

ANGEL PARK MIDDLE BRANCH DRAINAGE STUDY



FINAL REPORT
HEC-RAS INPUT FILES
VOLUME 2

AUGUST 8, 2008



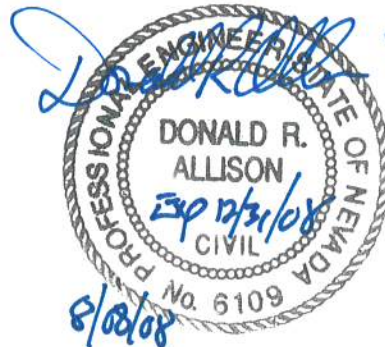
FINAL REPORT
HEC-RAS INPUT DATA
VOLUME 2

FOR

**ANGEL PARK MIDDLE BRANCH
DRAINAGE STUDY**

PREPARED FOR

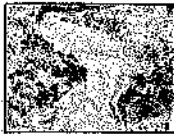
**CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS
City Hall, Fourth Floor
400 East Stewart Street
Las Vegas, Nevada 89101**



**PREPARED
AUGUST 8, 2008**

BY

**BUREAU VERITAS NORTH AMERICA, INC.
4840 West University Avenue, Suite A-1
Las Vegas, Nevada 89103**



ALTERNATIVE I

HEC-RAS Natural Channel Model Output for 4,000, 5,548 and 6,047 cfs

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```

X      X  XXXXXX   XXXX      XXXX      XX      XXXX
X      X  X        X      X      X      X      X
X      X  X        X      X      X      X      X
XXXXXXX XXXX      X      XXX XXXX XXXXXX XXXX
X      X  X        X      X      X      X      X
X      X  X        X      X      X      X      X
X      X  XXXXXX   XXXX      X      X      X      XXXXX

```

PROJECT DATA

Project Title: Angel Park Middle Branch Drainage Study
Project File : APHS_7_31_08.prj
Run Date and Time: 8/6/2008 1:11:41 PM

Project in English units

Project Description:

This is a steady state HEC-RAS simulation of the Angel Park Middle Branch Channel at Alta and Hualapai in the City of Las Vegas. The purpose of the model is to simulate various channel modifications for development immediately east of Hualapai adjacent the channel. The model is performed by BVNA for the City of Las Vegas.

PLAN DATA

Plan Title: Angel Park Middle Branch Drainage Study
Plan File : C:\Program Files\HEC\HEC-RAS\4.0\AP5\Natura12\APHS_7_31_08.p01

Geometry Title: Angel Park Hydrology Study

Geometry File : C:\Program

Files\HEC\HEC-RAS\4.0\AP5\Natura12\APHS_7_31_08.g01

Flow Title : Flow 19

Flow File : C:\Program

Files\HEC\HEC-RAS\4.0\AP5\Natura12\APHS_7_31_08.f19

Plan Summary Information:

Number of:	Cross Sections	=	32	Multiple Openings	=	0
	Culverts	=	1	Inline Structures	=	0
	Bridges	=	0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	=	0.1
Critical depth calculation tolerance	=	0.1
Maximum number of iterations	=	40
Maximum difference tolerance	=	1
Flow tolerance factor	=	0.05

Computation Options

Critical depth computed only where necessary

APHS_7_31_08.rep
 Conveyance Calculation Method: At breaks in n values only
 Friction Slope Method: Average Conveyance
 Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Flow 19
 Flow File : C:\Program Files\HEC\HEC-RAS\4.0\AP5\Natural2\APHS_7_31_08.f19
 Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
PF 3				
Angel Park Middl	0132 to 0030	-485	6047	5548
4000				

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
Angel Park Middl	0132 to 0030	PF 1	Normal S = 0.02
Normal S = 0.02			

GEOMETRY DATA

Geometry Title: Angel Park Hydrology Study
 Geometry File : C:\Program Files\HEC\HEC-RAS\4.0\AP5\Natural2\APHS_7_31_08.g01

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -485

INPUT

Description: X-Section -4+85

Station Elevation Data		num=	17								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-192	2900	-190	2895	-125	2890	-100	2885	-60	2885		
-40	2885	-23	2880	-15	2875	-10	2869	0	2869		
10	2869	20	2875	30	2880	40	2885	52	2890		
70	2895	80	2900								

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
-192	.035	-10	.025	10	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-10	10		110.01	110.01	.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -595

INPUT

Description: Station -5+95 - Upstream of 2-18' x 12
0' RCB, west side of
Hualapai

Station Elevation Data				num=	14				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-135	2905	-120	2900	-100	2885	-65	2881	-40	2881
-12.3	2879.5	-12.3	2867.5	0	2867.5	12.3	2867.5	12.3	2879.5
30	2885	40	2890	50	2895	60	2900		

Manning's n Values				num=	3				
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-135	.035	-12.3	.025	12.3	.035				

Bank Sta: Left		Right	Lengths: Left Channel		Right	Coeff Contr.	Expan.
-12.3	12.3		405	405	405	.3	.5

Ineffective Flow				num=	2				
Sta L	Sta R	Elev	Permanent						
-135	-12.3	2895	F						
12.3	60	2895	F						

CULVERT

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -900

INPUT

Description: 2, 12' x 10' RCB under Hualapai Way
Distance from Upstream XS = .1
Deck/Roadway Width = 399.8
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates

num=				14										
Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
-135	2895	2895	-120	2895	2895	-100	2895	2885		-12.3	2895	2875.5		
-65	2895	2881	-40	2895	2881	-12.3	2895	2867.5		12.3	2895	2867.5		
-12.3	2895	2867.5	0	2895	2867.5	30	2895	2879.5		40	2895	2885		
12.3	2895	2867.5	30	2895	2879.5	60	2895	2895						
50	2895	2890	60	2895	2895									

Upstream Bridge Cross Section Data

Station Elevation Data				num=	14				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-135	2905	-120	2900	-100	2885	-65	2881	-40	2881
-12.3	2879.5	-12.3	2867.5	0	2867.5	12.3	2867.5	12.3	2879.5
30	2885	40	2890	50	2895	60	2900		

Manning's n Values				num=	3				
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-135	.035	-12.3	.025	12.3	.035				

Bank Sta: Left		Right	Coeff Contr.	Expan.
-12.3	12.3		.3	.5

Ineffective Flow				num=	2				
Sta L	Sta R	Elev	Permanent						
-135	-12.3	2895	F						

12.3 60 2895

F

Downstream Deck/Roadway Coordinates

num=

7

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
-170		2897		2850	-12.3		2897		2850	-12.3		2897		2870
0		2897		2870	12.3		2897		2870	12.3		2897		2850
170		2897		2850										

Downstream Bridge Cross Section Data

Station Elevation Data

num=

15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-162	2895	-140	2890	-130	2885	-112	2880	-70	2875
-12.3	2872	-12.3	2860	0	2860	12.3	2860	12.3	2873
70	2875	92	2880	120	2885	140	2890	170	2895

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-162	.013	-12.3	.013	12.3	.013

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	-12.3	12.3		.3	.5

Ineffective Flow

num=

2

Sta L	Sta R	Elev	Permanent
-162	-12.3	2872	T
12.3	170	2872	T

Blocked Obstructions

num=

2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-162	-162	2890	170	170	2890

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
2	Box	10	12

FHWA Chart # 8 - flared wingwalls

FHWA Scale # 1 - wingwall flared 30 to 75 deg.

Solution Criteria = Outlet control

Culvert Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef
---------------------	--------	-------	----------	---------------	--------------------

Exit Loss Coef	0	400	.013	.013	0	.5
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Number of Barrels = 2

Upstream Elevation = 2867.5

Centerline Stations

Sta.	Sta.
-6.3	6.3

Downstream Elevation = 2860

Centerline Stations

Sta.	Sta.
-6.3	6.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -1005

INPUT

Description: X-Section -10+00 - 2-12' x 10' culvert, east side of Hualapai

Station		Elevation Data		num=	15	Sta		Elev		Sta		Elev	
-162	2895	-140	2890	-130	2885	-112	2880	-70	2875				
-12.3	2872	-12.3	2860	0	2860	12.3	2860	12.3	2873				
70	2875	92	2880	120	2885	140	2890	170	2895				

Manning's n Values		num=	3	Sta		n Val	
-162	.013	-12.3	.013	12.3	.013		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
-12.3	12.3	100	100	100	.3	.5		

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-162	-12.3	2872	T
12.3	170	2872	T

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
-162	-162	2890	170	170	2890

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -1100

INPUT

Description: X-Section -11+00

Station		Elevation Data		num=	18	Sta		Elev		Sta		Elev	
-140	2890	-120	2885	-110	2880	-90	2875	-60	2870				
-36	2865	-18	2860	-12	2855	0	2855	10	2855				
20	2860	40	2865	64	2870	80	2875	100	2880				
124	2885	140	2890	180	2895								

Manning's n Values		num=	3	Sta		n Val	
-140	.035	-12	.025	10	.035		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
-12	10	100	100	100	.1	.3		

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -1200

INPUT

Description: X-Section -12+00

Station		Elevation Data		num=	18	Sta		Elev		Sta		Elev	
-190	2890	-160	2885	-134	2880	-110	2875	-90	2870				
-70	2865	-40	2860	-10	2855	0	2853	12	2854				
16	2855	40	2860	52	2865	68	2870	84	2875				
104	2880	120	2885	144	2890								

Manning's n Values		num=	3	Sta		n Val	
-190	.035	-160	.025	10	.035		

-190 .035 -10 .025 12 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -10 12 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1300

INPUT

Description: X-Section -13+00

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-110	2885	-90	2880	-70	2875	-50	2870	-30	2865
-20	2860	-19	2852	0	2851	22	2852	40	2855
60	2860	70	2865	80	2870	88	2875	100	2880
120	2885								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-110	.035	-19	.025	22	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -19 22 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1400

INPUT

Description: X-Section -14+00

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-110	2875	-88	2870	-70	2865	-52	2860	-40	2855
-20	2850	0	2850	36	2850	52	2855	70	2860
78	2865	88	2870	100	2875	110	2880	130	2885

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-110	.035	-20	.025	36	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -20 36 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1500

INPUT

Description: X-Section -15+00

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-140	2871	-120	2870	-104	2870	-76	2865	-60	2860
-50	2855	-30	2850	-22	2848	0	2848	26	2848
40	2850	50	2855	72	2860	96	2865	110	2870
128	2875	162	2880						

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-140	.035	-22	.025	26	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-22	26		100	100	.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -1600

INPUT

Description: X-Section -16+00

Station Elevation Data

num=

14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-110	2860	-92	2860	-54	2855	-40	2850	-25	2846
0	2846	30	2846	42	2850	52	2855	81	2860
108	2865	120	2870	130	2875	160	2880		

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-110	.035	-25	.025	30	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-25	30		100	100	.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -1700

INPUT

Description: X-Section -17+00

Station Elevation Data

num=

19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-220	2880	-184	2875	-160	2870	-150	2865	-132	2860
-114	2855	-80	2855	-30	2845	-20	2844	0	2844
20	2844	30	2845	50	2850	80	2855	100	2860
120	2865	130	2870	150	2875	290	2880		

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-220	.035	-20	.025	20	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-20	20		100	100	.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -1800

INPUT

Description: X-Section -18+00

Station Elevation Data

num=

16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-132	2875	-124	2870	-116	2865	-108	2860	-92	2855
-80	2850	-14	2845	0	2845	20	2844	30	2845
50	2850	80	2855	100	2860	120	2865	130	2870

150 2875

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -132 .035 -14 .025 20 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -14 20 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1900

INPUT

Description: X-Section -19+00

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-144	2870	-130	2865	-116	2860	-100	2855	-84	2850
-70	2845	-41	2840	0	2840	40	2840	60	2845
80	2850	104	2855	124	2860	140	2865	160	2870
180	2875								

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -144 .035 -41 .025 40 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -41 40 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2000

INPUT

Description: X-Section -20+00

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	2870	-160	2865	-140	2860	-112	2855	-94	2850
-76	2845	-60	2840	0	2840	40	2840	60	2845
84	2850	110	2855	160	2865				

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -200 .035 -60 .025 40 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -60 40 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2100

INPUT

Description: X-Section -21+00

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-190	2865	-160	2860	-132	2855	-110	2850	-94	2845

-80	2840	-30	2837	0	2837	36	2837	50	2840
68	2845	90	2850	112	2855	130	2860	150	2865
170	2870								

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
-190 .035	-30 .025	36 .035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
-30	36	100	100	100	.1		.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2200

INPUT

Description: X-Section -22+00

Station Elevation Data	num=	13
Sta Elev	Sta Elev	Sta Elev
-150 2860	-124 2855	-100 2850
-36 2835	0 2835	35 2840
140 2850	164 2855	200 2860

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
-150 .035	-36 .025	35 .035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
-36	35	110	100	90	.1		.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2300

INPUT

Description: X-Section -23+00

Station Elevation Data	num=	15
Sta Elev	Sta Elev	Sta Elev
-172 2860	-100 2855	-64 2850
-30 2835	-14 2832	0 2832
112 2840	130 2845	160 2850

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
-172 .035	-14 .025	24 .035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
-14	24	110	100	90	.1		.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2400

INPUT

Description: X-Section -24+00

Station Elevation Data	num=	17
Sta Elev	Sta Elev	Sta Elev

APHS_7_31_08.rep

-132	2855	-96	2850	-64	2845	-40	2840	-20	2835
-10	2830	0	2830	10	2830	20	2830	50	2831
70	2831	110	2835	124	2840	150	2845	172	2850
196	2855	230	2860						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-132	.035	-10	.025	10	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

-10	10	100	100	100	.1	.3
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CROSS SECTION

RIVER: Angel Park Middl
REACH: 0132 to 0030 RS: -2500

INPUT

Description: X-Section -25+00

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-140	2845	-110	2840	-72	2835	-60	2830	0	2828
30	2830	66	2832	76	2835	108	2840	112	2845
168	2850	190	2855						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-140	.035	-60	.025	30	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

-60	30	90	100	110	.1	.3
-----	----	----	-----	-----	----	----

CROSS SECTION

RIVER: Angel Park Middl
REACH: 0132 to 0030 RS: -2600

INPUT

Description: X-Section -26+00

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-174	2850	-136	2845	-110	2840	-80	2835	-56	2830
0	2825	16	2825	76	2830	90	2835	128	2840
150	2845	180	2850	200	2855				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-174	.035	-56	.025	16	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

-56	16	90	100	110	.1	.3
-----	----	----	-----	-----	----	----

CROSS SECTION

RIVER: Angel Park Middl
REACH: 0132 to 0030 RS: -2700

INPUT

Description: X-Section -27+00

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-214	2855	-184	2850	-154	2845	-130	2840	-94	2835
-66	2830	-30	2825	0	2825	38	2825	70	2825
100	2830	110	2835	120	2840	130	2845	140	2850

Manning's n Values
 Sta n Val Sta n Val Sta n Val
 -214 .035 -30 .025 38 .035

Bank Sta: Left Right Lengths: Left Channel Right
 -30 38 100 100 100
 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2800

INPUT

Description: X-Section -28+00

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-222	2855	-190	2850	-170	2845	-146	2840	-120	2835
-90	2830	-70	2825	0	2823	60	2825	70	2830
80	2835	88	2840	100	2845	130	2850		

Manning's n Values
 Sta n Val Sta n Val Sta n Val
 -222 .035 -70 .025 60 .035

Bank Sta: Left Right Lengths: Left Channel Right
 -70 60 100 100 100
 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2900

INPUT

Description: X-Section 29+00

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-170	2850	-150	2845	-130	2840	-110	2835	-90	2830
-70	2825	-20	2820	-14	2820	0	2820	20	2820
40	2825	60	2830	80	2835	110	2840	134	2845

Manning's n Values
 Sta n Val Sta n Val Sta n Val
 -170 .035 -14 .025 20 .035

Bank Sta: Left Right Lengths: Left Channel Right
 -14 20 100 100 100
 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3000

INPUT

Description: X-Section -30+00

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-140	2845	-130	2840	-110	2835	-90	2830	-64	2825
-40	2820	-10	2815	0	2815	14	2815	30	2820
70	2825	100	2830	130	2835				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-140	.035	-10	.025	14	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
-10	14	110	100	90	.1	.3	

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3100

INPUT

Description: X-Section -30+00

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-154	2845	-132	2840	-116	2835	-100	2830	-80	2825
-60	2820	-20	2815	0	2813	15	2813	20	2815
40	2820	88	2825	124	2830	160	2835	196	2840

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-154	.035	-20	.025	15	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
-20	15	100	100	100	.1	.3	

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3200

INPUT

Description: X-Section -32+00

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	2840	-178	2835	-150	2830	-120	2825	-80	2820
-40	2815	-10	2811	0	2810	10	2810	30	2815
60	2820	94	2825	120	2830	144	2835	170	2840

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.035	-10	.025	10	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
-10	10	100	100	100	.1	.3	

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3300

INPUT

Description: X-Section -33+00

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-160	2840	-130	2835	-116	2830	-100	2825	-80	2820
-60	2815	-20	2810	0	2808	12	2810	30	2815
90	2820	120	2825	160	2830	176	2835		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-160	.035	-20	.025	12	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
-20	12	100	100	100	.1	.3	

CROSS SECTION

RIVER: Angel Park Middl
REACH: 0132 to 0030 RS: -3400

INPUT

Description: X-Section 34+00

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-262	2835	-240	2830	-210	2825	-176	2820	-148	2815
-100	2810	0	2807	38	2807	40	2810	50	2815
60	2820	76	2825	90	2830	100	2835		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-262	.035	-100	.025	38	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
-100	38	100	100	100	.1	.3	

CROSS SECTION

RIVER: Angel Park Middl
REACH: 0132 to 0030 RS: -3500

INPUT

Description: X-Section 35+00

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-240	2835	-230	2830	-200	2825	-170	2820	-140	2815
-105	2810	0	2805	10	2805	15	2810	30	2815
50	2820	80	2825	160	2830				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-240	.035	-105	.025	10	.02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
-105	10	105	100	90	.1	.3	

CROSS SECTION

RIVER: Angel Park Middl
REACH: 0132 to 0030 RS: -3600

INPUT

Description: X-Section 36+00

Station Elevation Data num= 12

APHS_7_31_08.rep

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-150	2830	-130	2825	-110	2820	-90	2815	-55	2810
-40	2805	0	2802	30	2803	30	2808	64	2810
100	2815	180	2819						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-150	.035	-40	.025	30	.02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
-40	30	100	100	100	.1		.3

CROSS SECTION

RIVER: Angel Park Middl
REACH: 0132 to 0030 RS: -3700

INPUT

Description: X-Section 37+00

Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-100	2825	-90	2820	-70	2815	-60	2810	-50	2805
-40	2802	-15	2800	0	2798	30	2800	30	2809

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-100	.035	-40	.025	30	.02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
-40	30	100	100	100	.1		.3

CROSS SECTION

RIVER: Angel Park Middl
REACH: 0132 to 0030 RS: -3800

INPUT

Description: X-Section 38+00

Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-100	2825	-90	2820	-70	2815	-60	2810	-50	2805
-40	2802	-15	2800	0	2797	30	2800	30	2809

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-100	.035	-40	.025	30	.02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
-40	30	120	100	60	.1		.3

CROSS SECTION

RIVER: Angel Park Middl
REACH: 0132 to 0030 RS: -3900

INPUT

Description: X-Section 39+00

Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-60	2807	-40	2805	-10	2800	-5	2796
						0	2796

60 2796 70 2809

Manning's n Values
 Sta n Val Sta n Val Sta n Val
 -60 .035 -5 .025 60 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -5 60 110 100 60 .1 .3

SUMMARY OF MANNING'S N VALUES

River: Angel Park Middl

Reach	River Sta.	n1	n2	n3
0132 to 0030	-485	.035	.025	.035
0132 to 0030	-595	.035	.025	.035
0132 to 0030	-900	culvert		
0132 to 0030	-1005	.013	.013	.013
0132 to 0030	-1100	.035	.025	.035
0132 to 0030	-1200	.035	.025	.035
0132 to 0030	-1300	.035	.025	.035
0132 to 0030	-1400	.035	.025	.035
0132 to 0030	-1500	.035	.025	.035
0132 to 0030	-1600	.035	.025	.035
0132 to 0030	-1700	.035	.025	.035
0132 to 0030	-1800	.035	.025	.035
0132 to 0030	-1900	.035	.025	.035
0132 to 0030	-2000	.035	.025	.035
0132 to 0030	-2100	.035	.025	.035
0132 to 0030	-2200	.035	.025	.035
0132 to 0030	-2300	.035	.025	.035
0132 to 0030	-2400	.035	.025	.035
0132 to 0030	-2500	.035	.025	.035
0132 to 0030	-2600	.035	.025	.035
0132 to 0030	-2700	.035	.025	.035
0132 to 0030	-2800	.035	.025	.035
0132 to 0030	-2900	.035	.025	.035
0132 to 0030	-3000	.035	.025	.035
0132 to 0030	-3100	.035	.025	.035
0132 to 0030	-3200	.035	.025	.035
0132 to 0030	-3300	.035	.025	.035
0132 to 0030	-3400	.035	.025	.035
0132 to 0030	-3500	.035	.025	.02
0132 to 0030	-3600	.035	.025	.02
0132 to 0030	-3700	.035	.025	.02
0132 to 0030	-3800	.035	.025	.02
0132 to 0030	-3900	.035	.025	.02

SUMMARY OF REACH LENGTHS

River: Angel Park Middl

Reach	River Sta.	Left	Channel	Right
0132 to 0030	-485	110.01	110.01	110.01
0132 to 0030	-595	405	405	405
0132 to 0030	-900	culvert		

APHS_7_31_08.rep

0132 to 0030	-1005	100	100	100
0132 to 0030	-1100	100	100	100
0132 to 0030	-1200	100	100	100
0132 to 0030	-1300	100	100	100
0132 to 0030	-1400	100	100	100
0132 to 0030	-1500	100	100	100
0132 to 0030	-1600	100	100	100
0132 to 0030	-1700	100	100	100
0132 to 0030	-1800	100	100	100
0132 to 0030	-1900	100	100	100
0132 to 0030	-2000	100	100	100
0132 to 0030	-2100	100	100	100
0132 to 0030	-2200	110	100	90
0132 to 0030	-2300	110	100	90
0132 to 0030	-2400	100	100	100
0132 to 0030	-2500	90	100	110
0132 to 0030	-2600	90	100	110
0132 to 0030	-2700	100	100	100
0132 to 0030	-2800	100	100	100
0132 to 0030	-2900	100	100	100
0132 to 0030	-3000	110	100	90
0132 to 0030	-3100	100	100	100
0132 to 0030	-3200	100	100	100
0132 to 0030	-3300	100	100	100
0132 to 0030	-3400	100	100	100
0132 to 0030	-3500	105	100	90
0132 to 0030	-3600	100	100	100
0132 to 0030	-3700	100	100	100
0132 to 0030	-3800	120	100	60
0132 to 0030	-3900	110	100	60

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Angel Park Middl

Reach	River Sta.	Contr.	Expan.
0132 to 0030	-485	.1	.3
0132 to 0030	-595	.3	.5
0132 to 0030	-900	culvert	
0132 to 0030	-1005		
0132 to 0030	-1100	.3	.5
0132 to 0030	-1200	.1	.3
0132 to 0030	-1300	.1	.3
0132 to 0030	-1400	.1	.3
0132 to 0030	-1500	.1	.3
0132 to 0030	-1600	.1	.3
0132 to 0030	-1700	.1	.3
0132 to 0030	-1800	.1	.3
0132 to 0030	-1900	.1	.3
0132 to 0030	-2000	.1	.3
0132 to 0030	-2100	.1	.3
0132 to 0030	-2200	.1	.3
0132 to 0030	-2300	.1	.3
0132 to 0030	-2400	.1	.3
0132 to 0030	-2500	.1	.3
0132 to 0030	-2600	.1	.3
0132 to 0030	-2700	.1	.3
0132 to 0030	-2800	.1	.3
0132 to 0030	-2900	.1	.3

0132 to 0030	-3000	.1	.3
0132 to 0030	-3100	.1	.3
0132 to 0030	-3200	.1	.3
0132 to 0030	-3300	.1	.3
0132 to 0030	-3400	.1	.3
0132 to 0030	-3500	.1	.3
0132 to 0030	-3600	.1	.3
0132 to 0030	-3700	.1	.3
0132 to 0030	-3800	.1	.3
0132 to 0030	-3900	.1	.3

Profile Output Table - Standard Table 1

Reach E.G. Elev (ft)	River Sta E.G. Slope (ft/ft)	Profile Vel Chn] (ft/s)	Q Total Flow Area (cfs) (sq ft)	Min Ch El Top Width (ft)	W.S. Elev Froude # Chl (ft)	Crit W.S. (ft)
0132 to 0030	-485	PF 1	6047.00	2869.00	2892.12	2881.22
2892.47	0.000174	6.37	1922.98	212.23	0.23	
0132 to 0030	-485	PF 2	5548.00	2869.00	2889.63	2880.59
2890.13	0.000270	7.34	1445.38	174.28	0.28	
0132 to 0030	-485	PF 3	4000.00	2869.00	2883.13	2878.64
2884.37	0.000868	10.24	577.40	69.91	0.48	
0132 to 0030	-595	PF 1	6047.00	2867.50	2890.52	2879.84
2892.29	0.001223	10.68	566.16	148.38	0.39	
0132 to 0030	-595	PF 2	5548.00	2867.50	2888.08	2879.10
2889.95	0.001494	10.96	506.31	140.27	0.43	
0132 to 0030	-595	PF 3	4000.00	2867.50	2882.28	2876.93
2884.16	0.002343	11.00	363.52	97.41	0.50	
0132 to 0030	-900		Culvert			
0132 to 0030	-1005	PF 1	6047.00	2860.00	2875.68	2875.68
2877.83	0.000816	12.82	611.36	148.70	0.57	
0132 to 0030	-1005	PF 2	5548.00	2860.00	2871.52	2871.52
2877.47	0.002724	19.58	283.29	24.60	1.02	
0132 to 0030	-1005	PF 3	4000.00	2860.00	2865.89	2869.34
2877.73	0.009249	27.62	144.84	24.60	2.01	
0132 to 0030	-1100	PF 1	6047.00	2855.00	2862.37	2866.20
2874.58	0.018444	30.56	261.12	55.97	1.98	
0132 to 0030	-1100	PF 2	5548.00	2855.00	2861.75	2865.67
2874.79	0.021721	31.28	228.00	51.28	2.12	
0132 to 0030	-1100	PF 3	4000.00	2855.00	2859.82	2864.00
2875.05	0.038071	33.08	143.10	37.41	2.66	
0132 to 0030	-1200	PF 1	6047.00	2853.00	2859.59	2862.96
2872.31	0.029555	32.99	263.21	75.59	2.40	
0132 to 0030	-1200	PF 2	5548.00	2853.00	2859.27	2862.59
2872.06	0.031461	32.78	239.50	72.12	2.45	
0132 to 0030	-1200	PF 3	4000.00	2853.00	2858.28	2861.38
2870.44	0.036780	31.06	173.05	61.37	2.57	

0132 to 0030	-1300	PF 1	6047.00	2851.00	2855.89	2859.33
2869.09	0.036413	30.37	225.41	63.04	2.56	
0132 to 0030	-1300	PF 2	5548.00	2851.00	2855.61	2858.98
2868.57	0.038818	30.01	207.93	61.88	2.61	
0132 to 0030	-1300	PF 3	4000.00	2851.00	2854.78	2857.65
2866.17	0.045242	27.86	157.88	58.00	2.71	
0132 to 0030	-1400	PF 1	6047.00	2850.00	2853.54	2856.47
2864.60	0.040275	27.72	243.52	81.50	2.60	
0132 to 0030	-1400	PF 2	5548.00	2850.00	2853.36	2856.16
2863.85	0.040920	26.96	228.58	80.17	2.59	
0132 to 0030	-1400	PF 3	4000.00	2850.00	2852.79	2855.04
2861.02	0.040581	23.73	184.28	76.09	2.50	
0132 to 0030	-1500	PF 1	6047.00	2848.00	2852.19	2854.68
2860.62	0.026099	24.96	285.70	83.14	2.15	
0132 to 0030	-1500	PF 2	5548.00	2848.00	2852.01	2854.34
2859.88	0.025743	24.07	270.74	82.05	2.12	
0132 to 0030	-1500	PF 3	4000.00	2848.00	2851.43	2853.20
2857.31	0.023363	20.67	224.33	78.59	1.97	
0132 to 0030	-1600	PF 1	6047.00	2846.00	2850.22	2852.54
2858.00	0.022628	23.36	292.46	83.07	2.00	
0132 to 0030	-1600	PF 2	5548.00	2846.00	2850.01	2852.23
2857.39	0.022935	22.72	274.74	82.04	2.00	
0132 to 0030	-1600	PF 3	4000.00	2846.00	2849.39	2851.09
2854.99	0.021523	19.67	225.13	77.87	1.88	
0132 to 0030	-1700	PF 1	6047.00	2844.00	2848.59	2850.77
2855.66	0.021297	23.96	323.36	92.31	1.97	
0132 to 0030	-1700	PF 2	5548.00	2844.00	2848.39	2850.43
2855.04	0.021135	23.16	305.06	90.50	1.95	
0132 to 0030	-1700	PF 3	4000.00	2844.00	2851.15	2849.34
2852.15	0.001775	9.30	590.89	117.68	0.61	
0132 to 0030	-1800	PF 1	6047.00	2844.00	2851.19	2851.19
2853.37	0.005081	14.73	610.98	140.02	1.02	
0132 to 0030	-1800	PF 2	5548.00	2844.00	2850.72	2850.97
2853.03	0.005858	15.04	545.94	136.06	1.08	
0132 to 0030	-1800	PF 3	4000.00	2844.00	2850.05	2850.05
2851.79	0.004981	12.82	456.99	130.45	0.98	
0132 to 0030	-1900	PF 1	6047.00	2840.00	2842.83	2845.21
2851.63	0.042477	24.51	268.54	108.74	2.57	
0132 to 0030	-1900	PF 2	5548.00	2840.00	2842.65	2844.94
2851.19	0.044708	24.09	249.49	107.01	2.61	
0132 to 0030	-1900	PF 3	4000.00	2840.00	2842.03	2844.00
2849.98	0.058996	23.12	184.23	100.86	2.86	
0132 to 0030	-2000	PF 1	6047.00	2840.00	2843.32	2844.68
2847.79	0.017177	17.32	371.27	123.88	1.68	
0132 to 0030	-2000	PF 2	5548.00	2840.00	2843.17	2844.42
2847.31	0.016856	16.66	353.38	122.84	1.65	
0132 to 0030	-2000	PF 3	4000.00	2840.00	2842.64	2843.58

APHS_7_31_08.rep						
2845.82	0.016435	14.55	288.96	119.00	1.58	
0132 to 0030	-2100	PF 1	6047.00	2837.00	2840.59	2842.15
2845.79	0.020595	20.02	372.41	133.80	1.86	
0132 to 0030	-2100	PF 2	5548.00	2837.00	2840.44	2841.91
2845.35	0.020535	19.40	351.62	132.81	1.84	
0132 to 0030	-2100	PF 3	4000.00	2837.00	2839.90	2841.11
2843.88	0.020307	17.24	281.66	127.96	1.78	
0132 to 0030	-2200	PF 1	6047.00	2835.00	2841.13	2841.77
2843.98	0.007209	14.51	507.58	156.67	1.16	
0132 to 0030	-2200	PF 2	5548.00	2835.00	2840.98	2841.52
2843.60	0.006869	13.86	483.28	154.92	1.12	
0132 to 0030	-2200	PF 3	4000.00	2835.00	2840.40	2840.59
2842.31	0.005834	11.71	395.26	148.42	1.01	
0132 to 0030	-2300	PF 1	6047.00	2832.00	2836.16	2838.00
2842.37	0.023812	23.71	354.71	119.71	2.05	
0132 to 0030	-2300	PF 2	5548.00	2832.00	2835.92	2837.74
2842.11	0.025366	23.54	326.80	117.73	2.09	
0132 to 0030	-2300	PF 3	4000.00	2832.00	2835.24	2836.85
2840.92	0.028894	22.11	248.34	111.99	2.17	
0132 to 0030	-2400	PF 1	6047.00	2830.00	2834.14	2835.87
2839.68	0.027633	25.49	363.15	119.73	2.21	
0132 to 0030	-2400	PF 2	5548.00	2830.00	2833.95	2835.60
2839.28	0.028196	24.92	339.68	117.36	2.21	
0132 to 0030	-2400	PF 3	4000.00	2830.00	2833.32	2834.65
2837.77	0.029040	22.53	268.30	109.81	2.18	
0132 to 0030	-2500	PF 1	6047.00	2828.00	2832.48	2833.89
2837.19	0.017378	17.97	373.85	133.54	1.70	
0132 to 0030	-2500	PF 2	5548.00	2828.00	2832.32	2833.64
2836.77	0.017408	17.42	352.25	132.60	1.69	
0132 to 0030	-2500	PF 3	4000.00	2828.00	2831.77	2832.85
2835.31	0.017218	15.38	281.50	126.15	1.63	
0132 to 0030	-2600	PF 1	6047.00	2825.00	2829.91	2831.42
2834.94	0.025836	19.88	358.74	130.01	2.02	
0132 to 0030	-2600	PF 2	5548.00	2825.00	2829.74	2831.16
2834.55	0.025716	19.43	336.59	125.99	2.00	
0132 to 0030	-2600	PF 3	4000.00	2825.00	2829.15	2830.40
2833.17	0.024893	17.71	265.68	112.18	1.93	
0132 to 0030	-2700	PF 1	6047.00	2825.00	2828.36	2829.60
2832.41	0.018459	18.11	410.46	144.35	1.74	
0132 to 0030	-2700	PF 2	5548.00	2825.00	2828.23	2829.36
2831.95	0.017785	17.33	392.27	142.67	1.70	
0132 to 0030	-2700	PF 3	4000.00	2825.00	2827.66	2828.56
2830.65	0.018284	15.43	312.62	135.10	1.67	
0132 to 0030	-2800	PF 1	6047.00	2823.00	2826.99	2828.06
2830.64	0.015598	15.40	400.58	141.94	1.57	
0132 to 0030	-2800	PF 2	5548.00	2823.00	2826.85	2827.83
2830.25	0.015482	14.85	380.44	141.09	1.55	

APHS_7_31_08.rep

0132 to 0030	-2800	PF 3	4000.00	2823.00	2826.36	2827.10
2828.96	0.015252	12.99	311.76	138.13	1.49	
0132 to 0030	-2900	PF 1	6047.00	2820.00	2825.82	2826.76
2829.48	0.009146	18.40	468.13	116.58	1.34	
0132 to 0030	-2900	PF 2	5548.00	2820.00	2825.53	2826.47
2829.11	0.009467	18.09	434.90	114.27	1.36	
0132 to 0030	-2900	PF 3	4000.00	2820.00	2824.69	2825.51
2827.69	0.009584	16.30	341.49	105.65	1.33	
0132 to 0030	-3000	PF 1	6047.00	2815.00	2821.65	2823.78
2828.15	0.013362	24.30	368.05	91.14	1.66	
0132 to 0030	-3000	PF 2	5548.00	2815.00	2821.33	2823.42
2827.69	0.013767	23.87	339.51	87.04	1.67	
0132 to 0030	-3000	PF 3	4000.00	2815.00	2820.12	2822.13
2826.20	0.016639	22.76	243.12	71.47	1.77	
0132 to 0030	-3100	PF 1	6047.00	2813.00	2819.26	2821.62
2826.52	0.015911	23.85	334.49	91.15	1.76	
0132 to 0030	-3100	PF 2	5548.00	2813.00	2818.95	2821.26
2826.12	0.016741	23.56	306.48	87.38	1.79	
0132 to 0030	-3100	PF 3	4000.00	2813.00	2817.98	2819.95
2824.41	0.018769	21.85	227.37	75.74	1.83	
0132 to 0030	-3200	PF 1	6047.00	2810.00	2816.64	2819.21
2824.73	0.018808	28.02	338.57	92.95	1.95	
0132 to 0030	-3200	PF 2	5548.00	2810.00	2816.35	2818.85
2824.28	0.019258	27.50	312.64	88.96	1.96	
0132 to 0030	-3200	PF 3	4000.00	2810.00	2815.41	2817.64
2822.45	0.020285	25.22	234.61	75.69	1.96	
0132 to 0030	-3300	PF 1	6047.00	2808.00	2814.79	2817.41
2822.97	0.017828	25.44	318.21	87.54	1.86	
0132 to 0030	-3300	PF 2	5548.00	2808.00	2814.56	2817.06
2822.31	0.017622	24.63	298.61	84.91	1.84	
0132 to 0030	-3300	PF 3	4000.00	2808.00	2813.63	2815.79
2820.44	0.018936	22.59	224.38	74.08	1.85	
0132 to 0030	-3400	PF 1	6047.00	2807.00	2809.83	2812.00
2819.53	0.080055	25.05	242.98	134.04	3.27	
0132 to 0030	-3400	PF 2	5548.00	2807.00	2809.72	2811.77
2818.92	0.079134	24.38	229.03	130.45	3.24	
0132 to 0030	-3400	PF 3	4000.00	2807.00	2809.33	2811.06
2816.97	0.077884	22.21	181.21	117.33	3.14	
0132 to 0030	-3500	PF 1	6047.00	2805.00	2810.32	2811.64
2814.62	0.017924	16.69	364.43	123.24	1.69	
0132 to 0030	-3500	PF 2	5548.00	2805.00	2810.20	2811.37
2814.13	0.017345	15.97	349.05	121.99	1.65	
0132 to 0030	-3500	PF 3	4000.00	2805.00	2809.71	2810.53
2812.64	0.015219	13.76	291.45	113.68	1.51	
0132 to 0030	-3600	PF 1	6047.00	2802.00	2807.69	2809.43
2812.96	0.013791	18.51	334.04	78.07	1.52	
0132 to 0030	-3600	PF 2	5548.00	2802.00	2807.40	2809.02

APHS_7_31_08.rep						
2812.47	0.014354	18.14	311.78	77.21	1.54	
0132 to 0030	-3600	PF 3	4000.00	2802.00	2806.47	2807.73
2810.82	0.016683	16.77	240.88	74.40	1.60	
0132 to 0030	-3700	PF 1	6047.00	2798.00	2803.67	2805.87
2810.97	0.022941	21.72	281.86	75.58	1.92	
0132 to 0030	-3700	PF 2	5548.00	2798.00	2803.43	2805.52
2810.43	0.023820	21.26	263.52	74.77	1.94	
0132 to 0030	-3700	PF 3	4000.00	2798.00	2802.62	2804.41
2808.62	0.027900	19.67	203.91	72.06	2.03	
0132 to 0030	-3800	PF 1	6047.00	2797.00	2804.76	2805.53
2808.67	0.008452	15.95	388.07	79.19	1.21	
0132 to 0030	-3800	PF 2	5548.00	2797.00	2804.53	2805.20
2808.14	0.008210	15.30	370.16	78.43	1.19	
0132 to 0030	-3800	PF 3	4000.00	2797.00	2803.77	2804.05
2806.39	0.007254	13.01	311.33	75.89	1.10	
0132 to 0030	-3900	PF 1	6047.00	2796.00	2800.22	2802.40
2807.21	0.019126	21.45	292.12	74.54	1.84	
0132 to 0030	-3900	PF 2	5548.00	2796.00	2799.96	2802.04
2806.65	0.019888	20.98	273.16	72.99	1.86	
0132 to 0030	-3900	PF 3	4000.00	2796.00	2799.11	2800.85
2804.83	0.023336	19.35	212.04	71.28	1.93	



ALTERNATIVE II

HEC-RAS Model Output for 6,047 cfs, 1.5:1 rip rap side slopes

HEC-RAS Version 4.0.0 March 2008
 U.S. Army Corps of Engineers
 Hydrologic Engineering Center
 609 Second Street
 Davis, California

```

X      X  XXXXXX  XXXX      XXXX      XX      XXXX
X      X  X      X      X      X      X      X
X      X  X      X      X      X      X      X
XXXXXXXX XXXX      X      XXX XXXX      XXXXXX  XXXX
X      X  X      X      X      X      X      X
X      X  X      X      X      X      X      X
X      X  XXXXXX  XXXX      X      X      X      X
    
```

PROJECT DATA

Project Title: Angel Park Middle Branch Drainage Study
 Project File : APTS_06_28_08_15_1ss.prj
 Run Date and Time: 8/6/2008 3:27:17 PM

Project in English units

Project Description:

This is a steady state HEC-RAS simulation of the Angel Park Middle Branch Channel east of Hualapai way in the City of Las Vegas. The purpose of the model is to simulate various channel modifications for development immediately east of Hualapai adjacent to the channel. The model is performed by BVNA for the City of Las Vegas.

PLAN DATA

Plan Title: Angel Park Hydrology Study

Plan File : C:\Program Files\HEC\HEC-RAS\4.0\AP5\15to1\APHS_06_28_08_15_1ss.p01

Geometry Title: Angel Park Hydrology Study

Geometry File : C:\Program
 Files\HEC\HEC-RAS\4.0\AP5\15to1\APHS_06_28_08_15_1ss.g01

Flow Title : Flow 15

Flow File : C:\Program
 Files\HEC\HEC-RAS\4.0\AP5\15to1\APHS_06_28_08_15_1ss.f15

Plan Summary Information:

Number of:	Cross Sections =	32	Multiple Openings =	0
	Culverts =	1	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information

water surface calculation tolerance	=	0.1
Critical depth calculation tolerance	=	0.1
Maximum number of iterations	=	40
Maximum difference tolerance	=	1
Flow tolerance factor	=	0.05

Computation Options

Critical depth computed only where necessary

APHS_06_28_08_15_1ss.rep
 Conveyance Calculation Method: At breaks in n values only
 Friction Slope Method: Average Conveyance
 Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Flow 15
 Flow File : C:\Program Files\HEC\HEC-RAS\4.0\AP5\15to1\APHS_06_28_08_15_1ss.f15

Flow Data (cfs)

River	Reach	RS	PF 1
Angel Park Middl	0132 to 0030	-485	6047

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
Angel Park Middl	0132 to 0030	PF 1	Normal S = 0.02
Normal S = 0.02			

GEOMETRY DATA

Geometry Title: Angel Park Hydrology Study
 Geometry File : C:\Program Files\HEC\HEC-RAS\4.0\AP5\15to1\APHS_06_28_08_15_1ss.g01

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -485

INPUT

Description: X-Section -4+85

Station Elevation Data		num=	17
Sta	Elev	Sta	Elev
-192	2900	-190	2895
-40	2885	-23	2880
10	2869	20	2875
70	2895	80	2900

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
-192	.035	-10	.025	10	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-10	10	110	110	110	.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

APHS_06_28_08_15_1ss.rep
RS: -595

INPUT

Description: Station -5+95 - Upstream of 2-18' x 10' RBC, west side of Hualapai

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-135	2905	-120	2900	-100	2885	-65	2881	-40	2881
-18.3	2878	-18.3	2863.5	0	2863.5	18.3	2863.5	18.3	2878
30	2885	40	2890	50	2895	100	2898		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-135	.035	-18.3	.013	18.3	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
-18.3 18.3 410 410 410 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-135	-18.3	2878.5	T
18.3	100	2878.5	T

CULVERT

RIVER: Angel Park Middl

REACH: 0132 to 0030 RS: -900

INPUT

Description: 2, 12' x 10' RCB under Hualapai Way

Distance from Upstream XS = .1

Deck/Roadway Width = 399.8

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 14

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
-135		2895		2895	-120		2895		2895	-100		2895		2885
-65		2895		2881	-40		2895		2881	-12.3		2895		2875.5
-12.3		2895		2867.5	0		2895		2867.5	12.3		2895		2867.5
12.3		2895		2867.5	30		2895		2879.5	40		2895		2885
50		2895		2890	60		2895		2895					

Upstream Bridge Cross Section Data

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-135	2905	-120	2900	-100	2885	-65	2881	-40	2881
-18.3	2878	-18.3	2863.5	0	2863.5	18.3	2863.5	18.3	2878
30	2885	40	2890	50	2895	100	2898		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-135	.035	-18.3	.013	18.3	.035

Bank Sta: Left Right Coeff Contr. Expan.
-18.3 18.3 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-135	-18.3	2878.5	T
18.3	100	2878.5	T

Downstream Deck/Roadway Coordinates

num= 7

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
-170		2897		2850	-12		2897		2850	-12		2897		2870

APHS_06_28_08_15_1ss.rep
 0 2897 2870 12 2897 2870 12 2897 2850
 170 2897 2850

Downstream Bridge Cross Section Data

Station Elevation Data num= 7
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2880 -65 2870 -50 2860 0 2860 50 2860
 65 2870 80 2880

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -80 .013 -50 .013 50 .013

Bank Sta: Left Right Coeff Contr. Expan.
 -50 50 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 -80 -12.5 2907 T
 12.5 80 2907 T

Blocked Obstructions num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 -80 -162 2927 170 80 2927

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of culverts = 1

Culvert Name Shape Rise Span
 2 Box 10 12

FHWA Chart # 8 - flared wingwalls
 FHWA Scale # 1 - wingwall flared 30 to 75 deg.

Solution Criteria = Outlet control

Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef
 Exit Loss Coef
 .3 0 350 .013 .013 0 .5

Number of Barrels = 2
 Upstream Elevation = 2863.5

Centerline Stations

Sta. Sta.
 -6.3 6.3

Downstream Elevation = 2860

Centerline Stations

Sta. Sta.
 -6.3 6.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030 RS: -1005

INPUT

Description: X-Section -10+00 - 2-12' x 10' culvert, east side of Hualapai

Station Elevation Data num= 7
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2880 -65 2870 -50 2860 0 2860 50 2860

65 2870 80

2880

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
-80	.013	-50	.013	50	.013

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.3	.5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 -80 -12.5 2907 T
 12.5 80 2907 T

Blocked obstructions num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 -80 -162 2927 170 80 2927

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030 RS: -1100

INPUT

Description: X-Section -11+00

Station Elevation Data		num= 5		Sta	Elev	Sta	Elev	Sta	Elev
-65	2865	-50	2855	0	2855	50	2855	65	2865

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030 RS: -1200

INPUT

Description: X-Section -12+00

Station Elevation Data		num= 5		Sta	Elev	Sta	Elev	Sta	Elev
-65	2863	-50	2853	0	2853	50	2853	65	2863

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030 RS: -1300

INPUT

Description: X-Section -13+00

Station Elevation Data num=

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2861	-50	2851	0	2851	50	2851	65	2861

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1400

INPUT

Description: X-Section -14+00

Station Elevation Data		num=		5	
Sta	Elev	Sta	Elev	Sta	Elev
-65	2860	-50	2850	0	2850

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1500

INPUT

Description: X-Section -15+00

Station Elevation Data		num=		5	
Sta	Elev	Sta	Elev	Sta	Elev
-65	2855	-50	2848	0	2848

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1600

INPUT

Description: X-Section -16+00

Station Elevation Data		num=		5	
Sta	Elev	Sta	Elev	Sta	Elev
-65	2856	-50	2846	0	2846

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

RIVER: Angel Park Middl
 REACH: 0132 to 0030

RS: -2000

INPUT

Description: X-Section -20+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2850	-50	2840	0	2840	50	2840	65	2850

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030

RS: -2100

INPUT

Description: X-Section -21+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2847	-50	2837	0	2837	50	2837	65	2847

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030

RS: -2200

INPUT

Description: X-Section -22+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2845	-50	2835	0	2835	50	2835	65	2845

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		110	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030

RS: -2300

INPUT

Description: X-Section -23+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2843	-50	2833	0	2833	50	2833	65	2843

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		110	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2400

INPUT

Description: X-Section -24+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2840	-50	2830	0	2830	50	2830	65	2840

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2500

INPUT

Description: X-Section -25+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2838	-50	2828	0	2828	50	2828	65	2838

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		90	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2600

INPUT

Description: X-Section -26+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2835	-50	2825	0	2825	50	2825	65	2835

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

-65 .035 -50

.025 50 .035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		90 100	110		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2700

INPUT

Description: X-Section -27+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2835	-50	2825	0	2825	50	2825	65	2835

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100 100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2800

INPUT

Description: X-Section -28+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2833	-50	2823	0	2823	50	2823	65	2833

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100 100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2900

INPUT

Description: X-Section 29+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2848	-50	2820	0	2820	50	2820	65	2848

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100 100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3000

INPUT

Description: X-Section -30+00

Station		Elevation Data		num=	5	Sta	Elev	Sta	Elev	Sta	Elev
-65	2843	-50	2815		0	2815	50	2815	65	2843	

Manning's n Values		num=	3	Sta	n Val	Sta	n Val
-65	.035			50	.035		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		110	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3100

INPUT

Description: X-Section -30+00

Station		Elevation Data		num=	5	Sta	Elev	Sta	Elev	Sta	Elev
-65	2841	-50	2813		0	2813	50	2813	65	2841	

Manning's n Values		num=	3	Sta	n Val	Sta	n Val
-65	.035			50	.035		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3200

INPUT

Description: X-Section -32+00

Station		Elevation Data		num=	5	Sta	Elev	Sta	Elev	Sta	Elev
-65	2838	-50	2810		0	2810	50	2810	65	2838	

Manning's n Values		num=	3	Sta	n Val	Sta	n Val
-65	.035			50	.035		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3300

INPUT

Description: X-Section -33+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2836	-50	2808	0	2808	50	2808	65	2836

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -3400

INPUT

Description: X-Section 34+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2833	-50	2805	0	2805	50	2805	65	2833

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -3500

INPUT

Description: X-Section 35+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2833	-50	2805	0	2805	50	2805	65	2833

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.02

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		105	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -3600

INPUT

Description: X-Section 36+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2830	-50	2802	0	2802	50	2802	65	2830

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.02

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-50	50		100	100	.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3700

INPUT

Description: X-Section 37+00

Station Elevation Data		num=	5				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2812	-50	2798	0	2798	50	2798
						65	2812

Manning's n Values		num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.02

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-50	50		120	100	.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3800

INPUT

Description: X-Section 38+00

Station Elevation Data		num=	5				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2810	-50	2796	0	2796	50	2796
						65	2810

Manning's n Values		num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.02

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-50	50		120	100	.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3900

INPUT

Description: X-Section 39+00

Station Elevation Data		num=	5				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-65	2810	-50	2796	0	2796	50	2796
						65	2810

Manning's n Values		num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
-65	.035	-50	.025	50	.02

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-50	50		110	100	.1	.3

SUMMARY OF MANNING'S N VALUES

River: Angel Park Middl

Reach	River Sta.	n1	n2	n3
0132 to 0030	-485	.035	.025	.035
0132 to 0030	-595	.035	.013	.035
0132 to 0030	-900	culvert		
0132 to 0030	-1005			
0132 to 0030	-1100	.013	.013	.013
0132 to 0030	-1200	.035	.025	.035
0132 to 0030	-1300	.035	.025	.035
0132 to 0030	-1400	.035	.025	.035
0132 to 0030	-1500	.035	.025	.035
0132 to 0030	-1600	.035	.025	.035
0132 to 0030	-1700	.035	.025	.035
0132 to 0030	-1800	.035	.025	.035
0132 to 0030	-1900	.035	.025	.035
0132 to 0030	-2000	.035	.025	.035
0132 to 0030	-2100	.035	.025	.035
0132 to 0030	-2200	.035	.025	.035
0132 to 0030	-2300	.035	.025	.035
0132 to 0030	-2400	.035	.025	.035
0132 to 0030	-2500	.035	.025	.035
0132 to 0030	-2600	.035	.025	.035
0132 to 0030	-2700	.035	.025	.035
0132 to 0030	-2800	.035	.025	.035
0132 to 0030	-2900	.035	.025	.035
0132 to 0030	-3000	.035	.025	.035
0132 to 0030	-3100	.035	.025	.035
0132 to 0030	-3200	.035	.025	.035
0132 to 0030	-3300	.035	.025	.035
0132 to 0030	-3400	.035	.025	.035
0132 to 0030	-3500	.035	.025	.02
0132 to 0030	-3600	.035	.025	.02
0132 to 0030	-3700	.035	.025	.02
0132 to 0030	-3800	.035	.025	.02
0132 to 0030	-3900	.035	.025	.02

SUMMARY OF REACH LENGTHS

River: Angel Park Middl

Reach	River Sta.	Left	Channel	Right
0132 to 0030	-485	110	110	110
0132 to 0030	-595	410	410	410
0132 to 0030	-900	culvert		
0132 to 0030	-1005			
0132 to 0030	-1100	100	100	100
0132 to 0030	-1200	100	100	100
0132 to 0030	-1300	100	100	100
0132 to 0030	-1400	100	100	100
0132 to 0030	-1500	100	100	100
0132 to 0030	-1600	100	100	100
0132 to 0030	-1700	100	100	100
0132 to 0030	-1800	100	100	100

APHS_06_28_08_15_1ss.rep

0132 to 0030	-1900	100	100	100
0132 to 0030	-2000	100	100	100
0132 to 0030	-2100	100	100	100
0132 to 0030	-2200	110	100	90
0132 to 0030	-2300	110	100	90
0132 to 0030	-2400	100	100	100
0132 to 0030	-2500	90	100	110
0132 to 0030	-2600	90	100	110
0132 to 0030	-2700	100	100	100
0132 to 0030	-2800	100	100	100
0132 to 0030	-2900	100	100	100
0132 to 0030	-3000	110	100	90
0132 to 0030	-3100	100	100	100
0132 to 0030	-3200	100	100	100
0132 to 0030	-3300	100	100	100
0132 to 0030	-3400	100	100	100
0132 to 0030	-3500	105	100	90
0132 to 0030	-3600	100	100	100
0132 to 0030	-3700	120	100	60
0132 to 0030	-3800	120	100	60
0132 to 0030	-3900	110	100	60

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Angel Park Middl

Reach	River Sta.	Contr.	Expan.
0132 to 0030	-485	.1	.3
0132 to 0030	-595	.3	.5
0132 to 0030	-900	culvert	
0132 to 0030	-1005		
0132 to 0030	-1100	.3	.5
0132 to 0030	-1100	.1	.3
0132 to 0030	-1200	.1	.3
0132 to 0030	-1300	.1	.3
0132 to 0030	-1400	.1	.3
0132 to 0030	-1500	.1	.3
0132 to 0030	-1600	.1	.3
0132 to 0030	-1700	.1	.3
0132 to 0030	-1800	.1	.3
0132 to 0030	-1900	.1	.3
0132 to 0030	-2000	.1	.3
0132 to 0030	-2100	.1	.3
0132 to 0030	-2200	.1	.3
0132 to 0030	-2300	.1	.3
0132 to 0030	-2400	.1	.3
0132 to 0030	-2500	.1	.3
0132 to 0030	-2600	.1	.3
0132 to 0030	-2700	.1	.3
0132 to 0030	-2800	.1	.3
0132 to 0030	-2900	.1	.3
0132 to 0030	-3000	.1	.3
0132 to 0030	-3100	.1	.3
0132 to 0030	-3200	.1	.3
0132 to 0030	-3300	.1	.3
0132 to 0030	-3400	.1	.3
0132 to 0030	-3500	.1	.3
0132 to 0030	-3600	.1	.3
0132 to 0030	-3700	.1	.3
0132 to 0030	-3800	.1	.3

0132 to 0030

-3900

APHS_06_28_08_15_1ss.rep

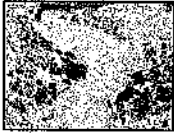
.1

.3

Profile Output Table - Standard Table 1

Reach E.G. Elev (ft)	River Sta E.G. Slope (ft/ft)	Profile Vel Chnl (ft/s)	Q Total Flow Area (cfs) (sq ft)	Min Ch El Top Width (ft)	W.S. Elev Froude # Chl (ft)	Crit W.S. (ft)
0132 to 0030	-485	PF 1	6047.00	2869.00	2888.60	2881.22
2889.38	0.000430	8.96	1268.66	166.60	0.36	
0132 to 0030	-595	PF 1	6047.00	2863.50	2888.83	2872.93
2889.24	0.000070	5.57	1638.10	142.76	0.20	
0132 to 0030	-900		Culvert			
0132 to 0030	-1005	PF 1	6047.00	2860.00	2872.16	2872.16
2878.30	0.001083	19.89	304.00	136.48	1.01	
0132 to 0030	-1100	PF 1	6047.00	2855.00	2856.76	2859.78
2874.47	0.152783	33.92	181.08	105.29	4.50	
0132 to 0030	-1200	PF 1	6047.00	2853.00	2855.53	2857.78
2864.06	0.045846	23.60	262.03	107.57	2.62	
0132 to 0030	-1300	PF 1	6047.00	2851.00	2853.99	2855.78
2860.02	0.025851	19.85	312.75	108.98	2.02	
0132 to 0030	-1400	PF 1	6047.00	2850.00	2853.62	2854.78
2857.70	0.013589	16.34	381.89	110.87	1.51	
0132 to 0030	-1500	PF 1	6047.00	2848.00	2851.34	2852.75
2856.03	0.017550	17.59	357.66	114.31	1.70	
0132 to 0030	-1600	PF 1	6047.00	2846.00	2849.32	2850.78
2854.20	0.018320	17.89	348.00	109.95	1.73	
0132 to 0030	-1700	PF 1	6047.00	2844.00	2847.25	2848.78
2852.35	0.019683	18.28	340.33	109.74	1.79	
0132 to 0030	-1800	PF 1	6047.00	2844.00	2848.78	2848.78
2851.07	0.005314	12.30	512.39	114.34	0.99	
0132 to 0030	-1900	PF 1	6047.00	2840.00	2842.86	2844.78
2849.49	0.030286	20.82	297.80	108.57	2.17	
0132 to 0030	-2000	PF 1	6047.00	2840.00	2844.48	2844.78
2847.10	0.006602	13.13	478.60	113.45	1.09	
0132 to 0030	-2100	PF 1	6047.00	2837.00	2840.11	2841.78
2845.68	0.022666	19.07	325.76	109.34	1.91	
0132 to 0030	-2200	PF 1	6047.00	2835.00	2838.23	2839.78
2843.38	0.019985	18.36	338.73	109.69	1.80	
0132 to 0030	-2300	PF 1	6047.00	2833.00	2836.23	2837.78
2841.38	0.019985	18.36	338.73	109.69	1.80	
0132 to 0030	-2400	PF 1	6047.00	2830.00	2833.00	2834.78
2839.02	0.025809	19.84	312.91	108.98	2.02	
0132 to 0030	-2500	PF 1	6047.00	2828.00	2831.22	2832.78
2836.41	0.020190	18.42	337.66	109.66	1.81	
0132 to 0030	-2600	PF 1	6047.00	2825.00	2827.99	2829.78
2834.04	0.026030	19.89	312.09	108.96	2.03	
0132 to 0030	-2700	PF 1	6047.00	2825.00	2829.61	2829.78
2832.08	0.006014	12.77	492.83	113.83	1.05	
0132 to 0030	-2800	PF 1	6047.00	2823.00	2826.46	2827.78
2830.94	0.015894	17.13	363.71	110.37	1.62	
0132 to 0030	-2900	PF 1	6047.00	2820.00	2823.13	2824.83
2828.86	0.022983	19.26	317.76	103.35	1.92	
0132 to 0030	-3000	PF 1	6047.00	2815.00	2817.64	2819.83
2825.69	0.040346	22.81	267.82	102.83	2.47	
0132 to 0030	-3100	PF 1	6047.00	2813.00	2816.07	2817.83
2822.03	0.024522	19.64	311.55	103.28	1.98	
0132 to 0030	-3200	PF 1	6047.00	2810.00	2812.96	2814.83

APHS_06_28_08_15_1ss.rep					
2819.37	0.027620	20.35	300.49	103.17	2.09
0132 to 0030	-3300	PF 1	6047.00	2808.00	2811.23
2816.59	0.020554	18.63	328.74	103.46	1.83
0132 to 0030	-3400	PF 1	6047.00	2805.00	2808.02
2814.16	0.025673	19.91	307.24	103.24	2.02
0132 to 0030	-3500	PF 1	6047.00	2805.00	2809.65
2812.21	0.006070	12.89	476.19	104.98	1.05
0132 to 0030	-3600	PF 1	6047.00	2802.00	2805.13
2810.82	0.022732	19.18	318.49	103.36	1.91
0132 to 0030	-3700	PF 1	6047.00	2798.00	2800.75
2807.95	0.034342	21.64	283.49	105.90	2.30
0132 to 0030	-3800	PF 1	6047.00	2796.00	2799.10
2804.74	0.022990	19.17	320.57	106.65	1.92
0132 to 0030	-3900	PF 1	6047.00	2796.00	2800.47
2803.14	0.006705	13.21	468.49	109.58	1.10



ALTERNATIVE III

HEC-RAS Model Output for 6,047 cfs, 3:1 rip rap side slopes

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```

X      X  XXXXXX      XXXX      XXXX      XX      XXXX
X      X  X          X  X      X  X      X
X      X  X          X  X      X  X      X
XXXXXXXX XXXX      X      XXX XXXX XXXXXX XXXX
X      X  X          X      X  X      X  X      X
X      X  X          X      X  X      X  X      X
X      X  XXXXXX      XXXX      X      X      X      XXXXX

```

PROJECT DATA

Project Title: Angel Park Middle Branch Drainage Study
Project File : APHS_06_28_08.prj
Run Date and Time: 8/6/2008 3:12:51 PM

Project in English units

Project Description:

This is a steady state HEC-RAS simulation of the Angel Park Middle Branch Channel east of Hualapai Way in the City of Las Vegas. The purpose of the model is to simulate various channel modifications for development immediately east of Hualapai adjacent the channel. The model is performed by BVNA for the City of Las Vegas.

PLAN DATA

Plan Title: Angel Park Middle Branch Drainage Study
Plan File : C:\Program Files\HEC\HEC-RAS\4.0\AP5\3to1\APHS_06_28_08.p01

Geometry Title: Angel Park Middle Branch Drainage Study

Geometry File : C:\Program
Files\HEC\HEC-RAS\4.0\AP5\3to1\APHS_06_28_08.g01

Flow Title : Flow 06

Flow File : C:\Program
Files\HEC\HEC-RAS\4.0\AP5\3to1\APHS_06_28_08.f06

Plan Summary Information:

Number of:	Cross Sections =	32	Multiple Openings =	0
	Culverts =	1	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information

Water surface calculation tolerance	=	0.1
Critical depth calculation tolerance	=	0.1
Maximum number of iterations	=	40
Maximum difference tolerance	=	1
Flow tolerance factor	=	0.05

Computation Options

Critical depth computed only where necessary

APHS_06_28_08.rep
 Conveyance Calculation Method: At breaks in n values only
 Friction Slope Method: Average Conveyance
 Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Flow 06

Flow File : C:\Program Files\HEC\HEC-RAS\4.0\AP5\3to1\APHS_06_28_08.f06

Flow Data (cfs)

River	Reach	RS	PF 1
Angel Park Middl	0132 to 0030	-485	6047

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
Angel Park Middl	0132 to 0030	PF 1	Normal S = 0.02
Normal S = 0.02			

GEOMETRY DATA

Geometry Title: Angel Park Middle Branch Drainage Study

Geometry File : C:\Program Files\HEC\HEC-RAS\4.0\AP5\3to1\APHS_06_28_08.g01

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -485

INPUT

Description: X-Section -4+85

Station Elevation Data		num=	17
Sta	Elev	Sta	Elev
-192	2900	-190	2895
-40	2885	-23	2880
10	2869	20	2875
70	2895	80	2900

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
-192	.035	-10	.025
		10	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-10	10	110	110	.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -595

INPUT

Description: Station -5+95 - Upstream of 2-18' x 10' RBC, west side of Hualapai

Station Elevation Data		num= 14		Sta		Elev		Sta		Elev	
-135	2905	-120	2900	-100	2885	-65	2881	-40	2881		
-18.3	2878	-18.3	2863.5	0	2863.5	18.3	2863.5	18.3	2878		
30	2885	40	2890	50	2895	100	2898				

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
-135	.035	-18.3	.013	18.3	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-18.3	18.3		405	405	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-135	-18.3	2878.5	T
18.3	100	2878.5	T

CULVERT

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -900

INPUT

Description: 2, 12' x 10' RCB under Hualapai Way

Distance from Upstream XS = .1

Deck/Roadway Width = 399.8

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 12		Sta Hi Cord Lo Cord		Sta Hi Cord Lo Cord		Sta Hi Cord Lo Cord		
-135	2895	2850	-120	2895	2850	-100	2895	2850
-65	2895	2850	-40	2895	2850	-12.3	2895	2873.5
-12.3	2895	2873.5	0	2895	2873.5	12.3	2895	2873.5
12.3	2895	2850	30	2895	2850	40	2895	2850

Upstream Bridge Cross Section Data

Station Elevation Data		num= 14		Sta		Elev		Sta		Elev	
-135	2905	-120	2900	-100	2885	-65	2881	-40	2881		
-18.3	2878	-18.3	2863.5	0	2863.5	18.3	2863.5	18.3	2878		
30	2885	40	2890	50	2895	100	2898				

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
-135	.035	-18.3	.013	18.3	.035

Bank Sta:	Left	Right	Coeff Contr.	Expan.
	-18.3	18.3	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-135	-18.3	2878.5	T
18.3	100	2878.5	T

Downstream Deck/Roadway Coordinates

num= 7		Sta Hi Cord Lo Cord		Sta Hi Cord Lo Cord		Sta Hi Cord Lo Cord		
-170	2897	2850	-12.3	2897	2850	-12.3	2897	2870
0	2897	2870	12.3	2897	2870	12.3	2897	2850

170 2897 2850

Downstream Bridge Cross Section Data

Station Elevation Data		num= 7		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2880	-65	2870	-50	2860	0	2860	50	2860
65	2870	80	2880						

Manning's n Values

num= 3		Sta n Val	
Sta	n Val	Sta	n Val
-80	.013	-50	.013
		50	.013

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	-50	50	.3		.5

Ineffective Flow		num= 2		Sta L Sta R Elev Permanent	
Sta L	Sta R	Elev	Permanent		
-80	-12.3	2907	T		
12.3	80	2907	T		

Blocked Obstructions		num= 2		Sta L Sta R Elev	
Sta L	Sta R	Elev	Sta L	Sta R	Elev
-80	-162	2927	170	80	2927

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
2	Box	10	12

FHWA Chart # 8 - flared wingwalls
 FHWA Scale # 1 - wingwall flared 30 to 75 deg.
 Solution Criteria = Outlet control
 Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef
 Exit Loss Coef

Sta.	Sta.
-6.3	6.3

Number of Barrels = 2
 Upstream Elevation = 2863.5
 Centerline Stations
 Downstream Elevation = 2860
 Centerline Stations

Sta.	Sta.
-6.3	6.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1005

INPUT

Description: X-Section -10+00 - 2-12' x 10' culvert, east side of Hualapai

Station Elevation Data		num= 7		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2880	-65	2870	-50	2860	0	2860	50	2860
65	2870	80	2880						

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Manning's n Values
 Sta n Val Sta n Val Sta n Val
 -80 .013 -50 .013 50 .013

Bank Sta: Left Right Lengths: Left Channel Right
 -50 50 100 100 100
 Coeff Contr. Expan.
 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 -80 -12.3 2907 T
 12.3 80 2907 T

Blocked Obstructions num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 -80 -162 2927 170 80 2927

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1100

INPUT

Description: X-Section -11+00

Station Elevation Data num= 5
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2865 -50 2855 0 2855 50 2855 80 2865

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -80 .025 -50 .025 50 .025

Bank Sta: Left Right Lengths: Left Channel Right
 -50 50 100 100 100
 Coeff Contr. Expan.
 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1200

INPUT

Description: X-Section -12+00

Station Elevation Data num= 5
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2863 -50 2853 0 2853 50 2853 80 2863

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -80 .025 -50 .025 50 .025

Bank Sta: Left Right Lengths: Left Channel Right
 -50 50 100 100 100
 Coeff Contr. Expan.
 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1300

INPUT

Description: X-Section -13+00

Station Elevation Data num= 5
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

-80	2861	-50	2851	0	2851	50	2851	80	2861
-----	------	-----	------	---	------	----	------	----	------

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
-80	.025	-50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1400

INPUT

Description: X-Section -14+00

Station Elevation Data		num=	5
Sta	Elev	Sta	Elev
-80	2860	-50	2850
		0	2850
		50	2850
		80	2860

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
-80	.025	-50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1500

INPUT

Description: X-Section -15+00

Station Elevation Data		num=	5
Sta	Elev	Sta	Elev
-80	2855	-50	2848
		0	2848
		50	2848
		80	2855

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
-80	.025	-50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1600

INPUT

Description: X-Section -16+00

Station Elevation Data		num=	5
Sta	Elev	Sta	Elev
-80	2856	-50	2846
		0	2846
		50	2846
		80	2856

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
-80	.025	-50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1700

INPUT

Description: X-Section -17+00

Station Elevation Data				num=	5				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2854	-50	2844	0	2844	50	2844	80	2854

Manning's n Values				num=	3			
Sta	n Val	Sta	n Val	Sta	n Val			
-80	.025	-50	.025	50	.025			

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1800

INPUT

Description: X-Section -18+00

Station Elevation Data				num=	5				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2854	-50	2844	0	2844	50	2844	80	2854

Manning's n Values				num=	3			
Sta	n Val	Sta	n Val	Sta	n Val			
-80	.025	-50	.025	50	.025			

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -1900

INPUT

Description: X-Section -19+00

Station Elevation Data				num=	5				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2850	-50	2840	0	2840	50	2840	80	2850

Manning's n Values				num=	3			
Sta	n Val	Sta	n Val	Sta	n Val			
-80	.025	-50	.025	50	.025			

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2000

INPUT

Description: X-Section -20+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2850	-50	2840	0	2840	50	2840	80	2850

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2100

INPUT

Description: X-Section -21+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2847	-50	2837	0	2837	50	2837	80	2847

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2200

INPUT

Description: X-Section -22+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2845	-50	2835	0	2835	50	2835	80	2845

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		110	90		.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -2300

INPUT

Description: X-Section -23+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2843	-50	2833	0	2833	50	2833	80	2843

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

-50	50	110	100	90	.1	.3
-----	----	-----	-----	----	----	----

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2400

INPUT

Description: X-Section -24+00

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2840	-50	2830	0	2830	50	2830	80	2840

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

-50	50	100	100	100	.1	.3
-----	----	-----	-----	-----	----	----

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2500

INPUT

Description: X-Section -25+00

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2838	-50	2828	0	2828	50	2828	80	2838

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

-50	50	90	100	110	.1	.3
-----	----	----	-----	-----	----	----

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2600

INPUT

Description: X-Section -26+00

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2835	-50	2825	0	2825	50	2825	80	2835

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

APHS_06_28_08.rep

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -50 50 90 100 110 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2700

INPUT

Description: X-Section -27+00

Station Elevation Data num= 5
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2835 -50 2825 0 2825 50 2825 80 2835

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -80 .025 -50 .025 50 .025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -50 50 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2800

INPUT

Description: X-Section -28+00

Station Elevation Data num= 5
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2833 -50 2823 0 2823 50 2823 80 2833

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -80 .025 -50 .025 50 .025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -50 50 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -2900

INPUT

Description: X-Section 29+00

Station Elevation Data num= 5
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2830 -50 2820 0 2820 50 2820 80 2830

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -80 .025 -50 .025 50 .025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -50 50 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -3000

INPUT

Description: X-Section -30+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2825	-50	2815	0	2815	50	2815	80	2825

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-50	50		110	100	.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -3100

INPUT

Description: X-Section -30+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2823	-50	2813	0	2813	50	2813	80	2823

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-50	50		100	100	.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -3200

INPUT

Description: X-Section -32+00

Station Elevation Data

num=

5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2820	-50	2810	0	2810	50	2810	80	2820

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-80	.025	-50	.025	50	.025

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-50	50		100	100	.1	.3

CROSS SECTION

RIVER: Angel Park Middl

REACH: 0132 to 0030

RS: -3300

INPUT

Description: X-Section -33+00

Station Elevation Data		num=	5						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2818	-50	2808	0	2808	50	2808	80	2818

Manning's n Values		num=	3			
Sta	n Val	Sta	n Val	Sta	n Val	
-80	.025	-50	.025	50	.025	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3400

INPUT

Description: X-Section 34+00

Station Elevation Data		num=	5						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2815	-50	2805	0	2805	50	2805	80	2815

Manning's n Values		num=	3			
Sta	n Val	Sta	n Val	Sta	n Val	
-80	.025	-50	.025	50	.025	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		100	100		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3500

INPUT

Description: X-Section 35+00

Station Elevation Data		num=	5						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2815	-50	2805	0	2805	50	2805	80	2815

Manning's n Values		num=	3			
Sta	n Val	Sta	n Val	Sta	n Val	
-80	.025	-50	.025	50	.02	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-50	50		105	90		.1	.3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3600

INPUT

Description: X-Section 36+00

Station Elevation Data		num=	5						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-80	2812	-50	2802	0	2802	50	2802	80	2812

Manning's n Values		num=	3			
Sta	n Val	Sta	n Val	Sta	n Val	

-80 .025 -50 .025 50 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -50 50 100 100 100 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3700

INPUT

Description: X-Section 37+00

Station Elevation Data num= 5
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2808 -50 2798 0 2798 50 2798 80 2808

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -80 .025 -50 .025 50 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -50 50 120 100 60 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3800

INPUT

Description: X-Section 38+00

Station Elevation Data num= 5
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2806 -50 2796 0 2796 50 2796 80 2806

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -80 .025 -50 .025 50 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -50 50 120 100 60 .1 .3

CROSS SECTION

RIVER: Angel Park Middl
 REACH: 0132 to 0030 RS: -3900

INPUT

Description: X-Section 39+00

Station Elevation Data num= 5
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -80 2806 -50 2796 0 2796 50 2796 80 2806

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -80 .025 -50 .025 50 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -50 50 110 100 60 .1 .3

SUMMARY OF MANNING'S N VALUES

River: Angel Park Middl

Reach	River Sta.	n1	n2	n3
0132 to 0030	-485	.035	.025	.035
0132 to 0030	-595	.035	.013	.035
0132 to 0030	-900	Culvert		
0132 to 0030	-1005			
0132 to 0030	-1100	.013	.013	.013
0132 to 0030	-1200	.025	.025	.025
0132 to 0030	-1300	.025	.025	.025
0132 to 0030	-1400	.025	.025	.025
0132 to 0030	-1500	.025	.025	.025
0132 to 0030	-1600	.025	.025	.025
0132 to 0030	-1700	.025	.025	.025
0132 to 0030	-1800	.025	.025	.025
0132 to 0030	-1900	.025	.025	.025
0132 to 0030	-2000	.025	.025	.025
0132 to 0030	-2100	.025	.025	.025
0132 to 0030	-2200	.025	.025	.025
0132 to 0030	-2300	.025	.025	.025
0132 to 0030	-2400	.025	.025	.025
0132 to 0030	-2500	.025	.025	.025
0132 to 0030	-2600	.025	.025	.025
0132 to 0030	-2700	.025	.025	.025
0132 to 0030	-2800	.025	.025	.025
0132 to 0030	-2900	.025	.025	.025
0132 to 0030	-3000	.025	.025	.025
0132 to 0030	-3100	.025	.025	.025
0132 to 0030	-3200	.025	.025	.025
0132 to 0030	-3300	.025	.025	.025
0132 to 0030	-3400	.025	.025	.025
0132 to 0030	-3500	.025	.025	.02
0132 to 0030	-3600	.025	.025	.02
0132 to 0030	-3700	.025	.025	.02
0132 to 0030	-3800	.025	.025	.02
0132 to 0030	-3900	.025	.025	.02

SUMMARY OF REACH LENGTHS

River: Angel Park Middl

Reach	River Sta.	Left	Channel	Right
0132 to 0030	-485	110	110	110
0132 to 0030	-595	405	405	405
0132 to 0030	-900	Culvert		
0132 to 0030	-1005			
0132 to 0030	-1100	100	100	100
0132 to 0030	-1200	100	100	100
0132 to 0030	-1300	100	100	100
0132 to 0030	-1400	100	100	100
0132 to 0030	-1500	100	100	100
0132 to 0030	-1600	100	100	100
0132 to 0030	-1700	100	100	100
0132 to 0030	-1800	100	100	100
0132 to 0030	-1900	100	100	100

APHS_06_28_08.rep

0132 to 0030	-2000	100	100	100
0132 to 0030	-2100	100	100	100
0132 to 0030	-2200	110	100	90
0132 to 0030	-2300	110	100	90
0132 to 0030	-2400	100	100	100
0132 to 0030	-2500	90	100	110
0132 to 0030	-2600	90	100	110
0132 to 0030	-2700	100	100	100
0132 to 0030	-2800	100	100	100
0132 to 0030	-2900	100	100	100
0132 to 0030	-3000	110	100	90
0132 to 0030	-3100	100	100	100
0132 to 0030	-3200	100	100	100
0132 to 0030	-3300	100	100	100
0132 to 0030	-3400	100	100	100
0132 to 0030	-3500	105	100	90
0132 to 0030	-3600	100	100	100
0132 to 0030	-3700	120	100	60
0132 to 0030	-3800	120	100	60
0132 to 0030	-3900	110	100	60

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Angel Park Middl

Reach	River Sta.	Contr.	Expan.
0132 to 0030	-485	.1	.3
0132 to 0030	-595	.3	.5
0132 to 0030	-900	culvert	
0132 to 0030	-1005		.5
0132 to 0030	-1100		.3
0132 to 0030	-1200	.1	.3
0132 to 0030	-1300	.1	.3
0132 to 0030	-1400	.1	.3
0132 to 0030	-1500	.1	.3
0132 to 0030	-1600	.1	.3
0132 to 0030	-1700	.1	.3
0132 to 0030	-1800	.1	.3
0132 to 0030	-1900	.1	.3
0132 to 0030	-2000	.1	.3
0132 to 0030	-2100	.1	.3
0132 to 0030	-2200	.1	.3
0132 to 0030	-2300	.1	.3
0132 to 0030	-2400	.1	.3
0132 to 0030	-2500	.1	.3
0132 to 0030	-2600	.1	.3
0132 to 0030	-2700	.1	.3
0132 to 0030	-2800	.1	.3
0132 to 0030	-2900	.1	.3
0132 to 0030	-3000	.1	.3
0132 to 0030	-3100	.1	.3
0132 to 0030	-3200	.1	.3
0132 to 0030	-3300	.1	.3
0132 to 0030	-3400	.1	.3
0132 to 0030	-3500	.1	.3
0132 to 0030	-3600	.1	.3
0132 to 0030	-3700	.1	.3
0132 to 0030	-3800	.1	.3
0132 to 0030	-3900	.1	.3

Profile Output Table - Standard Table 1

Reach E.G. Elev (ft)	River Sta E.G. Slope (ft/ft)	Profile Vel Chnl (ft/s)	Q Total Flow Area (cfs) (sq ft)	Min Ch El Top Width (ft)	W.S. Elev Froude # Chl (ft)	Crit W.S. (ft)
0132 to 0030	-485	PF 1	6047.00	2869.00	2888.60	2881.22
2889.38	0.000430	8.96	1268.66	166.60	0.36	
0132 to 0030	-595	PF 1	6047.00	2863.50	2888.83	2872.93
2889.24	0.000070	5.57	1638.10	142.76	0.20	
0132 to 0030	-900		Culvert			
0132 to 0030	-1005	PF 1	6047.00	2860.00	2872.29	2872.29
2878.50	0.001079	20.00	302.41	136.88	1.01	
0132 to 0030	-1100	PF 1	6047.00	2855.00	2856.71	2859.66
2874.62	0.162803	34.29	179.77	110.26	4.62	
0132 to 0030	-1200	PF 1	6047.00	2853.00	2855.47	2857.66
2863.79	0.046843	23.47	264.74	114.79	2.63	
0132 to 0030	-1300	PF 1	6047.00	2851.00	2853.93	2855.66
2859.70	0.025937	19.60	318.66	117.58	2.02	
0132 to 0030	-1400	PF 1	6047.00	2850.00	2853.54	2854.66
2857.39	0.013527	16.05	391.42	121.23	1.50	
0132 to 0030	-1500	PF 1	6047.00	2848.00	2851.20	2852.58
2855.68	0.018160	17.40	364.22	127.45	1.71	
0132 to 0030	-1600	PF 1	6047.00	2846.00	2849.27	2850.66
2853.83	0.017729	17.44	359.29	119.63	1.70	
0132 to 0030	-1700	PF 1	6047.00	2844.00	2847.21	2848.66
2851.97	0.019037	17.83	351.30	119.23	1.75	
0132 to 0030	-1800	PF 1	6047.00	2844.00	2848.66	2848.66
2850.77	0.005202	11.96	531.14	127.96	0.98	
0132 to 0030	-1900	PF 1	6047.00	2840.00	2842.79	2844.66
2849.20	0.030754	20.64	302.04	116.72	2.18	
0132 to 0030	-2000	PF 1	6047.00	2840.00	2844.33	2844.66
2846.81	0.006734	12.95	488.89	125.96	1.10	
0132 to 0030	-2100	PF 1	6047.00	2837.00	2840.04	2841.66
2845.38	0.022867	18.86	331.56	118.23	1.91	
0132 to 0030	-2200	PF 1	6047.00	2835.00	2838.13	2839.66
2843.15	0.020775	18.31	341.74	118.75	1.83	
0132 to 0030	-2300	PF 1	6047.00	2833.00	2836.13	2837.66
2841.15	0.020775	18.31	341.74	118.75	1.83	
0132 to 0030	-2400	PF 1	6047.00	2830.00	2832.91	2834.66
2838.75	0.026395	19.70	316.91	117.49	2.03	
0132 to 0030	-2500	PF 1	6047.00	2828.00	2831.15	2832.66
2836.10	0.020263	18.17	344.44	118.88	1.80	
0132 to 0030	-2600	PF 1	6047.00	2825.00	2827.92	2829.66
2833.73	0.026168	19.65	317.77	117.53	2.03	
0132 to 0030	-2700	PF 1	6047.00	2825.00	2829.51	2829.66
2831.78	0.005824	12.38	512.21	127.07	1.03	
0132 to 0030	-2800	PF 1	6047.00	2823.00	2826.37	2827.66
2830.65	0.016043	16.92	370.82	120.21	1.62	
0132 to 0030	-2900	PF 1	6047.00	2820.00	2823.00	2824.66
2828.50	0.024000	19.14	326.54	117.98	1.95	
0132 to 0030	-3000	PF 1	6047.00	2815.00	2817.56	2819.66
2825.23	0.040960	22.53	276.09	115.38	2.48	
0132 to 0030	-3100	PF 1	6047.00	2813.00	2815.98	2817.66
2821.55	0.024470	19.25	324.55	117.88	1.97	
0132 to 0030	-3200	PF 1	6047.00	2810.00	2812.88	2814.66
2818.88	0.027663	19.99	312.27	117.25	2.08	

APHS_06_28_08.rep						
0132 to 0030	-3300	PF 1	6047.00	2808.00	2811.14	2812.66
2816.13	0.020514	18.24	343.10	118.82	1.82	
0132 to 0030	-3400	PF 1	6047.00	2805.00	2807.92	2809.66
2813.74	0.026304	19.68	317.25	117.50	2.03	
0132 to 0030	-3500	PF 1	6047.00	2805.00	2809.54	2809.65
2811.74	0.005600	12.19	515.53	127.23	1.01	
0132 to 0030	-3600	PF 1	6047.00	2802.00	2805.01	2806.65
2810.40	0.023245	18.90	328.50	118.08	1.92	
0132 to 0030	-3700	PF 1	6047.00	2798.00	2800.70	2802.65
2807.52	0.034085	21.25	291.38	116.17	2.28	
0132 to 0030	-3800	PF 1	6047.00	2796.00	2799.03	2800.65
2804.36	0.022917	18.82	329.97	118.15	1.91	
0132 to 0030	-3900	PF 1	6047.00	2796.00	2800.36	2800.65
2802.77	0.006467	12.75	492.36	126.13	1.08	

