# CITY OF ALBUQUERQUE

May 2, 2005

Brad Sumrall, PE
Bohannan Huston, Inc.
7500 Jefferson NE
Albuquerque, NM 87109

**Re: Tempur-Pedic Parkway Drainage Report**
**Engineer's Stamp date 1-4-05 (K5/D1)**

Dear Mr. Sumrall,

Based upon the information provided in your submittal dated 1-5-05, the above referenced plan is approved as a Master Plan for the basins defined in your report.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Principal Engineer, Planning Dept
Development and Building Services

C: file

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

# DRAINAGE AND TRANSPORTATION INFORMATION SHEET
(REV. 1/28/2003rd)

PROJECT TITLE: Paseo del Volcan Access Road ZONE MAP/DRG. FILE # K-5/D1
DRB #: EPC#: WORK ORDER#:

LEGAL DESCRIPTION: Portion of Tracts A, B,C, D &E of Westland Business Park
CITY ADDRESS: 601 Paseo del Volcan NW

ENGINEERING FIRM: Bohannan Huston, Inc. CONTACT: L. Brad Sumrall, P.E.
ADDRESS: 7500 Jefferson NE – Courtyard I PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

OWNER: City of Albuquerque, Dept. of Municipal Development CONTACT: Mahn Tran
ADDRESS: 1 Civic Plaza, Room 304 PHONE: 505 768-2791
CITY, STATE: Albuquerque, NM ZIP CODE:

ARCHITECT: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

SURVEYOR: Bohannan Huston Inc. CONTACT: Robert Gromatzky
ADDRESS: 7500 Jefferson NE – Courtyard I PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

CONTRACTOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CHECK TYPE OF SUBMITTAL:

X DRAINAGE REPORT
___ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
___ DRAINAGE PLAN RESUBMITTAL
___ CONCEPTUAL GRADING & DRAINAGE PLAN
___ GRADING PLAN
___ EROSION CONTROL PLAN
___ ENGINEER'S CERTIFICATION (HYDROLOGY)
___ CLOMR/LOMR
___ TRAFFIC CIRCULATION LAYOUT (TCL)
___ ENGINEERS CERTIFICATION (TCL)
___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
___ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

___ SIA / FINANCIAL GUARANTEE RELEASE
___ PRELIMINARY PLAT APPROVAL
___ S. DEV. PLAN FOR SUB'D. APPROVAL
___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
___ SECTOR PLAN APPROVAL
___ FINAL PLAT APPROVAL
___ FOUNDATION PERMIT APPROVAL
___ BUILDING PERMIT APPROVAL
___ CERTIFICATE OF OCCUPANCY (PERM.)
___ CERTIFICATE OF OCCUPANCY (TEMP.)
___ GRADING PERMIT APPROVAL
___ PAVING PERMIT APPROVAL
___ WORK ORDER APPROVAL
X* OTHER (SPECIFY)
*Final Design City Project No. 727402

WAS A PRE-DESIGN CONFERENCE ATTENDED:
___ YES
___ NO
___ COPY PROVIDED

RECEIVED
JAN 0 5 2005
HYDROLOGY SECTION

DATE SUBMITTED: BY:

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report:** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

**Bohannan ▲ Huston** INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335
**www.bhinc.com**
**voice:** 505.823.1000
**facsimile:** 505.798.7988
**toll free:** 800.877.5332

# CLIENT/COURIER TRANSMITTAL

**To:** Brad Bingham
City of Albuquerque
600 Second Street NW, 2nd Floor West

**Requested by:** Brad Sumrall

**Date:** January 5, 2004

**Time Due:**
- [x] **This A.M.**
- [ ] **This P.M.**
- [ ] **Rush** _____
- [ ] **By Tomorrow**

**Phone:** 924-3986

**Job No.:** 050056.001.05 CWH

**Job Name:** Tempur Pedic Parkway

**DELIVERY VIA**
- [x] **Courier**
- [ ] **Federal Express**
- [ ] **Mail**
- [ ] **UPS**
- [ ] **Other**

**PICK UP**

**Item:** _____

| ITEM NO. | QUANTITY | DESCRIPTION |
|---|---|---|
| 1 | 1 | Drainage Report |
| 2 | 1 | Drainage Information Sheet |

**COMMENTS / INSTRUCTIONS**

RECEIVED
JAN 05 2005
HYDROLOGY SECTION

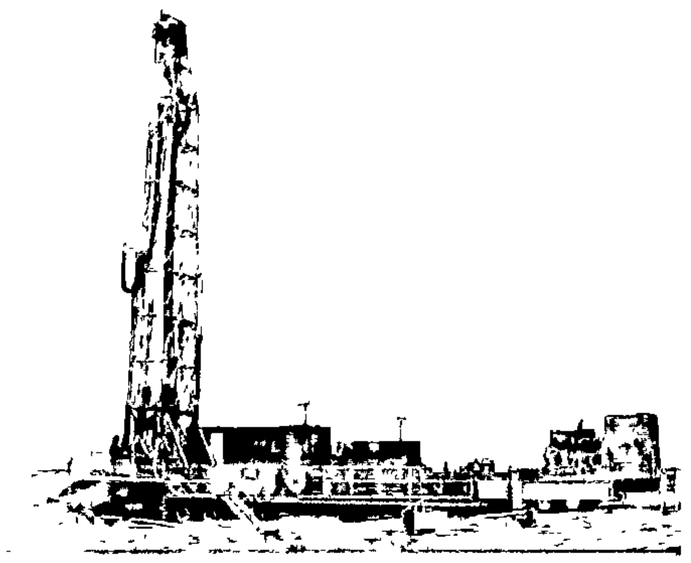
*REC'D BY:*_____ *DATE:*_____ *TIME:*_____

**ENGINEERING ▲**
**SPATIAL DATA ▲**
**ADVANCED TECHNOLOGIES ▲**

# TEMPUR-PEDIC PARKWAY DRAINAGE REPORT

**CITY PROJECT NO. 727402**

**JANUARY 2005**



**Prepared for:**

**City of Albuquerque**

**Department of Municipal Development**

**Transportation Division**

**P.O. Box 1293**

**Albuquerque, NM 87103**

**Bohannan Huston INC.**

ENGINEERING

SPATIAL DATA

ADVANCED TECHNOLOGIES

# TEMPUR-PEDIC PARKWAY

# DRAINAGE REPORT

## City Project No. 727402

January 4, 2005


PREPARED BY:

BOHANNAN HUSTON INC.

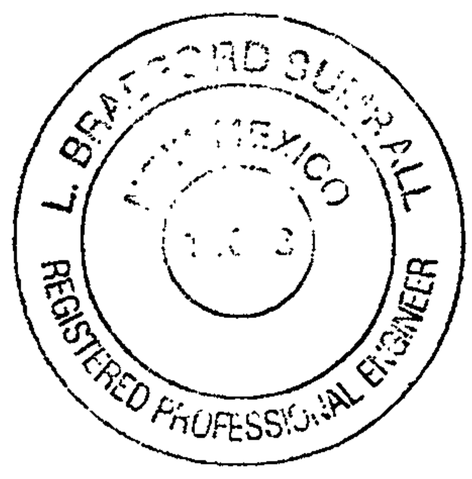
COURTYARD ONE

7500 JEFFERSON NE

ALBUQUERQUE, NM 87109


1/4/05

L. Brad Sumrall, P.E. Date



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Appendix A AHYMO Analysis

Appendix B Street Hydraulics And Inlet Analysis

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**Exhibits**

Exhibit 1 Vicinity Map

Exhibit 2 Drainage Basin Map

Exhibit 3 Swale Plans
Sta. 15+00 – 38+00

Exhibit 4 Swale Plan - Sta. 38+00 – 50+00

Exhibit 5 Retention Pond Plan

## I. SCOPE OF DRAINAGE REPORT

This report summarizes the findings of the drainage analysis for the proposed Tempur-Pedic Parkway and surrounding platted development area within the Westland Business Park.

### A. Purpose

The primary goal of this report is to perform drainage analysis in support of the proposed Tempur-Pedic Parkway. The report provides drainage calculations for existing and interim developed conditions.

### B. Project Location

The proposed Tempur-Pedic Parkway is located on Albuquerque's west side about 0.6 miles north of the Paseo del Volcan / I-40 interchange. Additional project location information is shown on Exhibit 1, Vicinity Map at the rear of this report.

The study area covers approximately 88 acres of land. This land is divided into seven drainage basins for hydrologic analysis. Exhibits 2 and 3 illustrate drainage basin locations. The study area is within the Westland Master Plan (2000) as well as land west of the Master Planed area.

### C. Methodology

The study area was modeled according to the standards set by the City of Albuquerque Development Process Manual (DMP), Volume II Design Criteria, Section 22.2, June 1997. The drainage analysis was performed using the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) Hydrologic Model (AHYMO_97). Summary output files for both Interim and Developed scenarios are found in Appendix A.

1. Land Treatments

The AHYMO program classifies different land types by infiltration and initial abstractions using one of four land treatment types. These land treatment types range from the highly pervious treatment type A, to impervious treatment type D. In general, treatment A describes undisturbed land and treatment D describes paved areas and rooftops. The City of Albuquerque DPM assigns the level of imperviousness, treatment

type D, based on development density. Level of imperviousness was calculated according to Table A-5 in the Albuquerque DPM, Section 22.2.

2. Routing

Muskingum-Cunge flood routing was implemented given this is the accepted standard for analyzing flood routing in AHYMO. It generally attenuates flows to a lesser degree than the variable storage coefficient method used in previous versions of AHYMO.

## II. STUDY AREA DESCRIPTION

### A. Topography

The study area slopes from the north west toward the south east with a maximum elevation of 5800 feet and a minimum elevation of 5725 feet. Existing ground varies in slope from 2.3% to 5.7%, with the steeper slopes generally occurring in the upper (western) portion of the study area.

### B. Existing Vegetation, Land Use, and Soils

The vegetation within the study area consists of native desert grasslands currently used for wildlife and cattle grazing. The area can be classified as land treatment A for hydrologic analysis since the land is undisturbed by human activity and the slopes are less than 10%.

Soils within the area consist of principally sands with traces of silt and gravel. A defined caliche exists at variable depth within the upper 20 feet of the profile.

## III. EXISTING CONDITIONS

The study area encompasses 88 acres analyzed as a single basin for existing conditions. Within this basin there is one arroyo trending from northwest to southeast. Currently the arroyo is in stable condition with little or no sediment generation and stable banks and bottom. In general, it exhibits a "V" section 80 feet wide with 4.0% side slopes. To protect the proposed roadway, flows carried within this channel will intercepted and discharged into the proposed retention pond.

## IV. DEVELOPED CONDITIONS

Portions of the ultimate development are currently in design to support near-term construction activities within the Westland Business Park. Within basins 1, 2, and 3, half of the ultimate 4-lane roadway section is being constructed to provide access to the Tempur-Pedic manufacturing facility

currently under construction. A swale is proposed to collect runoff from inlets in the proposed roadway as well as runoff from the singe offsite basin.

## A. Hydrologic Analysis

Drainage basins were delineated and areas calculated to support the hydrologic analysis. These basins are found on Exhibit 2.

1. On-Site Drainage Basins

Basin 2 is the roadway basin that extends from the northern boundary of the Tempur-Pedic site to a highpoint in the roadway approximately 1000 feet to the south. This basin includes an 86 foot right-of-way Collector Street and was assumed to be fully constructed to its full four-lane section. Hydraulic analysis can be found in Appendix A.

Basin 3 is the roadway basin that begins at the roadway high point and extends eastward to Paseo del Volcan. The basin is modeled as an 86 foot right-of-way Collector Street and also assumed complete buildout of the ultimate four-lane section. Hydraulic analysis can be found in Appendix A.

2. Off-Site Drainage Basins

Basin 7 is located north - northwest of the proposed Tempur-Pedic Parkway. This basin is modeled as an undeveloped area consisting of undisturbed soils and native vegetation. Hydraulic analysis can be found in Appendix A.

3. Summary

It is expected that runoff from the roadway and the single offsite undeveloped drainage basin will be collected by a swale paralleling Tempur-Pedic Parkway. These flows will be routed to a retention pond at the south eastern corner of the study area.

Table 1 illustrates developed flows from the roadway and the offsite contributing area that must be conveyed in the near term.

| Table 1<br>Partially Developed Conditions | | |
|---|---|---|
| Basin | Area (acre) | 10-yr, 6-hr Discharge (cfs) |
| 2 | 1.87 | 1.5 |
| 3 | 4.42 | 3.2 |
| | | |
| Basin | Area | 100-yr, 6-hr |
| 7 | 34.97 | 32.12 |

## B. Hydraulic Analysis

### 1. On-Site Drainage Basins

Basin 2, as a collector street, is designed to maintain one lane in either direction free from runoff at final build-out. Flows were calculated for the 10-year storm to size the inlets and the discharge lines into their discharge locations. In the near term, the drop inlets will discharge into a swale and ultimately into a proposed storm drain trunk line. Roadway drainage will be collected by a double type A inlet located at the low-point. Hydraulic analyses demonstrating street section flows and inlet capacities are included in Appendix B

Basin 3, also within the street, is designed to maintain one lane in either direction free from runoff. Roadway drainage will be collected by a double type A inlet located at the low-point located just west of the Paseo del Volcan roadway intersection. Hydraulic analyses demonstrating street section flows and inlet capacities are included in Appendix B.

### 2. Off-Site Drainage Basins

Basin 7 produces approximately 32 cfs of offsite runoff that must be managed to protect the roadway. In order to accommodate runoff from the basin a roadside swale has been designed. The swale will be placed within the right-of-way of the roadway where possible, as seen in the 100 percent DRC plan submittal (Exhibits 3 and 4). The swale will begin just to the north of the Tempur-Pedic project boundary and extend to the

south approximately 3100 feet before emptying into the retention pond. This swale has an 8 foot bottom width, 3:1 side slopes and is approximately 2.25 feet deep.

3. Summary

The focus of this design is protecting the roadway from upland off-site runoff as well as roadway surface runoff. Refer to Exhibit 2, Drainage Basin Map, for additional information concerning basin locations. All runoff from the roadway and the offsite basin will be captured in a retention pond located beyond the right-of-way of the proposed roadway as shown in Exhibit 5. The retention pond is sized to accommodate runoff from the ultimate roadway section as well as runoff from the existing offsite basin. Retention pond analysis in included in Appendix E.

Future development must either enlarge the retention pond to accommodate the increased runoff volume or use temporary on-site retention ponds to capture all onsite runoff until a storm drain outfall is constructed. Existing offsite runoff will be accommodated using a swale that parallels the roadway.

## V. CONCLUSION

This report provides the necessary hydrologic and hydraulic analysis for the development of Tempur-Pedic Parkway. The information provided within this report provides adequate supporting documentation and guidance for approval of this report and the preparation of drainage construction plans.

```
- SUMMARY FILE -
Alternate Swale Only - Hydrologic Calculations
Tempur Pedic Parkway
BHI No.            050056.001.05.CWH
Prepared By:       Kris Johnson
Date:              12.28.2004
    AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =
12/28/2004
    INPUT FILE = TEMPUR_Z.TXT                                                                  USER NO.= AHYMO-S-
9702c1BohanHu-AH
*S*********************************
    *S***     NOTES (ADDED 10/19/2004 by K Johnson)
    *S***
    *S***     1. 100-YR ALTERNATE
    *S***        TEMPUR PEDIC PARKWAY - ROADWAY & OFFSITE ANALYSIS
    *S***     2. INPUT FILE:
    *S***              056\Hydro\Study\programs\AHYMO\100-yr Alternate\tempur_k.HYM
    START                                                                                                                  TIME=
.00
                                  FROM  TO                    PEAK        RUNOFF                TIME TO    CFS      PAGE
=   1
                     HYDROGRAPH   ID    ID       AREA     DISCHARGE     VOLUME      RUNOFF     PEAK     PER
    COMMAND        IDENTIFICATION  NO.   NO.    (SQ MI)     (CFS)       (AC-FT)    (INCHES)  (HOURS)   ACRE
NOTATION

        *S**** 6-HR, 100-YEAR EVENT
    RAINFALL  TYPE= 1                                                                                                      RAIN6=
2.200
    *S
    *S
    *S**** BULK FACTOR*************
    SEDIMENT BULK                                                                                                          PK BF =
1.02
    *S
    *S**** CALC BASIN 2a*************
    COMPUTE NM HYD        BASIN2   -    21        .00150        4.12        .151      1.89675    1.500    4.302 PER
IMP=  90.00
    *S
    *S**** CALC BASIN 2b*************
    COMPUTE NM HYD        BASIN2   -    22        .00140        3.86        .142      1.89675    1.500    4.304 PER
IMP=  90.00
    *S
    *S**** CALC BASIN 7*************
    COMPUTE NM HYD        BASIN7   -     1        .05464       32.12       1.312       .45020    1.600     .918 PER
IMP=    .00
    *S
    *S**** COMBINE BASIN 2A & 2B*****
    *S****
    ADD HYD               RUNDOWN 21&22  13       .00290        7.98        .293      1.89656    1.500    4.303
    *S
    *S**** COMBINE BASIN 2A, 2B WITH BASIN 7 AT AP-1*****
```

```
    *S****
    ADD HYD               RUNDOWN 13& 1  14       .05754       38.27       1.605       .52303    1.567    1.039
    *S
    *S**** CALC BASIN 3-a*************
    COMPUTE NM HYD        BASIN3   -    31        .00606       12.60        .613      1.89675    1.600    3.251 PER
IMP=  90.00
    *S
    *S**** CALC BASIN 3-b*************
    COMPUTE NM HYD        BASIN3   -    32        .00085        2.35        .086      1.89675    1.500    4.316 PER
IMP=  90.00
    *S
    *S**** ADD BASIN 3-a TO BASIN 3-b AT AP-2********
    *S**** AP-2
    ADD HYD               RUNDOWN 31&32  16       .00691       14.22        .699      1.89664    1.600    3.216
    *S
    *S*** ROUTE AP-2 THROUGH 18" SD TO AP-3(RETENTION POND)********
    *S
    ROUTE                 AP2_AP2a   16   18       .00691       14.19        .699      1.89672    1.600    3.210
    *S
    FINISH
```

```
ADD HYD              ID=14 HYD=RUNDOWN ID I=13 II=1
PRINT HYD            ID=14 CODE=10
```

HYDROGRAPH FROM AREA RUNDOWN

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.667 | 33.1 | 3.333 | .8 | 5.000 | .1 | 6.667 |
| .0 | .333 | .0 | 2.000 | 10.0 | 3.667 | .5 | 5.333 | .1 | 7.000 |
| | .667 | .0 | 2.333 | 3.2 | 4.000 | .3 | 5.667 | .1 | |
| | 1.000 | .0 | 2.667 | 1.9 | 4.333 | .2 | 6.000 | .1 | |
| | 1.333 | 2.3 | 3.000 | 1.2 | 4.667 | .2 | 6.333 | .0 | |

```
RUNOFF VOLUME =      .52303 INCHES     =      1.6050 ACRE-FEET
PEAK DISCHARGE RATE =      38.27 CFS  AT   1.567 HOURS   BASIN AREA =   .0575 SQ. MI.


*S**** CALC BASIN 3-a*************
COMPUTE NM HYD          ID=31 HYD NO=BASIN3 DA=0.006056
                        PER A=0 PER B=5.0 PER C=5.0 PER D=90
                        TP=-0.234  RAIN=-1

K =   .127530HR    TP =   .234000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   12.258    CFS   UNIT VOLUME =    .9991       B =   526.28       P60 = 1.8700
AREA =      .005450 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


K =   .207896HR    TP =   .234000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
UNIT PEAK =   .91789    CFS   UNIT VOLUME =    .9847       B =   354.67       P60 = 1.8700
AREA =      .000606 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=31 CODE=10
```

HYDROGRAPH FROM AREA BASIN3

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.667 | 11.7 | 3.333 | .2 | 5.000 | .1 | 6.667 |
| .0 | .333 | .0 | 2.000 | 4.9 | 3.667 | .1 | 5.333 | .1 | 7.000 |
| .0 | .667 | .0 | 2.333 | 1.8 | 4.000 | .1 | 5.667 | .1 | 7.333 |
| .0 | 1.000 | .0 | 2.667 | .7 | 4.333 | .1 | 6.000 | .1 | |
| | 1.333 | 1.4 | 3.000 | .4 | 4.667 | .1 | 6.333 | .0 | |

```
RUNOFF VOLUME =     1.89675 INCHES     =       .6126 ACRE-FEET
PEAK DISCHARGE RATE =      12.60 CFS  AT   1.600 HOURS   BASIN AREA =   .0061 SQ. MI.


*S
*S**** CALC BASIN 3-b*************
COMPUTE NM HYD          ID=32 HYD NO=BASIN3 DA=0.000852
                        PER A=0 PER B=5.0 PER C=5.0 PER D=90
                        TP=-0.133  RAIN=-1

K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   3.0342    CFS   UNIT VOLUME =    .9956       B =   526.28       P60 = 1.8700
AREA =      .000767 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


K =   .118163HR    TP =   .133000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
UNIT PEAK =   .22720    CFS   UNIT VOLUME =    .9420       B =   354.67       P60 = 1.8700
AREA =      .000085 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=32 CODE=10
```

HYDROGRAPH FROM AREA BASIN3

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.333 | .7 | 2.667 | .0 | 4.000 | .0 | 5.333 |
| .0 | .333 | .0 | 1.667 | 1.2 | 3.000 | .0 | 4.333 | .0 | 5.667 |
| .0 | .667 | .0 | 2.000 | .6 | 3.333 | .0 | 4.667 | .0 | 6.000 |
| .0 | 1.000 | .0 | 2.333 | .1 | 3.667 | .0 | 5.000 | .0 | 6.333 |

```
RUNOFF VOLUME =     1.89675 INCHES     =       .0862 ACRE-FEET
PEAK DISCHARGE RATE =       2.35 CFS  AT   1.500 HOURS   BASIN AREA =   .0009 SQ. MI.


*S
*S**** ADD BASIN 3-a TO BASIN 3-b AT AP-2********
*S**** AP-2
ADD HYD              ID=16 HYD=RUNDOWN ID I=31 II=32
PRINT HYD            ID=16 CODE=10
```

HYDROGRAPH FROM AREA RUNDOWN

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.667 | 12.8 | 3.333 | .2 | 5.000 | .1 | 6.667 |
| .0 | .333 | .0 | 2.000 | 5.5 | 3.667 | .2 | 5.333 | .1 | 7.000 |
| .0 | .667 | .0 | 2.333 | 1.9 | 4.000 | .1 | 5.667 | .1 | 7.333 |
| .0 | 1.000 | .0 | 2.667 | .8 | 4.333 | .1 | 6.000 | .1 | |
| | 1.333 | 2.1 | 3.000 | .4 | 4.667 | .1 | 6.333 | .0 | |

```
RUNOFF VOLUME =     1.89664 INCHES     =       .6988 ACRE-FEET
PEAK DISCHARGE RATE =      14.22 CFS  AT   1.600 HOURS   BASIN AREA =   .0069 SQ. MI.


*S
*S*** ROUTE AP-2 THROUGH 18" SD TO AP-3(RETENTION POND)********
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.005
                     DIA=18 IN     N=.013
```

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .08 | .04 | .04 | .67 |
| .16 | .10 | .17 | .92 |
| .23 | .18 | .39 | 1.09 |
| .31 | .27 | .71 | 1.22 |
| .39 | .37 | 1.10 | 1.32 |
| .47 | .47 | 1.58 | 1.39 |
| .55 | .58 | 2.11 | 1.44 |
| .63 | .70 | 2.70 | 1.48 |
| .70 | .81 | 3.33 | 1.50 |
| .78 | .93 | 3.98 | 1.50 |
| .86 | 1.05 | 4.65 | 1.50 |
| .94 | 1.16 | 5.31 | 1.50 |
| 1.02 | 1.27 | 5.95 | 1.50 |
| 1.09 | 1.38 | 6.55 | 1.50 |
| 1.17 | 1.48 | 7.09 | 1.50 |
| 1.25 | 1.57 | 7.54 | 1.50 |
| 1.33 | 1.66 | 7.86 | 1.50 |
| 1.41 | 1.72 | 7.99 | 1.50 |
| 1.50 | 1.77 | 7.99 | 1.50 |

```
*S
COMPUTE TRAVEL TIME  ID=18 REACH=1A VS NO=1 L=202 SLP=.005
```

TRAVEL TIME TABLE
REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .078 | .035 | .04 | .0506 |
| .156 | .098 | .17 | .0324 |
| .235 | .176 | .39 | .0252 |
| 313 | .267 | .71 | .0212 |
| .391 | .366 | 1.10 | .0186 |
| .469 | .472 | 1.58 | .0168 |
| .547 | .583 | 2.11 | .0155 |
| .625 | .697 | 2.70 | .0145 |
| .704 | .814 | 3.33 | .0137 |
| .782 | .931 | 3.98 | .0131 |
| .860 | 1.048 | 4.65 | .0126 |
| .938 | 1.163 | 5.31 | .0123 |
| 1.016 | 1.274 | 5.95 | .0120 |
| 1.094 | 1.381 | 6.55 | .0118 |
| 1.173 | 1.482 | 7.09 | .0117 |
| 1.251 | 1.574 | 7.54 | .0117 |
| 1.329 | 1.656 | 7.86 | .0118 |
| 1.407 | 1.722 | 7.99 | .0121 |
| 1.500 | 1.767 | 7.99 | .0124 |

```
ROUTE                ID=18 HYD NO=AP2_AP2a  INFLOW ID=16 DT=0.0
TRAVEL TIME TABLE EXCEEDED
*S
FINISH

NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 09:09:53
```

## Street Drainage Capacity & Inlet Analysis

**Tempur Pedic Parkway**
**BHI no.** **050056.001.05**
**Prepared by:** Kris Johnson

**TYPE A CDIs**

| | ID # | Side | D/S Sta | Width [ft] | A [ac] | Q/A [cfs/ac] | Design Q [cfs] | Slope [ft/ft] | Depth [ft] | Q @ Depth [cfs] | No of Inlets | Capacity [cfs] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | EBL | 14+50 | 14 | 0.56 | 2.89 | 1.6 | 0.019 | 0.04 | 7.05 | 1 | 7.05 |
| min slope | | | | 14 | 0.27 | 2.89 | 0.8 | 0.024 | 0.04 | 7.54 | 1 | 7.54 |
| max slope | | | | 26 | 0.20 | 2.89 | 0.6 | 0.019 | 0.28 | 7.81 | 1 | 7.81 |
| | 2-a | NBL | 23+60 | 26 | 0.31 | 2.89 | 0.9 | 0.011 | 0.28 | 6.08 | 1 | 6.08 |
| | 2-b | NBL | 20+50 | 26 | 0.67 | 2.89 | 1.9 | 0.005 | 0.28 | 4.74 | 1 | 4.74 |
| min slope | 3-a | WBL | 23+90 | 26 | 0.31 | 2.89 | 0.9 | 0.018 | 0.28 | 7.61 | 1 | 7.61 |
| max slope | | | | 26 | 0.13 | 2.89 | 0.4 | 0.023 | 0.28 | 7.66 | 1 | 7.66 |
| | 3-b | WBL | 40+60 | | | | | | | | | |

Notes:
1. Flow rate per acre from City of Albuquerque DPM for Type D land treatment, pg. 22-15.
2. Depth of flow for on grade CDIs based on maintaining 1-12' driving lane dry.
3. Depth of flow for sump CDIs based on containing flow with an 8" curb.
4. Flow rate at the given depth from COA DPM, Plate 22.3 D-5 for Type A, C, and D inlets.
   Flow rate at the given depth from COA DPM, Plate 22.3 D-6 for Type C and D inlets used in location for double inlet case.
5. For the 2 CDIs at ID #1 and #3a, the first CDI will be a Type A followed by a Type C inlet.

**Retention Pond Incremental Volume Analysis** ***(Includes Access Road)***

**Tempur Pedic Parkway**

BHI No. 050056.001.05.CWH
Prepared By: Kris Johnson
Date: 12.28.2004

| Elevation | Incremental Volume | Cumulative Volume | Acre-Feet | Surface Area |
|---|---|---|---|---|
| | cu ft | cu ft | | sq ft |
| 5714.0000 | 0.0000 | 0.0000 | 0.0000 | 4562.9599 |
| 5715.0000 | 5057.3674 | 5057.3674 | 0.1161 | 6200.3073 |
| 5716.0000 | 6175.5300 | 11232.8974 | 0.2579 | 7056.9766 |
| 5717.0000 | 7328.0653 | 18560.9627 | 0.4261 | 8130.2232 |
| 5718.0000 | 8535.8052 | 27096.7679 | 0.6221 | 9411.9779 |
| 5719.0000 | 9807.3152 | 36904.0831 | 0.8472 | 10778.4779 |
| 5720.0000 | 11143.6655 | 48047.7486 | 1.1030 | 12147.8911 |
| 5721.0000 | 12545.7388 | 60593.4874 | 1.3910 | 13521.1750 |
| 5722.0000 | 14014.5199 | 74608.0073 | 1.7128 | 14961.9735 |
| 5723.0000 | 15551.3570 | 90159.3643 | 2.0698 | 16472.8511 |
| 5724.0000 | 17158.6782 | 107318.0426 | 2.4637 | 18055.9283 |
| 5725.0000 | 18840.6861 | 126158.7286 | 2.8962 | 19714.0017 |
| 5726.0000 | 20620.0989 | 146778.8275 | 3.3696 | 21662.1043 |
| 5727.0000 | 0.0000 | 146778.8275 | 3.3696 | 0.0000 |

# Retention Pond Sizing

☆ must hold 100 year - 10 day Storm event
☆ Designed to accomidate INTERIM Condition ONLY

Pond sized Per COA DPM Standards
Chapter 22, section A.5, equation a-9

(eq. a-9)

$$V_{10day} = V_{360} + A_D \cdot (P_{10\cdot day} - P_{360}) / 12 \frac{in}{ft}$$

$V_{360}$ = 2.304 acre-ft ( AHYMO Model : Interim Condition - Hydrologic Calculation

$P_{10day}$ = 3.67 in [COA DPM]

$P_{360}$ = 2.20 in [COA DPM]

$$A_{D_{sq.mi.}} = 0.9\left[\underbrace{(0.0015 + 0.0014)}_{\text{basin 2}} + \underbrace{(0.00606 + 0.00085)}_{\text{basin 3}}\right]$$

roadways assumed to have 10% pervious material

$A_{D_{sq.mi.}}$ = 0.008825 sq. mi $A_{D_{sq.ft}}$ = 5.648 acre

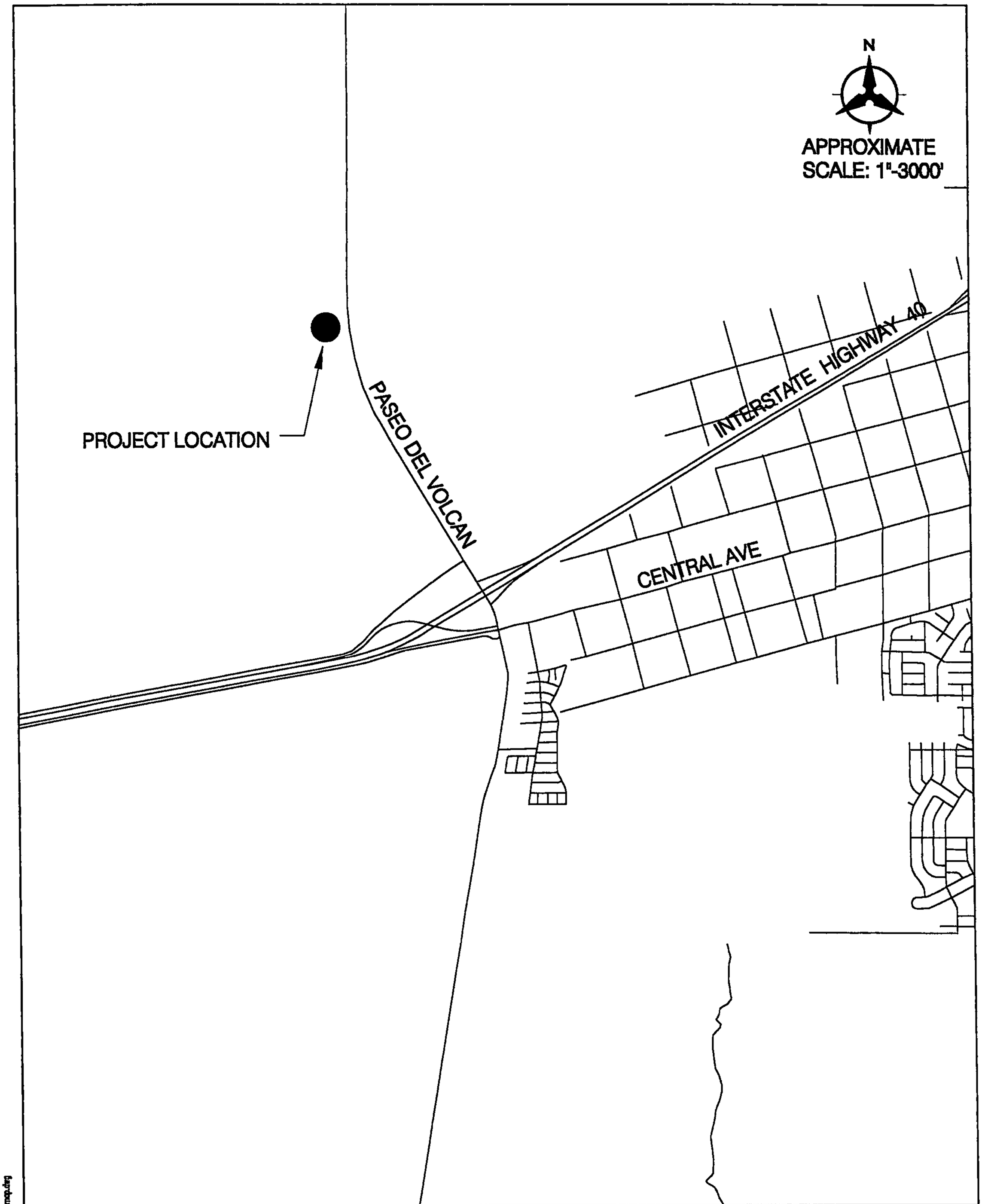
$$V_{10\text{-}day} = 2.304 \text{ acre-ft} + \frac{5.648 \text{ acre} (3.67 \text{ in} - 2.20)}{12}$$

$V_{10\text{-}day}$ = 3.00 acre-ft

Bohannan - Huston INC.

PROJECT NAME Tesoro Pkwy SHEET 1 OF
PROJECT NO. 05[illegible] BY KJOHNSON DATE 10-4-2004
SUBJECT CH'D DATE

ENGINEERING
SPATIAL DATA
ADVANCED TECHNOLOGIES




**Bohannan ▲ Huston INC.**

Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335

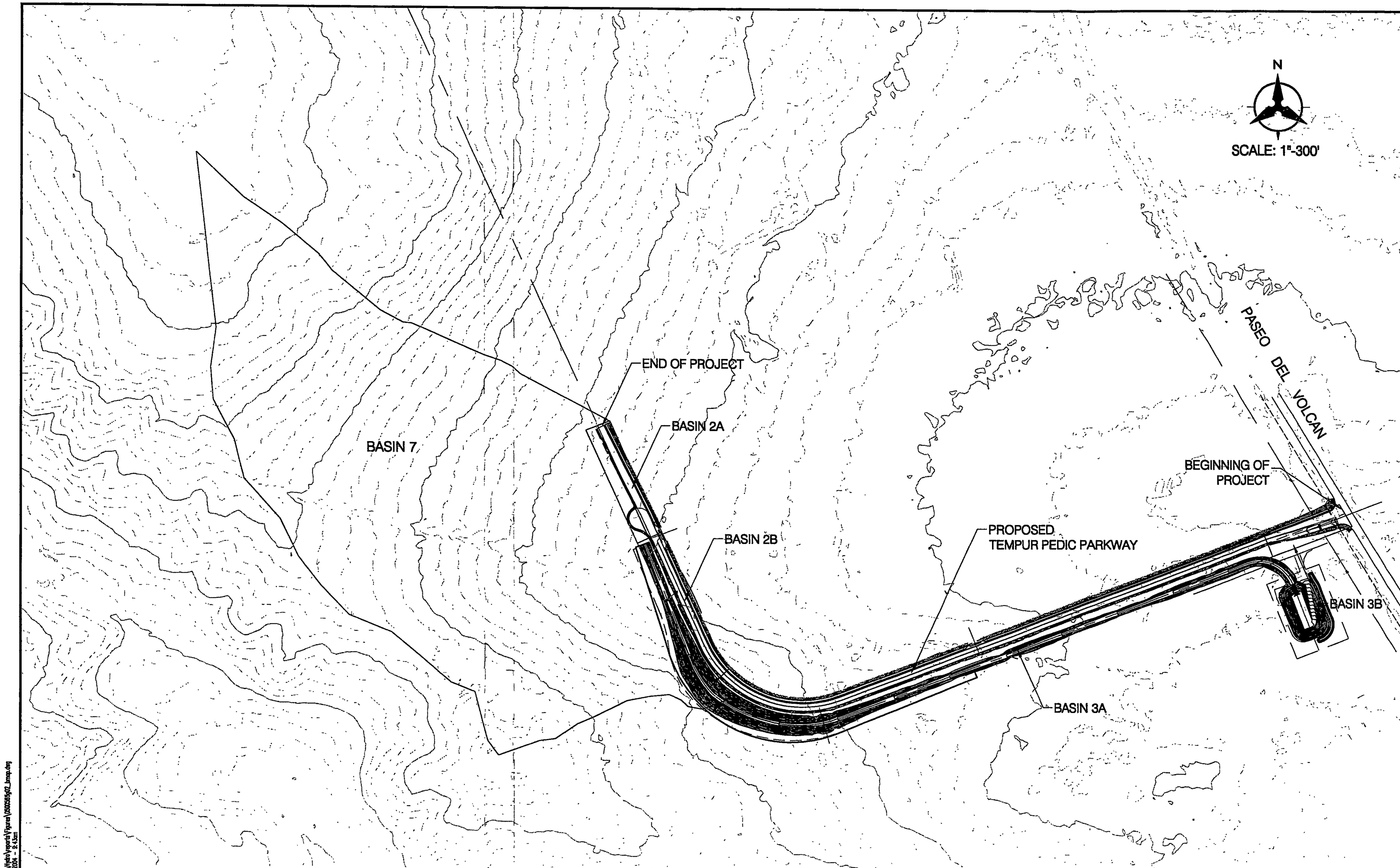
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

**CITY OF ALBUQUERQUE**
**PUBLIC WORKS DEPARTMENT**

TEMPUR-PEDIC PARKWAY
VICINITY MAP - EXHIBIT 1

| | | | |
|---|---|---|---|
| DRAWN BY: | K.W.J. | DATE: | 08.09.04 |
| CHECKED BY: | C.W.H | PROJECT NO. | 050056.001.05.CWH |

P:\050056\Hydro\reports\Figures\050056fig01_vmap.dwg
Dec 28, 2004 - 8:44am

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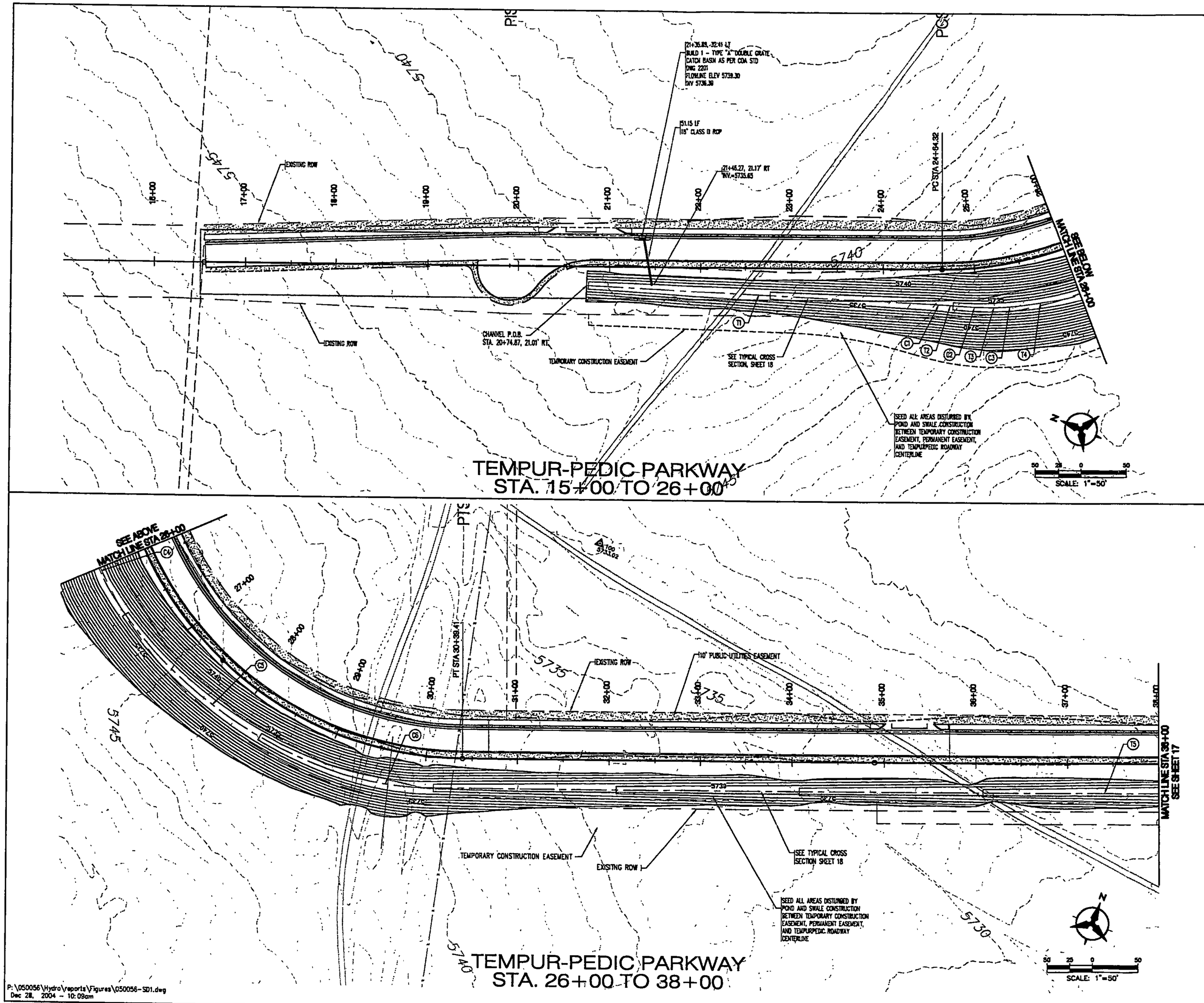
Dec 28, 2004 - 9:43am

Bohannan ▲ Huston INC
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

| | | | |
|---|---|---|---|
| PASEO DEL VULCON ACCESS ROAD DRAINAGE SYSTEM | DRAWN BY: K.W.J. | DATE: 12.28.04 | DRAINAGE BASIN MAP EXHIBIT 2 |
| | CHECKED BY: C.W.H. | ROW PROJECT NO. 050056.001.05 | |




TEMPUR-PEDIC PARKWAY
STA. 15+00 TO 26+00




TEMPUR-PEDIC PARKWAY
STA. 26+00 TO 38+00

P:\050056\Hydro\reports\Figures\050056-SD1.dwg
Dec 28, 2004 - 10:09am

| Tangent Table | | |
|---|---|---|
| ID | BEARING | LENGTH |
| T1 | S21°38'19"E | 378.81' |
| T2 | S20°11'26"E | 12.72' |
| T3 | S24°52'23"E | 3.88' |
| T4 | S33°37'22"E | 36.15' |
| T5 | N56°55'14"E | 1475.79' |

| Curve Table | | | | |
|---|---|---|---|---|
| ID | ARC | RADIUS | DELTA | TANGENT |
| C1 | 12.77' | 500.00' | 01°27'49" | 6.39' |
| C2 | 40.88' | 500.00' | 04°40'54" | 20.44' |
| C3 | 30.54' | 200.00' | 08°44'59" | 15.30' |
| C4 | 60.10' | 175.00' | 19°40'33" | 30.35' |
| C5 | 324.75' | 460.00' | 40°26'57" | 169.47' |
| C6 | 95.19' | 315.00' | 17°18'54" | 47.96' |

EXHIBIT 3

**Bohannan ▲ Huston** INC

Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

**CITY OF ALBUQUERQUE**
**DEPARTMENT OF MUNICIPAL DEVELOPMENT**

TEMPUR-PEDIC PARKWAY
CHANNEL PLAN
TEMPUR-PEDIC PARKWAY STA 15+00 TO STA 38+00

| Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr. | Mo./Day/Yr. |
|---|---|---|---|---|
| | | | | |

| City Project No. | Zone Map No. | Sheet | Of |
|---|---|---|---|
| 727402 | K-9, K-10, L-9, M-10 | 16 | 34 |

BHI JOB NO. 050056

AS-BUILT INFORMATION
CONTRACTOR — DATE
WORK STAKED BY — DATE
INSPECTOR'S ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

BENCH MARKS
NMSHC BRASS CAP STAMPED "1-40-27A"
GEOGRAPHIC POSITION (NAD 1927)
MODIFIED STATE PLANE COORDINATES
N = 1481056.174, E = 341060.989
GROUND TO GRID FACTOR = 0.999655608
NGVD 1929 ELEVATION = 5681.458

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

ENGINEER'S SEAL
L. BRADFORD SUMRALL
NEW MEXICO
14086
LICENSED PROFESSIONAL ENGINEER

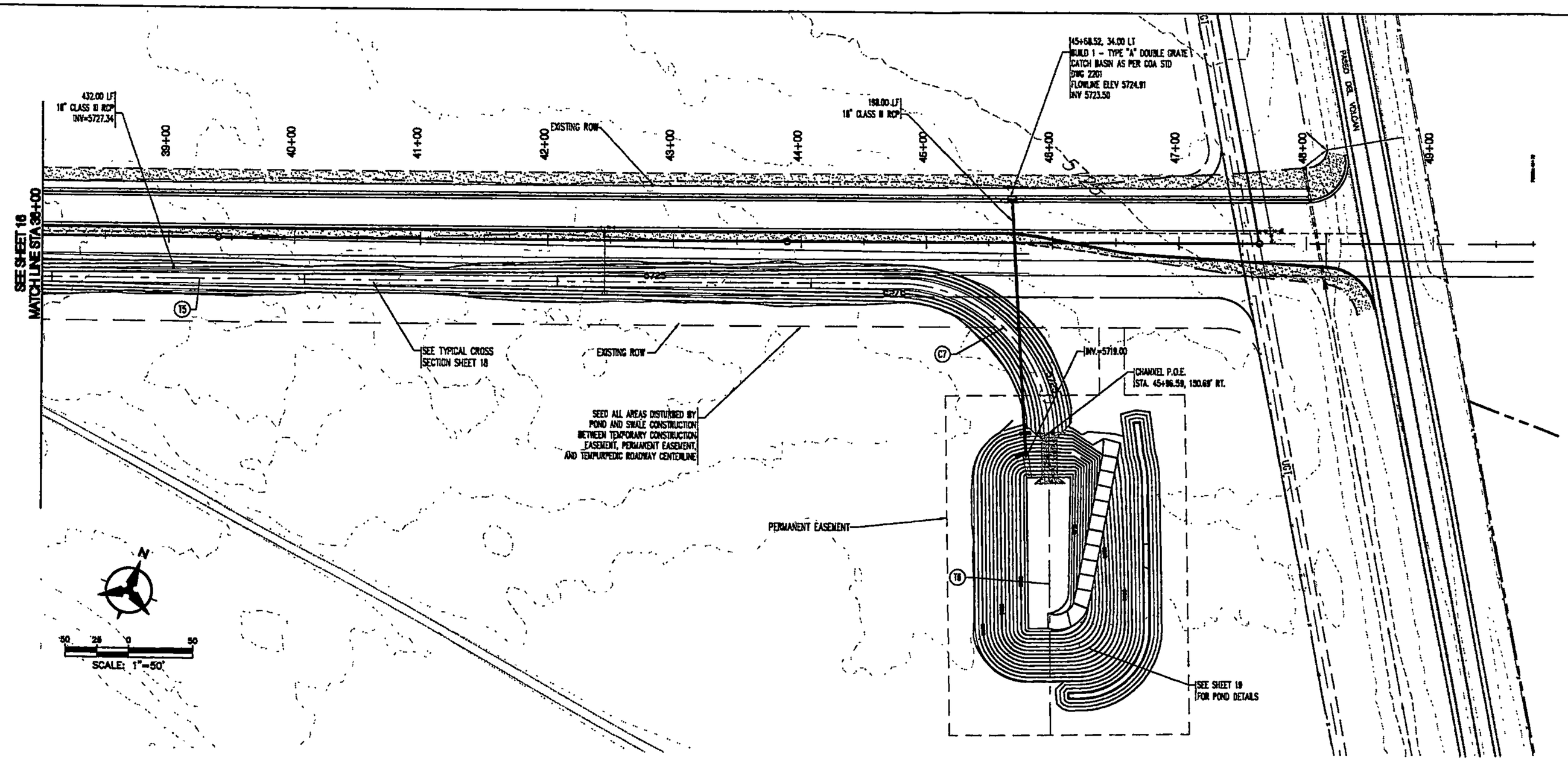
| No. | Date | REMARKS | By |
|---|---|---|---|
| | | REVISIONS | |
| | | DESIGN | |

Designed By: LBS — DATE: 11/04
Drawn By: TONYM — DATE: 11/04
Checked By: DJG

# EXHIBIT 4

## SWALE PLAN

## STA. 38+00 – 50+00




TEMPUR-PEDIC PARKWAY
STA. 38+00 TO 50+00

| Tangent Table | | |
|---|---|---|
| ID | BEARING | LENGTH |
| T6 | S21°10'02"E | 239.93' |

| Curve Table | | | | |
|---|---|---|---|---|
| ID | ARC | RADIUS | DELTA | TANGENT |
| C7 | 185.14' | 118.00' | 89°53'43" | 117.78' |

EXHIBIT 4

**Bohannan ▲ Huston**
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

**CITY OF ALBUQUERQUE**
**DEPARTMENT OF MUNICIPAL DEVELOPMENT**

TEMPUR-PEDIC PARKWAY
SWALE PLAN AND DETAILS
TEMPUR-PEDIC PARKWAY STA 38+00 TO STA 50+00

| Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr. | Mo./Day/Yr. |
|---|---|---|---|---|
| | | | | |

| City Project No. | Zone Map No. | Sheet | Of |
|---|---|---|---|
| 727402 | K-9, K-10, L-9, M-9 | 17 | 34 |

AS-BUILT INFORMATION
CONTRACTOR — DATE
WORK STAKED BY — DATE
INSPECTED BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS MODIFIED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

BENCH MARKS
NMSHC BRASS CAP STAMPED "1-40-27A"
GEOGRAPHIC POSITION (NAD 1927)
MODIFIED STATE PLANE COORDINATES
N = 1481056.174, E = 341080.669
GROUND TO GRID FACTOR = 0.999835608
NGVD 1929 ELEVATION = 5581.458

SURVEY INFORMATION
FIELD NOTES

| NO. | BY | DATE |
|---|---|---|
| | | |

ENGINEER'S SEAL
GEORGE L. MUDFORD SUMMALL
NEW MEXICO
14085
LICENSED PROFESSIONAL ENGINEER

| No. | Date | REMARKS | By |
|---|---|---|---|
| | | | |

REVISIONS
DESIGN
Designed By: LBS — DATE: 11/04
Drawn By: TONYM — DATE: 11/04
Checked By: DJG — DATE: 11/04

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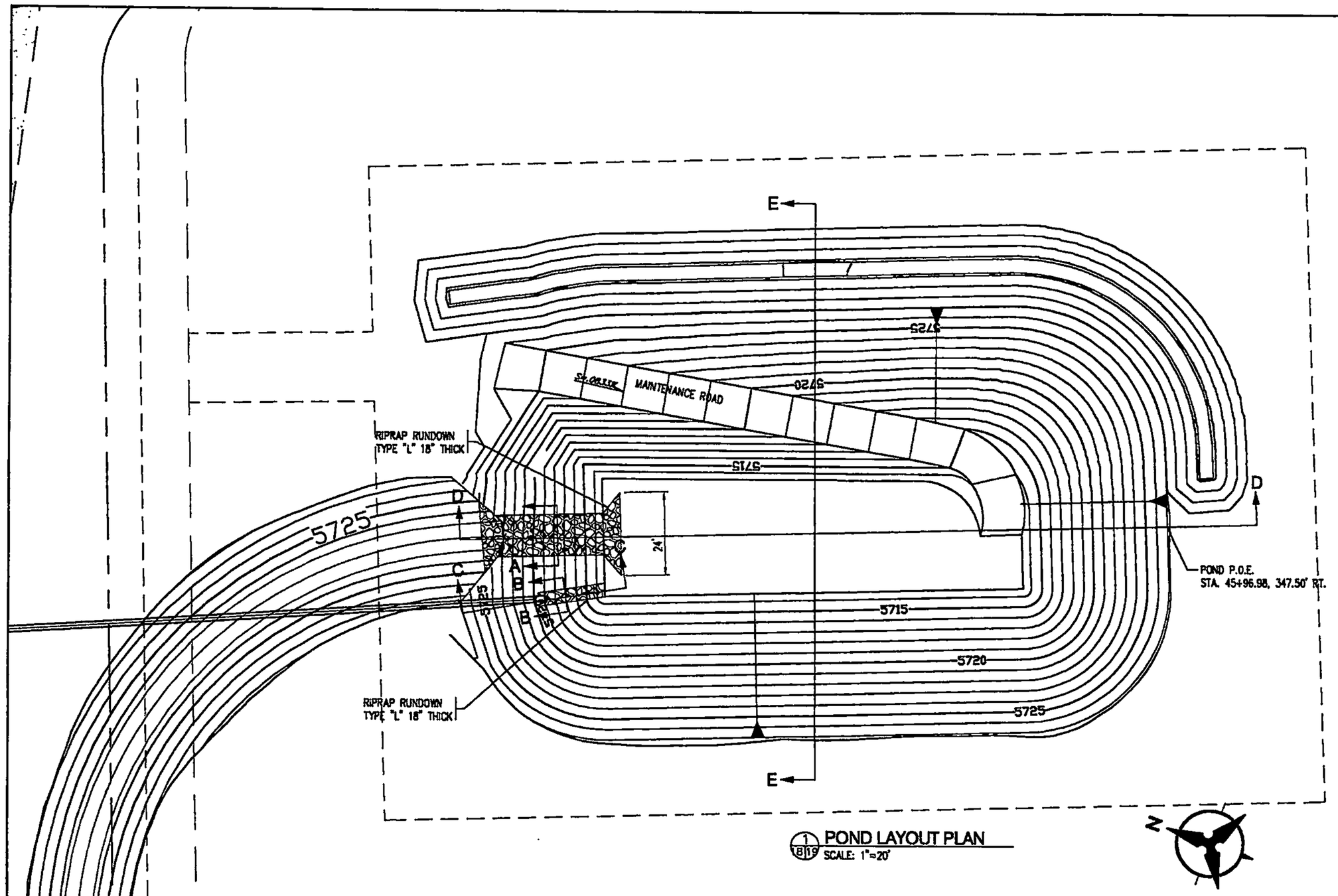
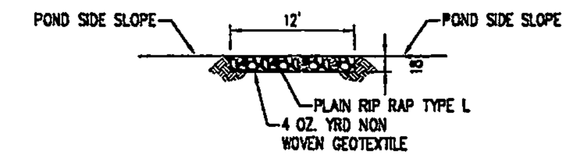
Dec 28, 2004 - 10:10am

BHI JOB NO. 050056

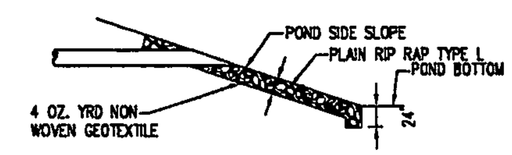



1 POND LAYOUT PLAN
SCALE: 1"=20'

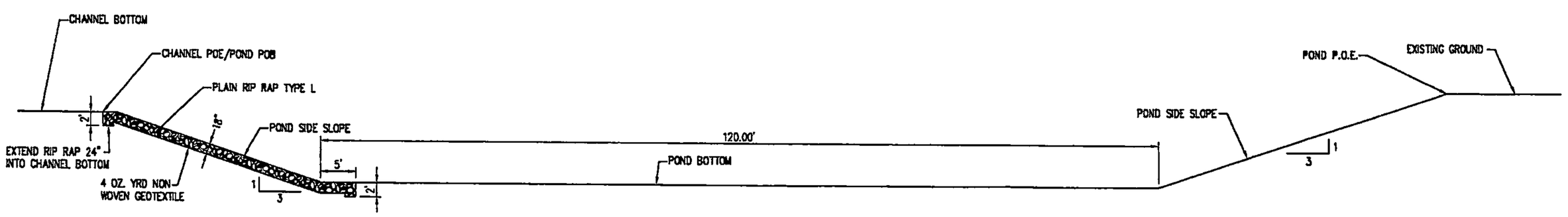



CHANNEL RUNDOWN SECTION A - A
SCALE: 1"=10'

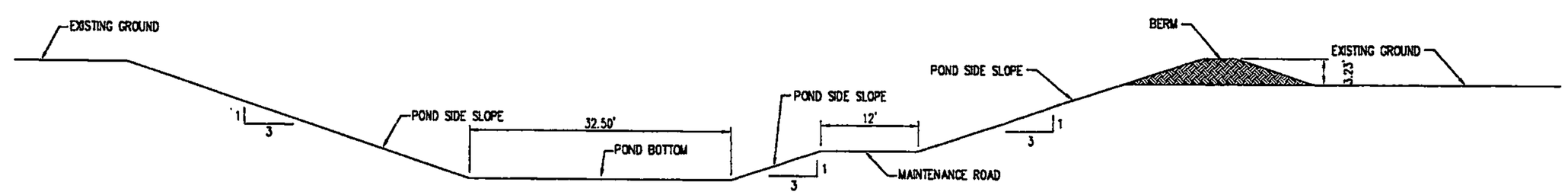
STORM DRAIN RUNDOWN SECTION B - B
SCALE: 1"=10'




STORM DRAIN RUNDOWN SECTION C - C
SCALE: 1"=10'




CHANNEL RUNDOWN SECTION D - D
SCALE: 1"=10'




CHANNEL RUNDOWN SECTION E - E
SCALE: 1"=10'

P:\050056\Hydro\reports\Figures\050056POND01.dwg
Dec 28, 2004 - 10:14am

AS-BUILT INFORMATION

| CONTRACTOR | DATE |
|---|---|
| WORK STAKED BY | DATE |
| INSPECTOR'S ACCEPTANCE BY | DATE |
| VERIFICATION OF ELEVATIONS BY | DATE |
| DRAWINGS CORRECTED BY | DATE |

MICRO-FILM INFORMATION

| RECORDED BY | DATE |
|---|---|
| NO. | |

BENCH MARKS

NMSHC BRASS CAP STAMPED "1-40-27A"
GEOGRAPHIC POSITION (NAD 1927)
MODIFIED STATE PLANE COORDINATES
N = 1481056.174, E = 341090.989
GROUND TO GRID FACTOR = 0.999855608
NGVD 1929 ELEVATION = 5681.458

SURVEY INFORMATION

FIELD NOTES

| NO. | BY | DATE |
|---|---|---|
| | | |

ENGINEER'S SEAL

| No. | Date | REMARKS | By |
|---|---|---|---|
| | | | |

REVISIONS

DESIGN

Designed By: LBS DATE: 11/04
Drawn By: TONYM DATE: 11/04
Checked By: DJG DATE: 11/04

# EXHIBIT 5

**Bohannan ▲ Huston**
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

**CITY OF ALBUQUERQUE**
**DEPARTMENT OF MUNICIPAL DEVELOPMENT**

TEMPUR-PEDIC PARKWAY
POND LAYOUT
AND DETAILS

| Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr. | Mo./Day/Yr. |
|---|---|---|---|---|
| | | | | |

| City Project No. | Zone Map No. | Sheet | Of |
|---|---|---|---|
| 727402 | K-5, K-6, L-5, M-5 | 19 | 34 |

BHI JOB NO. 050056

# CITY OF ALBUQUERQUE

THREE HUNDRED YEARS
1706 • 2006
ALBUQUERQUE
Making History

December 2, 2004

Craig Hoover, PE
Bohannan Huston, Inc.
7500 Jefferson NE
Albuquerque, NM 87109

**Re: Tempur-Pedic Parkway Drainage Report**
**Engineer's Stamp not stamped or originally signed (K5/D1)**

Dear Mr. Hoover,

Based upon the information provided in your submittal dated 10-11-04, the above referenced plan is approved as a Master Plan for the basins defined in your report. However, please send me a stamped, signed and dated copy of the cover to complete the report.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Principal Engineer, Planning Dept
Development and Building Services

C: file

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

# DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

K5-D001

PROJECT TITLE: Paseo del Volcan Access Road ZONE MAP/DRG. FILE # K-5
DRB #: EPC#: WORK ORDER#:

LEGAL DESCRIPTION: Portion of Tracts A, B,C, D &E of Westland Business Park
CITY ADDRESS: 601 Paseo del Volcan NW

ENGINEERING FIRM: Bohannan Huston, Inc. CONTACT: L. Brad Sumrall, P.E.
ADDRESS: 7500 Jefferson NE – Courtyard I PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

OWNER: City of Albuquerque, Dept. of Municipal Development CONTACT: Mahn Tran
ADDRESS: 1 Civic Plaza, Room 304 PHONE: 505 768-2791
CITY, STATE: Albuquerque, NM ZIP CODE:

ARCHITECT: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

SURVEYOR: Bohannan Huston Inc. CONTACT: Robert Gromatzky
ADDRESS: 7500 Jefferson NE – Courtyard I PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

CONTRACTOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CHECK TYPE OF SUBMITTAL:

X DRAINAGE REPORT
__ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
__ DRAINAGE PLAN RESUBMITTAL
__ CONCEPTUAL GRADING & DRAINAGE PLAN
__ GRADING PLAN
__ EROSION CONTROL PLAN
__ ENGINEER'S CERTIFICATION (HYDROLOGY)
__ CLOMR/LOMR
__ TRAFFIC CIRCULATION LAYOUT (TCL)
__ ENGINEERS CERTIFICATION (TCL)
__ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
__ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

__ SIA / FINANCIAL GUARANTEE RELEASE
__ PRELIMINARY PLAT APPROVAL
__ S. DEV. PLAN FOR SUB'D. APPROVAL
__ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
__ SECTOR PLAN APPROVAL
__ FINAL PLAT APPROVAL
__ FOUNDATION PERMIT APPROVAL
__ BUILDING PERMIT APPROVAL
__ CERTIFICATE OF OCCUPANCY (PERM.)
__ CERTIFICATE OF OCCUPANCY (TEMP.)
__ GRADING PERMIT APPROVAL
__ PAVING PERMIT APPROVAL
__ WORK ORDER APPROVAL
X* OTHER (SPECIFY)
*Preliminary design of City Project No. 727402

WAS A PRE-DESIGN CONFERENCE ATTENDED:
__ YES
__ NO
__ COPY PROVIDED

DATE SUBMITTED: BY:

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans,
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report:** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

Bohannan Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

October 8, 2004

Mr. Mahn Tran
Project Manager
City of Albuquerque
Department of Municipal Development
Transportation Division
P.O. Box 1293
Albuquerque, NM 87103

Re: Drainage Report – Paseo del Volcan Access Road (Tempur-Pedic Parkway)

Dear Mahn:

Attached is the drainage report that supports the Paseo del Volcan Access Road currently in design by Bohannan Huston Inc. As you are aware, this roadway has been platted as Tempur-Pedic Parkway and supports access to the Tempur-Pedic facility and the remainder of the Westland Business Park.

We have accommodated both local flows and off-site contributing areas that affect the roadway in both the near-term and long term conditions. The storm drain has been sized for ultimate development as directed by Brad Bingham, P.E., City Drainage Engineer.

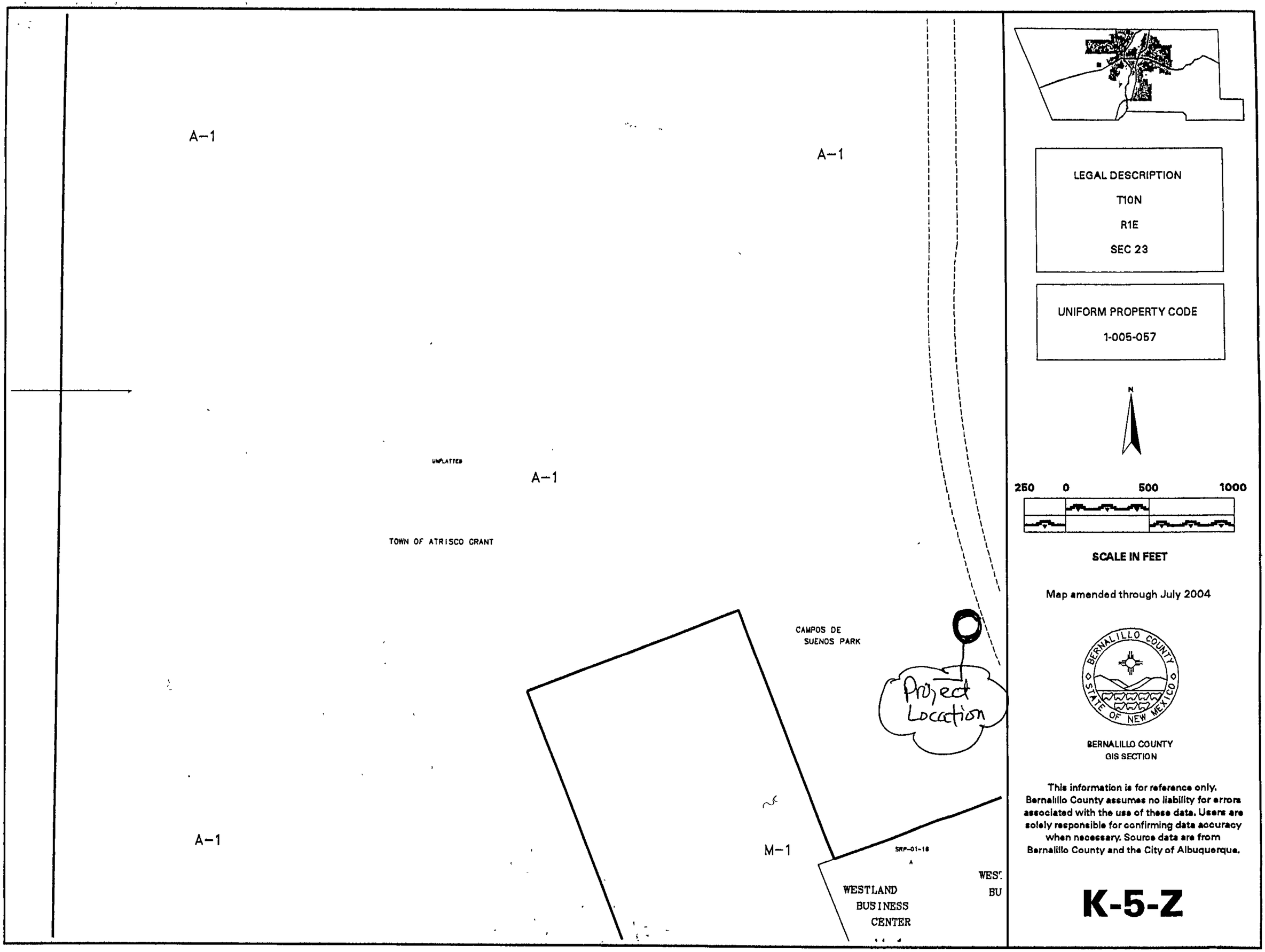
Please feel free to contact us should you have questions or require additional information. Thank you very much for your attention.

Sincerely,

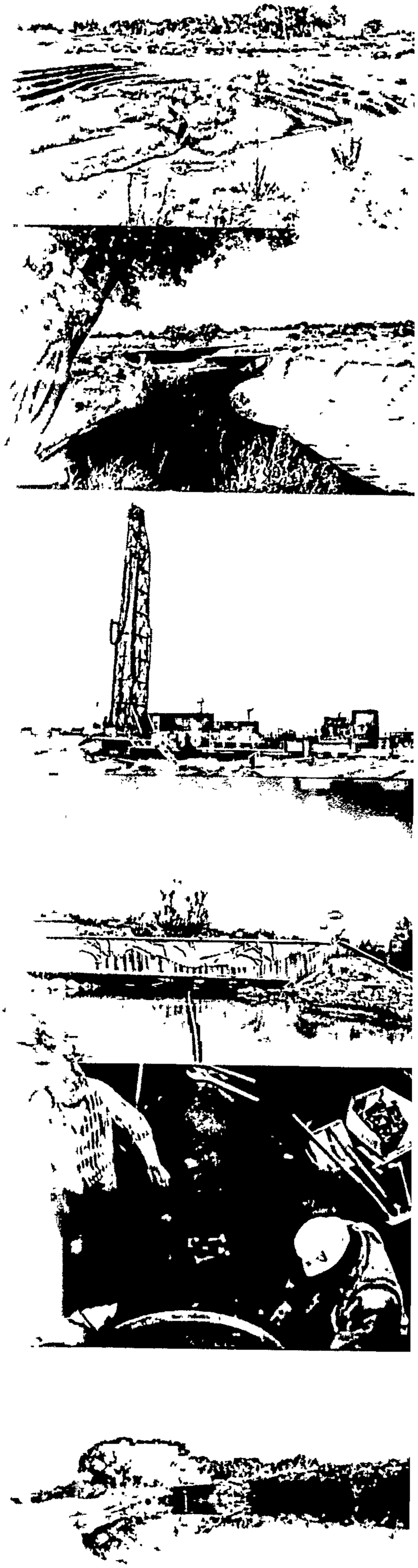
L. Brad Sumrall, P.E.
Senior Project Manager
Water Resources

LBS/vs
Enclosure

cc: Brad Bingham, P.E. – COA
Brad Catanach, P.E. – BCPW


A-1
A-1
UNPLATTED
A-1
TOWN OF ATRISCO GRANT
CAMPOS DE
SUENOS PARK
Project
Location
A-1
M-1
SRP-01-18
A
WESTLAND
BUSINESS
CENTER
WEST
BU
LEGAL DESCRIPTION
T10N
R1E
SEC 23
UNIFORM PROPERTY CODE
1-005-057
N
250
0
500
1000
SCALE IN FEET
Map amended through July 2004
BERNALILLO COUNTY
STATE OF NEW MEXICO
BERNALILLO COUNTY
GIS SECTION
This information is for reference only.
Bernalillo County assumes no liability for errors
associated with the use of these data. Users are
solely responsible for confirming data accuracy
when necessary. Source data are from
Bernalillo County and the City of Albuquerque.
K-5-Z

# TEMPUR-PEDIC PARKWAY DRAINAGE REPORT



**OCTOBER 2004**

**Prepared for:**

**City of Albuquerque**

**Department of Municipal Development**

**Transportation Division**

**P.O. Box 1293**

**Albuquerque, NM 87103**

**Bohannan ▲ Huston INC.**

ENGINEERING ▲

SPATIAL DATA ▲

ADVANCED TECHNOLOGIES ▲

# TEMPUR-PEDIC PARKWAY
# DRAINAGE REPORT

October 7, 2004

PREPARED BY:
BOHANNAN HUSTON INC.
COURTYARD ONE
7500 JEFFERSON NE
ALBUQUERQUE, NM 87109

Craig W. Hoover, P.E. Date

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**Appendices**


| | |
|---|---|
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| Appendix C | STORM DRAIN HGL ANALYSIS |
| Appendix D | INTERIM DETENTION POND ANALYSIS |
| Appendix E | TEMPORARY RETENTION POND ANALYSIS |


**Exhibits**


| | |
|---|---|
| Exhibit 1 | VICINITY MAP |
| Exhibit 2 | INTERIM DRAINAGE BASIN MAP |
| Exhibit 3 | PROPOSED FULLY DEVELOPED DRAINAGE BASIN MAP |
| Exhibit 4 | PLAN AND PROFILE OF STORM DRAIN TRUNK LINE AND SWALE STA. 15+00 – 26+00 |
| Exhibit 5 | PLAN AND PROFILE OF STORM DRAIN TRUNK LINE AND SWALE STA. 26+00 – 38+00 |
| Exhibit 6 | PLAN AND PROFILE OF STORM DRAIN TRUNK LINE AND SWALE STA. 38+00 – 50+00 |
| Exhibit 7 | RETENTION POND PLAN |
| Exhibit 8 | DETENTION POND PLAN |

# I. SCOPE OF DRAINAGE REPORT

This report summarizes the findings of the drainage analysis for the proposed Tempur-Pedic Parkway and surrounding platted development area within the Westland Business Park.

## A. Purpose

The primary goal of this report is to perform drainage analysis in support of the proposed Tempur-Pedic Parkway. The report provides drainage calculations for existing, interim and fully developed conditions.

## B. Project Location

The proposed Tempur-Pedic Parkway is located on Albuquerque's west side about 0.6 miles north of the Paseo del Volcan / I-40 interchange. Additional project location information is available on Exhibit 1, Vicinity Map at the rear of this report.

The study area covers approximately 88 acres of land. This land is divided into seven drainage basins for hydrologic analysis. Exhibits 2 and 3 illustrate drainage basin locations. The study area is within the Westland Master Plan (2000) as well as land west of the Master Planed area.

## C. Methodology

The study area was modeled according to the standards set by the City of Albuquerque Development Process Manual (DMP), Volume II Design Criteria, Section 22.2, June 1997. The drainage analysis was performed using the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) Hydrologic Model (AHYMO_97). Summary output files for both Interim and Developed scenarios are found in Appendix A.

### 1. Land Treatments

The AHYMO program classifies different land types by infiltration and initial abstractions using one of four land treatment types. These land treatment types range from the highly pervious treatment type A, to impervious treatment type D. In general, treatment A describes undisturbed land and treatment D describes paved areas and rooftops. The City of Albuquerque DPM assigns the level of imperviousness, treatment

type D, based on development density. Level of imperviousness was calculated according to Table A-5 in the Albuquerque DPM, Section 22.2.

2. Routing

Muskingum-Cunge flood routing was implemented given this is the community standard for analyzing flood routing in AHYMO. It generally attenuates flows to a lesser degree than the variable storage coefficient method used in previous versions of AHYMO.

## II. STUDY AREA DESCRIPTION

### A. Topography

The study area slopes from the north west toward the south east with a maximum elevation of 5800 feet and a minimum elevation of 5725 feet. Existing ground varies in slope from 2.3% to 5.7%, with the steeper slopes generally occurring in the upper (western) part of the study area.

### B. Existing Vegetation, Land Use, and Soils

The vegetation of the study area consists of native desert grasslands currently used for wildlife and cattle grazing. The area can be classified as land treatment A for hydrologic analysis since the land is undisturbed by human activity and the slopes are less than 10%.

Soils analysis can be found in the Soil Analysis Report for the area.

## III. EXISTING CONDITIONS

The study area encompasses 88 acres analyzed as a single basin for existing conditions. Within this basin there is one arroyo trending from northwest to southeast. Currently the arroyo is in stable condition with little or no sediment generation and stable banks and bottom. In general, it exhibits a "V" section 80 feet wide with 4.0% side slopes. To protect the proposed roadway, flows carried within this channel will need to be routed around the proposed roadway or collected and discharged into the proposed storm drain.

## IV. DEVELOPED CONDITIONS

### A. Hydrologic Analysis

Tempur-Pedic Parkway and associated drainage improvements are design to accommodate the fully developed area as outlined in the Westland Master Plan, consisting of 88 contributing acres. This land is divided into three offsite drainage basins and three roadway drainage basins ranging in size from 1.9 to 41.3 acres. Figure 3, Developed Drainage Basin Map, provides additional information concerning the proposed drainage basins. The drainage improvements are designed to accommodate developed conditions from contributing on-site and off-site basins during a 100-year, 6-hour storm event.

1. On-Site Drainage Basins

Basin 1 is a roadway basin that extends from the northwest corner of the study area, terminating at the proposed Tempur-Pedic Parkway. This basin is modeled as 60 foot right-of-way Local Industrial Commercial Street with 90% of the land assumed to be impervious as land treatment D.

Basin 2 is a roadway basin that extends from the northern boundary of the Tempur-Pedic project site to a highpoint in the roadway approximately 1000 feet south. This basin is modeled as 86 foot right-of-way Collector Street with 90% of the land assumed to be impervious.

Basin 3 is the roadway basin that begins at the roadway high point and extends eastward around the roadway curve to Paseo del Volcan. The basin is modeled as an 86 foot right-of-way Collector Street with 90% of the land assumed to be impervious, land treatment D.

2. Off-Site Drainage Basins

Basin 4 and Basin 5 are located at to the north, northwest of the proposed Tempur-Pedic Parkway. Each basin is modeled as a Light Industrial development with 70% assumed to be impervious. The remaining pervious land within these basins is assumed to be landscaped with grasses and shrubs as well as desert landscaping.

Basin 6 is located at the northeastern corner of the study area, between the proposed Tempur-Pedic Parkway and the western boundary of the Campos del Suenos ball field.

Existing conditions within the basin direct surface flows in a southeastern direction toward the existing ball fields. Under developed conditions it is assumed that the basin will be graded, or include other drainage improvements that allow it to discharge to the proposed storm drain trunk line within Tempur-Pedic Parkway. This basin like Basins 4 and 5 is modeled as a Light Industrial development. All impervious land within this basin is assumed to be landscaped with grasses and shrubs as well as desert landscaping.

3. Summary

Tempur-Pedic Parkway and associated drainage improvements are designed to accommodate the fully developed area as outlined in the Westland Master Plan, consisting of 88 acres of contributing drainage area. This land is divided into three offsite drainage basins and three roadway drainage basins ranging in size from 1.9 to 41.3 acres. Figure 3, Developed Drainage Basin Map, provides additional information concerning the proposed drainage basins. The drainage improvements are designed to accommodate developed conditions runoff from contributing on-site and off-site basins during a 100-year, 6-hour storm event. Results of the AHYMO analysis are shown below in Table 1. The Summary and Output Files generated using AHYMO are found in Appendix A.

*Table 1*
**Developed Conditions**

| Basin | Area (acre) | 100-yr 6-hr Peak Discharge (cfs) |
|---|---|---|
| 1 | 3.58 | 12.90 |
| 2 | 1.87 | 8.00 |
| 3 | 4.42 | 14.95 |
| 4 | 13.39 | 52.10 |
| 5 | 41.32 | 160.70 |
| 6 | 23.30 | 90.62 |

## B. Hydraulic Analysis

### 1. On-Site Drainage Basins

Basin 1 runoff will be carried in the street to inlets located on either side of the roadway at a low point in Basin 2. Hydraulic analyses demonstrating street section flows are included in Appendix B

Basin 2, as a collector street is designed to maintain one lane in either direction free from runoff. Roadway drainage will be combined with flows from Basin 1 and routed in the street to double type-A inlets located on either side of the roadway at the low-point shown in Figure 3. Hydraulic analyses demonstrating street section flows and inlet capacities are included in Appendix B.

Basin 3, also designed as a collector street, is to maintain one lane in either direction free from runoff. Roadway drainage will be collected by a double type-A, inlet located on either side of the roadway at the roadway low-point located just west of Paseo del Volcan. Hydraulic analyses demonstrating street section flows and inlet capacities are included in Appendix B

### 2. Off-Site Drainage Basins

Basins 4, 5 and 6 will be drained through onsite systems to be designed during future development. These drainage basins are expected discharge into the Tempur-Pedic Parkway storm drain trunk line. Manholes are strategically placed along the trunk line to allow simple connection of these future drainage basins. Hydraulic analysis demonstrating storm drain capacities and hydraulic grade line information can be found in Appendix B.

### 3. Summary

A 72 inch storm drain trunk line will collect all runoff from the contributing drainage basins surrounding Tempur-Pedic Parkway. This trunk line will tie into the proposed area storm drain network. Hydraulic Grade Line (HGL) calculations were run for both the fully developed condition as well as the interim condition using Bentley Inroads Storm and Sanitary, 2004. Please refer to Exhibits 4, 5 and 6, Plan and Profile sheets for the entire length of the storm drain trunk line, for a graphical representation of the HGL.

Please refer to Appendix B for numerical HGL calculation results generated using InRoads Storm and Sanitary.

## V. INTERIM DEVELOPED CONDITION

Portions of the ultimate development are currently in design to support near-term construction activities within the Westland Business Park. Within basins 1, 2, and 3, half of the ultimate 4-lane roadway section is being constructed to provide access to the Tempur-Pedic site. The storm drain trunk discussed above will be included as part of this construction effort. Therefore, the hydrologic and hydraulic models were also evaluated using the proposed interim condition.

### A. Hydrologic Analysis

1. On-Site Drainage Basins

Basin 2 is the roadway basin that extends from the northern boundary of the Tempur-Pedic site to a highpoint in the roadway approximately 1000 feet to the south. This basin is modeled as an 86 foot right-of-way Collector Street in order to accommodate future completion of the roadway. The modeling effort assumed that the road would be fully constructed to 4 lanes prior to development of adjoining lots. Hydraulic analysis can be found in Appendix A.

Basin 3 is the roadway basin that begins at the roadway high point and extends eastward to Paseo del Volcan. The basin is modeled as an 86 foot right-of-way Collector Street to accommodate future completion of the roadway. The modeling effort assumed that the road would be fully constructed to 4 lanes prior to development of adjoining lots. Hydraulic analysis can be found in Appendix A.

2. Off-Site Drainage Basins

Basin 7 is located to the north - northwest of the proposed Tempur-Pedic Parkway. This basin is modeled as an undeveloped area consisting of undisturbed soils and native vegetation. Hydraulic analysis can be found in Appendix A.

3. Summary

The study area will not be developed immediately, and the interim drainage conditions were analyzed. It is expected that runoff from the roadway and the single offsite undeveloped drainage basin will be collected in the storm drain trunk line within Tempur Pedic Parkway. These flows will be routed to a retention pond at the south western corner of the study area.

Table 2 illustrates developed flows from both roadway and offsite contributing areas that must be conveyed in the near term, interim condition.

*Table 2*
**Interim Conditions**

| Basin | Area (acre) | 10-yr, 6-hr Discharge (cfs) |
|---|---|---|
| 2 | 1.87 | 1.5 |
| 3 | 4.42 | 3.2 |
| | | |
| **Basin** | **Area (acre)** | **100-yr, 6-hr Discharge (cfs)** |
| 7 | 34.97 | 32.12 |

## B. Hydraulic Analysis

1. On-Site Drainage Basins

Basin 2, as a collector street, is designed to maintain one lane in either direction free from runoff at final build-out. Flows were calculated for the 10-year storm to size the inlets and the discharge lines into the storm drain trunk line. Roadway drainage will be collected by a double type A inlet located at the low-point. Hydraulic analyses demonstrating street section flows and inlet capacities are included in Appendix B

Basin 3, also within the street, is designed to maintain one lane in either direction free from runoff. Roadway drainage will be collected by a double type A inlet located at the low-point located just west of the Paseo del Volcan roadway intersection. Hydraulic

analyses demonstrating street section flows and inlet capacities are included in Appendix B.

2. Off-Site Drainage Basins

Basin 7 produces approximately 32 cfs of offsite runoff that must be managed to protect the roadway. Two options were considered to accommodate runoff from the basin, a roadside swale and a detention pond. The first option requires the swale be placed outside the right-of-way of the roadway, as seen in the 60 percent DRC plan submittal (Exhibits 4, 5 and 6). The swale will begin just to the north of the Tempur-Pedic project boundary and extend to the south approximately 2500 feet before draining to existing grade. This swale has an 8 foot bottom width and is approximately 2.25 feet deep. The second option utilizes a detention pond to remove silt and debris from the runoff before discharging into the storm drain within Tempur Pedic Parkway. The detention pond would be at a natural low-point in the basin. Detention pond analysis can be found in Appendix D. Runoff from this basin will be collected in the temporary retention pond near at the southwestern corner of the project area where the storm drain daylights. For additional information please refer to Exhibit 8, Detention Pond. This option requires that the retention pond be increased in size to accommodate the runoff volume from Basin 7.

3. Summary

The interim development condition focuses on protecting the roadway from upland off-site runoff as well as roadway surface runoff. Refer to Exhibit 2, Interim Drainage Basin Map, for additional information concerning basin locations. All runoff from the roadway will be captured in a retention pond located beyond the right-of-way of the proposed roadway. The retention pond is sized to accommodate runoff from the ultimate roadway section alone under Option 1. Alternatively, offsite runoff as well as roadway runoff can be retained under Option 2. Retention pond analysis for Option 2 can be found in Appendix E.

Future development must either enlarge the retention pond to accommodate the increased runoff volume or use temporary on-site retention ponds to capture all onsite runoff until a storm drain outfall is constructed. Existing offsite runoff must be

accommodated in order to protect the proposed roadway. Two options to protect the roadway from runoff were evaluated. The first utilized a swale to capture runoff from the offsite contributing basin. The second option utilizes a detention pond to remove silt and debris from runoff before discharging into the storm drain trunk line within Tempur Pedic Parkway. This option best utilizes the 72" storm drain system during the interim condition, providing a more inexpensive means to accommodate temporary drainage issues. Upon careful consideration of costs to benefits, we recommend that the Option 2 - detention pond be built.

## VI. CONCLUSION

This report provides the necessary hydrologic and hydraulic analysis for the development of the Tempur-Pedic Parkway. The information provided within this report provides adequate supporting documentation and guidance for approval of this report and the preparation of drainage construction plans.

Paseo del Volcan / Tempur Pedic

BHI no. 050056

Edited By: Kris Johnson

# Calculation of Time to Peak
## Revised DPM procedure

| Description | Var. | Unit | Basin 1 | Basin 2-a | Basin 2-b | Basin 3-a | Basin 3-b | Basin 4 | Basin 5 | Basin 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Basin | | | | | | | | | | | |
| Basin Area | | Acres | 3.5770 | 0.8217 | 1.0445 | 3.8756 | 0.5451 | 13.3910 | 41.3240 | 23.2966 | |
| Total Reach | L | Feet | 2519.60 | 418.30 | 544.44 | 2021.80 | 288.52 | 1046.84 | 1722.92 | 2285.05 | |
| Overland Reach | L1 | Feet | 400.0 | 400.0 | 400.0 | 400.0 | 288.5 | 400.0 | 400.0 | 400.0 | |
| Overland K | K1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Overland Elev1 | | | 5800.00 | 5745.94 | 5744.97 | 5744.97 | 5727.91 | 5800.00 | 5792.00 | 5780.00 | estimated value |
| Overland Elev2 | | | 5792.00 | 5739.40 | 5739.40 | 5738.34 | 5725.39 | 5792.30 | 5780.80 | 5771.00 | |
| Overland Slope | S1 | Percent | 2.00 | 1.63 | 1.39 | 1.66 | 0.87 | 1.92 | 2.80 | 2.25 | |
| Adj. Overland Slope | S1' | Percent | 2.000 | 1.635 | 1.393 | 1.658 | 0.873 | 1.925 | 2.800 | 2.250 | |
| Gully Reach | L2 | Feet | 1600.0 | 18.3 | 144.4 | 1600.0 | 0.0 | 646.8 | 1322.9 | 1600.0 | |
| Gully K | K2 | | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | |
| Gully Elev1 | | | 5792.00 | 5739.40 | 5739.40 | 5738.34 | 0.00 | 5792.30 | 5780.80 | 5771.00 | |
| Gully Elev2 | | | 5776.30 | 5738.56 | 5738.56 | 5727.10 | 0.000 | 5739.50 | 5743.20 | 5750.00 | |
| Gully Slope | S2 | Percent | 0.981 | 4.591 | 0.582 | 0.702 | 0.000 | 8.163 | 2.842 | 1.313 | |
| Adj. Gully Slope | S2' | Percent | 0.981 | 4.501 | 0.582 | 0.702 | 0.000 | 5.654 | 2.842 | 1.313 | |
| Arroyo Reach | L3 | Feet | 519.6 | 0.0 | 0.0 | 21.8 | 0.0 | 0.0 | 0.0 | 285.1 | |
| Arroyo K | K3 | | 3.000 | 3.000 | 3.000 | 3.000 | 3.000 | 3.000 | 3.000 | 3.000 | |
| Arroyo Elev1 | | | 5776.300 | 0.000 | 0.000 | 5727.100 | 0.000 | 0.000 | 0.000 | 5750.000 | |
| Arroyo Elev2 | | | 5748.30 | 0.00 | 0.00 | 5725.37 | 0.00 | 0.00 | 0.00 | 5747.20 | |
| Arroyo Slope | S3 | Percent | 5.389 | 0.000 | 0.000 | 7.936 | 0.000 | 0.000 | 0.000 | 0.982 | |
| Adj. Arroyo Slope | S3' | Percent | 4.958 | 0.000 | 0.000 | 5.623 | 0.000 | 0.000 | 0.000 | 0.982 | |
| Lca | Lca | Feet | 1259.8 | 209.1 | 272.2 | 1010.9 | 144.3 | 523.4 | 861.5 | 1142.5 | |
| Base Discharge | Qb | cfs | 15.6 | 3.6 | 4.6 | 16.9 | 2.4 | 58.5 | 180.6 | 101.8 | |
| Ground Slope S | S | Percent | 2.052 | 1.764 | 1.177 | 0.969 | 0.873 | 5.779 | 2.832 | 1.435 | |
| Adjusted Slope S' | S' | Percent | 2.052 | 1.764 | 1.177 | 0.969 | 0.873 | 5.120 | 2.832 | 1.435 | |
| K | K | | 1.510 | 0.000 | 0.000 | 1.620 | 0.000 | 0.000 | 0.000 | 0.000 | |
| K' | K' | | 1.506 | 0.993 | 1.157 | 1.619 | 1.000 | 1.090 | 1.621 | 1.621 | |
| K'' | K'' | | 3.458 | 2.862 | 3.658 | 5.105 | 3.778 | 2.777 | 4.572 | 4.572 | |
| K''' | K''' | | 2.370 | 1.962 | 2.507 | 3.499 | 2.590 | 1.903 | 3.134 | 3.134 | |
| Kn | Kn | | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | |
| Orig. TC | TC | Hrs. | 0.303 | 0.088 | 0.120 | 0.351 | 0.086 | 0.112 | 0.175 | 0.175 | |
| Adjusted TC | TC' | Hrs. | 0.303 | 0.088 | 0.120 | 0.351 | 0.086 | 0.068 | 0.175 | 0.175 | |
| Time Lag | Lg | Hrs. | - | - | - | - | - | - | - | - | |
| Time to Peak | TP | Hrs. | **0.202** | **0.133** | **0.133** | **0.234** | **0.133** | **0.133** | **0.133** | **0.133** | |

Note:

Red Text = User Input

Hidden Columns used to calculate K, K', K'', K''', Orig. TC, Adj TC, Time Lag, Time to Peak, HOWEVER do now require user input.

- SUMMARY FILE -
Developed Condition Hydrologic Calculations
Tempur Pedic Parkway
BHI No. 050056.001.05.CWH
Prepared By: Kris Johnson
Date: 08.25.2004

```
   AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                    - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =
08/25/2004
   INPUT FILE = tempur_c.txt                                                            USER NO.= AHYMO-S-
9702c1BohanHu-AH

                                   FROM  TO                    PEAK        RUNOFF                TIME TO   CFS      PAGE
=  1
                   HYDROGRAPH      ID    ID       AREA      DISCHARGE     VOLUME     RUNOFF     PEAK     PER
   COMMAND       IDENTIFICATION   NO.   NO.     (SQ MI)      (CFS)       (AC-FT)   (INCHES)  (HOURS)   ACRE
NOTATION

   *S*********************************
   *S***     NOTES (ADDED 8/225/04 by K Johnson)
   *S***
   *S***     1. AHYMO MODEL AREA SURROUNDING THE TEMPUR PEDIC FACILITY AND ROADWAY
   *S***     2. INPUT FILE: P:\040056\Hydro\Study\programs\tempur_c.HYM                                          TIME=
   START
.00
   *S**** 6-HR, 100-YEAR EVENT                                                                                   RAIN6=
   RAINFALL  TYPE= 1
2.200
   *S
   *S
   *S**** BULK FACTOR*************                                                                               PK BF =
   SEDIMENT BULK
1.02
   *S
   *S**** CALC BASIN 4*************
   COMPUTE NM HYD        BASIN4    -     4       .02092       52.10       1.854      1.66104    1.500    3.890 PER
IMP=  70.00
   *S
   *S**** CALC BASIN 6*************
   COMPUTE NM HYD        BASIN6    -     6       .03640       90.62       3.225      1.66104    1.500    3.890 PER
IMP=  70.00
   *S
   *S*** ROUTE BASIN 4 THROUGH 66" SD TO AP-1  ********
   *S
   ROUTE            BASIN4_ROUTE    4   20       .02092       50.11       1.854      1.66105    1.533    3.742
   *S
   *S**** ADD ROUTED BASIN 6 TO AP-1
   ADD HYD          BASIN6_ROUTE  6&20  10       .05732      137.93       5.078      1.66103    1.500    3.760
   *S
   *S**** CALC BASIN 1*************
   COMPUTE NM HYD        BASIN1    -     1       .00559       12.58        .565      1.89675    1.567    3.517 PER
IMP=  90.00
   *S
   *S**** ROUTE BASIN 1 THROUGH STREET TO AP-2
   *S
   ROUTE            BASIN1_ROUTE    1   15       .00559       12.21        .565      1.89677    1 600    3.412
   *S
   *S
   *S**** CALC BASIN 2a*************
   COMPUTE NM HYD        BASIN2    -    21       .00150        4.12        .151      1.89675    1.500    4.302 PER
IMP=  90.00
   *S
   *S**** CALC BASIN 2b*************
   COMPUTE NM HYD        BASIN2    -    22       .00140        3 86        .142      1.89675    1.500    4.304 PER
IMP=  90.00
   *S
   *S**** CALC BASIN 5*************
   COMPUTE NM HYD        BASIN5    -     5       .06457      160.72       5.720      1.66104    1.500    3.889 PER
IMP=  70.00
   *S
   *S*** ROUTE BASIN 4 & 6 THROUGH 66" SD TO AP-2  ********
   *S
   ROUTE            BASIN4_ROUTE   10   11       .05732      137.90       5.078      1.66104    1.533    3.759
   *S
   *S**** ADD ROUTED BASIN 1 TO AP-2
   ADD HYD          BASIN1_ROUTE 11&15  13       .06291      148.08       5.644      1.68197    1.533    3.678
   *S
   *S**** ADD ROUTED BASIN 2-a TO AP-2
   ADD HYD            BASIN5_AP2 13&21  12       .06441      151.99       5.795      1.68695    1.533    3.687
   *S
   *S**** ADD ROUTED BASIN 2-b TO AP-2
   ADD HYD            BASIN5_AP2 12&22  11       .06581      155.67       5.937      1.69142    1.533    3.696
   *S
   *S**** ADD ROUTED BASIN 5 TO AP-2
   ADD HYD            BASIN5_AP2 11& 5  12       .13038      310.66      11.657      1.67637    1.500    3.723
   *S
   *S*** ROUTE AP-2 THROUGH 72" SD TO AP-3  ********
   *S
   ROUTE            BASIN4_ROUTE   12   10       .13038      281.11      11.657      1.67638    1.567    3.369
   *S
   *S**** CALC BASIN 3-a*************
   COMPUTE NM HYD        BASIN3    -    31       .00606       12.60        .613      1.89675    1.600    3.251 PER
IMP=  90.00
   *S
   *S**** CALC BASIN 3-b*************
   COMPUTE NM HYD        BASIN3    -    32       .00085        2.35        .086      1.89675    1.500    4.316 PER
IMP=  90.00
   *S
   *S**** ADD BASIN 3-a TO AP3 FLOWS
   *S**** AP-2
   ADD HYD              RUNDOWN 10&31  11       .13644      293.21      12.269      1.68615    1.567    3.358
   *S
   *S**** ADD BASIN 3-b TO AP3 FLOWS
   *S**** AP-2
   ADD HYD              RUNDOWN 11&32  12       .13729      295.15      12.356      1.68746    1.567    3.359
   *S
   FINISH
```

NOTES for SD network analysis:

- Time to peak is calculated in excel sheet P:\050056\hydro\study\programs\AHYMO\AHYMOInput08-23-04.xls
- Routed Basin 1, Basin 2a & Basin 2b injected into pipe PIN 1 and PIN 2
- Routed Basin 3a & Basin 3b injected into PIN 3 and PIN 4
- Routed Basin 6 & Basin 5 injected into pipe P01

```
- OUTPUT FILE -
Developed Condition Hydrologic Calculations
Tempur Pedic Parkway
BHI No.          050056.001.05 CWH
Prepared By:     Kris Johnson
Date:            08.25.2004

      AHYMO PROGRAM (AHYMO_97) -                    - Version:  1997.02c
            RUN DATE (MON/DAY/YR) = 08/25/2004
            START TIME (HR:MIN:SEC) = 16:25:37      USER NO.= AHYMO-S-9702c1BohanHu-AH
            INPUT FILE = tempur_c.txt

*S*********************************
*S***      NOTES (ADDED 8/25/04 by K Johnson)
*S***
*S***      1. AHYMO MODEL AREA SURROUNDING THE TEMPUR PEDIC FACILITY AND ROADWAY
*S***      2. INPUT FILE: P:\040056\Hydro\Study\programs\tempur_c.HYM
****
START                    0.00
**************************
*S**** 6-HR, 100-YEAR EVENT
RAINFALL                 TYPE=1 RAIN QUARTER=0.0 RAIN ONE=1.87
                         RAIN SIX=2.20 DT=0.0333

                COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                DT =     .033333 HOURS        END TIME =     5.999940 HOURS
                   .0000   .0016   .0033   .0050   .0067   .0085   .0103
                   .0122   .0141   .0160   .0180   .0201   .0222   .0243
                   .0266   .0289   .0312   .0337   .0362   .0388   .0415
                   .0443   .0472   .0502   .0534   .0567   .0601   .0637
                   .0675   .0715   .0758   .0810   .0865   .0924   .1051
                   .1335   .1773   .2400   .3257   .4384   .5820   .7607
                   .9789  1.1808  1.2652  1.3365  1.4000  1.4577  1.5108
                  1.5602  1.6063  1.6495  1.6902  1.7285  1.7648  1.7991
                  1.8316  1.8624  1.8917  1.9194  1.9458  1.9519  1.9576
                  1.9631  1.9683  1.9732  1.9780  1.9826  1.9870  1.9912
                  1.9953  1.9993  2.0031  2.0068  2.0105  2.0140  2.0174
                  2.0207  2.0240  2.0272  2.0303  2.0333  2.0363  2.0392
                  2.0420  2.0448  2.0476  2.0502  2.0529  2.0554  2.0580
                  2.0605  2.0629  2.0653  2.0677  2.0701  2.0724  2.0746
                  2.0769  2.0791  2.0812  2.0834  2.0855  2.0876  2.0896
                  2.0916  2.0936  2.0956  2.0976  2.0995  2.1014  2.1033
                  2.1052  2.1070  2.1088  2.1106  2.1124  2.1142  2.1159
                  2.1176  2.1193  2.1210  2.1227  2.1244  2.1260  2.1276
                  2.1292  2.1308  2.1324  2.1340  2.1355  2.1371  2.1386
                  2.1401  2.1416  2.1431  2.1446  2.1461  2.1475  2.1489
                  2.1504  2.1518  2.1532  2.1546  2.1560  2.1573  2.1587
                  2.1601  2.1614  2.1627  2.1641  2.1654  2.1667  2.1680
                  2.1693  2.1705  2.1718  2.1731  2.1743  2.1756  2.1768
                  2.1780  2.1793  2.1805  2.1817  2.1829  2.1841  2.1852
                  2.1864  2.1876  2.1887  2.1899  2.1911  2.1922  2.1933
                  2.1945  2.1956  2.1967  2.1978  2.1989  2.2000

*S
*S
*S**** BULK FACTOR*************
SEDIMENT BULK          CODE = 1     BULK FACTOR = 1.025
*S
*S**** CALC BASIN 4*************
COMPUTE NM HYD         ID=4 HYD NO=BASIN4 DA=0.0209234
                       PER A=0 PER B=15 PER C=15 PER D=70
                       TP=-0.133  RAIN=-1

K =    .072485HR    TP =    .133000HR    K/TP RATIO =    .545000    SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    57.955    CFS   UNIT VOLUME =    .9992      B =    526.28      P60 = 1.8700
AREA =       .014646 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

K =    .118163HR    TP =    .133000HR    K/TP RATIO =    .888442    SHAPE CONSTANT, N =  3.992480
UNIT PEAK =    16.739    CFS   UNIT VOLUME =    .9997      B =    354.67      P60 = 1.8700
AREA =       .006277 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD              ID=4 CODE=10

                                   HYDROGRAPH FROM AREA BASIN4

        TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME
FLOW
         HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS
CFS
        .000        .0          1.667      26.6          3.333       .4          5.000       .2          6.667
.0
        .333        .0          2.000      11.4          3.667       .3          5.333       .3          7.000
.0
        .667        .0          2.333       2.5          4.000       .2          5.667       .3
       1.000        .0          2.667       1.0          4.333       .2          6.000       .3
       1.333      13.4          3.000        .5          4.667       .2          6.333       .0

RUNOFF VOLUME =     1.66104 INCHES     =      1.8536 ACRE-FEET
PEAK DISCHARGE RATE =      52.10 CFS  AT   1.500 HOURS   BASIN AREA =    .0209 SQ. MI.

*S
*S**** CALC BASIN 6*************
COMPUTE NM HYD         ID=6 HYD NO=BASIN6 DA=0.036401

                       PER A=0 PER B=15 PER C=15 PER D=70
                       TP=-0.133  RAIN=-1

K =    .072485HR    TP =    .133000HR    K/TP RATIO =    .545000    SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   100.83    CFS   UNIT VOLUME =    .9993      B =    526.28      P60 = 1.8700
AREA =       .025481 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

K =    .118163HR    TP =    .133000HR    K/TP RATIO =    .888442    SHAPE CONSTANT, N =  3.992480
UNIT PEAK =    29.121    CFS   UNIT VOLUME =    1.000      B =    354.67      P60 = 1.8700
AREA =       .010920 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD              ID=6 CODE=10

                                   HYDROGRAPH FROM AREA BASIN6

        TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME
FLOW
         HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS
CFS
        .000        .0          1.667      46.3          3.333       .6          5.000       .4          6.667
.0
        .333        .0          2.000      19.8          3.667       .5          5.333       .5          7.000
.0
        .667        .0          2.333       4.4          4.000       .4          5.667       .5
       1.000        .0          2.667       1.8          4.333       .4          6.000       .5
       1.333      23.3          3.000        .9          4.667       .4          6.333       .1

RUNOFF VOLUME =     1.66104 INCHES     =      3.2247 ACRE-FEET
PEAK DISCHARGE RATE =      90.62 CFS  AT   1.500 HOURS   BASIN AREA =    .0364 SQ. MI.

*S
*S*** ROUTE BASIN 4 THROUGH 66" SD TO AP-1  ********
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.005
                       DIA=66 IN     N=.013

                                RATING CURVE PIPE SECTION  1.0
                                 WATER      FLOW       FLOW       MAX
                                SURFACE     AREA       RATE       WIDTH
                                 ELEV       SQ FT      CFS        FT
                                  .00        .00        .00        .00
                                  .29        .47       1.25       2.44
                                  .57       1.31       5.41       3.36
                                  .86       2.37      12.57       3.99
                                 1.15       3.59      22.61       4.47
                                 1.43       4.92      35.30       4.83
                                 1.72       6.35      50.36       5.10
                                 2.01       7.84      67.48       5.30
                                 2.29       9.38      86.27       5.42
                                 2.58      10.94     106.35       5.49
                                 2.87      12.52     127.28       5.50
                                 3.15      14.09     148.59       5.50
                                 3.44      15.63     169.78       5.50
                                 3.73      17.13     190.29       5.50
                                 4.01      18.57     209.50       5.50
                                 4.30      19.92     226.69       5.50
                                 4.59      21.17     240.99       5.50
                                 4.87      22.26     251.22       5.50
                                 5.16      23.15     255.43       5.50
                                 5.50      23.76     255.43       5.50

*S
COMPUTE TRAVEL TIME  ID=20 REACH=1A VS NO=1 L=1035 SLP=.005

                                TRAVEL TIME TABLE
                                       REACH=  1.0

                                WATER      AVERAGE    FLOW       TRAVEL
                                DEPTH      AREA       RATE       TIME
                                FEET       SQ.FT.     CFS        HRS
                                  .287        .472       1.25      .1090
                                  .573       1.314       5.41      .0699
                                  .860       2.373      12.57      .0543
                                 1.146       3.589      22.61      .0456
                                 1.433       4.923      35.30      .0401
                                 1.720       6.348      50.36      .0362
                                 2.006       7.839      67.48      .0334
                                 2.293       9.377      86.27      .0312
                                 2.579      10.942     106.35      .0296
                                 2.866      12.518     127.28      .0283
                                 3.153      14.086     148.59      .0273
                                 3.439      15.630     169.78      .0265
                                 3.726      17.132     190.29      .0259
                                 4.013      18.571     209.50      .0255
                                 4.299      19.925     226.69      .0253
                                 4.586      21.166     240.99      .0253
                                 4.872      22.258     251.22      .0255
                                 5.159      23.147     255.43      .0261
                                 5.500      23.758     255.43      .0267
ROUTE                  ID=20 HYD NO=BASIN4_ROUTE  INFLOW ID=4 DT=0.0
PRINT HYD              ID=20 CODE=10

                                   HYDROGRAPH FROM AREA BASIN4_ROUTE

        TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME
FLOW
         HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS
```

```
CFS
        .000        .0        1.667      30.5        3.333        .4        5.000        .2        6.667
.0
        .333        .0        2.000      12.3        3.667        .3        5.333        .3        7.000
.0
        .667        .0        2.333       3.1        4.000        .3        5.667        .3
       1.000        .0        2.667       1.3        4.333        .2        6.000        .3
       1.333       7.2        3.000        .7        4.667        .2        6.333        .1

     RUNOFF VOLUME =     1.66105 INCHES     =       1.8536 ACRE-FEET
     PEAK DISCHARGE RATE =      50.11 CFS  AT   1.533 HOURS   BASIN AREA =   .0209 SQ. MI.


  *S
  *S**** ADD ROUTED BASIN 6 TO AP-1
  ADD HYD              ID=10 HYD=BASIN6_ROUTE ID I=6 II=20
  PRINT HYD            ID=10 CODE=10

                                   HYDROGRAPH FROM AREA BASIN6_ROUTE

      TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME
FLOW
       HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS
CFS
      .000        .0         1.667      76.8         3.333       1.0         5.000        .7         6.667
.0
      .333        .0         2.000      32.2         3.667        .8         5.333        .7         7.000
.0
      .667        .0         2.333       7.5         4.000        .7         5.667        .8
     1.000        .0         2.667       3.1         4.333        .7         6.000        .8
     1.333      30.5         3.000       1.6         4.667        .7         6.333        .2

     RUNOFF VOLUME =     1.66103 INCHES     =       5.0783 ACRE-FEET
     PEAK DISCHARGE RATE =     137.93 CFS  AT   1.500 HOURS   BASIN AREA =   .0573 SQ. MI.


  *S
  *S**** CALC BASIN 1*************
  COMPUTE NM HYD       ID=1 HYD NO=BASIN1 DA= 0.005589
                       PER A=0 PER B=5.0 PER C=5.0 PER D=90
                       TP=-0.202  RAIN=-1

     K =   .110090HR    TP =   .202000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   13.105    CFS   UNIT VOLUME =    .9990       B =   526.28       P60 = 1.8700
     AREA =      .005030 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .179465HR    TP =   .202000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992475
```

```
     UNIT PEAK =   .98131    CFS   UNIT VOLUME =    .9863       B =   354.67       P60 = 1.8700
     AREA =      .000559 SQ MI    IA =    .42500 INCHES    INF =   1 04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=1 CODE=10

                                   HYDROGRAPH FROM AREA BASIN1

      TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME
FLOW
       HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS
CFS
      .000        .0         1.667      10.2         3.333        .2         5.000        .1         6.667
.0
      .333        .0         2.000       4.3         3.667        .1         5.333        .1         7.000
.0
      .667        .0         2.333       1.3         4.000        .1         5.667        .1
     1.000        .0         2.667        .6         4.333        .1         6.000        .1
     1.333       1.9         3.000        .3         4.667        .1         6.333        .0

     RUNOFF VOLUME =     1.89675 INCHES     =        .5654 ACRE-FEET
     PEAK DISCHARGE RATE =      12.58 CFS  AT   1.567 HOURS   BASIN AREA =   .0056 SQ. MI.


  *S
  *S**** ROUTE BASIN 1 THROUGH STREET TO AP-2
  COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
                       MIN ELEV=5739.72 FT  MAX ELEV=5740.57
                       CH SLOPE=0.018  FP SLP=0.018  N= .016
                       DIST= 86 FT
                          DIST    ELEV
                          0.000  5740.57
                          8.636  5740.40
                          8.999  5740.39
                          8.999  5740.36
                          9.000  5739.72
                          9.081  5739.73
                          11.000  5739.85
                          22.516  5740.08
                          23.000  5740.09
                          23.484  5740.10
                          35.000  5740.33
                          42.678  5740.48
                          43.000  5740.49
                          50.678  5740.34
                          51.000  5740.33
                          51.484  5740.32
                          63.000  5740.09
```

```
                          74.516  5739.86
                          75.000  5739.85
                          75.081  5739.84
                          77.000  5739.72
                          77.000  5739.75
                          77.001  5740.39
                          85.637  5740.56
                          86.000  5740.57

                       RATING CURVE VALLEY SECTION  1.0
                          WATER       FLOW       FLOW       TOP
                         SURFACE      AREA       RATE      WIDTH
                          ELEV       SQ FT      CFS        FT
                         5739.72       .00        .00       .00
                         5739.77       .03        .03      1.36
                         5739.81       .12        .18      2.80
                         5739.85       .28        .53      4.49
                         5739.90       .58       1.14      8.98
                         5739.94      1.09       2.48     13.48
                         5739.99      1.79       4.72     17.98
                         5740.03      2.70       8.06     22.48
                         5740.08      3.81      12.67     26.98
                         5740.12      5.13      18.74     31.44
                         5740.17      6.64      26.39     35.94
                         5740.21      8.36      35.80     40.44
                         5740.26     10.27      47.10     44.94
                         5740.30     12.39      60.43     49.44
                         5740.35     14.71      76.06     53.77
                         5740.39     17.23      93.39     58.71
                         5740.44     20.07     109.64     67.79
                         5740.48     23.32     129.69     76.87
                         5740.53     26.90     157.74     81.96
                         5740.57     30.68     190.32     86.00

  *S
  COMPUTE TRAVEL TIME  ID=15 REACH=1 VS NO=1 L=486.79  SLP=.018

                       TRAVEL TIME TABLE
                                  REACH=  1.0

                       WATER       AVERAGE     FLOW       TRAVEL
                       DEPTH       AREA        RATE       TIME
                       FEET        SQ.FT.      CFS        HRS
                         .045        .029        .03       .1467
                         .090        .123        .18       .0911
                         .135        .281        .53       .0716
                         .180        .503       1.14       .0690
                         .225       1.088       2.48       .0594
                         .270       1.795       4.72       .0515
                         .314       2.704       8.06       .0454
                         .359       3.815      12.67       .0407
                         .404       5.126      18.74       .0370
```

```
                         .449       6.640      26.39       .0340
                         .494       8.356      35.80       .0316
                         .539      10.273      47.10       .0295
                         .584      12.393      60.43       .0277
                         .629      14.712      76.06       .0262
                         .674      17.232      93.39       .0249
                         .719      20.072     109.64       .0248
                         .764      23.323     129.69       .0243
                         .809      26.900     157.74       .0231
                         .854      30.683     190.32       .0218
  ROUTE                ID=15 HYD NO=BASIN1_ROUTE  INFLOW ID=1 DT=0.0
  PRINT HYD            ID=15 CODE=10

                                   HYDROGRAPH FROM AREA BASIN1_ROUTE

      TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME
FLOW
       HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS
CFS
      .000        .0         1.667      11.1         3.333        .2         5.000        .1         6.667
.0
      .333        .0         2.000       4.6         3.667        .1         5.333        .1         7.000
.0
      .667        .0         2.333       1.7         4.000        .1         5.667        .1         7.333
.0
     1.000        .0         2.667        .7         4.333        .1         6.000        .1
     1.333        .9         3.000        .3         4.667        .1         6.333        .1

     RUNOFF VOLUME =     1.89677 INCHES     =        .5654 ACRE-FEET
     PEAK DISCHARGE RATE =      12.21 CFS  AT   1.600 HOURS   BASIN AREA =   .0056 SQ. MI.


  *S
  *S
  *S**** CALC BASIN 2a*************
  COMPUTE NM HYD       ID=21 HYD NO=BASIN2 DA= 0.001495
                       PER A=0 PER B=5.0 PER C=5.0 PER D=90
                       TP=-0.133  RAIN=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   5.3241    CFS   UNIT VOLUME =    .9974       B =   526.28       P60 = 1.8700
     AREA =      .001346 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .118163HR    TP =   .133000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
     UNIT PEAK =   .39867    CFS   UNIT VOLUME =    .9672       B =   354.67       P60 = 1.8700
     AREA =      .000150 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333
```

```
BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=21 CODE=10
```

HYDROGRAPH FROM AREA BASIN2

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.333 | 1.2 | 2.667 | .1 | 4.000 | .0 | 5.333 |
| .0 | .333 | .0 | 1.667 | 2.1 | 3.000 | .0 | 4.333 | .0 | 5.667 |
| .0 | .667 | .0 | 2.000 | 1.0 | 3.333 | .0 | 4.667 | .0 | 6.000 |
| .0 | 1.000 | .0 | 2.333 | .2 | 3.667 | .0 | 5.000 | .0 | 6.333 |

```
RUNOFF VOLUME =     1.89675 INCHES     =        .1512 ACRE-FEET
PEAK DISCHARGE RATE =       4.12 CFS  AT   1.500 HOURS   BASIN AREA =   .0015 SQ. MI.


*S
*S**** CALC BASIN 2b*************
COMPUTE NM HYD        ID=22 HYD NO=BASIN2 DA= 0.0014024
                      PER A=0 PER B=5 0 PER C=5.0 PER D=90
                      TP=-0.133  RAIN=-1

K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   4.9943    CFS   UNIT VOLUME =    .9970      B =   526.28      P60 = 1.8700
AREA =      .001262 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


K =   .118163HR    TP =   .133000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
UNIT PEAK =   .37398    CFS   UNIT VOLUME =    .9639      B =   354.67      P60 = 1.8700
AREA =      .000140 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=22 CODE=10
```

HYDROGRAPH FROM AREA BASIN2

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.333 | 1.1 | 2.667 | .1 | 4.000 | .0 | 5.333 |
| .0 | .333 | .0 | 1.667 | 2.0 | 3.000 | .0 | 4.333 | .0 | 5.667 |
| .0 | .667 | .0 | 2.000 | .9 | 3.333 | .0 | 4.667 | .0 | 6.000 |
| .0 | 1.000 | .0 | 2.333 | .2 | 3.667 | .0 | 5.000 | .0 | 6.333 |

```
RUNOFF VOLUME =     1.89675 INCHES     =        .1419 ACRE-FEET
PEAK DISCHARGE RATE =       3.86 CFS  AT   1.500 HOURS   BASIN AREA =   .0014 SQ. MI.


*S
*S**** CALC BASIN 5*************
COMPUTE NM HYD        ID=5 HYD NO=BASIN5 DA=0.064569
                      PER A=0 PER B=15 PER C=15 PER D=70
                      TP=-0.133  RAIN=-1

K =   .072520HR    TP =   .133000HR    K/TP RATIO =   .545263     SHAPE CONSTANT, N =  7.102040
UNIT PEAK =   178.78    CFS   UNIT VOLUME =    .9994      B =   526.07      P60 = 1.8700
AREA =      .045198 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


K =   .118108HR    TP =   .133000HR    K/TP RATIO =   .888030     SHAPE CONSTANT, N =  3.994466
UNIT PEAK =   51.675    CFS   UNIT VOLUME =    1.000      B =   354.80      P60 = 1.8700
AREA =      .019371 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=5 CODE=10
```

HYDROGRAPH FROM AREA BASIN5

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.667 | 82.1 | 3.333 | 1.1 | 5.000 | .8 | 6.667 |
| .0 | .333 | .0 | 2.000 | 35.1 | 3.667 | .9 | 5.333 | .8 | 7.000 |
| .0 | .667 | .0 | 2.333 | 7.8 | 4.000 | .8 | 5.667 | .9 | 7.333 |
| | 1.000 | .0 | 2.667 | 3.2 | 4.333 | .7 | 6.000 | .9 | |
| | 1.333 | 41.3 | 3.000 | 1.7 | 4.667 | .7 | 6.333 | .1 | |

```
RUNOFF VOLUME =     1.66104 INCHES     =       5.7201 ACRE-FEET


PEAK DISCHARGE RATE =     160.72 CFS  AT   1.500 HOURS   BASIN AREA =   .0646 SQ. MI.


*S
*S*** ROUTE BASIN 4 & 6 THROUGH 66" SD TO AP-2  ********
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.005
                     DIA=60 IN     N=.013
```

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .26 | .39 | .97 | 2.22 |
| .52 | 1.09 | 4.19 | 3.06 |
| .78 | 1.96 | 9.75 | 3.62 |
| 1.04 | 2.97 | 17.53 | 4.06 |
| 1.30 | 4.07 | 27.38 | 4.39 |
| 1.56 | 5.25 | 39.06 | 4.64 |
| 1.82 | 6.48 | 52.33 | 4.81 |
| 2.08 | 7.75 | 66.91 | 4.93 |
| 2.35 | 9.04 | 82.48 | 4.99 |
| 2.61 | 10.35 | 98.71 | 5.00 |
| 2.87 | 11.64 | 115.24 | 5.00 |
| 3.13 | 12.92 | 131.68 | 5.00 |
| 3.39 | 14.16 | 147.58 | 5.00 |
| 3.65 | 15.35 | 162.48 | 5.00 |
| 3.91 | 16.47 | 175.81 | 5.00 |
| 4.17 | 17.49 | 186.90 | 5.00 |
| 4.43 | 18.39 | 194.84 | 5.00 |
| 4.69 | 19.13 | 198.10 | 5 00 |
| 5.00 | 19.63 | 198.10 | 5.00 |

```
*S
COMPUTE TRAVEL TIME  ID=11 REACH=1A VS NO=1 L=488.35 SLP=.005
```

TRAVEL TIME TABLE
REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .261 | .390 | .97 | .0548 |
| .521 | 1.086 | 4.19 | .0351 |
| .782 | 1.961 | 9.75 | .0273 |
| 1.042 | 2.966 | 17.53 | .0229 |
| 1.303 | 4.069 | 27.38 | .0202 |
| 1.563 | 5.246 | 39.06 | .0182 |
| 1.824 | 6.479 | 52.33 | .0168 |
| 2.084 | 7.749 | 66.91 | .0157 |
| 2.345 | 9.043 | 82.48 | .0149 |
| 2.606 | 10.345 | 98.71 | .0142 |
| 2.866 | 11.641 | 115.24 | .0137 |
| 3.127 | 12.918 | 131.68 | .0133 |
| 3.387 | 14.159 | 147.58 | .0130 |
| 3.648 | 15.348 | 162.48 | .0128 |
| 3.908 | 16.467 | 175.81 | .0127 |
| 4.169 | 17.492 | 186.90 | .0127 |
| 4.429 | 18.395 | 194.84 | .0128 |
| 4.690 | 19.130 | 198.10 | .0131 |
| 5.000 | 19.635 | 198.10 | .0134 |

```
ROUTE                ID=11 HYD NO=BASIN4_ROUTE  INFLOW ID=10 DT=0.0
PRINT HYD            ID=11 CODE=10
```

HYDROGRAPH FROM AREA BASIN4_ROUTE

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.667 | 80.8 | 3.333 | 1.1 | 5.000 | .7 | 6.667 |
| .0 | .333 | .0 | 2.000 | 33.0 | 3.667 | .8 | 5.333 | .7 | 7.000 |
| .0 | .667 | .0 | 2.333 | 8.0 | 4.000 | .7 | 5.667 | .8 | 7.333 |
| | 1.000 | .0 | 2.667 | 3.3 | 4.333 | .7 | 6.000 | .8 | |
| | 1.333 | 24.9 | 3.000 | 1.7 | 4.667 | .7 | 6.333 | .2 | |

```
RUNOFF VOLUME =     1.66104 INCHES     =       5.0783 ACRE-FEET
PEAK DISCHARGE RATE =     137.90 CFS  AT   1.533 HOURS   BASIN AREA =   .0573 SQ. MI


*S
*S**** ADD ROUTED BASIN 1 TO AP-2
ADD HYD              ID=13 HYD=BASIN1_ROUTE ID I=11 II=15
PRINT HYD            ID=13 CODE=10
```

HYDROGRAPH FROM AREA BASIN1_ROUTE

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .1 | .000 | .0 | 1.667 | 92.0 | 3.333 | 1.3 | 5.000 | .8 | 6.667 |
| .0 | .333 | .0 | 2.000 | 37.7 | 3.667 | .9 | 5.333 | .8 | 7.000 |
| .0 | .667 | .0 | 2.333 | 9.7 | 4.000 | .8 | 5.667 | .9 | 7.333 |
| | 1.000 | .0 | 2.667 | 3.9 | 4.333 | .7 | 6.000 | .9 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.333 | 25.7 | 3.000 | 2.1 | 4.667 | .7 | 6.333 | .3 |

RUNOFF VOLUME = 1.68197 INCHES = 5.6436 ACRE-FEET
PEAK DISCHARGE RATE = 140.08 CFS AT 1.533 HOURS BASIN AREA = .0629 SQ. MI.

```
*S
*S**** ADD ROUTED BASIN 2-a TO AP-2
ADD HYD              ID=12 HYD=BASIN5_AP2 ID I=13 II=21
PRINT HYD            ID=12 CODE=10
```

HYDROGRAPH FROM AREA BASIN5_AP2

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .1 | .000 | .0 | 1.667 | 94.1 | 3.333 | 1.3 | 5.000 | .8 | 6.667 |
| .0 | .333 | .0 | 2.000 | 38.6 | 3.667 | 1.0 | 5.333 | .8 | 7.000 |
| .0 | .667 | .0 | 2.333 | 9.9 | 4.000 | .8 | 5.667 | .9 | 7.333 |
| | 1.000 | .0 | 2.667 | 4.0 | 4.333 | .8 | 6.000 | 1.0 | |
| | 1.333 | 27.0 | 3.000 | 2.1 | 4.667 | .8 | 6.333 | .3 | |

RUNOFF VOLUME = 1.68695 INCHES = 5.7948 ACRE-FEET
PEAK DISCHARGE RATE = 151.99 CFS AT 1.533 HOURS BASIN AREA = .0644 SQ MI.

```
*S
*S**** ADD ROUTED BASIN 2-b TO AP-2
ADD HYD              ID=11 HYD=BASIN5_AP2 ID I=12 II=22
PRINT HYD            ID=11 CODE=10
```

HYDROGRAPH FROM AREA BASIN5_AP2

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .1 | .000 | .0 | 1.667 | 96.0 | 3.333 | 1.3 | 5.000 | .8 | 6.667 |
| .0 | .333 | .0 | 2.000 | 39.6 | 3.667 | 1.0 | 5.333 | .8 | 7.000 |
| .0 | .667 | .0 | 2.333 | 10.1 | 4 000 | .8 | 5.667 | .9 | 7.333 |
| | 1.000 | .0 | 2.667 | 4.1 | 4.333 | .8 | 6.000 | 1.0 | |
| | 1;333 | 28.1 | 3.000 | 2.2 | 4 667 | .8 | 6.333 | .3 | |

RUNOFF VOLUME = 1.69142 INCHES = 5.9367 ACRE-FEET
PEAK DISCHARGE RATE = 155.67 CFS AT 1.533 HOURS BASIN AREA = .0658 SQ. MI.

```
*S
*S**** ADD ROUTED BASIN 5 TO AP-2
ADD HYD              ID=12 HYD=BASIN5_AP2 ID I=11 II=5
PRINT HYD            ID=12 CODE=10
```

HYDROGRAPH FROM AREA BASIN5_AP2

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .1 | .000 | .0 | 1.667 | 178.1 | 3.333 | 2.4 | 5.000 | 1.6 | 6.667 |
| .0 | .333 | .0 | 2.000 | 74.7 | 3.667 | 1.8 | 5.333 | 1.7 | 7.000 |
| .0 | .667 | .0 | 2.333 | 17.8 | 4.000 | 1.6 | 5.667 | 1.8 | 7.333 |
| | 1.000 | .0 | 2.667 | 7.3 | 4.333 | 1.5 | 6.000 | 1.9 | |
| | 1.333 | 69.4 | 3.000 | 3.8 | 4.667 | 1.5 | 6.333 | .4 | |

RUNOFF VOLUME = 1.67637 INCHES = 11.6567 ACRE-FEET
PEAK DISCHARGE RATE = 310.66 CFS AT 1.500 HOURS BASIN AREA = .1304 SQ. MI.

```
*S
*S*** ROUTE AP-2 THROUGH 72" SD TO AP-3  ********
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.005
                     DIA=72 IN     N=.013
```

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .31 | .56 | 1.57 | 2.67 |
| .63 | 1.56 | 6.82 | 3.67 |
| .94 | 2.82 | 15.85 | 4.36 |
| 1.25 | 4.27 | 28.51 | 4.87 |
| 1.56 | 5.86 | 44.52 | 5.27 |
| 1.88 | 7.55 | 63.52 | 5.56 |
| 2.19 | 9.33 | 85.10 | 5.78 |
| 2.50 | 11.16 | 108.80 | 5.92 |
| 2.81 | 13.02 | 134.12 | 5.99 |
| 3.13 | 14.90 | 160.52 | 6.00 |
| 3.44 | 16.76 | 187.40 | 6.00 |
| 3.75 | 18.60 | 214.12 | 6.00 |
| 4.06 | 20.39 | 239.99 | 6.00 |
| 4.38 | 22.10 | 264.21 | 6.00 |
| 4.69 | 23.71 | 285.89 | 6.00 |
| 5.00 | 25.19 | 303.93 | 6.00 |
| 5.32 | 26.49 | 316.83 | 6.00 |
| 5.63 | 27.55 | 322.14 | 6.00 |
| 6.00 | 28.27 | 322.14 | 6.00 |

```
*S
COMPUTE TRAVEL TIME  ID=10 REACH=1A VS NO=1 L=2513 SLP=.005
```

TRAVEL TIME TABLE
REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .313 | .562 | 1.57 | .2498 |
| .625 | 1.564 | 6.82 | .1601 |
| .938 | 2.824 | 15.85 | .1243 |
| 1.251 | 4.271 | 28.51 | .1046 |
| 1.563 | 5.859 | 44.52 | .0919 |
| 1 876 | 7.554 | 63.52 | .0830 |
| 2.189 | 9.329 | 85.10 | .0765 |
| 2.501 | 11.159 | 108.80 | .0716 |
| 2.814 | 13.022 | 134.12 | .0678 |
| 3.127 | 14 897 | 160.52 | .0648 |
| 3.439 | 16.764 | 187.40 | .0624 |
| 3.752 | 18.601 | 214.12 | .0606 |
| 4.065 | 20.388 | 239.99 | .0593 |
| 4.377 | 22.101 | 264.21 | .0584 |
| 4.690 | 23.712 | 285.89 | .0579 |
| 5.003 | 25.189 | 303.93 | .0579 |
| 5.315 | 26.489 | 316.83 | .0584 |
| 5.628 | 27.547 | 322.14 | .0597 |
| 6.000 | 28.274 | 322.14 | .0613 |

```
ROUTE                ID=10 HYD NO=BASIN4_ROUTE  INFLOW ID=12 DT=0.0
*S
*S**** CALC BASIN 3-a*************
COMPUTE NM HYD       ID=31 HYD NO=BASIN3 DA=0.006056
                     PER A=0 PER B=5.0 PER C=5.0 PER D=90
                     TP=-0.234  RAIN=-1

K =   .127530HR    TP =   .234000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   12.258    CFS   UNIT VOLUME =    .9991       B =   526.28      P60 = 1.8700
AREA =       .005450 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

K =   .207896HR    TP =   .234000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
UNIT PEAK =   .91789    CFS   UNIT VOLUME =    .9847       B =   354.67      P60 = 1.8700
AREA =       .000606 SQ MI    IA =    .42500 INCHES    INF =    1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=31 CODE=10
```

HYDROGRAPH FROM AREA BASIN3

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.667 | 11.7 | 3.333 | .2 | 5.000 | .1 | 6.667 |
| .0 | .333 | .0 | 2.000 | 4.9 | 3.667 | .1 | 5.333 | .1 | 7.000 |
| .0 | .667 | .0 | 2.333 | 1.8 | 4.000 | .1 | 5.667 | .1 | 7.333 |
| | 1.000 | .0 | 2.667 | .7 | 4.333 | .1 | 6.000 | .1 | |
| | 1.333 | 1.4 | 3.000 | .4 | 4.667 | .1 | 6.333 | .0 | |

RUNOFF VOLUME = 1.89675 INCHES = .6126 ACRE-FEET
PEAK DISCHARGE RATE = 12.60 CFS AT 1.600 HOURS BASIN AREA = .0061 SQ. MI.

```
*S
*S**** CALC BASIN 3-b*************
COMPUTE NM HYD       ID=32 HYD NO=BASIN3 DA=0.000852
                     PER A=0 PER B=5.0 PER C=5.0 PER D=90
                     TP=-0.133  RAIN=-1

K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   3.0342    CFS   UNIT VOLUME =    .9956       B =   526.28      P60 = 1.8700
AREA =       .000767 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

K =   .118163HR    TP =   .133000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
UNIT PEAK =   .22720    CFS   UNIT VOLUME =    .9420       B =   354.67      P60 = 1.8700
AREA =       .000085 SQ MI    IA =    .42500 INCHES    INF =    1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=32 CODE=10
```

HYDROGRAPH FROM AREA BASIN3

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS |
|---|---|---|---|---|---|---|---|---|---|
| .000 | .0 | 1.333 | .7 | 2.667 | .0 | 4.000 | .0 | 5.333 | .0 |
| .333 | .0 | 1.667 | 1.2 | 3.000 | .0 | 4.333 | .0 | 5.667 | .0 |
| .667 | .0 | 2.000 | .6 | 3.333 | .0 | 4.667 | .0 | 6.000 | .0 |
| 1.000 | .0 | 2.333 | .1 | 3.667 | .0 | 5.000 | .0 | 6.333 | .0 |

RUNOFF VOLUME = 1.89675 INCHES = .0862 ACRE-FEET
PEAK DISCHARGE RATE = 2.35 CFS AT 1.500 HOURS BASIN AREA = .0009 SQ. MI.

```
*S
*S**** ADD BASIN 3-a TO AP3 FLOWS
*S**** AP-2
ADD HYD          ID=11 HYD=RUNDOWN ID I=10 II=31
PRINT HYD        ID=11 CODE=10
```

HYDROGRAPH FROM AREA RUNDOWN

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS |
|---|---|---|---|---|---|---|---|---|---|
| .000 | .0 | 1.667 | 227.5 | 3.333 | 3.3 | 5.000 | 1.6 | 6.667 | .4 |
| .333 | .0 | 2.000 | 89.5 | 3.667 | 2.4 | 5.333 | 1.7 | 7.000 | .1 |
| .667 | .0 | 2.333 | 27.2 | 4.000 | 1.9 | 5.667 | 1.8 | 7.333 | .0 |
| 1.000 | .0 | 2.667 | 10.5 | 4.333 | 1.7 | 6.000 | 1.9 | 7.667 | .0 |
| 1.333 | 28.2 | 3.000 | 5.2 | 4.667 | 1.6 | 6.333 | 1.2 | 8.000 | .0 |

RUNOFF VOLUME = 1.68615 INCHES = 12.2693 ACRE-FEET
PEAK DISCHARGE RATE = 293.21 CFS AT 1.567 HOURS BASIN AREA = .1364 SQ. MI.

```
*S
*S**** ADD BASIN 3-b TO AP3 FLOWS
*S**** AP-2
ADD HYD          ID=12 HYD=RUNDOWN ID I=11 II=32
PRINT HYD        ID=12 CODE=10
```

HYDROGRAPH FROM AREA RUNDOWN

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS |
|---|---|---|---|---|---|---|---|---|---|
| .000 | .0 | 1.667 | 228.7 | 3.333 | 3.3 | 5.000 | 1.6 | 6.667 | .4 |
| .333 | .0 | 2.000 | 90.0 | 3.667 | 2.4 | 5.333 | 1.7 | 7.000 | .1 |
| .667 | .0 | 2.333 | 27.3 | 4.000 | 1.9 | 5.667 | 1.8 | 7.333 | .0 |
| 1.000 | .0 | 2.667 | 10.6 | 4.333 | 1.7 | 6.000 | 2.0 | 7.667 | .0 |
| 1.333 | 28.9 | 3.000 | 5.2 | 4.667 | 1.6 | 6.333 | 1.2 | 8.000 | .0 |

RUNOFF VOLUME = 1.68746 INCHES = 12.3555 ACRE-FEET
PEAK DISCHARGE RATE = 295.15 CFS AT 1.567 HOURS BASIN AREA = .1373 SQ. MI.

```
*S
FINISH
```

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 16:25:37

## Street Drainage Capacity & Inlet Analysis

**Tempur Pedic Parkway**
**BHI no.** **050056.001.05**
**Prepared by:** Kris Johnson

**TYPE A CDIs**

| | ID # | Side | D/S Sta | Width [ft] | A [ac] | Q/A [cfs/ac] | Design Q [cfs] | Slope [ft/ft] | Depth [ft] | Q @ Depth [cfs] | No of Inlets | Capacity [cfs] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| min slope | 1 | EBL | 14+50 | 14 | 0.56 | 2.89 | 1.6 | 0.019 | 0.04 | 7.05 | 1 | 7.05 |
| max slope | | | | 14 | 0.27 | 2.89 | 0.8 | 0.024 | 0.04 | 7.54 | 1 | 7.54 |
| | 2-a | NBL | 23+60 | 26 | 0.20 | 2.89 | 0.6 | 0.019 | 0.28 | 7.81 | 1 | 7.81 |
| | 2-b | NBL | 20+50 | 26 | 0.31 | 2.89 | 0.9 | 0.011 | 0.28 | 6.08 | 1 | 6.08 |
| min slope | 3-a | WBL | 23+90 | 26 | 0.67 | 2.89 | 1.9 | 0.005 | 0.28 | 4.74 | 1 | 4.74 |
| max slope | | | | 26 | 0.31 | 2.89 | 0.9 | 0.018 | 0.28 | 7.61 | 1 | 7.61 |
| | 3-b | WBL | 40+60 | 26 | 0.13 | 2.89 | 0.4 | 0.023 | 0.28 | 7.66 | 1 | 7.66 |

Notes:
1. Flow rate per acre from City of Albuquerque DPM for Type D land treatment, pg. 22-15.
2. Depth of flow for on grade CDIs based on maintaining 1-12' driving lane dry.
3. Depth of flow for sump CDIs based on containing flow with an 8" curb.
4. Flow rate at the given depth from COA DPM, Plate 22.3 D-5 for Type A, C, and D inlets.
   Flow rate at the given depth from COA DPM, Plate 22.3 D-6 for Type C and D inlets used in location for double inlet case.
5. For the 2 CDIs at ID #1 and #3a, the first CDI will be a Type A followed by a Type C inlet.

**Interim Condition HGL Calculations**
**Tempur Pedic Parkway**
BHI No. 050056.001.05.CWH
Prepared By: Kris Johnson
Date: 10.06.2004
Design Log

```
==========================================================================
InRoads Storm & Sanitary Design Log

Drainage File:  P:\050056\Hydro\design\InRoads\050056drainage.sdb

Design File:  P:\050056\HYDRO\DESIGN\CONTROL\050056SD_PROFILE.DWG

Display Log:  P:\050056\HYDRO\DESIGN\CONTROL\design.log

Date:  Wednesday, October 06, 2004 1:26:31 PM
==========================================================================

Designing pipe P01
   No flow in structure
Designing manhole MH01
   No flow found upstream
Designing pipe P02
   No flow in structure
Designing pipe PIN02
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
        Total Flow:     3.9000 cfs              Flow From: Injected Storm

            Status:      Fixed                      Slope:     0.1182 ft/ft
        Pipe Width:    18 0000 in               Pipe Height:   18.0000 in
     Depth of Flow:     0.3320 ft               Flow Status:    Partial
   Critical Depth:      0.7500 ft                  Capacity:   36.1163 cfs
          Velocity:    13.3566 ft/s
      Froude Number:    4.8736                  Flow Regime: SuperCritical

Designing pipe P03

  Results:
        Total Flow:     3.9000 cfs              Flow From:   Upstream

            Status:      Fixed                      Slope:     0.0050 ft/ft
        Pipe Width:    66.0000 in               Pipe Height:   66.0000 in
     Depth of Flow:     0.4900 ft               Flow Status:    Partial
   Critical Depth:      0.5200 ft                  Capacity:  237.4529 cfs
          Velocity:     3.7266 ft/s
      Froude Number:    1.1386                  Flow Regime: SuperCritical

   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
        Total Flow:    24.3000 cfs              Flow From: Injected Storm

            Status:      Fixed                      Slope:     0.0915 ft/ft
        Pipe Width:    24.0000 in               Pipe Height:   24.0000 in
     Depth of Flow:     0.8230 ft               Flow Status:    Partial
   Critical Depth:      1.7400 ft                  Capacity:   68.4347 cfs
          Velocity.    19.9079 ft/s
      Froude Number:    4.4606                  Flow Regime: SuperCritical

Designing pipe P20

  Results:
        Total Flow:    36.0000 cfs              Flow From:   Upstream

            Status:      Fixed                      Slope:     0.0050 ft/ft
        Pipe Width:    66.0000 in               Pipe Height:   66.0000 in
     Depth of Flow:     1.4470 ft               Flow Status:    Partial
   Critical Depth:      1.6200 ft                  Capacity:  237.4529 cfs
          Velocity:     7.2065 ft/s
      Froude Number:    1.2516                  Flow Regime: SuperCritical

Designing pipe P06

  Results.
        Total Flow:    36.0000 cfs              Flow From:   Upstream

            Status:      Fixed                      Slope:     0.0050 ft/ft
        Pipe Width:    66.0000 in               Pipe Height:   66.0000 in
     Depth of Flow:     1.4470 ft               Flow Status:    Partial
   Critical Depth.      1.6200 ft                  Capacity:  237.4529 cfs
          Velocity      7.2065 ft/s
      Froude Number:    1.2516                  Flow Regime: SuperCritical

Designing manhole MH03

  Results.
        Total Flow:    36.0000 cfs              Flow From    Upstream

            Status:      Fixed
      Chamber Width:    8.0000 ft           Chamber Length:    8.0000 ft

Designing pipe P07

  Results:
```

```
Designing pipe PIN01
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
        Total Flow:     7.8000 cfs              Flow From: Injected Combined

            Status:      Fixed                      Slope:     0.0723 ft/ft
        Pipe Width:    18.0000 in               Pipe Height:   18.0000 in
     Depth of Flow:     0.5380 ft               Flow Status:    Partial
   Critical Depth:      1.0800 ft                  Capacity:   28.2522 cfs
          Velocity:    13.6531 ft/s
      Froude Number.    3.8247                  Flow Regime: SuperCritical

Designing pipe P04

  Results:
        Total Flow:    11 7000 cfs              Flow From:   Upstream

            Status:      Fixed                      Slope:     0.0050 ft/ft
        Pipe Width:    66.0000 in               Pipe Height:   66.0000 in
     Depth of Flow:     0.8300 ft               Flow Status:    Partial
   Critical Depth:      0.9100 ft                  Capacity:  237.4529 cfs
          Velocity:     5.1809 ft/s
      Froude Number:    1.2071                  Flow Regime: SuperCritical

Designing manhole MH02

  Results:
        Total Flow:    11.7000 cfs              Flow From:   Upstream

            Status:      Fixed
      Chamber Width:    8.0000 ft           Chamber Length:    8.0000 ft

Designing pipe P05

  Results:
        Total Flow:    11.7000 cfs              Flow From:   Upstream

            Status:      Fixed                      Slope:     0.0050 ft/ft
        Pipe Width:    66.0000 in               Pipe Height:   66.0000 in
     Depth of Flow:     0.8300 ft               Flow Status:    Partial
   Critical Depth:      0.9100 ft                  Capacity:  237.4529 cfs
          Velocity:     5.1809 ft/s
      Froude Number:    1.2071                  Flow Regime: SuperCritical

Designing pipe P18

        Total Flow:    36.0000 cfs              Flow From:   Upstream

            Status:      Fixed                      Slope:     0.0050 ft/ft
        Pipe Width:    66.0000 in               Pipe Height:   66.0000 in
     Depth of Flow:     1.4470 ft               Flow Status:    Partial
   Critical Depth:      1.6200 ft                  Capacity:  237.4529 cfs
          Velocity:     7.2065 ft/s
      Froude Number:    1.2516                  Flow Regime: SuperCritical

Designing pipe P08

  Results:
        Total Flow:    36.0000 cfs              Flow From:   Upstream

            Status:      Fixed                      Slope:     0.0050 ft/ft
        Pipe Width:    66.0000 in               Pipe Height:   66.0000 in
     Depth of Flow:     1.4470 ft               Flow Status:    Partial
   Critical Depth:      1.6200 ft                  Capacity:  237.4529 cfs
          Velocity:     7.2065 ft/s
      Froude Number:    1.2516                  Flow Regime: SuperCritical

Designing manhole MH04

  Results:
        Total Flow:    36.0000 cfs              Flow From:   Upstream

            Status:      Fixed
      Chamber Width:    8.0000 ft           Chamber Length:    8.0000 ft

Designing pipe P09
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
        Total Flow:    36.0000 cfs              Flow From:   Upstream

            Status:      Fixed                      Slope:     0.0050 ft/ft
        Pipe Width:    72.0000 in               Pipe Height:   72.0000 in
     Depth of Flow:     1.4040 ft               Flow Status:    Partial
   Critical Depth:      1.5800 ft                  Capacity:  299.4656 cfs
          Velocity:     7.1437 ft/s
      Froude Number:    1.2652                  Flow Regime: SuperCritical

Designing pipe P10
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
        Total Flow:    36.0000 cfs              Flow From:   Upstream
```

```
          Status:     Fixed                    Slope:     0.0050 ft/ft
      Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
   Depth of Flow:     1.4040 ft            Flow Status:    Partial
Critical Depth:       1.5800 ft               Capacity:  299.4656 cfs
        Velocity:     7.1437 ft/s
    Froude Number:    1.2652                Flow Regime: SuperCritical

Designing manhole MH05

  Results.
      Total Flow:    36.0000 cfs              Flow From:   Upstream

          Status:     Fixed
    Chamber Width:    8.0000 ft          Chamber Length:    8.0000 ft

Designing pipe P11
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
      Total Flow:    36.0000 cfs              Flow From:   Upstream

          Status:     Fixed                    Slope:     0.0116 ft/ft
      Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
   Depth of Flow:     1.1390 ft            Flow Status:    Partial
Critical Depth:       1.5800 ft               Capacity:  456.6835 cfs
        Velocity:     9.6246 ft/s
    Froude Number:    1.9045                Flow Regime: SuperCritical

Designing manhole MH06

  Results:
      Total Flow:    36.0000 cfs              Flow From:   Upstream

          Status:     Fixed
    Chamber Width:    8.0000 ft          Chamber Length:    8.0000 ft

Designing pipe P12
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
      Total Flow:    36.0000 cfs              Flow From:   Upstream

          Status:     Fixed                    Slope:     0.0050 ft/ft
      Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
   Depth of Flow:     1.4040 ft            Flow Status:    Partial
Critical Depth:       1.5800 ft               Capacity:  299.4656 cfs
        Velocity:     7.1437 ft/s
    Froude Number:    1.2652                Flow Regime: SuperCritical

Designing manhole MH07

  Results.
      Total Flow:    36.0000 cfs              Flow From:   Upstream

          Status:     Fixed
    Chamber Width:    8.0000 ft          Chamber Length:    8.0000 ft

Designing pipe P13
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
      Total Flow:    36.0000 cfs              Flow From:   Upstream

          Status:     Fixed                    Slope:     0.0050 ft/ft
      Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
   Depth of Flow:     1.4040 ft            Flow Status:    Partial
Critical Depth:       1.5800 ft               Capacity:  299.4656 cfs
        Velocity:     7.1437 ft/s
    Froude Number:    1.2652                Flow Regime: SuperCritical

Designing manhole MH08

  Results:
      Total Flow:    36.0000 cfs              Flow From:   Upstream

          Status:     Fixed
    Chamber Width:    8.0000 ft          Chamber Length:    8.0000 ft

Designing pipe P14
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
      Total Flow:    36.0000 cfs              Flow From:   Upstream

          Status:     Fixed                    Slope:     0.0050 ft/ft
      Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
   Depth of Flow:     1.4040 ft            Flow Status:    Partial
Critical Depth:       1.5800 ft               Capacity:  299.4656 cfs
        Velocity:     7.1437 ft/s
    Froude Number:    1.2652                Flow Regime: SuperCritical

Designing pipe PIN04

   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
      Total Flow:     2.3900 cfs           Flow From: Injected Storm

          Status:     Fixed                    Slope:     0.1007 ft/ft
      Pipe Width:    18.0000 in            Pipe Height:   18.0000 in
   Depth of Flow:     0.2710 ft            Flow Status:    Partial
Critical Depth:       0.5800 ft               Capacity:   33.3351 cfs
        Velocity:    10.9327 ft/s
    Froude Number:    4 4405                Flow Regime: SuperCritical

Designing pipe P15
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
      Total Flow:    38.3900 cfs              Flow From:   Upstream

          Status:     Fixed                    Slope:     0.0050 ft/ft
      Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
   Depth of Flow:     1.4500 ft            Flow Status:    Partial
Critical Depth:       1.6300 ft               Capacity:  299.4656 cfs
        Velocity:     7.2785 ft/s
    Froude Number:    1.2670                Flow Regime: SuperCritical

Designing pipe PIN03
   WARNING:  Full flow velocity is greater than maximum (10 00)

  Results:
      Total Flow:     2.3900 cfs           Flow From: Injected Storm

          Status:     Fixed                    Slope:     0.0547 ft/ft
      Pipe Width:    18.0000 in            Pipe Height:   18.0000 in
   Depth of Flow:     0.3150 ft            Flow Status:    Partial
Critical Depth:       0.5800 ft               Capacity:   24.5736 cfs
        Velocity:     8.8194 ft/s
    Froude Number:    3.3091                Flow Regime: SuperCritical

Designing pipe P16
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
      Total Flow:    40.7800 cfs              Flow From:   Upstream

          Status:     Fixed                    Slope:     0.0050 ft/ft
      Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
   Depth of Flow:     1.4950 ft            Flow Status:    Partial
Critical Depth:       1.6800 ft               Capacity:  299.4656 cfs
        Velocity:     7.4053 ft/s
    Froude Number:    1.2681                Flow Regime: SuperCritical

Designing manhole MH09

  Results:
      Total Flow:    40.7800 cfs              Flow From:   Upstream

          Status:     Fixed
    Chamber Width:    8.0000 ft          Chamber Length:    8.0000 ft

Designing pipe P17

  Results:
      Total Flow:    40.7800 cfs              Flow From:   Upstream

          Status:     Fixed                    Slope:     0.0010 ft/ft
      Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
   Depth of Flow:     2.2960 ft            Flow Status:    Partial
Critical Depth:       1.6800 ft               Capacity:  131.2450 cfs
        Velocity:     4.0952 ft/s
    Froude Number:    0.5527                Flow Regime: Subcritical

HGL/EGL Computations:

   No flow in structure:  IN04
   No flow in structure:  IN02
   No flow in structure:  IN03
   No flow in structure:  MH01
   No flow in structure:  P01
   No flow in structure:  P02

  Table A:

    Struct                                                                  2              Dnstrm
Rim
      ID          D        Q        L        V        d       dc      V /2g     Sf      Soffit  EGLdn    HGLdn   Tot Loss  EGLup
HGLup     Elev.
            (in)     (cfs)    (ft)    (ft/s)    (ft)     (ft)     (ft)   (ft/ft)   (ft)    (ft)     (ft)     (ft)     (ft)
(ft)      (ft)

  Outfall      -        -        -        -        -        -        -        -        -       -        -        -        -
5716.61     -
     (Alternate HGL and EGL Used)                                                                                          5718.41
5718.15
```

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P17 | 72 | 40 78 | 75.84 | 4.10 | 2.30 | 1.68 | 0.26 | 0.0010 | 5720.31 | 5718.41 | 5718 15 | 0.07 | 5718.48 | |
| 5718.22 | - | | | | | | | | | | | | | |
| MH09 | - | - | - | - | - | - | - | - | - | 5718.48 | 5718.22 | 0.15 | 5718.63 | |
| 5718.37 5726 74 | | | | | | | | | | | | | | |
| P16 | 72 | 40.78 | 5.83 | 7.41 | 1.49 | 1.68 | 0.85 | - | 5720.38 | 5716.73 | 5715 88 | - | 5716.74 | |
| 5715 89 | - | | | | | | | | | | | | | |
| Junction | - | - | - | 7.28 | - | - | 0.82 | - | - | - | - | - | 5716.67 | |
| 5715.84 | - | | | | | | | | | | | | | |
| P15 | 72 | 38.39 | 5.13 | 7.28 | 1.45 | 1.63 | 0.82 | - | 5720.39 | 5716.67 | 5715.84 | - | 5716.69 | |
| 5715 87 | - | | | | | | | | | | | | | |
| Junction | - | - | - | 7.14 | - | - | 0.79 | - | - | - | - | - | 5716.62 | |
| 5715 82 | - | | | | | | | | | | | | | |
| P14 | 72 | 36.00 | 300.36 | 7.14 | 1.40 | 1.58 | 0.79 | - | 5720.42 | 5716.62 | 5715.82 | - | 5718.10 | |
| 5717.30 | - | | | | | | | | | | | | | |
| MH08 | - | - | - | - | - | - | - | - | - | 5718.10 | 5717.30 | - | 5718.10 | |
| 5717.30 5728.30 | | | | | | | | | | | | | | |
| P13 | 72 | 36.00 | 450.01 | 7.14 | 1.40 | 1.58 | 0.79 | - | 5721.90 | 5718.10 | 5717.30 | - | 5720.31 | |
| 5719.51 | - | | | | | | | | | | | | | |
| MH07 | - | - | - | - | - | - | - | - | - | 5720.31 | 5719.51 | - | 5720.31 | |
| 5719 51 5730.00 | | | | | | | | | | | | | | |
| P12 | 72 | 36.00 | 450.01 | 7.14 | 1.40 | 1.58 | 0.79 | - | 5724.11 | 5720.31 | 5719.51 | - | 5722.52 | |
| 5721.72 | - | | | | | | | | | | | | | |
| MH06 | - | - | - | - | - | - | - | - | - | 5722.52 | 5721.72 | - | 5722.52 | |
| 5721 72 5731.90 | | | | | | | | | | | | | | |
| P11 | 72 | 36.00 | 441.81 | 9.62 | 1.14 | 1.58 | 1.44 | - | 5726.32 | 5722.89 | 5721.45 | - | 5727.94 | |
| 5726.50 | - | | | | | | | | | | | | | |
| MH05 | - | - | - | - | - | - | - | - | - | 5727.94 | 5726.50 | - | 5727.94 | |
| 5726 50 5739.82 | | | | | | | | | | | | | | |
| P10 | 72 | 36.00 | 7.22 | 7.14 | 1.40 | 1.58 | 0.79 | - | 5731.36 | 5727.56 | 5726.77 | - | 5727.58 | |
| 5726.78 | - | | | | | | | | | | | | | |
| Junction | - | - | - | 7.14 | - | - | 0.79 | - | - | - | - | - | 5727.58 | |
| 5726 79 | - | | | | | | | | | | | | | |
| P09 | 72 | 36.00 | 199.07 | 7.14 | 1 40 | 1.58 | 0.79 | - | 5731.38 | 5727.58 | 5726.79 | - | 5728.56 | |
| 5727 76 | - | | | | | | | | | | | | | |
| MH04 | - | - | - | - | - | - | - | - | - | 5728.56 | 5727.76 | - | 5728.56 | |
| 5727 76 5744 18 | | | | | | | | | | | | | | |
| P08 | 66 | 36.00 | 7.20 | 7.21 | 1.45 | 1.62 | 0.81 | - | 5731.86 | 5728.62 | 5727.81 | - | 5728.63 | |
| 5727.83 | - | | | | | | | | | | | | | |
| Junction | - | - | - | 7.21 | - | - | 0.81 | - | - | - | - | - | 5728.63 | |
| 5727 82 | - | | | | | | | | | | | | | |
| P07 | 66 | 36.00 | 198.58 | 7.21 | 1.45 | 1.62 | 0.81 | - | 5731.88 | 5728.63 | 5727.82 | - | 5729.60 | |
| 5728 80 | - | | | | | | | | | | | | | |
| MH03 | - | - | - | - | - | - | - | - | - | 5729.60 | 5728.80 | - | 5729.60 | |
| 5728.60 5747.49 | | | | | | | | | | | | | | |
| P06 | 66 | 36.00 | 7.21 | 7.21 | 1.45 | 1.62 | 0.81 | - | 5732.85 | 5729.61 | 5728.80 | - | 5729.62 | |
| 5728.82 | - | | | | | | | | | | | | | |
| Junction | - | - | - | 7.21 | - | - | 0.81 | - | - | - | - | - | 5729.62 | |
| 5728 81 | - | | | | | | | | | | | | | |
| P20 | 66 | 36.00 | 306.66 | 7.21 | 1.45 | 1.62 | 0.81 | - | 5732.87 | 5729.62 | 5728.81 | - | 5731.15 | |
| 5730.35 | - | | | | | | | | | | | | | |
| Junction | - | - | - | 19.91 | - | - | 6.16 | - | - | - | - | - | 5735.54 | |
| 5729.38 | - | | | | | | | | | | | | | |
| P18 | 24 | 24.30 | 100.91 | 19.91 | 0.82 | 1.74 | 6.16 | - | 5730.55 | 5735.54 | 5729.38 | - | 5744.73 | |
| 5738.57 | - | | | | | | | | | | | | | |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | 5719.15 | |
| 5717.94 | - | | | | | | | | | | | | | |
| PIN03 | 18 | 2.39 | 52.86 | 8.82 | 0.32 | 0.58 | 1.21 | - | 5718.40 | 5718.43 | 5717.22 | - | 5721.31 | |
| 5720.10 | - | | | | | | | | | | | | | |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | 5719.82 | |
| 5717.97 | - | | | | | | | | | | | | | |
| PIN04 | 18 | 2.39 | 28.61 | 10.93 | 0.27 | 0.58 | 1.86 | - | 5718.43 | 5719.06 | 5717.20 | - | 5721.92 | |
| 5720.07 | - | | | | | | | | | | | | | |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | 5732.52 | |
| 5732 11 | - | | | | | | | | | | | | | |
| P05 | 66 | 11.70 | 69.99 | 5.18 | 0.83 | 0.91 | 0.42 | - | 5734.40 | 5730.15 | 5729.73 | - | 5730.48 | |
| 5730.06 | - | | | | | | | | | | | | | |
| MH02 | - | - | - | - | - | - | - | - | - | 5730.48 | 5730.06 | - | 5730.48 | |
| 5730.06 5739.43 | | | | | | | | | | | | | | |
| P04 | 66 | 11.70 | 4.92 | 5.18 | 0.83 | 0.91 | 0.42 | - | 5734.73 | 5730.47 | 5730.06 | - | 5730.48 | |
| 5730.06 | - | | | | | | | | | | | | | |
| Junction | - | - | - | 13.65 | - | - | 2.90 | - | - | - | - | - | 5734.92 | |
| 5732.02 | - | | | | | | | | | | | | | |
| PIN01 | 18 | 7.80 | 62.58 | 13.65 | 0.54 | 1.08 | 2.90 | - | 5732.99 | 5734.92 | 5732.02 | - | 5739.43 | |
| 5736.54 | - | | | | | | | | | | | | | |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | 5732.46 | |
| 5732.24 | - | | | | | | | | | | | | | |
| P03 | 66 | 3 90 | 11.08 | 3.73 | 0.49 | 0.52 | 0.22 | - | 5734.73 | 5729.94 | 5729.72 | - | 5730.00 | |
| 5729.78 | - | | | | | | | | | | | | | |
| Junction | - | - | - | 13.36 | - | - | 2.77 | - | - | - | - | - | 5734.72 | |
| 5731.95 | - | | | | | | | | | | | | | |
| PIN02 | 18 | 3.90 | 37.32 | 13.36 | 0.33 | 0.75 | 2.77 | - | 5733.12 | 5734.72 | 5731.95 | - | 5739.10 | |
| 5736.33 | - | | | | | | | | | | | | | |

Table B:

| Str ID | Losses | | | | | | | | Loss Coefficients | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hf | Hb | Hstr | Hc | He | Hj | Total | | Dstr | Ko | CD | Cd | Cq | Cp |
| Outfall | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P17 | 0.07 | - | - | - | - | - | 0.07 | | - | - | - | - | - | - |
| MH09 | - | - | 0.15 | - | - | - | 0.15 | | 3.84 | 1.462 | 1.000 | 0.383 | 1.000 | 1.000 |
| P16 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| Junction | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P15 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| Junction | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P14 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| MH08 | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P13 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| MH07 | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P12 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| MH06 | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P11 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| MH05 | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P10 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| Junction | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P09 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| MH04 | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P08 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| Junction | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P07 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| MH03 | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P06 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| Junction | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P20 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| Junction | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P18 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| New Branch | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| PIN03 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| New Branch | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| PIN04 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| New Branch | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P05 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| MH02 | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P04 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| Junction | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| PIN01 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| New Branch | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| P03 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |
| Junction | - | - | - | - | - | - | - | | - | - | - | - | - | - |
| PIN02 | - | - | - | - | - | - | SuperCrt | | - | - | - | - | - | - |

**Developed Condition HGL Calculations**
**Tempur Pedic Parkway**
BHI No. 050056.001.05.CWH
Prepared By: Kris Johnson
Date: 08 25 2004

Design Log
==========
InRoads Storm & Sanitary Design Log
Drainage File: P:\050056\Hydro\design\InRoads\050056drainage.sdb
Design File: P:\050056\HYDRO\DESIGN\CONTROL\WORKAREA\050056INROADSWORK.DWG
Display Log: P:\050056\HYDRO\DESIGN\CONTROL\WORKAREA\design.log
Date: Wednesday, August 25, 2004 5:53:36 PM
==========

Designing pipe P01

Results:
Total Flow: 298.6500 cfs — Flow From: Injected Storm
Status: Fixed — Slope: 0.0050 ft/ft
Pipe Width: 66.0000 in — Pipe Height: 66.0000 in
Depth of Flow: 5.5000 ft — Flow Status: Full
Critical Depth: 5.5000 ft — Capacity: 237.5235 cfs
Velocity: 12.5703 ft/s
Froude Number: 0.0000 — Flow Regime: Subcritical

Designing manhole MH01

Results:
Total Flow: 298.6500 cfs — Flow From: Upstream
Status: Fixed
Chamber Width: 8.0000 ft — Chamber Length: 8.0000 ft

Designing pipe P02

Results:
Total Flow: 298.6500 cfs — Flow From: Upstream
Status: Fixed — Slope: 0.0050 ft/ft
Pipe Width: 66.0000 in — Pipe Height: 66.0000 in
Depth of Flow: 5.5000 ft — Flow Status: Full
Critical Depth: 5.5000 ft — Capacity: 237.4529 cfs
Velocity: 12.5703 ft/s
Froude Number: 0.0000 — Flow Regime: Subcritical

Designing pipe PIN02

WARNING: Full flow velocity is greater than maximum (10.00)

Results:
Total Flow: 10.1000 cfs — Flow From: Injected Storm
Status: Fixed — Slope: 0.1182 ft/ft
Pipe Width: 18.0000 in — Pipe Height: 18.0000 in
Depth of Flow: 0.5420 ft — Flow Status: Partial
Critical Depth: 1.2200 ft — Capacity: 36.1163 cfs
Velocity: 17.5025 ft/s
Froude Number: 4.8824 — Flow Regime: SuperCritical

Designing pipe P03

Results:
Total Flow: 308.7500 cfs — Flow From: Upstream
Status: Fixed — Slope: 0.0050 ft/ft
Pipe Width: 66.0000 in — Pipe Height: 66.0000 in
Depth of Flow: 5.5000 ft — Flow Status: Full
Critical Depth: 5.5000 ft — Capacity: 237.4529 cfs
Velocity: 12.9955 ft/s
Froude Number: 0.0000 — Flow Regime: Subcritical

Designing pipe PIN01
WARNING: Full flow velocity is greater than maximum (10.00)

Results:
Total Flow: 10.0100 cfs — Flow From: Injected Storm
Status: Fixed — Slope: 0.0723 ft/ft
Pipe Width: 18.0000 in — Pipe Height: 18.0000 in
Depth of Flow: 0.6160 ft — Flow Status: Partial
Critical Depth: 1.2100 ft — Capacity: 28.2522 cfs
Velocity: 14.6105 ft/s
Froude Number: 3.7846 — Flow Regime: SuperCritical

Designing pipe P04

Results:
Total Flow: 318.7600 cfs — Flow From: Upstream
Status: Fixed — Slope: 0.0050 ft/ft
Pipe Width: 66.0000 in — Pipe Height: 66.0000 in
Depth of Flow: 5.5000 ft — Flow Status: Full
Critical Depth: 5.5000 ft — Capacity: 237.4529 cfs
Velocity: 13.4168 ft/s
Froude Number: 0.0000 — Flow Regime: Subcritical

Designing manhole MH02

Results:
Total Flow: 318.7600 cfs — Flow From: Upstream
Status: Fixed
Chamber Width: 8.0000 ft — Chamber Length: 8.0000 ft

Designing pipe P05

Results:
Total Flow: 318.7600 cfs — Flow From: Upstream
Status: Fixed — Slope: 0.0050 ft/ft
Pipe Width: 66.0000 in — Pipe Height: 66.0000 in
Depth of Flow: 5.5000 ft — Flow Status: Full
Critical Depth: 5.5000 ft — Capacity: 237.4529 cfs
Velocity: 13.4168 ft/s
Froude Number: 0.0000 — Flow Regime: Subcritical

Designing pipe P06

Results:
Total Flow: 318.7600 cfs — Flow From: Upstream
Status: Fixed — Slope: 0.0050 ft/ft
Pipe Width: 66.0000 in — Pipe Height: 66.0000 in
Depth of Flow: 5.5000 ft — Flow Status: Full
Critical Depth: 5.5000 ft — Capacity: 237.4529 cfs
Velocity: 13.4168 ft/s
Froude Number: 0.0000 — Flow Regime: Subcritical

Designing manhole MH03

Results:
Total Flow: 318.7600 cfs — Flow From: Upstream
Status: Fixed
Chamber Width: 8.0000 ft — Chamber Length: 8.0000 ft

Designing pipe P07

Results
Total Flow: 318 7600 cfs — Flow From: Upstream
Status: Fixed — Slope: 0.0050 ft/ft
Pipe Width: 66.0000 in — Pipe Height: 66.0000 in
Depth of Flow: 5.5000 ft — Flow Status: Full
Critical Depth: 5.5000 ft — Capacity: 237.4529 cfs
Velocity: 13.4168 ft/s
Froude Number: 0.0000 — Flow Regime: Subcritical

Designing pipe P08

Results:
Total Flow: 318.7600 cfs — Flow From: Upstream
Status: Fixed — Slope: 0.0050 ft/ft
Pipe Width: 66.0000 in — Pipe Height: 66.0000 in
Depth of Flow: 5.5000 ft — Flow Status: Full
Critical Depth: 5.5000 ft — Capacity: 237.4529 cfs
Velocity: 13.4168 ft/s
Froude Number: 0.0000 — Flow Regime: Subcritical

Designing manhole MH04

Results:
Total Flow: 318.7600 cfs — Flow From: Upstream
Status: Fixed
Chamber Width: 8.0000 ft — Chamber Length: 8.0000 ft

Designing pipe P09
WARNING: Full flow velocity is greater than maximum (10.00)

Results:
Total Flow: 318.7600 cfs — Flow From: Upstream
Status: Fixed — Slope: 0.0050 ft/ft
Pipe Width: 72.0000 in — Pipe Height: 72.0000 in
Depth of Flow: 5.3830 ft — Flow Status: Partial
Critical Depth: 4.8600 ft — Capacity: 299.4656 cfs
Velocity: 11.9185 ft/s
Froude Number: 0.7758 — Flow Regime: Subcritical

Designing pipe P10
WARNING: Full flow velocity is greater than maximum (10.00)

Results:
Total Flow: 318.7600 cfs — Flow From: Upstream
Status: Fixed — Slope: 0.0050 ft/ft

```
      Pipe Width:    72.0000 in          Pipe Height:    72.0000 in
    Depth of Flow:    5.3830 ft          Flow Status:    Partial
   Critical Depth:    4.8600 ft             Capacity:   299.4656 cfs
         Velocity:   11.9185 ft/s
     Froude Number:   0.7758             Flow Regime: Subcritical

Designing manhole MH05

 Results:
      Total Flow:   318.7600 cfs          Flow From:   Upstream

           Status:     Fixed
     Chamber Width:    8.0000 ft       Chamber Length:    8.0000 ft

Designing pipe P11
   WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
      Total Flow:   318.7600 cfs          Flow From:   Upstream

           Status:     Fixed                  Slope:    0.0116 ft/ft
       Pipe Width:   72.0000 in        Pipe Height:   72.0000 in
    Depth of Flow:    3.6910 ft        Flow Status:    Partial
   Critical Depth:    4.8600 ft           Capacity:   456.6835 cfs
         Velocity:   17 4643 ft/s
     Froude Number:   1.7417             Flow Regime: SuperCritical

Designing manhole MH06

 Results:
      Total Flow:   318.7600 cfs          Flow From:   Upstream

           Status:     Fixed
     Chamber Width:    8.0000 ft       Chamber Length:    8.0000 ft

Designing pipe P12
   WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
      Total Flow:   318.7600 cfs          Flow From:   Upstream

           Status:     Fixed                  Slope:    0.0050 ft/ft
       Pipe Width:   72.0000 in        Pipe Height:   72.0000 in
    Depth of Flow:    5.3830 ft        Flow Status:    Partial
   Critical Depth:    4.8600 ft           Capacity:   299.4656 cfs
         Velocity:   11.9185 ft/s
     Froude Number:   0.7758             Flow Regime: Subcritical
```

```
 Results:
      Total Flow:     7.5000 cfs        Flow From: Injected Storm

           Status:     Fixed                  Slope:    0.1007 ft/ft
       Pipe Width:   18.0000 in        Pipe Height:   18.0000 in
    Depth of Flow:    0.4830 ft        Flow Status:    Partial
   Critical Depth:    1.0600 ft           Capacity:    33.3351 cfs
         Velocity:   15.2098 ft/s
     Froude Number:   4.5274             Flow Regime: SuperCritical

Designing pipe P15
   WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
      Total Flow:   326.2600 cfs          Flow From:   Upstream

           Status:     Fixed                  Slope:    0.0050 ft/ft
       Pipe Width:   72.0000 in        Pipe Height:   72.0000 in
    Depth of Flow:    6.0000 ft        Flow Status:      Full
   Critical Depth:    6.0000 ft           Capacity:   299.4656 cfs
         Velocity:   11.5391 ft/s
     Froude Number:   0.0000             Flow Regime: Subcritical

Designing pipe PIN03
   WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
      Total Flow:     7.5000 cfs        Flow From: Injected Storm

           Status:     Fixed                  Slope:    0.0547 ft/ft
       Pipe Width:   18.0000 in        Pipe Height:   18.0000 in
    Depth of Flow:    0.5680 ft        Flow Status:    Partial
   Critical Depth:    1.0600 ft           Capacity:    24.5736 cfs
         Velocity:   12.2004 ft/s
     Froude Number.   3.3133             Flow Regime: SuperCritical

Designing pipe P16
   WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
      Total Flow:   333.7600 cfs          Flow From:   Upstream

           Status:     Fixed                  Slope:    0.0050 ft/ft
       Pipe Width:   72.0000 in        Pipe Height:   72.0000 in
    Depth of Flow:    6.0000 ft        Flow Status:      Full
   Critical Depth.    6.0000 ft           Capacity:   299.4656 cfs
         Velocity:   11 8043 ft/s
     Froude Number:   0.0000             Flow Regime: Subcritical
```

```
Designing manhole MH07

 Results:
      Total Flow:   318.7600 cfs          Flow From:   Upstream

           Status:     Fixed
     Chamber Width:    8.0000 ft       Chamber Length:    8.0000 ft

Designing pipe P13
   WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
      Total Flow:   318.7600 cfs          Flow From:   Upstream

           Status:     Fixed                  Slope:    0.0050 ft/ft
       Pipe Width:   72.0000 in        Pipe Height:   72.0000 in
    Depth of Flow:    5.3830 ft        Flow Status:    Partial
   Critical Depth:    4.8600 ft           Capacity:   299.4656 cfs
         Velocity:   11.9185 ft/s
     Froude Number:   0.7758             Flow Regime: Subcritical

Designing manhole MH08

 Results:
      Total Flow:   318.7600 cfs          Flow From:   Upstream

           Status:     Fixed
     Chamber Width:    8.0000 ft       Chamber Length:    8.0000 ft

Designing pipe P14
   WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
      Total Flow:   318.7600 cfs          Flow From:   Upstream

           Status:     Fixed                  Slope:    0.0050 ft/ft
       Pipe Width:   72.0000 in        Pipe Height:   72.0000 in
    Depth of Flow:    5.3830 ft        Flow Status:    Partial
   Critical Depth:    4.8600 ft           Capacity:   299.4656 cfs
         Velocity:   11.9185 ft/s
     Froude Number:   0.7758             Flow Regime: Subcritical

Designing pipe PIN04
   WARNING:  Full flow velocity is greater than maximum (10.00)
```

```
Designing manhole MH09

 Results:
      Total Flow:   333.7600 cfs          Flow From:   Upstream

           Status:     Fixed
     Chamber Width:    8.0000 ft       Chamber Length:    8.0000 ft

Designing pipe P17

 Results:
      Total Flow:   333.7600 cfs          Flow From:   Upstream

           Status:     Fixed                  Slope:    0.0010 ft/ft
       Pipe Width:   72.0000 in        Pipe Height:   72.0000 in
    Depth of Flow:    6.0000 ft        Flow Status:      Full
   Critical Depth:    6.0000 ft           Capacity:   131.2450 cfs
         Velocity:   11.8043 ft/s
     Froude Number:   0.0000             Flow Regime: Subcritical
```

HGL/EGL Computations:

No flow in structure: IN04
No flow in structure: IN02
No flow in structure: IN03

Table A:

| Struct | D | Q | L | V | d | dc | V /2g | Sf | Dnstrm Soffit | EGLdn | HGLdn | Tot Loss | EGLup |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rim ID | (in) | (cfs) | (ft) | (ft/s) | (ft) | (ft) | (ft) | (ft/ft) | (ft) | (ft) | (ft) | (ft) | (ft) |
| HGLup Elev. (ft) (ft) | | | | | | | | | | | | | |
| Outfall | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5720.36 - | | | | | | | | | | | | | 5722.53 |
| (Alternate HGL and EGL Used) | | | | | | | | | | | | | |
| 5720.36 P17 | 72 | 333.76 | 24.04 | 11.80 | - | - | 2.17 | 0.0062 | 5720.36 | 5722.53 | 5720.36 | 0.15 | 5722.68 |
| 5720.51 - MH09 | - | - | - | - | - | - | - | - | - | 5722.68 | 5720.51 | 0.15 | 5722.82 |
| 5720.66 5726.74 P16 | 72 | 333.76 | 5.83 | 11.80 | - | - | 2.17 | 0.0062 | 5720.38 | 5722.82 | 5720.66 | 0.04 | 5722.86 |

-

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5720.69 | - | | | | | | | | | | | | | |
| Junction | - | - | - | - | - | - | - | - | - | 5722.86 | 5720.69 | 0.00 | 5722.86 | |
| 5720.69 | - | | | | | | | | | | | | | |
| P15 | 72 | 326.26 | 5.13 | 11.54 | - | - | 2.07 | 0.0059 | 5720.39 | 5722.86 | 5720.69 | 0.03 | 5722.89 | |
| 5720.82 | - | | | | | | | | | | | | | |
| Junction | - | - | - | - | - | - | - | - | - | 5722.89 | 5720.82 | 0.00 | 5722.89 | |
| 5720.82 | - | | | | | | | | | | | | | |
| P14 | 72 | 318.76 | 300.36 | 11.27 | - | - | 1.98 | 0.0057 | 5720.42 | 5722.89 | 5720.82 | 1.70 | 5724.59 | |
| 5722.62 | - | | | | | | | | | | | | | |
| MH08 | - | - | - | - | - | - | - | - | - | 5724.59 | 5722.62 | 0.14 | 5724.73 | |
| 5722.76 5728.30 | | | | | | | | | | | | | | |
| P13 | 72 | 318.76 | 450.01 | 11.27 | - | - | 1.98 | 0.0057 | 5721.90 | 5724.73 | 5722.76 | 2.55 | 5727.28 | |
| 5725.31 | - | | | | | | | | | | | | | |
| MH07 | - | - | - | - | - | - | - | - | - | 5727.28 | 5725.31 | 0.15 | 5727.43 | |
| 5725.45 5730.00 | | | | | | | | | | | | | | |
| P12 | 72 | 318.76 | 450 01 | 11.27 | - | - | 1.98 | 0.0057 | 5724.11 | 5727.43 | 5725.45 | 2.55 | 5729.98 | |
| 5728.00 | - | | | | | | | | | | | | | |
| MH06 | - | - | - | - | - | - | - | - | - | 5729.98 | 5728.00 | 0.15 | 5730.13 | |
| 5728 16 5731.90 | | | | | | | | | | | | | | |
| P11 | 72 | 318.76 | 441.81 | 11.27 | - | - | 1.98 | 0.0057 | 5726.32 | 5730.13 | 5728.16 | 2.50 | 5732.63 | |
| 5730.66 | - | | | | | | | | | | | | | |
| MH05 | - | - | - | - | - | - | - | - | - | 5732.63 | 5730.66 | 0.12 | 5732.76 | |
| 5730.78 5739.82 | | | | | | | | | | | | | | |
| (Alternate HGL and EGL Used) | | | | | | | | | | | | | | 5732.77 |
| 5730.79 | | | | | | | | | | | | | | |
| P10 | 72 | 318.76 | 7.22 | 11.27 | - | - | 1.98 | 0.0057 | 5731.36 | 5732.77 | 5730.79 | 0.04 | 5732.81 | |
| 5730.83 | - | | | | | | | | | | | | | |
| Junction | - | - | - | - | - | - | - | - | - | 5732.81 | 5730.83 | 0.19 | 5733.00 | |
| 5731.02 | - | | | | | | | | | | | | | |
| P09 | 72 | 318.76 | 199.07 | 11.27 | - | - | 1.98 | 0.0057 | 5731.38 | 5733.00 | 5731.02 | 1.13 | 5734.13 | |
| 5732.15 | - | | | | | | | | | | | | | |
| MH04 | - | - | - | - | - | - | - | - | - | 5734.13 | 5732.15 | 0.13 | 5734.25 | |
| 5732.28 5744.18 | | | | | | | | | | | | | | |
| P08 | 66 | 318.76 | 7.20 | 13.42 | - | - | 2.80 | 0.0090 | 5731.86 | 5734.25 | 5732.28 | 0.06 | 5734.32 | |
| 5731.52 | - | | | | | | | | | | | | | |
| Junction | - | - | - | - | - | - | - | - | - | 5734.32 | 5731.52 | 0.27 | 5734.59 | |
| 5731.80 | - | | | | | | | | | | | | | 5734.67 |
| (Alternate HGL and EGL Used) | | | | | | | | | | | | | | |
| 5731 88 | | | | | | | | | | | | | | |
| P07 | 66 | 318.76 | 198.58 | 13.42 | - | - | 2.80 | 0.0090 | 5731.88 | 5734.67 | 5731.88 | 1.79 | 5736.46 | |
| 5733.67 | - | | | | | | | | | | | | | |
| MH03 | - | - | - | - | - | - | - | - | - | 5736.46 | 5733.67 | 0.22 | 5736.68 | |
| 5733.89 5747.49 | | | | | | | | | | | | | | |
| P06 | 66 | 318.76 | 7.21 | 13.42 | - | - | 2.80 | 0.0090 | 5732.85 | 5736.68 | 5733.89 | 0.07 | 5736.75 | |
| 5733.95 | - | | | | | | | | | | | | | |
| Junction | - | - | - | - | - | - | - | - | - | 5736.75 | 5733.95 | 0.27 | 5737.02 | |
| 5734.22 | - | | | | | | | | | | | | | |
| P05 | 66 | 318.76 | 376.65 | 13.42 | - | - | 2.80 | 0.0090 | 5732.87 | 5737.02 | 5734.22 | 3.39 | 5740.41 | |
| 5737.61 | - | | | | | | | | | | | | | |
| MH02 | - | - | - | - | - | - | - | - | - | 5740.41 | 5737.61 | 0.27 | 5740.68 | |
| 5737.88 5739.43 | | | | | | | | | | | | | | |
| P04 | 66 | 318.76 | 4.92 | 13.42 | - | - | 2.80 | 0.0090 | 5734.73 | 5740.68 | 5737.88 | 0.04 | 5740.72 | |
| 5737.92 | - | | | | | | | | | | | | | |
| Junction | - | - | - | - | - | - | - | - | - | 5740.72 | 5737.92 | 0.00 | 5740.72 | |
| 5737.93 | - | | | | | | | | | | | | | |
| P03 | 66 | 308.75 | 11.08 | 13.00 | - | - | 2.62 | 0.0085 | 5734.73 | 5740.72 | 5737.93 | 0.09 | 5740.82 | |
| 5738.19 | - | | | | | | | | | | | | | |
| Junction | - | - | - | - | - | - | - | - | - | 5740.82 | 5738.19 | 0.00 | 5740.82 | |
| 5738.19 | - | | | | | | | | | | | | | |
| P02 | 66 | 298.65 | 434.08 | 12.57 | - | - | 2.46 | 0.0079 | 5734.79 | 5740.82 | 5738.19 | 3.43 | 5744.25 | |
| 5741.79 | - | | | | | | | | | | | | | |
| MH01 | - | - | - | - | - | - | - | - | - | 5744.25 | 5741.79 | 0.26 | 5744.51 | |
| 5742.06 5746.03 | | | | | | | | | | | | | | |
| P01 | 66 | 298.65 | 105.46 | 12.57 | - | - | 2.46 | 0.0079 | 5736.94 | 5744.51 | 5742.06 | 0.83 | 5745.35 | |
| 5742.89 | - | | | | | | | | | | | | | |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | 5722.86 | |
| 5720.69 | - | | | | | | | | | | | | | |
| PIN03 | 18 | 7.50 | 52.86 | 4.24 | - | - | 0.28 | 0.0051 | 5718.40 | 5722.86 | 5720.69 | 0.27 | 5723.13 | |
| 5722.85 | - | | | | | | | | | | | | | |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | 5722.89 | |
| 5720.82 | - | | | | | | | | | | | | | |
| PIN04 | 18 | 7.50 | 28.61 | 4.24 | - | - | 0.28 | 0.0051 | 5718.43 | 5722.89 | 5720.82 | 0.15 | 5723.03 | |
| 5722.75 | - | | | | | | | | | | | | | |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | 5740.72 | |
| 5737 92 | - | | | | | | | | | | | | | |
| PIN01 | 18 | 10.01 | 62.58 | 5.66 | - | - | 0.50 | 0.0091 | 5732.99 | 5740.72 | 5737.92 | 0.57 | 5741.29 | |
| 5740.79 | - | | | | | | | | | | | | | |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | 5740.82 | |
| 5738.19 | - | | | | | | | | | | | | | |
| PIN02 | 18 | 10.10 | 37.32 | 5.72 | - | - | 0.51 | 0.0092 | 5733.12 | 5740.82 | 5738.19 | 0.35 | 5741.16 | |
| 5740.65 | - | | | | | | | | | | | | | |

Table B:

| Str ID | Losses Hf | Hb | Hstr | Hc | He | Hj | Total | Loss Coefficients Dstr | Ko | CD | Cd | Cq | Cp | Cb | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Outfall | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| P17 | 0.15 | - | - | - | - | - | 0.15 | - | - | - | - | - | - | - | - |
| MH09 | - | - | 0.15 | - | - | - | 0.15 | 6.13 | 0.133 | 1.000 | 0.506 | 1.000 | 1.000 | 1.000 | 0.068 |
| P16 | 0.04 | - | - | - | - | - | 0.04 | - | - | - | - | - | - | - | - |
| Junction | - | 0.00 | - | - | - | Neg | 0.00 | - | - | - | - | - | - | - | - |
| P15 | 0.03 | - | - | - | - | - | 0.03 | - | - | - | - | - | - | - | - |
| Junction | - | 0.00 | - | - | - | Neg | 0.00 | - | - | - | - | - | - | - | - |
| P14 | 1.70 | - | - | - | - | - | 1.70 | - | - | - | - | - | - | - | - |
| MH08 | - | - | 0.14 | - | - | - | 0.14 | 6.72 | 0.133 | 1.000 | 0.535 | 1.000 | 1.000 | 1.000 | 0.071 |
| P13 | 2.55 | - | - | - | - | - | 2.55 | - | - | - | - | - | - | - | - |
| MH07 | - | - | 0.15 | - | - | - | 0.15 | 7.20 | 0.133 | 1.000 | 0.558 | 1.000 | 1.000 | 1.000 | 0.074 |
| P12 | 2.55 | - | - | - | - | - | 2.55 | - | - | - | - | - | - | - | - |
| MH06 | - | - | 0.15 | - | - | - | 0.15 | 7.68 | 0.134 | 1.000 | 0.580 | 1.000 | 1.000 | 1.000 | 0.078 |
| P11 | 2.50 | - | - | - | - | - | 2.50 | - | - | - | - | - | - | - | - |
| MH05 | - | - | 0.12 | - | - | - | 0.12 | 5.30 | 0.133 | 1.000 | 0.464 | 1.000 | 1.000 | 1.000 | 0.062 |
| P10 | 0.04 | - | - | - | - | - | 0 04 | - | - | - | - | - | - | - | - |
| Junction | - | 0.19 | - | - | - | - | 0.19 | - | - | - | - | - | - | - | - |
| P09 | 1 13 | - | - | - | - | - | 1.13 | - | - | - | - | - | - | - | - |
| MH04 | - | - | 0.13 | - | - | - | 0.13 | 5.79 | 0.133 | 1.000 | 0.489 | 1.000 | 1.000 | 1.000 | 0.065 |
| P08 | 0.06 | - | - | - | - | - | 0.06 | - | - | - | - | - | - | - | - |
| Junction | - | 0.27 | - | - | - | - | 0.27 | - | - | - | - | - | - | - | - |
| P07 | 1.79 | - | - | - | - | - | 1.79 | - | - | - | - | - | - | - | - |
| MH03 | - | - | 0.22 | - | - | - | 0.22 | 6.32 | 0.145 | 1.000 | 0.543 | 1.000 | 1.000 | 1.000 | 0.079 |
| P06 | 0.07 | - | - | - | - | - | 0.07 | - | - | - | - | - | - | - | - |
| Junction | - | 0.27 | - | - | - | - | 0.27 | - | - | - | - | - | - | - | - |
| P05 | 3.39 | - | - | - | - | - | 3.39 | - | - | - | - | - | - | - | - |
| MH02 | - | - | 0.27 | - | - | - | 0.27 | 8.38 | 0.147 | 1.000 | 0.644 | 1.000 | 1.000 | 1.000 | 0.095 |
| P04 | 0.04 | - | - | - | - | - | 0.04 | - | - | - | - | - | - | - | - |
| Junction | - | 0.00 | - | - | - | Neg | 0 00 | - | - | - | - | - | - | - | - |
| P03 | 0.09 | - | - | - | - | - | 0.09 | - | - | - | - | - | - | - | - |
| Junction | - | 0.00 | - | - | - | Neg | 0.00 | - | - | - | - | - | - | - | - |
| P02 | 3.43 | - | - | - | - | - | 3.43 | - | - | - | - | - | - | - | - |
| MH01 | - | - | 0.26 | - | - | - | 0.26 | 10.35 | 0.146 | 1.000 | 0.731 | 1.000 | 1.000 | 1.000 | 0.107 |
| P01 | 0.83 | - | - | - | - | - | 0.83 | - | - | - | - | - | - | - | - |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PIN03 | 0.27 | - | - | - | - | - | 0.27 | - | - | - | - | - | - | - | - |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PIN04 | 0.15 | - | - | - | - | - | 0.15 | - | - | - | - | - | - | - | - |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PIN01 | 0.57 | - | - | - | - | - | 0.57 | - | - | - | - | - | - | - | - |
| New Branch | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PIN02 | 0.35 | - | - | - | - | - | 0.35 | - | - | - | - | - | - | - | - |

- SUMMARY FILE -
Interim Condition - Hydrologic Calculations
Tempur Pedic Parkway
BHI No. 050056.001.05.CWH
Prepared By: Kris Johnson
Date: 10.04.2004
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =
10/04/2004
INPUT FILE = tempur_g.txt USER NO.= AHYMO-S-
9702c1BohanHu-AH

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 1 |
|---|---|---|---|---|---|---|---|---|---|---|

```
    *S**********************************
    *S***     NOTES (ADDED 10/04/2004 by K Johnson)
    *S***
    *S***     1. - EXISTING - AHYMO MODEL AREA SURROUNDING THE TEMPUR PEDIC
    *S***                     FACILITY AND ROADWAY
    *S***     2. INPUT FILE: P:\040056\Hydro\Study\programs\tempur_g.HYM
    START                                                                                    TIME=
.00
    *S**** 6-HR, 100-YEAR EVENT                                                              RAIN6=
    RAINFALL  TYPE= 1
2.200
    *S
    *S
    *S**** BULK FACTOR*************                                                          PK BF =
    SEDIMENT BULK
1.02
    *S
    *S**** CALC BASIN 2a*************
    COMPUTE NM HYD        BASIN2   -    21        .00150        4.12        .151      1.89675    1.500    4.302 PER
IMP=  90.00
    *S
    *S**** CALC BASIN 2b*************
    COMPUTE NM HYD        BASIN2   -    22        .00140        3.86        .142      1.89675    1.500    4.304 PER
IMP=  90.00
    *S
    *S**** ADD ROUTED BASIN 2-a TO BASIN 2-b AT AP-2
    ADD HYD               2a_2b 21&22  10        .00290        7.98        .293      1.89656    1.500    4.303
    *S
    *S*** ROUTE AP-2 THROUGH 66" SD TO AP-2a  ********
    *S
    ROUTE               AP2_AP2a   10   11        .00290        7.96        .293      1.89672    1.500    4.290
    *S
    *S**** CALC BASIN 7*************
    COMPUTE NM HYD        BASIN7   -     1        .05464       32.12       1.312      .45020    1.600     .918 PER
```

```
IMP=    .00
    *S
    *S*** Route Basin 7 Through Detention Pond********************
    ROUTE RESERVOIR         POND    1    2        .05464       24.22       1.312      .45020    1.733     .692 AC-FT=
.382
    *S
    *S
    *S*** ROUTE DETENTION POND OUTFLOW THROUGH 24" SD TO AP-2a  ********
    *S
    ROUTE               POND_OUT    2   12        .05464       24.30       1.312      .45017    1.733     .695
    *S
    *S**** Combine AP-2a Flows from Basins 2a, 2b and 7
    *S****
    ADD HYD               RUNDOWN 11&12  13        .05754       27.60       1.605      .52300    1.733     .749
    *S
    *S*** ROUTE AP-2a THROUGH 72" SD TO AP-3  ********
    *S
    ROUTE               AP2a_AP3   13   14        .05754       24.95       1.605      .52300    1.800     .678
    *S
    *S
    *S**** CALC BASIN 3-a*************
    COMPUTE NM HYD        BASIN3   -    31        .00606       12.60        .613      1.89675    1.600    3.251 PER
IMP=  90.00
    *S
    *S**** CALC BASIN 3-b*************
    COMPUTE NM HYD        BASIN3   -    32        .00085        2.35        .086      1.89675    1.500    4.316 PER
IMP=  90.00
    *S
    *S**** ADD BASIN 3-a TO AP3 FLOWS
    *S**** AP-2
    ADD HYD               RUNDOWN 14&31  15        .06359       33.39       2.217      .65381    1.767     .821
    *S
    *S**** ADD BASIN 3-b TO AP3 FLOWS
    *S**** AP-2
    ADD HYD               RUNDOWN 15&32  16        .06445       34.28       2.304      .67024    1.767     .831
    *s
    FINISH
```

```
- OUTPUT FILE -
Interim Condition - Hydrologic Calculations
Tempur Pedic Parkway
BHI No          050056.001.05.CWH
Prepared By:    Kris Johnson
Date.           10.04.2004
      AHYMO PROGRAM (AHYMO_97) -                    - Version:  1997.02c
            RUN DATE (MON/DAY/YR) = 10/04/2004
            START TIME (HR:MIN:SEC) = 15:29:55      USER NO.= AHYMO-S-9702c1BohanHu-AH
            INPUT FILE = tempur_g.txt

*S*********************************
*S***     NOTES (ADDED 10/04/2004 by K Johnson)
*S***
*S***     1. - EXISTING - AHYMO MODEL AREA SURROUNDING THE TEMPUR PEDIC
*S***                     FACILITY AND ROADWAY
*S***     2. INPUT FILE: P:\040056\Hydro\Study\programs\tempur_g.HYM
****
START                 0.00
***************************
*S**** 6-HR, 100-YEAR EVENT
RAINFALL              TYPE=1 RAIN QUARTER=0.0 RAIN ONE=1.87
                      RAIN SIX=2.20 DT=0.0333

                COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                DT =     .033333 HOURS      END TIME =     5.999940 HOURS
                   .0000   .0016   .0033   .0050   .0067   .0085   .0103
                   .0122   .0141   .0160   .0180   .0201   .0222   .0243
                   .0266   .0289   .0312   .0337   .0362   .0388   .0415
                   .0443   .0472   .0502   .0534   .0567   .0601   .0637
                   .0675   .0715   .0758   .0810   .0865   .0924   .1051
                    1335   .1773   .2400   .3257   .4384   .5820   .7607
                   .9789  1.1808  1.2652  1.3365  1.4000  1.4577  1.5108
                  1.5602  1.6063  1.6495  1.6902  1.7285  1.7648  1.7991
                  1.8316  1.8624  1.8917  1.9194  1.9458  1.9519  1.9576
                  1.9631  1.9683  1.9732  1.9780  1.9826  1.9870  1.9912
                  1.9953  1.9993  2.0031  2.0068  2.0105  2.0140  2.0174
                  2.0207  2.0240  2.0272  2.0303  2.0333  2.0363  2.0392
                  2.0420  2.0448  2.0476  2.0502  2.0529  2.0554  2.0580
                  2.0605  2.0629  2.0653  2.0677  2.0701  2.0724  2.0746
                  2.0769  2.0791  2.0812  2.0834  2.0855  2.0876  2.0896
                  2.0916  2.0936  2.0956  2.0976  2.0995  2.1014  2.1033
                  2.1052  2.1070  2.1088  2.1106  2.1124  2.1142  2.1159
                  2.1176  2.1193  2.1210  2.1227  2.1244  2.1260  2.1276
                  2.1292  2.1308  2.1324  2.1340  2.1355  2.1371  2.1386
                  2.1401  2.1416  2.1431  2.1446  2.1461  2.1475  2.1489
                  2.1504  2.1518  2.1532  2.1546  2.1560  2.1573  2.1587
                  2.1601  2.1614  2.1627  2.1641  2.1654  2.1667  2.1680
                  2.1693  2.1705  2.1718  2.1731  2.1743  2.1756  2.1768
                  2.1780  2.1793  2.1805  2.1817  2.1829  2.1841  2.1852
                  2.1864  2.1876  2.1887  2.1899  2.1911  2.1922  2.1933
                  2.1945  2.1956  2.1967  2.1978  2.1989  2.2000

*S
*S
*S**** BULK FACTOR*************
SEDIMENT BULK         CODE = 1    BULK FACTOR = 1.025
*S
*S**** CALC BASIN 2a*************
COMPUTE NM HYD        ID=21 HYD NO=BASIN2 DA= 0.001495
                      PER A=0 PER B=5.0 PER C=5.0 PER D=90
                      TP=-0.133  RAIN=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   5.3241    CFS   UNIT VOLUME =    .9974       B =   526.28      P60 = 1.8700
     AREA =      .001346 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

     K =   .118163HR    TP =   .133000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
     UNIT PEAK =   .39867    CFS   UNIT VOLUME =    .9672       B =   354.67      P60 = 1.8700
     AREA =      .000150 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD             ID=21 CODE=10

                                   HYDROGRAPH FROM AREA BASIN2

        TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
        HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
       .000        .0          1.333       1.2          2.667       .1          4.000        .0          5.333        .0
       .333        .0          1.667       2.1          3.000        .0         4.333        .0          5.667        .0
       .667        .0          2.000       1.0          3.333        .0         4.667        .0          6.000        .0
      1.000        .0          2.333        .2          3.667        .0         5.000        .0          6.333        .0

     RUNOFF VOLUME =     1.89675 INCHES     =        .1512 ACRE-FEET
     PEAK DISCHARGE RATE =       4.12 CFS  AT   1.500 HOURS   BASIN AREA =   .0015 SQ. MI.

*S
*S**** CALC BASIN 2b*************
COMPUTE NM HYD        ID=22 HYD NO=BASIN2 DA= 0.0014024
                      PER A=0 PER B=5.0 PER C=5.0 PER D=90
                      TP=-0.133  RAIN=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   4.9943    CFS   UNIT VOLUME =    .9970       B =   526.28      P60 = 1.8700
     AREA =      .001262 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

     K =   .118163HR    TP =   .133000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
     UNIT PEAK =   .37398    CFS   UNIT VOLUME =    .9639       B =   354.67      P60 = 1.8700
     AREA =      .000140 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD             ID=22 CODE=10

                                   HYDROGRAPH FROM AREA BASIN2

        TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
        HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
       .000        .0          1.333       1.1          2.667       .1          4.000        .0          5.333        .0
       .333        .0          1.667       2.0          3.000        .0         4.333        .0          5.667        .0
       .667        .0          2.000        .9          3.333        .0         4.667        .0          6.000        .0
      1.000        .0          2.333        .2          3.667        .0         5.000        .0          6.333        .0

     RUNOFF VOLUME =     1.89675 INCHES     =        .1419 ACRE-FEET
     PEAK DISCHARGE RATE =       3.86 CFS  AT   1.500 HOURS   BASIN AREA =   .0014 SQ. MI.

*S
*S**** ADD ROUTED BASIN 2-a TO BASIN 2-b AT AP-2
ADD HYD               ID=10 HYD=2a_2b ID I=21 II=22
PRINT HYD             ID=10 CODE=10

                                   HYDROGRAPH FROM AREA 2a_2b

        TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
        HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
       .000        .0          1.333       2.3          2.667       .1          4.000        .0          5.333        .0
       .333        .0          1.667       4.0          3.000        .1         4.333        .0          5.667        .1
       .667        .0          2.000       1.9          3.333        .1         4.667        .0          6.000        .1
      1.000        .0          2.333        .4          3.667        .0         5.000        .0          6.333        .0

     RUNOFF VOLUME =     1.89656 INCHES     =        .2931 ACRE-FEET
     PEAK DISCHARGE RATE =       7.98 CFS  AT   1.500 HOURS   BASIN AREA =   .0029 SQ. MI.

*S
*S*** ROUTE AP-2 THROUGH 66" SD TO AP-2a ********
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.005
                                DIA=66 IN     N=.013

                                RATING CURVE PIPE SECTION  1.0
                                  WATER      FLOW       FLOW       MAX
                                  SURFACE    AREA       RATE       WIDTH
                                  ELEV       SQ FT      CFS        FT
                                   .00        .00        .00        .00
                                   .29        .47       1.25       2.44
                                   .57       1.31       5.41       3.36
                                   .86       2.37      12.57       3.99
                                  1.15       3.59      22.61       4.47
                                  1.43       4.92      35.30       4.83
                                  1.72       6.35      50.36       5.10
                                  2.01       7.84      67.48       5.30
                                  2.29       9.38      86.27       5.42
                                  2.58      10.94     106.35       5.49
                                  2.87      12.52     127.28       5.50
                                  3.15      14.09     148.59       5.50
                                  3.44      15.63     169.78       5.50
                                  3.73      17.13     190.29       5.50
                                  4.01      18.57     209.50       5.50
                                  4.30      19.92     226.69       5.50
                                  4.59      21.17     240.99       5.50
                                  4.87      22.26     251.22       5.50
                                  5.16      23.15     255.43       5.50
                                  5.50      23.76     255.43       5.50
*S
COMPUTE TRAVEL TIME  ID=11 REACH=1A VS NO=1 L=70 SLP=.005

                          TRAVEL TIME TABLE
                                  REACH=  1.0

                          WATER      AVERAGE    FLOW       TRAVEL
                          DEPTH      AREA       RATE       TIME
                          FEET       SQ.FT.     CFS        HRS
                           .287       .472       1.25       .0074
```

| | | | |
|---|---|---|---|
| .573 | 1.314 | 5.41 | .0047 |
| .860 | 2.373 | 12.57 | .0037 |
| 1.146 | 3.589 | 22 61 | .0031 |
| 1.433 | 4.923 | 35.30 | .0027 |
| 1.720 | 6.348 | 50.36 | .0025 |
| 2.006 | 7.839 | 67 48 | .0023 |
| 2.293 | 9.377 | 86.27 | .0021 |
| 2.579 | 10.942 | 106.35 | .0020 |
| 2.866 | 12.518 | 127 28 | .0019 |
| 3.153 | 14.086 | 148.59 | .0018 |
| 3.439 | 15.630 | 169.78 | .0018 |
| 3.726 | 17.132 | 190.29 | .0018 |
| 4.013 | 18.571 | 209.50 | .0017 |
| 4.299 | 19.925 | 226.69 | .0017 |
| 4.586 | 21.166 | 240.99 | .0017 |
| 4.872 | 22.258 | 251.22 | .0017 |
| 5.159 | 23.147 | 255.43 | .0018 |
| 5.500 | 23.758 | 255.43 | .0018 |

```
ROUTE                ID=11 HYD NO=AP2_AP2a  INFLOW ID=10 DT=0.0
*S
*S**** CALC BASIN 7*************
COMPUTE NM HYD       ID=1 HYD NO=BASIN7 DA= 0.05464
                     PER A=100 PER B=0 PER C=0 PER D=0
                     TP=-0.202  RAIN=-1

   k =   .248043HR    TP =   .202000HR    K/TP RATIO =  1.227936     SHAPE CONSTANT, N =  2.899764
   UNIT PEAK =   73 993    CFS   UNIT VOLUME =    .9997     B =   273.54      P60 = 1.8700
   AREA =      .054640 SQ MI    IA =    .65000 INCHES    INF =   1 67000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

  BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1 02500 AT PEAK FLOW.

PRINT HYD            ID=1 CODE=10
```

HYDROGRAPH FROM AREA BASIN7

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS |
|---|---|---|---|---|---|---|---|---|---|
| .000 | .0 | 1.667 | 29.0 | 3.333 | .7 | 5.000 | .1 | 6.667 | .0 |
| .333 | .0 | 2.000 | 8.1 | 3 667 | .5 | 5.333 | .0 | 7.000 | .0 |
| .667 | .0 | 2.333 | 2 8 | 4.000 | .3 | 5.667 | .0 | | |
| 1.000 | .0 | 2.667 | 1.8 | 4.333 | .2 | 6.000 | .0 | | |
| 1.333 | .0 | 3.000 | 1.1 | 4.667 | .1 | 6.333 | .0 | | |

```
  RUNOFF VOLUME =       .45020 INCHES      =       1.3119 ACRE-FEET
  PEAK DISCHARGE RATE =       32.12 CFS  AT   1.600 HOURS   BASIN AREA =   .0546 SQ. MI.
```

```
*S
*S*** Route Basin 7 Through Detention Pond*******************
ROUTE RESERVOIR      ID=2 HYD NO=POND   INFLOW ID=1  CODE=5
```

| OUTFLOW (CFS) | STORAGE (AC FT) | ELEV (FT) |
|---|---|---|
| 0 | 0 | 5735.75 |
| 0.53 | 0.06 | 5736 |
| 2.16 | 0.11 | 5736.25 |
| 4.95 | 0.17 | 5736.5 |
| 9 | 0.23 | 5736.75 |
| 14.43 | 0.3 | 5737 |
| 21.41 | 0.36 | 5737.25 |
| 30.17 | 0.43 | 5737.5 |
| 41.18 | 0.5 | 5737.75 |
| 55.43 | 0.57 | 5738 |
| 27.31 | 0.65 | 5738.25 |
| 29.91 | 0.72 | 5738.5 |
| 32.31 | 0.8 | 5738.75 |

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

| TIME (HRS) | INFLOW (CFS) | ELEV (FEET) | VOLUME (AC-FT) | OUTFLOW (CFS) |
|---|---|---|---|---|
| .00 | .00 | 5735.75 | .000 | .00 |
| .17 | .00 | 5735.75 | .000 | .00 |
| .33 | .00 | 5735.75 | .000 | .00 |
| .50 | .00 | 5735.75 | .000 | .00 |
| .67 | .00 | 5735.75 | .000 | .00 |
| .83 | .00 | 5735.75 | .000 | .00 |
| 1.00 | .00 | 5735.75 | .000 | .00 |
| 1.17 | .00 | 5735.75 | .000 | .00 |
| 1.33 | .00 | 5735.75 | .000 | .00 |
| 1.50 | 25.03 | 5736.31 | .124 | 2.82 |
| 1.67 | 29.02 | 5737.28 | .367 | 22.34 |
| 1.83 | 15.89 | 5737.23 | .355 | 20.84 |
| 2.00 | 8.12 | 5736.94 | .284 | 13.19 |
| 2.17 | 4.15 | 5736.71 | .219 | 8.29 |
| 2.33 | 2.79 | 5736.52 | .174 | 5.20 |
| 2.50 | 2.22 | 5736.40 | .147 | 3.86 |
| 2.67 | 1.78 | 5736.32 | .127 | 2.97 |
| 2.83 | 1.42 | 5736.26 | .113 | 2.31 |
| 3.00 | 1.14 | 5736.21 | .102 | 1.90 |
| 3.17 | .91 | 5736.16 | .092 | 1.58 |
| 3.33 | .73 | 5736.12 | .084 | 1.30 |
| 3.50 | .58 | 5736.08 | .076 | 1.06 |
| 3.67 | .46 | 5736.05 | .070 | .86 |
| 3.83 | .37 | 5736.03 | .065 | .70 |
| 4.00 | .30 | 5736.01 | .061 | .57 |

| | | | | |
|---|---|---|---|---|
| 4 17 | .24 | 5735.99 | .057 | .51 |
| 4.33 | .19 | 5735.97 | .054 | .47 |
| 4.50 | .15 | 5735.96 | .050 | .44 |
| 4.67 | .12 | 5735.94 | .046 | .40 |
| 4 83 | .10 | 5735.92 | .042 | .37 |
| 5.00 | .08 | 5735.91 | .038 | .34 |
| 5.17 | .06 | 5735.90 | .035 | .31 |
| 5.33 | .05 | 5735.88 | .031 | .28 |
| 5.50 | .04 | 5735.87 | .028 | .25 |
| 5.67 | .03 | 5735.86 | .026 | .23 |
| 5.83 | .03 | 5735.85 | .023 | .20 |
| 6.00 | .02 | 5735.84 | .021 | .18 |
| 6 17 | .02 | 5735.83 | .019 | .16 |
| 6.33 | .01 | 5735.82 | .017 | .15 |
| 6.50 | .01 | 5735.81 | .015 | .13 |
| 6.67 | .01 | 5735.81 | .013 | .12 |
| 6.83 | .01 | 5735 80 | .012 | .10 |
| 7.00 | .01 | 5735.79 | .011 | .09 |
| 7.17 | .00 | 5735.79 | .009 | .08 |
| 7.33 | .00 | 5735.78 | .008 | .07 |
| 7.50 | .00 | 5735.78 | .007 | .07 |
| 7.67 | .00 | 5735.78 | .007 | .06 |
| 7.83 | .00 | 5735.77 | .006 | .05 |
| 8.00 | .00 | 5735.77 | .005 | .05 |
| 8.17 | .00 | 5735.77 | .005 | .04 |
| 8.33 | .00 | 5735.77 | .004 | .04 |
| 8.50 | .00 | 5735.76 | .004 | .03 |
| 8.67 | .00 | 5735.76 | .003 | .03 |
| 8.83 | .00 | 5735.76 | .003 | .02 |
| 9 00 | .00 | 5735.76 | .002 | .02 |
| 9 17 | .00 | 5735.76 | .002 | .02 |

| TIME (HRS) | INFLOW (CFS) | ELEV (FEET) | VOLUME (AC-FT) | OUTFLOW (CFS) |
|---|---|---|---|---|
| 9.33 | .00 | 5735.76 | .002 | .02 |
| 9.50 | .00 | 5735.76 | .002 | .02 |
| 9.67 | .00 | 5735.76 | .002 | .01 |
| 9.83 | .00 | 5735.76 | .001 | .01 |
| 10.00 | .00 | 5735 75 | .001 | .01 |
| 10.17 | .00 | 5735.75 | .001 | .01 |
| 10 33 | .00 | 5735.75 | .001 | .01 |
| 10.50 | .00 | 5735.75 | .001 | .01 |
| 10.67 | .00 | 5735.75 | .001 | .01 |
| 10.83 | .00 | 5735.75 | .001 | .01 |
| 11.00 | .00 | 5735.75 | .001 | .01 |
| 11.17 | .00 | 5735 75 | .001 | .00 |

```
PEAK DISCHARGE =        24 216 CFS - PEAK OCCURS AT HOUR     1.73
MAXIMUM WATER SURFACE ELEVATION =      5737.330
MAXIMUM STORAGE =          .3824 AC-FT       INCREMENTAL TIME=     .033333HRS
```

```
PRINT HYD            ID=2 CODE=10
```

HYDROGRAPH FROM AREA POND

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS |
|---|---|---|---|---|---|---|---|---|---|
| .000 | 0 | 2.667 | 3.0 | 5.333 | .3 | 8.000 | .0 | 10.667 | .0 |
| .333 | .0 | 3.000 | 1.9 | 5.667 | .2 | 8.333 | .0 | 11.000 | .0 |
| .667 | .0 | 3.333 | 1.3 | 6.000 | .2 | 8.667 | .0 | 11.333 | .0 |
| 1.000 | .0 | 3.667 | .9 | 6.333 | .1 | 9.000 | .0 | 11.667 | .0 |
| 1.333 | .0 | 4.000 | .6 | 6.667 | .1 | 9.333 | .0 | 12.000 | .0 |
| 1.667 | 22.3 | 4.333 | .5 | 7.000 | .1 | 9.667 | .0 | 12.333 | .0 |
| 2.000 | 13.2 | 4.667 | .4 | 7.333 | .1 | 10.000 | .0 | 12.667 | .0 |
| 2.333 | 5.2 | 5.000 | .3 | 7.667 | .1 | 10.333 | .0 | 13.000 | .0 |

```
  RUNOFF VOLUME =       .45020 INCHES      =       1.3119 ACRE-FEET
  PEAK DISCHARGE RATE =       24.22 CFS  AT   1.733 HOURS   BASIN AREA =   .0546 SQ. MI.
```

```
*S
*S
*S*** ROUTE DETENTION POND OUTFLOW THROUGH 24" SD TO AP-2a  ********
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.0915
                                DIA=24 IN      N=.013
```

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .10 | .06 | .36 | .89 |
| .21 | .17 | 1.56 | 1.22 |
| .31 | .31 | 3.62 | 1.45 |
| .42 | .47 | 6.52 | 1.62 |
| .52 | .65 | 10.17 | 1.76 |
| .63 | .84 | 14.51 | 1.85 |
| .73 | 1.04 | 19.45 | 1.93 |
| .83 | 1.24 | 24.86 | 1.97 |
| .94 | 1.45 | 30.65 | 2.00 |
| 1.04 | 1.66 | 36.68 | 2.00 |

| | | | |
|---|---|---|---|
| 1.15 | 1.86 | 42.82 | 2.00 |
| 1.25 | 2.07 | 48.93 | 2.00 |
| 1.35 | 2.27 | 54.84 | 2.00 |
| 1.46 | 2.46 | 60.37 | 2.00 |
| 1.56 | 2.63 | 65.33 | 2.00 |
| 1.67 | 2.80 | 69.45 | 2.00 |
| 1.77 | 2.94 | 72.40 | 2.00 |
| 1.88 | 3.06 | 73.61 | 2.00 |
| 2.00 | 3.14 | 73.61 | 2.00 |

```
*S
COMPUTE TRAVEL TIME  ID=12 REACH=1A VS NO=1 L=100.49 SLP=.0915
```

TRAVEL TIME TABLE
REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .104 | .062 | .36 | .0049 |
| .208 | .174 | 1.56 | .0031 |
| .313 | .314 | 3.62 | .0024 |
| .417 | .475 | 6.52 | .0020 |
| .521 | .651 | 10.17 | .0018 |
| .625 | .839 | 14.51 | .0016 |
| .730 | 1.037 | 19.45 | .0015 |
| .834 | 1.240 | 24.86 | .0014 |
| .938 | 1.447 | 30.65 | .0013 |
| 1.042 | 1.655 | 36.68 | .0013 |
| 1 146 | 1.863 | 42.82 | .0012 |
| 1.251 | 2.067 | 48.93 | .0012 |
| 1.355 | 2.265 | 54.84 | .0012 |
| 1.459 | 2.456 | 60.37 | .0011 |
| 1.563 | 2.635 | 65.33 | .0011 |
| 1.668 | 2.799 | 69.45 | .0011 |
| 1.772 | 2.943 | 72.40 | .0011 |
| 1.876 | 3.061 | 73.61 | .0012 |
| 2 000 | 3.142 | 73.61 | .0012 |

```
ROUTE                ID=12 HYD NO=POND_OUT  INFLOW ID=2 DT=0.0
*S
*S**** Combine AP-2a Flows from Basins 2a, 2b and 7
*S****
ADD HYD              ID=13 HYD=RUNDOWN ID I=11 II=12
PRINT HYD            ID=13 CODE=10
```

HYDROGRAPH FROM AREA RUNDOWN

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 2.667 | 3.1 | 5.333 | .3 | 8.000 | .0 | 10.667 |
| .0 | .333 | .0 | 3.000 | 2.0 | 5.667 | .3 | 8.333 | .0 | 11.000 |
| .0 | .667 | .0 | 3.333 | 1.4 | 6.000 | .2 | 8.667 | .0 | 11.333 |
| .0 | 1.000 | .0 | 3.667 | .9 | 6.333 | .2 | 9.000 | .0 | 11.667 |
| .0 | 1.333 | 2.2 | 4.000 | .6 | 6.667 | .1 | 9.333 | .0 | 12.000 |
| .0 | 1.667 | 26.4 | 4.333 | .5 | 7.000 | .1 | 9.667 | .0 | 12.333 |
| 0 | 2.000 | 15.2 | 4.667 | .4 | 7.333 | .1 | 10.000 | .0 | 12.667 |
| .0 | 2.333 | 5.6 | 5.000 | .4 | 7.667 | .1 | 10.333 | .0 | 13.000 |
| 0 | | | | | | | | | |

RUNOFF VOLUME = .52300 INCHES = 1.6049 ACRE-FEET
PEAK DISCHARGE RATE = 27.60 CFS AT 1.733 HOURS BASIN AREA = .0575 SQ. MI.

```
*S
*S*** ROUTE AP-2a THROUGH 72" SD TO AP-3  ********
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.005
                                DIA=72 IN     N=.013
```

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .31 | .56 | 1.57 | 2.67 |
| .63 | 1.56 | 6.82 | 3.67 |
| .94 | 2.82 | 15.85 | 4.36 |
| 1.25 | 4.27 | 28.51 | 4.87 |
| 1.56 | 5.86 | 44.52 | 5.27 |
| 1.88 | 7.55 | 63.52 | 5.56 |
| 2.19 | 9.33 | 85.10 | 5.78 |
| 2.50 | 11.16 | 108.80 | 5.92 |
| 2.81 | 13.02 | 134.12 | 5.99 |
| 3.13 | 14.90 | 160.52 | 6.00 |
| 3.44 | 16.76 | 187.40 | 6.00 |
| 3.75 | 18.60 | 214.12 | 6.00 |
| 4.06 | 20.39 | 239.99 | 6.00 |
| 4.38 | 22.10 | 264.21 | 6.00 |
| 4.69 | 23.71 | 285.89 | 6.00 |
| 5.00 | 25.19 | 303.93 | 6.00 |
| 5.32 | 26.49 | 316.83 | 6.00 |
| 5.63 | 27.55 | 322.14 | 6.00 |
| 6.00 | 28.27 | 322.14 | 6.00 |

```
*S
COMPUTE TRAVEL TIME  ID=14 REACH=1A VS NO=1 L=2346.45 SLP=.005
```

TRAVEL TIME TABLE
REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .313 | .562 | 1.57 | .2332 |
| .625 | 1.564 | 6.82 | .1494 |
| .938 | 2.824 | 15.85 | .1161 |
| 1.251 | 4.271 | 28.51 | .0976 |
| 1.563 | 5.859 | 44.52 | .0858 |
| 1.876 | 7.554 | 63.52 | .0775 |
| 2.189 | 9.329 | 85.10 | .0715 |
| 2 501 | 11.159 | 108.80 | .0669 |
| 2.814 | 13.022 | 134.12 | .0633 |
| 3.127 | 14.897 | 160.52 | .0605 |
| 3.439 | 16.764 | 187.40 | .0583 |
| 3.752 | 18.601 | 214.12 | .0566 |
| 4.065 | 20.388 | 239.99 | .0554 |
| 4.377 | 22.101 | 264.21 | .0545 |
| 4.690 | 23.712 | 285.89 | .0541 |
| 5.003 | 25.189 | 303.93 | .0540 |
| 5.315 | 26.489 | 316.83 | .0545 |
| 5.628 | 27.547 | 322.14 | .0557 |
| 6.000 | 28.274 | 322.14 | .0572 |

```
ROUTE                ID=14 HYD NO=AP2a_AP3  INFLOW ID=13 DT=0.0
*S
*S
*S**** CALC BASIN 3-a*************
COMPUTE NM HYD       ID=31 HYD NO=BASIN3 DA=0.006056
                     PER A=0 PER B=5.0 PER C=5.0 PER D=90
                     TP=-0.234  RAIN=-1

K =   .127530HR    TP =   .234000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   12.258    CFS   UNIT VOLUME =    .9991       B =   526.28      P60 = 1.8700
AREA =      .005450 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

K =   .207896HR    TP =   .234000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
UNIT PEAK =   .91789    CFS   UNIT VOLUME =    .9847       B =   354.67      P60 = 1.8700
AREA =      .000606 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=31 CODE=10
```

HYDROGRAPH FROM AREA BASIN3

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.667 | 11.7 | 3.333 | .2 | 5.000 | .1 | 6.667 |
| .0 | .333 | .0 | 2.000 | 4.9 | 3.667 | .1 | 5.333 | .1 | 7.000 |
| .0 | .667 | .0 | 2.333 | 1.8 | 4.000 | .1 | 5.667 | .1 | 7.333 |
| .0 | 1.000 | .0 | 2.667 | .7 | 4.333 | .1 | 6.000 | .1 | |
| | 1.333 | 1.4 | 3.000 | .4 | 4.667 | .1 | 6.333 | .0 | |

RUNOFF VOLUME = 1.89675 INCHES = .6126 ACRE-FEET
PEAK DISCHARGE RATE = 12.60 CFS AT 1.600 HOURS BASIN AREA = .0061 SQ. MI.

```
*S
*S**** CALC BASIN 3-b*************
COMPUTE NM HYD       ID=32 HYD NO=BASIN3 DA=0.000852
                     PER A=0 PER B=5.0 PER C=5.0 PER D=90
                     TP=-0.133  RAIN=-1

K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   3.0342    CFS   UNIT VOLUME =    .9956       B =   526.28      P60 = 1.8700
AREA =      .000767 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

K =   .118163HR    TP =   .133000HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
UNIT PEAK =   .22720    CFS   UNIT VOLUME =    .9420       B =   354.67      P60 = 1.8700
AREA =      .000085 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.02500 AT PEAK FLOW.

PRINT HYD            ID=32 CODE=10
```

HYDROGRAPH FROM AREA BASIN3

| FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|---|
| .0 | .000 | .0 | 1.333 | .7 | 2.667 | .0 | 4.000 | .0 | 5.333 |
| 0 | .333 | .0 | 1.667 | 1.2 | 3.000 | .0 | 4.333 | .0 | 5.667 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| .667 | .0 | 2.000 | .6 | 3.333 | .0 | 4.667 | .0 | 6.000 |
| 1.000 | .0 | 2.333 | 1 | 3.667 | .0 | 5.000 | .0 | 6.333 |

.0
.0

RUNOFF VOLUME = 1.89675 INCHES = .0862 ACRE-FEET
PEAK DISCHARGE RATE = 2 35 CFS AT 1.500 HOURS BASIN AREA = .0009 SQ. MI.

```
*S
*S**** ADD BASIN 3-a TO AP3 FLOWS
*S**** AP-2
ADD HYD              ID=15 HYD=RUNDOWN ID I=14 II=31
PRINT HYD            ID=15 CODE=10
```

HYDROGRAPH FROM AREA RUNDOWN

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|
| .000 | .0 | 3.000 | 2 9 | 6.000 | .4 | 9.000 | .0 | 12.000 |
| .333 | 0 | 3.333 | 2.0 | 6.333 | .2 | 9.333 | .0 | 12.333 |
| .667 | .0 | 3.667 | 1.4 | 6.667 | .2 | 9.667 | .0 | 12.667 |
| 1.000 | .0 | 4.000 | .9 | 7.000 | .1 | 10.000 | .0 | 13.000 |
| 1.333 | 1.8 | 4.333 | .7 | 7.333 | .1 | 10 333 | .0 | 13.333 |
| 1.667 | 30.4 | 4.667 | .6 | 7.667 | .1 | 10.667 | .0 | |
| 2.000 | 23.3 | 5.000 | .5 | 8.000 | .1 | 11.000 | .0 | |
| 2.333 | 9.4 | 5.333 | .5 | 8.333 | 0 | 11.333 | .0 | |
| 2.667 | 4.7 | 5.667 | .4 | 8.667 | .0 | 11.667 | .0 | |

FLOW
CFS
.0
.0
.0
.0
.0
.0

RUNOFF VOLUME = .65381 INCHES = 2.2175 ACRE-FEET
PEAK DISCHARGE RATE = 33.39 CFS AT 1.767 HOURS BASIN AREA = .0636 SQ. MI.

```
*S
*S**** ADD BASIN 3-b TO AP3 FLOWS
*S**** AP-2
ADD HYD              ID=16 HYD=RUNDOWN ID I=15 II=32
PRINT HYD            ID=16 CODE=10
```

HYDROGRAPH FROM AREA RUNDOWN

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS |
|---|---|---|---|---|---|---|---|---|
| .000 | .0 | 3.000 | 2.9 | 6.000 | .4 | 9.000 | .0 | 12.000 |
| .333 | .0 | 3.333 | 2.0 | 6.333 | .2 | 9.333 | .0 | 12.333 |
| .667 | .0 | 3.667 | 1.4 | 6.667 | .2 | 9.667 | .0 | 12.667 |
| 1.000 | .0 | 4.000 | 1.0 | 7.000 | .1 | 10.000 | .0 | 13.000 |
| 1.333 | 2.5 | 4.333 | .7 | 7.333 | .1 | 10.333 | .0 | 13.333 |
| 1.667 | 31.6 | 4.667 | .6 | 7.667 | .1 | 10.667 | .0 | |
| 2.000 | 23.8 | 5.000 | .5 | 8.000 | .1 | 11.000 | .0 | |
| 2.333 | 9.5 | 5.333 | .5 | 8.333 | .0 | 11.333 | .0 | |
| 2.667 | 4.7 | 5.667 | .4 | 8.667 | .0 | 11.667 | .0 | |

RUNOFF VOLUME = .67024 INCHES = 2.3036 ACRE-FEET
PEAK DISCHARGE RATE = 34.28 CFS AT 1.767 HOURS BASIN AREA = .0644 SQ. MI.

```
*s
FINISH
```

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 15:29:55

# Detention Pond Sizing

## Sedimentation

* Min partical size to be removed: Fine sand.

Settling velocity of Fine Sand $V_s$

$V_s = 0.01 \frac{m}{s}$

Specific Gravity 2.65

Check Reynolds #

$Re = \frac{V_s D}{\nu}$

$D \approx 0.17$ mm

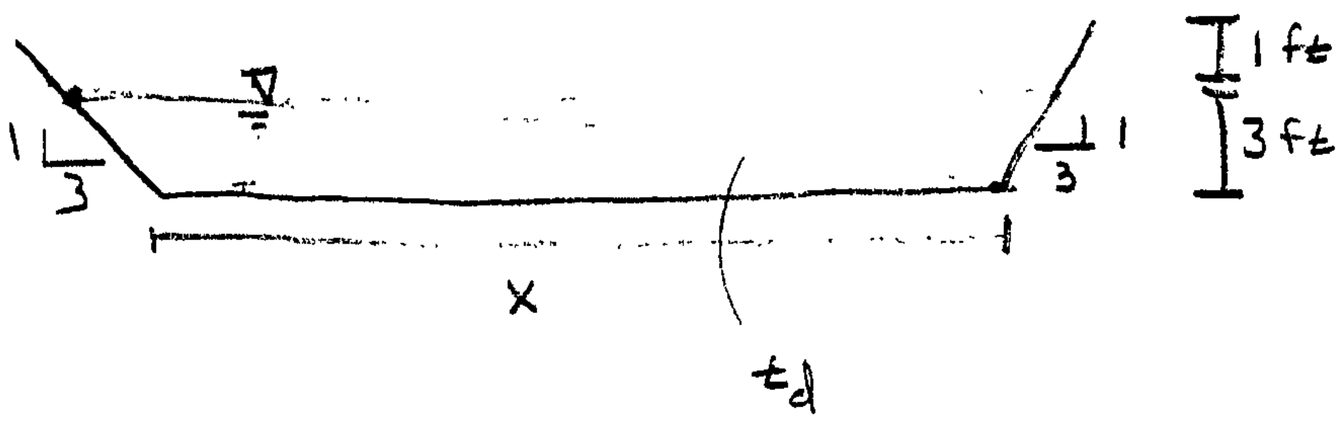
$\nu_{20°C} = 1.007 \times 10^{-6} \frac{m^2}{s}$

$Re = 1.68$

Thus $1 < Re < 2000$

use fig. 26.2

$V_s \approx 0.0045 \frac{ft}{sec}$




$t_d = \frac{3 \text{ ft}}{0.0045 \frac{ft}{sec}} = 666.7 \text{ sec} = 11.1 \text{ min}$

$V_s = \frac{Q}{A}$ surface area of pond

assume 1:3 width length ratio

$3W^2 = \frac{Q}{V}$

$W = \sqrt{\frac{Q}{3V}} = \sqrt{\frac{32.12}{3(0.0045)}} = 48.77$

Pond Dimensions

50' wide
150' long
4' deep

Bohannan Huston INC

PROJECT NAME Tempe Pecos Parkway SHEET 1 OF
PROJECT NO. 050056.001.04 BY KOHNEN DATE 10/04/04
SUBJECT CH'D DATE

ENGINEERING
SPATIAL DATA
ADVANCED TECHNOLOGIES

**Detention Pond Volume**
**Tempur Pedic Parkway**
BHI No. 050056.001.05.CWH
Prepared By: Kris Johnson
Date: 10.04.2004

| Elevation | Incremental Volume | Cumulative Volume | Acre-Feet | Surface Area |
|---|---|---|---|---|
| | cu ft | cu ft | | sq ft |
| 5735.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5736.00 | 2409.26 | 2409.26 | 0.06 | 9811.35 |
| 5736.25 | 2496.72 | 4905.98 | 0.11 | 10163.01 |
| 5736.50 | 2585.09 | 7491.06 | 0.17 | 10518.28 |
| 5736.75 | 2674.35 | 10165.42 | 0.23 | 10877.15 |
| 5737.00 | 2764.52 | 12929.94 | 0.30 | 11239.63 |
| 5737.25 | 2855.59 | 15785.53 | 0.36 | 11605.71 |
| 5737.50 | 2947.56 | 18733.09 | 0.43 | 11975.40 |
| 5737.75 | 3040.44 | 21773.53 | 0.50 | 12348.69 |
| 5738.00 | 3134.21 | 24907.74 | 0.57 | 12725.59 |
| 5738.25 | 3228.89 | 28136.62 | 0.65 | 13106.10 |
| 5738.50 | 3324.46 | 31461.09 | 0.72 | 13490.21 |
| 5738.75 | 3420.94 | 34882.03 | 0.80 | 13877.93 |
| 5739.00 | 3518.32 | 38400.35 | 0.88 | 14269.25 |
| 5739.25 | 3616.60 | 42016.96 | 0.96 | 14664.18 |
| 5739.50 | 3715.79 | 45732.74 | 1.05 | 15062.71 |
| 5739.75 | 0.00 | 45732.74 | 1.05 | 0.00 |

**Detention Pond Discharge Curve**

**Tempur Pedic Parkway**

BHI No. 050056.001.05.CWH
Prepared By: Kris Johnson
Date: 09.29.2004

```
;Name Detention Pond
;Method Structures
;Max Elev 5739.75 ft
;Min Elev 5735.75 ft - SD is 1 foot above bottom of pond
;Max Q 237.04 cfs
;UNITS: ft, cfs
;Circular Orifice 5736.75 ft 24.00 ft
5735.75 0.00
5736.00 0.00
5736.25 0.00
5736.50 0.00
5736.75 0.00
5737.00 1.61
5737.25 6.46
5737.50 14.57
5737.75 25.95
5738.00 40.62
5738.25 58.60
5738.50 79.91
5738.75 104.56
5739.00 132.58
5739.25 163.99
5739.50 198.80
5739.75 237.04
```

**Retention Pond Incremental Volume Analysis**

**Tempur Pedic Parkway**

BHI No. 050056.001.05.CWH
Prepared By: Kris Johnson
Date: 10.04.2004

| Elevation | Incremental Volume | Cumulative Volume | Acre-Feet | Surface Area |
|---|---|---|---|---|
| | cu ft | cu ft | | sq ft |
| 5713.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5713.50 | 877.77 | 877.77 | 0.02 | 3616.13 |
| 5713.75 | 930.60 | 1808.36 | 0.04 | 3829.25 |
| 5714.00 | 984.33 | 2792.69 | 0.06 | 4045.98 |
| 5714.25 | 1038.96 | 3831.65 | 0.09 | 4266.32 |
| 5714.50 | 1094.50 | 4926.15 | 0.11 | 4490.26 |
| 5714.75 | 1150.93 | 6077.08 | 0.14 | 4717.81 |
| 5715.00 | 1208.27 | 7285.35 | 0.17 | 4948.96 |
| 5715.25 | 1266.51 | 8551.86 | 0.20 | 5183.71 |
| 5715.50 | 1325.65 | 9877.51 | 0.23 | 5422.07 |
| 5715.75 | 1385.69 | 11263.20 | 0.26 | 5664.04 |
| 5716.00 | 1446.63 | 12709.83 | 0.29 | 5909.61 |
| 5716.25 | 1508.47 | 14218.30 | 0.33 | 6158.78 |
| 5716.50 | 1571.22 | 15789.52 | 0.36 | 6411.56 |
| 5716.75 | 1634.86 | 17424.38 | 0.40 | 6667.94 |
| 5717.00 | 1699.41 | 19123.79 | 0.44 | 6927.93 |
| 5717.25 | 1764.86 | 20888.65 | 0.48 | 7191.52 |
| 5717.50 | 1831.21 | 22719.85 | 0.52 | 7458.72 |
| 5717.75 | 1898.46 | 24618.31 | 0.57 | 7729.52 |
| 5718.00 | 1966.61 | 26584.92 | 0.61 | 8003.93 |
| 5718.25 | 2035.66 | 28620.58 | 0.66 | 8281.95 |
| 5718.50 | 2105.61 | 30726.19 | 0.71 | 8563.56 |
| 5718.75 | 2176.47 | 32902.66 | 0.76 | 8848.79 |
| 5719.00 | 2248.22 | 35150.88 | 0.81 | 9137.61 |
| 5719.25 | 2320.88 | 37471.76 | 0.86 | 9430.04 |
| 5719.50 | 2394.44 | 39866.20 | 0.92 | 9726.08 |
| 5719.75 | 2468.90 | 42335.10 | 0.97 | 10025.72 |
| 5720.00 | 2544.26 | 44879.37 | 1.03 | 10328.97 |
| 5720.25 | 2620.52 | 47499.89 | 1.09 | 10635.82 |
| 5720.50 | 2697.69 | 50197.58 | 1.15 | 10946.27 |
| 5720.75 | 2775.75 | 52973.33 | 1.22 | 11260.33 |
| 5721.00 | 2854.72 | 55828.04 | 1.28 | 11578.00 |
| 5721.25 | 2934.58 | 58762.63 | 1.35 | 11899.27 |
| 5721.50 | 3015.35 | 61777.98 | 1.42 | 12224.14 |
| 5721.75 | 3097.02 | 64875.00 | 1.49 | 12552.62 |
| 5722.00 | 3179.59 | 68054.59 | 1.56 | 12884.71 |
| 5722.25 | 3263.06 | 71317.65 | 1.64 | 13220.40 |
| 5722.50 | 3347.44 | 74665.09 | 1.71 | 13559.69 |
| 5722.75 | 3432.71 | 78097.80 | 1.79 | 13902.59 |
| 5723.00 | 3518.89 | 81616.68 | 1.87 | 14249.09 |
| 5723.25 | 3605.96 | 85222.64 | 1.96 | 14599.20 |
| 5723.50 | 3693.94 | 88916.58 | 2.04 | 14952.91 |
| 5723.75 | 3782.82 | 92699.40 | 2.13 | 15310.23 |
| 5724.00 | 3872.60 | 96572.00 | 2.22 | 15671.15 |
| 5724.25 | 3963.28 | 100535.28 | 2.31 | 16035.68 |
| 5724.50 | 4054.86 | 104590.14 | 2.40 | 16403.81 |
| 5724.75 | 4147.34 | 108737.48 | 2.50 | 16775.55 |
| 5725.00 | 4240.73 | 112978.21 | 2.59 | 17150.89 |
| 5725.25 | 4335.02 | 117313.23 | 2.69 | 17529.84 |
| 5725.50 | 4430.20 | 121743.43 | 2.79 | 17912.39 |
| 5725.75 | 4526.29 | 126269.72 | 2.90 | 18298.54 |
| 5726.00 | 4623.28 | 130893.01 | 3.00 | 18688.31 |
| 5726.25 | 4721.17 | 135614.18 | 3.11 | 19081.67 |
| 5726.50 | 4819.96 | 140434.14 | 3.22 | 19478.64 |
| 5726.75 | 4919.66 | 145353.80 | 3.34 | 19879.22 |
| 5727.00 | 0.00 | 145353.80 | 3.34 | 0.00 |

# Retention Pond Sizing

☆ must hold 100 year - 10 day Storm event
☆ Designed to accomodate INTERIM Condition ONLY

Pond sized Per COA DPM Standards
Chapter 22, section A.5, equation a-9

(eq. a-9)

$$V_{10\,day} = V_{360} + A_D \cdot (P_{10\,day} - P_{360}) / 12 \frac{in}{ft}$$

$V_{360} = 2.304$ acre-ft (AHYMO Model : Interim Condition - Hydrologic Calculation

$P_{10\,day} = 3.67$ in [COA DPM]

$P_{360} = 2.20$ in [COA DPM]

$$A_{D_{sq.mi.}} = 0.9\left[\underbrace{(0.0015 + 0.0014)}_{\text{basin 2}} + \underbrace{(0.00606 + 0.00085)}_{\text{basin 3}}\right]$$

roadways assumed to have 10% pervious material

$A_{D_{sq.mi.}} = 0.008825$ sq. mi $\quad A_{D_{sq.ft}} = 5.648$ acre

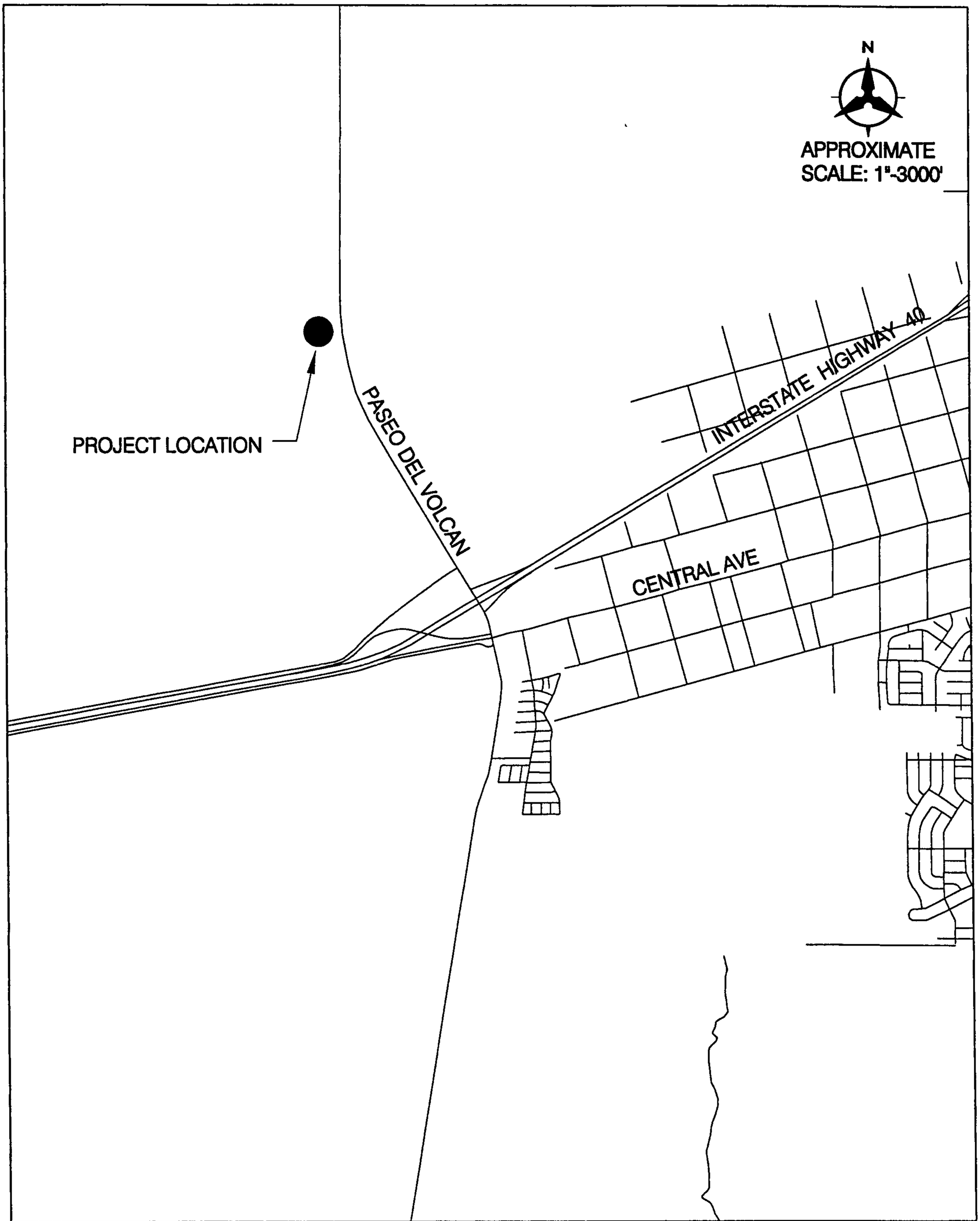
$$V_{10\text{-}day} = 2.304 \text{ acre-ft} + \frac{5.648 \text{ acre}(3.67 \text{ in} - 2.20)}{12}$$

$$V_{10\text{-}day} = 3.00 \text{ acre-ft}$$

Bohannan & Huston INC.

PROJECT NAME Teays Pole Parkway SHEET 1 OF
PROJECT NO. 050056.01.01 BY KJOHNSON DATE 10-4-2004
SUBJECT CH'D DATE

ENGINEERING
SPATIAL DATA
ADVANCED TECHNOLOGIES




**Bohannan ▲ Huston INC.**

Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335

ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

**CITY OF ALBUQUERQUE**
**PUBLIC WORKS DEPARTMENT**

TEMPUR-PEDIC PARKWAY
VICINITY MAP - EXHIBIT 1

| | | | |
|---|---|---|---|
| DRAWN BY: | K.W.J. | DATE: | 08.09.04 |
| CHECKED BY: | C.W.H | PROJECT NO. | 050056.001.05.CWH |

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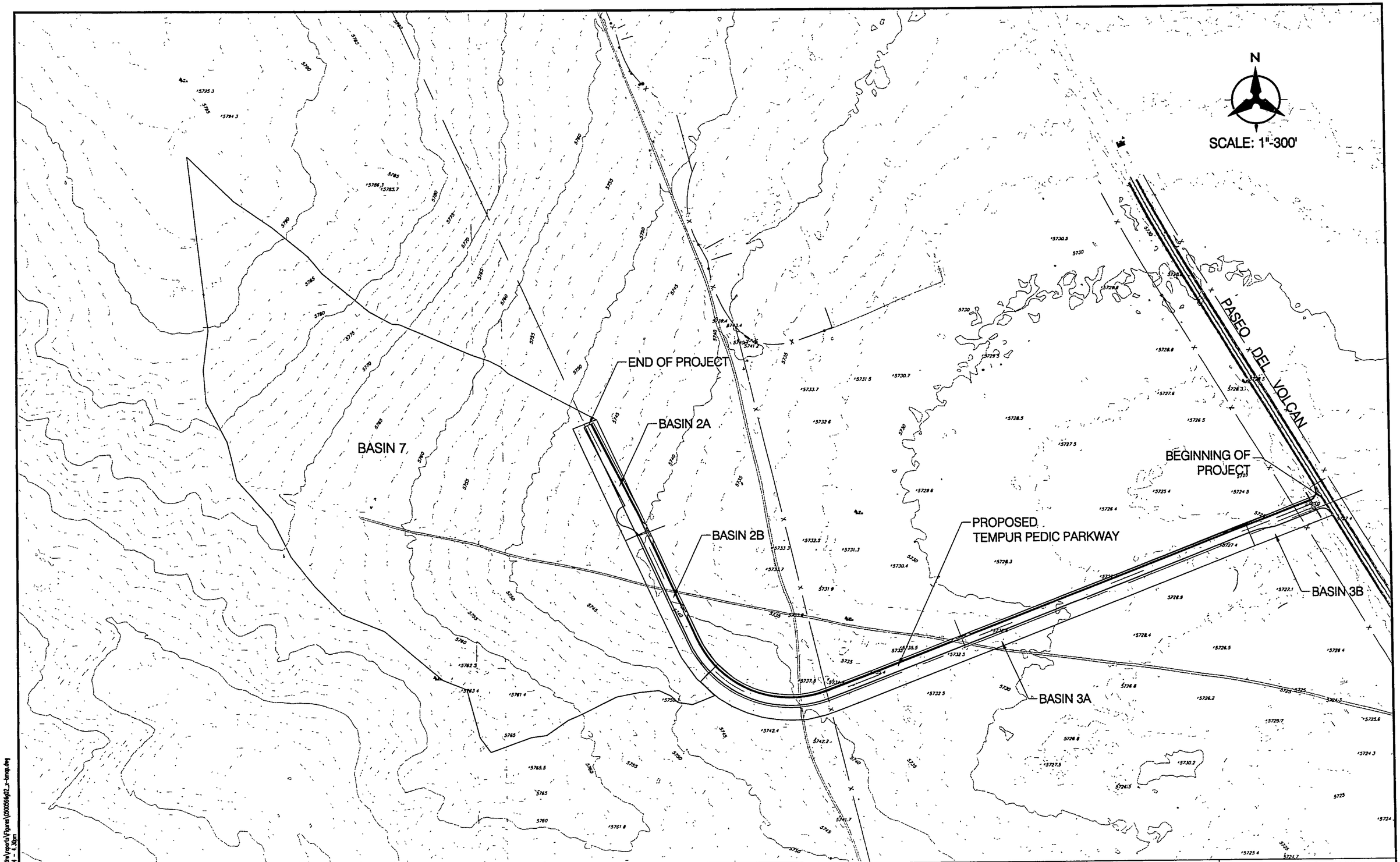
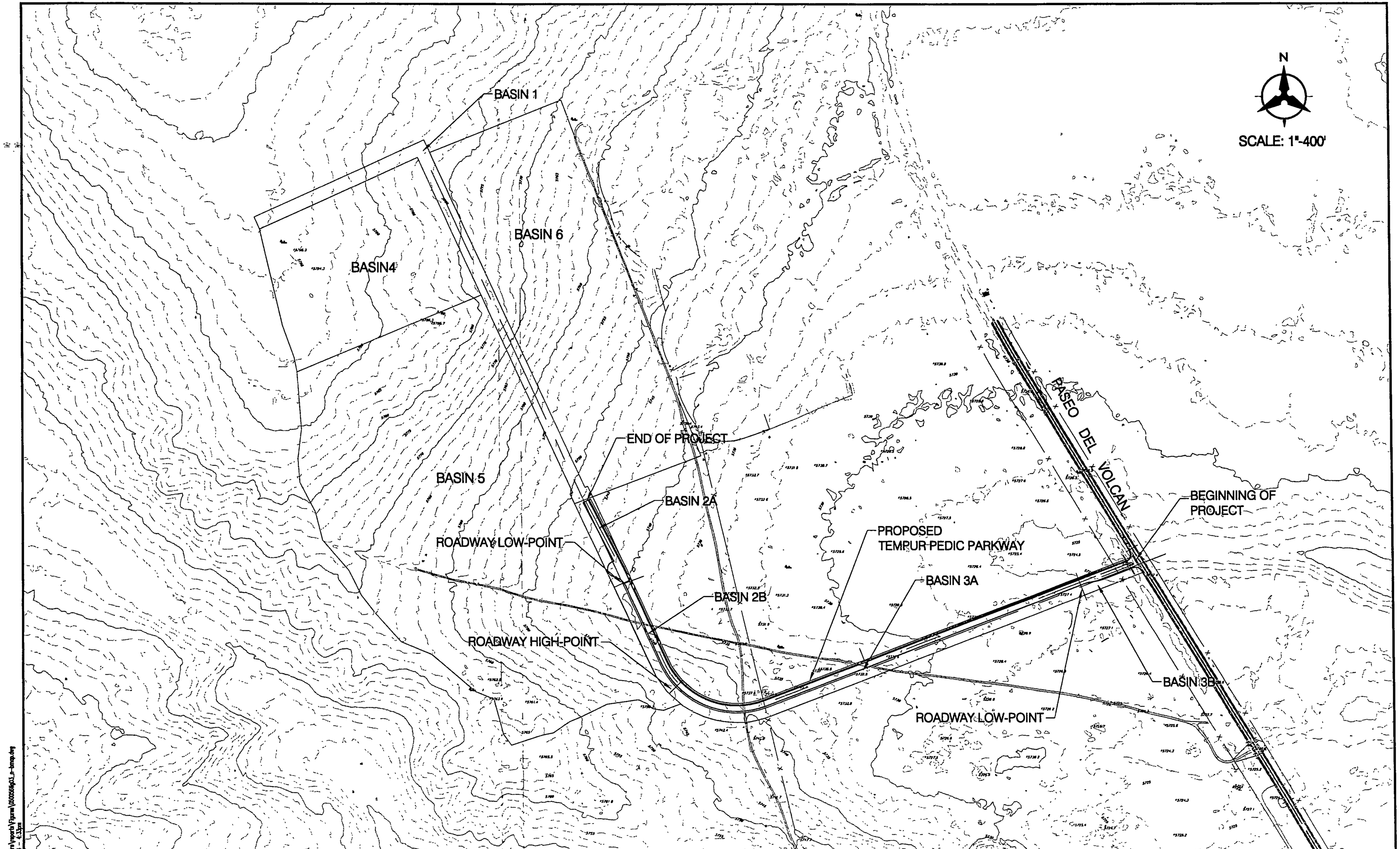
Sep 28, 2004 - 4:01pm




| | | | |
|---|---|---|---|
| PASEO DEL VULCON ACCESS ROAD STORM DRAIN SYSTEM | DRAWN BY: K.W.J. | DATE: 08.13.04 | INTERIM DRAINAGE BASIN MAP EXHIBIT 2 |
| | CHECKED BY: C.W.H. | ROW PROJECT NO. 050056.001.05 | |

P:\050056\Hydro\reports\Figures\050056ex02_2-temp.dwg
Sep 28, 2004 - 6:30pm

Bohannan ▲ Huston INC.
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

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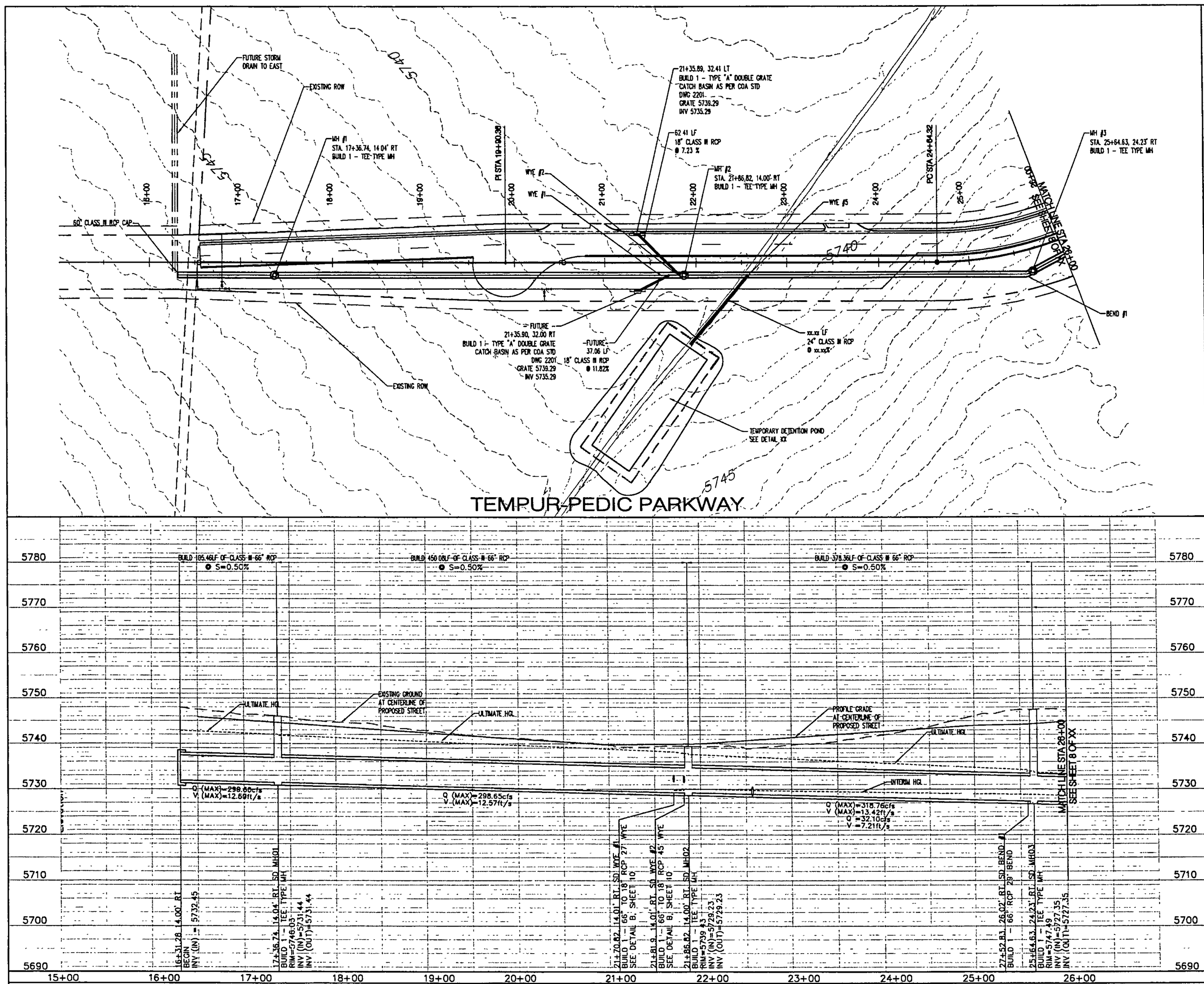
Sep 28, 2004 - 4:13pm

Bohannan ▲ Huston INC
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

| | | | |
|---|---|---|---|
| TEMPUR PEDIC PARKWAY STORM DRAIN SYSTEM | DRAWN BY: K.W.J. | DATE: 08.13.04 | DEVELOPED DRAINAGE BASIN MAP EXHIBIT 3 |
| | CHECKED BY: C.W.H. | ROW PROJECT NO. 050056.001.05 | |

# EXHIBIT 4

## PLAN AND PROFILE OF STORM DRAIN TRUNK LINE AND SWALE Sta. 15+00 – 26+00







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Oct 06, 2004 - 3:32pm

SCALE: 1"=50' (HORIZ.)
1"= 5' (VERT.)

KEYED NOTES

# EXHIBIT 4

SCALE: 1"=50'

**Bohannan ▲ Huston**

Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

**CITY OF ALBUQUERQUE**
**DEPARTMENT OF MUNICIPAL DEVELOPMENT**

TEMPUR-PEDIC PARKWAY
STORM DRAIN PLAN & PROFILE
TEMPUR-PEDIC PARKWAY STA 15+00 TO STA 26+00

| Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr | Mo./Day/Yr |
|---|---|---|---|---|
| | | | | |

| City Project No. | Zone Map No. | Sheet | Of |
|---|---|---|---|
| 727402 | K-5,K-6 | 10 | 22 |

BHI JOB NO. 050056

AS-BUILT INFORMATION
CONTRACTOR DATE
WORK STAKED BY DATE
WORK INSPECTED BY DATE
WORK ACCEPTED BY DATE
FIELD CALCULATION BY DATE
DRAWINGS CORRECTED BY DATE
MICRO-FILM INFORMATION
RECORDED BY DATE
NO

BENCH MARKS
NMSHC BRASS CAP STAMPED "1-40-27A"
GEOGRAPHIC POSITION (NAD 1927)
NM STATE PLANE COORDINATES (CENTRAL ZONE)
X = 340,973.50 Y = 1,450,546.11 (GRID)
GROUND TO GRID FACTOR = 0.999655608
DELTA ALPHA = -0°18'19"
NGVD 1929 ELEVATION = 5681.458

SURVEY INFORMATION
FIELD NOTES
NO. BY DATE

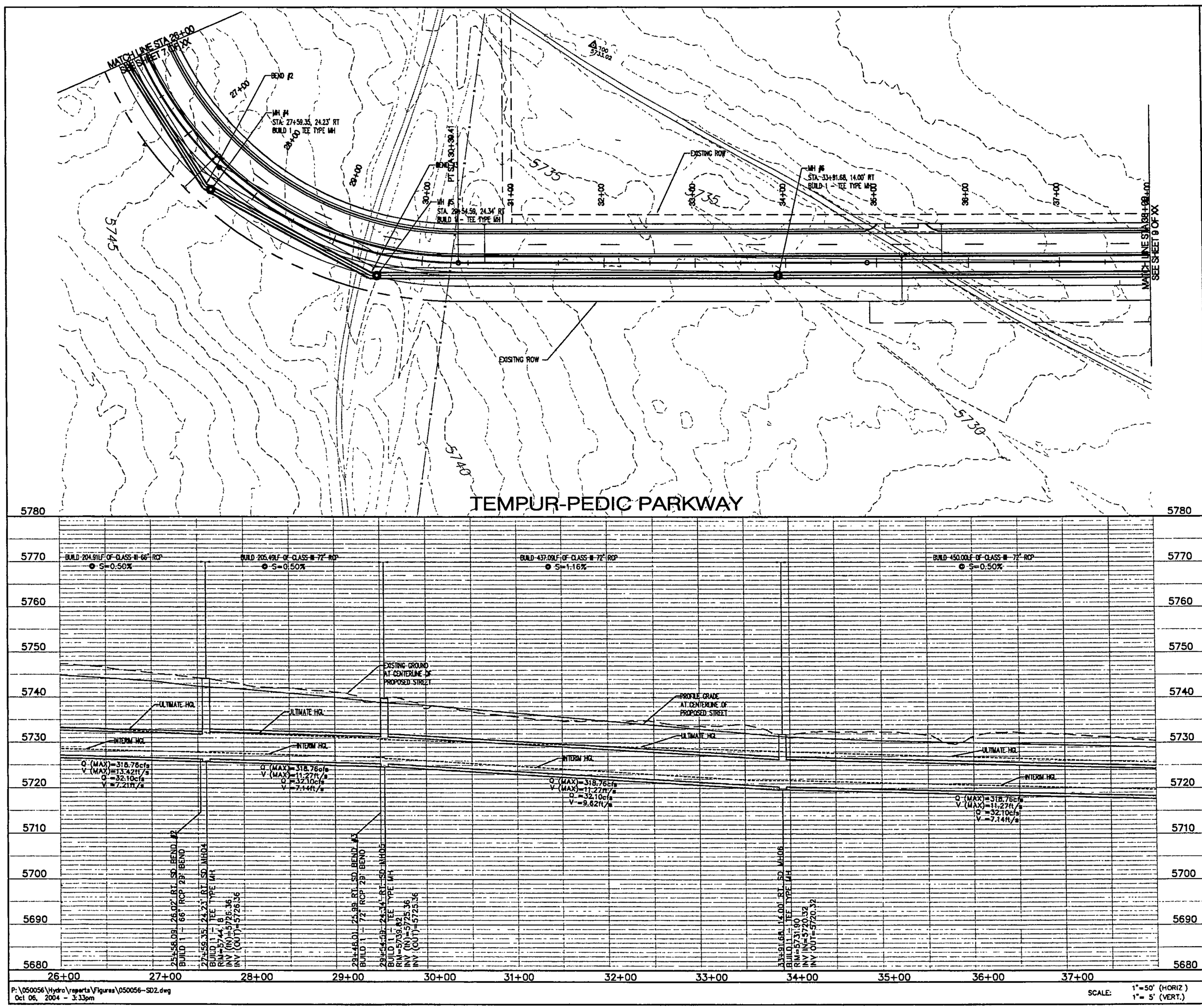
ENGINEER'S SEAL

| No. | Date | REMARKS | By |
|---|---|---|---|
| | | REVISIONS | |
| | | DESIGN | |

Designed By: KWJ DATE: AUG 2004
Drawn By: LAH DATE: AUG 2004
Checked By: CWH DATE: AUG 2004

# EXHIBIT 5

## PLAN AND PROFILE OF STORM DRAIN TRUNK LINE AND SWALE Sta. 26+00 – 38+00

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SCALE: 1"=50' (HORIZ.) 1"= 5' (VERT.)

KEYED NOTES

1

AS-BUILT INFORMATION
CONTRACTOR — DATE
WORK STAKED BY — DATE
INSPECTOR ACCEPTANCE BY — DATE
FIELD DRAWING BY — DATE
DRAWING REVISED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

BENCH MARKS
NMSHC BRASS CAP STAMPED "1-40-27A"
GEOGRAPHIC POSITION (NAD 1927)
NM STATE PLANE COORDINATES (CENTRAL ZONE)
X = 340,973.50 Y = 1,480,546.11 (GRID)
GROUND TO GRID FACTOR = 0.999655608
DELTA ALPHA = -0°16'19"
NGVD 1929 ELEVATION = 5681.458

SURVEY INFORMATION
FIELD NOTES

| NO. | BY | DATE |
|---|---|---|
| | | |

ENGINEER'S SEAL

| No. | Date | REMARKS | By |
|---|---|---|---|
| | | REVISIONS | |
| | | DESIGN | |

Designed By: KWJ DATE: AUG 2004
Drawn By: LAH DATE: AUG 2004
Checked By: CWH

# EXHIBIT 5

N

50 25 0 50
SCALE: 1"=50'

**Bohannan ▲ Huston**
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

**CITY OF ALBUQUERQUE**
**DEPARTMENT OF MUNICIPAL DEVELOPMENT**

TEMPUR-PEDIC PARKWAY
STORM DRAIN PLAN & PROFILE
TEMPUR-PEDIC PARKWAY STA 26+00 TO STA 38+00

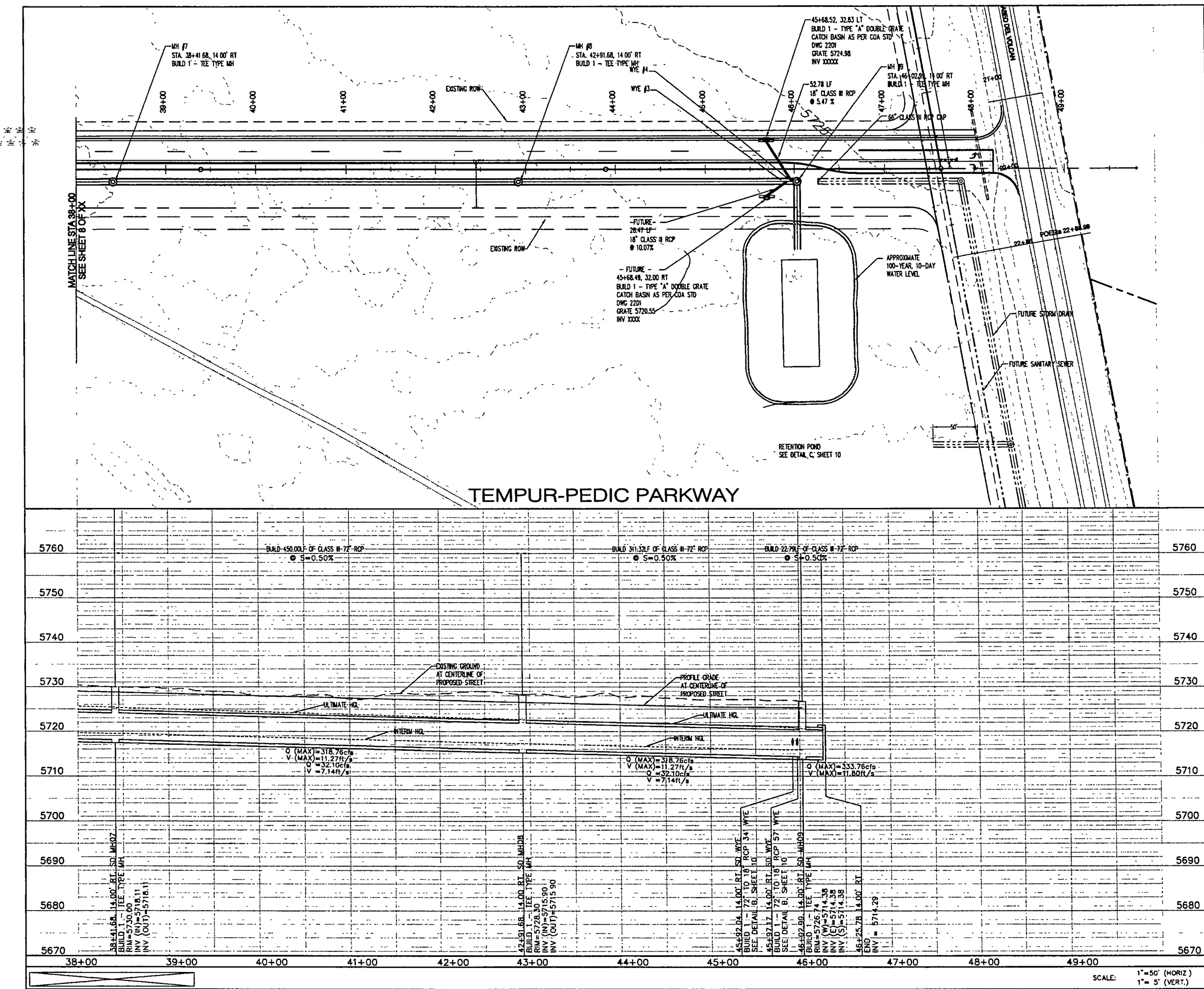
Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr. | Mo./Day/Yr.

| City Project No. | Zone Map No. | Sheet | Of |
|---|---|---|---|
| 727402 | K-5,K-6 | 11 | 22 |

BH JOB NO. 050056

# EXHIBIT 6

## PLAN AND PROFILE OF STORM DRAIN TRUNK LINE AND SWALE Sta. 38+00 – 50+00




KEYED NOTES

# EXHIBIT 6

SCALE: 1"=50'

**Bohannan ▲ Huston**

Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335

ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

**CITY OF ALBUQUERQUE**
**DEPARTMENT OF MUNICIPAL DEVELOPMENT**

TEMPUR-PEDIC PARKWAY
STORM DRAIN PLAN & PROFILE
TEMPUR-PEDIC PARKWAY STA 38+00 TO EOP

| Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr | Mo./Day/Yr |
|---|---|---|---|---|
| | | | | |

| City Project No. | Zone Map No | Sheet | Of |
|---|---|---|---|
| 727402 | K-5,K-6 | 12 | 22 |

BHI JOB NO. 050056

AS-BUILT INFORMATION
CONTRACTOR — DATE
STAKED BY — DATE
INSPECTOR'S ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE

MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

BENCH MARKS
NMSHC BRASS CAP STAMPED 7-40-27A"
GEOGRAPHIC POSITION (NAD 1927)
NM STATE PLANE COORDINATES (CENTRAL ZONE)
X = 340,973.50 Y = 1,480,546.11 (GRID)
GROUND TO GRID FACTOR = 0.999655608
DELTA ALPHA = -0°18'19"
NGVD 1929 ELEVATION = 5681.458

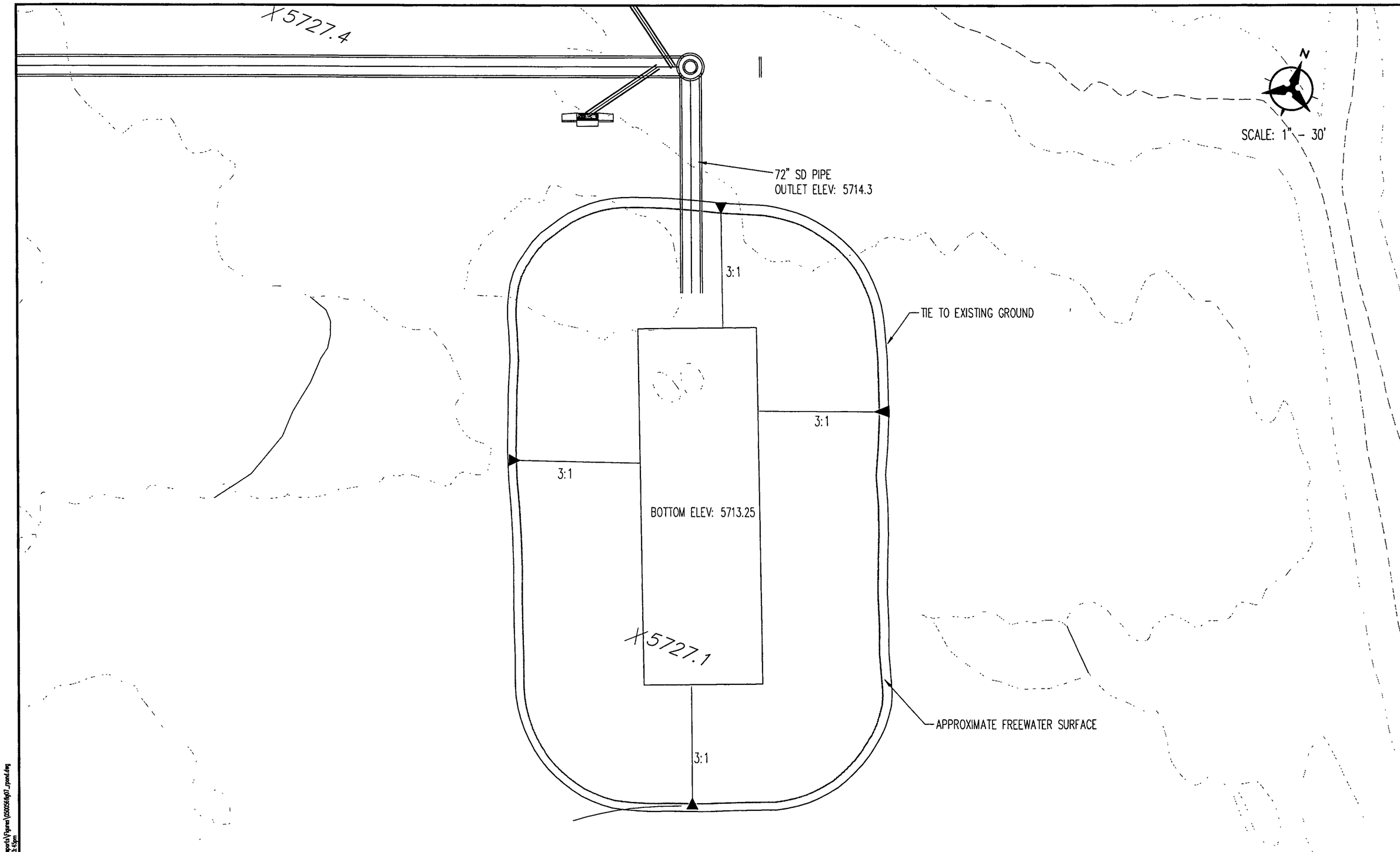
SURVEY INFORMATION
FIELD NOTES

| NO. | BY | DATE |
|---|---|---|
| | | |

ENGINEER'S SEAL

| No. | Date | REMARKS | By |
|---|---|---|---|
| | | REVISIONS | |
| | | DESIGN | |

Designed By: KWJ — DATE: AUG 2004
Drawn By: LAH & KWJ — DATE: AUG 2004
Checked By: CWH — DATE: AUG 2004

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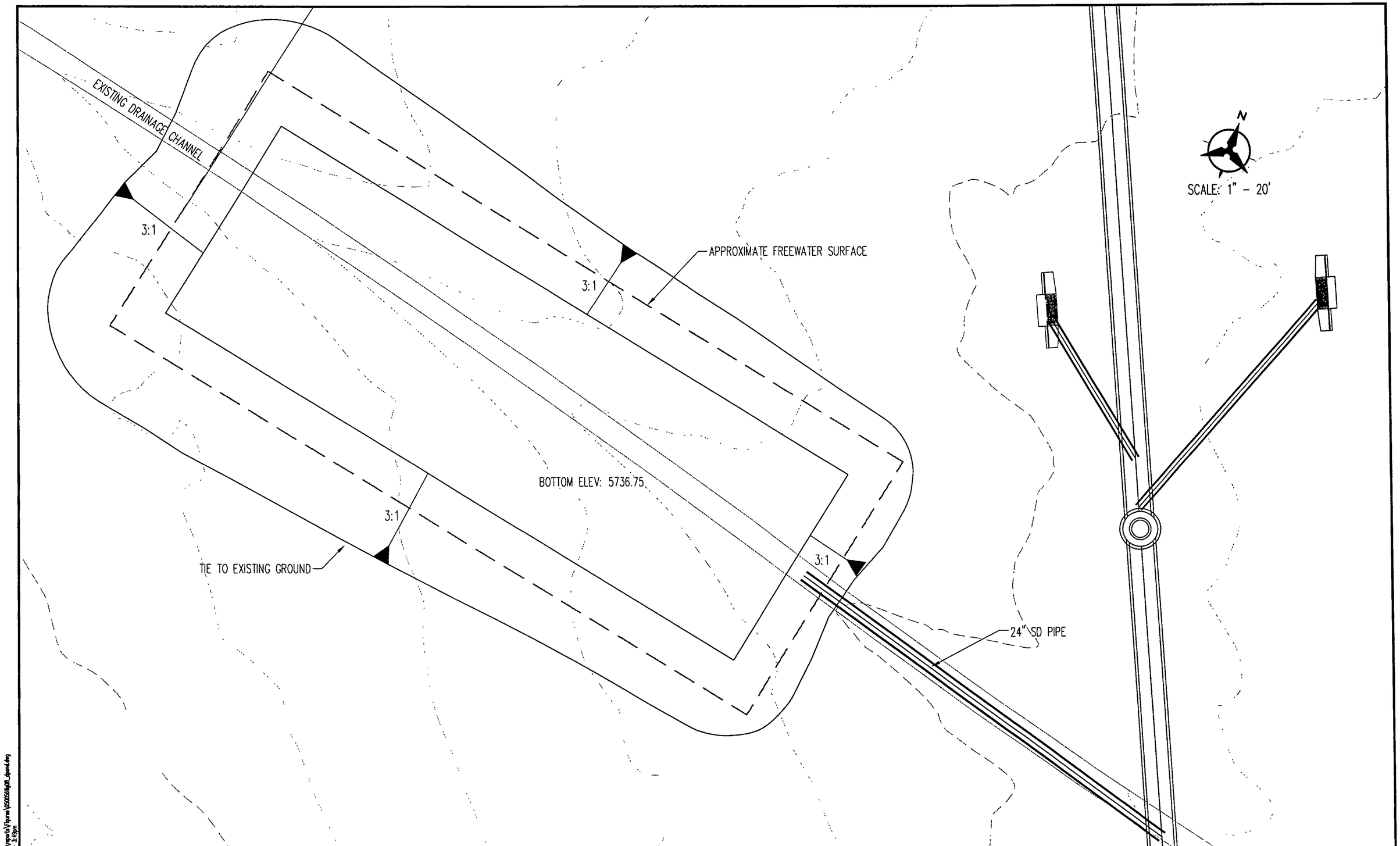
Oct 06, 2004 - 3:45pm

**Bohannan ▲ Huston INC**

Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

| PASEO DEL VULCON ACCESS ROAD STORM DRAIN SYSTEM | DRAWN BY: K.W.J. | DATE: 08.13.04 | TEMPORARY RETENTION POND EXHIBIT 7 |
|---|---|---|---|
| | CHECKED BY: C.W.H. | ROW PROJECT NO. 050056.001.05 | |




| | | | |
|---|---|---|---|
| PASEO DEL VULCON ACCESS ROAD<br>STORM DRAIN SYSTEM | DRAWN BY: K.W.J.<br>CHECKED BY: C.W.H. | DATE: 09.29.04<br>ROW PROJECT NO. 050056.001.05 | INTERIM DETENTION POND<br>EXHIBIT 8 |

Bohannan ▲ Huston INC.
Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109-4335
ENGINEERING ▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

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Oct 06, 2004 - 3:49pm