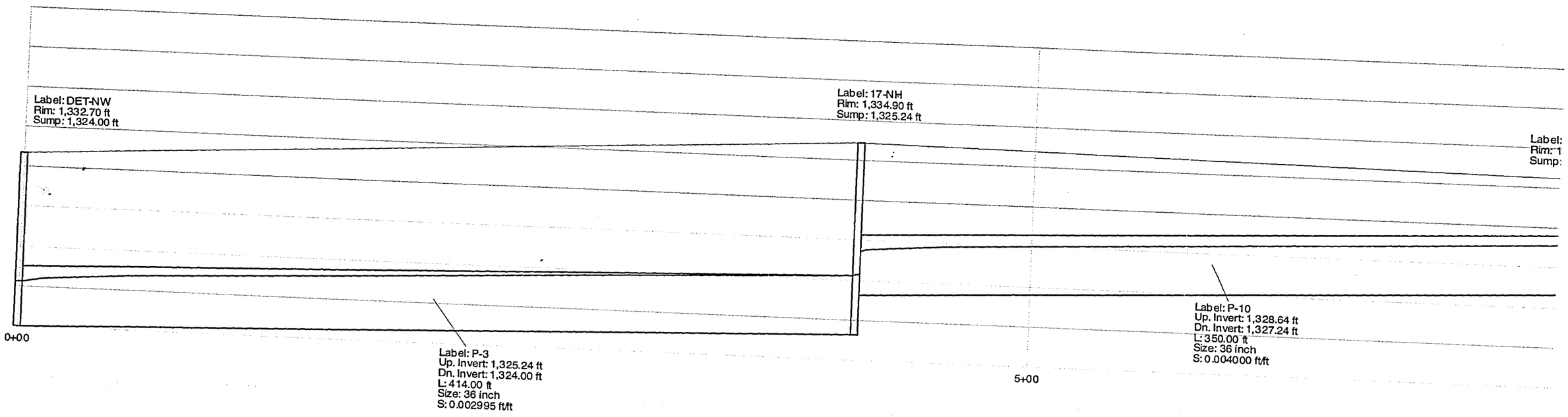

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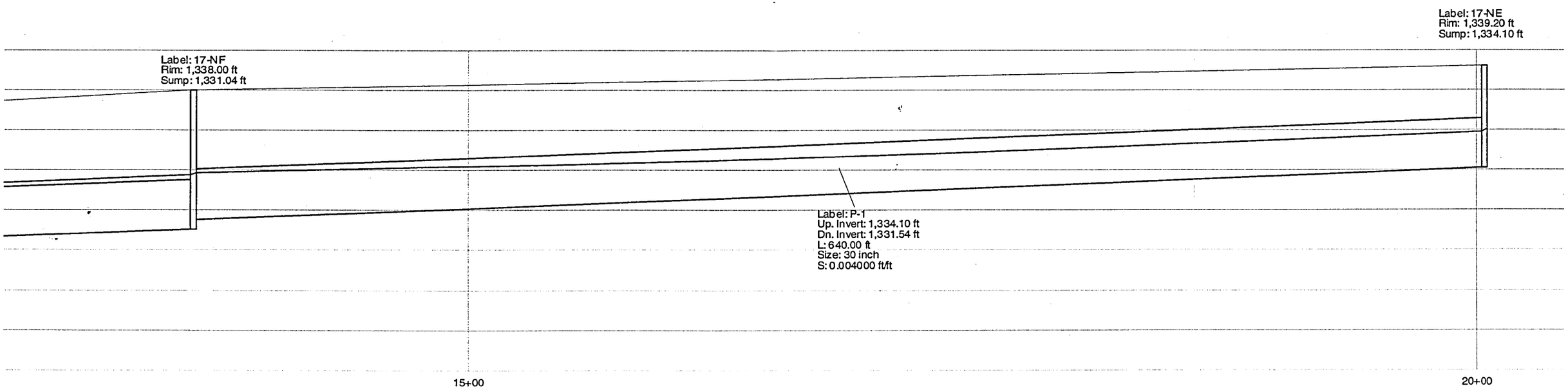

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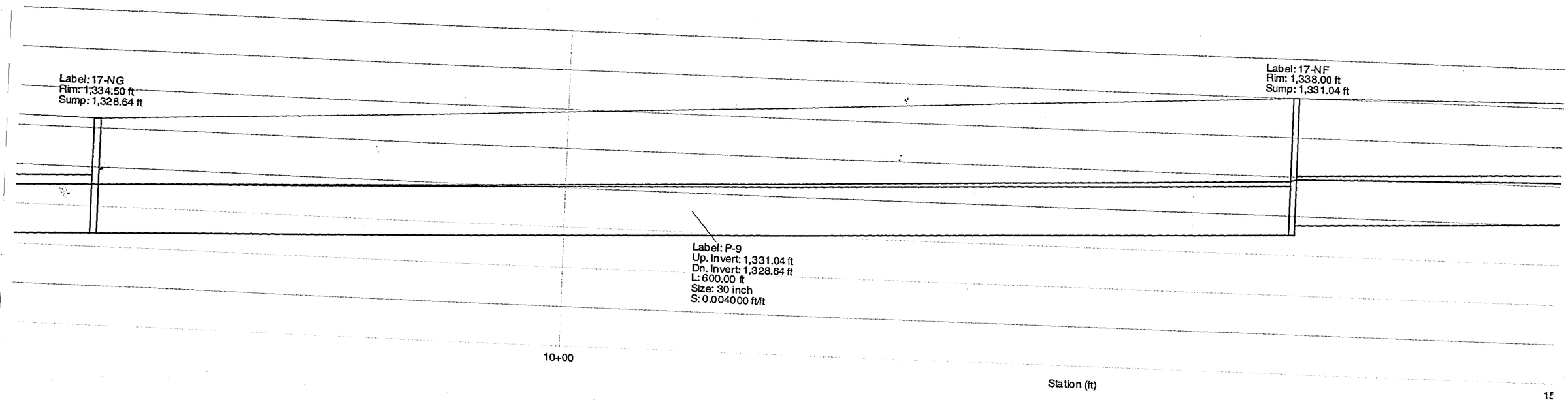

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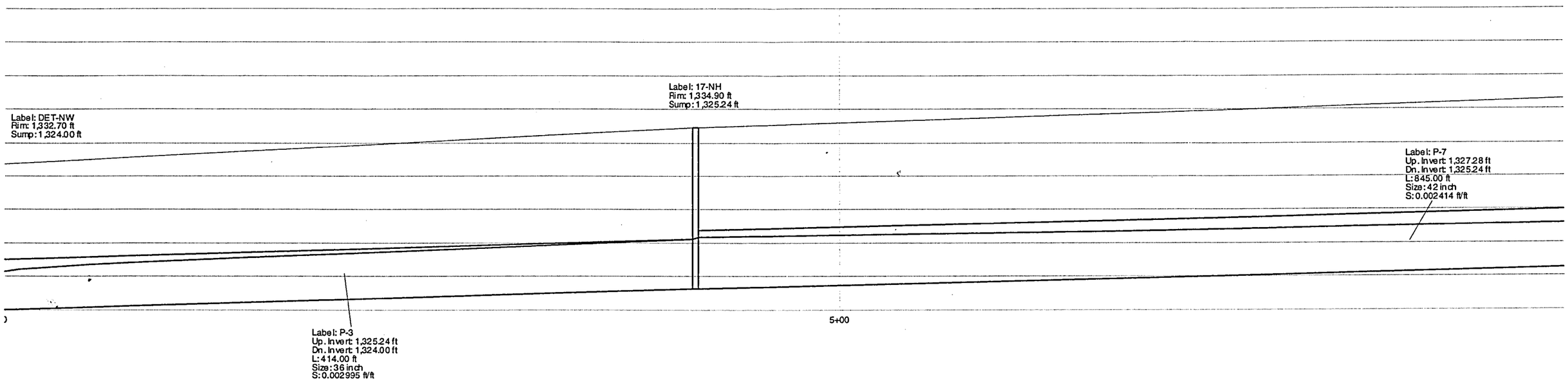


Appendix V

Improvement Plans

DRAINAGE IMPROVEMENTS
WILLIAMS GATEWAY AIRPORT

MESA, MARICOPA COUNTY, ARIZONA

CITY OF MESA
PROJECT NO. 02-83

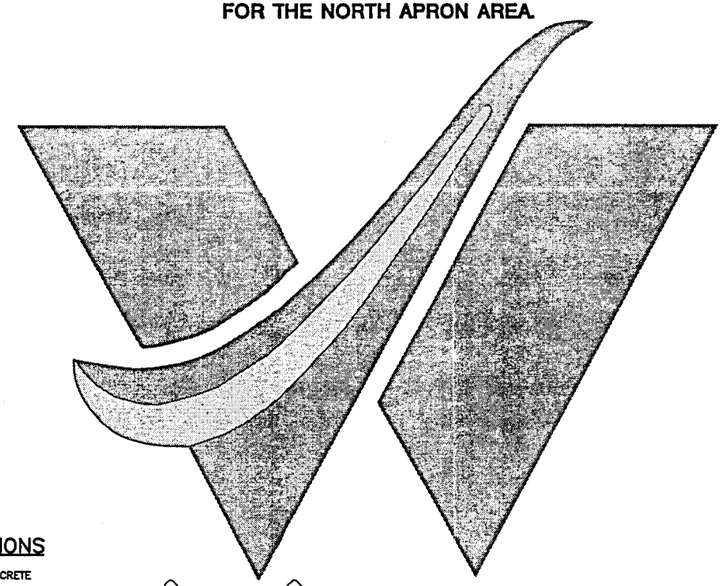
PROJECT DESCRIPTION
PHASE 1 GRADING AND DRAINAGE IMPROVEMENTS FOR THE NORTH APRON AREA.

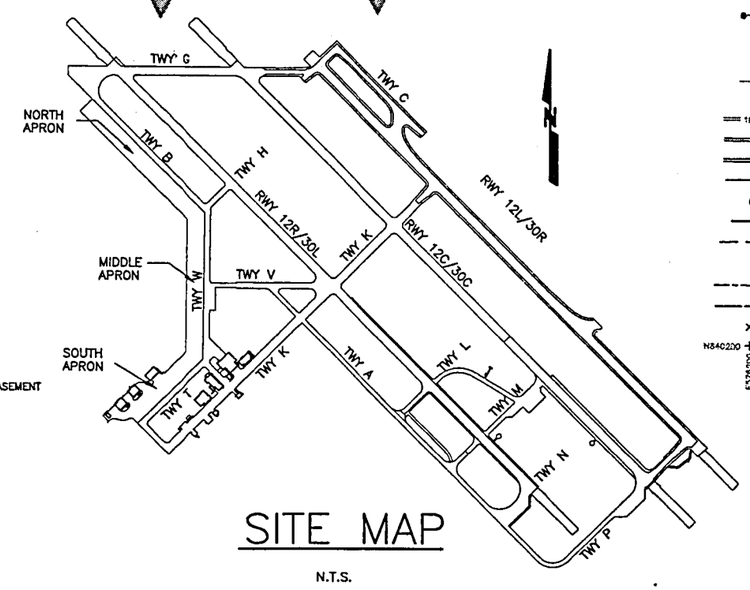
GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL CONFORM TO THE MOST CURRENT UNIFORM STANDARD SPECIFICATIONS AND DETAILS FOR PUBLIC WORKS CONSTRUCTION AS FURNISHED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS AND AS AMENDED BY THE CITY OF MESA. ALL WORK AND MATERIALS NOT IN CONFORMANCE WITH THESE AMENDED SPECIFICATIONS AND DETAILS ARE SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTORS EXPENSE.
2. CONTRACTOR IS RESPONSIBLE FOR VERIFYING LOCATIONS OF ALL EXISTING UTILITIES AND AVOIDING DAMAGE TO SAME. CALL (602) 263-1100 FOR BLUE STAKE. FOR SALT RIVER DISTRICT POLE BRACING, ELECTRIC SERVICE OR CONSTRUCTION SCHEDULING, CALL (602) 273-8888.
3. CONTRACTOR SHALL COMPLY WITH THE PROVISIONS FOR TRAFFIC CONTROL AND BARRICADING AS PER CURRENT CITY OF MESA "TRAFFIC BARRICADE MANUAL" FOR ALL PORTIONS OF WORK OUTSIDE 'AIR OPERATION AREAS'. WORK WITHIN 'AIR OPERATIONS AREAS' SHALL BE GOVERNED BY FAA REGULATIONS, SEE CONTRACT SPECIAL PROVISIONS.
4. CONTRACTOR TO POTHOLE EXISTING UTILITIES AHEAD OF HIS CONSTRUCTION, TO ALLOW FOR ANY NECESSARY ADJUSTMENT IN GRADE LINE, AND TO VERIFY PIPE TYPES FOR ORDERING PROPER TRANSITION, AND/OR TIE-IN FITTINGS WHICH MAY BE REQUIRED.
5. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO REMOVE ALL ABANDONED (RETIRED) UTILITIES THAT INTERFERE WITH THE CONSTRUCTION PROJECT. THE CITY OF MESA UTILITY CONSTRUCTION DIVISION WILL ASSIST THE CONTRACTOR IN DETERMINING IF THE UTILITY (GAS, WATER, AND SEWER ONLY) IS ABANDONED. FOR UTILITIES OUTSIDE THE WGA BOUNDARY CALL (480) 644-2754 FOR ASSISTANCE.
6. THE CONTRACTOR IS ADVISED THAT AN EXCAVATIONS AND DIRT MOVING PERMIT MAY BE REQUIRED BY THE MARICOPA COUNTY HEALTH DEPARTMENT. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO OBTAIN THIS PERMIT, IF NECESSARY, AND COMPLY WITH ITS REQUIREMENTS.
7. THE EXISTING UTILITIES ARE PLOTTED FROM AVAILABLE RECORDS. THE CONTRACTOR SHALL TAKE PRECAUTIONARY MEASURES TO PROTECT THESE UTILITIES. THE ENGINEER MAKES NO WARRANTY AS TO THE EXISTENCE OF ANY UTILITIES OR STRUCTURES NOT SHOWN IN AVAILABLE RECORDS. THE CONTRACTOR SHALL NOTIFY BLUE STAKE AT LEAST 48 HOURS BEFORE DIGGING (1-800-782-5348), AND WGAA ENGINEERING AT LEAST 96 HOURS PRIOR TO DIGGING (480-988-1013).
8. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL EXISTING UTILITIES AND THE PROTECTION AND REPAIR OF DAMAGE TO THEM. THE CONTRACTOR SHALL POTHOLE IF NECESSARY IN AREAS OF SHALLOW OR CONGESTED UTILITIES TO VERIFY EXACT LOCATIONS OF UTILITIES AS REQUIRED DURING CONSTRUCTION ACTIVITIES. ANY UTILITIES ENCOUNTERED WHICH ARE NOT SHOWN SHALL BE NOTED ON THE AS-BUILTS.
9. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND/OR THE SURVEYOR PROVIDING THE CONSTRUCTION LAYOUT TO COMPARE THE SITE CONDITIONS WITH THE PLANS AND NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES OBSERVED. SHOULD ANY GRADE OR DESIGN INDICATED ON THE PLANS BE SUSPECT, THE ENGINEER SHALL BE NOTIFIED OF SAID AREA AT LEAST TWENTY-FOUR HOURS BEFORE CONSTRUCTION IS SCHEDULED TO BEGIN ON THE AFFECTED AREA, ANY DISCREPANCIES SHALL BE DEEMED TO BE THE RESPONSIBILITY OF THE CONTRACTOR AND/OR SURVEYOR.
10. CONTRACTOR SHALL ADJUST ALL MANHOLES, VALVE BOXES, CLEAN OUTS, AND DUCT MARKERS TO FINISH GRADE. ELECTRICAL PULL BOXES MUST BE SET ONE INCH ABOVE GRADE. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE OTHER ITEMS OF WORK, EXCEPT WHEN THE BIDDING SCHEDULE CONTAINS SPECIFIC ITEMS ON A UNIT BASIS.
11. SAW CUTTING OF ASPHALT PAVEMENT SHALL BE REQUIRED FOR ASPHALT PAVEMENT REMOVAL IN EVERY LOCATION WHERE NEW PAVEMENT MUST MATCH EXISTING PAVEMENT.
12. LOCATION OF THE CONTRACTORS ENTRANCES, HAUL ROUTES AND YARD/STAGING AREAS SHALL BE VERIFIED AT THE PRE CONSTRUCTION CONFERENCE.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY LIGHTING AND/OR JUMPER CABLES TO MAINTAIN LIGHTING ON AREAS NOT CLOSED FOR CONSTRUCTION.
14. THE CONTRACTOR MUST REMOVE ALL DEBRIS FROM THE AIRFIELD PAVEMENTS BEFORE OPENING THE AREA TO AIRCRAFT.
15. THE CONTRACTOR MUST PROVIDE TWENTY-FOUR HOUR ACCESS TO EMERGENCY VEHICLES THROUGHOUT THE CONSTRUCTION AREA.
16. INSPECTION SHALL BE PROVIDED BY THE CITY OF MESA. THE CONTRACTOR SHALL NOTIFY THE CITY INSPECTION DEPARTMENT AT LEAST 48 HOURS IN ADVANCE OF ANY CONSTRUCTION.
17. ALL EQUIPMENT AND MATERIALS NOT SHOWN OR SPECIFIED ON THE PLANS OR SPECIFICATIONS, BUT REQUIRED TO COMPLETE THIS PROJECT, SHALL BE PROVIDED BY THE CONTRACTOR AS PART OF THIS CONTRACT AT NO ADDITIONAL COST TO THE CITY.
18. VERTICAL OR HORIZONTAL BENDS SHALL BE PIPE JOINT DEFLECTIONS UNLESS OTHERWISE NOTED. PIPE JOINT DEFLECTIONS SHALL NOT EXCEED PIPE MANUFACTURERS RECOMMENDATIONS.
19. ANY SURVEY MARKERS DISTURBED OR DAMAGED BY THE CONTRACTOR SHALL BE REPLACED IN KIND AT NO ADDITIONAL COST TO THE CITY.

ABBREVIATIONS

AC	ASPHALT CONCRETE
ASPH	ASPHALT PAVEMENT
BC	BACK OF CURB
BLDG	BUILDING
C.A.S.S.	CENTRALIZED AIRCRAFT SUPPORT SYSTEM
CB	CATCH BASIN
CONC	CONCRETE PAVEMENT
E	ELECTRIC
EXST	EXISTING
G	GAS
GB	GRADE BREAK
HVAC	HEATING, VENTILATING, AIR CONDITIONING
MH	MANHOLE
NG	NATURAL GAS
OHE	OVERHEAD ELECTRIC
PCC	PORTLAND CEMENT CONCRETE
PP	POWER POLE
PU&FE	PUBLIC UTILITY AND FACILITY EASEMENT
PVMT	PAVEMENT
R/W	RIGHT OF WAY
SD	STORM DRAIN
S	SEWER LINE
TEL	TELEPHONE
TX	TRANSFORMER
UGE	UNDERGROUND ELECTRIC
VCG	VERTICAL CURB AND GUTTER
VCP	VITRIFIED CLAY PIPE
W	WATER

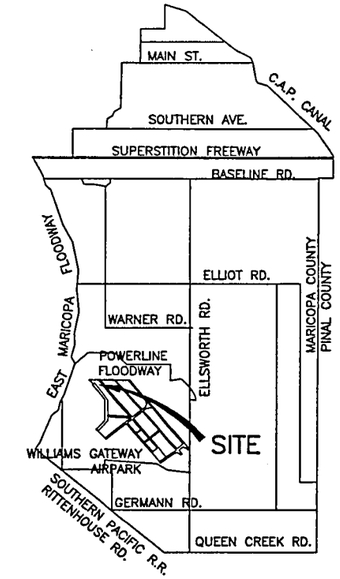




SITE MAP
N.T.S.

LEGEND

—1343—	EXISTING CONTOUR
—1343—	PROPOSED CONTOUR
	EXISTING PAVEMENT MARKINGS
	EXISTING EDGE ASPHALT PAVEMENT
	EXISTING CONCRETE PAVEMENT
	EXISTING CONCRETE CURB
	EXISTING TELCO RISER
	EXISTING POWER POLE
	EXISTING GUY DOWN
	EXISTING SIGN
	EXISTING WOOD POST
	EXISTING FIRE HYDRANT
	EXISTING CLEAN OUT
	EXISTING MANHOLE
	PROPOSED MANHOLE
CB	EXISTING CATCH BASIN\INLET
	PROPOSED CATCH BASIN
	EXISTING VALVE
EX 8" WATER —W—	EXISTING UNDERGROUND UTILITY
	EXISTING GATE
BLDG	EXISTING BUILDING
	EXISTING WIRE FENCE
	EXISTING WOOD FENCE
	EXISTING LIGHT
—OHE—	EXISTING OVERHEAD ELECTRIC
	EXISTING POWER POLE W/ TRANSFORMER
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
	PROPOSED STORM DRAIN BY OTHERS
	PROPERTY LINE
	SURVEY MONUMENT
	RIGHT OF WAY
	EASEMENT
	BASELINE FOR STATIONING
	LOT LINE
X1343.9	SPOT ELEVATION
N840200 E378200	GRID TIC & COORDINATES



VICINITY MAP
NTS

SHEET INDEX-PHASE ONE

1	COVER SHEET
2	HORIZONTAL CONTROL MAP & SHEET INDEX
3	PLAN SHEET KEY
4-10	PLAN & PROFILES
11	DETENTION BASIN GRADING & DRAINAGE
12-14	CONSTRUCTION DETAILS, NOTES & QUANTITIES.
S1-S3	STRUCTURAL DETAILS

BENCH MARK

CHISELED ☒ TOP OF IRRIGATION HEADWALL
N.W. CORNER OF POWER AND RAY ROADS.
CITY OF MESA DATUM - ELEV. = 1323.04

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
BLUE STAKE CENTER

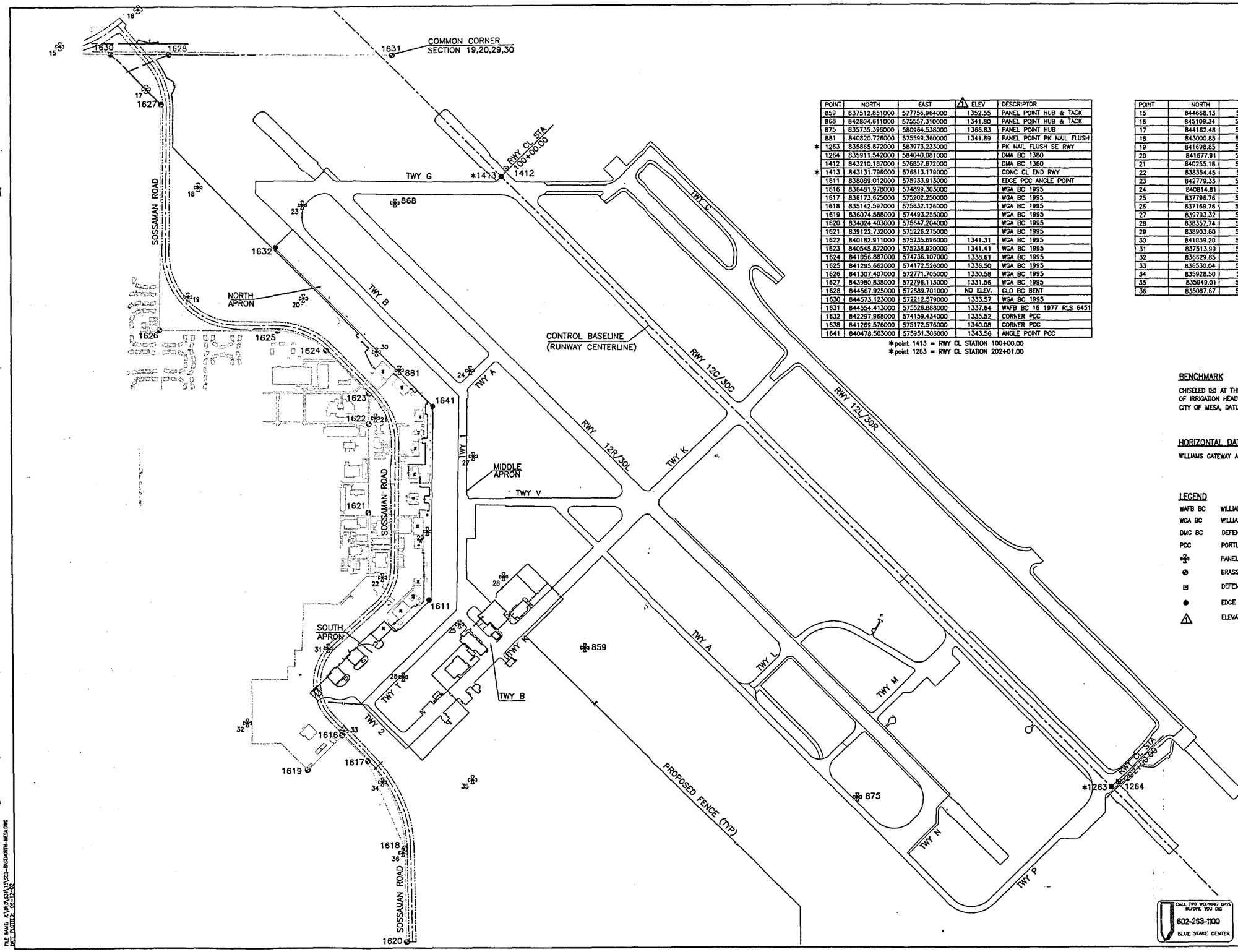
340 WO | CATALOG NO. : A-

GILBERTSON ASSOCIATES inc.
consulting civil engineers & land surveyors
15974 North 77th Street . Scottsdale, Arizona 85260-1761 480/607/2244

DRAINAGE IMPROVEMENTS
NORTH APRON
WILLIAMS GATEWAY AIRPORT
COVER SHEET

Designed by DS	Drawn by CS	
Date JUNE 12, 2002	Job No. 53115	Sheet 1 of 17

FILE NAME: K:\JOB\53115\SDI-NORTH-MESLING
DATE PLOTTED: 06-12-02



POINT	NORTH	EAST	⚠ ELEV	DESCRIPTOR
859	837512.851000	577756.964000	1352.55	PANEL POINT HUB & TACK
868	842804.611000	575557.310000	1341.80	PANEL POINT HUB & TACK
875	835735.396000	580964.538000	1366.83	PANEL POINT HUB
881	840820.726000	575599.360000	1341.89	PANEL POINT PK NAIL FLUSH
* 1263	835865.872000	583973.233000		PK NAIL FLUSH SE RWY
1264	835911.542000	584040.081000		DMA BC 1360
1412	843210.187000	576857.672000		DMA BC 1360
* 1413	843131.795000	576813.179000		CONC CL END RWY
1611	838089.012000	575933.913000		EDGE PCC ANGLE POINT
1616	836481.978000	574899.303000		WGA BC 1995
1617	836173.625000	575202.250000		WGA BC 1995
1618	835142.597000	575632.126000		WGA BC 1995
1619	836074.588000	574493.255000		WGA BC 1995
1620	834024.403000	575647.204000		WGA BC 1995
1621	839122.732000	575226.275000		WGA BC 1995
1622	840182.911000	575235.696000	1341.31	WGA BC 1995
1623	840545.872000	575238.920000	1341.41	WGA BC 1995
1624	841056.887000	574736.107000	1338.61	WGA BC 1995
1625	841295.662000	574172.526000	1336.50	WGA BC 1995
1626	841307.407000	572771.705000	1330.58	WGA BC 1995
1627	843980.838000	572796.113000	1331.56	WGA BC 1995
1628	844567.925000	572889.701000	NO ELEV.	GLO BC BENT
1630	844573.123000	572212.579000	1333.57	WGA BC 1995
1631	844554.413000	575526.888000	1337.64	WAFB BC 16 1977 RLS 6451
1632	842297.968000	574159.434000	1335.52	CORNER PCC
1638	841269.576000	575172.576000	1340.08	CORNER PCC
1641	840478.503000	575951.306000	1343.56	ANGLE POINT PCC

*point 1413 = RWY CL STATION 100+00.00
*point 1263 = RWY CL STATION 202+01.00

POINT	NORTH	EAST	ELEV	DESCRIPTOR
15	844668.13	571616.41	1331.92	P Pt#1 H&T
16	845109.34	572530.86	1334.04	P Pt#2 H&T
17	844162.48	572624.16	1330.68	P Pt#3 H&T
18	843000.85	573238.43	1333.76	P Pt#4 H&T
19	841698.85	573108.80	1333.19	P Pt#5 H&T
20	841577.91	574472.08	1337.35	P Pt#6 H&T
21	840255.16	575314.79	1341.47	P Pt#7 H&T
22	838354.45	575389.11	1342.25	P Pt#8 H&T
23	842779.33	574465.84	1337.80	P Pt 9
24	840814.81	576423.01	1345.01	P Pt 10 H&T
25	837796.76	576284.30	1344.66	P Pt 11 H&T
26	837169.76	575625.36	1343.20	P Pt 12 H&T
27	839793.32	576453.34	1346.70	P Pt 13 PK
28	838357.74	576804.56	1347.54	P Pt 14 H&T
29	838903.60	575917.52	1344.74	P Pt 15 H&T
30	841039.20	575332.49	1340.89	P Pt 16 H&T
31	837513.99	574740.49	1340.43	P Pt 17 H&T
32	836629.85	573801.40	1337.91	P Pt#18 H&T
33	836530.04	574920.89	1343.20	P Pt#19 H&T
34	835928.50	575374.41	1344.63	P Pt#20 H&T
35	835949.01	576423.22	1349.64	P Pt#21 H&T
36	835087.67	575609.26	1346.82	P Pt#22 H&T

BENCHMARK

CHISELED ⊠ AT THE TOP NORTHWEST CORNER
OF IRRIGATION HEADWALL – POWER AND RAY ROAD
CITY OF MESA, DATUM – ELEV. = 1323.04'

HORIZONTAL DATUM

WILLIAMS GATEWAY AIRPORT GRID 1997

LEGEND

WAFB BC	WILLIAMS AIRFORCE BASE BRASS CAP
WGA BC	WILLIAMS GATEWAY AIRPORT BRASS CAP
DMC BC	DEFENSE MAPPING AGENCY BRASS CAP
PCC	PORTLAND CONCRETE CEMENT
✠	PANEL POINT (TYPE AS NOTED)
⊘	BRASS CAP (TYPE AS NOTED)
⊠	DEFENSE MAPPING AGENCY BRASS CAP
●	EDGE CONCRETE
⚠	ELEVATIONS REVISED 2/29/00

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

N

SCALE: 1" = 500'
0' 500' 1000' 1500'

340 WO | CATALOG NO. : A–

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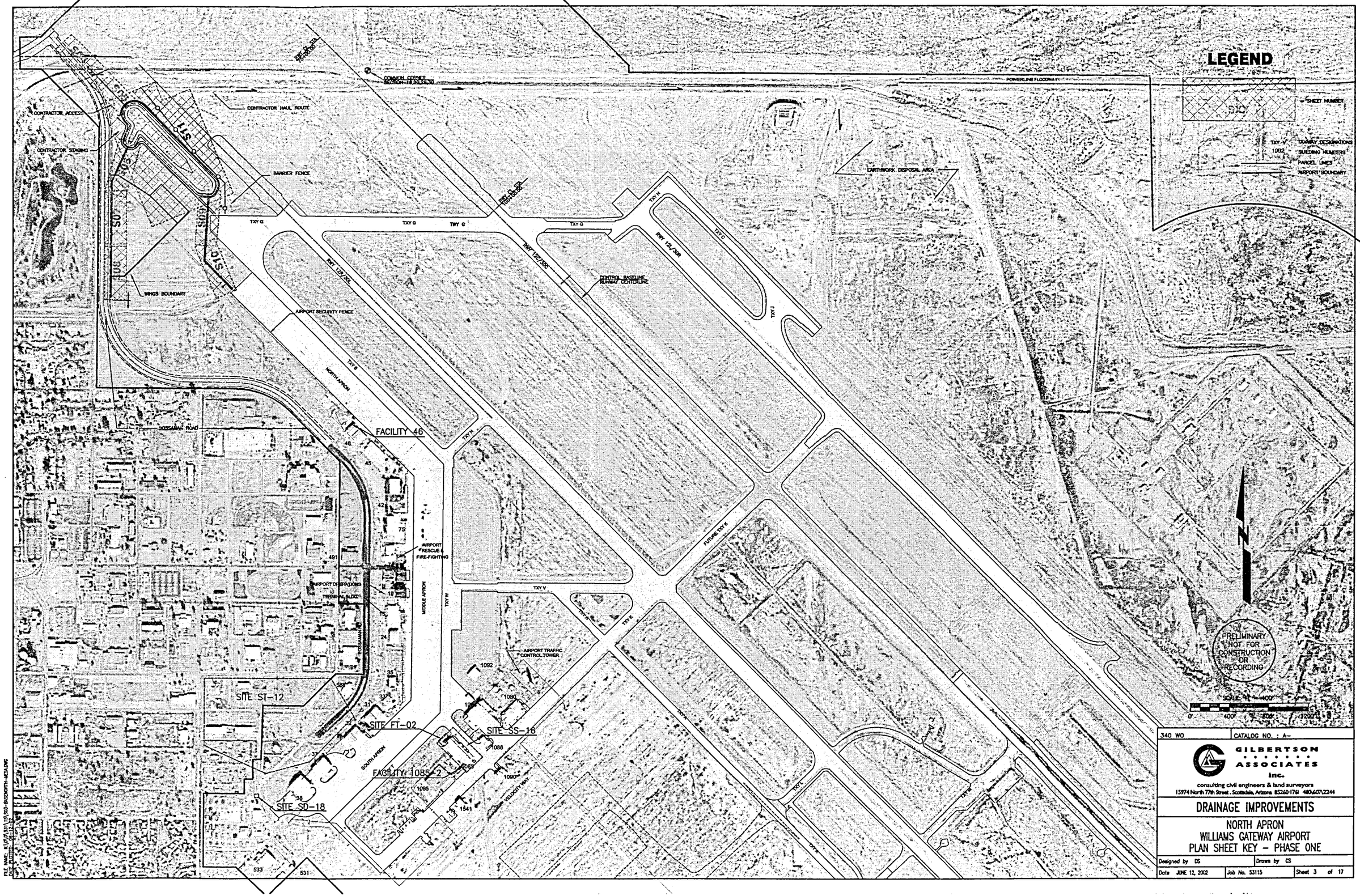
DRAINAGE IMPROVEMENTS

NORTH APRON
WILLIAMS GATEWAY AIRPORT
HORIZONTAL CONTROL PLAN

Designed by DS | Drawn by CS
Date JUNE 12, 2002 | Job No. 53115 | Sheet 2 of 17

FILE NAME: K:\D\D_53115\D_53115_02-BASEMAP-HORIZ.DWG
DATE PLOTTED: 06-12-02


LEGEND
SHEET NUMBER
TXY-V TAXWAY DESIGNATIONS
1092 BUILDING NUMBERS
PARCEL LINES
AIRPORT BOUNDARY
POWERLINE FLOODWAY
CONTRACTOR ACCESS
CONTRACTOR HAUL ROUTE
CONTRACTOR STAGING
BARRIER FENCE
WINGS BOUNDARY
AIRPORT SECURITY FENCE
EARTHWORK DISPOSAL AREA
CENTRAL BASELINE RUNWAY CENTERLINE
RWY 12L/30R
RWY 12R/30L
RWY 12C/30C
TWY C
TXY G
TXY H
TXY J
TXY K
TXY L
TXY V
TXY W
NORTH APRON
MIDDLE APRON
SOUTH APRON
FUTURE TXY K
FACILITY 46
FACILITY 1085-2
SITE ST-12
SITE FT-02
SITE SS-16
SITE SD-18
AIRPORT RESCUE FIRE-FIGHTING
AIRPORT OPERATIONS TERMINAL BLDG
AIRPORT TRAFFIC CONTROL TOWER
ROSSMAN ROAD
YELDOTT WAY
PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
SCALE 1" = 400'
0' 400' 800' 1200'
340 WO
CATALOG NO. : A-
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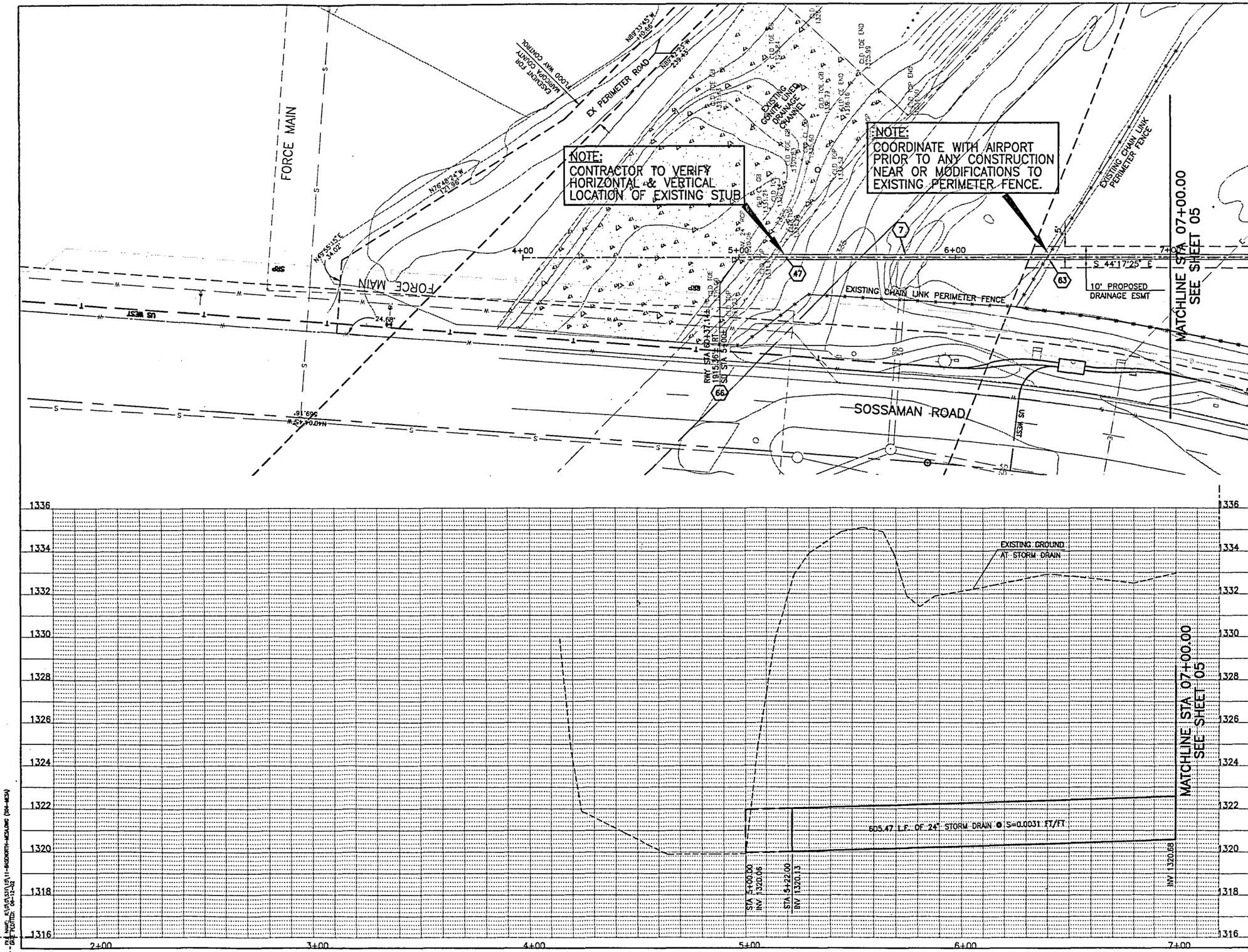
15974 North 77th Street . Scottsdale, Arizona 85260-1791 480.607.2344
DRAINAGE IMPROVEMENTS
NORTH APRON
WILLIAMS GATEWAY AIRPORT
PLAN SHEET KEY - PHASE ONE
Designed by DS
Drawn by CS
Date JUNE 12, 2002
Job No. 53115
Sheet 3 of 17



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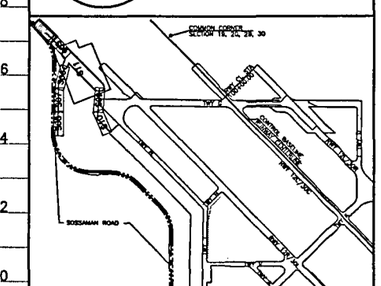
CONSTRUCTION NOTES

7. INSTALL 24" STORM DRAIN PIPE PER PROFILE.
47. LOCATE AND CONNECT TO EXISTING CONCRETE STORM DRAIN PIPE STUB IN GUNITE CHANNEL.
63. REMOVE AND REPLACE EXISTING CHAIN LINK SECURITY FENCE IN KIND.
66. SAWCUT, REMOVE & REPLACE CONCRETE CHANNEL LINING IN KIND AS NEEDED.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL
0' 20' 40' 80'

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING



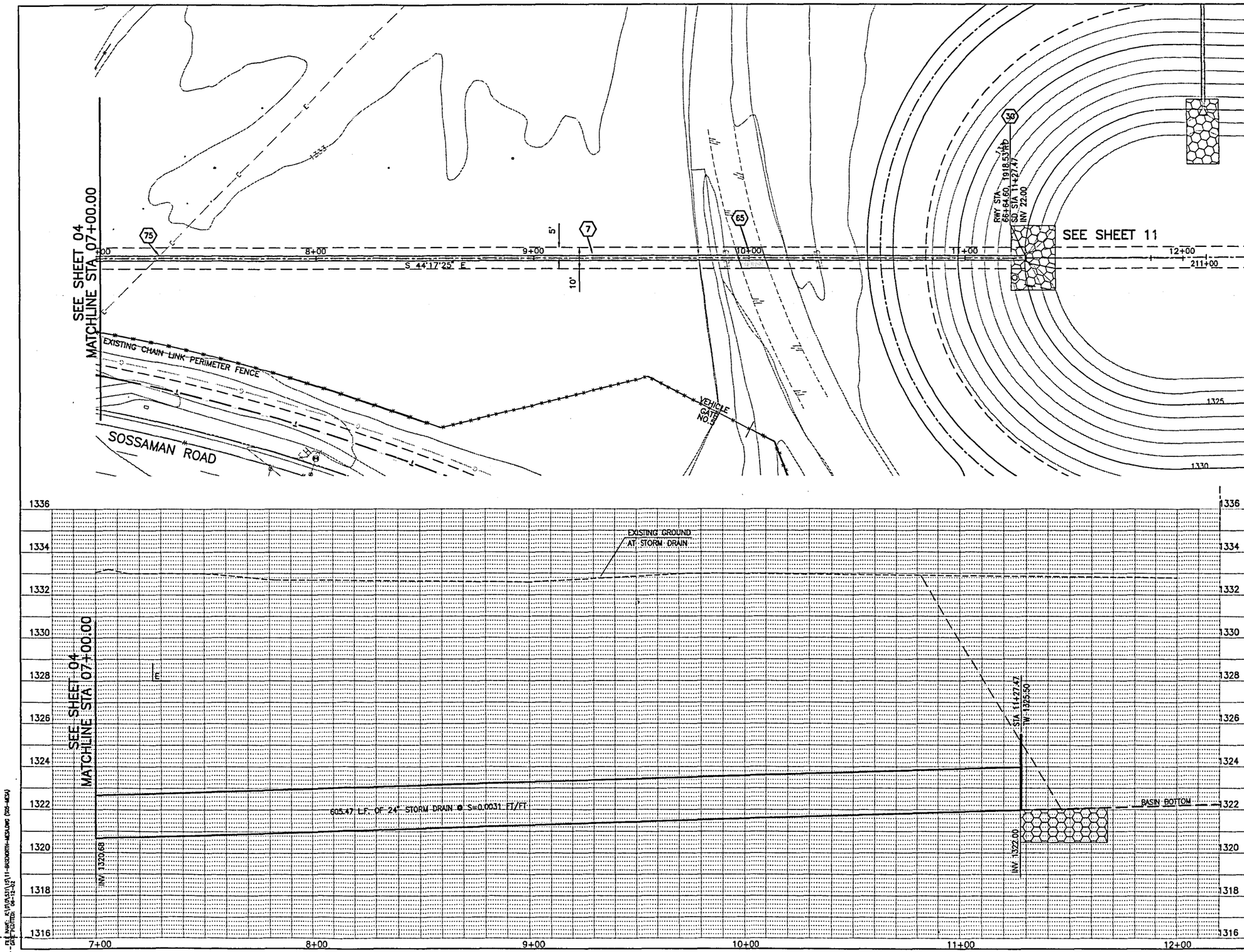
340 WO | CATALOG NO. : A-

DRAINAGE IMPROVEMENTS

NORTH APRON
WILLIAMS GATEWAY AIRPORT

Designed by DS | Drawn by CS
Date JUNE 12, 2002 | Job No. 53115 | Sheet 4 of 17

FILE NAME: K:\05\53115\11-BASENORTH-MODIFIED (304-MESA)
DATE PLOTTED: 06-12-02



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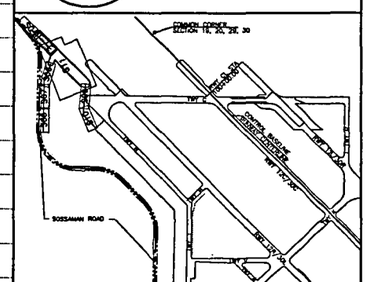
CONSTRUCTION NOTES

7. INSTALL 24" STORM DRAIN PIPE PER PROFILE AND DETAILS SHEET D-2.
30. INSTALL HEADWALL PER M.A.G. STD. DETAIL 501-1, "U" TYPE.
65. SAWCUT, REMOVE AND REPLACE EXIST. ASPHALT PAVEMENT IN KIND & PER DETAILS ON SHEET D-2.
75. COORDINATE EXISTING UTILITY CONFLICT WITH WILLIAMS GATEWAY AIRPORT AND UTILITY PROVIDER PRIOR TO CONSTRUCTION IN AREA.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL
0' 20' 40' 60'

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING



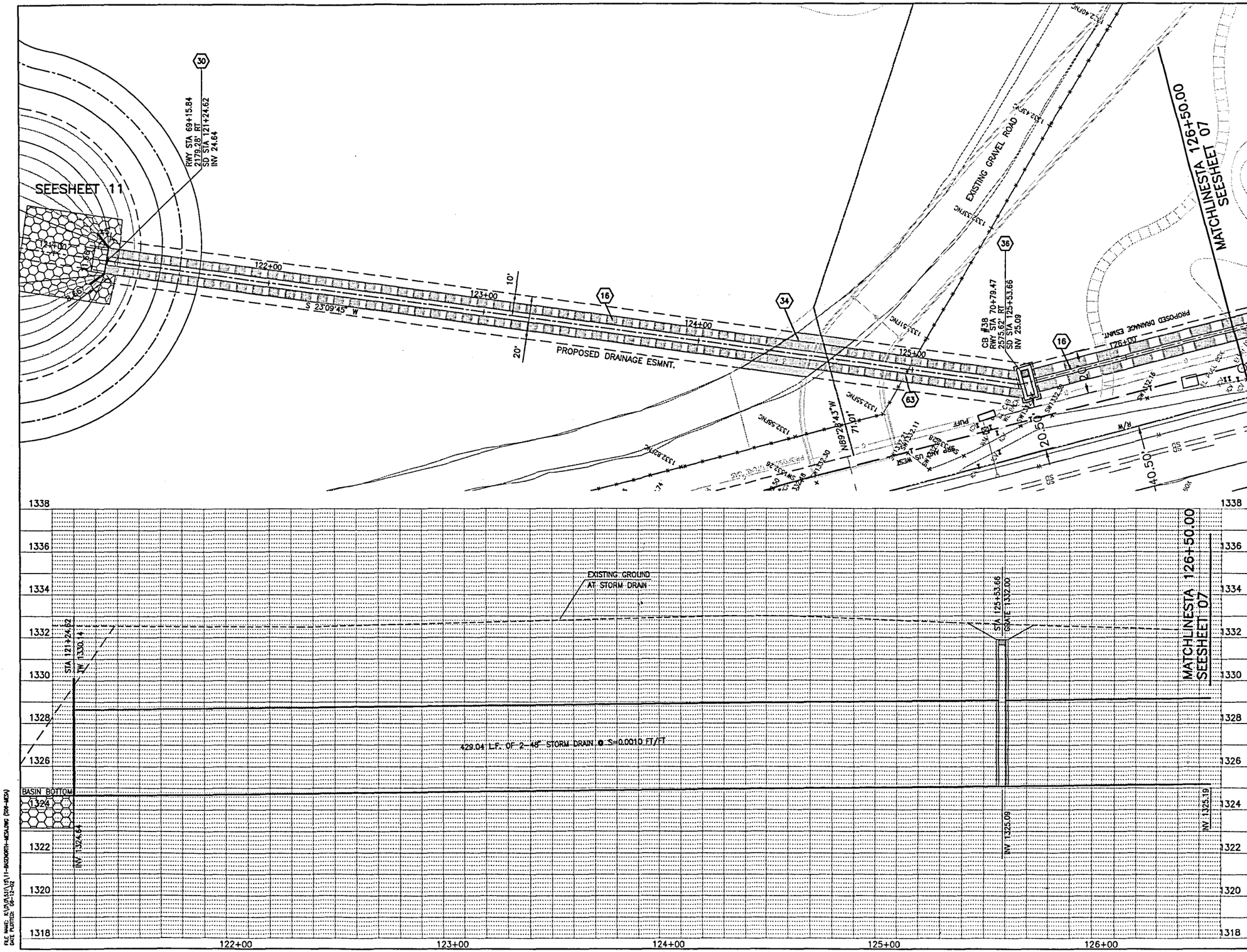
340 WO | CATALOG NO. : A-

DRAINAGE IMPROVEMENTS

NORTH APRON
WILLIAMS GATEWAY AIRPORT

Designed by DS | Drawn by CS
Date JUNE 12, 2002 | Job No. 53115 | Sheet 5 of 17

FILE NAME: K:\P\A31\S11-BASNORTH-MCSLONG (GSS-MCSV)
DATE PLOTTED: 06-12-02



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CONSTRUCTION NOTES

16 INSTALL 2-48" STORM DRAIN PIPES PER PROFILE AND DETAILS ON SHEET D2.

30 INSTALL OUTLET HEADWALL PER DIMENSIONS SHOWN AND PER DETAILS ON SHEETS S1, S2, AND S3. SLOPE WINGS AT 4:1.

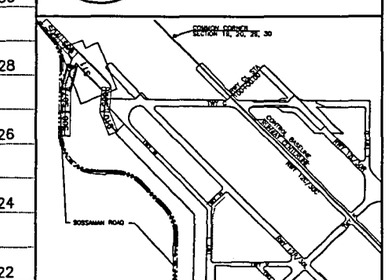
36 CONSTRUCT PERIMETER ROAD PER DETAIL ON SHEET D-2.

36 CONSTRUCT CATCH BASIN PER DETAILS ON SHEETS D1, S1, S2 & S3. GRATE OPENING SIZE 3.25' X 3.50'.

63 REMOVE AND REPLACE EXISTING CHAIN LINK SECURITY FENCE IN KIND.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL
0' 20' 40' 60'

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING



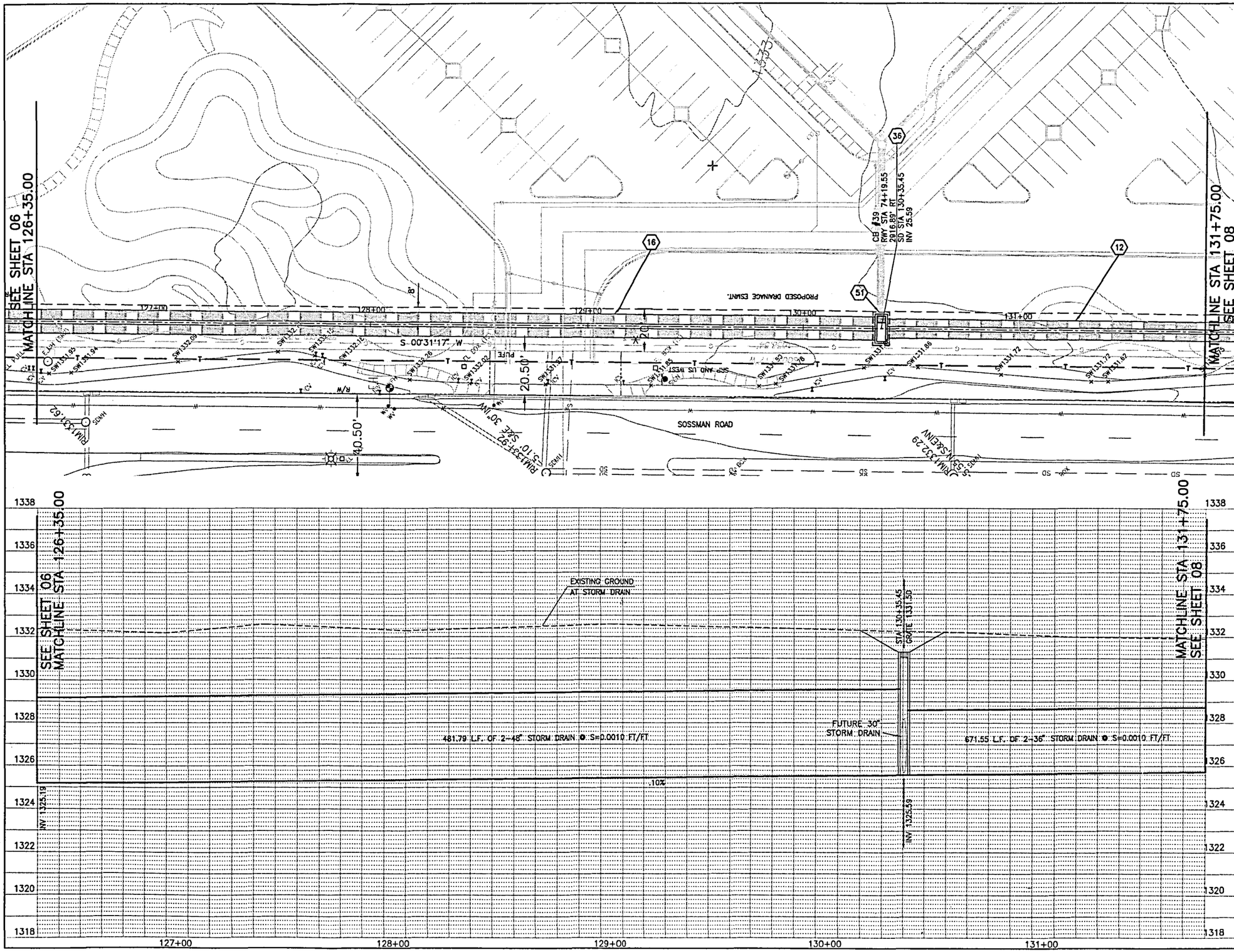
340 WO | CATALOG NO. : A-

DRAINAGE IMPROVEMENTS

NORTH APRON
WILLIAMS GATEWAY AIRPORT

Designed by DS	Drawn by CS	
Date JUNE 12, 2002	Job No. 53115	Sheet 6 of 17

FILE NAME: N:\0\0\53\1\1-BASSNORTH-MESALINE (304-MESA)
DATE PLOTTED: 06-12-02



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CONSTRUCTION NOTES

(12) INSTALL 2-36" STORM DRAIN PIPE PER PROFILE AND DETAILS SHEET D-2.

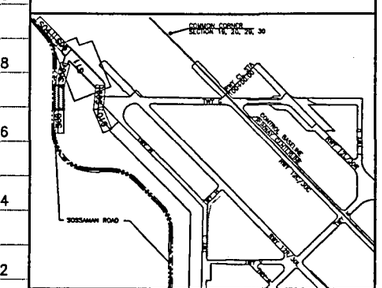
(16) INSTALL 2-48" STORM DRAIN PIPE PER PROFILE AND DETAILS SHEET D-2.

(36) CONSTRUCT CATCH BASIN PER DETAILS ON SHEETS D1, S1, S2 & S3. GRATE OPENING 3.25' X 4.08'.

(51) STUB OUT FOR FUTURE STORM DRAIN AND PLUG PER MAG STD DETAIL 427.

SCALE: 1"=20' HORIZONTAL
1"=2' VERTICAL
0' 20' 40' 60'

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING



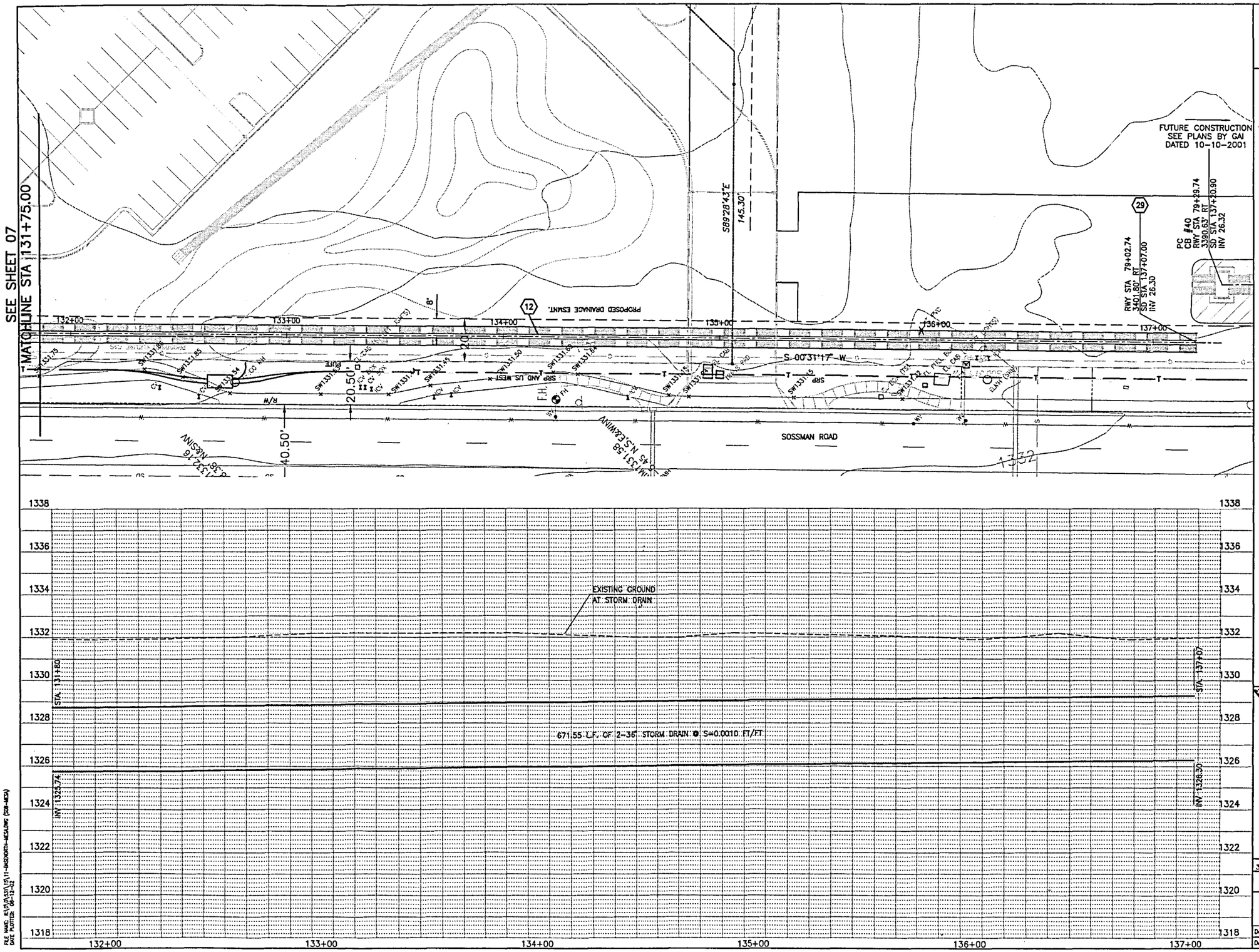
340 WO | CATALOG NO. : A-

DRAINAGE IMPROVEMENTS

NORTH APRON
WILLIAMS GATEWAY AIRPORT

Designed by DS | Drawn by CS
Date JUNE 12, 2002 | Job No. 53115 | Sheet 7 of 17

FILE NAME: K:\D\53115\1151\11-BASENORTH-MESA.DWG (007-MESA)
DATE PLOTTED: 06-12-02



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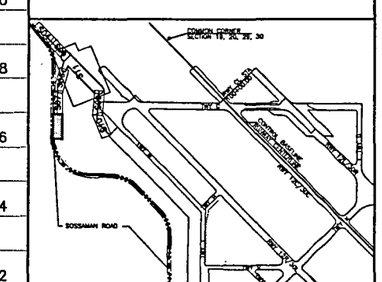
CONSTRUCTION NOTES

(12) INSTALL 2-36" STORM DRAIN PIPE PER PROFILE AND DETAILS ON SHEET D-2.

(29) PLUG PIPES PER M.A.G. STD. DETAIL 427.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL
0' 20' 40' 60'

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

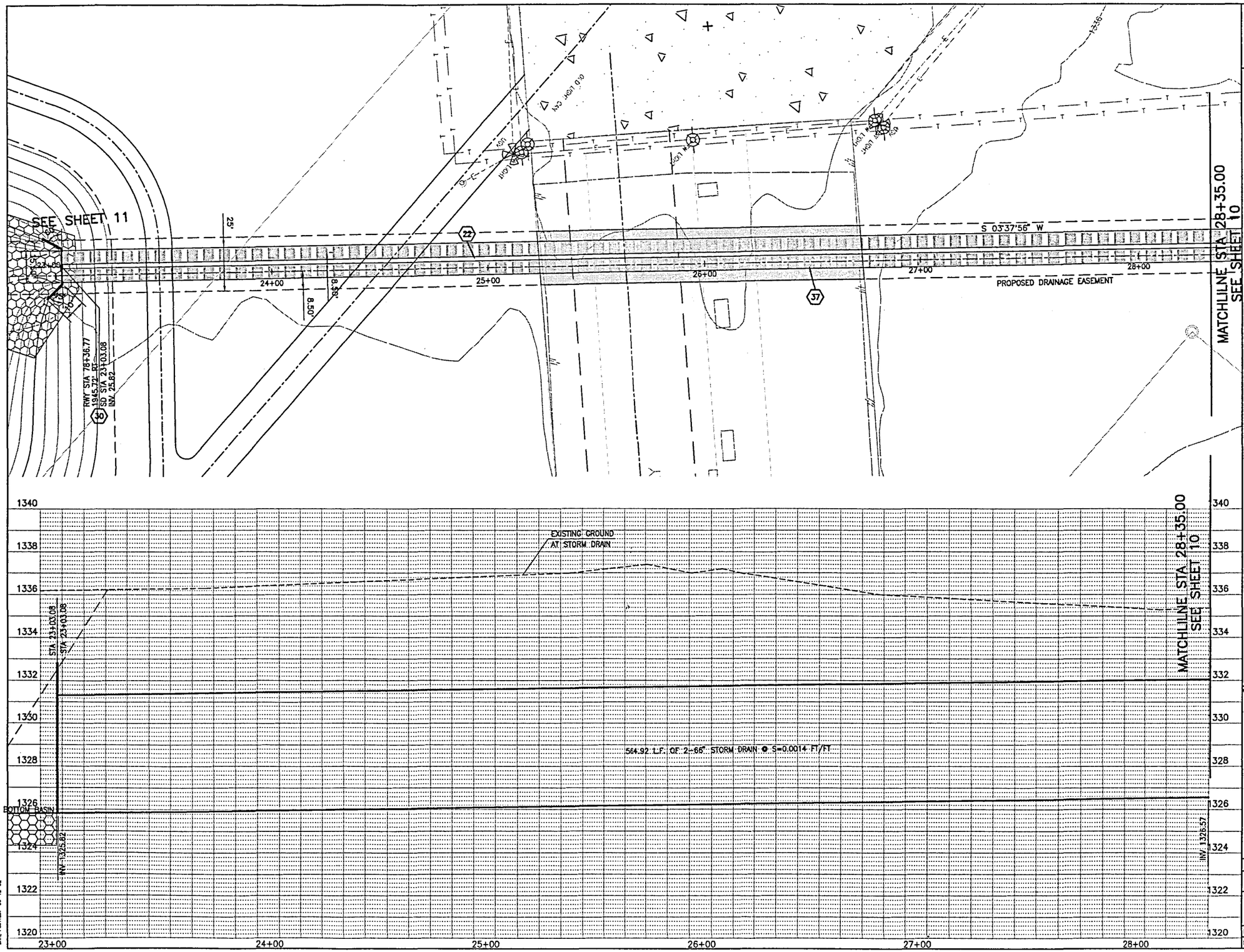


340 WO | CATALOG NO. : A-

DRAINAGE IMPROVEMENTS
NORTH APRON
WILLIAMS GATEWAY AIRPORT

Designed by DS | Drawn by CS
Date JUNE 12, 2002 | Job No. 53115 | Sheet 8 of 17

FILE NAME: K:\P\53115\11-MASTERPLAN\53115-NORTH-MESALING (DSB-MESA)
DATE PLOTTED: 06-12-02



FILE NAME: K:\P\0531\11\11-BASNORTH-MESLOPE (DSB-MESX)
DATE PLOTTED: 06-12-02

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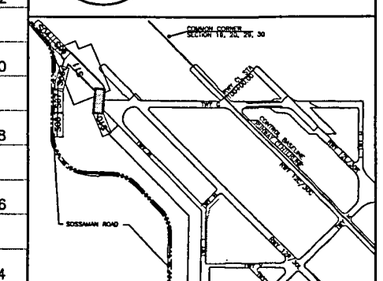
CONSTRUCTION NOTES

22. INSTALL 2-66" STORM DRAIN PIPE PER PROFILE AND DETAILS ON SHEET D-2.
30. INSTALL OUTLET HEADWALL PER DIMENSIONS SHOWN AND PER DETAILS ON SHEETS S1, S2, AND S3. SLOPE WINGS AT 4:1.
37. REMOVE EXISTING ASPHALT CONCRETE PAVEMENT.

SCALE:1"=20'HORIZONTAL
1"=2'VERTICAL
0' 20' 40' 60'

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

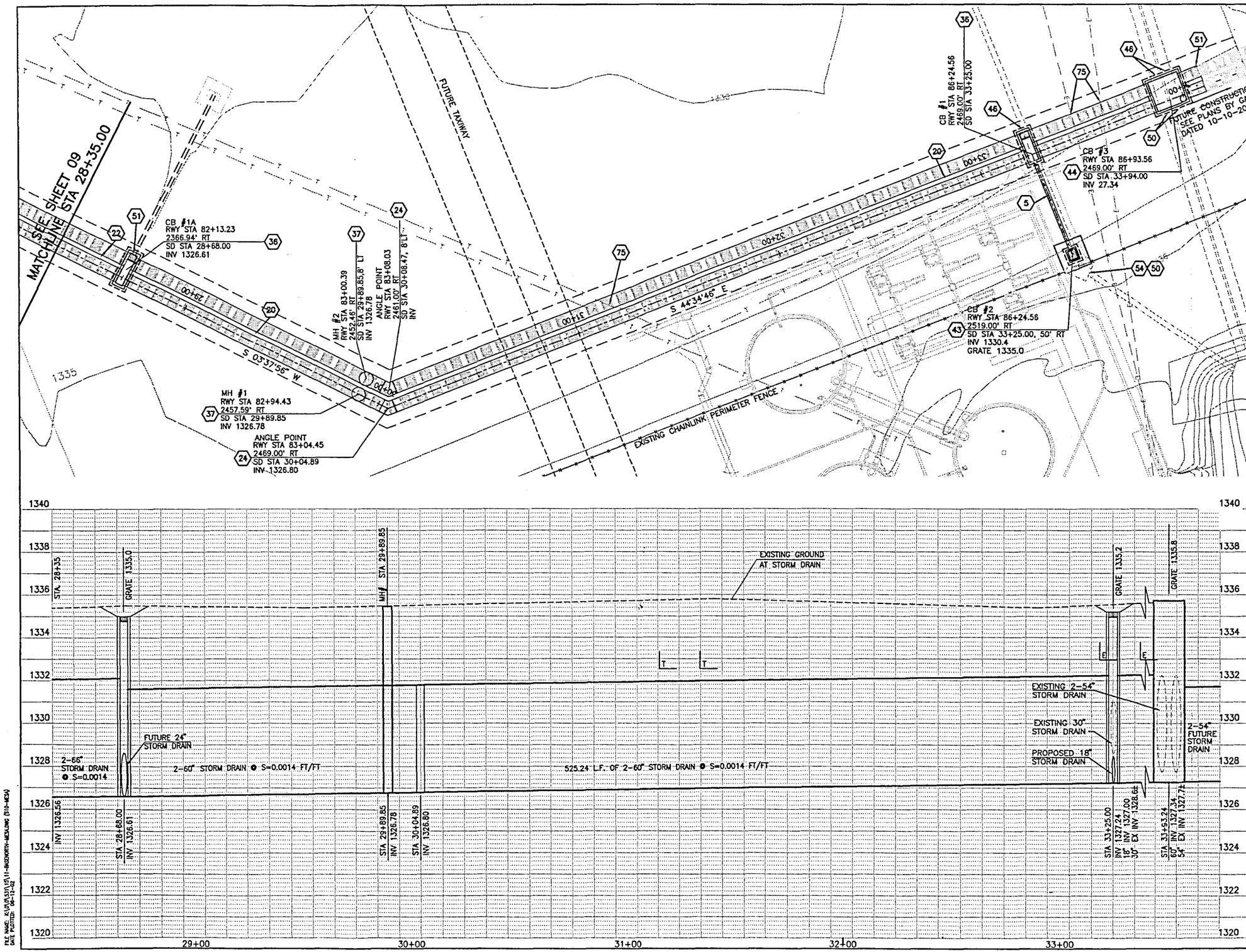


340 WO | CATALOG NO. : A-

DRAINAGE IMPROVEMENTS

NORTH APRON
WILLIAMS GATEWAY AIRPORT

Designed by DS | Drawn by CS
Date JUNE 12, 2002 | Job No. 53115 | Sheet 9 of 17



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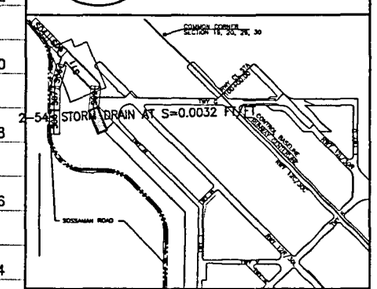
CONSTRUCTION NOTES

- (5) INSTALL 18" STORM DRAIN PIPE PER PROFILE.
- (20) INSTALL 2-60" STORM DRAIN PIPE PER PROFILE.
- (22) INSTALL 2-66" STORM DRAIN PIPE PER PROFILE.
- (24) INSTALL 45° BEND SITH CONCRETE PIPE COLLAR PER MAG STANDARD DETAIL 505.
- (36) CONSTRUCT CATCH BASIN PER DETAILS ON SHEETS D1, S1, S2 & S3. GRATE OPENING SIZE 3.25' X 4.08'.
- (37) CONSTRUCT STORM DRAIN MANHOLE PER M.A.G. STD. DETAIL 521 MODIFIED WITH A GRATED INLET.
- (43) CONSTRUCT CATH BASIN WITH APRON PER DETAILS SHEETS D1, S1, S2 & S3. GRATE OPENING SIZE 3.50' X 4.66'.
- (44) CONSTRUCT JUNCTION STRUCTURE PER DETAILS SHEETS S1, S2, S3 WITH 30" MANHOLE FRAME AND COVER.
- (46) CONNECT TO STORM DRAIN PIPE.
- (50) PLUG EXISTING STORM DRAIN PIPE PER M.A.G. STD. DETAIL 427.
- (51) STUB OUT FOR FUTURE STORM DRAIN AND PLUG PER MAG STD DETAIL 427.
- (54) REMOVE EXISTING CATCH BASIN.
- (75) COORDINATE EXISTING UTILITY CONFLICT WITH WILLIAMS GATEWAY AIRPORT AND UTILITY PROVIDER PRIOR TO CONSTRUCTION IN AREA

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL
0' 20' 40' 60'

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING



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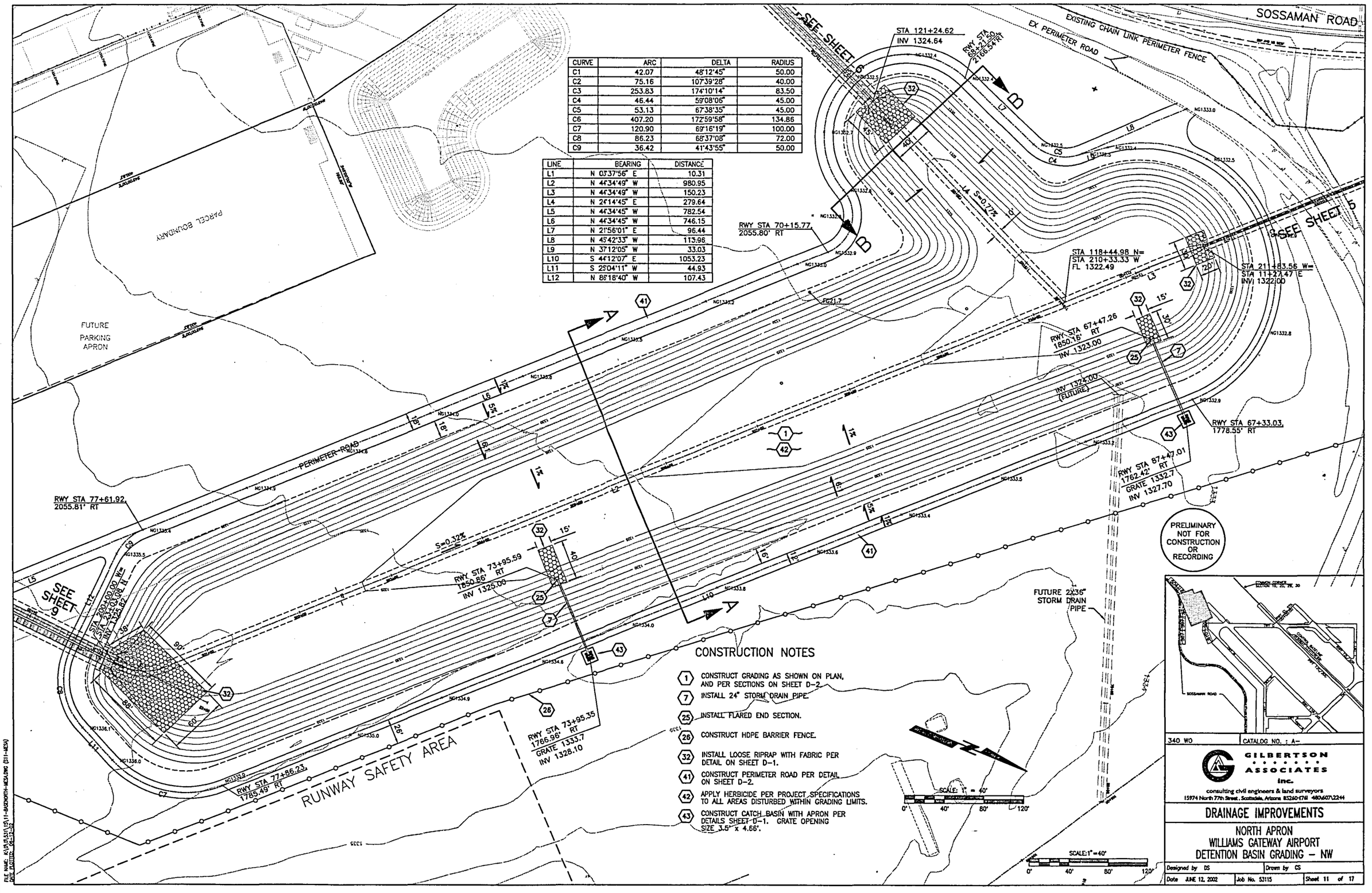
DRAINAGE IMPROVEMENTS
NORTH APRON
WILLIAMS GATEWAY AIRPORT

Designed by DS	Drawn by CS	
Date JUNE 12, 2002	Job No. 53115	Sheet 10 of 17

FILE NAME: K:\D\D331\25\11-BASENORTH-MEDLING (510-MEM)
DATE PLOTTED: 06-12-02

CURVE	ARC	DELTA	RADIUS
C1	42.07	48°12'45"	50.00
C2	75.16	107°39'28"	40.00
C3	253.83	174°10'14"	83.50
C4	46.44	59°08'06"	45.00
C5	53.13	67°38'35"	45.00
C6	407.20	172°59'58"	134.86
C7	120.90	69°16'19"	100.00
C8	86.23	68°37'08"	72.00
C9	36.42	41°43'55"	50.00

LINE	BEARING	DISTANCE
L1	N 03°37'56" E	10.31
L2	N 44°34'49" W	980.95
L3	N 44°34'49" W	150.23
L4	N 26°14'45" E	279.64
L5	N 44°34'45" W	782.54
L6	N 44°34'45" W	746.15
L7	N 21°56'01" E	96.44
L8	N 45°42'33" W	113.96
L9	N 37°12'05" W	33.03
L10	S 44°12'07" E	1053.23
L11	S 25°04'11" W	44.93
L12	N 88°18'40" W	107.43



PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

CONSTRUCTION NOTES

1. CONSTRUCT GRADING AS SHOWN ON PLAN, AND PER SECTIONS ON SHEET D-2.
7. INSTALL 24" STORM DRAIN PIPE.
25. INSTALL FLARED END SECTION.
26. CONSTRUCT HDPE BARRIER FENCE.
32. INSTALL LOOSE RIPRAP WITH FABRIC PER DETAIL ON SHEET D-1.
41. CONSTRUCT PERIMETER ROAD PER DETAIL ON SHEET D-2.
42. APPLY HERBICIDE PER PROJECT SPECIFICATIONS TO ALL AREAS DISTURBED WITHIN GRADING LIMITS.
43. CONSTRUCT CATCH BASIN WITH APRON PER DETAILS SHEET D-1. GRATE OPENING SIZE 3.6" x 4.66'.

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DRAINAGE IMPROVEMENTS

NORTH APRON
WILLIAMS GATEWAY AIRPORT
DETENTION BASIN GRADING – NW

Designed by DS | Drawn by CS
Date JUNE 12, 2002 | Job No. 53115 | Sheet 11 of 17

FILE NAME: K:\D\(1531\15\11-BASINNORTH-NESLONG (311-NESW)
DATE LAYOUT: 06-12-02

ENGINEER'S GENERAL NOTES

1. THE CONTRACTOR SHALL SCHEDULE ALL UTILITY ADJUSTMENT WORK WITH WILLIAMS GATEWAY AIRPORT AUTHORITY FACILITIES MANAGEMENT 480-988-1073.
2. THE CONTRACTOR IS RESPONSIBLE FOR ALL METHODS, SEQUENCING, AND SAFETY USED DURING CONSTRUCTION UNLESS SPECIFICALLY ADDRESSED OTHERWISE ON THESE PLANS OR ELSEWHERE IN THE CONTRACT DOCUMENTS.
3. THE CONTRACTOR IS TO COMPLY WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS APPLICABLE TO THE CONSTRUCTION COVERED BY THESE PLANS, INCLUDING BUT NOT LIMITED TO THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS.
4. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING (AT THE CONTRACTOR'S SOLE EXPENSE) AND COMPLYING WITH ALL PERMITS AND LICENSES REQUIRED TO COMPLETE ALL WORK COVERED BY THESE PLANS. EACH BIDDING CONTRACTOR CERTIFIES, BY SUBMITTING A BID PROPOSAL FOR THE WORK COVERED BY THESE PLANS, THAT HE/SHE AND HIS/HER SUBCONTRACTORS HOLDS A CURRENT LICENSE(S) ISSUED BY THE STATE OF ARIZONA REGISTRAR OF CONTRACTORS FOR THE WORK TO BE PERFORMED.
5. THE QUANTITIES AND SITE CONDITIONS DEPICTED ON THESE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY AND ARE SUBJECT TO ERROR AND OMISSIONS. CONTRACTORS SHALL SATISFY THEMSELVES AS TO ACTUAL QUANTITIES AND SITE CONDITIONS PRIOR TO BIDDING THE WORK FOR THE CONSTRUCTION COVERED BY THESE PLANS. EACH BIDDING CONTRACTOR CERTIFIES, BY SUBMITTING A BID PROPOSAL FOR THE WORK COVERED BY THESE PLANS, THAT HE/SHE HAS THOROUGHLY EXAMINED THE LOCATION OF THE WORK TO BE PERFORMED, IS FAMILIAR WITH LOCAL CONDITIONS, AND HAS READ AND THOROUGHLY UNDERSTOOD THE CONTRACT DOCUMENTS AS THEY RELATE TO THE PHYSICAL CONDITIONS PREVALENT OR LIKELY TO BE ENCOUNTERED IN THE PERFORMANCE OF THE WORK AT SUCH LOCATION.
6. A REASONABLE EFFORT HAS BEEN MADE TO SHOW THE LOCATIONS OF EXISTING UNDERGROUND FACILITIES AND UTILITIES IN THE CONSTRUCTION AREA. CONTRACTORS ARE RESPONSIBLE FOR ANY DAMAGE TO UTILITIES AND/OR FACILITIES CAUSED DURING THEIR CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY DAMAGED UTILITY AND/OR FACILITY (AT THE CONTRACTOR'S SOLE EXPENSE) TO THE SATISFACTION OF THE OWNER OF THE UTILITY AND/OR FACILITY. THE CONTRACTOR SHALL CALL FOR BLUE STAKE 263-1100 TWO WORKING DAYS PRIOR TO ANY EXCAVATION.
7. THE CONTRACTOR IS RESPONSIBLE FOR ALL COORDINATION OF CONSTRUCTION AFFECTING UTILITIES AND THE COORDINATION OF ANY NECESSARY UTILITY RELOCATION WORK.
8. ANY DEVIATION FROM THE PLANS WILL NOT BE ALLOWED WITHOUT A WRITTEN APPROVED PLAN REVISION FROM THE OWNER. AN APPROVED SET OF PLANS SHALL BE MAINTAINED OF THE JOB SITE AT ALL TIMES WHEN WORK IS IN PROGRESS. THE CONTRACTOR SHALL PREPARE AND MAINTAIN RECORD "AS-BUILT" DOCUMENTS FOR THE PROJECT TO ACCURATELY REFLECT THE PROJECT CONSTRUCTION WORK AS BUILT. THE CONTRACTOR SHALL LEGIBLY MARK ALL PLAN CHANGES AND DEVIATIONS ON BLUE LINE DRAWINGS WITH RED PENCIL OR PEN. PRIOR TO FINAL ACCEPTANCE. THE CONTRACTOR SHALL SUBMIT THE RECORD "AS-BUILT" DOCUMENTS TO THE OWNER FOR REVIEW AND APPROVAL. IMPROPER AS-BUILT RECORD KEEPING BY THE CONTRACTOR CAN BE CAUSE FOR THE OWNER TO REQUIRE THE CONTRACTOR TO EXPOSE BURIED WORK FOR INSPECTION BY THE OWNER, AT NO ADDITIONAL COST TO THE OWNER.
9. THIS PROJECT IS SUBJECT TO THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) REQUIREMENTS FOR CONSTRUCTION SITES UNDER THE ENVIRONMENTAL PROTECTION AGENCY (EPA) GENERAL PERMIT FOR ARIZONA. THE OWNER OR CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING AND SUBMITTING ALL DOCUMENTS REQUIRED BY THE REGULATION, INCLUDING BUT NOT LIMITED TO SWPPP/SWMP, N.O.I. AND N.O.T.; UNLESS PROVIDED FOR ELSEWHERE BY THE OWNER.
10. THE CONTRACTOR SHALL PERFORM SITE CLEANUP AND DISPOSAL IN A LEGAL MANNER ON A DAILY BASIS OR AS DIRECTED BY THE OWNER, HIS REPRESENTATIVE OR ANY GOVERNMENT AGENCY HAVING JURISDICTION.
11. THE CONTRACTOR SHALL PRESERVE ALL SURVEY CONSTRUCTION STAKES (SET FOR THE PURPOSE OF CONTROL LINES, LEVELS/GRADES, OR MEASUREMENT OF THE WORK) IN THEIR PROPER PLACES, UNTIL AUTHORIZED TO REMOVE THEM BY THE OWNER. ANY EXPENSE INCURRED IN REPLACING ANY STAKES THAT THE CONTRACTOR OR HIS/HER SUBCONTRACTORS MAY HAVE FAILED TO PRESERVE WILL BE CHARGED TO THE CONTRACTOR.
12. IN ADDITION TO UTILITIES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CARE AND PROTECTION OF ALL EXISTING PUBLIC AND PRIVATE IMPROVEMENTS IN THE WORK AREA. IMPROVEMENTS THAT HAVE BEEN REMOVED OR DAMAGED DURING THE COURSE OF CONSTRUCTION SHALL BE REPAIRED OR REPLACED, INCLUDING CLEANUP, TO THE SATISFACTION OF THE OWNER, AT THE CONTRACTOR'S SOLE EXPENSE.
13. INCIDENTAL WORK MIGHT NOT BE SPECIFICALLY INDICATED ON THESE PLANS. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL SUPPLEMENTARY OR MISCELLANEOUS ITEMS, APPURTENANCES AND DEVICES INCIDENTAL TO, OR NECESSARY FOR, A SOUND, SECURE, COMPLETE, FUNCTIONAL AND ACCEPTABLE INSTALLATION, AT NO ADDITIONAL COST TO THE OWNER.

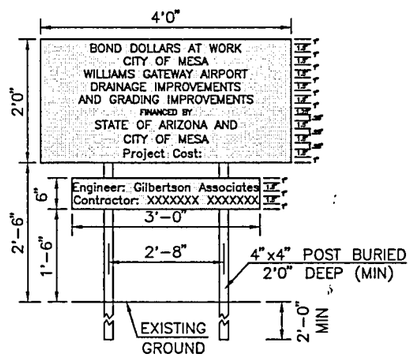
GRADING AND DRAINAGE NOTES

1. ALL VEGETATION, INCLUDING ROOTS GREATER THAN ONE (1) INCH IN DIAMETER SHALL BE REMOVED.
2. THE EXCAVATIONS LEFT FROM REMOVAL OF EXISTING UNDERGROUND UTILITIES, BRUSH AND TREES SHALL BE BACKFILLED. PRIOR TO BACK FILL, ALL LOOSE SOIL SHALL BE REMOVED TO FIRM UNDISTURBED SOIL. BACK FILL SHALL BE PLACED AND COMPACTED IN LIFTS NOT TO EXCEED 8".
3. ANY DRAINAGE AREAS, DITCHES OR WASHES THAT ARE TO BE FILLED SHALL BE EXCAVATED TO THE FULL WIDTH OF CONSTRUCTION EQUIPMENT. AFTER EXCAVATION HAS BEEN COMPLETED, THE BACK FILL SHALL BE PLACED AND COMPACTED.

NOTE: LOCATION OF SIGN WILL BE DETERMINED BY OWNER AT PRE-CONSTRUCTION CONFERENCE.

SIGN SHALL BE FURNISHED AND ERECTED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION.

PROJECT SIGN SHALL BE NON-REFLECTIVE GREEN BACKGROUND AND NON-REFLECTIVE WHITE LETTERS AND NUMERALS.



PROJECT SIGN

N.T.S.

ESTIMATED QUANTITIES

Item No.	Spec No.	Item	Base Bid Quantity	Unit
1	110	Mobilization	1	LS
2	P-104	Utility Relocation	Allowance	FA
3	P-105	Temporary Construction Signage And Traffic Control	1	LS
4	P-106	Herbacide Application	9	AC
5	P-156	Temporary Air & Water Pollution,Soil Erosion & Siltation Control	1	LS
6	215	Earthwork For Open Channels	82,000	CY
7	220	Plain Rip Rap	1,004	SY
8	301	Subgrade Preparation	5,830	SY
9	310	Untreated Base Course (Aggregate Base, 6")	5,830	SY
10	321	Asphalt Concrete Pavement (3")	50	SY
11	350	Remove Existing Asphalt Concrete Pavement	470	SY
12	350	Miscellaneous Removals	1	LS
13	420	Chain Link Fence (7')	80	LF
14	505	Catch Basin #1 for (2) 60" Pipes, STA 33+25	1	LS
15	505	Catch Basin #2 With Apron for 18" Pipe, STA 33+25	1	LS
16	505	Catch Basin #3 for (2) 60" Pipes, STA 33+93.24	1	LS
17	505	Catch Basin #1A for (2) 66" Pipes, STA 28+68	1	LS
18	505	Catch Basin #38 for (2) 48" Pipes, STA 125+53.66	1	LS
19	505	Catch Basin #39 for (2) 48" Pipes, STA 130+35.45	1	LS
20	505	Catch Basin With Apron for 24" Pipe, STA 73+95	1	LS
21	505	Catch Basin With Apron for 24" Pipe, STA 87+47	1	LS
22	505	Headwall 24" Pipe	1	LS
23	505	Headwall (2) 48" Pipes	1	LS
24	505	Headwall (2) 66" Pipes	1	LS
25	505	Storm Drain Manhole	2	EA
26	618	18" Storm Drain	45	LF
27	618	24" Storm Drain	775	LF
28	618	36" Storm Drain (2 X 684')	1,368	LF
29	618	48" Storm Drain (2 X 911')	1,822	LF
30	618	54" Storm Drain (2 X 10')	20	LF
31	618	60" Storm Drain (2 X 517')	1,034	LF
32	618	66" Storm Drain (2 X 565')	1,130	LF
33	618	24" End Section	2	EA
34		Stub and Plug Storm Drain Pipe	2	EA
35		Plug Storm Drain Pipe	6	EA
36		Construction Survey Staking	1	LS

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DRAINAGE IMPROVEMENTS

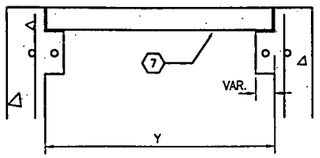
NORTH APRON
WILLIAMS GATEWAY AIRPORT
DETAILS AND CONSTRUCTION NOTES

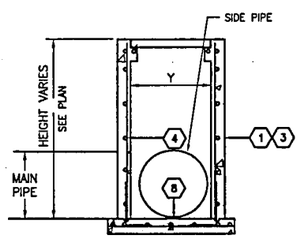
Designed by DS	Drawn by CS	
Date JUNE 12, 2002	Job No. 53115	Sheet 12 of 17

FILE NAME: K:\01\53115\53512-QUAN-NOTES.DWG
DATE PLOTTED: 06-12-02

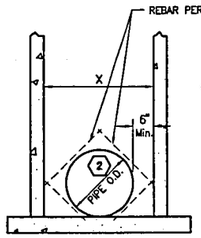
CATCH BASIN CONSTRUCTION NOTES

1. CONSTRUCTION OF CATCH BASIN SHALL BE PER STRUCTURAL DETAILS ON SHEETS S1, S2 & S3.
2. CONNECTION PIPE TO BE CENTERED IN WALL.
3. ALL CONCRETE SHALL BE PER STRUCTURAL DETAILS ON SHEETS S1, S2 & S3.
4. ALL REINFORCING BARS SHALL BE PER STRUCTURAL DETAILS AND NOTES ON SHEETS S1, S2, & S3.
5. STEPS SHALL CONFORM TO M.A.G. STANDARD DETAIL 428.
6. MIDDLE OF STEPS SHALL BE PLACED IN CENTER OF GRATE AT LONG DIMENSION EXTENDED.
7. GRATE AND FRAME SHALL BE PER STRUCTURAL DETAILS AND NOTES ON SHEETS S-1, S-2 & S-3. GRATE OPENING SIZE AS SHOWN ON PLANS.
8. CATCH BASIN BOTTOM SHALL BE TROWEL FINISHED AND SLOPED AS SHOWN.

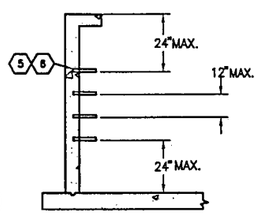




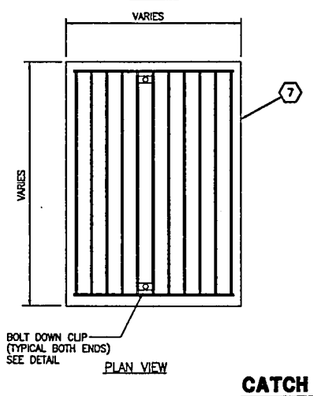
SECTION



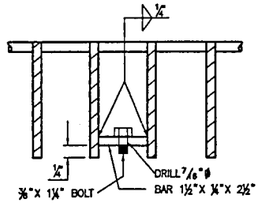
PIPE OPENING DETAIL



STEP LOCATION



PLAN VIEW



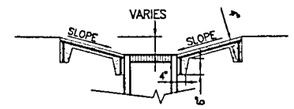
BOLT DOWN CLIP DETAIL

CATCH BASIN DETAILS

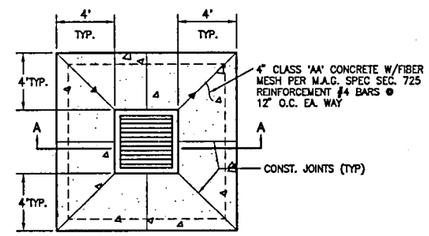
N.T.S.

CATCH BASIN DIMENSION TABLE

SIDE PIPE		12"–24"	30"	36"	42"	48"	54"	60"	66"	2–30"	2–54"
18"–24" MAIN	X	56"									
	Y	42"									
30" MAIN	X	56"	56"								
	Y	42"	49"								
36" MAIN	X	58"	58"	58"							
	Y	42"	49"	58"							
42" MAIN	X	66"	66"	66"	66"						
	Y	42"	49"	58"	66"						
48" MAIN	X	72"	72"	72"	72"	72"					
	Y	42"	49"	58"	66"	72"					
54" MAIN	X	80"	80"	80"	80"	80"	80"				
	Y	42"	49"	58"	66"	72"	80"				
60" MAIN	X	88"	88"	88"	88"	88"	88"	88"			
	Y	42"	49"	58"	66"	72"	80"	88"			
66" MAIN	X	96"	96"	96"	96"	96"	96"	96"	96"		
	Y	42"	49"	58"	66"	72"	80"	88"	96"		
2–36" MAIN	X	120"	120"	120"	120"	120"	120"	120"	120"	120"	120"
	Y	42"	49"	58"	66"	72"	80"	88"	96"	110"	158"
2–42" MAIN	X	132"	132"	132"	132"	132"	132"	132"	132"	132"	132"
	Y	42"	49"	58"	66"	72"	80"	88"	96"	110"	158"
2–48" MAIN	X	144"	144"	144"	144"	144"	144"	144"	144"	144"	144"
	Y	42"	49"	58"	66"	72"	80"	88"	96"	110"	158"
2–54" MAIN	X	158"	158"	158"	158"	158"	158"	158"	158"	158"	158"
	Y	42"	49"	58"	66"	72"	80"	88"	96"	110"	158"
2–60" MAIN	X	172"	172"	172"	172"	172"	172"	172"	172"	172"	172"
	Y	42"	49"	58"	66"	72"	80"	88"	96"	110"	158"
2–66" MAIN	X	186"	186"	186"	186"	186"	186"	186"	186"	186"	186"
	Y	42"	49"	58"	66"	72"	80"	88"	96"	110"	158"



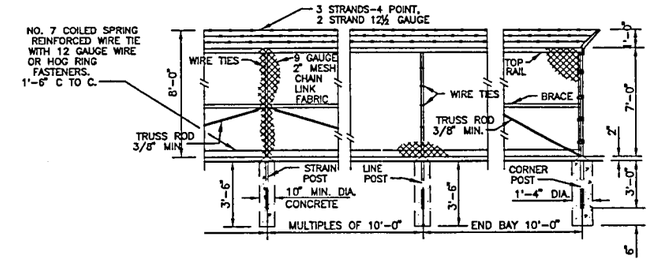
APRON SECTION A–A
NTS



PLAN VIEW

CATCH BASIN APRON DETAIL

N.T.S.

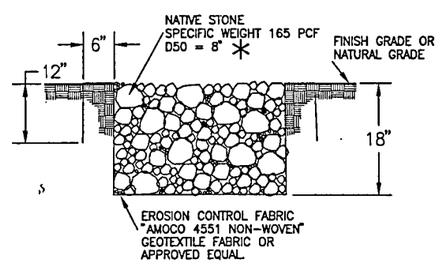


7' CHAIN LINK FENCE

NTS

CHAIN LINK FENCE AND GATES

		TYP. FENCE POST			
		TERMINAL	POST	LINE	POST
	(END,	CORNER,	(LATCH & PULL)		
FABRIC	LENGTH	POST HOLE	SIZE	LENGTH	SIZE
HEIGHT		DIA. X DEPTH	OD X SECTION		OD X SECTION
84"	10'	1'4" X 3'6"	2.875"X.160"	9'6"	2.375"X.130"



PLAIN LOOSE RIPRAP OUTLET PROTECTION

N.T.S.

* RIP-RAP GRADATION TABLE

SIZE	% PASSING
16"	100
12"	85
8"	50
5"	15
3"	5

* RIP-RAP NOTES

1. THE STONE SHOULD BE REASONABLY WELL GRADED THROUGHOUT THE IN-PLACE LAYER THICKNESS.
2. OVERSIZE STONE, EVEN IN ISOLATED SPOTS, SHOULD BE REMOVED INDIVIDUALLY AND REPLACED WITH PROPER SIZE STONES.
3. SIDE SLOPES ON WHICH STONE IS PLACED BY MACHINE OR DUMPED SHOULD NOT BE STEEPER THAN 3:1.
4. THE STONE SHALL BE PLACED TO FORM AN INTERLOCKED, DENSE, UNIFORM MASS OF DURABLE, ANGULAR STONES WITH NO APPARENT VOIDS OR POCKETS.
5. THE STONE SHALL BE PREDOMINANTLY ANGULAR IN SHAPE.
6. MINIMUM SPECIFIC WEIGHT OF STONE SHOULD BE 165 LB/FT .
7. ALL RIPRAP SHALL BE NATIVE STONE INDEGENOUS TO SITE.

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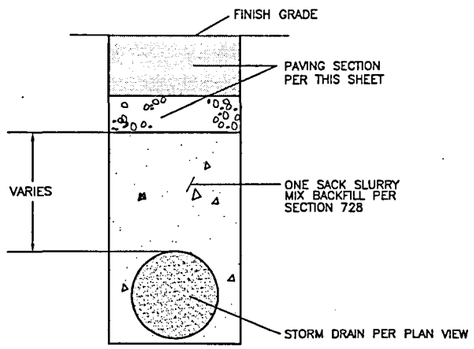
DRAINAGE IMPROVEMENTS

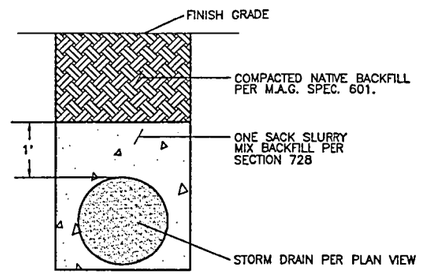
NORTH APRON
WILLIAMS GATEWAY AIRPORT
D–1 DETAILS

Designed by DS | Drawn by CS
Date JUNE 12, 2002 | Job No. 53115 | Sheet 13 of 17

FILE NAME: K:\D\D531\15513-DLT.DWG
DATE PLOTTED: 06-12-02



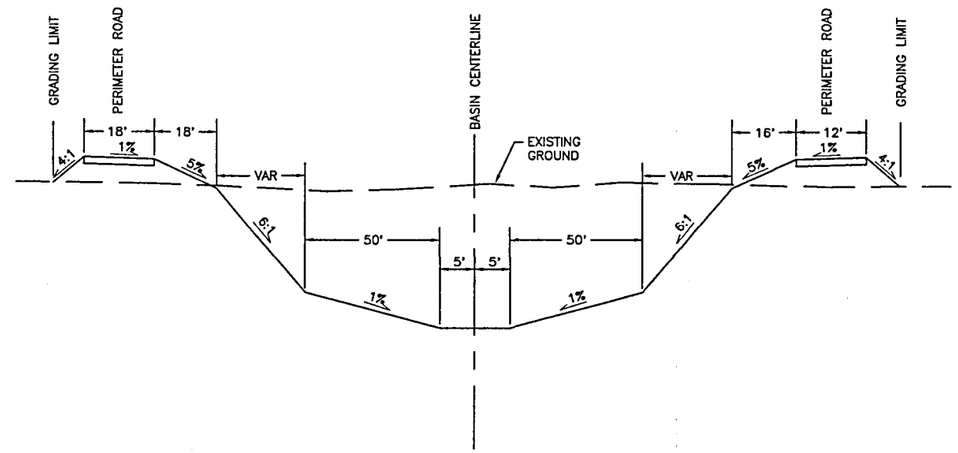
PAVEMENT AREA



NON-PAVEMENT AREA

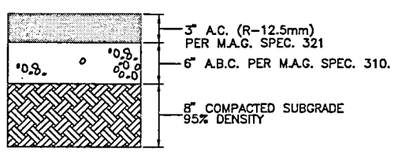
STORM DRAIN TYPICAL TRENCH DETAILS

N.T.S.



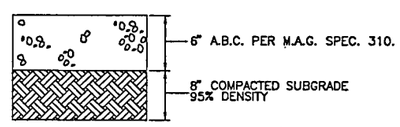
SECTION A (N.W. BASIN)

N.T.S.



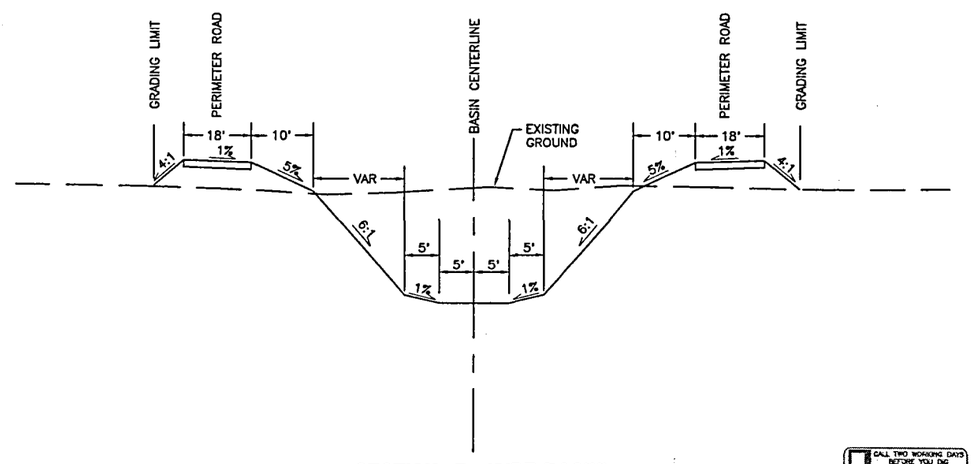
ASPHALT PAVEMENT REPLACEMENT SECTION

N.T.S.



PERIMETER ROAD SECTION

N.T.S.



SECTION B (SIDE BASIN)

N.T.S.

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NOTE:

CONTRACTOR SHALL HAVE THE OPTION OF INSTALLING EITHER:
(a) ROUND REINFORCED CONCRETE PIPE
(b) HIGH DENSITY POLYETHYLENE (HDPE) PIPE PER AASHTO M294 CLASSIFICATION S (SMOOTH LINED)
(c) CAST IN PLACE CONCRETE PIPE WHERE STORM DRAINS ARE CALLED FOR ON THE PLANS

STORM DRAIN PIPE STRENGTH MUST BE EQUIVELANT TO REINFORCED CONCRETE PIPE CLASS III, UNLESS OTHERWISE NOTED.

CONSTRUCTION NOTES

1. SAWCUT PCC PAVEMENT FULL DEPTH ALONG JOINT RESERVOIR OR REPAIR BOUNDARY. RELIEF CUTS MAY BE MADE WITHIN REPLACEMENT AREA PRIOR TO BOUNDARY SAWING. CONTRACTOR TO SUBMIT REMOVAL PLAN.

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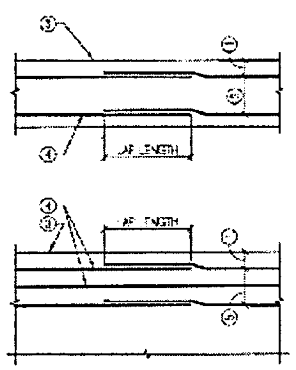
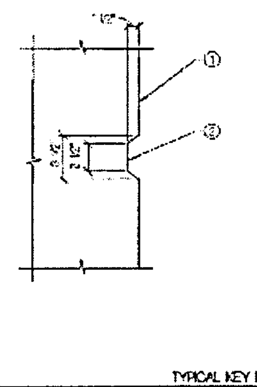
DRAINAGE IMPROVEMENTS

NORTH APRON
WILLIAMS GATEWAY AIRPORT
D-2 DETAILS

Designed by DS	Drawn by CS	
Date JUNE 12, 2002	Job No. 53115	Sheet 14 of 17

FILE NAME: R:\53115\53115\WORKPAPER\514-DTL.DWG
DATE PLOTTED: 06-12-02





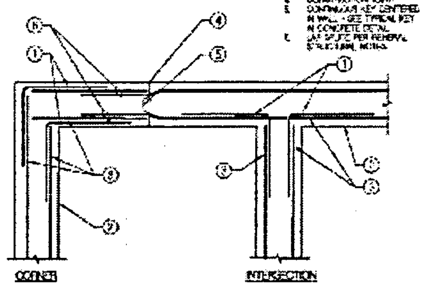
TYPICAL KEY IN CONCRETE (01)
NO SCALE

CLASS 'B' TENSION LAP SPLICE TABLE				
BAR SIZE	POSITION	Concrete Strength in psi		
		[illegible]	[illegible]	[illegible]
[illegible]	Top	[illegible]	[illegible]	[illegible]
	Other	[illegible]	[illegible]	[illegible]
#4	Top	[illegible]	[illegible]	[illegible]
	Other	[illegible]	[illegible]	[illegible]
#5	Top	[illegible]	[illegible]	[illegible]
	Other	[illegible]	[illegible]	[illegible]
#6	Top	[illegible]	[illegible]	[illegible]
	Other	[illegible]	[illegible]	[illegible]
#7	Top	[illegible]	[illegible]	[illegible]
	Other	[illegible]	[illegible]	[illegible]
[illegible]	Top	[illegible]	[illegible]	[illegible]
	Other	[illegible]	[illegible]	[illegible]
[illegible]	Top	[illegible]	[illegible]	[illegible]
	Other	[illegible]	[illegible]	[illegible]
[illegible]	Top	[illegible]	[illegible]	[illegible]
	Other	[illegible]	[illegible]	[illegible]
#11	Top	[illegible]	[illegible]	[illegible]
	Other	[illegible]	[illegible]	[illegible]

LAP SPLICE IN INCHES

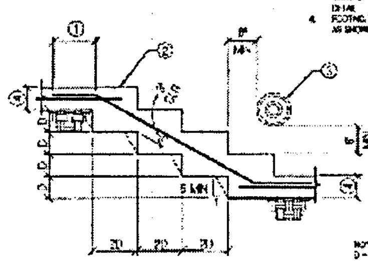
TABLE NOTES:

CLASS 'B' TENSION LAP SPLICE DETAIL (05)
NO SCALE

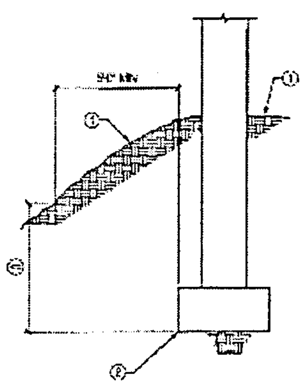


CORNER — INTERSECTION

PLAN - CORNER REINFORCING IN CONCRETE FOOTING, STEM OR WALL (02)
NO SCALE



TYPICAL STEPPED FOOTING (03)
NO SCALE



TYPICAL FOOTING EMBEDMENT ADJACENT TO SLOPES (04)
NO SCALE

GENERAL STRUCTURAL NOTES

Applies unless noted otherwise on drawings

GENERAL:

ALL CONSTRUCTION SHALL CONFORM TO THE 1994 EDITION OF THE UNIFORM BUILDING CODE.

THE CONTRACT STRUCTURAL DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OR SEQUENCE OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. THESE MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, THE BRACING AND SHORING OF LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND IMPLEMENTATION OF ALL SCAFFOLDING, BRACING AND SHORING. OBSERVATION VISITS TO THE SITE BY THE STRUCTURAL ENGINEER SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS. THE STRUCTURAL ENGINEER WILL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OF CONSTRUCTION NOR WILL THE STRUCTURAL ENGINEER BE RESPONSIBLE FOR THE CONSTRUCTION SITE SAFETY OR THE SAFETY PRECAUTIONS AND THE PROGRAMS.

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND COORDINATE SITE CONDITIONS WITH THE DRAWINGS PRIOR TO CONSTRUCTION. ANY DISCREPANCIES AND OMISSIONS SHALL BE RESOLVED WITH THE ARCHITECT. DO NOT USE SCALED DIMENSIONS.

WHERE ANY DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL STRUCTURAL NOTES AND SPECIFICATIONS, THE GREATER REQUIREMENTS SHALL GOVERN. WHERE NO SPECIFIC DETAIL IS SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT. FOR BIDDING PURPOSES, WHERE ANY MEMBER OR STRUCTURAL ELEMENT IS SHOWN BUT NOT CALLED OUT ON THE PLANS OR DETAILS, THE LARGEST SIMILAR MEMBER OR ELEMENT USED IN THE PROJECT SHALL BE UTILIZED.

APPROVED EQUAL ALTERNATES ARE FOR THE CONTRACTOR'S CONVENIENCE. IF AN ALTERNATE IS CHOSEN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHANGES AND COORDINATION NECESSARY OF ALL DETAILS ASSOCIATED WITH THE ALTERNATE.

ALL DETAILS SHOWN SHALL BE INCORPORATED INTO THE PROJECT AT ALL APPROPRIATE LOCATIONS, WHETHER SPECIFICALLY INDICATED OR NOT. TYPICAL DETAILS MAY OR MAY NOT BE CUT ON THE DRAWINGS BUT SHALL APPLY WHERE APPLICABLE UNLESS NOTED OTHERWISE.

WHERE REFERENCE IS MADE TO VARIOUS TEST STANDARDS FOR MATERIALS, SUCH STANDARDS SHALL BE THE LATEST EDITION AND/OR ADDENDUM.

ANY ENGINEERING DESIGN PROVIDED BY OTHERS AND SUBMITTED FOR REVIEW SHALL BEAR THE SEAL OF A CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE IN WHICH THE PROJECT IS LOCATED.

DESIGN LOADS:

WIND LOADS
BASIC WIND SPEED ---------- 70 MPH
EXPOSURE ---------- "C"
I (IMPORTANCE FACTOR) ---------- 1.0

SEISMIC LOADS
ZONE ---------- 2B (Z= 0.075)
SOIL PROFILE TYPE ---------- S2 (S3 USED FOR DESIGN)

SURCHARGES
HEADWALL ---------- 500 PSF
JUNCTION STRUCTURES AND CATCH BASINS ---------- 1500 PSF

FOUNDATIONS:

FOUNDATION DESIGN IS BASED ON AND SHALL BE IN CONFORMANCE THE 1994 EDITION OF THE UNIFORM BUILDING CODE.

SPREAD FOOTING FOUNDATIONS ARE DESIGNED TO BE SUPPORTED ON APPROVED EXISTING FIRM UNDISTURBED SUBGRADE OR APPROVED COMPACTED STRUCTURAL FILL. FOUNDATIONS ARE DESIGNED FOR AN ALLOWABLE BEARING PRESSURE OF 1500 PSF AT A MINIMUM OF 1'-6" BELOW LOWEST ADJACENT GRADE. LOWEST ADJACENT GRADE IS DEFINED AS THE LOWEST FINISH GRADE WITHIN 5 FEET OF THE OUTSIDE FACE OF FOOTING.

THE CONTRACTOR SHALL RETAIN THE SERVICES OF A REGISTERED GEOTECHNICAL ENGINEER TO PERFORM NECESSARY TESTING AND INSPECTIONS FOR QUALITY CONTROL TO ENSURE THAT THE REQUIREMENTS OF THE INFORMATION REFERENCED ARE COMPLIED WITH. TEST REPORTS SHALL BE SUBMITTED DIRECTLY TO THE ARCHITECT, STRUCTURAL ENGINEER AND CONTRACTOR WITH ADDITIONAL COPIES TO BE SUPPLIED AS REQUIRED BY THE CONTRACT DOCUMENTS. ARCHITECT OR CONTRACTOR. TEST REPORTS SHALL CONTAIN SUFFICIENT INFORMATION TO COMPLY WITH LOCAL CODES, CONTRACT DOCUMENTS AND CURRENT INDUSTRY STANDARDS.

A REGISTERED GEOTECHNICAL ENGINEER OR HIS REPRESENTATIVE SHALL INSPECT ALL SUBGRADE PREPARATION WORK PRIOR TO PLACEMENT OF ANY REINFORCING STEEL OR CONCRETE AND PERFORM THE NECESSARY TESTS TO VERIFY AND CERTIFY THAT SUCH WORK IS IN CONFORMANCE WITH THE RECOMMENDATIONS CONTAINED IN THE INFORMATION REFERENCED.

THE STRUCTURAL ENGINEER ASSUMES NO RESPONSIBILITY FOR THE VALIDITY OF THE SUBSURFACE CONDITIONS DESCRIBED IN THE DRAWINGS, SPECIFICATIONS, TEST BORINGS OR GEOTECHNICAL REPORTS. THESE DATA ARE INCLUDED TO ASSIST THE CONTRACTOR DURING BIDDING, SUBSEQUENT CONSTRUCTION AND TO REPRESENT CONDITIONS ONLY AT SPECIFIC LOCATIONS AT THE PARTICULAR TIME OBSERVATIONS WERE MADE.

FILLED EXCAVATIONS OR BURIED STRUCTURES SUCH AS CESSPOOLS, CISTERNS, EXISTING FOUNDATIONS, ETC., ENCOUNTERED DURING SITE CLEARING OR EXCAVATION SHALL BE BROUGHT TO THE ATTENTION OF THE GEOTECHNICAL ENGINEER IMMEDIATELY.

ABANDONED FOOTINGS, UTILITIES, ETC., THAT INTERFERE WITH NEW CONSTRUCTION SHALL BE BROUGHT TO THE ATTENTION OF THE GEOTECHNICAL ENGINEER AND BE REMOVED AT THE DIRECTION OF THE GEOTECHNICAL ENGINEER.

FOOTING EMBEDMENTS OR ELEVATIONS SHOWN ON THE DRAWINGS REPRESENT ESTIMATED DEPTHS AND ARE NOT TO BE CONSTRUED AS LIMITING THE AMOUNT OF EXCAVATION REQUIRED TO REACH SUITABLE BEARING MATERIAL.

CONTRACTOR SHALL PROVIDE TEMPORARY SUPPORTS AS REQUIRED TO PREVENT HORIZONTAL MOVEMENT OR VERTICAL SETTLEMENT THAT WILL ENDANGER ADJACENT STRUCTURES, STREETS OR UTILITIES.

CONCRETE:

CONCRETE WORK SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING STANDARDS:

ACI 301 – "SPECIFICATIONS FOR STRUCTURAL CONCRETE"
ACI MCP – "MANUAL OF CONCRETE PRACTICE"
ACI 318 – "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE"
ACI 318.1 – "BUILDING CODE REQUIREMENTS FOR STRUCTURAL PLAIN CONCRETE"

CONCRETE SHALL BE READY MIXED CONCRETE IN ACCORDANCE WITH ASTM C94. MINIMUM 28-DAY ULTIMATE COMPRESSIVE STRENGTH SHALL BE 3000 PSI (DESIGNED AS 2500 PSI U.N.O.) EXCEPT AS FOLLOWS:

FOOTINGS ---------- 3,000 PSI

CEMENT SHALL CONFORM TO ASTM C150, TYPE II.

AGGREGATE SHALL CONFORM TO ASTM C33. LIGHTWEIGHT AGGREGATE SHALL CONFORM TO ASTM C330.

CONCRETE SHALL BE FREE OF CHLORIDE. IN LOCATIONS WHERE FLY ASH IS ACCEPTABLE, FLY ASH SHALL CONFORM TO ASTM C618, CLASS F. FLY ASH SHALL NOT EXCEED 15% OF CEMENT BY WEIGHT.

CONCRETE MIX DESIGNS SHALL BE DESIGNED BY A CONCRETE PRODUCTION FACILITY IN ACCORDANCE WITH ACI 301. MIX DESIGNS AND TRIAL BATCH DATA SHALL BE PROVIDED TO THE ARCHITECT AND STRUCTURAL ENGINEER FOR REVIEW PRIOR TO CONSTRUCTION.

CONCRETE STRENGTH AND SLUMP SHALL BE TESTED IN ACCORDANCE WITH ASTM C31, C39 AND C143 BY A QUALIFIED TESTING AGENCY. PROVIDE 3 TEST CYLINDERS FOR EACH 50 CUBIC YARDS OF CONCRETE PLACED OR FOR ANY ONE-DAY'S OPERATION. THE RESULTS OF THESE ANALYSES SHALL BE SUBMITTED TO THE ARCHITECT AND ENGINEER FOR REVIEW.

CONCRETE SHALL NOT BE DROPPED MORE THAN 5 FEET VERTICALLY WITHOUT THE USE OF TREMIES.

PROVIDE SLEEVES FOR UTILITY OPENINGS IN CONCRETE PRIOR TO PLACING CONCRETE. DO NOT CUT ANY CONFLICTING REINFORCING.

MECHANICALLY VIBRATE ALL CONCRETE WHEN PLACED.

CONCRETE WHICH HAS CONTAINED WATER FOR MORE THAN 90 MINUETS (60 MINUETS IF AIR TEMPERATURE EXCEEDS 85 DEGREES) SHALL NOT BE USED. RETEMPERING OF CONCRETE AFTER INITIAL SET HAS OCCURRED IS NOT PERMITTED.

REINFORCEMENT:

DETAILING, FABRICATION AND ERECTION OF REINFORCING STEEL SHALL CONFORM TO THE FOLLOWING:

ACI 315 – "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT"
ACI 318 – "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE"
MSP2 – "CRSI MANUAL OF STANDARD PRACTICE"
AWS D1.4 – "STRUCTURAL WELDING CODE – REINFORCING STEEL"
WRI – "WELDED WIRE FABRIC MANUAL OF STANDARD PRACTICE"
THE UNIFORM BUILDING CODE

STEEL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60 (F_y = 60 KSI)

ALL REINFORCING BAR BENDS SHALL BE MADE COLD UNLESS NOTED OTHERWISE.

ALL REINFORCING STEEL SHALL BE ACCURATELY PLACED AND SUPPORTED BY PLASTIC, CONCRETE (ADOBE TYPE) OR GALVANIZED METAL CHAIRS, SPACERS OR HANGERS. MINIMUM REINFORCING CLEARANCES FOR REINFORCING SHALL BE AS FOLLOWS:

CONCRETE PLACED DIRECTLY AGAINST AND PERMANENTLY TO EARTH: ---------- 3"

EXPOSED TO EARTH OR WEATHER
#6 AND LARGER: ---------- 2"
#5 AND SMALLER ---------- 1 1/2"

ALL OTHERS PER THE LATEST ADDITON OF ACI 318.

UNLESS NOTED OTHERWISE, LAP SPLICES IN CONCRETE SHALL BE CLASS "B" TENSION LAP SPLICES WITH A 2'-0" MINIMUM LAP PER THE LATEST ADDITION OF ACI 318. STAGGER ALTERNATE LAP SPLICES A MINIMUM OF ONE LAP LENGTH. WELDED WIRE FABRIC SHALL LAP A MINIMUM OF 2" PLUS THE CROSS WIRE SPACING OR 6", WHICHEVER IS GREATER, AND BE TIED TOGETHER. ALL SPLICE LOCATIONS ARE SUBJECT TO APPROVAL AND SHALL BE MADE ONLY WHERE SHOW ON THE DRAWINGS.

SPLICED BARS SHALL BE PLACED AT THE SAME EFFECTIVE DEPTH UNLESS NOTED OTHERWISE. REINFORCING BARS NOTED AS "CONTINUOUS" SHALL BE FULLY CONTINUOUS AND MAY BE SPLICED ONLY WHERE APPROVED BY THE ENGINEER.

REINFORCING BAR HOOKS SHALL BE STANDARD ACI HOOKS UNLESS NOTED OTHERWISE ON PLANS.

EXTEND ALL HORIZONTAL REINFORCING CONTINUOUS AROUND CORNERS AND INTERSECTIONS OR PROVIDE BENT CORNER BARS TO MATCH AND LAP WITH HORIZONTAL BARS OF WALLS AND FOOTINGS.

DOWEL ALL VERTICAL REINFORCING TO THE FOUNDATION. SKEW HOOKS AS REQUIRED TO PROVIDE ADEQUATE CONCRETE COVER. CONCRETE COLUMN DOWEL EMBEDMENT SHALL BE A STANDARD COMPRESSION DOWEL EMBEDMENT LENGTH PER THE LATEST EDITION OF ACI 318 UNLESS NOTED OTHERWISE ON PLANS.

CONTRACTOR SHALL REFER TO TYPICAL DETAILS SHOWN ON CONTRACT DRAWINGS FOR ADDITIONAL REINFORCEMENT REQUIREMENTS.

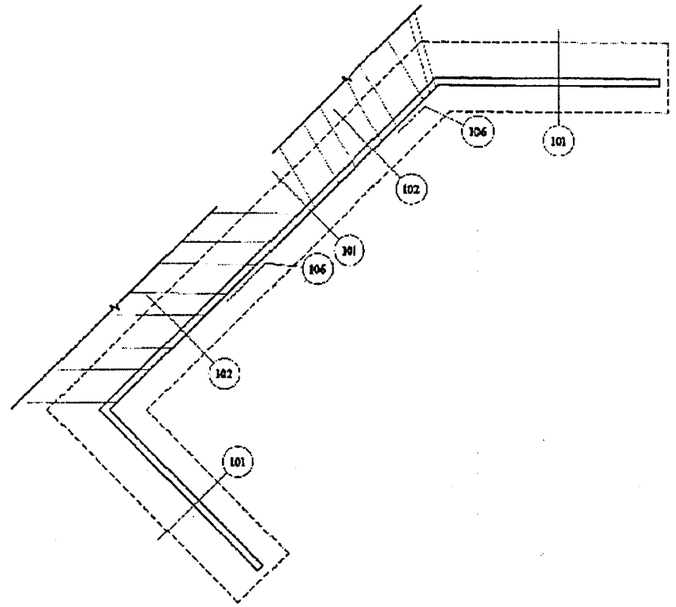
340 WO	CATALOG NO. : A-

GILBERTSON ASSOCIATES Inc.
consulting civil engineers & land surveyors
15974 North 77th Street, Scottsdale, Arizona 85260-1764 480/607-2244

DRAINAGE IMPROVEMENTS

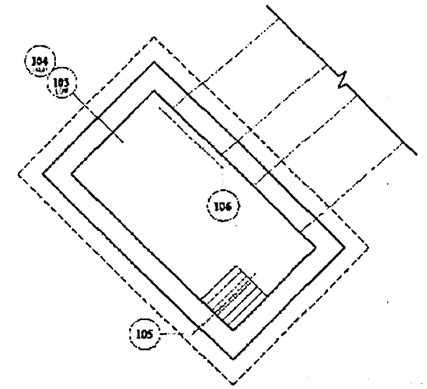
NORTH APRON
WILLIAMS GATEWAY AIRPORT
G.S.N. & TYPICAL DETAILS

Designed by JLK	Drawn by LF	
Date OCT. 10, 2001	Job No. 50111	Sheet [illegible] of 17



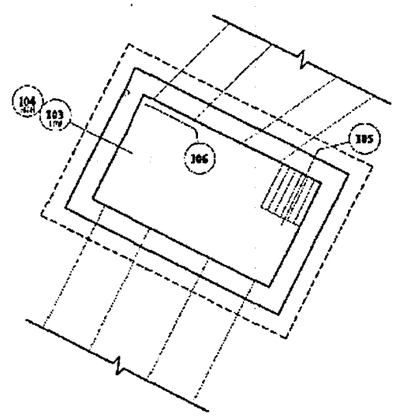
OUTLET HEAD WALL FOUNDATION PLAN

SCALE: 1/8"=1'-0"



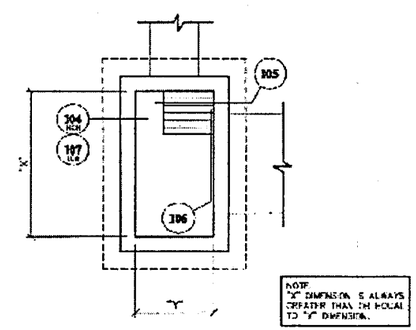
JUNCTION A-02 PLAN

SCALE: 1/4"=1'-0"



JUNCTION C-02 PLAN

SCALE: 1/4"=1'-0"



CATCH BASIN FOUNDATION PLAN

SCALE: 1/4"=1'-0"

340 WO	CATALOG NO. : A–

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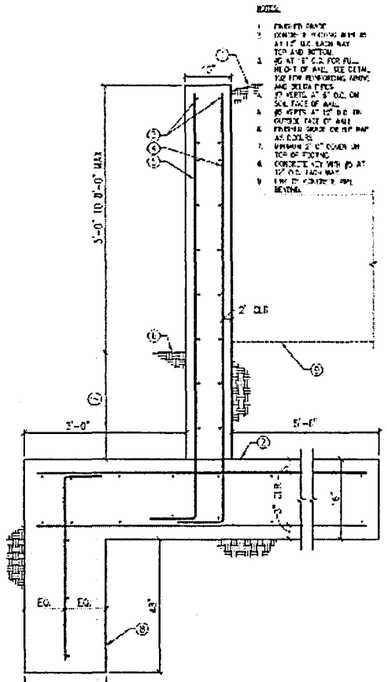
consulting civil engineers & land surveyors
15974 North 77th Street, Scottsdale, Arizona 85260-1768 480.607.2244

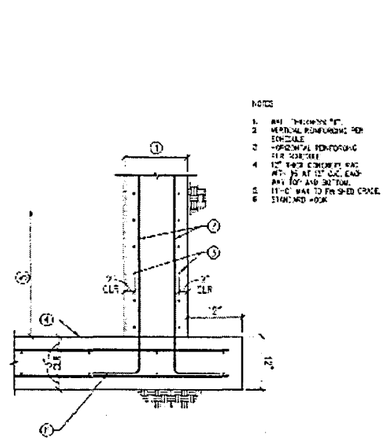
DRAINAGE IMPROVEMENTS

NORTH APRON
WILLIAMS GATEWAY AIRPORT
STRUCTURAL PLANS

Designed by JEW	Drawn by TV	
Date OCT. 10, 2004	Job No. 52111	Sheet S2 of 17

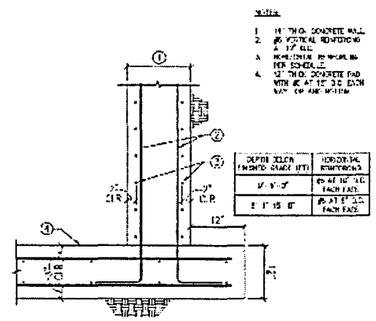


CONCRETE HEAD WALL BETWEEN PIPES - MAXIMUM 5'-0" GRADE DIFFERENCE
NO SCALE 01-073 (108)



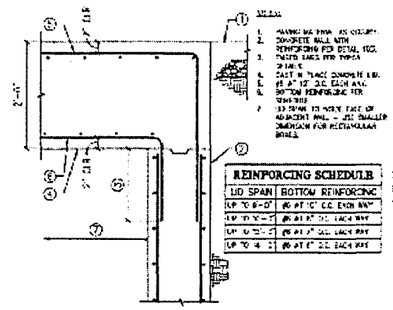
WALL REINFORCING SCHEDULE					
"A"	"B"	"T"	VERTICAL REINFORCING	HORIZONTAL REINFORCING	COMMENTS
UP TO 5'-0"	ANY	8"	#5 AT 18" O.C. EACH FACE	#5 AT 18" O.C. EACH FACE	SINGLE REBAR MAT CENTERED IN WALL
UP TO 7'-0"	ANY	10"	#5 AT 12" O.C. EACH FACE	#5 AT 12" O.C. EACH FACE	---
UP TO 8'-0"	ANY	12"	#5 AT 12" O.C. EACH FACE	#5 AT 12" O.C. EACH FACE	---
UP TO 13'-0"	UP TO 5'-0"	14"	#5 AT 12" O.C. EACH FACE	#5 AT 12" O.C. EACH FACE	---
UP TO 14'-0"	UP TO 5'-0"	14"	#5 AT 12" O.C. EACH FACE	#5 AT 7" O.C. EACH FACE	---
UP TO 8'-0"	UP TO 14'-0"	14"	#5 AT 12" O.C. EACH FACE	#5 AT 12" O.C. EACH FACE	---

CATCH BASIN
NO SCALE 01-073 (107)



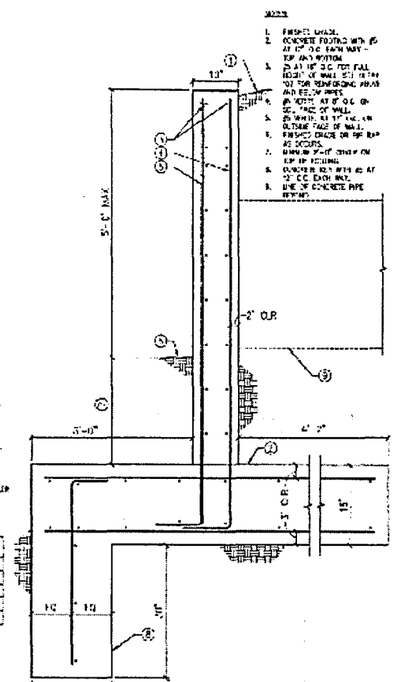
DEPTH BELOW FINISHED GRADE (FT)	HORIZONTAL REINFORCING
0' TO 5'	#5 AT 18" O.C. EACH FACE
5' TO 15'	#5 AT 12" O.C. EACH FACE

JUNCTION STRUCTURE WALL AT FOUNDATION
NO SCALE 01-073 (103)

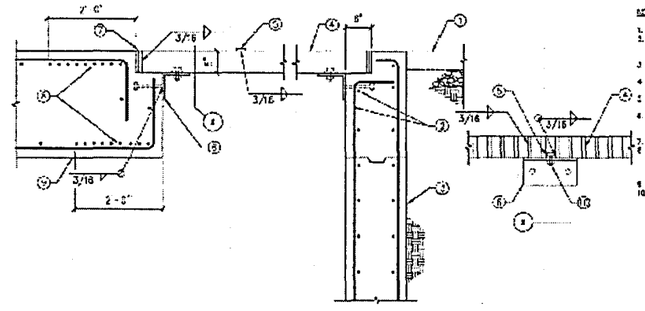


REINFORCING SCHEDULE	
LID SPAN	BOTTOM REINFORCING
UP TO 6'-0"	#5 AT 12" O.C. EACH WAY
UP TO 7'-0"	#5 AT 12" O.C. EACH WAY
UP TO 7'-5"	#5 AT 12" O.C. EACH WAY
UP TO 8'-5"	#5 AT 12" O.C. EACH WAY

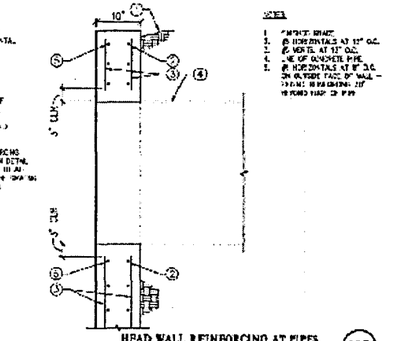
CONCRETE LID OVER STRUCTURE
NO SCALE 01-073 (104)



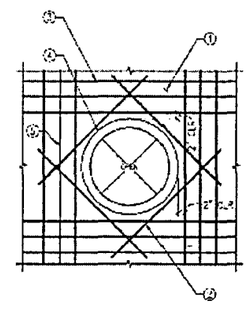
CONCRETE HEAD WALL BETWEEN PIPES - MAXIMUM 5'-0" GRADE DIFFERENCE
NO SCALE 01-073 (101)



STEEL GRATE AT JUNCTION STRUCTURE LID
NO SCALE 01-073 (105)



HEAD WALL REINFORCING AT PIPES
NO SCALE 01-073 (102)



REINFORCING AT PIPE OPENING
NO SCALE 01-073 (106)

340 WO | CATALOG NO. : A-

GILBERTSON ASSOCIATES Inc.
consulting civil engineers & land surveyors
15974 North 77th Street, Scottsdale, Arizona 85260-1761 480/607-2244

DRAINAGE IMPROVEMENTS

WILLIAMS GATEWAY AIRPORT
STRUCTURAL DETAILS

Designed by JSW | Drawn by JV
Date OCT. 13 2004 | Job No. 53111 | Sheet 53 of 17

FILE NAME: K:\DRAWINGS\15\15-517.DWG
LAST SAVED: 06-07-07

Appendix VI

FAA / USDA correspondence

USDA

United States Department of Agriculture

Animal and Plant Health Inspection Service

Wildlife Services

2224 W. Desert Cove
Suite 209
Phoenix, AZ 85029

June 12, 2002

Mr. David A. Gilbertson, P.E.
President
Gilbertson Associates, Inc.
15974 North 77th Street
Scottsdale, Arizona 85260-1761

Re: Supplement to the Preliminary Drainage Report and Conceptual Master Drainage Plan for Williams Gateway Airport

Dear Mr. Gilbertson:

I have reviewed the supplement to the Preliminary Drainage Report and Conceptual Master Drainage Plan (supplement) for Phase 1 improvements at Williams Gateway Airport. As presented, the proposed drainage project should aid in reducing wildlife hazards at Williams Gateway Airport, especially since the current situation allows for standing sheets of storm water on and around taxiways and runways. Detention basins have been proposed to manage runoff through enclosed storm drains that will carry water from the basins to outfall locations. Temporary ponding should only occur in the detention basins when the rate of inflow into the basins exceeds the drain capacity. As stated in the supplement, the detention basins will drain within 24 hours to minimize the attractant to wildlife.

If, for some reason, temporary ponding is found to attract wildlife species after completion of the drainage project, Williams Gateway Airport personnel should consider implementing wildlife management techniques to minimize the newly created hazard (i.e., cover ponds with bird netting, wire grids, or plastic balls to exclude birds from the area). In addition, the detention basins should be maintained on a regular basis to prevent wildlife from utilizing the area. For instance, weeds can create cover or a food source for wildlife and should not be allowed to grow. Trash and debris are attractive to scavenging animals and should be collected routinely.

If you have any questions or wish to discuss this matter further, please contact either myself or Mr. David Bergman, State Director, at (602) 870-2081.

Sincerely,

Wendy Servoss

Wendy Servoss
Wildlife Biologist

cc:
David Bergman, WS
Kevin Flynn, FAA
Bill Long, FAA

U.S Department
of Transportation

**Federal Aviation
Administration**

Western-Pacific Region
Airports Division

P.O. Box 92007
Los Angeles, CA 90009

May 8, 2002

Mr. Art Allan, P.E.
Airport Engineer
Williams Gateway Airport
5835 South Sossaman Road
Mesa, Arizona 85212-1013

Dear Mr. Allan:

Williams Gateway Airport, Mesa, Arizona
Airport Drainage

This is in response to your letter dated May 2, 2002 regarding the Conceptual Drainage Plan for the Northeast Detention Basin for the above subject airport. We have no objection to the project, as proposed, contingent upon the following:

a. The specific project, including location, size, alignment, depth, etc., has been reviewed and concurred with by the Department of Agricultural, Wildlife Services.

b. The Authority has developed and is implementing a wildlife management program.

c. The project is consistent with Advisory Circular 150/5200-33, Hazardous Wildlife Attractants on or Near Airports.

Should you have any questions, please contact me at (310) 725-3633.

Sincerely,

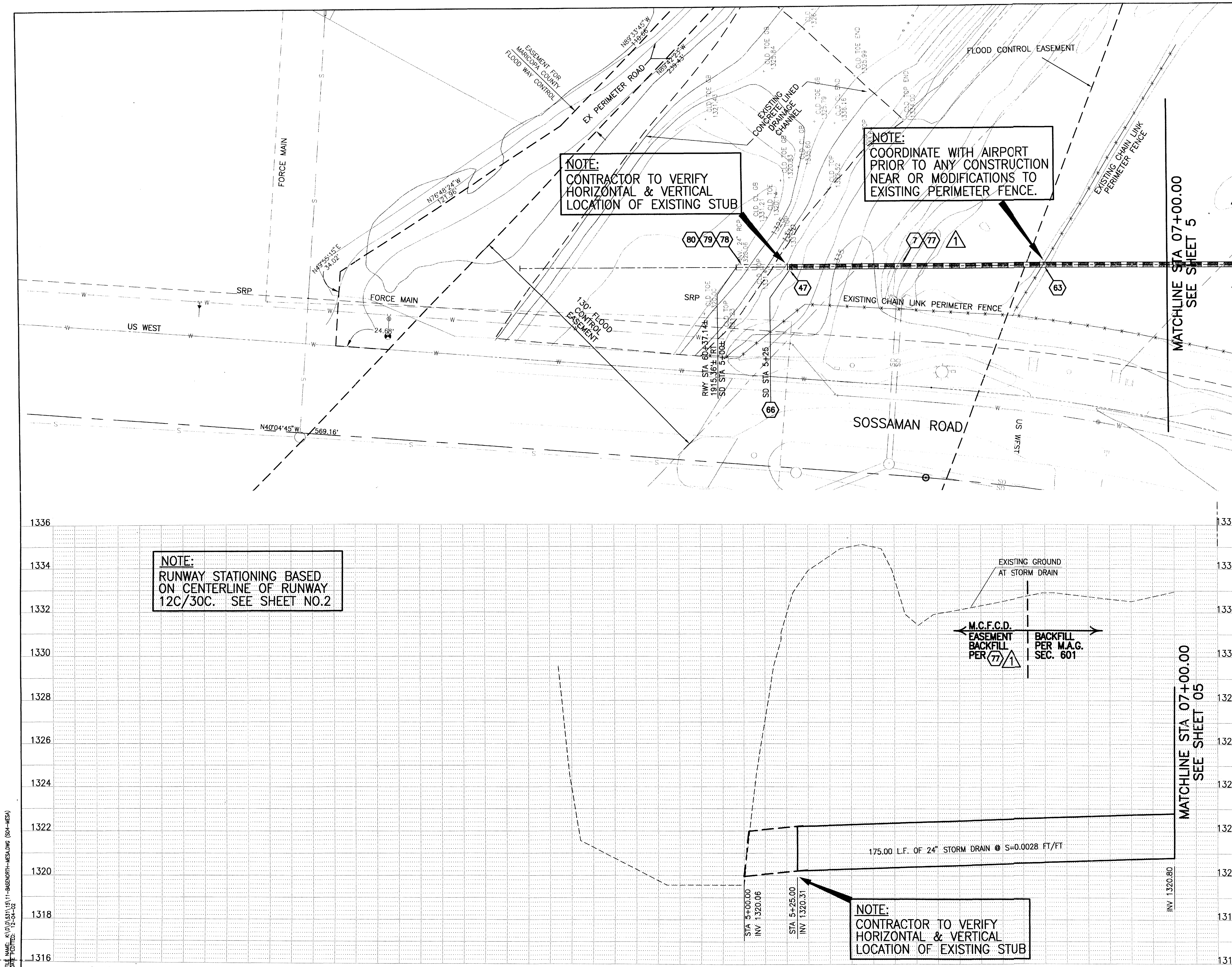
Rodolfo H. Victorio

Rodolfo H. Victorio, P.E.
Civil Engineer, AWP-623.3

Kevin Flynn
Supervisor, Arizona Standards Section, AWP-623

cc: ADOT

2003P071



GILBERTSON ASSOCIATES inc.
consulting civil engineers & land surveyors
15974 North 77th Street, Scottsdale, Arizona 85260-1761 480\607\2244

CONSTRUCTION NOTES

(7) INSTALL 24" STORM DRAIN PIPE PER PROFILE.

(47) LOCATE AND CONNECT TO EXISTING CONCRETE STORM DRAIN PIPE STUB AT STATION SHOWN. REMOVE AND DISPOSE OF ANY EXCESS STORM DRAIN PIPE.

(63) REMOVE AND REPLACE EXISTING CHAIN LINK SECURITY FENCE IN KIND.

(66) CONSTRUCT CONCRETE PIPE COLLAR PER MAG STANDARD DETAIL 505.

1 (77) ALL COMPACTION WITH M.C.F.C.D. EASEMENT, OUTSIDE CONCRETE LINING SHALL BE 95% OF STANDARD PROCTOR.

IF EXCAVATION IS REQUIRED UNDER CONCRETE CHANNEL LINING:

1 (78) BACKFILL SHALL BE ONE SACK CLSM PER SEC. 728.

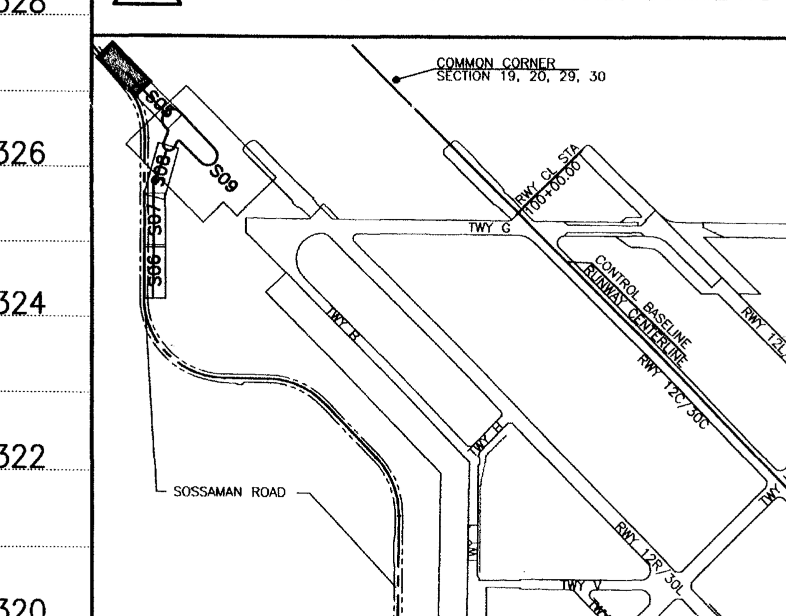
(79) CHANNEL LINING REMOVAL SHALL BE SAWCUT TO NEAT CLEAN EDGE.

(80) LINING REPLACEMENT SHALL BE PHUEMATICALLY PLACED MORTAR PER M.A.G. SEC. 525. MATCH EXISTING THICKNESS, 3" MINIMUM REQUIRED.

Registered Professional Engineer (Civil) CERTIFICATE NO. 10277 DAVID A. GILBERTSON ARIZONA, U.S.A.

CALL TWO WORKING DAYS BEFORE YOU DIG 602-263-1100 BLUE STAKE CENTER

1 REVISED 12-30-03 M.C.F.C.D. COMMENTS



340 WO: 3309 | CATALOG NO. : A-

DRAINAGE IMPROVEMENTS

NORTH APRON WILLIAMS GATEWAY AIRPORT

Designed by DS | Drawn by CS

Date DEC. 4, 2002 | Job No. 53115 | Sheet 4 of 14

FILE NAME: K:\D\D\531\15\11-BASENORTH-MESA.DWG (SO4-MESA)
DATE PLOTTED: 12-04-02