DEVELOPMENT: Faith Lutheran High School Addition
CALCULATED BY: SOA
PROJECT NUMBER: 81156

DATE: February 2009

SUB-BASIN DATA			INITIAL/OVERLAND TIME (ti)				TRAVEL TIME (tt)				tc CHECK (URBANIZED BASINS)		FINAL tc	REMARKS			
DESIGN (1)	K (2)	AREA Ac (3)	AREA Square Miles (4)	LENGTH Ft (5)	SLOPE % (6)	ti Min (7)	LENGTH Ft (8)	SLOPE % (9)	VELOCITY FPS (10)	tt Min (11)	TOTAL LENGTH Ft (12)	tc =(L/180)+10 Min (13)	Min (14)	CN (15)	tL Hrs (16)	Urbanized?	Soil Type
ND1	0.7967	5.45	0.00852	207	0.4	10.7	700	0.4	2.1	5.6	907	15.0	15.0	89.9	0.150	YES	D
ND2	0.9036	1.91	0.00298	108	0.9	3.9	300	0.9	1.7	3.0	408	12.3	6.9	98.0	0.069	YES	D
ND3	0.9036	0.75	0.00117	77	2.5	2.3	100	2.5	2.1	0.8	177	11.0	3.1	98.0	0.050	YES	D

$ti = 1.8 (1.1 - K) L^{(0.5)} / S^{(1/3)}$

$K = 0.0132 CN - 0.39$

$tt = L / (60 V)$

$tc = ti + tt$

$tL = tLAG = 0.6 tc$

LOCATION: Onsite
HYDROLOGIC CONDITION: Developed Condition
TRIAL: Final Iteration

Curve Number Calculations
Faith Lutheran High School Addition

Sub-Basin: ND1
Total Area: 5.45 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Cruve Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	0.55	D	10%	98	9.8
Open Space: Poor Condition	4.91	D	90%	89	80.1
Total:	5.45	------	100%	----------	89.9

Curve Number Calculations
Faith Lutheran High School Addition

Sub-Basin: ND2
Total Area: 1.91 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Cruve Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	1.91	D	100%	98	98.0
Total:	1.91	------	100%	----------	98.0

Curve Number Calculations
Faith Lutheran High School Addition

Sub-Basin: ND3
Total Area: 0.75 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Cruve Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	0.75	D	100%	98	98.0
Total:	0.75	------	100%	----------	98.0

AVERAGE VELOCITY

Input Variables	Basin ND1	Basin ND2	Basin ND3														
Bottom Width, B, (ft)	2.0	5.0	20														
Right Side Slope, Zr:	0	100	100														
Left Side Slope, Zl:	50	100	100														
Manning's n:	0.015	0.015	0.015														
Geometric Slope, So (ft/ft):	0.004	0.009	0.025														
Flowrate, Q (cfs):	8	4	2														
Output Variables																	
Normal Depth, Yn (ft):	0.35	0.13	0.09														
Area of Flow, A, (sf):	3.83	2.42	0.95														
Velocity, V (fps):	2.09	1.66	2.10														
Wetted Perimeter, p (ft):	20.04	31.48	19.68														
Hydraulic Radius, Rh (ft):	0.19	0.08	0.05														
Free Surface Top Width, T (ft):	19.68	31.48	19.63														
Centroid, Y*, (ft):	0.13	0.05	0.03														

*** NOTE : HALF OF THE 100-YEAR STORM RUNOFF FLOWS IS USED TO DETERMINE THE BASIN TRAVEL VELOCITY REQUIRED FOR THE LAG TIME CALCULATIONS**

Faith Lutheran High School Addition
(Technical Drainage Study)

10-Year & 100-Year
6-Hour Storm:
Proposed Condition

FILE: 81156P.DAT

```
*                JUN  1998                  *
*               VERSION 4.1                 *
*                                           *
*   RUN DATE   23FEB09   TIME  10:36:48      *
*                                           *
*********************************************
```

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

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

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

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

1

HEC-1 INPUT

PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
  1           ID       FAITH LUTHERAN HIGH SCHOOL ADDITION - TECHNICAL DRAINAGE STUDY
  2           ID       PROPOSED CONDITION - ONSITE
  3           ID       USING SCS METHODS AND KINEMATIC WAVE ROUTING
  4           ID       MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
  5           ID       LOCHSA JOB# 081156
  6           ID
  7           ID
  8           ID       INPUT FILE NAME:  81156P.DAT
  9           ID
 10           ID   FEBRUARY 2009
 11           ID
 12           ID       **************************************************************************
 13           ID       **************************************************************************
 14           ID            OUTSIDE McCARRAN AIRPORT RAINFALL AREA
 15           ID
 16           ID            10 YEAR & 100 YEAR - 6 HOUR STORM EVENT
 17           ID            PRECIPITATION BASED ON FIGURES 501 THROUGH 506
 18           ID            MODIFIED ON STANDARD FORM 3 (FIGURE 520) AND
 19           ID            ADJUSTED PER TABLE 501
 20           ID
 21           ID            10-YEAR ADJUSTMENT RATIO = 1.24 (FROM TABLE 501)
 22           ID            100-YEAR ADJUSTMENT RATIO = 1.43 (FROM TABLE 501)
```

```
 26          ID              100-YEAR RAINFALL DEPTH (STAT) = 2.20in
 27          ID              10-YEAR ADJUSTED RAINFALL DEPTH = 1.24 x 1.40 = 1.736in
 28          ID
 29          ID              100-YEAR ADJUSTED RAINFALL DEPTH = 1.43 x 2.20 = 3.146in
 30          ID
 31          ID              10-YEAR RAINFALL DEPTH RATIO (JR CARD) = 1.736/3.146 = 0.5518
 32          ID          ********************************************************************************
 33          ID          ********************************************************************************
             *DIAGRAM
 34          IT       5                    300
 35          IO       5       0
 36          IN       5
 37          JR    PREC    .5518    1.00

 38          KK     ND1
 39          KM    PROPOSED BASIN ND1
 40          PB    3.146
 41          PC      0.0      .02      .057      .07      .087      .108      .124      .13      .13      .13
 42          PC      .13      .13       .13      .133       .14      .142      .148      .158      .172      .181
 43          PC      .19      .197      .199       .2      .201      .204      .214      .229      .241      .249
 44          PC      .251     .256      .27      .278      .281      .283      .295      .322      .352      .409
 45          PC      .499     .59       .71      .744      .781      .812      .819      .835      .851      .856
 46          PC      .86      .868      .876      .888       .91      .926      .937       .95       .97      .976
 47          PC      .982     .985      .987      .989       .99      .993      .993      .994      .995      .998
 48          PC      .998     .999       1.0
 49          BA    .00852
 50          LS        0     89.9
 51          UD     .150
```

1

HEC-1 INPUT

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

```
 52          KK     ND2
 53          KM    PROPOSED BASIN ND2
 54          BA    .00298
 55          LS        0     98.0
 56          UD     .069

 57          KK     ND3
 58          KM    PROPOSED BASIN ND3
 59          BA    .00117
 60          LS        0     98.0
 61          UD     .050
 62          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW

```
 38          ND1
              .
              .
 52           .          ND2
              .           .
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1**********
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* *
* RUN DATE 23FEB09 TIME 10:36:48 *
* *
****

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

FAITH LUTHERAN HIGH SCHOOL ADDITION - TECHNICAL DRAINAGE STUDY
PROPOSED CONDITION - ONSITE
USING SCS METHODS AND KINEMATIC WAVE ROUTING
MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
LOCHSA JOB# 081156

INPUT FILE NAME: 81156P.DAT

FEBRUARY 2009

****
****
OUTSIDE McCARRAN AIRPORT RAINFALL AREA

10 YEAR & 100 YEAR - 6 HOUR STORM EVENT
PRECIPITATION BASED ON FIGURES 501 THROUGH 506
MODIFIED ON STANDARD FORM 3 (FIGURE 520) AND
ADJUSTED PER TABLE 501

10-YEAR ADJUSTMENT RATIO = 1.24 (FROM TABLE 501)
100-YEAR ADJUSTMENT RATIO = 1.43 (FROM TABLE 501)

10-YEAR RAINFALL DEPTH (SF3) = 1.40in
100-YEAR RAINFALL DEPTH (SF3) = 2.20in
10-YEAR ADJUSTED RAINFALL DEPTH = 1.24 x 1.40 = 1.736in
100-YEAR ADJUSTED RAINFALL DEPTH = 1.43 x 2.20 = 3.146in

10-YEAR RAINFALL DEPTH RATIO (JR CARD) = 1.736/3.146 = 0.5518

****
****

35 IO OUTPUT CONTROL VARIABLES

IPRNT		5	PRINT CONTROL
IPLOT		0	PLOT CONTROL
QSCAL		0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN		5	MINUTES IN COMPUTATION INTERVAL
IDATE	1	0	STARTING DATE

NDTIME 0055 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.55 1.00

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .55	RATIO 2 1.00
HYDROGRAPH AT						
+	ND1	.01	1	FLOW	6.	15.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ND2	.00	1	FLOW	4.	7.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ND3	.00	1	FLOW	2.	3.
				TIME	3.50	3.50

*** NORMAL END OF HEC-1 ***

APPENDIX B

HYDRAULIC ANALYSIS

INLET CAPACITY CALCULATIONS

Combined Capacity of the Existing 24"x24" Jensen Precast Inlet and the Proposed Neenah Foundry Grate Model R-2565-J

Project Number: 81156

Date: February 2009

Rating Table for 30-inch Diameter Grate Cover for Existing Manhole (Neenah R-2565-J) and Existing 2'x2' Jensen Inlet

Orifice Equation: Q=KCA(2gh)^0.5

Effective Area of Jensen Grate: A=0.73 (L)^2

Effective Area of Neenah Grate 2.4 sq.ft (See Attached Manufacturers Spec)

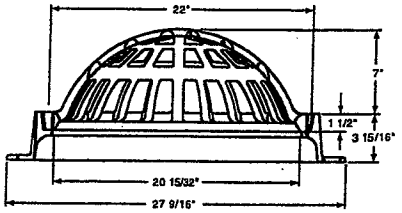
Combined 30-inch Diameter and 2'x2' Jensen Grates for Basin ND1 (6/15 cfs)

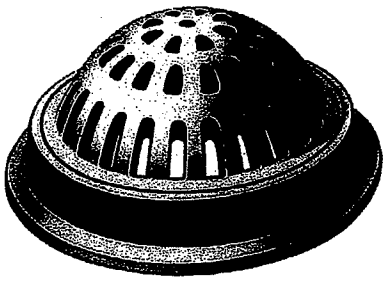
Grate			30-inch R-2565-J		2'x2' Jensen	
Grate Length/Diameter (D)(ft):			2.5		2.00	
Orifice Coefficient (C):			0.65		0.65	
Clogging Factor (K):			0.50		0.50	
Top of Grate Elevation :			27.99		27.98	
WSE (ft)	Head Above Grate (h) (ft)	Effective Area of 30-inch Grate (A) (sf)	Flow into 30-inch Grate (Q) (cfs)	Effective Area of 2'x2' Jensen Grate (A) (sf)	Flow into 2'x2' Jensen Grate (Q) (cfs)	Combined Flows Intercepted (Q) (cfs)
28.1	0.1	2.4	1.98	2.88	2.38	4.36
28.2	0.2	2.4	2.81	2.88	3.36	6.16
28.3	0.3	2.4	3.44	2.88	4.11	7.55
28.4	0.4	2.4	3.97	2.88	4.75	8.72
28.5	0.5	2.4	4.44	2.88	5.31	9.75
28.6	0.6	2.4	4.86	2.88	5.82	10.68
28.7	0.7	2.4	5.25	2.88	6.28	11.53
28.8	0.8	2.4	5.61	2.88	6.72	12.33
28.9	0.9	2.4	5.95	2.88	7.13	13.08
29.0	1.0	2.4	6.27	2.88	7.51	13.78
29.5	**1.5**	**2.4**	**7.68**	**2.88**	**9.20**	**16.88**
30.5	2.5	2.4	9.92	2.88	11.88	21.80
31.5	3.5	2.4	11.74	2.88	14.05	25.79
32.5	4.5	2.4	13.31	2.88	15.93	29.24
33.5	5.5	2.4	14.71	2.88	17.62	32.33
34.5	6.5	2.4	15.99	2.88	19.15	35.14
35.5	7.5	2.4	17.18	2.88	20.57	37.75
36.5	8.5	2.4	18.29	2.88	21.90	40.19
37.5	9.5	2.4	19.34	2.88	23.15	42.49
38.5	10.5	2.4	20.33	2.88	24.34	44.67
39.5	11.5	2.4	21.27	2.88	25.47	46.75
40.5	12.5	2.4	22.18	2.88	26.56	48.74
41.5	13.5	2.4	23.05	2.88	27.60	50.65
42.5	14.5	2.4	23.89	2.88	28.60	52.49
43.5	15.5	2.4	24.70	2.88	29.57	54.27

R-2563
Inlet Frame, Beehive Grate

CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-2563	Beehive	1.2	5.8

Available Lid: **R-1690**

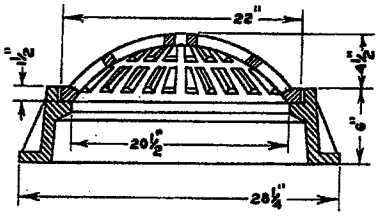


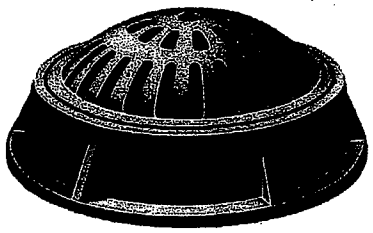


R-2564
Inlet Frame, Beehive Grate

CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-2564	Beehive	1.0	5.8

Available Lid: **R-1761**



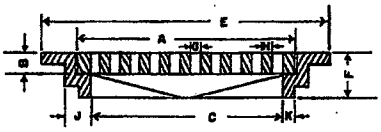


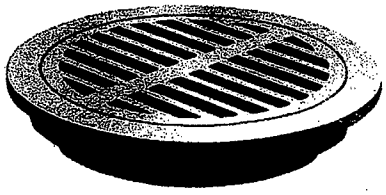
R-2565 Series
Inlet Frame, Grate

Heavy Duty

CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-2565-A	G	0.8	5.5
R-2565-C	G	1.2	6.0
R-2565-E	G	1.8	7.1
R-2565-F	G	1.8	7.1
R-2565-G	G	1.6	7.1
R-2565-H	G	1.9	7.6
R-2565-J	G	2.4	8.5

Effective Open Area = 2.4 sq.ft.





For Frame/Lid alternatives, see the **R-6052 Series.**

Dimensions in inches

Catalog No.	A	B	C	E	F	G	H	J	K	Frame/Lid
R-2565-A	21	2 1/2	18	27 1/2	5	1 3/8	1	2 7/8	1	R-6052-A
R-2565-C	23	1 1/4	20	29 3/4	4	1 3/8	1	2 1/2	1	R-6052-C
R-2565-E	27	1 1/4	23 1/2	33 1/2	4	1 1/2	1	2 1/4	3/4	R-6052-D
R-2565-F	27	2 1/2	24	33 1/2	5	1 1/2	1	2 7/8	1	R-6052-G
R-2565-G	27	2 1/2	24	33 1/2	5	1 1/2	1	2 7/8	1	R-6052-G
R-2565-H	29	1 3/4	27	35	6	1	1	2 7/8	1	R-6052-H
R-2565-J	32 3/8	2	30	39 1/2	6	1 1/2	1	2 7/8	1	R-6052-J

WEST HALF OF INDIGO DRIVE SOUTH OF POINT
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\streets.fm2
Worksheet	66-foot BC to BC
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		
Channel Slope	0.019700	ft/ft
Elevation range: 0.00 ft to 0.88 ft.		
Discharge	4.50	cfs

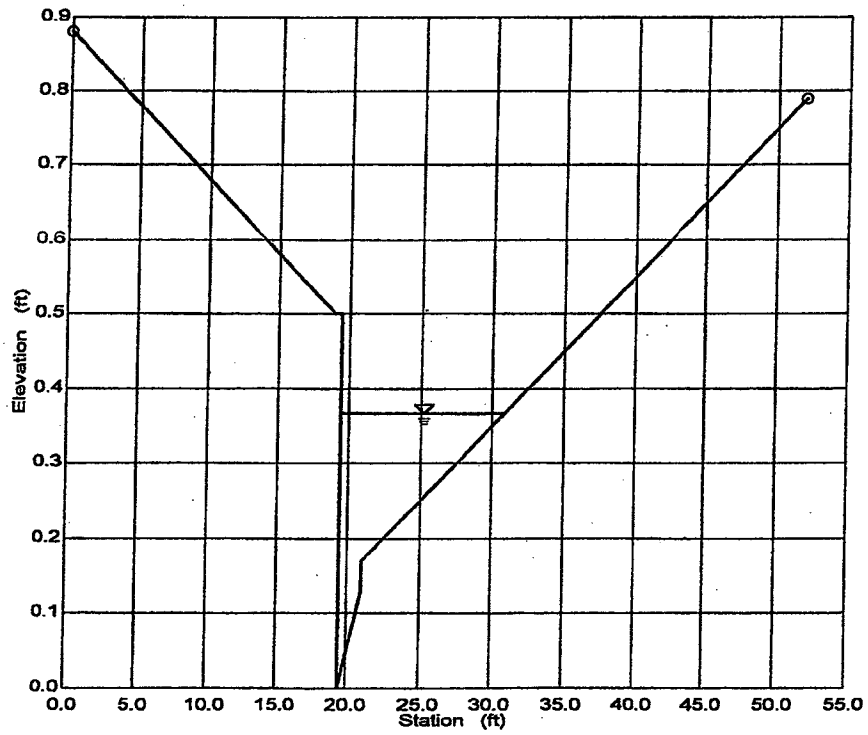
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	0.88	0.00	52.00	0.016
19.00	0.50			
19.50	0.50			
19.50	0.00			
21.00	0.13			
21.00	0.17			
52.00	0.79			

Results		
Wtd. Mannings Coefficient	0.016	
Water Surface Elevation	0.37	ft
Flow Area	1.41	ft²
Wetted Perimeter	11.72	ft
Top Width	11.31	ft
Height	0.37	ft
Critical Depth	0.42	ft
Critical Slope	0.007362	ft/ft
Velocity	3.18	ft/s
Velocity Head	0.16	ft
Specific Energy	0.52	ft
Froude Number	1.59	
Flow is supercritical.		

Cross Section
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\streets.fm2
Worksheet	66-foot BC to BC
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.016	
Channel Slope	0.019700	ft/ft
Water Surface Elevation	0.37	ft
Discharge	4.50	cfs



EAST HALF OF INDIGO DRIVE SOUTH OF PT 6
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\streets.fm2
Worksheet	66-foot BC to BC
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

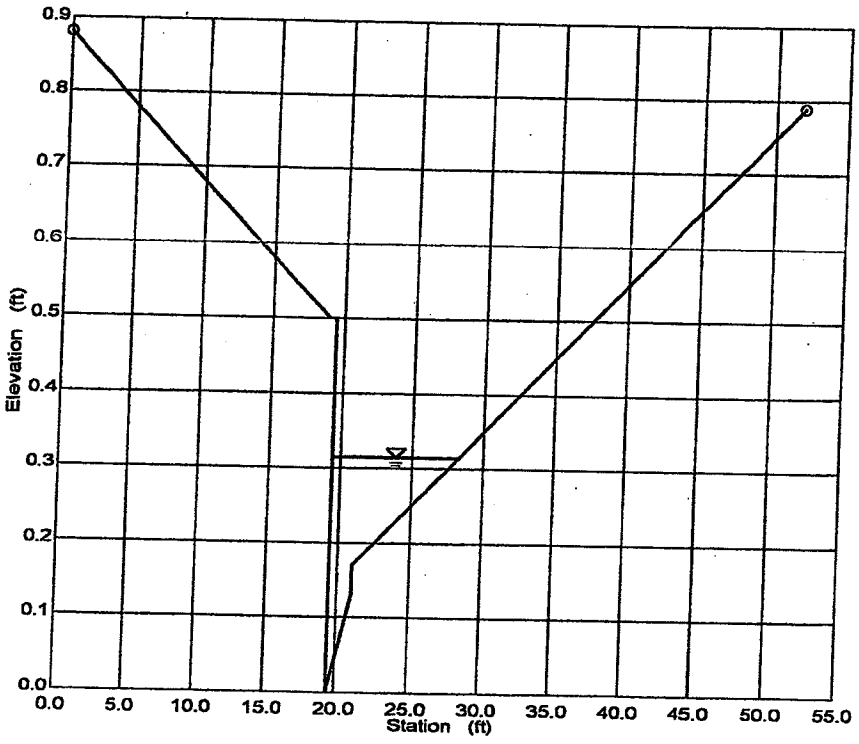
Input Data					
Channel Slope	0.019700 ft/ft				
Elevation range: 0.00 ft to 0.88 ft.					
Station (ft)	Elevation (ft)		Start Station	End Station	Roughness
0.00	0.88		0.00	52.00	0.016
19.00	0.50				
19.50	0.50				
19.50	0.00				
21.00	0.13				
21.00	0.17				
52.00	0.79				
Discharge	2.50	cfs			

Results		
Wtd. Mannings Coefficient	0.016	
Water Surface Elevation	0.31	ft
Flow Area	0.90	ft²
Wetted Perimeter	9.10	ft
Top Width	8.73	ft
Height	0.31	ft
Critical Depth	0.35	ft
Critical Slope	0.007958	ft/ft
Velocity	2.78	ft/s
Velocity Head	0.12	ft
Specific Energy	0.44	ft
Froude Number	1.53	
Flow is supercritical.		

Cross Section
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\streets.fm2
Worksheet	66-foot BC to BC
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.016	
Channel Slope	0.019700	ft/ft
Water Surface Elevation	0.31	ft
Discharge	2.50	cfs



Indigo Drive - Pt. 6
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\streets.fm2
Worksheet	66-foot BC to BC
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		
Channel Slope	0.011500 ft/ft	
Elevation range: 0.00 ft to 0.88 ft.		
Station (ft)	Elevation (ft)	
0.00	0.88	
19.00	0.50	
19.50	0.50	
19.50	0.00	
21.00	0.13	
21.00	0.17	
52.00	0.79	
83.00	0.17	
83.00	0.13	
84.50	0.00	
84.50	0.50	
85.00	0.50	
104.00	0.88	
Discharge	15.00	cfs

Start Station	End Station	Roughness
0.00	104.00	0.016

Results		
Wtd. Mannings Coefficient	0.016	
Water Surface Elevation	0.45	ft
Flow Area	5.12	ft²
Wetted Perimeter	32.16	ft
Top Width	31.16	ft
Height	0.45	ft
Critical Depth	0.49	ft
Critical Slope	0.006876	ft/ft
Velocity	2.93	ft/s
Velocity Head	0.13	ft
Specific Energy	0.58	ft
Froude Number	1.27	
Flow is supercritical.		
Flow is divided.		

Cross Section
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\streets.fm2
Worksheet	66-foot BC to BC
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.016	
Channel Slope	0.011500	ft/ft
Water Surface Elevation	0.45	ft
Discharge	15.00	cfs

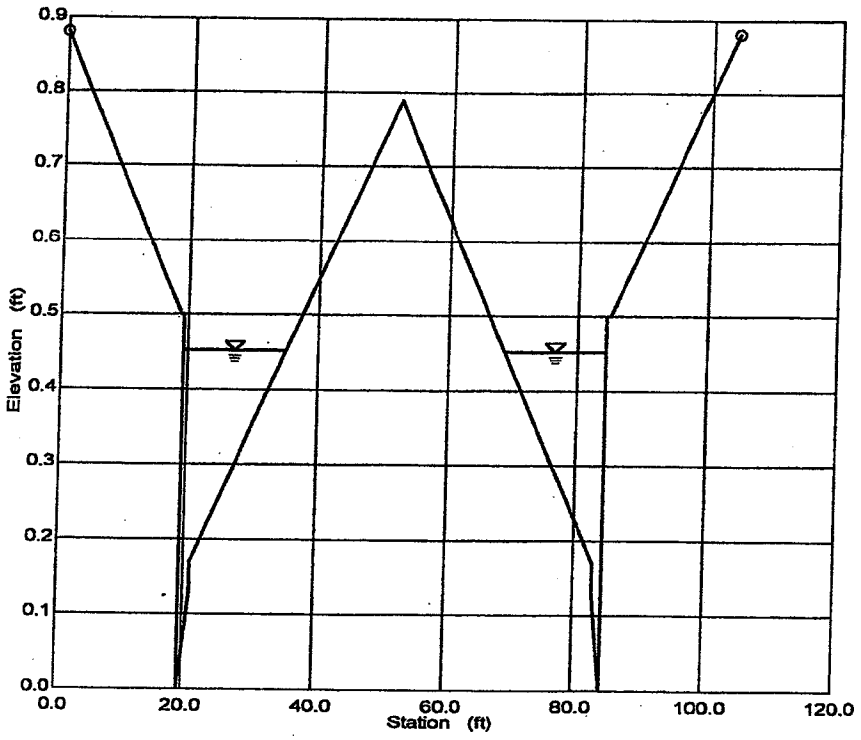


TABLE 2
STREET FLOW CHARACTERISTICS

Street*	Width (ft)	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (fps)	Vxd
Sandstone Bluffs Dr. South of Sump (East)	46	0.4	3.5	0.42	1.63	0.7
Park Center Dr.	60	1.5	9	0.46	3.38	1.6
Indigo Road South of Point 6 (West)	66	1.97	4.5	0.37	3.18	1.2
Indigo Road South of Point 6 (East)	66	1.97	2.5	0.31	2.78	0.9
Indigo Road North of Point 6 (West)	66	0.5	7.5	0.45	2.93	1.3
Indigo Road North of Point 6 (West)	66	0.5	7.5	0.45	2.93	1.3
Home Stretch Drive	66	2.0	7	0.34	3.02	1.0

*See Figure 6

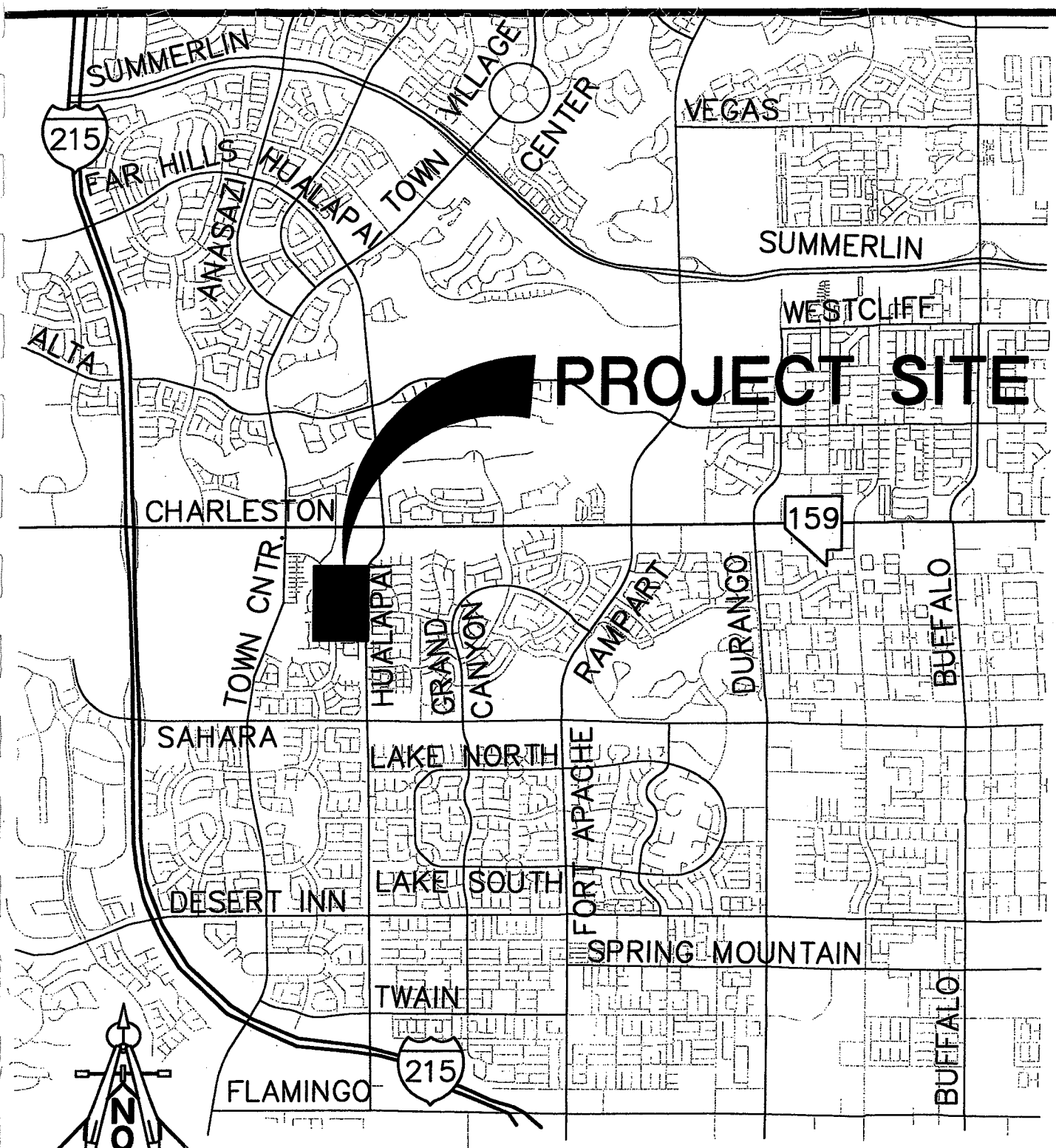
Drop inlets were sized using the nomographs contained in the Manual for inlets. For Modified Type "C" inlets on grade, a safety clogging factor was added by assuming that the extended grate portion of the inlet will make up the additional clogging capacity to achieve an overall capacity factor in excess of 50 percent. This approach to inlet sizing has been used in numerous approved drainage studies submitted by G. C. Wallace, Inc. For inlets in a sump condition a 50 percent clogging factor was applied to the full length of the curb and grate opening per the Manual. Calculations for sizing the drop inlets are included in Appendix B and summarized in Table 3.

The proposed storm drain system is shown on Figure 6. The proposed storm drain system was designed and modeled using the combined peak flows from the revised HEC-1 analysis. Hydraulic calculations were performed using Standard Form 6 and are included in Appendix B. The hydraulic grade line and energy grade line are included with the pipe profile in the attached drawings. The starting HGL elevation of 29.24 at the 5-foot by 4-foot RCB was taken from the *Village 13 Faith Lutheran One Half Street Improvements Drainage Study*. This starting HGL should be conservative since it was based on a 100-year flow of 246 cfs in the 5-foot by 4-foot RCB. The current design 100-year flow in the 5-foot by 4-foot RCB is 224 cfs.

THIS IS THE OUTFALL FROM THE DETENTION BASIN. NEED TO ADD FLOW FROM BASINS TO THE NORTH + A26 + B2 ? FOR A TOTAL OF 201 cfs

APPENDIX C

FIGURES



VICINITY MAP

NOT TO SCALE

DRAWN BY:	WER	SCALE:	NONE
CHECKED BY:	SOA	DATE:	02-26-09

VICINITY MAP (FIGURE 1)

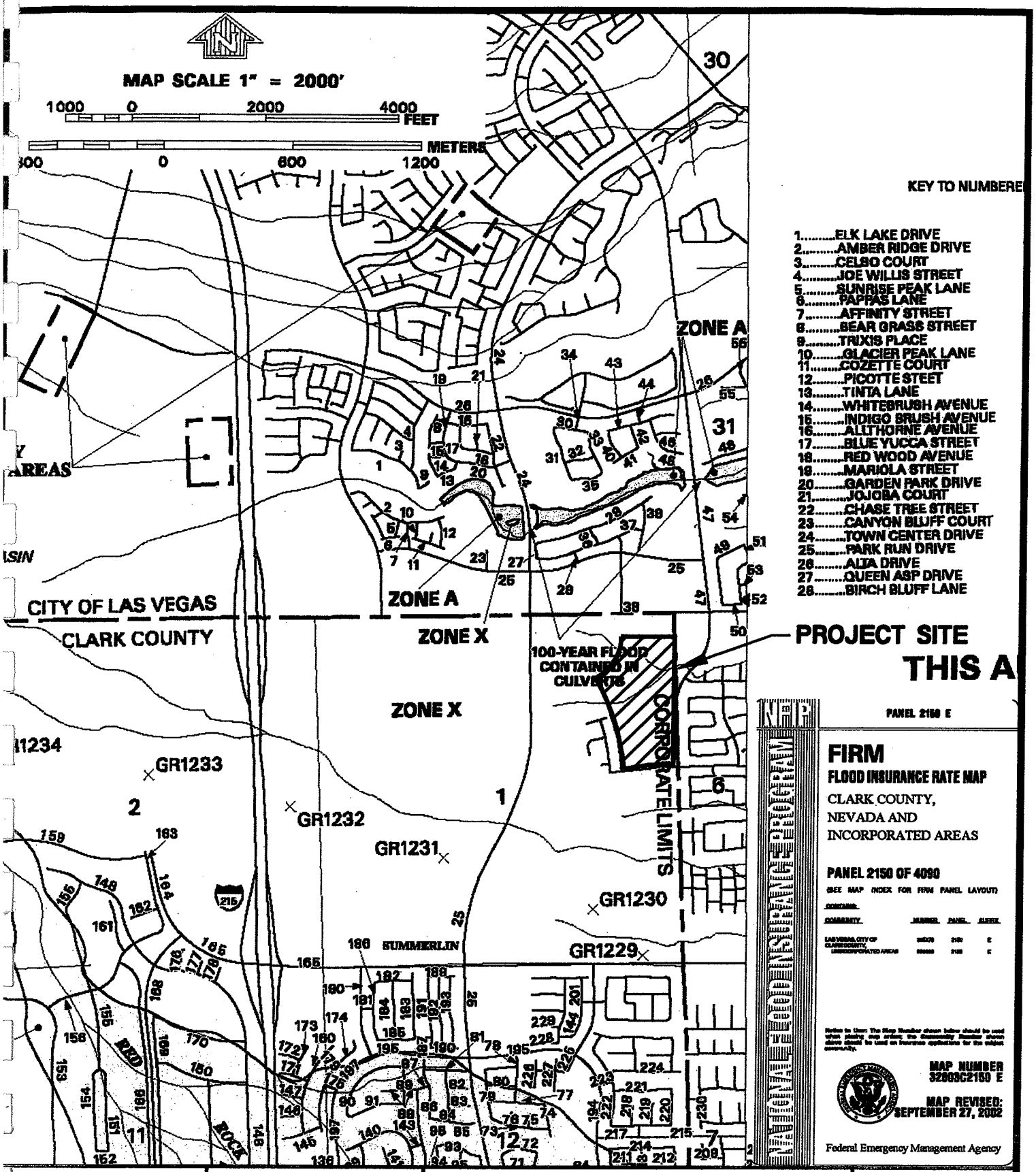
PROJECT No.: 081156

SHEET No. 1

SHEET 1 OF 1

LOCHSA ENGINEERING
6345 SOUTH JONES BLVD., SUITE 100
LAS VEGAS, NV 89118
P: 702 365-9312, F: 702 365-9317

FAITH LUTHERAN HIGH SCHOOL ADDITION



DRAWN BY:	WER	SCALE:	1"=2000'
CHECKED BY:	SOA	DATE:	02-04-09

FLOOD INSURANCE RATE MAP (FIGURE 2)

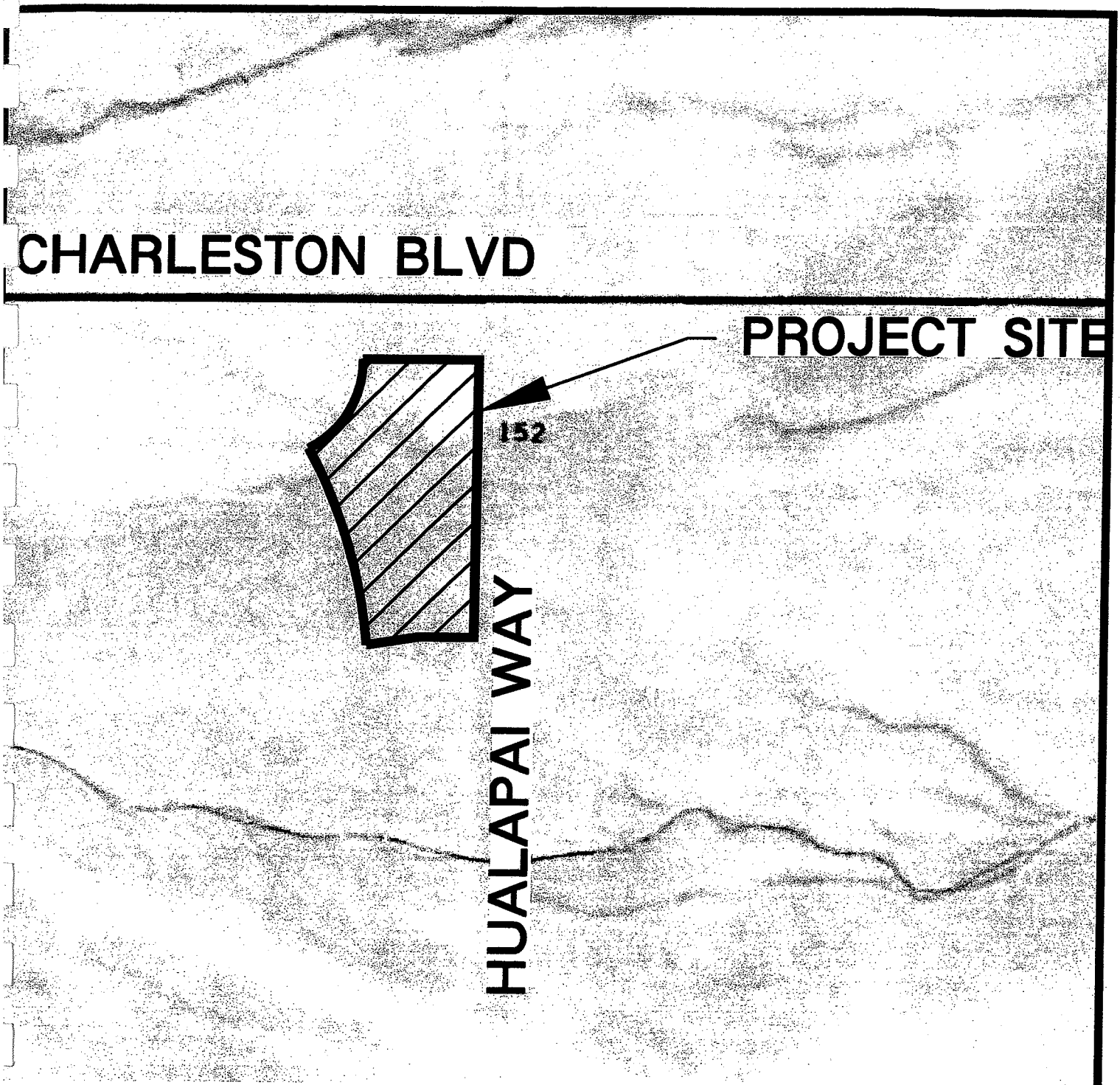
PROJECT No.: 081156

SHEET No. 2

SHEET 1 OF 1

LOCHSA ENGINEERING
6345 SOUTH JONES BLVD., SUITE 100
LAS VEGAS, NV 89118
P: 702 365-9312, F: 702 365-9317

FAITH LUTHERAN HIGH SCHOOL ADDITION



GRAPHIC SCALE

00 0 500 1000 2000

(IN FEET)
1 inch = 1000 ft.

NORTH

AWN BY:	WER	SCALE:	1"=1000'
HECKED BY:	HMN	DATE:	03-03-09

LOCHSA ENGINEERING
6345 SOUTH JONES BLVD., SUITE 100
LAS VEGAS, NV 89118
P: 702 365-9312, F: 702 365-9317

SOILS MAP (FIGURE 3)

FAITH LUTHERAN HIGH SCHOOL ADDITION

PROJECT No.: 081156

SHEET No. 3

SHEET 1 OF 1

Soil Survey of Las Vegas Valley Area Nevada

Part of Clark County

This unit is limited for roads because of the depth to the indurated hardpan. Roads should be designed to minimize cuts.

This map unit is in capability subclass VIIs, nonirrigated, and in horticultural group 6.

152—Cave gravelly fine sandy loam, 0 to 4 percent slopes. This shallow, well drained soil is on erosional fan remnants. It formed in alluvium derived from various kinds of rock.

Typically, about 60 percent of the surface is covered with a desert pavement of pebbles and cobbles. The surface layer is pale brown gravelly fine sandy loam about 12 inches thick. The next layer to a depth of 16 inches is an indurated, lime-cemented hardpan. The underlying material to a depth of 60 inches or more is light brown very gravelly sandy loam. Depth to the hardpan ranges from 4 to 20 inches.

Included in this unit are about 5 percent Anzo soils, flooded, in channels, 5 percent Canutio soils on inset fans, and 5 percent Grapevine soils on side slopes of erosional fan remnants. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of the Cave soil is moderate above the hardpan. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high if the surface is disturbed.

This unit is used mainly for urban development. It is also used as habitat for desert wildlife and for recreation.

This unit is poorly suited to urban development. The main limitation is the shallow depth to the hardpan. Excavation for building sites is limited by the hardpan, and heavy equipment is needed. Special design of septic tank absorption fields is needed.

Roads should be designed to minimize cuts because of the limited depth to the hardpan.

It is difficult to establish plants in areas where the pan is exposed. Mulching and terracing cut areas help to establish plants. Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. Annual applications of iron chelates reduce the effects of chlorosis.

Intermittent streams form the drainageways in this unit. These drainageways are subject to rare or occasional periods of high-velocity flooding. Care should be taken during urbanization to accommodate the runoff into the drainageways. If drains become plugged during a major flood, accelerated erosion and damage to roads, buildings, and other structures can occur.

This map unit is in capability subclass VIIs, nonirrigated, and in horticultural group 6.

155—Cave gravelly fine sandy loam, 4 to 15 percent slopes. This shallow, well drained soil is on erosional fan remnants. It formed in alluvium derived from various kinds of rock.

Typically, about 70 percent of the surface is covered with a desert pavement of rock fragments and pan fragments. The surface layer is light brown gravelly fine sandy loam about 5 inches thick. The underlying material to a depth of 15 inches is light brown gravelly fine sandy loam. The next layer to a depth of 60 inches or more is an indurated, lime-cemented hardpan. Depth to the hardpan ranges from 4 to 20 inches.

Included in this unit are about 5 percent Anzo soils, flooded, in channels and 5 percent Cajon soils on side slopes of erosional fan remnants. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of the Cave soil is moderate above the hardpan. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is moderate, and the hazard of water erosion is slight. The hazard of soil blowing is high if the surface is disturbed.

This unit is used as habitat for desert wildlife and for recreation.

This unit is limited for roads because of the depth to the indurated hardpan. Roads should be designed to minimize cuts. Cutting and filling can be reduced by building roads in the less sloping areas.

This map unit is in capability subclass VIIs, nonirrigated and in horticultural group 6.

160—Destazo cobbly fine sandy loam, 0 to 2 percent slopes. This very deep, well drained soil is on relict alluvial flats. It formed in alluvium derived dominantly from limestone and dolomite.

Typically, about 60 percent of the surface is covered with a desert pavement of pebbles and cobbles. The surface layer is pink cobbly fine sandy loam about 11 inches thick. The upper 28 inches of the underlying material is light brown very gravelly sandy clay loam, and the lower part to a depth of 60 inches or more is pinkish white gravelly sandy loam containing some crystalline gypsum.

Included in this unit are about 5 percent Bracken very cobbly fine sandy loam, 2 to 5 percent slopes, on side slopes of slightly higher remnants of relict alluvial flats and 10 percent Las Vegas soils on summits of slightly higher remnants of alluvial flats. Included areas make up about 15 percent of the total acreage.

Permeability of this Destazo soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used mainly as habitat for desert wildlife and for recreation. It is also used for urban development.

This unit is well suited to the construction of dwellings.

The main limitation for septic tank absorption fields is restricted permeability. The operation of septic tank

value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the amount of stable aggregates 0.84 millimeters in size. These are represented idealistically by USDA textural classes. There can be soils containing rock fragments in any group.

1. Sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

In table 14, soils that have sufficient rock fragments on the surface for partial protection from wind erosion have been adjusted to a higher wind erodibility group.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 15 gives the frequency of flooding and the time of year when flooding is most likely.

Frequency and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic

matter content with increasing depth, and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. Indicated in table 15 are the depth to the seasonal high water table and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

Only saturated zones within a depth of about 6 feet are indicated.

Depth to bedrock is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Cemented pans are cemented or indurated subsurface layers within a depth of 60 inches. Such pans cause difficulty in excavation. Pans are classified as thin or thick. A pan that is less than 3 inches thick is continuously indurated or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A thick pan is more than 3 inches thick if continuously indurated or more than 18 inches thick if discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract. Many soils in the Las Vegas Valley Area contain calcium sulfate, in the form of gypsum, and sodium sulfate salts. These soils have a high risk of corrosion to concrete.

TABLE 15.--SOIL AND WATER FEATURES

"Flooding" and "water table" and terms such as "rare" and "occasional" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern.)

Soil name and map symbol	Hydrologic group	Flooding		High water table		Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Months	Depth	Kind	Depth	Thickness	Depth	Hardness	Uncoated steel	Concrete
				Ft		In		In			
125*. McCullough	D	Rare	---	>6.0	---	>60	---	---	---	High	High.
126. Nash	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.
127. Newspoint	A	None	---	>6.0	---	>60	---	---	---	High	Low.
128. Nimas	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.
129. Nimas	A	Occasional	Mar-Sep	>6.0	---	>60	---	---	---	High	Low.
130. Nimas	A	Rare	---	>6.0	---	>60	---	---	---	High	High.
131. Nimas	A	None	---	>6.0	---	>60	---	---	---	High	Low.
132. Nimas	A	Rare	---	>6.0	Jan-Sep	>60	---	---	---	High	Moderate.
133, 134, 135. Nimas	A	None	---	>6.0	---	>60	---	---	---	High	Low.
136*. Pranket	D	None	---	>6.0	---	20-40	Soft	---	---	High	High.
137. Pranket	B	Rare	---	>6.0	---	>60	---	---	---	High	High.
138. Pranket	B	None	---	>6.0	---	40-60	Soft	---	---	High	High.
139*. Pranket	B	None	---	>6.0	---	40-60	Soft	---	---	High	High.
140. Rock outcrop.											
141. Rosamond	D	None	---	>6.0	---	20-40	Soft	---	---	High	High.
142. Tecuya	A	None	---	>6.0	---	>60	---	---	---	High	High.
143. Vaca	B	None	---	>6.0	---	>60	---	4-40	Strong	High	Low.
144. Vaca	B	Rare	---	>6.0	---	>60	---	10-20	Strong	High	Low.
145, 146. Vaca	B	None	---	>6.0	---	>60	---	4-20	Strong	High	Low.
147. Vaca	B	None	---	>6.0	---	>60	---	---	---	High	High.
148*. Vallecito	B	None	---	>6.0	---	>60	---	---	---	High	Low.
149. Wasco	B	None	---	>6.0	---	>60	---	20-40	Thick	High	Low.

See footnote at end of table.

APPENDIX D

REFERENCES

REFERENCE 5

"*Technical Drainage Study for the Summerlin Village 13 East Detention Basin*"
(Amendment to the Drainage Study for Summerlin Village 13 Town Center Drive Improvements), Approved on September 18, 2000

DRAINAGE STUDY

HTE 00-26582

PROJECT NAME

SUMM/ VILLAGE 1BE DETENTION AMD

SECTION-TOWNSHIP-RANGE

01-21-59

CROSS STREETS

PARK CENTER/ TOWN CENTER

NEW ASSESSOR'S PARCEL NUMBER

164-01-510-004

AGREAGE:

4

SUBMITTAL DATE:

8/25/00

DRAWER # D209

TECHNICAL DRAINAGE STUDY
FOR THE
SUMMERLIN VILLAGE 13 EAST
DETENTION BASIN

(Amendment to the Drainage Study for Summerlin Village 13 Town Center Drive Improvements)

62013.606

August 2000

Prepared for:

Howard Hughes Properties, Inc.
a Nevada Corporation
10000 West Charleston Boulevard, Suite 200
Las Vegas, NV 89135
Phone: (702) 791-4300
Fax: (702) 791-4453

Department of Public Works

500 S Grand Central Pky • PO Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

M.J. Manning, Director • E-Mail: mjm@co.clark.nv.us

September 18, 2000

G. C. Wallace, Inc.
1555 South Rainbow Boulevard
Las Vegas, Nevada 89146

Re: **Technical Drainage Study** for Summerlin Village 13 East Detention Basin
Study Dated: August 25, 2000
Location: Southwest corner of Indigo Drive and Griffith Peak Drive
(Sec.1, T. 21 S., R. 59 E.)
HTE #00-26582

The referenced **Technical Drainage Study** has been reviewed and is accepted as complying with minimum improvement standards. As set forth in the subject drainage study, the following measures will be taken to mitigate flood hazards:

1. The site shall be graded with respect to drainage as shown on "Village 13 East Detention Basin Park," sheets 1-7 of 7, signed and sealed by Jeff W. Stayton, P.E. on August 25, 2000;

2. The following drainage facilities shall be constructed:

   a. Approximately 193 lf of 18-inch PVC storm drain connecting to the existing junction structure at the west end of the detention basin. A 12" x 12" catch basin with grate shall be constructed in the northwest area of the detention basin at the low point. The listed facilities shall be constructed as shown on details 2/7 and 3/7

   b. Approximately 150 lf of 18-inch PVC storm drain connecting to SDMH#1. A 12" x 12" catch basin with grate shall be constructed in the southwest area of the detention basin at the low point. The listed facilities shall be constructed as shown on details 1/7 and 3/7

   c. Approximately 809 lf of 24-inch Class III RCP stormdrain connecting to the existing junction structure at the west end of the detention basin. There are four (4) Type I storm drain manholes. The inlet area includes a temporary rip rap basin approximately 3 feet deep including a 5 foot by foot bottom lined with rock d50 = 18 inches, 36 inches thick

   d. An 8-foot-wide concrete valley crossing the parking lot entrance to the park/detention basin on the west side of Griffith Peak Drive

3. A bond estimate must be submitted to Clark County Public Works for the above-mentioned stormwater management facilities;

4. The subject site is located within Zone X, as shown on FIRM Community Panel Number 32003C2150D, revised August 16, 1995, and later revised to reflect LOMR dated January 14, 1997. Zone X is determined to be outside the 500-year flood plain;

5. Mylars of the grading plan must be submitted to the Clark County Plan Check for approval signatures prior to permit issuance;

6. Grant of public drainage easement must be verified;

7. The consultant/developer must verify that a license and maintenance agreement has been executed for the detention basin/park facility;

8. At the request of Clark County Public Works, drainage/grading plans for the proposed development have been reviewed for compliance to the requirements set forth in the "Minimum Drainage Study Criteria Checklist," "Drainage Plan Information," dated July 15, 1997. **As a condition of final approval, the drainage/grading plans submitted for this project require the following modifications to meet the minimum standards outlined in the above-referenced regulation:**

   a. Provide matchline information as redlined

   b. Reference HTE# for plans or facilities listed as existing

   c. Design information at entrance to parking area

   d. Station profiles

   e. Revise rip-rap thickness to 36 inches

   f. Additional comments as shown on the plans

No liability is assumed by the County for information, data, and conclusions of the consulting engineer.

M.J. MANNING
DIRECTOR OF PUBLIC WORKS

BY: _____
MARC A. BOLDUC, P.E.
SENIOR ENGINEER, MAJOR PROJECTS

MAB/tg

Cc: Howard Hughes Corporation
Development File

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

62013.606

Name of Development: Summerlin Village 13 Detention Basin Date: August 2000

Location of Development: a) Descriptive (Cross Streets) North/South: Town Center Dr. East/West: Park Centre Drive

b) Sect. 1 Twn. T21S Rng. R59E

Name of Owner: Howard Hughes Properties, a Nevada Corporation Assessors Parcel No: 164-01-510-004; 164-01-610-003

Telephone No: (702) 791-4300 Facsimile No: (702) 791-4450

Address: 10000 West Charleston Boulevard, Suite 200
Las Vegas, NV 89135

Contact Person-Name: Kayann Jongsma, P.E. Telephone No: 804-2000

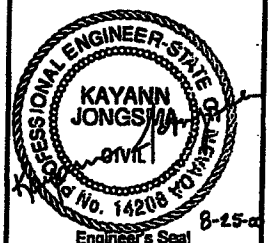
Firm: G. C. Wallace, Inc.

Address: 1555 South Rainbow Boulevard, Las Vegas, NV 89146

Type of Land Development/Land Disturbance Process:

	Rezoning		Subdivision Map		Clearing and Grading Only
	Parcel Map		Planned Unit Development	X	Other (Please specify below)
	Large Parcel Map		Building Permit		Grading & storm drain improvements

1. Total Owned Land Area: At Site: 6 ac. Being Developed/Disturbed: 4 ac.
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? Yes* No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? Yes* No
4. Proposed type of development (Residential, Commercial, etc.)? Park/Paseo
5. Approximate upstream land area which drains to the subject site? 650 ac.
6. Has the site drainage been evaluated in the past? YES NO If yes, please identify documentation:
   Technical Drainage Study for Summerlin Village 13 East Phase 1 Improvements, G. C. Wallace, Inc. October 1999.
   Technical Drainage Study for Summerlin Village 13 Town Center Drive Improvements, G. C. Wallace, Inc. July 2000.
7. *If known, please briefly identify the proposed discharge point(s) of runoff from the site:*
   Summerlin Village 13 Detention Basin
8. Briefly describe your proposed schedule for the subject project: September 2000



Engineer's Seal

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

* Review and concurrence of the Clark County Regional Flood Control District is Required.

00-26382
Local Entity File No.

Revision	Date

REFERENCE: STANDARD FORM 1

G. C. WALLACE, INC.
Engineers / Planners / Surveyors

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AFFILIATE OFFICE IN
SACRAMENTO, CA

52013.606

August 25, 2000

Marc A. Bolduc, P.E., Major Projects
Clark County Department of Public Works
Community Development Department
500 South Grand Central Parkway
Las Vegas, NV 89155-4000

Subject: Summerlin Village 13 East Detention Basin
(Summerlin Village 13 Town Center Drive Improvements)

Dear Mr. Bolduc:

The Summerlin Village 13 Detention Basin was originally designed and constructed with the Summerlin Village 13 Faith Lutheran School Improvements. Subsequent modifications to the detention basin grading and ultimate design were made with the *Amendment to the Technical Drainage Study for Summerlin Village 13 East Phase 1 Improvements* (H.T.F. #98-28108), approved by Clark County Department of Public Works (CCPW) on October 19, 1998. More recently, the final improvements to the detention basin (78-inch RCP storm drain, junction box to 48-inch RCP with 45-inch orifice, and reduction of the grate area for the outlet) which convert the basin to an off-line facility were designed and approved with the *Technical Drainage Study for the Summerlin Village 13 Town Center Drive Improvements* (H.T.F. #00-21026). Please note that the storm drain facilities are not CCRFCD facilities and are not located in a Zone A Flood Zone.

This amendment addresses refined grading for the detention basin to incorporate a park facility, as originally intended. As part of the finish grading for the detention basin, two 12-inch by 12-inch grates and 18-inch PVC storm drain have been added to prevent standing water in the park area. The project also includes the construction of a 24-inch storm drain through the Paseo (Parcel P5) to connect the existing storm drain stub at the end of Park Centre Drive with the existing junction structure under the detention basin. The location of the proposed facilities is shown on Figure 1.

The proposed finish grading for the detention basin is shown on Figure 2. The HEC-1 model is updated to simulate the detention basin hydraulics with the proposed stage/volume modifications. The approved stage/outflow values are unchanged. The additional 12-inch by 12-inch inlets and 18-inch PVC storm drain proposed for low areas in the detention basin are intended only for nuisance flows. Regardless, the 18-inch PVC storm drains discharge to the junction structure upstream of the 45-inch orifice designed to restrict the outflow from the detention basin during major storm events. The revised HEC-1 model

is included in the appendix along with the reference model from the approved *Technical Drainage Study for the Summerlin Village 13 Town Center Drive Improvements*. During a 100-year storm event, storm water in the detention basin reaches a maximum stage of 2946.1 with a volume of 11.0 acre-feet. The height of the spillway is at elevation 2946.1. Therefore, as approved with the Town Center Drive Improvements, the spillway will be used only as an emergency overflow. The peak outflow from the revised detention basin is 231 cfs during a 100-year storm event. This outflow is unchanged from that approved with the Town Center Drive Improvements. Therefore, the proposed modifications do not affect downstream properties.

Detention Basin's peak stage elevation is 2946.1' which is same as the spillway elevation. No overflow through the spillway is expected in the 100-YR storm event.

The HGL/EGL for the proposed 24-inch storm drain to Park Centre Drive was calculated using WSPG. The hydraulic calculations for this storm drain are included in the appendix. The HGL is included on the attached improvement sheets. As part of the construction for the Paseo storm drain, the interim opening at the end of Park Centre Drive will be filled in. The upstream end of the proposed storm drain will be left exposed to intercept storm flows (Q_{100} = 15 cfs) from the existing V-ditch south of Park Centre Drive. Interim storm flows will pond to a depth of 2.3 feet before the culvert.

The 18-inch PVC storm drains are intended to convey only nuisance and minor flows. Therefore, the hydraulics for these facilities were not modeled.

The Paseo area generates approximately 3 cfs during a 100-year storm event. The proposed grading directs storm flows in the Paseo to the detention basin. The 100-year depth in the Paseo is 0.2 feet with a corresponding velocity of 2.9 fps. Due to the low velocities, significant erosion within the Paseo is unlikely.

If you have any questions or need additional information, please do not hesitate to contact us at 804-2000.

Very truly yours,

G. C. WALLACE, INC.

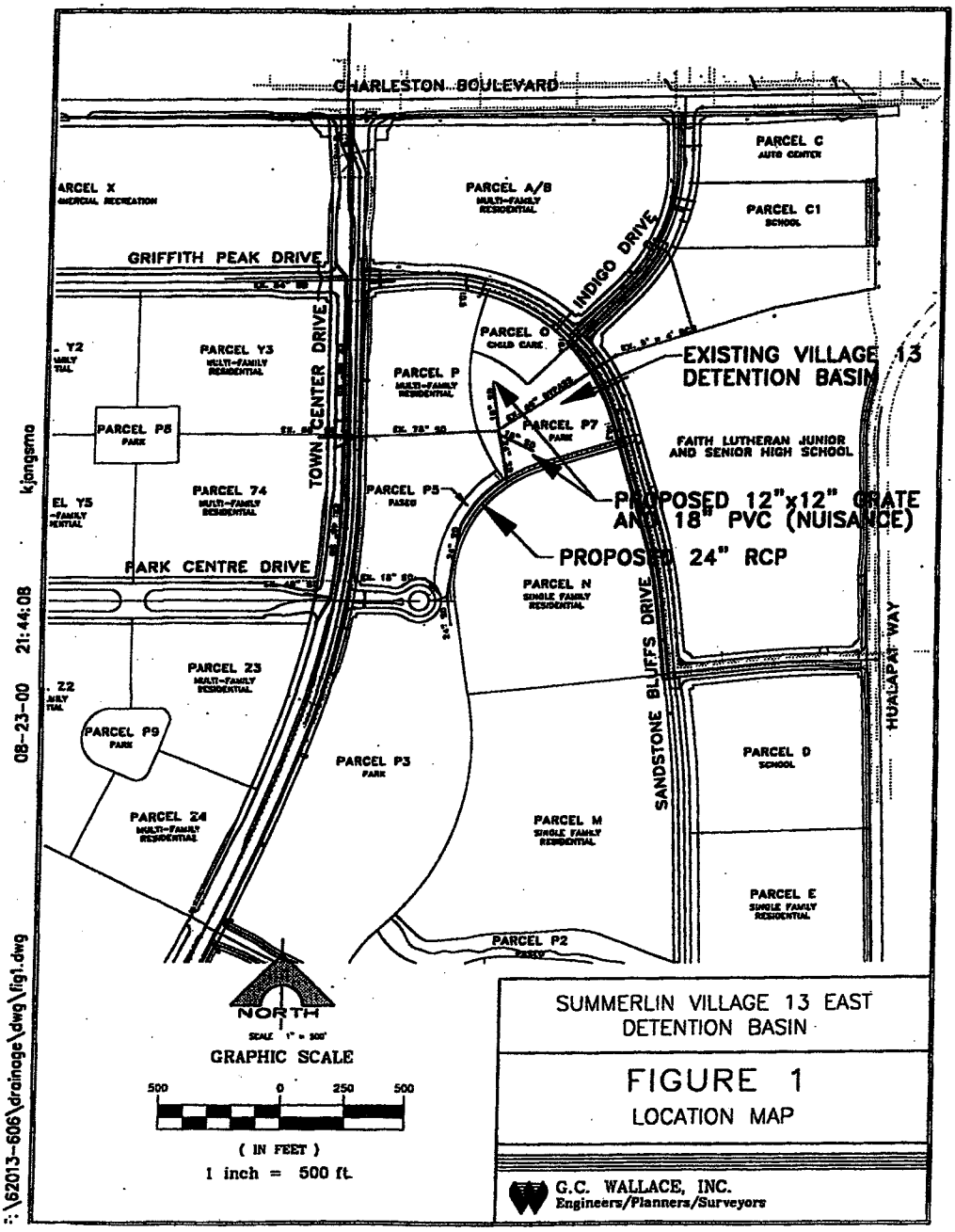
Kayann Jongsma, P.E.
Engineer

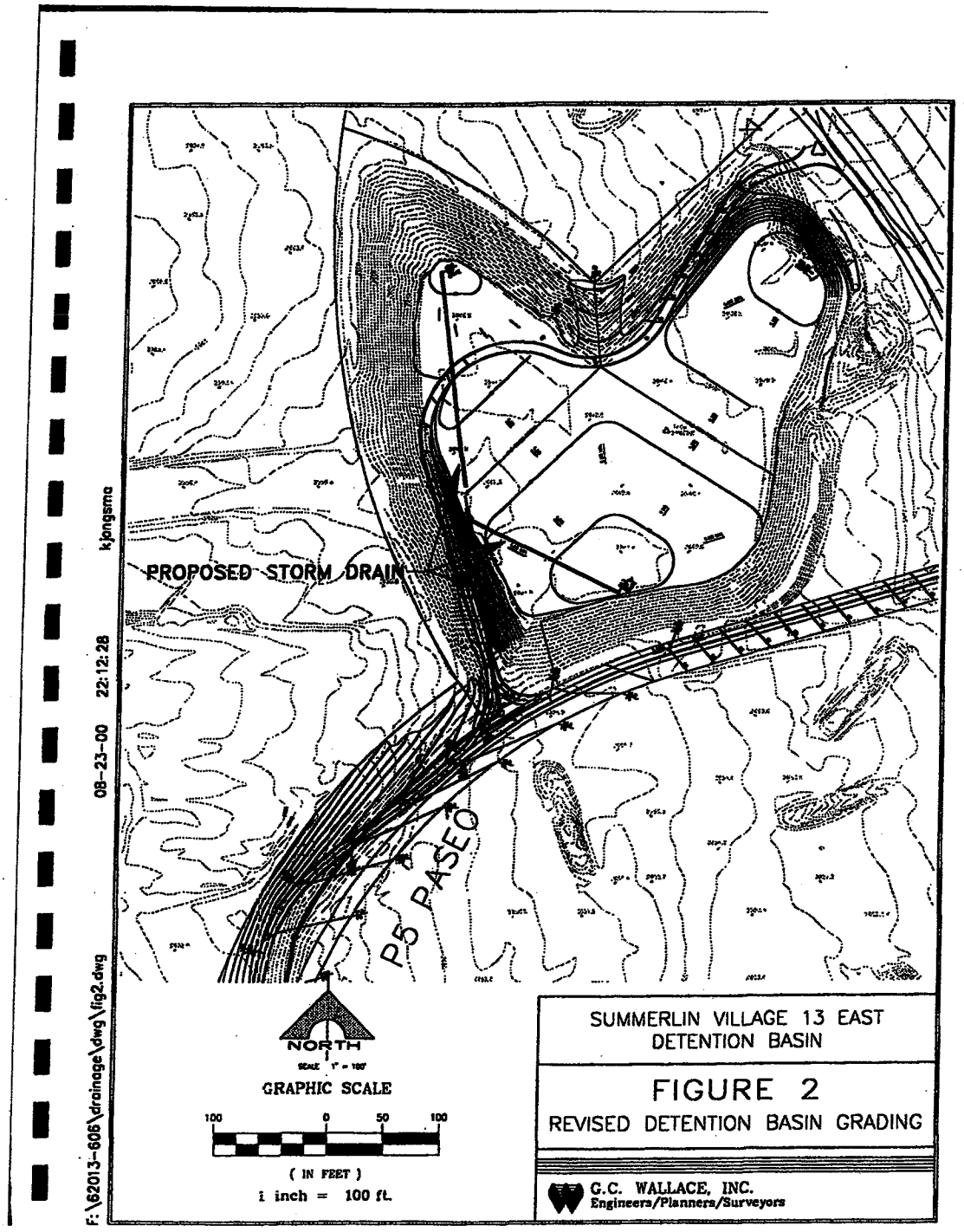
KJ

Encl.

pc: Calvin Black, GCW
Jeff Stayton, GCW
Randall K. Gremlich, GCW

\\Gcw2\data\62013-606\admin\drstudies\62013-606-amm.wpd


CHARLESTON BOULEVARD
GRIFFITH PEAK DRIVE
TOWN CENTER DRIVE
INDIGO DRIVE
PARK CENTRE DRIVE
SANDSTONE BLUFFS DRIVE
HUALAPAI WAY
PARCEL C
AUTO CENTER
PARCEL C1
SCHOOL
PARCEL A/B
MULTI-FAMILY RESIDENTIAL
PARCEL O
CHILD CARE
PARCEL P
MULTI-FAMILY RESIDENTIAL
PARCEL P7
PARK
PARCEL P8
PARK
PARCEL P5
PARK
PARCEL Y3
MULTI-FAMILY RESIDENTIAL
PARCEL 74
MULTI-FAMILY RESIDENTIAL
PARCEL N
SINGLE FAMILY RESIDENTIAL
PARCEL 23
MULTI-FAMILY RESIDENTIAL
PARCEL P9
PARK
PARCEL P3
PARK
PARCEL 24
MULTI-FAMILY RESIDENTIAL
PARCEL M
SINGLE FAMILY RESIDENTIAL
PARCEL D
SCHOOL
PARCEL E
SINGLE FAMILY RESIDENTIAL
PARCEL P2
PARK
FAITH LUTHERAN JUNIOR AND SENIOR HIGH SCHOOL
EXISTING VILLAGE 13 DETENTION BASIN
PROPOSED 12"x12" GRATE AND 18" PVC (NUISANCE)
PROPOSED 24" RCP
NORTH
SCALE 1" = 500'
GRAPHIC SCALE
500 0 250 500
(IN FEET)
1 inch = 500 ft.
SUMMERLIN VILLAGE 13 EAST
DETENTION BASIN
FIGURE 1
LOCATION MAP
G.C. WALLACE, INC.
Engineers/Planners/Surveyors
08-23-00 21:44:08 kjongsma
J:\62013-606\drainage\dwg\fig1.dwg


PROPOSED STORM DRAIN
P5 PASEO
NORTH
GRAPHIC SCALE
100 0 50 100
(IN FEET)
1 inch = 100 ft.
SUMMERLIN VILLAGE 13 EAST
DETENTION BASIN
FIGURE 2
REVISED DETENTION BASIN GRADING
G.C. WALLACE, INC.
Engineers/Planners/Surveyors
08-23-00 22:12:28 kjongsma
F:\62013-606\drainage\dwg\fig2.dwg

REVISED DETENTION BASIN VOLUMES

Volumes

elevation	area (sf)	avg. area (sf)	volume (cf)	cumulative volume (cf)	cumulative volume (acre-ft)
39.5	0			0	0.00
		5,023	2,512		
40.0	10,046			3,765	0.09
		27,203	27,203		
41.0	44,360			30,968	0.71
		54,969	27,484		
41.5	65,577			58,452	1.34
		72,477	36,239		
42.0	79,377			94,691	2.17
		84,168	84,168		
43.0	88,959			178,859	4.11
		91,552	91,552		
44.0	94,144			270,410	6.21
		96,697	96,697		
45.0	99,249			367,107	8.43
		101,682	101,682		
46.0	104,114			468,788	10.76
		104,339	10,434		
46.1	104,563			479,222	11.00
		106,584	95,925		
47.0	108,604			575,147	13.20
		111,022	111,022		
48.0	113,439			686,169	15.75

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*         SEPTEMBER 1990                *
*           VERSION 4.0                 *
*                                       *
*  RUN DATE  08/18/2000  TIME  14:39:16 *
*                                       *
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*                                       *
*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*       609 SECOND STREET               *
*       DAVIS, CALIFORNIA 95616         *
*         (916) 756-1104                *
*                                       *
*****************************************
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X    X X       X              X
XXXXXXX XXXX   X        XXXX  X
X    X X       X              X
X    X X       X     X        X
X    X XXXXXXX  XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1      ID  **********************************************************
   2      ID  * ------------------------------------------------------ *
   3      ID  * :                                                    : *
   4      ID  * :          SUMMERLIN VILLAGE 13 EAST                 : *
   5      ID  * :          REVISED DETENTION BASIN GRADING           : *
   6      ID  * :                                                    : *
   7      ID  * :.................................................... : *
   8      ID  * :                                                    : *
   9      ID  * :          RETURN PERIOD . . . 10-YEAR/100-YEAR      : *
  10      ID  * :          DISTRIBUTION. . . . 6-HOUR SCS3           : *
  11      ID  * :          PROJECT NO. . . . . 62013.606             : *
  12      ID  * :          FILENAME. . . . . V13DBR.H1               : *
  13      ID  * :          REV. DATE . . . . . 08/18/00              : *
  14      ID  * :          MODELED BY. . . . . KJ                    : *
  15      ID  * :                                                    : *
  16      ID  * :.................................................... : *
  17      ID  **********************************************************
  18      IT      5       0       0     300
  19      IO      5       0
  20      IN      5       0       0
  21      JR   PREC     .57     .99    1.0

  22      KK     A1
  23      KM   RESORT/OFFICE SWING SITE
  24      BA  .06031
  25      PB    3.15
  26      PC  0.000   .0200   .0570   .0700   .0870   .1080   .1240   .1300   .1300   .1300
  27      PC  .1300   .1300   .1300   .1330   .1400   .1420   .1480   .1580   .1720   .1810
  28      PC  .1900   .1970   .1990   .2000   .2010   .2040   .2140   .2290   .2410   .2490
  29      PC  .2510   .2560   .2700   .2780   .2810   .2830   .2950   .3220   .3520   .4090
  30      PC  .4990   .5900   .7100   .7440   .7810   .8120   .8190   .8350   .8510   .8560
  31      PC  .8600   .8680   .8760   .8880   .9100   .9260   .9370   .9500   .9700   .9760
  32      PC  .9820   .9850   .9870   .9890   .9900   .9930   .9930   .9940   .9950   .9980
  33      PC  .9980   .9990  1.000
  34      LS     0      95
  35      UD   .159

  36      KK     A2A
  37      KM   PAVILION CENTER DRIVE
  38      BA  .00272
  39      LS     0      95
  40      UD   .066
```

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    41          KK     A2B
    42          KM   PAVALION CENTER DRIVE
    43          BA  .00398
    44          LS       0       95
    45          UD    .093
                                           HEC-1 INPUT                                       PAGE 2
1

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


    46          KK     CA1
    47          KM   COMBINE A1, A2A, AND A2B AT CA1
    48          HC       3

    49          KK   R/CA1
    50          KM   ROUTE FLOWS TO CA2
    51          RD    2200     .02    .013            CIRC     4.5

    52          KK       X
    53          KM   PARCEL X
    54          BA  .04472
    55          LS       0       95
    56          UD    .144

    57          KK      A7
    58          KM      HR
    59          BA  .01563
    60          LS       0       95
    61          UD    .115

    62          KK   R/A7
    63          KM   ROUTE FLOWS TO CA2
    64          RD     830     .02    .013            CIRC     4.5

    65          KK      A8
    66          KM      HR
    67          BA  .01625
    68          LS       0       95
    69          UD    .111

    70          KK      A9
    71          KM   GRIFFITH PEAK DRIVE
    72          BA  .00952
    73          LS       0       95
    74          UD    .098

    75          KK     CA2
    76          KM   COMBINE CA1, X, A7, A8 AND A9
    77          HC       5

    78          KK   R/CA2
    79          KM   ROUTE FLOWS TO CA4
    80          RD     650    .004    .013            CIRC       5

    81          KK     CH1
    82          KM   CHARLESTON BLVD
    83          BA   .0024
    84          LS       0       96
    85          UD    .051
                                           HEC-1 INPUT                                       PAGE 3
1

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


    86          KK   A10AW
    87          KM   TOWN CENTER DRIVE
    88          BA  .00222
    89          LS       0       95
    90          UD    .102

    91          KK     COM
    92          HC       2

    93          KK    A10B
    94          KM   TOWN CENTER DRIVE
    95          BA  .00383
    96          LS       0       95
    97          UD    .103

    98          KK    CA4N
    99          KM   COMBINE CA2, CH1, A10AW, AND A10B AT CA4
   100          HC       3
```

```
                101          KK     A5
                102          KM   OFFICE
                103          BA  .02038
                104          LS       0      95
                105          UD    .088

                106          KK     A6
                107          KM   STREET
                108          BA  .00234
                109          LS       0      94
                110          UD    .097

                111          KK    A13
                112          KM   STREET
                113          BA  .00234
                114          LS       0      94
                115          UD    .097

                116          KK    CA4C
                117          KM   COMBINE A5, A6, AND A13 IN STORM DRAIN
                118          HC       3

                119          KK   R/CA4C
                120          KM   ROUTE FLOWS TO CA4   CENTER
                121          RD    1700     .02    .013            CIRC     2.5

                122          KK    CON
                123          KM   COMBINE CA4N WITH A5, A6, AND A13 AT CA4
                124          HC       2
1                                                  HEC-1 INPUT                                        PAGE  4

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

                125          KK    A11
                126          KM   CENTRAL PARK
                127          BA  .00906
                128          LS       0      88
                129          UD    .109

                130          KK   R/A11
                131          KM   ROUTE FLOWS TO CA3
                132          RD    1800     .021    .016            TRAP       0      50

                133          KK    A14
                134          KM     HR
                135          BA  .01406
                136          LS       0      95
                137          UD    .112

                138          KK   R/A14
                139          KM   ROUTE FLOWS TO CA3
                140          RD     800     .02    .013            CIRC     2.5

                141          KK    A15
                142          KM     HR
                143          BA  .01656
                144          LS       0      95
                145          UD    .107

                146          KK    CON
                147          KM   COMBINE FLOW TO REDUCE THE NUMBER OF HYDROGRAPHS
                148          KM   A11,  A14, A15
                149          HC       3

                150          KK    A16
                151          KM     HR
                152          BA  .00844
                153          LS       0      95
                154          UD    .092

                155          KK   R/A16
                156          KM   ROUTE FLOWS TO CA3
                157          RD     800     .02    .013            CIRC     2.5

                158          KK    A17
                159          KM   STREET
                160          BA  .00094
                161          LS       0      94
                162          UD    .056
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  163          KK  R/A17
  164          KM  ROUTE FLOWS TO CA3
  165          RD    800    .021    .016          TRAP       0      50
1                                        HEC-1 INPUT                                                    PAGE  5

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

  166          KK    A18
  167          KM     HR
  168          BA  .01188
  169          LS       0      95
  170          UD    .083

  171          KK    A19
  172          KM  STREET
  173          BA  .01313
  174          LS       0      89
  175          UD    .117

  176          KK    CA3
  177          KM  COMBINE A11, A12, A13, A14, A15, A16, A17, A18, AND A19 AT CA3
  178          HC       5

  179          KK  R/CA3
  180          KM  ROUTE FLOWS TO CA4
  181          RD    800     .02    .013           CIRC       4

  182          KK    A20
  183          KM  STREET/PARK
  184          BA  .00406
  185          LS       0      87
  186          UD    .145

  187          KK  A21AW
  188          KM  TOWN CENTER DRIVE (WEST SIDE)
  189          BA  .00313
  190          LS       0      95
  191          UD    .122

  192          KK   COM2
  193          KM  COMBINE A20 AND A21AW
  194          HC       2

  195          KK  R/COM
  196          KM  ROUTE FLOWS TO CA4
  197          RD    600    .023    .016          TRAP       0      50

  198          KK   A21B
  199          KM  TOWN CENTER DRIVE
  200          BA  .00441
  201          LS       0      95
  202          UD    .096

  203          KK   CA4S
  204          KM  COMBINE CA3, A20, AND A21 AT CA4 SOUTH
  205          HC       3
1                                        HEC-1 INPUT                                                    PAGE  6

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

  206          KK    CA4
  207          KM  COMBINE TOTAL FLOWS AT CA4
  208          HC       2

  209          KK  R/CA4
  210          KM  ROUTE FLOWS THRU A22 TO CA5
  211          RD    750    .025    .013           CIRC       6

  212          KK    A22
  213          KM     HR
  214          BA  .0195
  215          LS       0      95
  216          UD    .097

  217          KK    A23
  218          KM  COMMUNITY FACILITY
  219          BA  .00750
  220          LS       0      95
  221          UD    .123
```

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222         KK   A21AE
223         KM   TOWN CENTER DRIVE (EAST SIDE)
224         BA  .00328
225         LS     0      95
226         UD    .122

227         KK    A36
228         KM   COMMINITY BOULEVARD EAST OF TCD
229         BA   .0013
230         LS     0      95
231         UD    .042

232         KK   COM3
233         KM   COMBINE A23, A21AE, AND A36
234         HC     3

235         KK   B/COM
236         KM   ROUTE FLOWS THRU A24 TO CA5
237         RD    800    .02    .013          CIRC      2

238         KK    A24
239         KM   PASED
240         BA   .0016
241         LS     0      82
242         UD    .034

243         KK   COM2
244         KM   COMBINE COM3 AND A24
245         HC     2
1                                    HEC-1 INPUT                                    PAGE  7

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

246         KK   A25A
247         KM     DB
248         BA   .0082
249         LS     0      82
250         UD    .075

251         KK    CA5
252         KM   COMBINE CA4, A22, A23+, AND A25A AT CA5
253         HC     4

254         KK    DET
255         KM   PROPOSED DETENTION
256         KO     1
257         RS     1    STOR     -1
258         SV     0      0    0.71    1.34    2.17    4.11    6.21    8.43   10.76   11.00
259         SV  13.20   15.75
260         SE    31     39.5     41    41.5     42      43      44      45      46    46.1
261         SE    47     48
262         SQ     0    128     165     173     181     194     207     219     230     231
263         SQ   497   1139
            * ***************************************************************************
            * FLOWS DOWNSTREAM OF DETENTION BASIN
            * ***************************************************************************

264         KK   A10AE
265         KM   TOWN CENTER DRIVE (EAST SIDE)BETWEEN CHARLESTON AND GRIFFITH PEAK
266         BA  .00228
267         LS     0      95
268         UD    .102

269         KK  3A10AE
270         KM   ROUTE IN NORTH HALF OF GRIFFITH PEAK DRIVE TO DI AT INDIGO/GRIFFITH
271         KM   PEAK DRIVE INTERSECTION
272         RD    900     .03    .016          TRAP      23       3

273         KK   A30A
274         KM   GRIFFITH PEAK DRIVE NORTH OF SUBBASIN A22 BETWEEN SUBBASIN A25B
275         KM   AND TOWN CENTER DRIVE
276         BA   .0016
277         LS     0      93
278         UD    .051

279         KK   A30B
280         KM   GRIFFITH PEAK DRIVE BETWEEN INDIGO AND SUBBASIN A30A
281         BA  .00141
282         LS     0      93
283         UD    .036
```

Village 13
D.B.

```
                284          KK   COM30
                285          HC      2
1                                                HEC-1 INPUT                                                PAGE  8

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

                286          KK    DIV
                287          KM   DIVERT SOUTH HALF OF GRIFFITH PEAK DRIVE SOUTH TO SUMP AREA IN GRIFFITH PEAK
                288          DT    A30S
                289          DI      0      5     10     50
                290          DQ      0    2.5      5     10

                291          KK   COMDI
                292          KM   COMBINE FLOW ON NORTH HALF WITH A10AE AT DI AT INDIGO/GRIFFITH PEAK INT
                293          HC      2

                294          KK     DI
                295          KM   DIVERT 2 CFS TO INDIGO DRIVE FROM DI BYPASS REMAINING FLOW ROUTED IN SD
                296          DT    DIND
                297          DI      0      5      7      8
                298          DQ      0      0      2      2

                299          KK   A28-9
                300          KM   REVISED ON 9/15/99 BY CZ COMBINED SUBBASINS A28/A29 INTO ONE PARCEL
                301          KM   CN REVISED FROM MR TO PUBLIC FACILITY
                302          BA  .02844
                303          LS      0     95
                304          UD  0.133

                305          KK    D24
                306          KM   DIVERT 32 CFS OF PARCEL FLOW TO EXISTING 36-INCH RCP AT INDIGO DRIVE
                307          KM   REMAINING FLOW ROUTED TO 24-INCH RCP IN GRIFFITH PEAK DRIVE
                308          DT    D36
                309          DI      0     10     50    100   1000
                310          DQ      0      5     32     32     32

                311          KK   COM3
                312          KM   COMBINE A28-9 (D24)WITH NORTH HALF OF GRIFFITH PEAK DRIVE IN SD
                313          HC      2

                314          KK    A25B
                315          KM     DC
                316          BA  .00250
                317          LS      0     95
                318          UD   .064

                319          KK   COM2
                320          KM   COMBINE A25B AND 24-INCH FROM A28-9
                321          HC      2
                             * ***********************************
                             * ROUTING OMITTED DUE TO INSUFFICENT POINTS
                             *    KK    R/SD
                             *  ROUTE COMBINED FLOW THROUGH 24-IN RCP TO EXISTING 5X4 RCB AT CA6
                             *    RD    250   .057   .013        CIRC      2
                             * ***********************************
1                                                HEC-1 INPUT                                                PAGE  9

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

                322          KK   RA30S
                323          KM   RECALL SOUTH HALF OF GRIFFITH PEAK DRIVE
                324          DR    A30S

                325          KK    A31
                326          KM   GRIFFITH PEAK DRIVE SURFACE FLOW TO SUMP AT CA6
                327          BA  .00141
                328          LS      0     93
                329          UD   .039

                330          KK    A27
                331          KM   GRIFFITH PEAK DRIVE SURFACE FLOW FROM SOUTH OF SUMP
                332          BA  .00344
                333          LS      0     93
                334          UD   .131

                335          KK   CA6S
                336          KM   COMBINE SURFACE FLOW AT SUMP
                337          HC      3

                338          KK    A26
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339          KM      LR
340          BA  .02688
341          LS       0      90
342          UD    .145

343          KK     RSD
344          KM   ROUTE THROUGH 30INCH SD TO SUMP AT INLETS
345          RD     340    .019    .013             CIRC     2.5

346          KK    CA6SP
347          KM    COMBINE SOUTH PIPE FLOW
348          HC       2
             * **********************
             * ROUTE REMOVED SINCE TOO SHORT OF DISTANCE
             *
             *   K  RSD2
             *   KM  ROUTE TO EXISTING 5X4 RCB THOUGH EXISTING 36INCH RCP
             *   RD   100   .0125    .013                CIRC       3
             * ***************************************************************

349          KK      CA6
350          KM    COMBINE ALL FLOW AT EXISTING 5X4 RCB
351          HC       3

352          KK    RDIND
353          KM    RECALL 2 CFS FROM INTERSECTION OF INDIGO DRIVE AND GRIFFITH PEAK DRIVE
354          DR     DIND
1                                        HEC-1 INPUT                                          PAGE 10

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

355          KK      A32
356          KM    STREET
357          BA  .00188
358          LS       0      95
359          UD    .047

360          KK      CH2
361          KM    CHARLESTON BOULEVARD
362          BA  .0044
363          LS       0      96
364          UD    .074

365          KK      A33
366          KM    STREET
367          BA  .00203
368          LS       0      95
369          UD    .078

370          KK    CA7S
371          KM    COMBINE SURFACE FLOW AT CA7
372          HC       4

373          KK    RD36
374          KM    RECALL 32 CFS OF PARCEL A28-9 FOR EXISTING 36IN STORM DRAIN
375          DR      D36

376          KK      CA7
377          KM    COMBINE PIPE FLOW AT CA7
378          HC       2

379          KK     PT.A
380          KM    TOTAL FLOW TO FAITH LUTHERAN HIGH SCHOOL SITE
381          HC       2
             * ***************************************************************************

382          KK      A34
383          KM    AUTO CENTER
384          BA  .00734
385          LS       0      95
386          UD    .104

387          KK      A35
388          KM    SCHOOL EXPANSION
389          KM    NOT ENOUGH INFORMATION TO DETERMINE CN
390          KM    ASSUMED IMPERVIOUS SURFACE FOR A CONSERVATIVE CN=98
391          BA  .00734
392          LS       0      98
393          UD    .092
1                                        HEC-1 INPUT                                          PAGE 11
```

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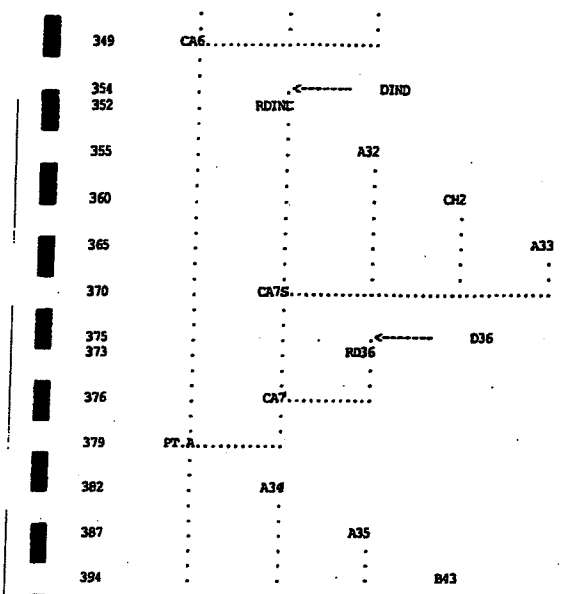
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 394          KK    B43
 395          KM   HOMESTRETCH
 396          BA  .00266
 397          LS     0      95
 398          UD    .049
 399          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE        (V) ROUTING          (---->) DIVERSION OR PUMP FLOW
  NO.        (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

  22            A1
                .
                .
  36            .        A2A
                .         -
                .         -
  41            .         -        A2B
                .         -         .
                .         -         .
  46         CA1.........-.........
                V         -
                V         -
  49        R/CA1         -
                .         -
                .         -
  52            .         X
                .         .
                .         .
  57            .         .        A7
                .         .        V
                .         .        V
  62            .         .      R/A7
                .         .        .
                .         .        .
  65            .         .        .        A8
                .         .        .         .
                .         .        .         .
  70            .         .        .         .        A9
                .         .        .         .         .
                .         .        .         .         .
  75         CA2.........-........-.........-.........
                V         .        .         .
                V         .        .         .
  78        R/CA2         .        .         .
                .         .        .         .
                .         .        .         .
  81            .        CH1       .         .
                .         .        .         .
                .         .        .         .
  86            .         .      A10AW       .
                .         .        .         .
                .         .        .         .
  91            .        CON.......-.........-
                .         .        .         .
                .         .        .         .
  93            .         .      A10B        .
                .         .        .         .
                .         .        .         .
  98         CA4N.........-........-.........-
                .         .        .         .
                .         .        .         .
 101            .        A5        .         .
                .         .        .         .
                .         .        .         .
 106            .         .      A6          .
                .         .        .         .
                .         .        .         .
 111            .         .        .       A13
                .         .        .         .
                .         .        .         .
 116            .      CA4C.........-.........
                .         V        .
                .         V        .
 119            .      R/CA4       .
                .         .        .
                .         .        .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)*
*         SEPTEMBER 1990             *
*           VERSION 4.0              *
*                                    *
*  RUN DATE  08/18/2000  TIME  14:39:16*
*                                    *
**************************************
```

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

SUMMERLIN VILLAGE 13 EAST
REVISED DETENTION BASIN GRADING

RETURN PERIOD . . . 10-YEAR/100-YEAR
DISTRIBUTION. . . . 6-HOUR SDN3
PROJECT NO. 62013.606
FILENAME. V13DBR.M1
REV. DATE 08/18/00
MODELED BY. . . . . KJ

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

 IT          HYDROGRAPH TIME DATA
                NMIN          5  MINUTES IN COMPUTATION INTERVAL
                IDATE     1   0  STARTING DATE
                ITIME        0000  STARTING TIME
                  NQ          300  NUMBER OF HYDROGRAPH ORDINATES
```

```
                    NDDATE      2    0  ENDING DATE
                    NDTIME        0055  ENDING TIME
                    ICENT           19  CENTURY MARK

                 COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE   24.92 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

   JP          MULTI-PLAN OPTION
                    NPLAN          1  NUMBER OF PLANS

   JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                    .57       .99      1.00

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

              **************
              *            *
 254 KK       *     DET    *
              *            *
              **************

 256 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          1  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

 257 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                      ITYP        STOR  TYPE OF INITIAL CONDITION
                      RSVRIC     -1.00  INITIAL CONDITION
                      X            .00  WORKING R AND D COEFFICIENT

 258 SV          STORAGE          .0       .0       .7      1.3      2.2      4.1      6.2      8.4     10.8     11.0
                                13.2     15.8

 260 SE          ELEVATION     31.00    39.50    41.00    41.50    42.00    43.00    44.00    45.00    46.00    46.10
                               47.00    48.00

 262 SQ          DISCHARGE        0.     128.     165.     173.     181.     194.     207.     219.     230.     231.
                                497.    1139.

                                                         ***

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

                                        HYDROGRAPH AT STATION      DET
                                         PLAN 1,   RATIO =   .57

*************************************************************************************************************************
```

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	31.0	*	1		0820	101	0.	.0	31.0	*	1		1640	201	0.	.0	31.0
1		0005	2	0.	.0	31.0	*	1		0825	102	0.	.0	31.0	*	1		1645	202	0.	.0	31.0
1		0010	3	0.	.0	31.0	*	1		0830	103	0.	.0	31.0	*	1		1650	203	0.	.0	31.0
1		0015	4	0.	.0	31.0	*	1		0835	104	0.	.0	31.0	*	1		1655	204	0.	.0	31.0
1		0020	5	1.	.0	31.1	*	1		0840	105	0.	.0	31.0	*	1		1700	205	0.	.0	31.0
1		0025	6	4.	.0	31.3	*	1		0845	106	0.	.0	31.0	*	1		1705	206	0.	.0	31.0
1		0030	7	9.	.0	31.6	*	1		0850	107	0.	.0	31.0	*	1		1710	207	0.	.0	31.0
1		0035	8	12.	.0	31.8	*	1		0855	108	0.	.0	31.0	*	1		1715	208	0.	.0	31.0
1		0040	9	11.	.0	31.7	*	1		0900	109	0.	.0	31.0	*	1		1720	209	0.	.0	31.0
1		0045	10	7.	.0	31.5	*	1		0905	110	0.	.0	31.0	*	1		1725	210	0.	.0	31.0
1		0050	11	4.	.0	31.3	*	1		0910	111	0.	.0	31.0	*	1		1730	211	0.	.0	31.0
1		0055	12	2.	.0	31.1	*	1		0915	112	0.	.0	31.0	*	1		1735	212	0.	.0	31.0
1		0100	13	1.	.0	31.1	*	1		0920	113	0.	.0	31.0	*	1		1740	213	0.	.0	31.0
1		0105	14	1.	.0	31.1	*	1		0925	114	0.	.0	31.0	*	1		1745	214	0.	.0	31.0
1		0110	15	2.	.0	31.2	*	1		0930	115	0.	.0	31.0	*	1		1750	215	0.	.0	31.0

1	0115	16	4.	.0	31.3	* 1	0935	116	0.	.0	31.0	* 1	1755	216	0.	.0	31.0
1	0120	17	5.	.0	31.4	* 1	0940	117	0.	.0	31.0	* 1	1800	217	0.	.0	31.0
1	0125	18	7.	.0	31.5	* 1	0945	118	0.	.0	31.0	* 1	1805	218	0.	.0	31.0
1	0130	19	11.	.0	31.8	* 1	0950	119	0.	.0	31.0	* 1	1810	219	0.	.0	31.0
1	0135	20	16.	.0	32.0	* 1	0955	120	0.	.0	31.0	* 1	1815	220	0.	.0	31.0
1	0140	21	18.	.0	32.2	* 1	1000	121	0.	.0	31.0	* 1	1820	221	0.	.0	31.0
1	0145	22	18.	.0	32.2	* 1	1005	122	0.	.0	31.0	* 1	1825	222	0.	.0	31.0
1	0150	23	15.	.0	32.0	* 1	1010	123	0.	.0	31.0	* 1	1830	223	0.	.0	31.0
1	0155	24	12.	.0	31.8	* 1	1015	124	0.	.0	31.0	* 1	1835	224	0.	.0	31.0
1	0200	25	8.	.0	31.5	* 1	1020	125	0.	.0	31.0	* 1	1840	225	0.	.0	31.0
1	0205	26	6.	.0	31.4	* 1	1025	126	0.	.0	31.0	* 1	1845	226	0.	.0	31.0
1	0210	27	7.	.0	31.5	* 1	1030	127	0.	.0	31.0	* 1	1850	227	0.	.0	31.0
1	0215	28	13.	.0	31.9	* 1	1035	128	0.	.0	31.0	* 1	1855	228	0.	.0	31.0
1	0220	29	21.	.0	32.4	* 1	1040	129	0.	.0	31.0	* 1	1900	229	0.	.0	31.0
1	0225	30	24.	.0	32.6	* 1	1045	130	0.	.0	31.0	* 1	1905	230	0.	.0	31.0
1	0230	31	22.	.0	32.5	* 1	1050	131	0.	.0	31.0	* 1	1910	231	0.	.0	31.0
1	0235	32	17.	.0	32.2	* 1	1055	132	0.	.0	31.0	* 1	1915	232	0.	.0	31.0
1	0240	33	17.	.0	32.1	* 1	1100	133	0.	.0	31.0	* 1	1920	233	0.	.0	31.0
1	0245	34	21.	.0	32.4	* 1	1105	134	0.	.0	31.0	* 1	1925	234	0.	.0	31.0
1	0250	35	21.	.0	32.4	* 1	1110	135	0.	.0	31.0	* 1	1930	235	0.	.0	31.0
1	0255	36	17.	.0	32.1	* 1	1115	136	0.	.0	31.0	* 1	1935	236	0.	.0	31.0
1	0300	37	16.	.0	32.0	* 1	1120	137	0.	.0	31.0	* 1	1940	237	0.	.0	31.0
1	0305	38	26.	.0	32.7	* 1	1125	138	0.	.0	31.0	* 1	1945	238	0.	.0	31.0
1	0310	39	46.	.0	34.0	* 1	1130	139	0.	.0	31.0	* 1	1950	239	0.	.0	31.0
1	0315	40	78.	.0	36.2	* 1	1135	140	0.	.0	31.0	* 1	1955	240	0.	.0	31.0
1	0320	41	129.	.0	39.6	* 1	1140	141	0.	.0	31.0	* 1	2000	241	0.	.0	31.0
1	0325	42	143.	.3	40.1	* 1	1145	142	0.	.0	31.0	* 1	2005	242	0.	.0	31.0
1	0330	43	168.	.9	41.2	* 1	1150	143	0.	.0	31.0	* 1	2010	243	0.	.0	31.0
1	0335	44	177.	1.7	41.7	* 1	1155	144	0.	.0	31.0	* 1	2015	244	0.	.0	31.0
1	0340	45	183.	2.4	42.1	* 1	1200	145	0.	.0	31.0	* 1	2020	245	0.	.0	31.0
1	0345	46	185.	2.7	42.3	* 1	1205	146	0.	.0	31.0	* 1	2025	246	0.	.0	31.0
1	0350	47	184.	2.6	42.2	* 1	1210	147	0.	.0	31.0	* 1	2030	247	0.	.0	31.0
1	0355	48	182.	2.2	42.0	* 1	1215	148	0.	.0	31.0	* 1	2035	248	0.	.0	31.0
1	0400	49	176.	1.7	41.7	* 1	1220	149	0.	.0	31.0	* 1	2040	249	0.	.0	31.0
1	0405	50	168.	1.0	41.2	* 1	1225	150	0.	.0	31.0	* 1	2045	250	0.	.0	31.0
1	0410	51	143.	.3	40.1	* 1	1230	151	0.	.0	31.0	* 1	2050	251	0.	.0	31.0
1	0415	52	36.	.0	32.5	* 1	1235	152	0.	.0	31.0	* 1	2055	252	0.	.0	31.0
1	0420	53	31.	.0	32.2	* 1	1240	153	0.	.0	31.0	* 1	2100	253	0.	.0	31.0
1	0425	54	33.	.0	32.3	* 1	1245	154	0.	.0	31.0	* 1	2105	254	0.	.0	31.0
1	0430	55	43.	.0	33.0	* 1	1250	155	0.	.0	31.0	* 1	2110	255	0.	.0	31.0
1	0435	56	55.	.0	33.8	* 1	1255	156	0.	.0	31.0	* 1	2115	256	0.	.0	31.0
1	0440	57	59.	.0	34.1	* 1	1300	157	0.	.0	31.0	* 1	2120	257	0.	.0	31.0
1	0445	58	56.	.0	33.9	* 1	1305	158	0.	.0	31.0	* 1	2125	258	0.	.0	31.0
1	0450	59	58.	.0	34.0	* 1	1310	159	0.	.0	31.0	* 1	2130	259	0.	.0	31.0
1	0455	60	57.	.0	33.9	* 1	1315	160	0.	.0	31.0	* 1	2135	260	0.	.0	31.0
1	0500	61	48.	.0	33.3	* 1	1320	161	0.	.0	31.0	* 1	2140	261	0.	.0	31.0
1	0505	62	36.	.0	32.5	* 1	1325	162	0.	.0	31.0	* 1	2145	262	0.	.0	31.0
1	0510	63	26.	.0	31.9	* 1	1330	163	0.	.0	31.0	* 1	2150	263	0.	.0	31.0
1	0515	64	18.	.0	31.3	* 1	1335	164	0.	.0	31.0	* 1	2155	264	0.	.0	31.0
1	0520	65	13.	.0	31.0	* 1	1340	165	0.	.0	31.0	* 1	2200	265	0.	.0	31.0
1	0525	66	10.	.0	31.0	* 1	1345	166	0.	.0	31.0	* 1	2205	266	0.	.0	31.0
1	0530	67	8.	.0	31.0	* 1	1350	167	0.	.0	31.0	* 1	2210	267	0.	.0	31.0
1	0535	68	6.	.0	31.0	* 1	1355	168	0.	.0	31.0	* 1	2215	268	0.	.0	31.0
1	0540	69	5.	.0	31.0	* 1	1400	169	0.	.0	31.0	* 1	2220	269	0.	.0	31.0
1	0545	70	5.	.0	31.0	* 1	1405	170	0.	.0	31.0	* 1	2225	270	0.	.0	31.0
1	0550	71	6.	.0	31.0	* 1	1410	171	0.	.0	31.0	* 1	2230	271	0.	.0	31.0
1	0555	72	5.	.0	31.0	* 1	1415	172	0.	.0	31.0	* 1	2235	272	0.	.0	31.0
1	0600	73	4.	.0	31.0	* 1	1420	173	0.	.0	31.0	* 1	2240	273	0.	.0	31.0
1	0605	74	4.	.0	31.0	* 1	1425	174	0.	.0	31.0	* 1	2245	274	0.	.0	31.0
1	0610	75	3.	.0	31.0	* 1	1430	175	0.	.0	31.0	* 1	2250	275	0.	.0	31.0
1	0615	76	2.	.0	31.0	* 1	1435	176	0.	.0	31.0	* 1	2255	276	0.	.0	31.0
1	0620	77	1.	.0	31.0	* 1	1440	177	0.	.0	31.0	* 1	2300	277	0.	.0	31.0
1	0625	78	0.	.0	31.0	* 1	1445	178	0.	.0	31.0	* 1	2305	278	0.	.0	31.0
1	0630	79	0.	.0	31.0	* 1	1450	179	0.	.0	31.0	* 1	2310	279	0.	.0	31.0
1	0635	80	0.	.0	31.0	* 1	1455	180	0.	.0	31.0	* 1	2315	280	0.	.0	31.0
1	0640	81	0.	.0	31.0	* 1	1500	181	0.	.0	31.0	* 1	2320	281	0.	.0	31.0
1	0645	82	0.	.0	31.0	* 1	1505	182	0.	.0	31.0	* 1	2325	282	0.	.0	31.0
1	0650	83	0.	.0	31.0	* 1	1510	183	0.	.0	31.0	* 1	2330	283	0.	.0	31.0
1	0655	84	0.	.0	31.0	* 1	1515	184	0.	.0	31.0	* 1	2335	284	0.	.0	31.0
1	0700	85	0.	.0	31.0	* 1	1520	185	0.	.0	31.0	* 1	2340	285	0.	.0	31.0
1	0705	86	0.	.0	31.0	* 1	1525	186	0.	.0	31.0	* 1	2345	286	0.	.0	31.0
1	0710	87	0.	.0	31.0	* 1	1530	187	0.	.0	31.0	* 1	2350	287	0.	.0	31.0
1	0715	88	0.	.0	31.0	* 1	1535	188	0.	.0	31.0	* 1	2355	288	0.	.0	31.0
1	0720	89	0.	.0	31.0	* 1	1540	189	0.	.0	31.0	* 2	0000	289	0.	.0	31.0
1	0725	90	0.	.0	31.0	* 1	1545	190	0.	.0	31.0	* 2	0005	290	0.	.0	31.0
1	0730	91	0.	.0	31.0	* 1	1550	191	0.	.0	31.0	* 2	0010	291	0.	.0	31.0
1	0735	92	0.	.0	31.0	* 1	1555	192	0.	.0	31.0	* 2	0015	292	0.	.0	31.0
1	0740	93	0.	.0	31.0	* 1	1600	193	0.	.0	31.0	* 2	0020	293	0.	.0	31.0
1	0745	94	0.	.0	31.0	* 1	1605	194	0.	.0	31.0	* 2	0025	294	0.	.0	31.0
1	0750	95	0.	.0	31.0	* 1	1610	195	0.	.0	31.0	* 2	0030	295	0.	.0	31.0
1	0755	96	0.	.0	31.0	* 1	1615	196	0.	.0	31.0	* 2	0035	296	0.	.0	31.0
1	0800	97	0.	.0	31.0	* 1	1620	197	0.	.0	31.0	* 2	0040	297	0.	.0	31.0

1	0805	98	0.	.0	31.0	*	1	1625	198	0.	.0	31.0	*	2	0045	298	0.	.0	31.0
1	0810	99	0.	.0	31.0	*	1	1630	199	0.	.0	31.0	*	2	0050	299	0.	.0	31.0
1	0815	100	0.	.0	31.0	*	1	1635	200	0.	.0	31.0	*	2	0055	300	0.	.0	31.0

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
(CFS)	(HR)					
		(CFS)				
185.	3.75		41.	10.	10.	10.
		(INCHES)	1.228	1.229	1.229	1.229
		(AC-FT)	21.	21.	21.	21.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
(AC-FT)	(HR)				
3.	3.75	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
(FEET)	(HR)				
42.28	3.75	33.41	31.60	31.58	31.58

CUMULATIVE AREA = .31 SQ MI

HYDROGRAPH AT STATION DET
PLAN 1, RATIO = .99

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	31.0	*	1		0820	101	0.	.0	31.0	*	1		1640	201	0.	.0	31.0
1		0005	2	0.	.0	31.0	*	1		0825	102	0.	.0	31.0	*	1		1645	202	0.	.0	31.0
1		0010	3	2.	.0	31.1	*	1		0830	103	0.	.0	31.0	*	1		1650	203	0.	.0	31.0
1		0015	4	8.	.0	31.5	*	1		0835	104	0.	.0	31.0	*	1		1655	204	0.	.0	31.0
1		0020	5	17.	.0	32.1	*	1		0840	105	0.	.0	31.0	*	1		1700	205	0.	.0	31.0
1		0025	6	30.	.0	33.0	*	1		0845	106	0.	.0	31.0	*	1		1705	206	0.	.0	31.0
1		0030	7	44.	.0	33.9	*	1		0850	107	0.	.0	31.0	*	1		1710	207	0.	.0	31.0
1		0035	8	48.	.0	34.2	*	1		0855	108	0.	.0	31.0	*	1		1715	208	0.	.0	31.0
1		0040	9	38.	.0	33.5	*	1		0900	109	0.	.0	31.0	*	1		1720	209	0.	.0	31.0
1		0045	10	24.	.0	32.6	*	1		0905	110	0.	.0	31.0	*	1		1725	210	0.	.0	31.0
1		0050	11	13.	.0	31.9	*	1		0910	111	0.	.0	31.0	*	1		1730	211	0.	.0	31.0
1		0055	12	7.	.0	31.4	*	1		0915	112	0.	.0	31.0	*	1		1735	212	0.	.0	31.0
1		0100	13	3.	.0	31.2	*	1		0920	113	0.	.0	31.0	*	1		1740	213	0.	.0	31.0
1		0105	14	3.	.0	31.2	*	1		0925	114	0.	.0	31.0	*	1		1745	214	0.	.0	31.0
1		0110	15	7.	.0	31.5	*	1		0930	115	0.	.0	31.0	*	1		1750	215	0.	.0	31.0
1		0115	16	13.	.0	31.8	*	1		0935	116	0.	.0	31.0	*	1		1755	216	0.	.0	31.0
1		0120	17	16.	.0	32.0	*	1		0940	117	0.	.0	31.0	*	1		1800	217	0.	.0	31.0
1		0125	18	21.	.0	32.4	*	1		0945	118	0.	.0	31.0	*	1		1805	218	0.	.0	31.0
1		0130	19	33.	.0	33.2	*	1		0950	119	0.	.0	31.0	*	1		1810	219	0.	.0	31.0
1		0135	20	43.	.0	33.9	*	1		0955	120	0.	.0	31.0	*	1		1815	220	0.	.0	31.0
1		0140	21	47.	.0	34.1	*	1		1000	121	0.	.0	31.0	*	1		1820	221	0.	.0	31.0
1		0145	22	46.	.0	34.0	*	1		1005	122	0.	.0	31.0	*	1		1825	222	0.	.0	31.0
1		0150	23	39.	.0	33.6	*	1		1010	123	0.	.0	31.0	*	1		1830	223	0.	.0	31.0
1		0155	24	28.	.0	32.9	*	1		1015	124	0.	.0	31.0	*	1		1835	224	0.	.0	31.0
1		0200	25	19.	.0	32.2	*	1		1020	125	0.	.0	31.0	*	1		1840	225	0.	.0	31.0
1		0205	26	14.	.0	31.9	*	1		1025	126	0.	.0	31.0	*	1		1845	226	0.	.0	31.0
1		0210	27	18.	.0	32.2	*	1		1030	127	0.	.0	31.0	*	1		1850	227	0.	.0	31.0
1		0215	28	33.	.0	33.2	*	1		1035	128	0.	.0	31.0	*	1		1855	228	0.	.0	31.0
1		0220	29	51.	.0	34.4	*	1		1040	129	0.	.0	31.0	*	1		1900	229	0.	.0	31.0
1		0225	30	58.	.0	34.8	*	1		1045	130	0.	.0	31.0	*	1		1905	230	0.	.0	31.0
1		0230	31	51.	.0	34.4	*	1		1050	131	0.	.0	31.0	*	1		1910	231	0.	.0	31.0
1		0235	32	40.	.0	33.6	*	1		1055	132	0.	.0	31.0	*	1		1915	232	0.	.0	31.0
1		0240	33	40.	.0	33.7	*	1		1100	133	0.	.0	31.0	*	1		1920	233	0.	.0	31.0
1		0245	34	48.	.0	34.2	*	1		1105	134	0.	.0	31.0	*	1		1925	234	0.	.0	31.0
1		0250	35	47.	.0	34.1	*	1		1110	135	0.	.0	31.0	*	1		1930	235	0.	.0	31.0
1		0255	36	37.	.0	33.5	*	1		1115	136	0.	.0	31.0	*	1		1935	236	0.	.0	31.0
1		0300	37	35.	.0	33.3	*	1		1120	137	0.	.0	31.0	*	1		1940	237	0.	.0	31.0
1		0305	38	58.	.0	34.9	*	1		1125	138	0.	.0	31.0	*	1		1945	238	0.	.0	31.0
1		0310	39	102.	.0	37.8	*	1		1130	139	0.	.0	31.0	*	1		1950	239	0.	.0	31.0
1		0315	40	134.	.1	39.8	*	1		1135	140	0.	.0	31.0	*	1		1955	240	0.	.0	31.0
1		0320	41	163.	.7	40.9	*	1		1140	141	0.	.0	31.0	*	1		2000	241	0.	.0	31.0
1		0325	42	179.	2.0	41.9	*	1		1145	142	0.	.0	31.0	*	1		2005	242	0.	.0	31.0
1		0330	43	194.	4.1	43.0	*	1		1150	143	0.	.0	31.0	*	1		2010	243	0.	.0	31.0
1		0335	44	209.	6.7	44.2	*	1		1155	144	0.	.0	31.0	*	1		2015	244	0.	.0	31.0
1		0340	45	221.	8.8	45.2	*	1		1200	145	0.	.0	31.0	*	1		2020	245	0.	.0	31.0
1		0345	46	228.	10.2	45.8	*	1		1205	146	0.	.0	31.0	*	1		2025	246	0.	.0	31.0

1	0350	47	230.	10.9	46.0	*	1	1210	147	0.	.0	31.0	*	1	2030	247	0.	.0	31.0
1	0355	48	231.	10.9	46.1	*	1	1215	148	0.	.0	31.0	*	1	2035	248	0.	.0	31.0
1	0400	49	229.	10.5	45.9	*	1	1220	149	0.	.0	31.0	*	1	2040	249	0.	.0	31.0
1	0405	50	226.	9.8	45.6	*	1	1225	150	0.	.0	31.0	*	1	2045	250	0.	.0	31.0
1	0410	51	222.	9.0	45.2	*	1	1230	151	0.	.0	31.0	*	1	2050	251	0.	.0	31.0
1	0415	52	217.	8.0	44.8	*	1	1235	152	0.	.0	31.0	*	1	2055	252	0.	.0	31.0
1	0420	53	211.	6.9	44.3	*	1	1240	153	0.	.0	31.0	*	1	2100	253	0.	.0	31.0
1	0425	54	205.	5.9	43.9	*	1	1245	154	0.	.0	31.0	*	1	2105	254	0.	.0	31.0
1	0430	55	199.	5.0	43.4	*	1	1250	155	0.	.0	31.0	*	1	2110	255	0.	.0	31.0
1	0435	56	195.	4.3	43.1	*	1	1255	156	0.	.0	31.0	*	1	2115	256	0.	.0	31.0
1	0440	57	191.	3.7	42.8	*	1	1300	157	0.	.0	31.0	*	1	2120	257	0.	.0	31.0
1	0445	58	187.	3.1	42.5	*	1	1305	158	0.	.0	31.0	*	1	2125	258	0.	.0	31.0
1	0450	59	183.	2.5	42.2	*	1	1310	159	0.	.0	31.0	*	1	2130	259	0.	.0	31.0
1	0455	60	179.	2.0	41.9	*	1	1315	160	0.	.0	31.0	*	1	2135	260	0.	.0	31.0
1	0500	61	174.	1.4	41.6	*	1	1320	161	0.	.0	31.0	*	1	2140	261	0.	.0	31.0
1	0505	62	166.	.8	41.1	*	1	1325	162	0.	.0	31.0	*	1	2145	262	0.	.0	31.0
1	0510	63	135.	.1	39.8	*	1	1330	163	0.	.0	31.0	*	1	2150	263	0.	.0	31.0
1	0515	64	32.	-.1	31.0	*	1	1335	164	0.	.0	31.0	*	1	2155	264	0.	.0	31.0
1	0520	65	22.	-.1	31.0	*	1	1340	165	0.	.0	31.0	*	1	2200	265	0.	.0	31.0
1	0525	66	18.	-.1	31.0	*	1	1345	166	0.	.0	31.0	*	1	2205	266	0.	.0	31.0
1	0530	67	15.	-.1	31.0	*	1	1350	167	0.	.0	31.0	*	1	2210	267	0.	.0	31.0
1	0535	68	11.	.0	31.0	*	1	1355	168	0.	.0	31.0	*	1	2215	268	0.	.0	31.0
1	0540	69	9.	.0	31.0	*	1	1400	169	0.	.0	31.0	*	1	2220	269	0.	.0	31.0
1	0545	70	10.	.0	31.0	*	1	1405	170	0.	.0	31.0	*	1	2225	270	0.	.0	31.0
1	0550	71	11.	.0	31.1	*	1	1410	171	0.	.0	31.0	*	1	2230	271	0.	.0	31.0
1	0555	72	9.	.0	31.0	*	1	1415	172	0.	.0	31.0	*	1	2235	272	0.	.0	31.0
1	0600	73	8.	.0	31.0	*	1	1420	173	0.	.0	31.0	*	1	2240	273	0.	.0	31.0
1	0605	74	7.	.0	31.0	*	1	1425	174	0.	.0	31.0	*	1	2245	274	0.	.0	31.0
1	0610	75	5.	.0	31.0	*	1	1430	175	0.	.0	31.0	*	1	2250	275	0.	.0	31.0
1	0615	76	3.	.0	31.0	*	1	1435	176	0.	.0	31.0	*	1	2255	276	0.	.0	31.0
1	0620	77	1.	.0	31.0	*	1	1440	177	0.	.0	31.0	*	1	2300	277	0.	.0	31.0
1	0625	78	1.	.0	31.0	*	1	1445	178	0.	.0	31.0	*	1	2305	278	0.	.0	31.0
1	0630	79	0.	.0	31.0	*	1	1450	179	0.	.0	31.0	*	1	2310	279	0.	.0	31.0
1	0635	80	0.	.0	31.0	*	1	1455	180	0.	.0	31.0	*	1	2315	280	0.	.0	31.0
1	0640	81	0.	.0	31.0	*	1	1500	181	0.	.0	31.0	*	1	2320	281	0.	.0	31.0
1	0645	82	0.	.0	31.0	*	1	1505	182	0.	.0	31.0	*	1	2325	282	0.	.0	31.0
1	0650	83	0.	.0	31.0	*	1	1510	183	0.	.0	31.0	*	1	2330	283	0.	.0	31.0
1	0655	84	0.	.0	31.0	*	1	1515	184	0.	.0	31.0	*	1	2335	284	0.	.0	31.0
1	0700	85	0.	.0	31.0	*	1	1520	185	0.	.0	31.0	*	1	2340	285	0.	.0	31.0
1	0705	86	0.	.0	31.0	*	1	1525	186	0.	.0	31.0	*	1	2345	286	0.	.0	31.0
1	0710	87	0.	.0	31.0	*	1	1530	187	0.	.0	31.0	*	1	2350	287	0.	.0	31.0
1	0715	88	0.	.0	31.0	*	1	1535	188	0.	.0	31.0	*	1	2355	288	0.	.0	31.0
1	0720	89	0.	.0	31.0	*	1	1540	189	0.	.0	31.0	*	2	0000	289	0.	.0	31.0
1	0725	90	0.	.0	31.0	*	1	1545	190	0.	.0	31.0	*	2	0005	290	0.	.0	31.0
1	0730	91	0.	.0	31.0	*	1	1550	191	0.	.0	31.0	*	2	0010	291	0.	.0	31.0
1	0735	92	0.	.0	31.0	*	1	1555	192	0.	.0	31.0	*	2	0015	292	0.	.0	31.0
1	0740	93	0.	.0	31.0	*	1	1600	193	0.	.0	31.0	*	2	0020	293	0.	.0	31.0
1	0745	94	0.	.0	31.0	*	1	1605	194	0.	.0	31.0	*	2	0025	294	0.	.0	31.0
1	0750	95	0.	.0	31.0	*	1	1610	195	0.	.0	31.0	*	2	0030	295	0.	.0	31.0
1	0755	96	0.	.0	31.0	*	1	1615	196	0.	.0	31.0	*	2	0035	296	0.	.0	31.0
1	0800	97	0.	.0	31.0	*	1	1620	197	0.	.0	31.0	*	2	0040	297	0.	.0	31.0
1	0805	98	0.	.0	31.0	*	1	1625	198	0.	.0	31.0	*	2	0045	298	0.	.0	31.0
1	0810	99	0.	.0	31.0	*	1	1630	199	0.	.0	31.0	*	2	0050	299	0.	.0	31.0
1	0815	100	0.	.0	31.0	*	1	1635	200	0.	.0	31.0	*	2	0055	300	0.	.0	31.0

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 231.	3.92		84.	21.	20.	20.
		(INCHES)	2.488	2.491	2.491	2.491
		(AC-FT)	42.	42.	42.	42.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
11.	3.92	2.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
46.05	3.92	36.21	32.30	32.26	32.26

CUMULATIVE AREA = .31 SQ MI

HYDROGRAPH AT STATION DST
PLAN 1, RATIO = 1.00

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	31.0	1		0820	101	0.	.0	31.0	1		1640	201	0.	.0	31.0
1		0005	2	0.	.0	31.0	1		0825	102	0.	.0	31.0	1		1645	202	0.	.0	31.0
1		0010	3	2.	.0	31.1	1		0830	103	0.	.0	31.0	1		1650	203	0.	.0	31.0
1		0015	4	8.	.0	31.5	1		0835	104	0.	.0	31.0	1		1655	204	0.	.0	31.0
1		0020	5	17.	.0	32.2	1		0840	105	0.	.0	31.0	1		1700	205	0.	.0	31.0
1		0025	6	31.	.0	33.1	1		0845	106	0.	.0	31.0	1		1705	206	0.	.0	31.0
1		0030	7	45.	.0	34.0	1		0850	107	0.	.0	31.0	1		1710	207	0.	.0	31.0
1		0035	8	49.	.0	34.2	1		0855	108	0.	.0	31.0	1		1715	208	0.	.0	31.0
1		0040	9	39.	.0	33.6	1		0900	109	0.	.0	31.0	1		1720	209	0.	.0	31.0
1		0045	10	25.	.0	32.6	1		0905	110	0.	.0	31.0	1		1725	210	0.	.0	31.0
1		0050	11	13.	.0	31.9	1		0910	111	0.	.0	31.0	1		1730	211	0.	.0	31.0
1		0055	12	7.	.0	31.5	1		0915	112	0.	.0	31.0	1		1735	212	0.	.0	31.0
1		0100	13	3.	.0	31.2	1		0920	113	0.	.0	31.0	1		1740	213	0.	.0	31.0
1		0105	14	3.	.0	31.2	1		0925	114	0.	.0	31.0	1		1745	214	0.	.0	31.0
1		0110	15	7.	.0	31.5	1		0930	115	0.	.0	31.0	1		1750	215	0.	.0	31.0
1		0115	16	13.	.0	31.9	1		0935	116	0.	.0	31.0	1		1755	216	0.	.0	31.0
1		0120	17	16.	.0	32.1	1		0940	117	0.	.0	31.0	1		1800	217	0.	.0	31.0
1		0125	18	22.	.0	32.4	1		0945	118	0.	.0	31.0	1		1805	218	0.	.0	31.0
1		0130	19	34.	.0	33.2	1		0950	119	0.	.0	31.0	1		1810	219	0.	.0	31.0
1		0135	20	44.	.0	33.9	1		0955	120	0.	.0	31.0	1		1815	220	0.	.0	31.0
1		0140	21	48.	.0	34.2	1		1000	121	0.	.0	31.0	1		1820	221	0.	.0	31.0
1		0145	22	46.	.0	34.1	1		1005	122	0.	.0	31.0	1		1825	222	0.	.0	31.0
1		0150	23	40.	.0	33.6	1		1010	123	0.	.0	31.0	1		1830	223	0.	.0	31.0
1		0155	24	29.	.0	32.9	1		1015	124	0.	.0	31.0	1		1835	224	0.	.0	31.0
1		0200	25	19.	.0	32.3	1		1020	125	0.	.0	31.0	1		1840	225	0.	.0	31.0
1		0205	26	14.	.0	31.9	1		1025	126	0.	.0	31.0	1		1845	226	0.	.0	31.0
1		0210	27	18.	.0	32.2	1		1030	127	0.	.0	31.0	1		1850	227	0.	.0	31.0
1		0215	28	34.	.0	33.2	1		1035	128	0.	.0	31.0	1		1855	228	0.	.0	31.0
1		0220	29	52.	.0	34.4	1		1040	129	0.	.0	31.0	1		1900	229	0.	.0	31.0
1		0225	30	59.	.0	34.9	1		1045	130	0.	.0	31.0	1		1905	230	0.	.0	31.0
1		0230	31	52.	.0	34.4	1		1050	131	0.	.0	31.0	1		1910	231	0.	.0	31.0
1		0235	32	40.	.0	33.7	1		1055	132	0.	.0	31.0	1		1915	232	0.	.0	31.0
1		0240	33	40.	.0	33.7	1		1100	133	0.	.0	31.0	1		1920	233	0.	.0	31.0
1		0245	34	49.	.0	34.2	1		1105	134	0.	.0	31.0	1		1925	234	0.	.0	31.0
1		0250	35	48.	.0	34.2	1		1110	135	0.	.0	31.0	1		1930	235	0.	.0	31.0
1		0255	36	38.	.0	33.5	1		1115	136	0.	.0	31.0	1		1935	236	0.	.0	31.0
1		0300	37	35.	.0	33.3	1		1120	137	0.	.0	31.0	1		1940	237	0.	.0	31.0
1		0305	38	59.	.0	34.9	1		1125	138	0.	.0	31.0	1		1945	238	0.	.0	31.0
1		0310	39	104.	.0	37.9	1		1130	139	0.	.0	31.0	1		1950	239	0.	.0	31.0
1		0315	40	135.	.1	39.8	1		1135	140	0.	.0	31.0	1		1955	240	0.	.0	31.0
1		0320	41	165.	.7	41.0	1		1140	141	0.	.0	31.0	1		2000	241	0.	.0	31.0
1		0325	42	180.	2.0	41.9	1		1145	142	0.	.0	31.0	1		2005	242	0.	.0	31.0
1		0330	43	194.	4.2	43.0	1		1150	143	0.	.0	31.0	1		2010	243	0.	.0	31.0
1		0335	44	210.	6.8	44.3	1		1155	144	0.	.0	31.0	1		2015	244	0.	.0	31.0
1		0340	45	222.	9.0	45.2	1		1200	145	0.	.0	31.0	1		2020	245	0.	.0	31.0
1		0345	46	228.	10.4	45.9	1		1205	146	0.	.0	31.0	1		2025	246	0.	.0	31.0
1		0350	47	238.	11.1	46.1	1		1210	147	0.	.0	31.0	1		2030	247	0.	.0	31.0
1		0355	48	236.	11.0	46.1	1		1215	148	0.	.0	31.0	1		2035	248	0.	.0	31.0
1		0400	49	229.	10.6	45.9	1		1220	149	0.	.0	31.0	1		2040	249	0.	.0	31.0
1		0405	50	226.	10.0	45.7	1		1225	150	0.	.0	31.0	1		2045	250	0.	.0	31.0
1		0410	51	222.	9.1	45.3	1		1230	151	0.	.0	31.0	1		2050	251	0.	.0	31.0
1		0415	52	217.	8.1	44.9	1		1235	152	0.	.0	31.0	1		2055	252	0.	.0	31.0
1		0420	53	212.	7.1	44.4	1		1240	153	0.	.0	31.0	1		2100	253	0.	.0	31.0
1		0425	54	206.	6.1	43.9	1		1245	154	0.	.0	31.0	1		2105	254	0.	.0	31.0
1		0430	55	200.	5.1	43.5	1		1250	155	0.	.0	31.0	1		2110	255	0.	.0	31.0
1		0435	56	196.	4.4	43.1	1		1255	156	0.	.0	31.0	1		2115	256	0.	.0	31.0
1		0440	57	192.	3.8	42.9	1		1300	157	0.	.0	31.0	1		2120	257	0.	.0	31.0
1		0445	58	188.	3.3	42.6	1		1305	158	0.	.0	31.0	1		2125	258	0.	.0	31.0
1		0450	59	185.	2.7	42.3	1		1310	159	0.	.0	31.0	1		2130	259	0.	.0	31.0
1		0455	60	181.	2.2	42.0	1		1315	160	0.	.0	31.0	1		2135	260	0.	.0	31.0
1		0500	61	175.	1.6	41.7	1		1320	161	0.	.0	31.0	1		2140	261	0.	.0	31.0
1		0505	62	168.	.9	41.2	1		1325	162	0.	.0	31.0	1		2145	262	0.	.0	31.0
1		0510	63	141.	.3	40.0	1		1330	163	0.	.0	31.0	1		2150	263	0.	.0	31.0
1		0515	64	32.	-.1	31.7	1		1335	164	0.	.0	31.0	1		2155	264	0.	.0	31.0
1		0520	65	23.	-.1	31.1	1		1340	165	0.	.0	31.0	1		2200	265	0.	.0	31.0
1		0525	66	18.	-.1	31.0	1		1345	166	0.	.0	31.0	1		2205	266	0.	.0	31.0
1		0530	67	15.	-.1	31.0	1		1350	167	0.	.0	31.0	1		2210	267	0.	.0	31.0
1		0535	68	12.	.0	31.0	1		1355	168	0.	.0	31.0	1		2215	268	0.	.0	31.0
1		0540	69	9.	.0	31.0	1		1400	169	0.	.0	31.0	1		2220	269	0.	.0	31.0
1		0545	70	10.	.0	31.0	1		1405	170	0.	.0	31.0	1		2225	270	0.	.0	31.0
1		0550	71	11.	.0	31.1	1		1410	171	0.	.0	31.0	1		2230	271	0.	.0	31.0
1		0555	72	9.	.0	31.0	1		1415	172	0.	.0	31.0	1		2235	272	0.	.0	31.0
1		0600	73	8.	.0	31.0	1		1420	173	0.	.0	31.0	1		2240	273	0.	.0	31.0
1		0605	74	7.	.0	31.0	1		1425	174	0.	.0	31.0	1		2245	274	0.	.0	31.0
1		0610	75	5.	.0	31.0	1		1430	175	0.	.0	31.0	1		2250	275	0.	.0	31.0
1		0615	76	3.	.0	31.0	1		1435	176	0.	.0	31.0	1		2255	276	0.	.0	31.0
1		0620	77	1.	.0	31.0	1		1440	177	0.	.0	31.0	1		2300	277	0.	.0	31.0

1	0625	78	1.	.0	31.0	*	1	1445	178	0.	.0	31.0	*	1	2305	278	0.	.0	31.0
1	0630	79	0.	.0	31.0	*	1	1450	179	0.	.0	31.0	*	1	2310	279	0.	.0	31.0
1	0635	80	0.	.0	31.0	*	1	1455	180	0.	.0	31.0	*	1	2315	280	0.	.0	31.0
1	0640	81	0.	.0	31.0	*	1	1500	181	0.	.0	31.0	*	1	2320	281	0.	.0	31.0
1	0645	82	0.	.0	31.0	*	1	1505	182	0.	.0	31.0	*	1	2325	282	0.	.0	31.0
1	0650	83	0.	.0	31.0	*	1	1510	183	0.	.0	31.0	*	1	2330	283	0.	.0	31.0
1	0655	84	0.	.0	31.0	*	1	1515	184	0.	.0	31.0	*	1	2335	284	0.	.0	31.0
1	0700	85	0.	.0	31.0	*	1	1520	185	0.	.0	31.0	*	1	2340	285	0.	.0	31.0
1	0705	86	0.	.0	31.0	*	1	1525	186	0.	.0	31.0	*	1	2345	286	0.	.0	31.0
1	0710	87	0.	.0	31.0	*	1	1530	187	0.	.0	31.0	*	1	2350	287	0.	.0	31.0
1	0715	88	0.	.0	31.0	*	1	1535	188	0.	.0	31.0	*	1	2355	288	0.	.0	31.0
1	0720	89	0.	.0	31.0	*	1	1540	189	0.	.0	31.0	*	2	0000	289	0.	.0	31.0
1	0725	90	0.	.0	31.0	*	1	1545	190	0.	.0	31.0	*	2	0005	290	0.	.0	31.0
1	0730	91	0.	.0	31.0	*	1	1550	191	0.	.0	31.0	*	2	0010	291	0.	.0	31.0
1	0735	92	0.	.0	31.0	*	1	1555	192	0.	.0	31.0	*	2	0015	292	0.	.0	31.0
1	0740	93	0.	.0	31.0	*	1	1600	193	0.	.0	31.0	*	2	0020	293	0.	.0	31.0
1	0745	94	0.	.0	31.0	*	1	1605	194	0.	.0	31.0	*	2	0025	294	0.	.0	31.0
1	0750	95	0.	.0	31.0	*	1	1610	195	0.	.0	31.0	*	2	0030	295	0.	.0	31.0
1	0755	96	0.	.0	31.0	*	1	1615	196	0.	.0	31.0	*	2	0035	296	0.	.0	31.0
1	0800	97	0.	.0	31.0	*	1	1620	197	0.	.0	31.0	*	2	0040	297	0.	.0	31.0
1	0805	98	0.	.0	31.0	*	1	1625	198	0.	.0	31.0	*	2	0045	298	0.	.0	31.0
1	0810	99	0.	.0	31.0	*	1	1630	199	0.	.0	31.0	*	2	0050	299	0.	.0	31.0
1	0815	100	0.	.0	31.0	*	1	1635	200	0.	.0	31.0	*	2	0055	300	0.	.0	31.0

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 238.	3.83		85.	21.	20.	20.
		(INCHES)	2.512	2.515	2.515	2.515
		(AC-FT)	42.	42.	42.	42.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
11.	3.83	2.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
46.12	3.83	36.27	32.32	32.27	32.27

CUMULATIVE AREA = .31 SQ MI

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .57	RATIO 2 .99	RATIO 3 1.00
HYDROGRAPH AT							
+	A1	.06	1	FLOW	62.	117.	118.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A2A	.00	1	FLOW	3.	6.	7.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A2B	.00	1	FLOW	5.	9.	9.
				TIME	3.50	3.50	3.50
3 COMBINED AT							
+	CA1	.07	1	FLOW	68.	129.	130.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	R/CA1	.07	1	FLOW	66.	125.	127.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	X	.04	1	FLOW	47.	88.	89.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							

+	A7	.02	1	FLOW	17.	32.	32.
				TIME	3.58	3.50	3.50
ROUTED TO							
+	R/A7	.02	1	FLOW	17.	31.	31.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A8	.02	1	FLOW	17.	33.	34.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A9	.01	1	FLOW	11.	20.	21.
				TIME	3.50	3.50	3.50
5 COMBINED AT							
+	CA2	.15	1	FLOW	156.	295.	299.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	R/CA2	.15	1	FLOW	153.	291.	295.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	CH1	.00	1	FLOW	3.	6.	6.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A10AW	.00	1	FLOW	2.	5.	5.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	COM	.00	1	FLOW	6.	11.	11.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A10B	.00	1	FLOW	4.	8.	8.
				TIME	3.50	3.50	3.50
3 COMBINED AT							
+	CA4N	.16	1	FLOW	161.	306.	310.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A5	.02	1	FLOW	24.	45.	46.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A6	.00	1	FLOW	3.	5.	5.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A13	.00	1	FLOW	3.	5.	5.
				TIME	3.50	3.50	3.50
3 COMBINED AT							
+	CA4C	.03	1	FLOW	29.	55.	55.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	R/CA4	.03	1	FLOW	26.	51.	52.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	COM	.19	1	FLOW	188.	356.	360.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A11	.01	1	FLOW	7.	15.	15.
				TIME	3.58	3.50	3.50
ROUTED TO							
+	R/A11	.01	1	FLOW	6.	15.	15.
				TIME	3.67	3.67	3.67
HYDROGRAPH AT							
+	A14	.01	1	FLOW	15.	29.	29.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	R/A14	.01	1	FLOW	15.	28.	28.
				TIME	3.58	3.58	3.58

HYDROGRAPH AT							
+	A15	.02	1	FLOW	18.	34.	35.
				TIME	3.50	3.50	3.50
3 COMBINED AT							
+	COM	.04	1	FLOW	38.	75.	75.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A16	.01	1	FLOW	10.	18.	19.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	R/A16	.01	1	FLOW	9.	18.	18.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A17	.00	1	FLOW	1.	2.	2.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	R/A17	.00	1	FLOW	1.	2.	2.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A18	.01	1	FLOW	14.	27.	27.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A19	.01	1	FLOW	10.	22.	23.
				TIME	3.58	3.58	3.58
5 COMBINED AT							
+	CA3	.07	1	FLOW	69.	140.	142.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	R/CA3	.07	1	FLOW	69.	137.	139.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A20	.00	1	FLOW	3.	6.	6.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A21AW	.00	1	FLOW	3.	6.	6.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	COM2	.01	1	FLOW	6.	13.	13.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	R/COM	.01	1	FLOW	6.	12.	12.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A21B	.00	1	FLOW	5.	9.	10.
				TIME	3.50	3.50	3.50
3 COMBINED AT							
+	CA4S	.09	1	FLOW	80.	158.	160.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	CA4	.27	1	FLOW	267.	514.	520.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	R/CA4	.27	1	FLOW	266.	512.	518.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A22	.02	1	FLOW	22.	42.	42.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A23	.01	1	FLOW	8.	15.	15.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A21AE	.00	1	FLOW	3.	7.	7.

				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A36	.00	1	FLOW	2.	3.	3.
				TIME	3.50	3.50	3.50
3 COMBINED AT							
+	COM3	.01	1	FLOW	13.	25.	25.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	R/COM	.01	1	FLOW	12.	24.	24.
				TIME	3.58	3.50	3.50
HYDROGRAPH AT							
+	A24	.00	1	FLOW	1.	3.	3.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	COM2	.01	1	FLOW	13.	26.	27.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A25A	.01	1	FLOW	4.	12.	13.
				TIME	3.50	3.50	3.50
4 COMBINED AT							
+	CA5	.31	1	FLOW	302.	584.	591.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	DET	.31	1	FLOW	185.	231.	238.
				TIME	3.75	3.92	3.83
				** PEAK STAGES IN FEET **			
			1	STAGE	42.28	46.05	46.12
				TIME	3.75	3.92	3.83
HYDROGRAPH AT							
+	A10AE	.00	1	FLOW	3.	5.	5.
				TIME	3.50	3.50	3.50
ROUTED TO							
+	RA10AE	.00	1	FLOW	2.	5.	5.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A30A	.00	1	FLOW	2.	4.	4.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A30B	.00	1	FLOW	2.	3.	4.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	COM30	.00	1	FLOW	4.	7.	7.
				TIME	3.50	3.50	3.50
DIVERSION TO							
+	A30S	.00	1	FLOW	2.	4.	4.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	DIV	.00	1	FLOW	2.	4.	4.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	COMDI	.01	1	FLOW	4.	8.	8.
				TIME	3.50	3.50	3.50
DIVERSION TO							
+	DIND	.01	1	FLOW	0.	2.	2.
				TIME	.08	3.50	3.50
HYDROGRAPH AT							
+	DI	.01	1	FLOW	4.	6.	6.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A28-9	.03	1	FLOW	30.	57.	57.
				TIME	3.58	3.58	3.58

100-year pond elevation 46.05 less than spillway's 46.10 inv.

DIVERSION TO							
+	D36	.03	1	FLOW	19.	32.	32.
				TIME	3.58	3.50	3.50
HYDROGRAPH AT							
+	D24	.03	1	FLOW	12.	25.	25.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	COM3	.03	1	FLOW	15.	30.	30.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A25B	.00	1	FLOW	3.	6.	6.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	COM2	.04	1	FLOW	18.	34.	35.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	RA30S	.00	1	FLOW	2.	4.	4.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A31	.00	1	FLOW	2.	3.	4.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A27	.00	1	FLOW	3.	7.	7.
				TIME	3.58	3.58	3.58
3 COMBINED AT							
+	CA6S	.00	1	FLOW	7.	13.	14.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A26	.03	1	FLOW	21.	46.	47.
				TIME	3.58	3.58	3.58
ROUTED TO							
+	RSD	.03	1	FLOW	21.	46.	47.
				TIME	3.58	3.58	3.58
2 COMBINED AT							
+	CA6SP	.03	1	FLOW	26.	56.	57.
				TIME	3.58	3.58	3.58
3 COMBINED AT							
+	CA6	.38	1	FLOW	220.	299.	301.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	RDIND	.00	1	FLOW	0.	2.	2.
				TIME	.08	3.50	3.50
HYDROGRAPH AT							
+	A32	.00	1	FLOW	3.	5.	5.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	CH2	.00	1	FLOW	6.	10.	10.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A33	.00	1	FLOW	2.	5.	5.
				TIME	3.50	3.50	3.50
4 COMBINED AT							
+	CA7S	.01	1	FLOW	11.	22.	22.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	RD36	.00	1	FLOW	19.	32.	32.
				TIME	3.58	3.50	3.50
2 COMBINED AT							
+	CA7	.01	1	FLOW	28.	54.	54.
				TIME	3.50	3.50	3.50
2 COMBINED AT							
+	PT.A	.39	1	FLOW	246.	347.	349.

				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	A34	.01	1	FLOW	8.	15.	16.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	A35	.01	1	FLOW	10.	17.	17.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	B43	.00	1	FLOW	4.	7.	7.
				TIME	3.50	3.50	3.50

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
	R/CA1 MANE	2.09	66.43	217.57	1.29	5.00	65.74	215.00	1.29
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4606E+01 EXCESS= .0000E+00 OUTFLOW= .4606E+01 BASIN STORAGE= .2256E-03 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
	R/CA1 MANE	1.84	126.37	217.26	2.57	5.00	125.24	215.00	2.56
CONTINUITY SUMMARY (AC-FT) - INFLOW= .9169E+01 EXCESS= .0000E+00 OUTFLOW= .9169E+01 BASIN STORAGE= .2160E-03 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
	R/CA1 MANE	1.84	128.76	216.78	2.60	5.00	127.00	215.00	2.60
CONTINUITY SUMMARY (AC-FT) - INFLOW= .9278E+01 EXCESS= .0000E+00 OUTFLOW= .9278E+01 BASIN STORAGE= .1917E-03 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
	R/A7 MANE	1.05	16.56	211.51	1.29	5.00	16.51	215.00	1.29
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1074E+01 EXCESS= .0000E+00 OUTFLOW= .1074E+01 BASIN STORAGE= .7093E-04 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
	R/A7 MANE	.92	31.59	211.69	2.57	5.00	31.11	215.00	2.57
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2138E+01 EXCESS= .0000E+00 OUTFLOW= .2138E+01 BASIN STORAGE= .7693E-04 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
	R/A7 MANE	.92	31.86	211.22	2.60	5.00	31.47	215.00	2.60
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2164E+01 EXCESS= .0000E+00 OUTFLOW= .2164E+01 BASIN STORAGE= .7674E-04 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
	R/CA2 MANE	.98	153.64	215.21	1.29	5.00	153.21	215.00	1.29
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1053E+02 EXCESS= .0000E+00 OUTFLOW= .1052E+02 BASIN STORAGE= .1018E-03 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
	R/CA2 MANE	.86	291.47	215.35	2.56	5.00	291.02	215.00	2.57
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2095E+02 EXCESS= .0000E+00 OUTFLOW= .2094E+02 BASIN STORAGE= .1097E-03 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .00									
	R/CA2 MANE	.86	295.19	214.82	2.59	5.00	294.97	215.00	2.60

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          FOR PLAN = 1  RATIO=  .00
            R/CA4  MANE          .42    518.63    215.17      2.54      5.00    518.16    215.00        2.54

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3684E+02 EXCESS= .0000E+00 OUTFLOW= .3683E+02 BASIN STORAGE= .5809E-04 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            R/COM  MANE          1.18     12.83    211.62      1.29      5.00     12.43    215.00        1.29

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .8303E+00 EXCESS= .0000E+00 OUTFLOW= .8303E+00 BASIN STORAGE= .8082E-04 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            R/COM  MANE          1.04     24.40    211.99      2.57      5.00     23.55    210.00        2.57

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1653E+01 EXCESS= .0000E+00 OUTFLOW= .1653E+01 BASIN STORAGE= .7752E-04 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            R/COM  MANE          1.04     24.70    211.52      2.60      5.00     23.78    210.00        2.60

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1672E+01 EXCESS= .0000E+00 OUTFLOW= .1672E+01 BASIN STORAGE= .7587E-04 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
            RA10AE  MANE         3.50      2.51    217.00      1.29      5.00      2.47    215.00        1.29

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1569E+00 EXCESS= .0000E+00 OUTFLOW= .1571E+00 BASIN STORAGE= .5178E-03 PERCENT ERROR=   -.5

          FOR PLAN = 1  RATIO=  .00
            RA10AE  MANE         3.00      4.72    213.00      2.57      5.00      4.72    215.00        2.56

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3121E+00 EXCESS= .0000E+00 OUTFLOW= .3125E+00 BASIN STORAGE= .4845E-03 PERCENT ERROR=   -.3

          FOR PLAN = 1  RATIO=  .00
            RA10AE  MANE         3.00      4.77    213.00      2.60      5.00      4.77    215.00        2.59

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3159E+00 EXCESS= .0000E+00 OUTFLOW= .3163E+00 BASIN STORAGE= .4877E-03 PERCENT ERROR=   -.3

          FOR PLAN = 1  RATIO=  .00
              RSD  MANE          .45     21.29    215.47       .92      5.00     21.15    215.00         .92

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1322E+01 EXCESS= .0000E+00 OUTFLOW= .1322E+01 BASIN STORAGE= .3321E-04 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
              RSD  MANE          .39     46.18    215.39      2.09      5.00     46.04    215.00        2.09

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3001E+01 EXCESS= .0000E+00 OUTFLOW= .3001E+01 BASIN STORAGE= .3258E-04 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .00
              RSD  MANE          .38     46.73    215.22      2.12      5.00     46.59    215.00        2.12

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3043E+01 EXCESS= .0000E+00 OUTFLOW= .3043E+01 BASIN STORAGE= .3217E-04 PERCENT ERROR=    .0


 *** NORMAL END OF HEC-1 ***
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