DRAINAGE REPORT

FOR

STORM CLOUD SUBDIVISION, UNITS 4 & 5

A 241-DWELLING UNIT SINGLE-DETACHED RESIDENTIAL SUBDIVISION

ALBUQUERQUE, NEW MEXICO
FEBRUARY 10, 2012

Prepared by:

ISAACSON & ARFMAN, P.A.
128 Monroe Street NE
Albuquerque, NM 87108
(505) 268-8828

Åsa Nilsson-Weber 2-10-12

Åsa Nilsson-Weber, PE **Date**

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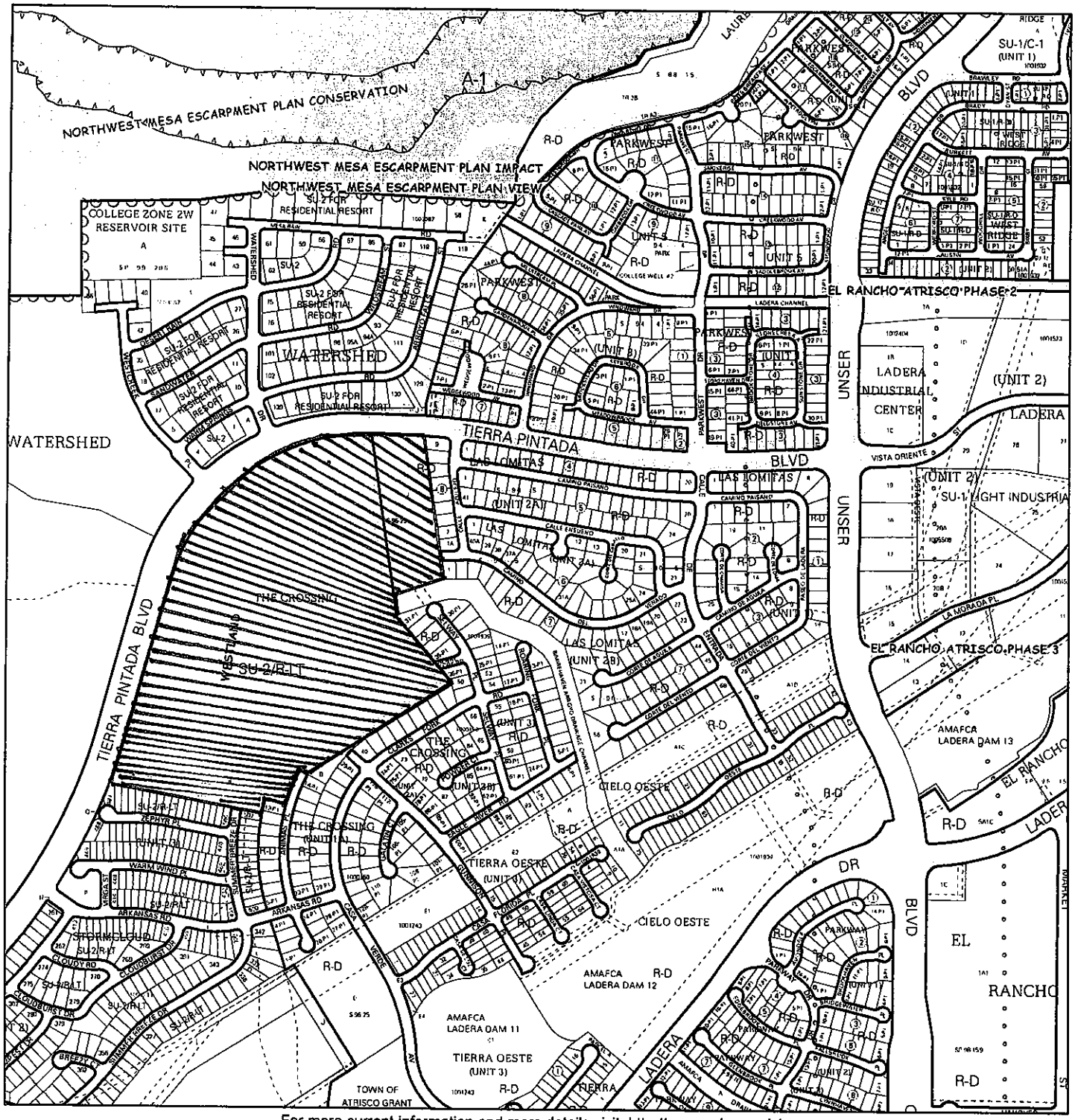
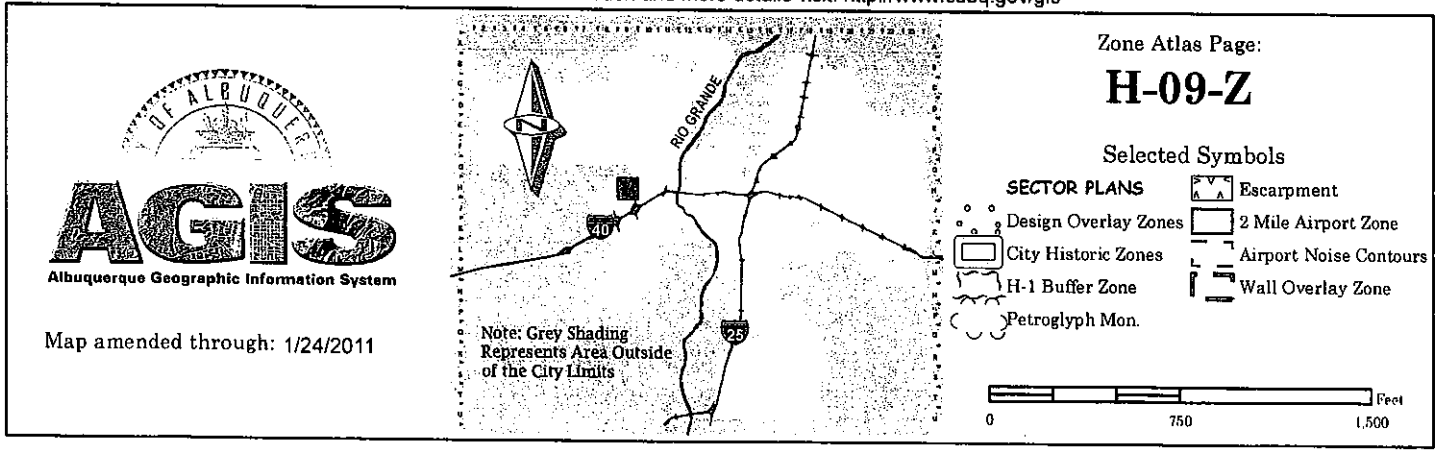
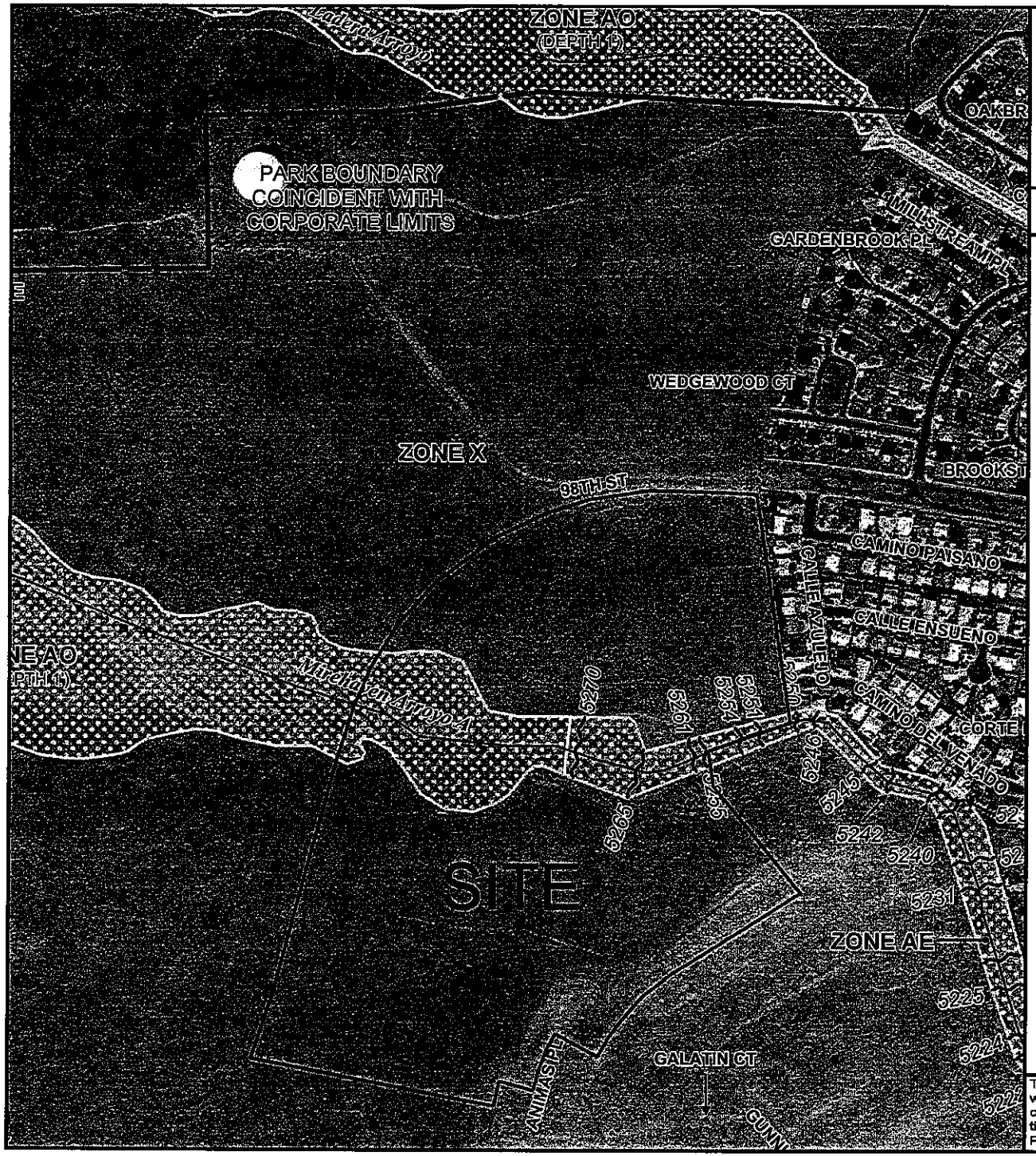


For more current information and more details visit: http://www.cabq.gov/gis





MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0326G

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO

AND INCORPORATED AREAS

PANEL 326 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0326	G
BERNALILLO COUNTY UNINCORPORATED AREAS	350001	0326	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
35001C0326G

MAP REVISED
SEPTEMBER 26, 2008

Federal Emergency Management Agency

I. PROJECT INFORMATION

PROPOSED LEGAL DESCRIPTION:
Storm Cloud Subdivision, Units 4 & 5

EXISTING LEGAL DESCRIPTION:
Tracts B & J, The Crossings, and Tract R, Storm Cloud Subdivision, Unit 3

ENGINEER: Isaacson & Arfman, P.A.
128 Monroe Street NE
Albuquerque, NM 87108
(505) 268-8828
Attn: Åsa Nilsson-Weber

SURVEYOR: Surv-Tek, Inc.
(505) 897-3366
Attn: Russ P. Hugg, NMPLS No. 9750

DEVELOPER: WALH, LLC
c/o The Garrett Group
Attn: Jeff Garrett

NUMBER OF PROPOSED DWELLING UNITS: 241

TOTAL AREA: 55.24 Acres
Unit 4 = 31.036 AC.
Unit 5 = 21.404 AC.
Mirehaven Arroyo = 2.802 Ac.

FLOOD PLAIN: This site lies within Zone "X" (areas determined to be outside the 0.2% annual chance floodplain), Zone "A0, (DEPTH 1')" (Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined), and Zone "AE" (Base Flood Elevations determined) as shown on National Flood Insurance Program Flood Insurance Rate Map Number 35001C0326G, Map Revised September 26, 2008.

II. INTRODUCTION

Storm Cloud Subdivision, Units 4 & 5, will be developed with 241 lots. The site is bounded on the west and north by Tierra Pintada, NW, and on the east and south by existing subdivisions (see vicinity map). The Mirehaven Arroyo separates the two units with Unit 4 being on the north side and Unit 5 on the south side. A preliminary plat and grading plan was approved in 2006/2008, and the site has been graded and retaining wall and perimeter walls have been partially installed based on the original layout. The approved drainage report for the original layout was prepared by Advanced Engineering and Consulting, LLC, in 2006. The new Owners of the site are now pursuing a revised layout with Unit 5 being a private, gated community with wider lots (55'-65'), and Unit 4 being redesigned to have lot widths of 45'-55'. The street layout in Unit 5 will remain the same, but the street layout in Unit 4 has been revised. This report presents drainage recommendations for the development of Storm Cloud Subdivision, Units 4 & 5.

III. EXISTING CONDITIONS

The site has been graded and retaining and perimeter walls have been partially installed per the original grading plan. A retaining wall investigation has been performed, and a number of walls are failing and some have already collapsed. Unit 4 is graded to drain to the Mirehaven Arroyo, and Unit 5 is graded to drain to the Mirehaven Arroyo, to a storm drain system in Summer Breeze Drive, and via surface flow to Gunnison Road and Animas Place.

IV. PROPOSED CONDITIONS

The site will be developed in two phases with154 lots in Unit 4 and 87 lots in Unit 5. The interior retaining walls and portions of the perimeter walls shall be removed and the site shall be re-graded.

The Grading & Drainage Plans and Retaining Wall Plans for Units 4 & 5 are in the pocket at the back pockets of this report.

LAND TREATMENTS & BASIN AREAS

Land treatment percent D was calculated based on the equation in DPM 22.2 Table A-6, and the remaining area was split between land treatments B and C. See Appendix A for land treatment calculations and basin area table and Appendix C for Drainage Basin Exhibits.

Unit 4:

A 36" storm drain with two on-grade inlets in Chinook Road and two sump inlets in Summer Breeze Drive will convey 28.8 cfs to an existing 36" storm drain at the south end of the site. In case the sump inlets would clog, emergency overflow would be directed south in Summer Breeze Drive. The starting HGL for the storm drain was assumed at 62.7 per HGL shown on the as-built drawing.

A 36"/24" storm drain system discharges 41.3 cfs to the Mirehaven Arroyo. The storm drain extends from the Mirehaven Arroyo, a drainage easement, through Gunnison Place and Jet Stream Road, and terminates at two sump inlets in Summer Breeze Dr. In case of clogging, the emergency overflow would be directed south to the sump inlets connecting to the two sump inlets connected to the storm drain system in Summer Breeze Drive, which have been conservatively sized with double grates. Three on-grade inlets are located at the intersection of Jet Stream Rd and Gunnison Place, and two sump inlets are located in Monsoon Drive, next to the drainage easement which would provide emergency overflow.

Unit 5:

A 42" storm drain located in a drainage easement with two on-grade inlets in Torrent Lane, two on-grade inlets and three sump inlets in Camino del Venado will discharge 67.1 cfs to the Mirehaven Arroyo. An emergency flow path is provided through the drainage easement.

SIDEWALK CULVERTS

The parks in Unit 4 and Unit 5 will drain to sidewalk culverts. In Unit 4, a 3-foot culvert is required at the northeast corner of the park at Animas Place, and in Unit 5, a 2-foot culvert is required at the southeast corner of the park at Camino del Venado. See Appendix F for calculations.

MIREHAVEN ARROYO

The channel improvements have been designed by Wilson & Co. and shall be constructed with either Unit 4 or Unit 5, whichever is developed first.

TIERRA PINTADA

Plans for Tierra Pintada, including box culvert at the Mirehaven Arroyo crossing are currently being designed by Bohannan Huston, Inc.

HYDROLOGY

The 100-year, 6-hour flows were calculated using AHYMO. The summary and output files are included in Appendix B. The Drainage Basin Exhibits in Appendix C show the flow rates for each basin, street flow at critical analysis points (AP) and storm drain flows for each inlet. Below is a summary of discharge locations:

Unit 4:

- 29.4 cfs Summer Breeze Drive—29.2 to existing 36" storm drain and 0.2 cfs surface flow (29.8 cfs allowed)
- 3.3 cfs Animas Place south end—surface flow (3.5 cfs allowed)
- 19.6 cfs Animas Place north end—surface flow (20.5 cfs allowed)
- 10.6 cfs Gunnison Place—surface flow (13 cfs allowed)
- 41.8 cfs Mirehaven Arroyo—41.3 cfs to 36" storm drain ; 0.5 cfs surface flow

104.7 cfs total

Unit 5:

- 67.9 cfs Mirehaven Arroyo—67.1 to 42" storm drain and 0.8 cfs surface flow
- 1.0 cfs Camino del Venado east end—surface flow (4.0 cfs allowed) via A 2' concrete rundowns connecting from new curb to existing offsite street via openings in wall.

68.9 cfs total

The total allowable discharge rates listed are per the approved drainage report for Storm Cloud Units 4 & 5 by Advanced Engineering, 2006.

STREET CAPACITY

The streets in Unit 4 will be public and the streets in Unit 5 will be private. All streets will have mountable or standard curb and gutter. Appendix D shows street flow depths at critical analysis points, which are labeled on the Drainage Basin Exhibits in Appendix C.

STORM DRAIN

On-grade inlets were sized using DPM Plates 22.3-D5 and 22.3-D6, and sump inlet capacities were calculated based on the orifice equation (See Appendix E). There will be two separate storm drain systems on Unit 4 and one system on Unit 5. Storm Drain Exhibits and Hydraflow Storm Sewer Calculations are included in Appendix D.

V. SUMMARY & CONCLUSIONS

The site will be developed in two phases. The Mirehaven Arroyo drop structures shall be constructed with the first unit to be developed.

Based on this report, it is recommended that the following improvements be constructed (as shown on the Grading Plans in the back pockets):

Unit 4:

- Standard or mountable curb as shown on plans
- Retaining walls as shown on plans
- Inlets as shown on plans
- 18"-36" storm drains as shown on plans
- 3' sidewalk culvert to convey flows from park tract onto Animas Place

Unit 5:

- Standard or mountable curb as shown on plans
- Retaining walls as shown on plans
- Inlets as shown on plans
- 18"-42" storm drains as shown on plans
- 2' sidewalk culvert to convey flows from park tract to Camino del Venado
- Wall openings and 2' concrete rundowns from gutters at east end of Camino del Venado connecting to existing street to convey 1.0 cfs to existing offsite street

APPENDIX A

Land Treatments & Basin Areas

LAND TREATMENT CALCULATIONS

(Per the City of Albuquerque DPM Section 22.2, Table A-5)

PROJECT NAME: **Storm Cloud, Unit 4**

JOB NUMBER: 1821

Total Area 31.04 Acres
# of Lots 154 lots

N = 4.96 D.U./Ac.

Percentage of Impervious Land (Type D)

$\%D = 7(N^2+5N)^{1/2}$

%D= 49.21 %

A+D= 49.21 %
B+C= 50.79 %

LAND TREATMENTS		USE	
Type A=	**0 %**	**0**	**%**
Type B=	**25.39 %**	**26**	**%**
Type C=	**25.39 %**	**25**	**%**
Type D=	**49.21 %**	**49**	**%**
Σ=	100 %		

STORM CLOUD, UNIT 4

BASIN AREA AND LAND TREATMENT TABLE-- PROPOSED CONDITIONS

BASIN	AREA			LAND TREATMENT (%)				Q100, cfs
	SF	AC.	SQ. MI.	A	B	C	D	
A1	90130	2.0691	0.00323	0	26	25	49	7
A2	153082	3.5143	0.00549	0	26	25	49	11.9
A3	65521	1.5042	0.00235	0	26	25	49	5.1
A4	69002	1.5841	0.00248	0	26	25	49	5.4
A5	2625	0.0603	0.00009	0	26	25	49	0.2
B	41794	0.9595	0.00150	0	26	25	49	3.3
C	78955	1.8126	0.00283	0	26	25	49	6.1
D1	78985	1.8132	0.00283	0	26	25	49	6.1
D2	68298	1.5679	0.00245	0	26	25	49	5.3
D3	32372	0.7432	0.00116	0	26	25	49	2.8
D4	101608	2.3326	0.00364	0	26	25	49	7.9
D5	36266	0.8326	0.00130	0	26	25	49	2.5
D6	274285	6.2967	0.00984	0	26	25	49	21.2
D7	5772	0.1325	0.00021	0	26	25	49	0.5
E1	51325	1.1783	0.00184	0	26	25	49	4.0
E2	201914	4.6353	0.00724	0	26	25	49	15.6
TOTAL	1351935	31.0362	0.0485					104.9

Q100, cfs OUTFALL (after AHYMO routing)

19.6	Animas north
3.3	Animas south
10.6	Gunnison
0.2	Summer Breeze surface flow
29.2	Summer Breeze storm drain
41.3	Gunnison storm drain to Mirehaven
0.5	NW corner rundown to Mirehaven
104.7	TOTAL

LAND TREATMENT CALCULATIONS

(Per the City of Albuquerque DPM Section 22.2, Table A-5)

PROJECT NAME: **Storm Cloud, Unit 5**

JOB NUMBER: 1822

Total Area	21.404	Acres
# of Lots	87	lots

N = 4.06 D.U./Ac.

Percentage of Impervious Land (Type D)

$\%D = 7(N^2+5N)^{1/2}$

%D= 42.49 %

A+D= 42.49 %

B+C= 57.51 %

LAND TREATMENTS		USE	
Type A=	**0 %**	**0**	**%**
Type B=	**28.76 %**	**29**	**%**
Type C=	**28.76 %**	**29**	**%**
Type D=	**42.49 %**	**42**	**%**
Σ=	100 %		

STORM CLOUD, UNIT 5

BASIN AREA AND LAND TREATMENT TABLE-- PROPOSED CONDITIONS

BASIN	*AREA*			*LAND TREATMENT (%)*				Q100, cfs
	SF	*AC.*	*SQ. MI.*	*A*	*B*	*C*	*D*	
F1	128118	2.9412	0.00460	0	29	29	42	9.6
F2	100086	2.2977	0.00359	0	29	29	42	7.5
F3	65208	1.4970	0.00234	0	29	29	42	4.9
F4	97208	2.2316	0.00349	0	29	29	42	7.3
F5	41190	0.9456	0.00148	0	29	29	42	3.1
F6	45479	1.0441	0.00163	0	29	29	42	3.4
F7	83564	1.9184	0.00300	0	29	29	42	6.2
F8	34460	0.7911	0.00124	0	29	29	42	2.6
F9	96462	2.2145	0.00346	0	29	29	42	7.2
F10	155818	3.5771	0.00559	0	29	29	42	11.7
F11	28361	0.6511	0.00102	0	29	29	42	2.2
F12	33286	0.7641	0.00119	0	29	29	42	2.5
F13	10290	0.2362	0.00037	0	29	29	42	0.8
F14	12819	0.2943	0.00046	0	29	29	42	1
TOTAL	932349	21.4038	0.0334					70.0

Q100, CFS, OUTFALL (after AHYMO routing)

67.1	Camino del Venado storm drain to Mirehaven
0.8	Basin F13 to Mirehaven
1.0	Basin F14 to east Camino del Venado
68.9	

APPENDIX B

Drainage Calculations

NOAA Atlas 14, Volume 1, Version 5
Location name: Albuquerque, New Mexico, US*
Coordinates: 35.1038, -106.7418
Elevation: 5259ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF tabular | PF graphical | Maps & aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.164 (0.141-0.191)	0.213 (0.182-0.248)	0.286 (0.243-0.334)	0.344 (0.292-0.400)	0.423 (0.357-0.491)	0.485 (0.408-0.563)	0.551 (0.460-0.638)	0.620 (0.514-0.719)	0.715 (0.586-0.829)	0.790 (0.643-0.916)
10-min	0.250 (0.214-0.291)	0.324 (0.276-0.377)	0.436 (0.370-0.509)	0.523 (0.444-0.609)	0.644 (0.543-0.748)	0.738 (0.621-0.857)	0.838 (0.699-0.972)	0.944 (0.782-1.09)	1.09 (0.892-1.26)	1.20 (0.979-1.40)
15-min	0.309 (0.266-0.361)	0.401 (0.343-0.468)	0.540 (0.459-0.630)	0.649 (0.551-0.755)	0.798 (0.673-0.927)	0.915 (0.769-1.06)	1.04 (0.867-1.20)	1.17 (0.970-1.36)	1.35 (1.11-1.57)	1.49 (1.21-1.73)
30-min	0.417 (0.358-0.486)	0.541 (0.462-0.630)	0.727 (0.618-0.849)	0.874 (0.742-1.02)	1.08 (0.907-1.25)	1.23 (1.04-1.43)	1.40 (1.17-1.62)	1.58 (1.31-1.83)	1.82 (1.49-2.11)	2.01 (1.63-2.33)
60-min	0.516 (0.443-0.602)	0.669 (0.571-0.780)	0.900 (0.765-1.05)	1.08 (0.918-1.26)	1.33 (1.12-1.55)	1.53 (1.28-1.77)	1.73 (1.45-2.01)	1.95 (1.62-2.26)	2.25 (1.84-2.61)	2.49 (2.02-2.88)
2-hr	0.596 (0.510-0.702)	0.762 (0.652-0.900)	1.01 (0.862-1.19)	1.21 (1.03-1.42)	1.49 (1.26-1.74)	1.72 (1.44-2.00)	1.96 (1.63-2.28)	2.21 (1.82-2.57)	2.57 (2.09-2.98)	2.86 (2.30-3.33)
3-hr	0.644 (0.559-0.758)	0.821 (0.709-0.964)	1.08 (0.932-1.26)	1.28 (1.11-1.50)	1.57 (1.34-1.83)	1.80 (1.53-2.09)	2.04 (1.72-2.37)	2.31 (1.93-2.68)	2.67 (2.20-3.10)	2.97 (2.42-3.45)
6-hr	0.744 (0.650-0.864)	0.940 (0.822-1.09)	1.22 (1.06-1.41)	1.43 (1.25-1.66)	1.73 (1.50-2.00)	1.96 (1.69-2.26)	2.21 (1.89-2.55)	2.46 (2.09-2.84)	2.82 (2.37-3.25)	3.12 (2.59-3.60)
12-hr	0.829 (0.729-0.945)	1.05 (0.921-1.19)	1.33 (1.16-1.51)	1.55 (1.36-1.76)	1.85 (1.61-2.10)	2.08 (1.81-2.36)	2.33 (2.00-2.63)	2.58 (2.20-2.92)	2.92 (2.47-3.31)	3.19 (2.68-3.63)
24-hr	0.941 (0.833-1.07)	1.18 (1.05-1.34)	1.48 (1.31-1.68)	1.72 (1.52-1.94)	2.04 (1.79-2.30)	2.28 (2.00-2.57)	2.54 (2.22-2.86)	2.80 (2.43-3.15)	3.15 (2.72-3.54)	3.42 (2.94-3.85)
2-day	0.992 (0.884-1.11)	1.24 (1.11-1.40)	1.56 (1.39-1.74)	1.80 (1.60-2.01)	2.13 (1.89-2.38)	2.38 (2.10-2.66)	2.64 (2.33-2.95)	2.91 (2.54-3.25)	3.26 (2.84-3.65)	3.53 (3.06-3.96)
3-day	1.13 (1.02-1.25)	1.41 (1.27-1.56)	1.75 (1.58-1.93)	2.01 (1.81-2.22)	2.36 (2.13-2.61)	2.64 (2.36-2.91)	2.91 (2.60-3.21)	3.19 (2.84-3.52)	3.56 (3.15-3.93)	3.84 (3.38-4.25)
4-day	1.27 (1.16-1.39)	1.58 (1.44-1.73)	1.93 (1.77-2.12)	2.22 (2.02-2.42)	2.60 (2.36-2.84)	2.89 (2.62-3.16)	3.18 (2.88-3.47)	3.47 (3.13-3.79)	3.86 (3.46-4.22)	4.15 (3.71-4.55)
7-day	1.46 (1.33-1.59)	1.81 (1.65-1.97)	2.20 (2.02-2.40)	2.51 (2.30-2.73)	2.92 (2.66-3.17)	3.22 (2.93-3.49)	3.52 (3.20-3.82)	3.81 (3.46-4.14)	4.19 (3.80-4.56)	4.47 (4.03-4.87)
10-day	1.62 (1.48-1.76)	2.01 (1.84-2.18)	2.46 (2.26-2.67)	2.81 (2.58-3.05)	3.28 (3.00-3.55)	3.63 (3.32-3.93)	3.99 (3.63-4.32)	4.33 (3.94-4.70)	4.79 (4.33-5.19)	5.12 (4.62-5.57)
20-day	2.03 (1.86-2.22)	2.53 (2.32-2.76)	3.07 (2.82-3.35)	3.48 (3.19-3.79)	4.00 (3.67-4.36)	4.38 (4.01-4.77)	4.75 (4.34-5.16)	5.10 (4.64-5.54)	5.54 (5.03-6.02)	5.85 (5.30-6.36)
30-day	2.45 (2.24-2.65)	3.03 (2.78-3.29)	3.65 (3.35-3.96)	4.11 (3.77-4.45)	4.69 (4.29-5.06)	5.10 (4.66-5.51)	5.49 (5.01-5.93)	5.86 (5.34-6.32)	6.30 (5.73-6.80)	6.61 (6.01-7.14)
45-day	2.99 (2.75-3.23)	3.69 (3.41-4.00)	4.41 (4.06-4.76)	4.91 (4.53-5.31)	5.53 (5.10-5.97)	5.96 (5.48-6.43)	6.34 (5.84-6.84)	6.69 (6.15-7.22)	7.08 (6.51-7.64)	7.32 (6.74-7.90)
60-day	3.44 (3.17-3.73)	4.26 (3.93-4.62)	5.08 (4.69-5.50)	5.67 (5.23-6.13)	6.38 (5.88-6.90)	6.87 (6.33-7.42)	7.31 (6.74-7.91)	7.71 (7.11-8.34)	8.17 (7.53-8.85)	8.47 (7.81-9.16)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4) - Ver. S4.01a, Rel: 01a RUN DATE (MON/DAY/YR) =11/11/2011
INPUT FILE = M:\PROJECT DOCUMENTS\1800-1899\1821\CALCS\1821P1.DAT USER NO.= AHYMO_Temp_User:20122010

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
*S**********										
*S	STORM CLOUD, UNIT 4									
*S	DEVELOPED CONDITIONS									
*S	100-YR, 6-HR STORM									
*S	1821P1.DAT									
*S	OCTOBER 2011									
*S	BY ASA NILSSON-WEBER									
*S	ISAACSON & ARFMAN, P.A.									
*S**********										
START										TIME= 0.00
RAINFALL TYPE= 1 NOAA 14										RAIN6= 2.210
*S BASIN A1										
COMPUTE NM HYD	101.00	-	1	0.00323	6.99	0.241	1.39851	1.530	3.379	PER IMP= 49.00
*S BASIN A2										
COMPUTE NM HYD	102.00	-	2	0.00549	11.86	0.409	1.39851	1.530	3.376	PER IMP= 49.00
*S BASIN A3										
COMPUTE NM HYD	103.00	-	3	0.00235	5.09	0.175	1.39851	1.530	3.382	PER IMP= 49.00
*S BASIN A4										
COMPUTE NM HYD	104.00	-	4	0.00248	5.37	0.185	1.39851	1.530	3.382	PER IMP= 49.00
*S BASIN A5										
COMPUTE NM HYD	105.00	-	5	0.00009	0.21	0.007	1.39851	1.530	3.691	PER IMP= 49.00
*S BASIN B										
COMPUTE NM HYD	106.00	-	6	0.00150	3.25	0.112	1.39851	1.530	3.389	PER IMP= 49.00
*S BASIN C										
COMPUTE NM HYD	107.00	-	7	0.00283	6.12	0.211	1.39851	1.530	3.380	PER IMP= 49.00
*S BASIN D1										
COMPUTE NM HYD	108.00	-	8	0.00283	6.12	0.211	1.39851	1.530	3.380	PER IMP= 49.00
*S BASIN D2										
COMPUTE NM HYD	109.00	-	9	0.00245	5.30	0.183	1.39851	1.530	3.382	PER IMP= 49.00
*S BASIN D5										
COMPUTE NM HYD	110.00	-	10	0.00130	2.82	0.097	1.39851	1.530	3.392	PER IMP= 49.00
*S BASIN D3										
COMPUTE NM HYD	111.00	-	11	0.00116	2.52	0.087	1.39851	1.530	3.394	PER IMP= 49.00
*S BASIN D4										
*S *** AP5 ***										
COMPUTE NM HYD	112.00	-	12	0.00364	7.87	0.271	1.39851	1.530	3.378	PER IMP= 49.00
*S BASIN D6										
*S *** AP8 ***										
COMPUTE NM HYD	113.00	-	13	0.00984	21.24	0.734	1.39851	1.530	3.373	PER IMP= 49.00
*S BASIN D7										
COMPUTE NM HYD	114.00	-	14	0.00021	0.47	0.016	1.39851	1.530	3.506	PER IMP= 49.00

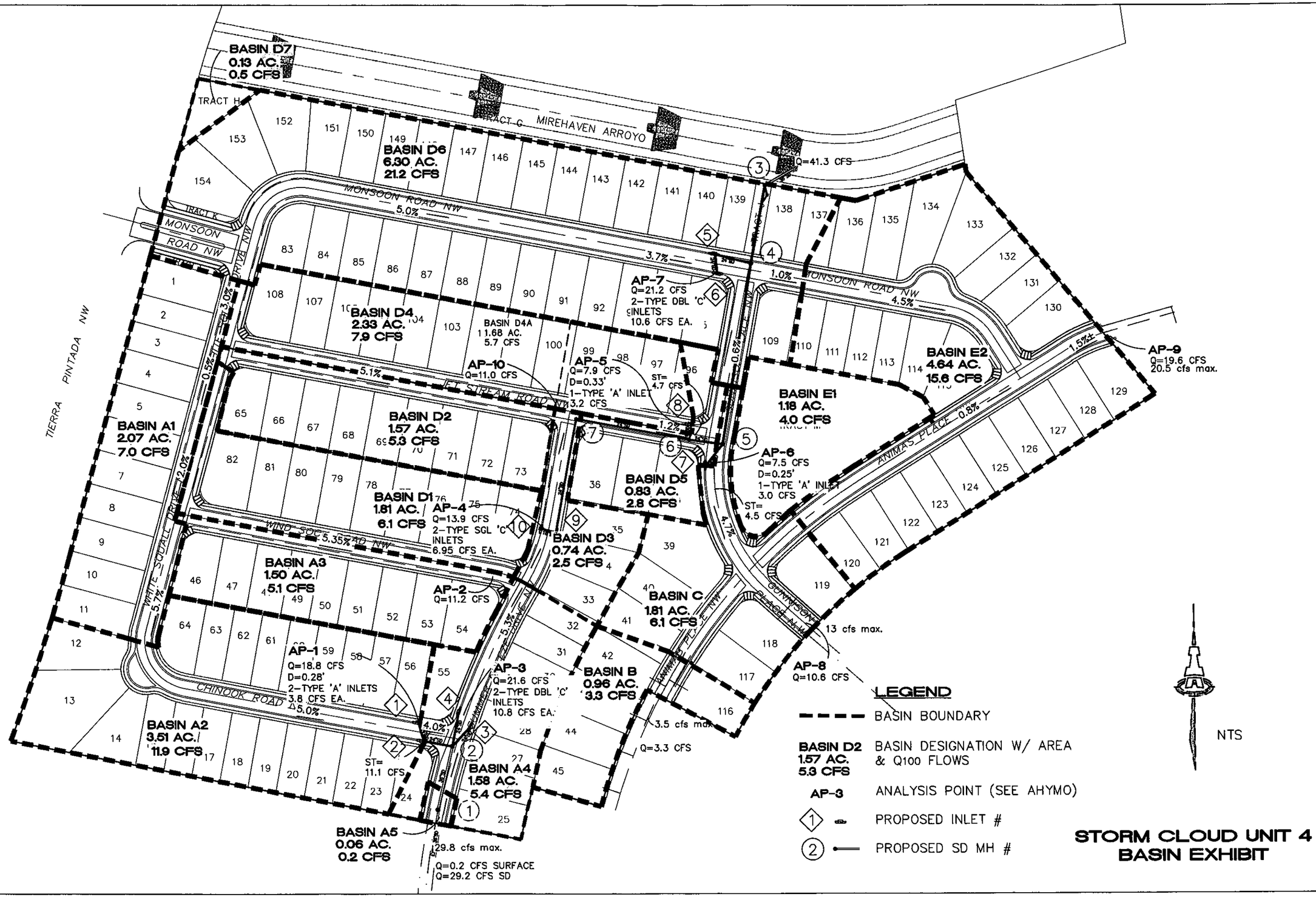
COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	TIME TO RUNOFF (INCHES)	PEAK (HOURS)	CFS PER ACRE	NOTATION
*S BASIN E1										
COMPUTE NM HYD	115.00	-	15	0.00184	3.99	0.137	1.39851	1.530	3.385	PER IMP= 49.00
*S BASIN E2										
COMPUTE NM HYD	116.00	-	16	0.00724	15.64	0.540	1.39851	1.530	3.374	PER IMP= 49.00
*S ROUTE FLOWS FROM BASIN A1 THROUGH 30' F-F STREET										
ROUTE MCUNGE	200.00	1	20	0.00323	6.99	0.241	1.39847	1.550	3.379	CCODE = 0.2
*S ADD BASINS A1 & A2										
*S *** AP1 ***										
ADD HYD	200.10	2&20	21	0.00872	18.75	0.650	1.39845	1.540	3.360	
*S DIVIDE FLOWS, 7.6 CFS TO SD; REM. IN STREET										
DIVIDE HYD	220.SD	21	22	0.00639	7.60	0.476	1.39845	1.420	1.860	
	230.ST	and	23	0.00233	11.15	0.174	1.39845	1.540	7.465	
*S ADD BASINS A3 & D1										
*S *** AP2 ***										
ADD HYD	240.00	3& 8	24	0.00518	11.21	0.386	1.39841	1.530	3.381	
*S ROUTE FLOWS FROM BASIN A3 THROUGH 26' F-F STREET										
ROUTE MCUNGE	200.00	3	25	0.00235	5.08	0.175	1.39844	1.540	3.380	CCODE = 0.2
*S ADD FLOWS AT BASIN AP3—LOW POINT										
*S *** AP3 ***										
ADD HYD	260.00	25& 4	26	0.00483	10.43	0.360	1.39839	1.540	3.373	
ADD HYD	270.00	23&26	27	0.00716	21.58	0.534	1.39841	1.540	4.706	
*S ROUTE FLOWS FROM BASIN D2 THROUGH 26' F-F STREET										
ROUTE MCUNGE	280.00	9	28	0.00245	5.30	0.183	1.39845	1.540	3.382	CCODE = 0.2
*S ADD FLOWS AT AP4—LOW POINT (BASINS D1-D3)										
*S *** AP4 ***										
ADD HYD	290.00	8&11	29	0.00399	8.64	0.298	1.39838	1.530	3.384	
ADD HYD	300.00	28&29	30	0.00644	13.91	0.480	1.39838	1.530	3.376	
*S DIVIDE FLOWS FROM BASIN D4, 3.2 CFS TO SD; REM. IN STREET										
*S *** AP5 ***										
DIVIDE HYD	310.SD	12	31	0.00267	3.20	0.199	1.39844	1.410	1.873	
	320.ST	and	32	0.00097	4.67	0.072	1.39844	1.530	7.513	
*S ADD BASIN D5										
*S *** AP6 ***										
ADD HYD	330.00	10&32	33	0.00227	7.49	0.169	1.39836	1.530	5.154	
*S DIVIDE FLOWS, 3.0 CFS TO SD; REM. IN STREET										
DIVIDE HYD	340.SD	33	34	0.00154	3.00	0.115	1.39836	1.440	3.051	
	350.ST	and	35	0.00073	4.49	0.055	1.39836	1.530	9.552	
*S ADD BASIN C										
*S *** AP8 ***										
ADD HYD	360.00	7&35	36	0.00356	10.61	0.266	1.39840	1.530	4.652	
*S ADD BASINS E1 & E2										
*S *** AP9 ***										
ADD HYD	370.00	15&16	37	0.00908	19.62	0.677	1.39845	1.530	3.377	
FINISH										

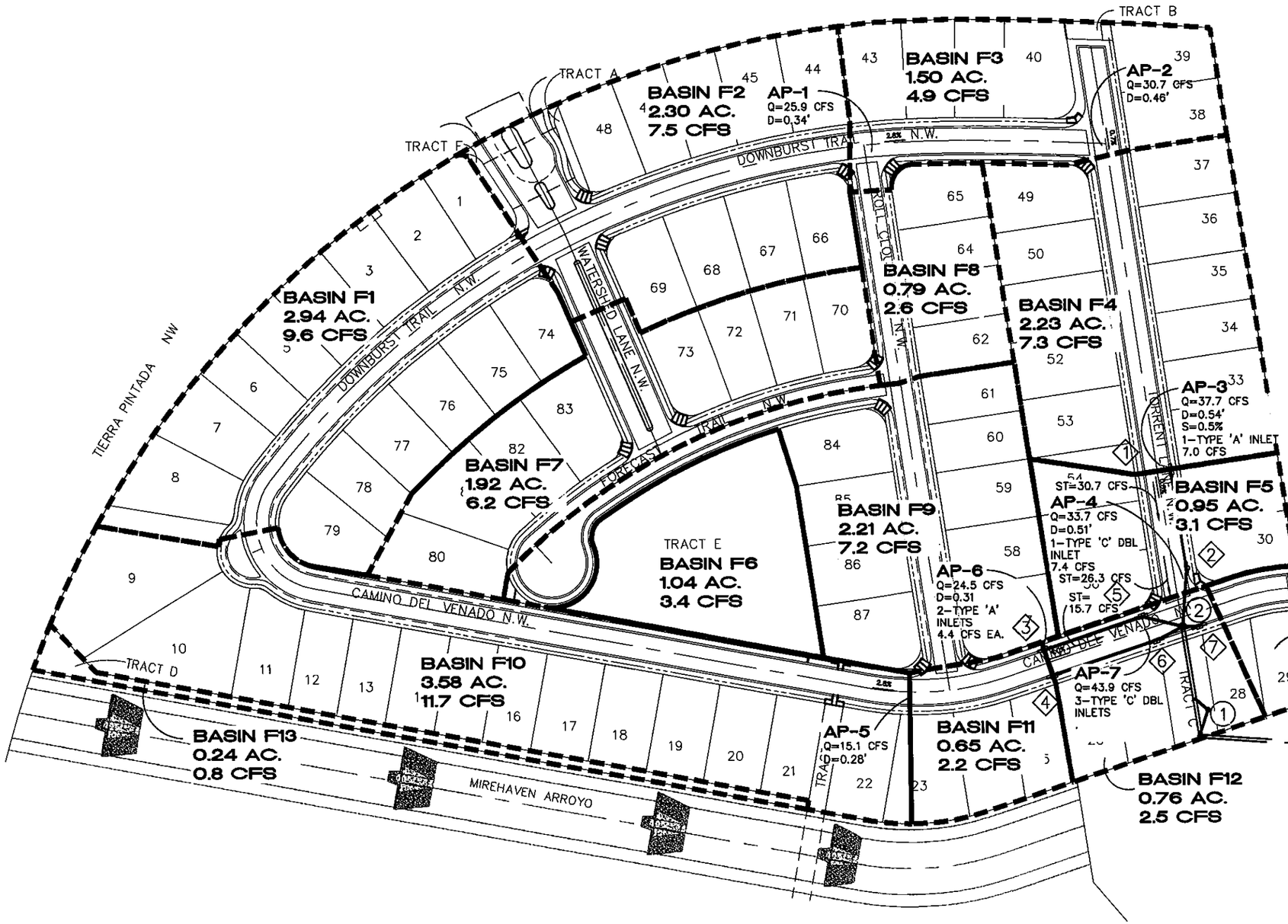
```
AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4)                    - Ver. S4.01a, Rel: 01a      RUN DATE (MON/DAY/YR) =12/13/2011
INPUT FILE = M:\PROJECT DOCUMENTS\1800-1899\1822\CALCS\1822P1.DAT                      USER NO.= AHYMO_Temp_User:20122010

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

*S*************************************************************************
*S       STORM CLOUD, UNIT 5
*S       DEVELOPED CONDITIONS
*S       100-YR, 6-HR STORM
*S       1822P1.DAT
*S       OCTOBER 2011
*S       BY ASA NILSSON-WEBER
*S       ISAACSON & ARFMAN, P.A.
*S*************************************************************************
START                                                                                                  TIME=      0.00
RAINFALL  TYPE= 1 NOAA 14                                                                              RAIN6=     2.210
*S  BASIN F1
COMPUTE NM HYD         101.00   -     1      0.00460        9.61       0.325     1.32312     1.530     3.266 PER IMP=  42.00
*S  BASIN F2
COMPUTE NM HYD         102.00   -     2      0.00359        7.51       0.253     1.32312     1.530     3.267 PER IMP=  42.00
*S  BASIN F3
COMPUTE NM HYD         103.00   -     3      0.00234        4.90       0.165     1.32312     1.530     3.272 PER IMP=  42.00
*S  BASIN F4
COMPUTE NM HYD         104.00   -     4      0.00349        7.30       0.246     1.32312     1.530     3.268 PER IMP=  42.00
*S  BASIN F5
COMPUTE NM HYD         105.00   -     5      0.00148        3.11       0.104     1.32312     1.530     3.278 PER IMP=  42.00
*S  BASIN F6
COMPUTE NM HYD         106.00   -     6      0.00163        3.42       0.115     1.32312     1.530     3.276 PER IMP=  42.00
*S  BASIN F7
COMPUTE NM HYD         107.00   -     7      0.00300        6.28       0.212     1.32312     1.530     3.269 PER IMP=  42.00
*S  BASIN F8
COMPUTE NM HYD         108.00   -     8      0.00124        2.60       0.088     1.32312     1.530     3.282 PER IMP=  42.00
*S  BASIN F9
COMPUTE NM HYD         109.00   -     9      0.00346        7.24       0.244     1.32312     1.530     3.268 PER IMP=  42.00
*S  BASIN F10
COMPUTE NM HYD         110.00   -    10      0.00559       11.68       0.394     1.32312     1.530     3.265 PER IMP=  42.00
*S  BASIN F11
COMPUTE NM HYD         111.00   -    11      0.00102        2.15       0.072     1.32312     1.530     3.287 PER IMP=  42.00
*S  BASIN F12
COMPUTE NM HYD         112.00   -    12      0.00119        2.50       0.084     1.32312     1.530     3.283 PER IMP=  42.00
*S  BASIN F13
COMPUTE NM HYD         113.00   -    13      0.00037        0.79       0.026     1.32312     1.530     3.335 PER IMP=  42.00
*S  BASIN F14
COMPUTE NM HYD         114.00   -    14      0.00046        0.98       0.032     1.32312     1.530     3.320 PER IMP=  42.00
*S  ROUTE FLOWS FROM BASIN F1 THROUGH 32' F-F STREET
ROUTE MCUNGE           200.00   1    20      0.00460        9.61       0.325     1.32308     1.550     3.264 CCODE =     0.2
*S  ADD BASIN F2
ADD HYD                210.00 2&20   21      0.00819       17.02       0.578     1.32305     1.540     3.248
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
*S ADD BASINS F7 AND F8										
ADD HYD	220.00	7& 8	22	0.00424	8.88	0.299	1.32299	1.530	3.273	
*S ADD FLOWS AT SUN DROP AND DOWNBURST										
*S * * * AP-1 * * *										
ADD HYD	230.00	21&22	23	0.01243	25.87	0.877	1.32303	1.540	3.252	
*S ROUTE FLOWS FROM BASINS F1, F2, F7 & F8 THROUGH 32' F-F STREET										
ROUTE MCUNGE	240.00	23	24	0.01243	25.87	0.877	1.32304	1.550	3.252	CCODE = 0.2
*S ADD BASIN F3										
*S TOTAL FLOWS AT TORRENT AND DOWNBURST										
*S * * * AP-2 * * *										
ADD HYD	250.00	3&24	25	0.01477	30.69	1.042	1.32303	1.550	3.247	
*S ROUTE FLOWS THROUGH 32' F-F STREET										
ROUTE MCUNGE	270.00	25	27	0.01477	30.66	1.042	1.32311	1.570	3.243	CCODE = 0.2
*S ADD BASIN F4 - TOTAL FLOWS AT INLET 1										
*S * * * AP3 * * *										
ADD HYD	280.00	4&27	28	0.01826	37.66	1.289	1.32309	1.560	3.223	
*S DIVIDE FLOWS, 7.0 CFS TO SD; REM. IN STREET										
DIVIDE HYD	290.SD	28	29	0.00912	7.00	0.643	1.32309	1.390	1.199	
	300.ST	and	30	0.00914	30.66	0.645	1.32309	1.560	5.241	
*S ADD BASIN F5 - TOTAL FLOWS AT INLET 2										
*S * * * AP4 * * *										
ADD HYD	310.00	5&30	31	0.01062	33.66	0.749	1.32307	1.560	4.952	
*S DIVIDE FLOWS, 7.4 CFS TO SD; REM. IN STREET										
DIVIDE HYD	320.SD	31	32	0.00440	7.40	0.310	1.32307	1.440	2.630	
	330.ST	and	33	0.00622	26.26	0.439	1.32307	1.560	6.593	
*S ADD BASINS F6 & F10										
*S TOTAL FLOWS AT SUN DROP AND CAMINO DEL VENDADO										
*S * * * AP5 * * *										
ADD HYD	340.00	6&10	34	0.00722	15.10	0.509	1.32305	1.530	3.267	
*S ADD BASINS 9 & 11										
*S TOTAL FLOWS AT INLETS 3 & 4										
*S * * * AP6 * * *										
ADD HYD	350.00	9&11	35	0.00448	9.38	0.316	1.32300	1.530	3.272	
ADD HYD	360.00	34&35	36	0.01170	24.48	0.826	1.32303	1.530	3.269	
*S DIVIDE FLOWS, 8.8 CFS TO SD; REM. IN STREET										
DIVIDE HYD	380.SD	36	38	0.00804	8.80	0.567	1.32303	1.400	1.710	
	390.ST	and	39	0.00366	15.68	0.258	1.32303	1.530	6.696	
*S ADD BASIN F12 AND FLOWS FROM TORRENT										
*S TOTAL FLOWS AT SUMP INLETS 5 & 6										
*S * * * AP 7 * * *										
ADD HYD	400.00	12&39	40	0.00485	18.18	0.342	1.32300	1.530	5.858	
ADD HYD	410.00	33&40	41	0.01107	43.88	0.781	1.32304	1.550	6.192	
*S ADD STORM DRAIN FLOW										
ADD HYD	500.00	29&32	50	0.01352	14.40	0.954	1.32308	1.440	1.665	
ADD HYD	510.00	38&50	51	0.02156	23.20	1.521	1.32306	1.440	1.682	
ADD HYD	520.00	41&51	52	0.03263	67.08	2.302	1.32305	1.550	3.212	
FINISH										

APPENDIX C

Drainage Basin Exhibits


BASIN D7
0.13 AC.
0.5 CFS
TRACT H
TRACT G MIREHAVEN ARROYO
BASIN D6
6.30 AC.
21.2 CFS
Q=41.3 CFS
MONSOON ROAD NW
5.0%
TRACT K
MONSOON ROAD NW
TRACT J
3.7%
1.0%
MONSOON ROAD NW
4.5%
AP-7
Q=21.2 CFS
2-TYPE DBL 'C' INLETS
10.6 CFS EA.
BASIN D4
2.33 AC.
7.9 CFS
BASIN D4A
11.68 AC.
5.7 CFS
AP-10
Q=11.0 CFS
AP-5
Q=7.9 CFS
D=0.33'
1-TYPE 'A' INLET
3.2 CFS
ST=
4.7 CFS
STREAM ROAD NW
5.1%
1.2%
0.6%
BASIN E2
4.64 AC.
15.6 CFS
AP-9
Q=19.6 CFS
20.5 cfs max.
1.5%±
BASIN E1
1.18 AC.
4.0 CFS
AP-6
Q=7.5 CFS
D=0.25'
1-TYPE 'A' INLET
3.0 CFS
ST=
4.5 CFS
ANIMAS PLACE 0.8%
4.7%
TIERRA PINTADA NW
0.5%±
3.0%
BASIN A1
2.07 AC.
7.0 CFS
BASIN D2
1.57 AC.
5.3 CFS
BASIN D1
1.81 AC.
6.1 CFS
AP-4
Q=13.9 CFS
2-TYPE SGL 'C' INLETS
6.95 CFS EA.
WIND SOCK 5.35% RD NW
BASIN D5
0.83 AC.
2.8 CFS
BASIN D3
0.74 AC.
2.5 CFS
BASIN A3
1.50 AC.
5.1 CFS
AP-2
Q=11.2 CFS
WHITE SQUALL DRIVE NW
5.7%
BASIN C
1.81 AC.
6.1 CFS
GUNNISON GLACIER AVE NW
13 cfs max.
AP-1
Q=18.8 CFS
D=0.28'
2-TYPE 'A' INLETS
3.8 CFS EA.
CHINOOK ROAD
5.0%
AP-3
Q=21.6 CFS
2-TYPE DBL 'C' INLETS
10.8 CFS EA.
BASIN B
0.96 AC.
3.3 CFS
AP-8
Q=10.6 CFS
3.5 cfs max.
Q=3.3 CFS
4.0%
BASIN A2
3.51 AC.
11.9 CFS
ST=
11.1 CFS
BASIN A4
1.58 AC.
5.4 CFS
BASIN A5
0.06 AC.
0.2 CFS
29.8 cfs max.
Q=0.2 CFS SURFACE
Q=29.2 CFS SD
LEGEND
BASIN BOUNDARY
BASIN D2 1.57 AC. 5.3 CFS
BASIN DESIGNATION W/ AREA & Q100 FLOWS
AP-3
ANALYSIS POINT (SEE AHYMO)
PROPOSED INLET #
PROPOSED SD MH #
NTS
STORM CLOUD UNIT 4
BASIN EXHIBIT



LEGEND

- BASIN BOUNDARY
- BASIN F3 1.50 AC. 4.9 CFS — BASIN DESIGNATION W/ AREA & Q100 FLOWS
- AP-3 — ANALYSIS POINT (SEE AHYMO)
- ① — PROPOSED INLET #
- ② — PROPOSED SD MH #

STORM CLOUD UNIT 5
BASIN EXHIBIT

APPENDIX D

Street Flow Capacity Calculations

STREET FLOW DEPTH TABLE

STORM CLOUD, UNIT 4

STREET	LOCATION	STREET WIDTH	CURB TYPE	SLOPE (ft/ft)	Q_{100} (cfs)	DEPTH (ft)	EGL DEPTH (ft)
CHINOOK	AP1; INLETS 1 & 2	30' F-F	STD	0.0400	18.8	0.28	0.62
WIND SOCK	AP2	28' F-F	MTBL	0.0340	11.2	0.24	0.47
SUMMER BREEZE	AP3; INLETS 3 & 4	26' F-F	STD	0.0050	21.6	0.44	0.55
SUMMER BREEZE	AP4; INLETS 9 & 10	26' F-F	STD	0.0050	13.9	0.36	0.45
JET STREAM	AP5; INLET 8	30' F-F	STD	0.0120	15.8	0.33	0.46
GUNNISON	AP6; INLET 7	30' F-F	STD	0.0470	15	0.25	0.59
MONSOON RD	AP7; INLETS 5 & 6	30' F-F	STD	0.0050	21.2	0.43	0.53
GUNNISON	AP8	28' F-F	STD	0.0400	10.6	0.23	0.48
ANIMAS PL	AP9	28' F-F	STD	0.0150	19.6	0.34	0.53
JET STREAM	AP10	30' F-F	MTBL	0.0510	11	0.22	0.53

STREET FLOW CAPACITY CALCULATIONS, STORM CLOUD, UNIT 4

STREET NAME:	CHINOOK	1
LOCATION:	AP1; INLETS 1 & 2	

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.04	Road Width/2	15
Q_{100}	18.8	Curb Height	0.67
Right-of-way Width	51	1/2 Wetted Perimeter (P)	14.484
Road Width	30	1/2 Area(STD)	2.016
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	9.407
Depth	0.264		

RESULTS

HGL

Q_{100} FLOW CAPACITY = 18.81 cfs OK
at an HGL Depth= 0.28 ft < Curb height = 0.67
OK

EGL

Velocity 4.67 fps
$V^2/2g$ 0.34 ft
EGL Depth = 0.62 ft < Right-of-way height = 0.87
OK

STREET NAME:	WIND SOCK	2
LOCATION:	AP2	

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.034	Road Width/2	14
Q_{100}	11.2	Curb Height	0.33
Right-of-way Width	47	1/2 Wetted Perimeter (P)	12.342
Road Width	28	1/2 Area(STD)	----
Curb Type	MTBL	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	1.464
Manning's N	0.017	Discharge (1/2 Q)	5.657
Depth	0.242		

RESULTS

HGL

Q_{100} FLOW CAPACITY = 11.31 cfs OK
at an HGL Depth= 0.24 ft < Curb height = 0.33
OK

EGL

Velocity 3.86 fps
$V^2/2g$ 0.23 ft
EGL Depth = 0.47 ft < Right-of-way height = 0.51
OK

STREET NAME:	SUMMER BREEZE	3
LOCATION:	AP3; INLETS 3 & 4	

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.005	Road Width/2	13
Q_{100}	21.6	Curb Height	0.67
Right-of-way Width	45	1/2 Wetted Perimeter (P)	13.435
Road Width	26	1/2 Area(STD)	3.965
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	10.819
Depth	0.435		

RESULTS

HGL

Q_{100} FLOW CAPACITY = 21.64 cfs OK
at an HGL Depth= 0.44 ft < Curb height = 0.67
OK

EGL

Velocity 2.73 fps
$V^2/2g$ 0.12 ft
EGL Depth = 0.55 ft < Right-of-way height = 0.85
OK

STREET FLOW CAPACITY CALCULATIONS, STORM CLOUD, UNIT 4

STREET NAME:	**SUMMER BREEZE**		4
LOCATION:	**AP4; INLETS 9 & 10**		
STREET INFORMATION		**HALF STREET CALCULATIONS**	
Slope	0.035	Road Width/2	13
Q_{100}	13.9	Curb Height	0.67
Right-of-way Width	46	1/2 Wetted Perimeter (P)	13.364
Road Width	30	1/2 Area(STD)	3.042
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	6.975
Depth	0.364		

RESULTS

HGL

Q_{100} FLOW CAPACITY =	**13.95 cfs**	OK	
at an HGL Depth=	**0.36 ft**	<	Curb height = 0.67
		OK	

EGL

Velocity	2.29 fps		
$V^2/2g$	0.08 ft		
EGL Depth =	**0.45 ft**	<	Right-of-way height = 0.86
		OK	

STREET NAME:	**JET STREAM**		5
LOCATION:	**AP5; INLET 8**	=7.9 cfs north side	
STREET INFORMATION		**HALF STREET CALCULATIONS**	
Slope	0.012	Road Width/2	15
Q_{100}	15.8	Curb Height	0.67
Right-of-way Width	61	1/2 Wetted Perimeter (P)	15.328
Road Width	30	1/2 Area(STD)	2.670
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	7.928
Depth	0.328		

RESULTS

HGL

Q_{100} FLOW CAPACITY =	**15.86 cfs**	OK	
at an HGL Depth=	**0.33 ft**	<	Curb height = 0.67
		OK	

EGL

Velocity	2.97 fps		
$V^2/2g$	0.14 ft		
EGL Depth =	**0.46 ft**	<	Right-of-way height = 0.87
		OK	

STREET NAME:	**GUNNISON**		6
LOCATION:	**AP6; INLET 7**	=7.5 cfs west side	
STREET INFORMATION		**HALF STREET CALCULATIONS**	
Slope	0.047	Road Width/2	15
Q_{100}	15	Curb Height	0.67
Right-of-way Width	61	1/2 Wetted Perimeter (P)	12.903
Road Width	30	1/2 Area(STD)	1.600
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	7.489
Depth	0.253		

RESULTS

HGL

Q_{100} FLOW CAPACITY =	**14.95 cfs**	****DEPTH INSUFFICIENT, TRY AGAIN****	
at an HGL Depth=	**0.25 ft**	<	Curb height = 0.67
		OK	

EGL

Velocity	4.68 fps		
$V^2/2g$	0.34 ft		
EGL Depth =	**0.59 ft**	<	Right-of-way height = 0.87
		OK	

STREET FLOW CAPACITY CALCULATIONS, STORM CLOUD, UNIT 4

STREET NAME: **MONSOON RD** 7
LOCATION: **AP7; INLETS 5 & 6**

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.005	Road Width/2	15
Q_{100}	21.2	Curb Height	0.67
Right-of-way Width	51	1/2 Wetted Perimeter (P)	15.426
Road Width	30	1/2 Area(STD)	4.140
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	10.600
Depth	0.423		

RESULTS

HGL
Q_{100} FLOW CAPACITY = **21.20 cfs** OK
at an HGL Depth= **0.43 ft** < Curb height = 0.67
OK

EGL
Velocity 2.56 fps
$V^2/2g$ 0.10 ft
EGL Depth = **0.53 ft** < Right-of-way height = 0.87
OK

STREET NAME: **GUNNISON** 8
LOCATION: **AP8**

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.04	Road Width/2	14
Q_{100}	10.6	Curb Height	0.67
Right-of-way Width	47	1/2 Wetted Perimeter (P)	11.730
Road Width	28	1/2 Area(STD)	1.323
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	5.357
Depth	0.230	Flow in West Haven Street = 14.57 cfs	

RESULTS

HGL
Q_{100} FLOW CAPACITY = **10.71 cfs** OK
at an HGL Depth= **0.23 ft** < Curb height = 0.67
OK

EGL
Velocity 4.05 fps
$V^2/2g$ 0.25 ft
EGL Depth = **0.48 ft** < Right-of-way height = 0.85
OK

STREET NAME: **ANIMAS PL** 9
LOCATION: **AP9**

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.015	Road Width/2	14
Q_{100}	19.6	Curb Height	0.67
Right-of-way Width	47	1/2 Wetted Perimeter (P)	14.338
Road Width	28	1/2 Area(STD)	2.772
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	9.868
Depth	0.338		

RESULTS

HGL
Q_{100} FLOW CAPACITY = **19.74 cfs** OK
at an HGL Depth= **0.34 ft** < Curb height = 0.67
OK

EGL
Velocity 3.56 fps
$V^2/2g$ 0.20 ft
EGL Depth = **0.53 ft** < Right-of-way height = 0.85
OK

STREET FLOW CAPACITY CALCULATIONS, STORM CLOUD, UNIT 4

STREET NAME:	JET STREAM	10
LOCATION:	AP10	

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.051	Road Width/2	15
Q_{100}	11	Curb Height	0.33
Right-of-way Width	51	1/2 Wetted Perimeter (P)	11.322
Road Width	30	1/2 Area(STD)	----
Curb Type	MTBL	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	1.232
Manning's N	0.017	Discharge (1/2 Q)	5.503
Depth	0.222		

RESULTS

HGL

Q_{100} FLOW CAPACITY =	**11.01 cfs**	OK	
at an HGL Depth=	**0.22 ft**	<	Curb height = 0.33
		OK	

EGL

Velocity	4.47 fps		
$V^2/2g$	0.31 ft		
EGL Depth =	**0.53 ft**	<	Right-of-way height = 0.53
		OK	

STREET FLOW DEPTH TABLE

STORM CLOUD, UNIT 5

STREET	LOCATION	STREET WIDTH	CURB TYPE	SLOPE (ft/ft)	Q_{100} (cfs)	DEPTH (ft)	EGL DEPTH (ft)
DOWNBURST	AP1	32' F-F	STD	0.0280	25.9	0.34	0.66
DOWNBURST/TORRENT	AP2	32' F-F	STD	0.0070	30.7	0.46	0.62
TORRENT	AP3; INLET 1	32' F-F	STD	0.0050	37.7	0.54	0.69
TORRENT	AP4; INLET 2	32' F-F	STD	0.0050	33.7	0.51	0.65
CAMINO DEL VENADO	AP5	32' F-F	STD	0.0280	15.1	0.28	0.51
CAMINO DEL VENADO	AP6; INLETS 3 & 4	32' F-F	STD	0.0400	24.5	0.31	0.70
CAMINO DEL VENADO	AP7; INLETS 5-7	32' F-F	STD	0.0050	43.9	0.57	0.74

STREET FLOW CAPACITY CALCULATIONS
STORM CLOUD, UNIT 5

STREET NAME: **DOWNBURST** 1
LOCATION: **AP1**

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.028	Road Width/2	16
Q_{100}	25.9	Curb Height	0.67
Right-of-way Width	51	1/2 Wetted Perimeter (P)	16.339
Road Width	32	1/2 Area(STD)	2.864
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	13.045

Depth: 0.339

RESULTS

HGL

Q_{100} FLOW CAPACITY = 26.09 cfs OK
at an HGL Depth= 0.34 ft < Curb height = 0.67
OK

EGL

Velocity 4.55 fps
$V^2/2g$ 0.32 ft
EGL Depth = 0.66 ft < Right-of-way height = 0.85
OK

STREET NAME: **DOWNBURST/TORRENT** 2
LOCATION: **AP2**

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.007	Road Width/2	16
Q_{100}	30.7	Curb Height	0.67
Right-of-way Width	51	1/2 Wetted Perimeter (P)	16.460
Road Width	32	1/2 Area(STD)	4.800
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	15.374

Depth: 0.460

RESULTS

HGL

Q_{100} FLOW CAPACITY = 30.75 cfs OK
at an HGL Depth= 0.46 ft < Curb height = 0.67
OK

EGL

Velocity 3.20 fps
$V^2/2g$ 0.16 ft
EGL Depth = 0.62 ft < Right-of-way height = 0.85
OK

STREET NAME: **TORRENT** 3
LOCATION: **AP3; INLET 1**

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.005	Road Width/2	16
Q_{100}	37.7	Curb Height	0.67
Right-of-way Width	51	1/2 Wetted Perimeter (P)	16.536
Road Width	32	1/2 Area(STD)	6.016
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	18.886

Depth: 0.536

RESULTS

HGL

Q_{100} FLOW CAPACITY = 37.77 cfs OK
at an HGL Depth= 0.54 ft < Curb height = 0.67
OK

EGL

Velocity 3.14 fps
$V^2/2g$ 0.15 ft
EGL Depth = 0.69 ft < Right-of-way height = 0.85
OK

STREET FLOW CAPACITY CALCULATIONS
STORM CLOUD, UNIT 5

STREET NAME: **TORRENT** 4
LOCATION: **AP4; INLET 2**

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.005	Road Width/2	16
Q_{100}	33.7	Curb Height	0.67
Right-of-way Width	51	1/2 Wetted Perimeter (P)	16.511
Road Width	32	1/2 Area(STD)	5.616
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	16.853

Depth: 0.511

RESULTS

HGL

Q_{100} FLOW CAPACITY = **33.71 cfs** OK
at an HGL Depth= **0.51 ft** < Curb height = 0.67
OK

EGL

Velocity 3.00 fps
$V^2/2g$ 0.14 ft
EGL Depth = **0.65 ft** < Right-of-way height = 0.85
OK

STREET NAME: **CAMINO DEL VENADO** 5
LOCATION: **AP5**

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.028	Road Width/2	16
Q_{100}	15.1	Curb Height	0.67
Right-of-way Width	51	1/2 Wetted Perimeter (P)	14.280
Road Width	32	1/2 Area(STD)	1.960
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	7.578

Depth: 0.280

RESULTS

HGL

Q_{100} FLOW CAPACITY = **15.16 cfs** OK
at an HGL Depth= **0.28 ft** < Curb height = 0.67
OK

EGL

Velocity 3.87 fps
$V^2/2g$ 0.23 ft
EGL Depth = **0.51 ft** < Right-of-way height = 0.85
OK

STREET NAME: **CAMINO DEL VENADO** 6
LOCATION: **AP6; INLETS 3 & 4**

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.04	Road Width/2	16
Q_{100}	24.5	Curb Height	0.67
Right-of-way Width	51	1/2 Wetted Perimeter (P)	16.014
Road Width	32	1/2 Area(STD)	2.465
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	12.300

Depth: 0.314

RESULTS

HGL

Q_{100} FLOW CAPACITY = **24.60 cfs** OK
at an HGL Depth= **0.31 ft** < Curb height = 0.67
OK

EGL

Velocity 4.99 fps
$V^2/2g$ 0.39 ft
EGL Depth = **0.70 ft** < Right-of-way height = 0.85
OK

STREET FLOW CAPACITY CALCULATIONS
STORM CLOUD, UNIT 5

STREET NAME:	CAMINO DEL VENADO	7
LOCATION:	AP7; INLETS 5-7	

STREET INFORMATION		HALF STREET CALCULATIONS	
Slope	0.005	Road Width/2	16
Q_{100}	43.9	Curb Height	0.67
Right-of-way Width	61	1/2 Wetted Perimeter (P)	16.572
Road Width	32	1/2 Area(STD)	6.592
Curb Type	STD	1/2 Area(MDN)	----
Road Cross Slope	0.02	1/2 Area(MTBL)	----
Manning's N	0.017	Discharge (1/2 Q)	21.970
Depth	0.572		

RESULTS

HGL

Q_{100} FLOW CAPACITY =	**43.94 cfs**	OK	
at an HGL Depth=	**0.57 ft**	<	Curb height = 0.67
		OK	

EGL

Velocity	3.33 fps		
$V^2/2g$	0.17 ft		
EGL Depth =	**0.74 ft**	<	Right-of-way height = 0.85
		OK	

APPENDIX E

Storm Drain Calculations

STORM CLOUD, UNIT 4

SUMP INLET CAPACITY

GRATE OPEN AREA:
(per COA std dwg #2220, single grate)

GROSS AREA FOR ONE GRATE =	(25 in/12)(40 in/12) =	6.94 SF
LESS BEARING BARS =	(0.5 in/12)(3.33 ft)(13) =	1.80 SF
LESS CROSS BARS =	(0.5 in/12)(7)[(25 in/12)-(13)(0.5 in/12)] =	0.45 SF
	NET GRATE OPEN AREA =	**4.69 SF**
	GRATE OPEN AREA (assuming 50% clogging factor) =	***2.35 SF***

ORIFICE EQUATION:

$$Q = CA(2gh)^{1/2}$$

Where:
- C = 0.67
- A = 2.35 ft^2
- g = 32.2 ft/sec^2
- h = height of the water surface above the grate

CAPACITY CALCULATIONS:

INLET # 3 & 4
LOCATION: SUMMER BREEZE

h = 0.67 ft
$Q_{(capacity)}$ = 10.32273 cfs REQUIRED Q = 21.6 cfs

NUMBER OF GRATES REQUIRED = 3

INLET # 4 & 5
LOCATION: MONSOON

h = 0.67 ft
$Q_{(capacity)}$ = 10.32273 cfs REQUIRED Q = 21.2 cfs

NUMBER OF GRATES REQUIRED = 3

INLET # 9 & 10
LOCATION: SUMMER BREEZE

h = 0.67 ft
$Q_{(capacity)}$ = 10.32273 cfs REQUIRED Q = 13.9 cfs

NUMBER OF GRATES REQUIRED = 2

STORM CLOUD, UNIT 5

SUMP INLET CAPACITY

GRATE OPEN AREA:
(per COA std dwg #2220, single grate)

GROSS AREA FOR ONE GRATE =	(25 in/12)(40 in/12) =	6.94 SF
LESS BEARING BARS =	(0.5 in/12)(3.33 ft)(13) =	1.80 SF
LESS CROSS BARS =	(0.5 in/12)(7)[(25 in/12)-(13)(0.5 in/12)] =	0.45 SF
	NET GRATE OPEN AREA =	**4.69 SF**
	GRATE OPEN AREA (assuming 50% clogging factor) =	***2.35 SF***

ORIFICE EQUATION:

$$Q = CA(2gh)^{1/2}$$

Where:

C = 0.67
A = 2.35 ft^2
g = 32.2 ft/sec^2
h = height of the water surface above the grate

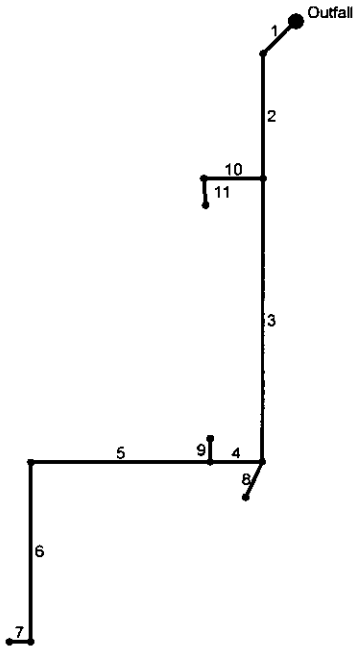
CAPACITY CALCULATIONS:

INLETS # 5, 6 & 7
LOCATION: CAMINO DEL VENADO

h = 0.67 ft
$Q_{(capacity)}$ = 10.32273 cfs
REQUIRED Q = 43.9 cfs

NUMBER OF GRATES REQUIRED = **5**

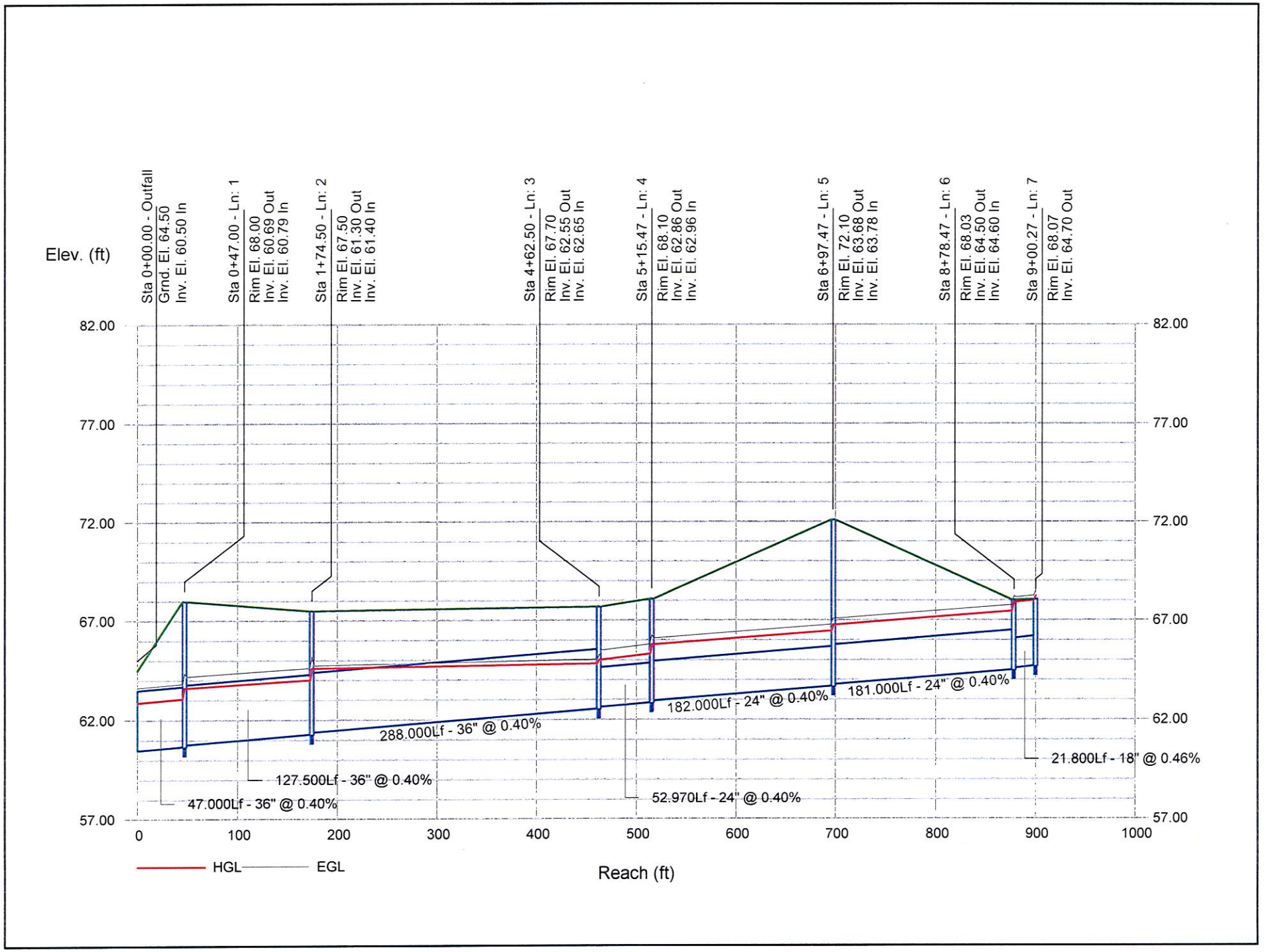
GUNNISON SD UNIT 4



Project File: 1821 GUNNISON SD.stm	Number of lines: 11	Date: 12/13/2011

Storm Sewer Profile

Proj. file: 1821 GUNNISON SD.stm



Storm Sewer Profile

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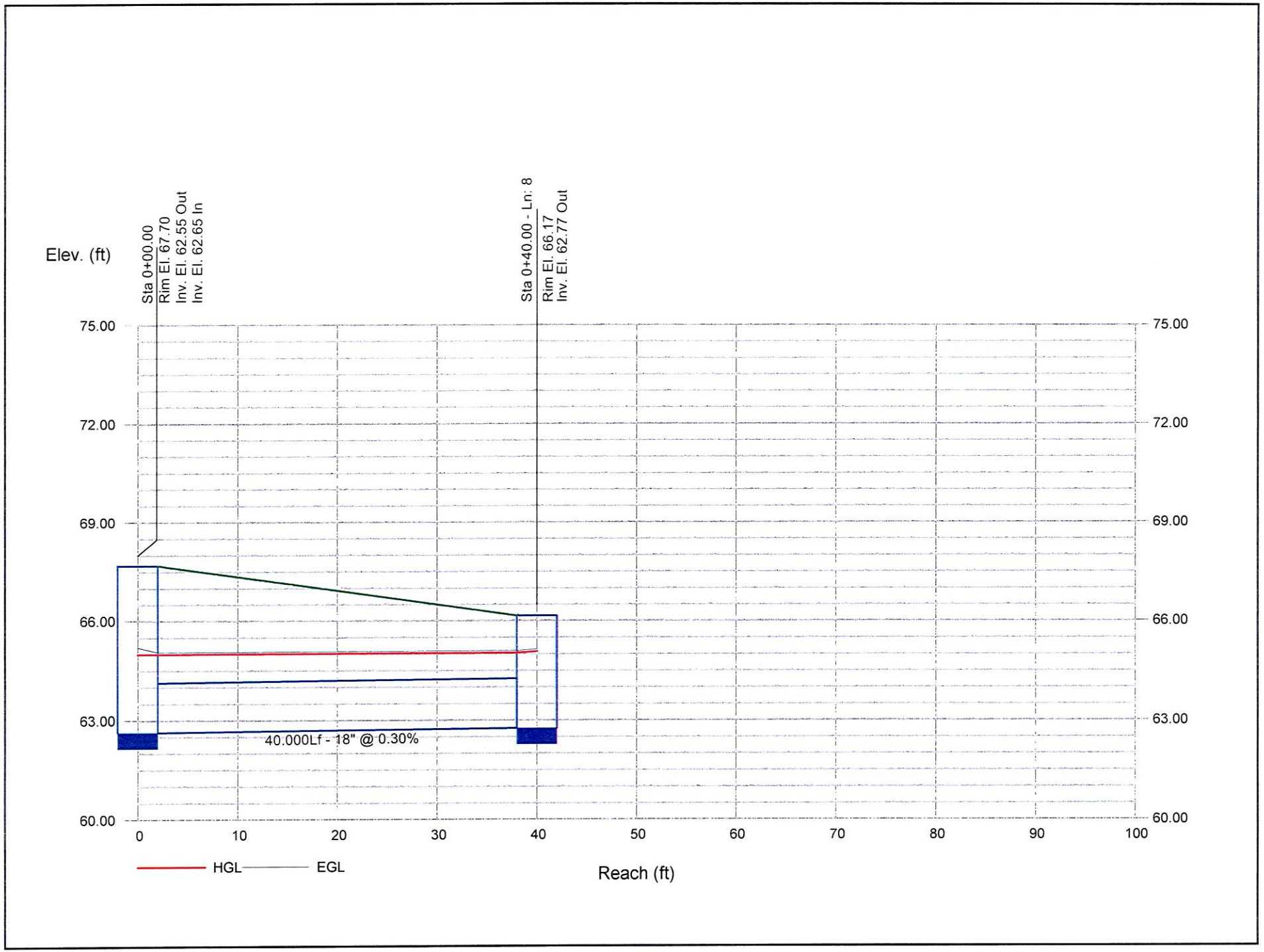

Storm Sewer Profile

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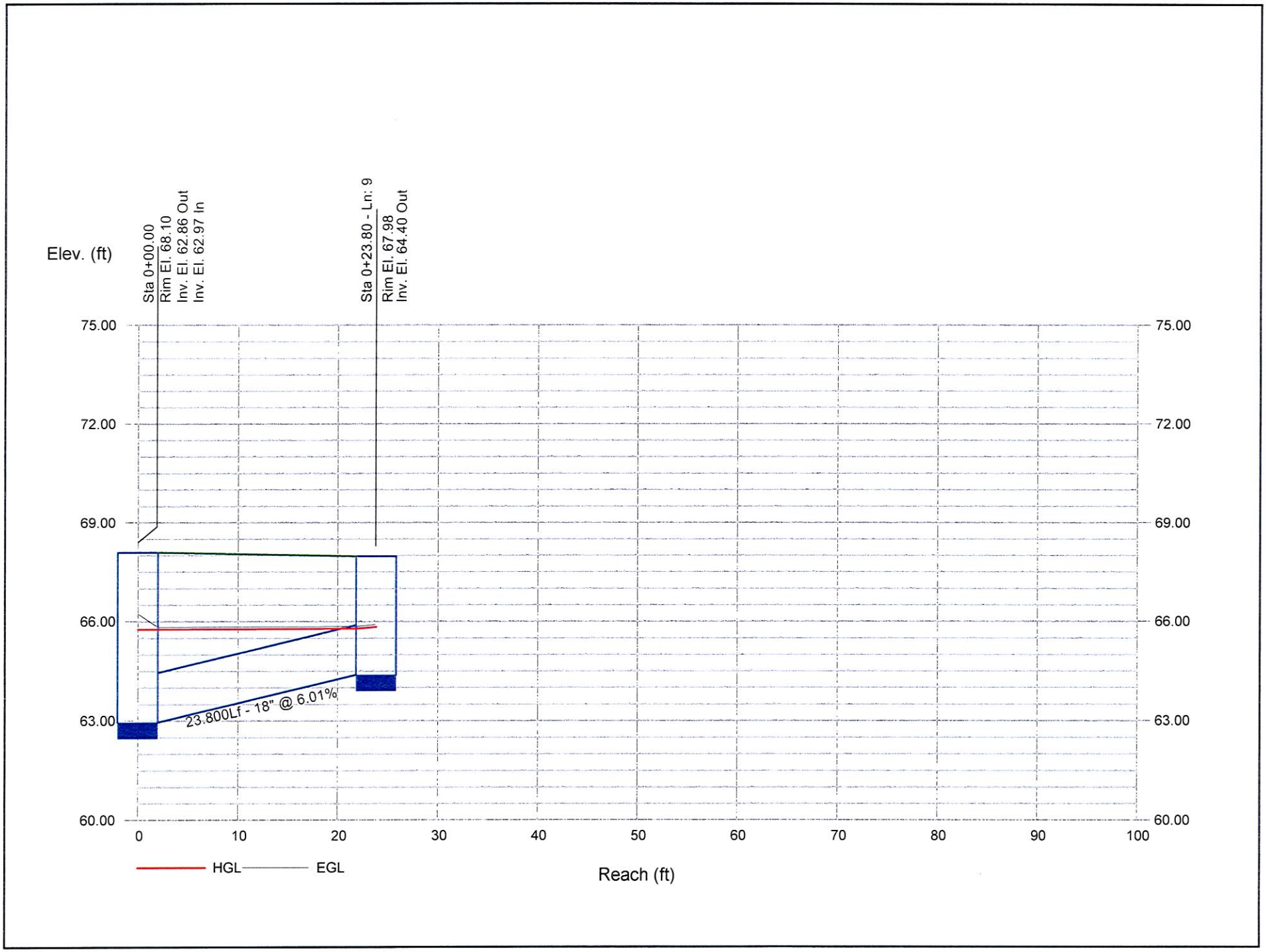

Storm Sewer Profile

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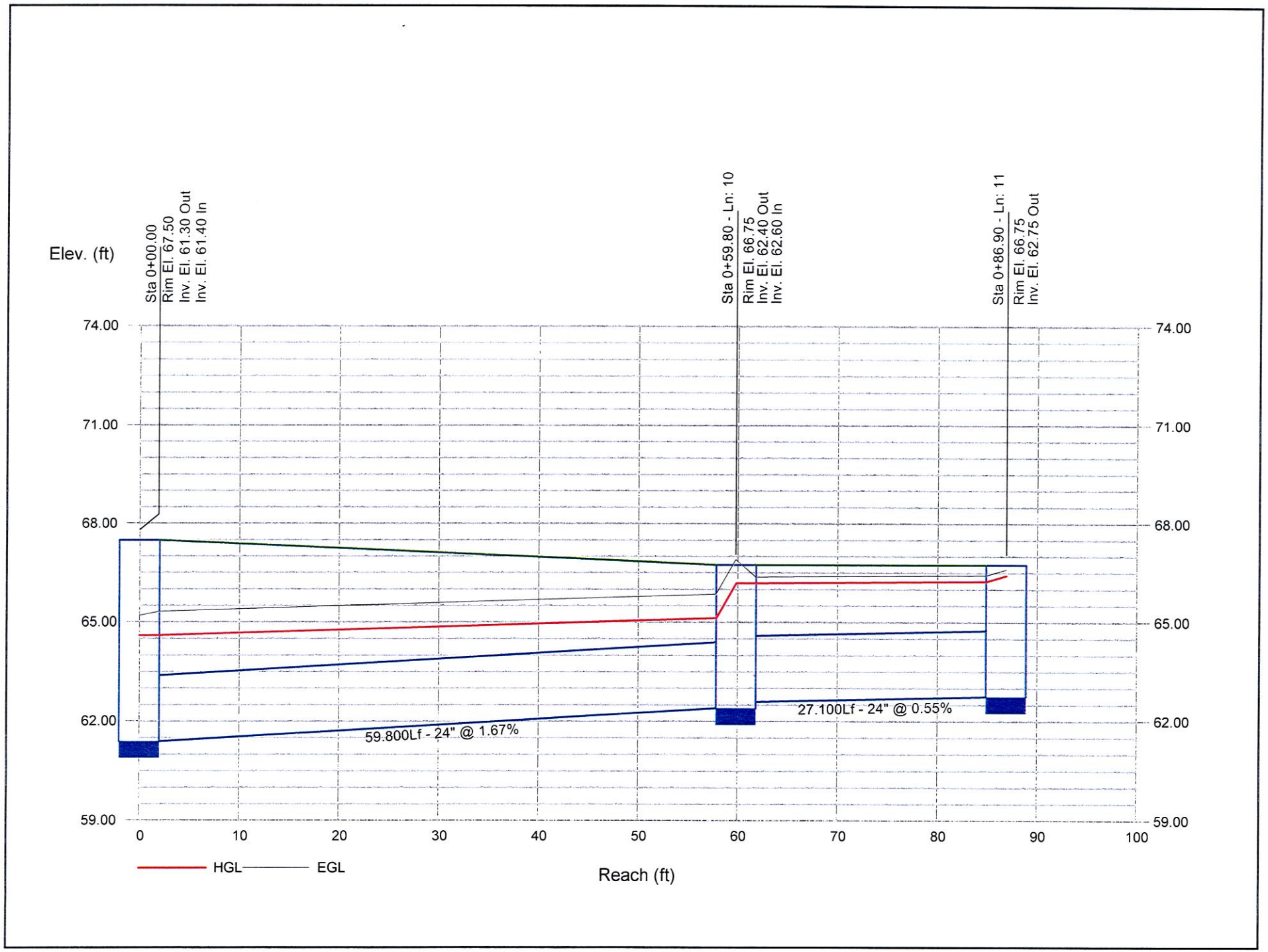


Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1		41.30	36	Cir	47.000	60.50	60.69	0.404	62.88	63.07	0.55	63.62	End	Manhole
2		41.30	36	Cir	127.500	60.79	61.30	0.400	63.62	64.02	0.59	64.60	1	Manhole
3		20.10	36	Cir	288.000	61.40	62.55	0.399	64.60	64.82	0.19	65.01	2	Manhole
4		17.10	24	Cir	52.970	62.65	62.86	0.396	65.01*	65.31*	0.46	65.77	3	Manhole
5		13.90	24	Cir	182.000	62.96	63.68	0.396	65.77*	66.46*	0.30	66.76	4	Manhole
6		13.90	24	Cir	181.000	63.78	64.50	0.398	66.76*	67.45*	0.46	67.91	5	Generic
7		6.95	18	Cir	21.800	64.60	64.70	0.459	67.91*	68.00*	0.24	68.24	6	Generic
8		3.00	18	Cir	40.000	62.65	62.77	0.300	65.01*	65.04*	0.04	65.09	3	Generic
9		3.20	18	Cir	23.800	62.97	64.40	6.008	65.77	65.79	0.05	65.84	4	Generic
10		21.20	24	Cir	59.800	61.40	62.40	1.672	64.60*	65.13*	1.06	66.19	2	Generic
11		10.60	24	Cir	27.100	62.60	62.75	0.554	66.19*	66.25*	0.18	66.43	10	Generic

GUNNISON SD | Number of lines: 11 | Run Date: 12/13/2011

NOTES: Return period = 2 Yrs. ; *Surcharged (HGL above crown).

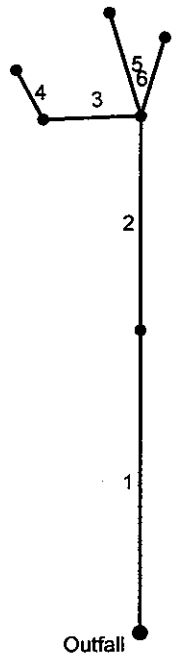
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	47.000	0.00	0.00	0.00	0.00	0.00	0.0	3.7	0.0	41.30	42.40	6.86	36	0.40	60.50	60.69	62.88	63.07	64.50	68.00	
2	1	127.500	0.00	0.00	0.00	0.00	0.00	0.0	3.3	0.0	41.30	42.18	6.06	36	0.40	60.79	61.30	63.62	64.02	68.00	67.50	
3	2	288.000	0.00	0.00	0.00	0.00	0.00	0.0	1.6	0.0	20.10	42.14	3.17	36	0.40	61.40	62.55	64.60	64.82	67.50	67.70	
4	3	52.970	0.00	0.00	0.00	0.00	0.00	0.0	1.5	0.0	17.10	14.24	5.44	24	0.40	62.65	62.86	65.01	65.31	67.70	68.10	
5	4	182.000	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	13.90	14.23	4.42	24	0.40	62.96	63.68	65.77	66.46	68.10	72.10	
6	5	181.000	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	13.90	14.27	4.42	24	0.40	63.78	64.50	66.76	67.45	72.10	68.03	
7	6	21.800	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.95	7.11	3.93	18	0.46	64.60	64.70	67.91	68.00	68.03	68.07	
8	3	40.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.00	5.75	1.70	18	0.30	62.65	62.77	65.01	65.04	67.70	66.17	
9	4	23.800	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.20	25.74	1.84	18	6.01	62.97	64.40	65.77	65.79	68.10	67.98	
10	2	59.800	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	21.20	29.25	6.75	24	1.67	61.40	62.40	64.60	65.13	67.50	66.75	
11	10	27.100	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	10.60	16.83	3.37	24	0.55	62.60	62.75	66.19	66.25	66.75	66.75	

GUNNISON SD | Number of lines: 11 | Run Date: 12/13/2011

NOTES:Intensity = 69.87 / (Inlet time + 13.10) ^ 0.87; Return period =Yrs. 2 ; c = cir e = ellip b = box

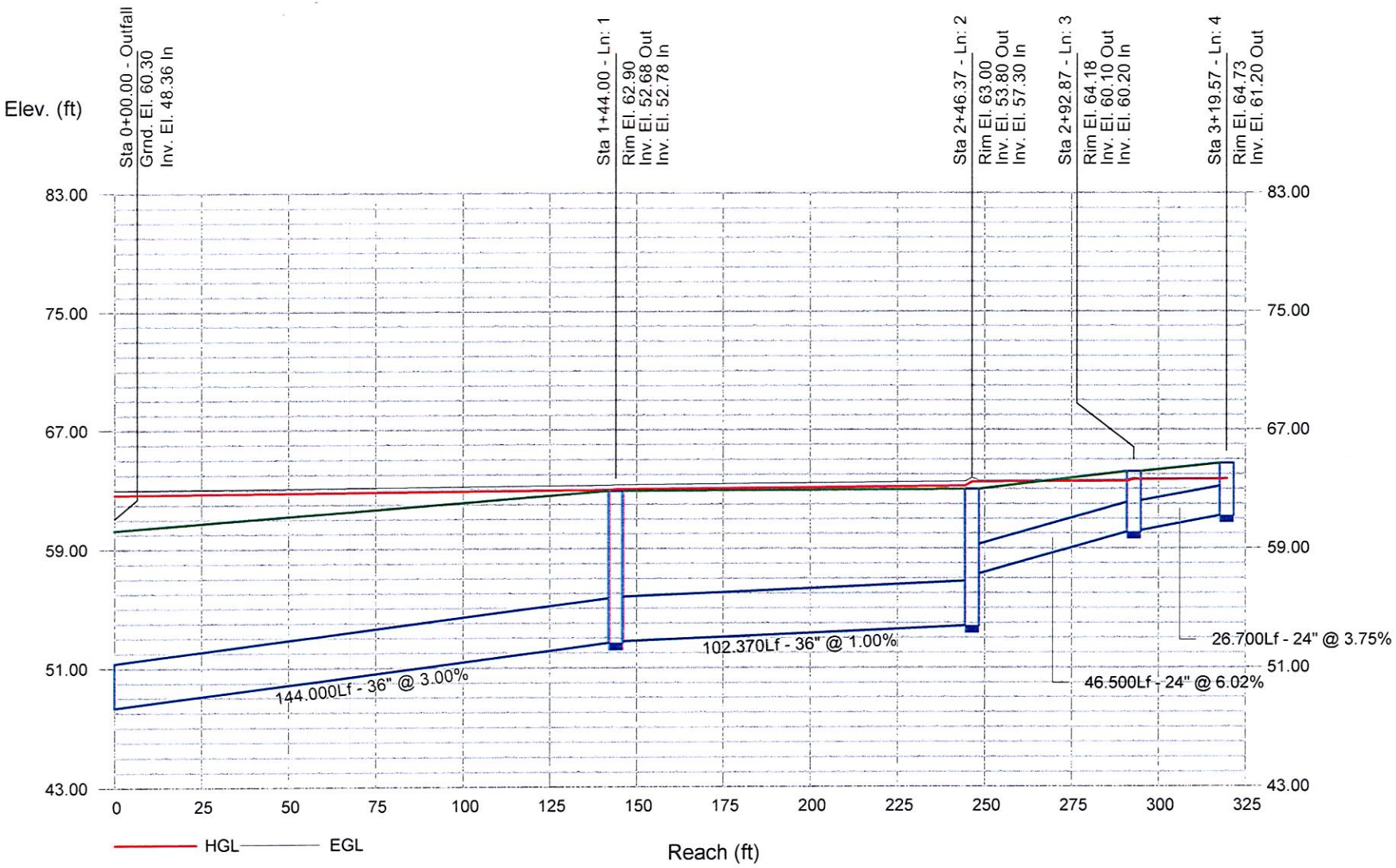
1821 SUMMER BREEZE SD UNIT 4



Project File: 1821 SUMMER BREEZE SD.stm	Number of lines: 6	Date: 12/13/2011

Storm Sewer Profile

Proj. file: 1821 SUMMER BREEZE SD.stm



Storm Sewer Profile

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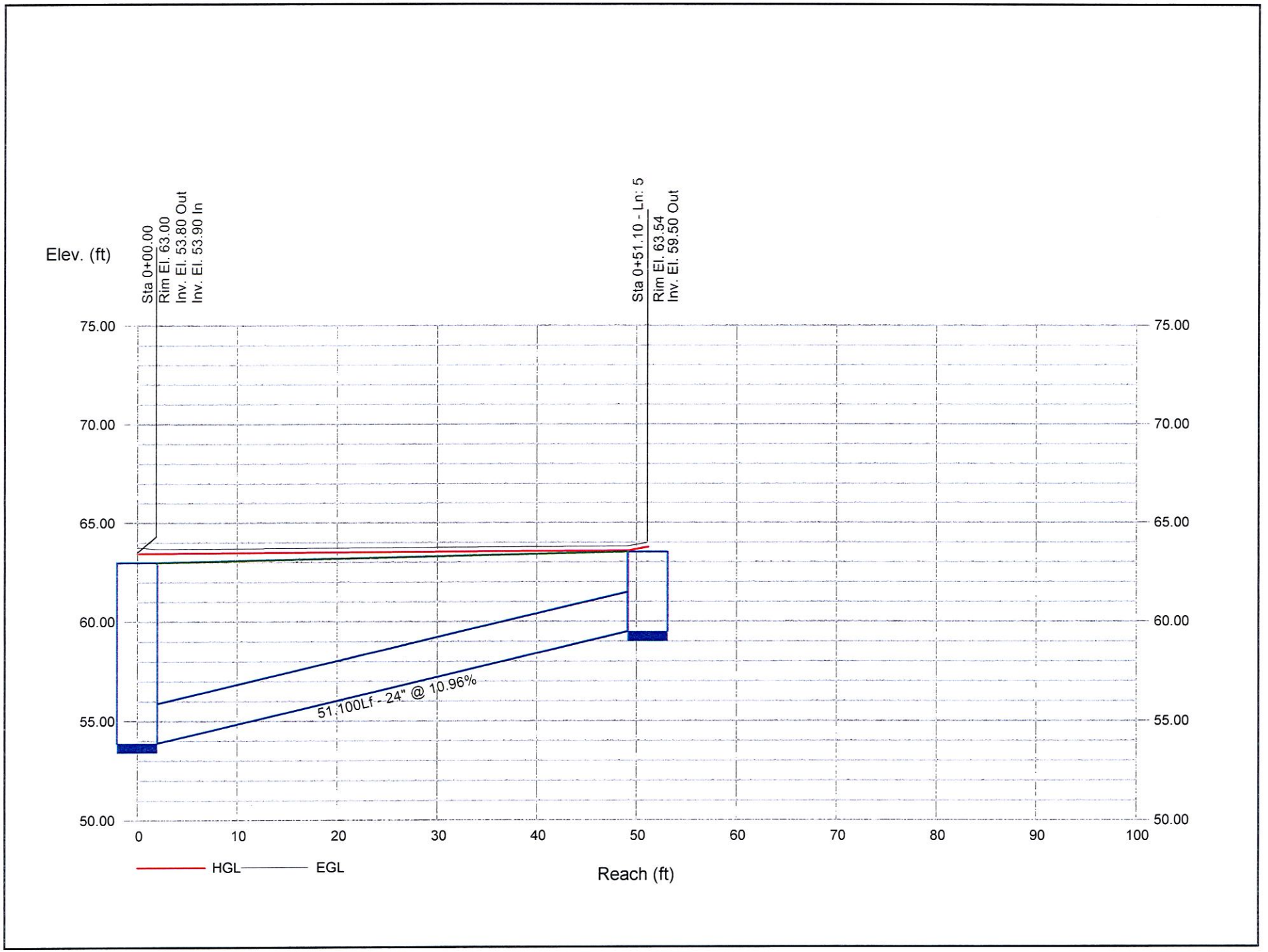
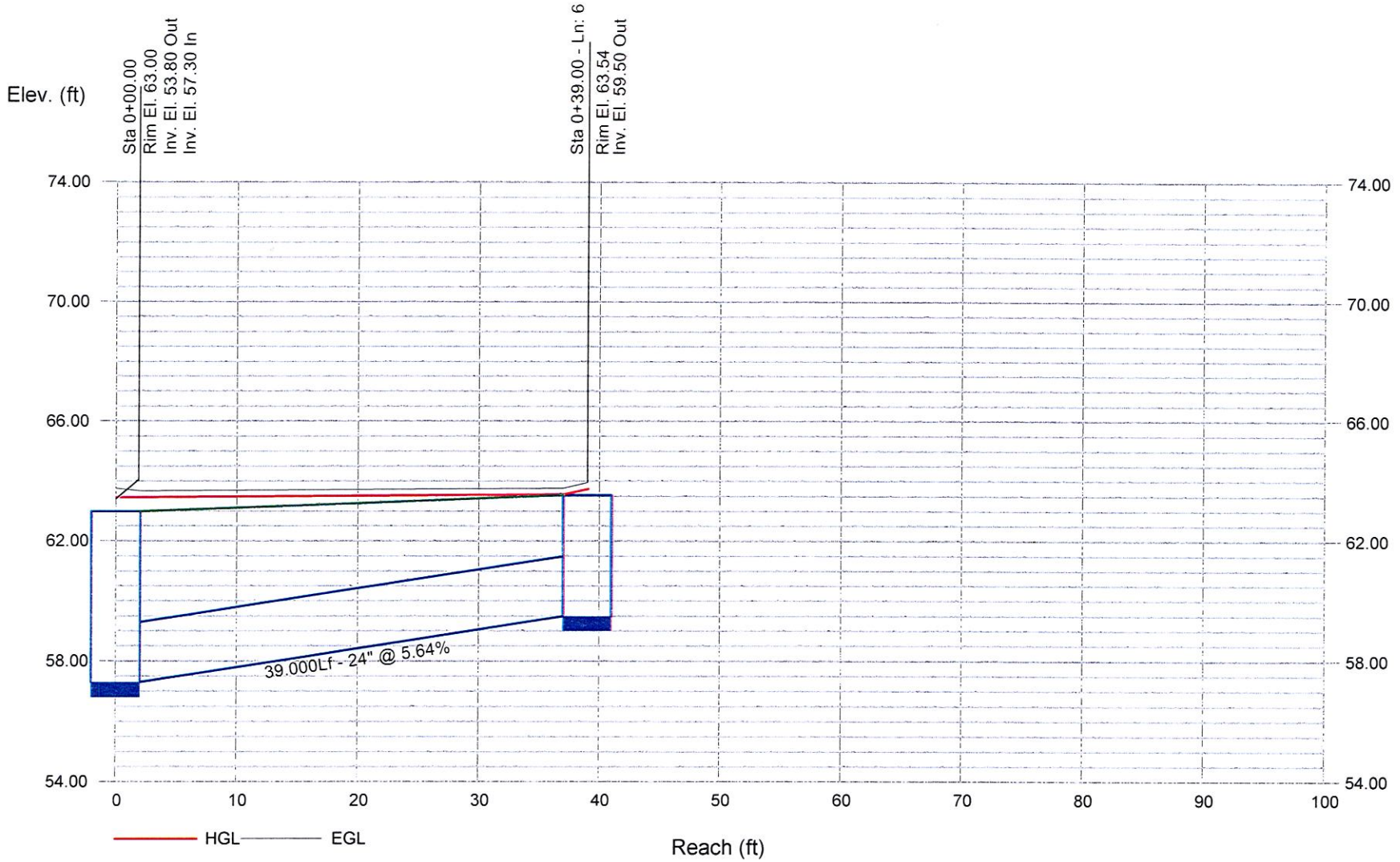


Storm Sewer Profile

Proj. file: 1821 SUMMER BREEZE SD.stm



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1		29.20	36	Cir	144.000	48.36	52.68	3.000	62.70*	62.98*	0.04	63.02	End	Manhole
2		29.20	36	Cir	102.370	52.78	53.80	0.996	63.02*	63.21*	0.27	63.48	1	Manhole
3		7.60	24	Cir	46.500	57.30	60.10	6.022	63.48*	63.53*	0.12	63.65	2	Generic
4		3.80	24	Cir	26.700	60.20	61.20	3.745	63.65*	63.66*	0.02	63.69	3	Generic
5		10.80	24	Cir	51.100	53.90	59.50	10.959	63.48*	63.59*	0.18	63.78	2	Generic
6		10.80	24	Cir	39.000	57.30	59.50	5.641	63.48*	63.57*	0.18	63.75	2	Generic

1821 SUMMER BREEZE SD | Number of lines: 6 | Run Date: 12/13/2011

NOTES: Return period = 2 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Tabulation

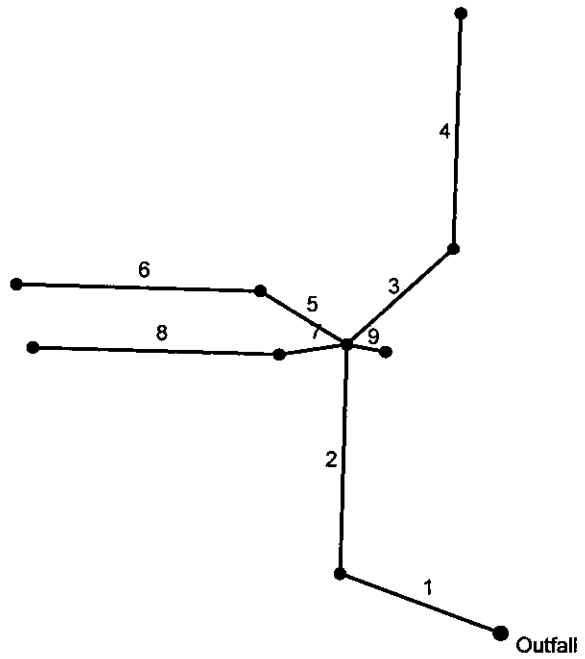
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	144.000	0.00	0.00	0.00	0.00	0.00	0.0	1.1	0.0	29.20	115.5	4.13	36	3.00	48.36	52.68	62.70	62.98	60.30	62.90	
2	1	102.370	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	29.20	66.57	4.13	36	1.00	52.78	53.80	63.02	63.21	62.90	63.00	
3	2	46.500	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	7.60	55.50	2.42	24	6.02	57.30	60.10	63.48	63.53	63.00	64.18	
4	3	26.700	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.80	43.77	1.21	24	3.75	60.20	61.20	63.65	63.66	64.18	64.73	
5	2	51.100	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	10.80	74.87	3.44	24	10.96	53.90	59.50	63.48	63.59	63.00	63.54	
6	2	39.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	10.80	53.72	3.44	24	5.64	57.30	59.50	63.48	63.57	63.00	63.54	

1821 SUMMER BREEZE SD | Number of lines: 6 | Run Date: 12/13/2011

NOTES:Intensity = 69.87 / (Inlet time + 13.10) ^ 0.87; Return period =Yrs. 2 ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2012 Plan

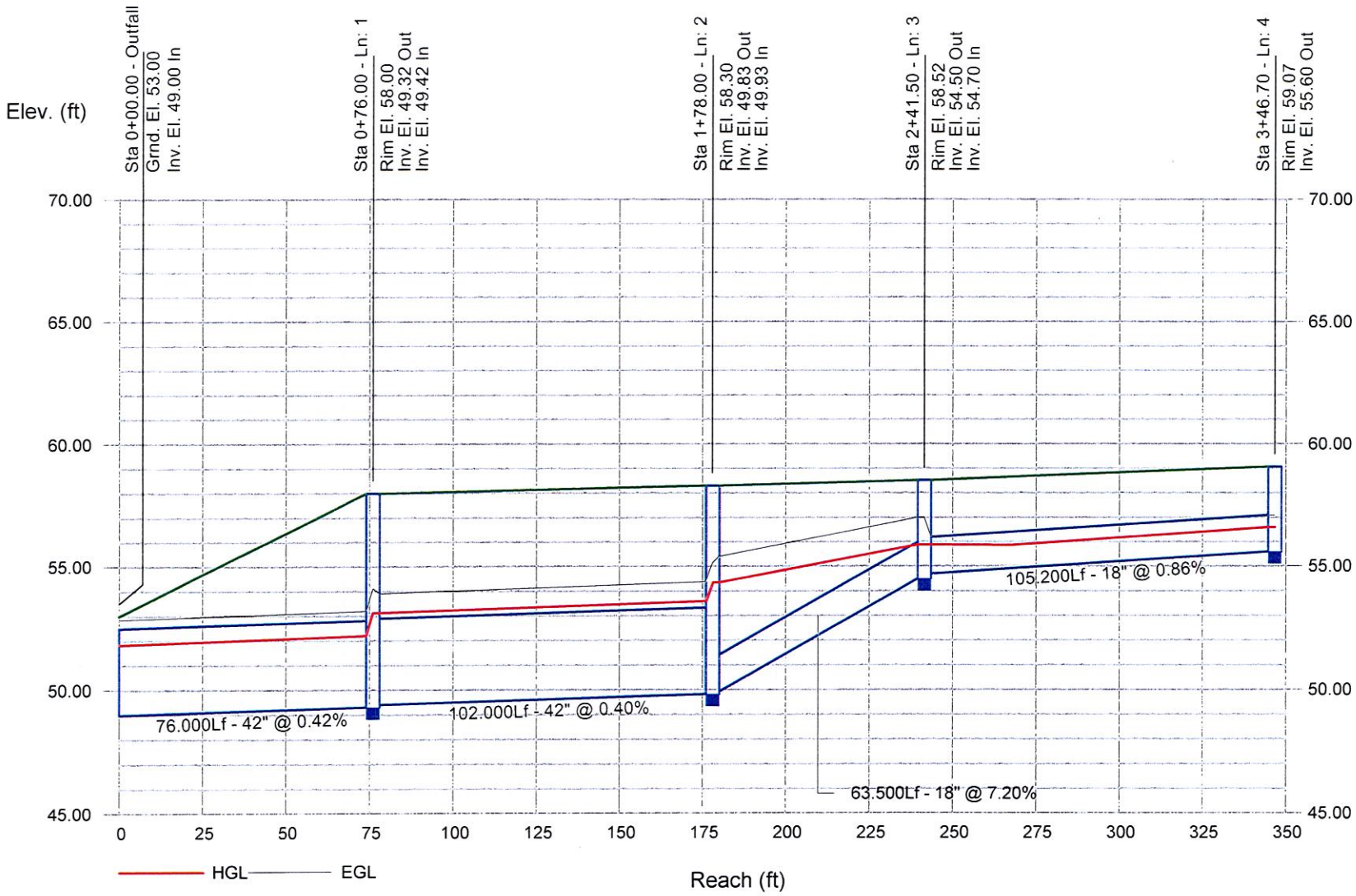
CAMINO DEL VENADO / TORRENT DR SD
UNIT 5



Project File: 1822 CAMINO TORRENT SD.stm	Number of lines: 9	Date: 12/13/2011

Storm Sewer Profile

Proj. file: 1822 CAMINO TORRENT SD.stm



Storm Sewer Profile

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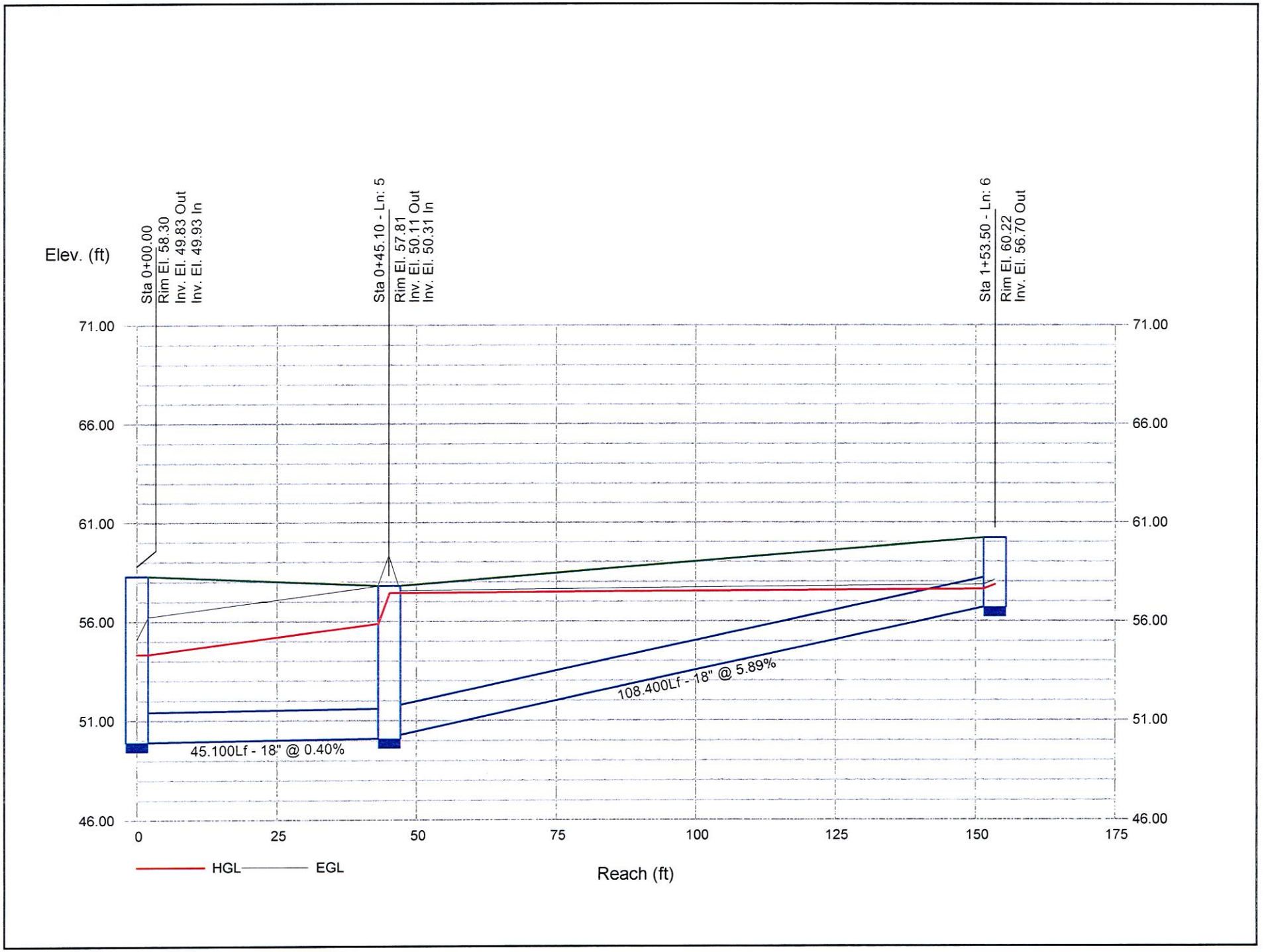

Storm Sewer Profile

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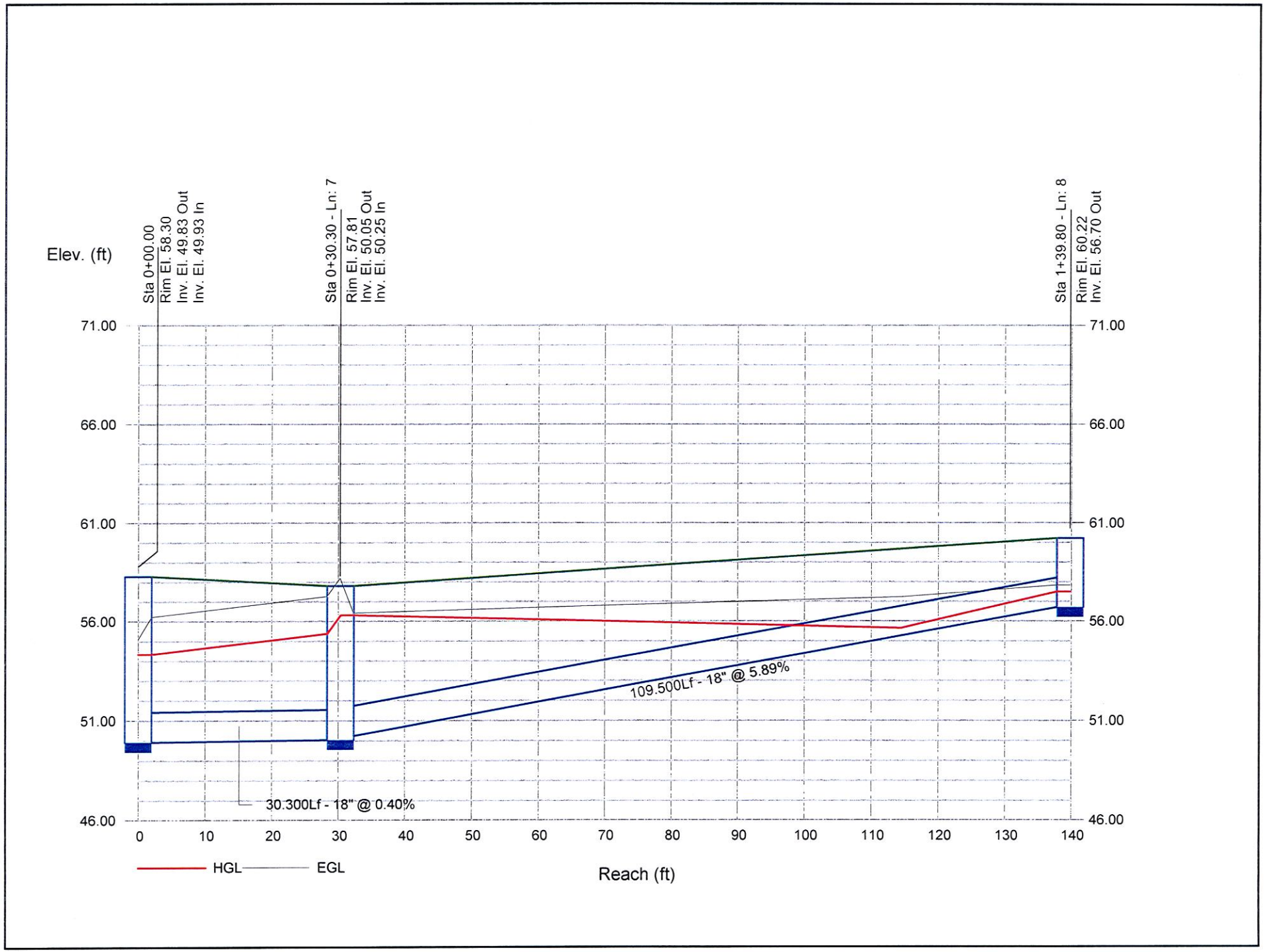

Storm Sewer Profile

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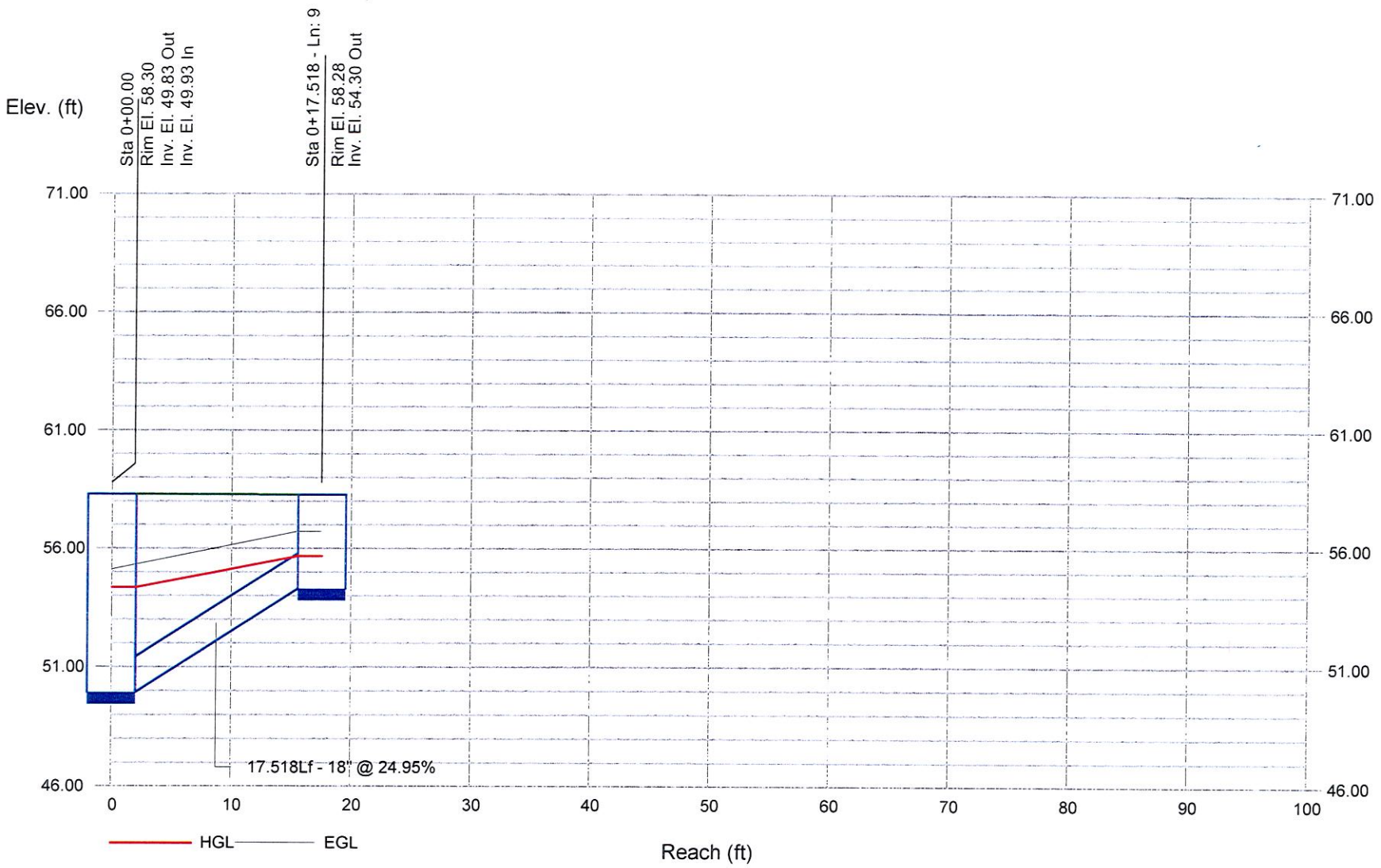

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1		67.10	42	Cir	76.000	49.00	49.32	0.421	51.85	52.21	0.93	53.14	End	Manhole
2		67.10	42	Cir	102.000	49.42	49.83	0.402	53.14*	53.60*	0.76	54.35	1	Manhole
3		14.40	18	Cir	63.500	49.93	54.50	7.197	54.35	55.89	n/a	55.89	2	Generic
4		7.00	18	Cir	105.200	54.70	55.60	0.856	55.89	56.61	n/a	56.61 j	3	Generic
5		19.40	18	Cir	45.100	49.93	50.11	0.399	54.35*	55.89*	1.56	57.45	2	Generic
6		4.40	18	Cir	108.400	50.31	56.70	5.895	57.45	57.60	0.24	57.85	5	Generic
7		19.40	18	Cir	30.300	49.93	50.05	0.396	54.35*	55.39*	0.94	56.33	2	Generic
8		4.40	18	Cir	109.500	50.25	56.70	5.890	56.33	57.50	n/a	57.50 j	7	Generic
9		13.90	18	Cir	17.518	49.93	54.30	24.946	54.35	55.68	n/a	55.68	2	Generic

Project File: 1822 CAMINO TORRENT SD.stm

Number of lines: 9

Run Date: 12/13/2011

NOTES: Return period = 2 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	76.000	0.00	0.00	0.00	0.00	0.00	0.0	1.0	0.0	67.10	65.28	7.94	42	0.42	49.00	49.32	51.85	52.21	53.00	58.00	
2	1	102.000	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	67.10	63.79	6.97	42	0.40	49.42	49.83	53.14	53.60	58.00	58.30	
3	2	63.500	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	14.40	28.17	8.28	18	7.20	49.93	54.50	54.35	55.89	58.30	58.52	
4	3	105.200	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	7.00	9.71	5.09	18	0.86	54.70	55.60	55.89	56.61	58.52	59.07	
5	2	45.100	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	19.40	6.63	10.98	18	0.40	49.93	50.11	54.35	55.89	58.30	57.81	
6	5	108.400	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.40	25.50	3.22	18	5.89	50.31	56.70	57.45	57.60	57.81	60.22	
7	2	30.300	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	19.40	6.61	10.98	18	0.40	49.93	50.05	54.35	55.39	58.30	57.81	
8	7	109.500	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.40	25.49	3.54	18	5.89	50.25	56.70	56.33	57.50	57.81	60.22	
9	2	17.518	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	13.90	52.45	8.02	18	24.95	49.93	54.30	54.35	55.68	58.30	58.28	

Project File: 1822 CAMINO TORRENT SD.stm

Number of lines: 9

Run Date: 12/13/2011

NOTES:Intensity = 69.87 / (Inlet time + 13.10) ^ 0.87; Return period =Yrs. 2 ; c = cir e = ellip b = box

APPENDIX F

Sidewalk Culvert Calculations

STORM CLOUD UNITS 4 & 5
SIDEWALK CULVERT CAPACITY CALCULATIONS

UNIT 4, PARK IN TRACT M--4.0 CFS
CURB OPENING LENGTH REQUIERD

Weir equation:		$Q=CLH^{3/2}$
Constant	C =	3.33
Curb height	H =	0.67 feet
Opening Length	L =	2.20 feet

Q= 4.0 cfs

Use 3' sidewalk culvert

UNIT 5, PARK IN TRACT E--3.4 CFS
CURB OPENING LENGTH REQUIERD

Weir equation:		$Q=CLH^{3/2}$
Constant	C =	3.33
Curb height	H =	0.67 feet
Opening Length	L =	1.85 feet

Q= 3.4 cfs

Use 2' sidewalk culvert