APPENDIX A

Rainfall Data and
Hydraulic Data and Results
for
Existing Inlets, Storm Drains and Culverts -

Flow Master and Culvert Master Model Output

RAINFALL DATA

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Mexico 35.17166 N 106.59219 W 5144 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006
Extracted: Tue Nov 7 2006

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | Docs | U.S. Map

LOCATION - ALBUQUERQUE: JUST SOUTH OF PASEO DEL NORTE AND JUST WEST OF JEFFERSON ST.

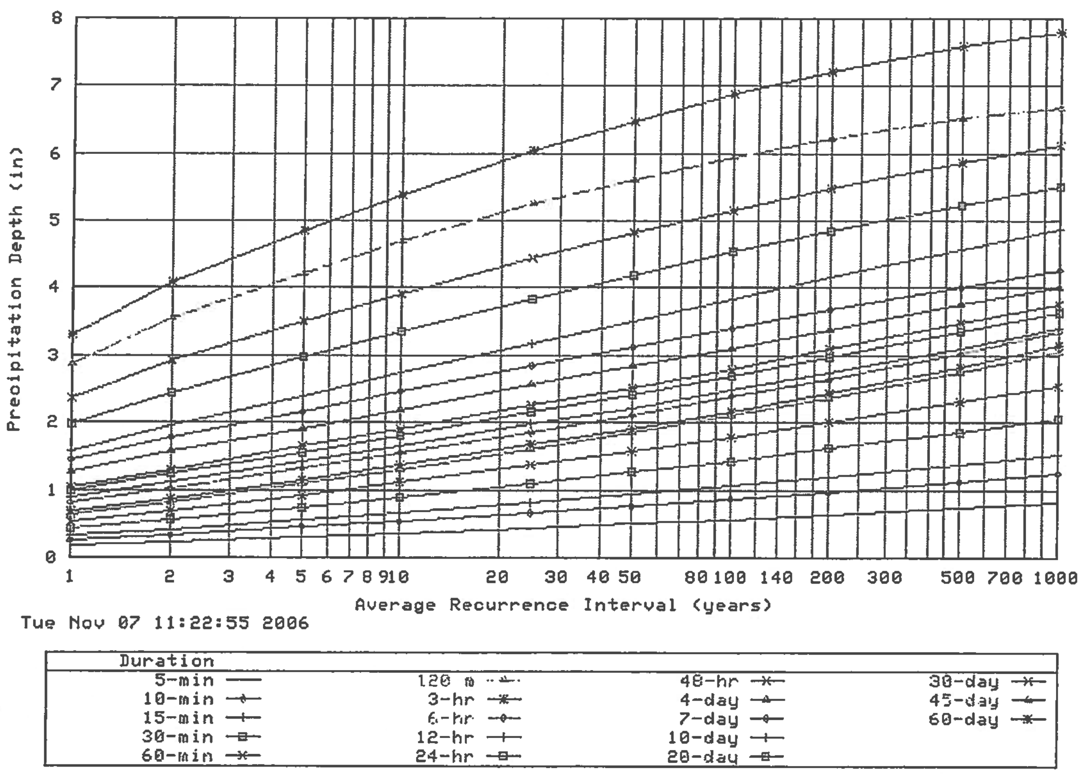
Precipitation Frequency Estimates (inches)

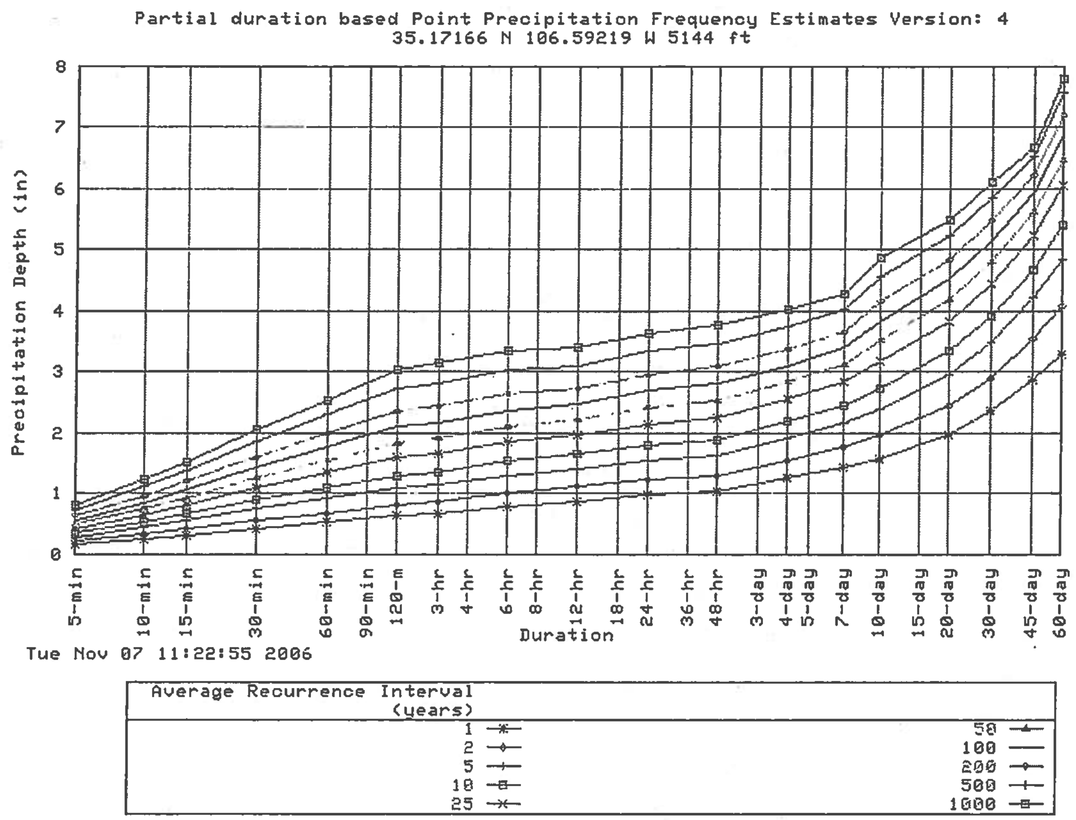
ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.17	0.26	0.32	0.43	0.53	0.64	0.69	0.80	0.88	0.99	1.04	1.26	1.44	1.59	1.98	2.35	2.87	3.31
2	0.22	0.33	0.41	0.56	0.69	0.82	0.87	1.01	1.12	1.24	1.30	1.56	1.78	1.97	2.45	2.91	3.55	4.08
5	0.29	0.45	0.56	0.75	0.93	1.09	1.15	1.31	1.42	1.56	1.64	1.91	2.16	2.40	2.97	3.49	4.22	4.85
10	0.35	0.54	0.67	0.90	1.11	1.30	1.36	1.54	1.65	1.81	1.90	2.19	2.46	2.74	3.35	3.92	4.69	5.40
25	0.43	0.66	0.82	1.10	1.36	1.60	1.66	1.86	1.97	2.15	2.25	2.55	2.84	3.18	3.85	4.45	5.25	6.05
50	0.50	0.76	0.94	1.26	1.56	1.84	1.91	2.11	2.22	2.42	2.52	2.83	3.13	3.51	4.20	4.82	5.62	6.48
100	0.56	0.86	1.06	1.43	1.77	2.10	2.17	2.38	2.48	2.69	2.80	3.11	3.41	3.84	4.54	5.16	5.96	6.88
200	0.64	0.97	1.20	1.61	2.00	2.37	2.45	2.65	2.75	2.97	3.09	3.39	3.68	4.16	4.85	5.48	6.23	7.21
500	0.73	1.11	1.38	1.86	2.30	2.75	2.83	3.03	3.11	3.35	3.47	3.75	4.02	4.57	5.24	5.86	6.53	7.58
1000	0.81	1.23	1.53	2.06	2.54	3.05	3.15	3.34	3.41	3.64	3.77	4.02	4.27	4.87	5.51	6.11	6.69	7.79

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Partial duration based Point Precipitation Frequency Estimates Version: 4
35.17166 N 106.59219 W 5144 ft





Confidence Limits -

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)																		
ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.20	0.30	0.38	0.51	0.63	0.79	0.84	0.98	1.04	1.16	1.19	1.38	1.56	1.72	2.15	2.54	3.10	3.57
2	0.26	0.39	0.49	0.66	0.81	1.02	1.07	1.24	1.31	1.44	1.50	1.70	1.93	2.13	2.66	3.14	3.83	4.41
5	0.35	0.53	0.66	0.89	1.10	1.34	1.40	1.59	1.67	1.81	1.88	2.08	2.34	2.59	3.21	3.76	4.53	5.22
10	0.42	0.63	0.79	1.06	1.31	1.60	1.66	1.86	1.94	2.10	2.17	2.38	2.65	2.95	3.63	4.21	5.03	5.80
25	0.51	0.78	0.97	1.30	1.61	1.96	2.03	2.25	2.31	2.50	2.58	2.77	3.06	3.42	4.16	4.77	5.63	6.49
50	0.59	0.89	1.11	1.49	1.85	2.26	2.32	2.55	2.60	2.80	2.89	3.08	3.37	3.78	4.53	5.16	6.02	6.96
100	0.67	1.01	1.26	1.69	2.09	2.56	2.63	2.87	2.91	3.11	3.21	3.38	3.67	4.13	4.89	5.53	6.37	7.38
200	0.75	1.14	1.41	1.90	2.36	2.88	2.97	3.19	3.22	3.43	3.54	3.67	3.96	4.48	5.23	5.87	6.66	7.74
500	0.86	1.31	1.63	2.19	2.72	3.35	3.43	3.65	3.65	3.87	3.98	4.07	4.33	4.93	5.65	6.28	6.96	8.13
1000	0.95	1.45	1.80	2.42	3.00	3.72	3.82	4.03	4.07	4.22	4.33	4.37	4.60	5.26	5.94	6.55	7.12	8.35

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

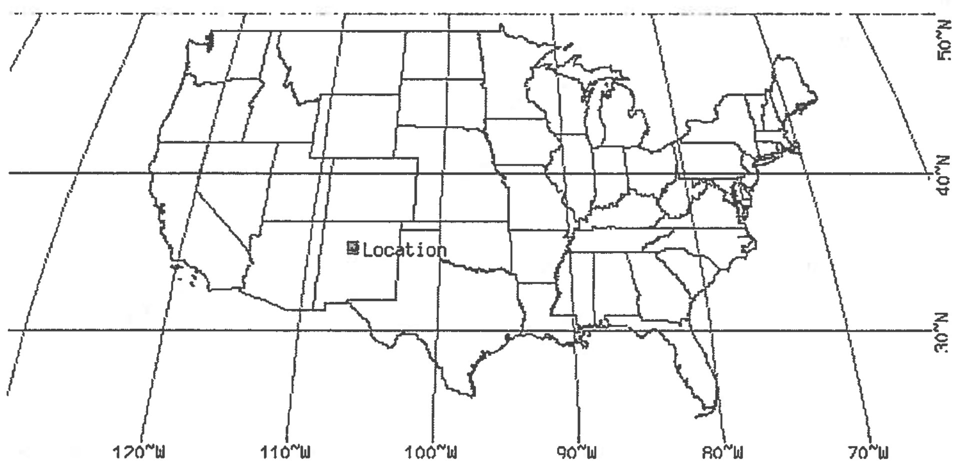
* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)																		
ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.14	0.22	0.27	0.36	0.45	0.53	0.57	0.68	0.76	0.86	0.90	1.16	1.32	1.46	1.82	2.17	2.66	3.06
2	0.18	0.28	0.35	0.47	0.58	0.68	0.72	0.85	0.95	1.08	1.14	1.43	1.64	1.81	2.26	2.68	3.29	3.79
5	0.25	0.38	0.47	0.63	0.78	0.90	0.95	1.10	1.21	1.35	1.42	1.75	2.00	2.21	2.74	3.22	3.91	4.51
10	0.30	0.45	0.56	0.75	0.93	1.07	1.13	1.29	1.41	1.57	1.65	2.00	2.27	2.53	3.10	3.62	4.34	5.01
25	0.36	0.55	0.68	0.92	1.14	1.31	1.37	1.55	1.67	1.85	1.94	2.33	2.62	2.93	3.55	4.10	4.87	5.62

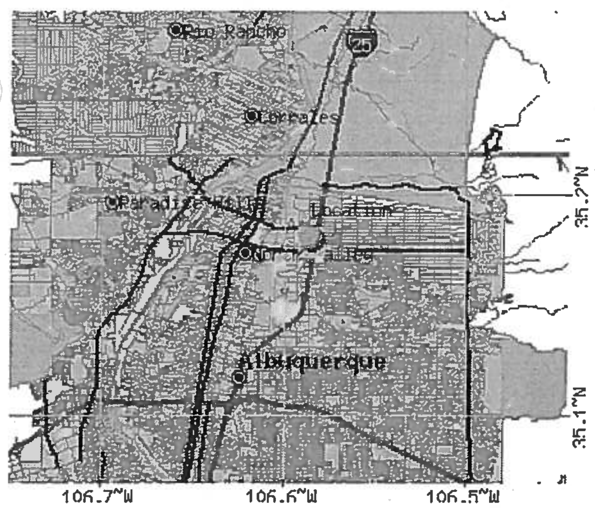
50	0.41	0.63	0.78	1.05	1.30	1.50	1.56	1.75	1.87	2.07	2.17	2.59	2.88	3.23	3.87	4.44	5.22	6.03
100	0.47	0.71	0.88	1.18	1.46	1.69	1.76	1.96	2.08	2.30	2.40	2.83	3.13	3.53	4.17	4.76	5.54	6.40
200	0.52	0.79	0.98	1.32	1.64	1.90	1.97	2.17	2.29	2.52	2.63	3.07	3.38	3.82	4.46	5.05	5.80	6.73
500	0.59	0.91	1.12	1.51	1.87	2.18	2.26	2.46	2.56	2.82	2.94	3.39	3.69	4.18	4.81	5.39	6.09	7.09
1000	0.65	0.99	1.23	1.66	2.06	2.40	2.49	2.69	2.79	3.05	3.17	3.62	3.91	4.44	5.06	5.62	6.27	7.31

* The lower bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are less than.
** These precipitation frequency estimates are based on a partial duration maxima series. ARI is the Average Recurrence Interval.

Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

Maps -





These maps were produced using a direct map request from the U.S. Census Bureau Mapping and Cartographic Resources Tiger Map Server.

Please read disclaimer for more information.

LEGEND

State	Connector
County	Stream
Indian Resv	Military Area
Lake/Pond/Ocean	National Park
Street	Other Park
Expressway	City
Highway	County

Scale 1:228583 — 0, 2, 4, 6, 8 mi; 0, 2, 4, 6, 8, 10 km
*average--true scale depends on monitor resolution

Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study, *please refer to our documentation.*

Using the **National Climatic Data Center's (NCDC)** station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (35.17166/-106.59219). Digital ASCII data can be obtained directly from **NCDC**.

Find Natural Resources Conservation Service (NRCS) SNOTEL (SNOwpack TELemetry) stations by visiting the **Western Regional Climate Center's state-specific SNOTEL station maps**.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910
(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

EXISTING STORM DRAIN INLET CAPACITY SUMMARY

AND

FLOW MASTER OUTPUT

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AHY Anal Point to Di for I Capa
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a
AP 30.91	3 inlets on Headline Rd. at Jefferson	Type B curb inlet 35"L x 60"W x 6"T	3	5156	5154	140	0.01429	30.00	90, 90/2=45 45/3=15 /inlet	5	0.02	0.02	0.013	2.75	3	5	3	15	3	63	10	30		30.9
AP 30.91	2 inlets on Jefferson at Headline Rd.	Type B curb inlet 35"L x 60"W x 6"H	2	5156	5154	80	0.02500	30.00	90, 90/2=45 45/2=23/inlet	5	0.02	0.02	0.013	2.75	3	5	3	15	3	60	14	28		30.9
																						TOTAL	58	30.9
AP 31.91	2 inlets on Lang Ave. N-S	40" L x 24" W x 6" H grate with another 40" curb opening 6" high	2	5140	5138	180	0.01111	31.00	57, 57/7 inlets at AP 31.91= 8/ inlet	2	0.02	0.02	0.013	2.75	2	2	3.33	15	6.66	57	3	6		31.9
AP 31.91	2 inlets on Lang Ave. N-S	80" L x 24" W x 6" H	2	5138	5136	160	0.01250	31.00	57, 57/7 inlets at AP 31.91= 8/inlet	2	0.02	0.02	0.013	2.75	2	2	6.66	15	6.66	61	5	10		31.9
AP 31.91	1 inlet on Lang Ave. NW corner	80" L x 24" W x 6" H	1	5136	5134	100	0.02000	31.00	57, 57/7 inlets at AP 31.91= 8/inlet	2	0.02	0.02	0.013	2.75	2	2	6.66	15	6.66	58	5	5		31.9
AP 31.91	2 sumps on the south side of Lang Ave.	Type D median inlet 80" x 24" (no curb)	2	-	-	-	-	31.91	57, 57/7 inlets at AP 31.91= 8/ inlet	------	------	------	------	0.01	2	2	6.66	25	------	------	8	16		31.9
																						TOTAL	37	31.9
AP 32.91	5 sumps south of Paseo Del Norte and west of Headline Rd.	24" W x 40" L Median Inlet	5	-	-	-	-	32.00	51, 57*(.25)=13, 13/7 sump inlets = 2/inlet	----	----	----	----	0.01	2	2	3.33	25	----	----	2	10		32.9

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		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a
AP 32.91	2 sumps south of Paseo Del Norte, west of Headline Rd.	40" L x 24" W x 6" H	2	-	-	-	-	32.00	51, 57*(.25)=13, 13/7 sump inlets = 2/inlet	----	----	----	----	0.01	2	2	3.33	15	3.33	----	2	4		32.
AP 32.91	3 inlets on Paeo and Jefferson, East off Jefferson	Type B curb inlet 35"L x 60"W x 6"H	3	5126	5124	115	0.01739	32.00	51, 57*(.75)=38, 38/5 remain. inlets = 8/ inlet	5	0.02	0.02	0.013	2.75	3	5	3	15	3	59	5	15		32.!
AP 32.91	1 inlet on Jefferson at El Pueblo Rd, E side on Jefferson	Type B curb inlet 35"L x 60"W x 6"H	1	5130	5128	80	0.02500	32.00	51, 57*(.75)=38, 38/5 remain. inlets = 8/ inlet	5	0.02	0.02	0.013	2.75	3	5	3	15	3	59	5	5		32.9
AP 32.91	1 inlet on Paseo and Jefferson, SW corner	10' L x 16" W x 6" H	1	5126	5124	145	0.01379	32.00	51, 57*(.75)=38, 38/5 remain. inlets = 8 per inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	10	15	10	72	6	6		32.9
																						TOTAL	40	32.9
AP 28.91	1 inlet on eastbound Paseo and Headline Rd	42"W x 48"L Median Inlet	1	5156	5154	110	0.01818	28.00	14, 14/3 inlets = 4/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	----	74	3	3		28.9
AP 28.91	1 inlet on eastbound Paseo	42"W x 48"L Median Inlet	1	5136	5134	140	0.01429	28.00	14, 14/3 inlets = 4/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	74	3	3		28.9
AP 28.91	1 inlet on eastbound Paseo and Jefferson	42"W x 48"L Median Inlet	1	5128	5126	100	0.02000	28.00	14, 14/3 inlets = 4/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	74	3	3		28.9
																						TOTAL	9	28.9

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		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a
AP 27.91	1 inlet on westbound Paseo across from Headline Rd.	42"W x 48"L Median Inlet	1	5154	5152	40	0.05000	27.00	15, 15/2 inlets = 7.5/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	68	5	5		27.
AP 27.91	1 inlet on westbound Paseo and Jefferson	42"W x 48"L Median Inlet	1	5128	5126	75	0.02667	27.00	15, 15/2 inlets = 7.5 per inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	65	5	5		27.
																						TOTAL	10	27.
AP 26.91	1 inlet on the road north off westbound Paseo	60" L x 16" W x 6" H Curb Inlet	1	5146	5144	110	0.01818	26.00	58, 58/5 inlets = 11/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	38	4	4		26.
AP 26.91	1 inlet on the road north off westbound Paseo	60" L x 16" W x 6" H Curb Inlet	1	5138	5136	70	0.02857	26.00	58, 58/5 inlets = 11/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	36	4	4		26.
AP 26.91	1 inlet on the road north off westbound Paseo	60" L x 16" W x 6" H Curb Inlet	1	5132	5130	30	0.06667	26.00	58, 58/5 inlets = 11 per inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	36	4	4		26.
AP 26.91	2 sumps north of Paseo on east and west sides of Jefferson	60" L x 16" W x 6" H Curb Inlet in sump	2	-	-	-	-	26.00	58, 58/5 inlets = 11/ inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	25	5	-----	11	22		26.9
																						TOTAL	34	26.9
AP 21.91	1 inlet on westbound Paseo	42"W x 48"L Median Inlet	1	5098	5096	45	0.04444	21.98	37, 37/ inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	39	14	14		21.9
																						TOTAL	14	21.9

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		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a
AP 19.91	1 inlet on westbound Paseo	42"W x 48"L Median Inlet	1	5086	5084	90	0.02222	19.99	28, 28/ inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	45	13	13		19.
																						TOTAL	13	19.
AP 18.91	2 inlets on westbound PDN near N. Div. Chan.	42"W x 48"L Median Inlet	2	5076	5074	165	0.01212	18.99	13, 13/2 inlets =6.5/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	66	4	8		18.
																						TOTAL	8	18.
AP 25.91	1 sump north of Paseo / frontage Rd.	42"W x 48"L Median Inlet	1	-	-	-	-	25.00	29, 29*(0.7) to this inlet =20	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	-----	20	20		25.
AP 25.91	1 inlet in frontage Rd. north of PDN	60" L x 16" W x 6" H Curb Inlet	1	5098	5096	75	0.02667	25.00	29, 29*(0.3) to this inlet =9	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	40	4	4		25.
																						TOTAL	24	25.
AP 24.91	1 inlet north of Paseo / frontage Rd.	60" L x 16" W x 6" H Curb Inlet	1	5084	5083.6	20	0.02000	24.99	13, 13/ inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	25	5	37	5	5		24.
																						TOTAL	5	24.
AP 22.91	1 inlet in Frontage Rd. near N. Div. Chan.	60" L x 16" W x 6" H Curb Inlet	1	5076	5074	85	0.02353	22.97	4, 4/ inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	25	5	52	2	2		22.
																						TOTAL	2	22.

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AH Ana Poir to D for Cap
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a
AP 20.91	2 inlets on eastbound Paseo	42"W x 48"L Median Inlet	2	5098	5096	50	0.04000	20.99	61, 61/3 inlets =20/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	51	10	20		20
AP 20.91	1 inlet on eastbound Paseo	42"W x 48"L Median Inlet	1	5094	5092	100	0.02000	20.99	61, 61/3 inlets =20/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	51	10	10		20.
																						TOTAL	30	20.
AP 17.91	1 inlet on eastbound Paseo	42"W x 48"L Median Inlet	1	5084	5082	140	0.01429	17.99	49, 49/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	37	18	18		
																						TOTAL	18	17.
AP 16.91	1 inlet on eastbound PDN near N. Div. Chan.	42"W x 48"L Median Inlet	1	5076	5074	170	0.01176	16.99	16, 16/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	53	8	8		16.
																						TOTAL	8	16.
AP 14.91	1 sump on El Pueblo Rd. south of Paseo	42"W x 48"L Median Inlet	1	-	-	-	-	14.98	37, 37/3 inlets =12/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	25	-----	-----	12	12		14.
AP 14.91	1 inlet on El Pueblo, south of Paseo	60" L x 16" W x 6" H Curb Inlet	1	5098	5096	85	0.02353	14.98	37, 37/3 inlets =12/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	37	4	4		14.
AP 14.91	1 inlet on El Pueblo, south of Paseo, NE of rail tracks	60" L x 16" W x 6" H Curb Inlet	1	5094	5092	90	0.02222	14.98	37, 37/3 inlets =12/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	37	4	4		14.
																						TOTAL	20	14.9

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AH Ana Poin to D for Cap
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a
AP 7.91	3 inlets in Lorraine Ct.	40" L x 24" W x 6" H	3	5094	5092	135	0.01481	7.00	15, 15/3 inlets =5/inlet	2	0.02	0.02	0.013	2.75	2	2	3.33	15	3.33	47	2	6		7.9
																						TOTAL	6	7.9
AP 6.91	1 inlet south of El Pueblo in sump	17" diameter grate in sump	1	5088	5086	200	0.01000	6.00	22, 22*(0.3) = 7/inlet	-----	-----	------	-----	0.01	1.5	1.5	1.5	25	-----	-----	7	7		6.9
AP 6.91	1 inlet further south of El Pueblo in sump	10' curb opening 39" L x 25" W x 6" H in sump	1	5084	5082	80	0.02500	6.00	22, 22*(0.7) = 15/inlet	2	0.02	0.02	0.013	2.75	2	2	3.33	15	10	----	15	15		6.9
																						TOTAL	22	6.9
AP 2.91	2 inlets in of El Pueblo Rd	52" L x 16" W x 6" H	2	5078	5076	205	0.00976	2.99	271, 271/3 inlets =90/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	4.33	15	4.33	18	16	32		2.9
AP 2.91	1 sump north of El Pueblo	42"W x 48"L Median Inlet	1	-	-	-	-	2.99	271, 271/3 inlets =90/inlet	-----	-----	------	-----	0.01	3.5	3.5	4	25	-----	-----	15	15		2.9
																						TOTAL	47	2.9

(a) See Figure 1 for Drainage Basin Map and Figure 2 for Analysis Point Locations and Inlet locations. See AHYMO modeling schematic Figure 3 for DIVIDE HYD locations,
(b) All inlet locations, types and dimensions determined by field measurements
(c) Elevation and length data to compute slope approaching inlet determined from Drainage Basin Map contours
(d) See AHYMO_97 model summary table for peak discharge results.
) Computed with the Flow Master Program - see Appendix for output with results

Worksheet for AP 30.91- 3 type B inlets on head. rd. at jefferson

Project Description

Solve For	Efficiency

Input Data

Discharge	15.00	ft³/s
Slope	0.01429	ft/ft
Gutter Width	5.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	3.00	ft
Grate Width	5.00	ft
Grate Length	3.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	3.00	ft

TOTAL Q_{100} YR
BASIN 30 = 90 CFS
APPROX. $\frac{1}{2}$ TO
HEADLINE RD. = 45 CFS
ASSUME $\frac{45 \text{ CFS}}{3 \text{ INLETS}}$
= 15 CFS TO EACH INLET

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	63.48	%
Intercepted Flow	9.52	ft³/s
Bypass Flow	5.48	ft³/s
Spread	17.22	ft
Depth	0.34	ft
Flow Area	2.96	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.06	ft/s
Splash Over Velocity	9.20	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.06	
Grate Flow Ratio	0.60	
Equivalent Cross Slope	0.06579	ft/ft
Active Grate Length	2.55	ft
Length Factor	0.01	
Total Interception Length	36.25	ft

ASSUME
10 CFS
PER INLET

Worksheet for AP 30.91 - 2 type B inlets on jeff. at head rd.

Project Description

Solve For	Efficiency		

Input Data

Discharge		23.00	ft³/s
Slope		0.02500	ft/ft
Gutter Width		5.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Roughness Coefficient		0.013	
Local Depression		2.75	in
Local Depression Width		3.00	ft
Grate Width		5.00	ft
Grate Length		3.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		3.00	ft

100-YR TOTAL Q BASIN 30
=90 CFS
APPROX. ½ TO
JEFFERSON = 45 CFS
ASSUME $\frac{45 CFS}{2 \text{ INLETS}}$
= 23 CFS TO EACH INLET

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	59.86	%
Intercepted Flow	13.77	ft³/s
Bypass Flow	9.23	ft³/s
Spread	18.20	ft
Depth	0.36	ft
Flow Area	3.31	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	6.94	ft/s
Splash Over Velocity	9.20	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.03	
Grate Flow Ratio	0.58	
Equivalent Cross Slope	0.06395	ft/ft
Active Grate Length	2.55	ft
Length Factor	0.01	
Total Interception Length	52.19	ft

14 CFS
PER INLET

Worksheet for AP 31.91 - 2 inlets on lang at jeff.

Project Description

Solve For	Efficiency

Input Data

Discharge		8.00	ft³/s
Slope		0.01111	ft/ft
Gutter Width		2.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Roughness Coefficient		0.013	
Local Depression		2.75	in
Local Depression Width		2.00	ft
Grate Width		2.00	ft
Grate Length		3.33	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		6.66	ft

TOTAL 100-YR
Qp BASIN 31 = 57cfs
7 INLETS AT
AP 31.91
∴ ASSUME $\frac{57 \text{ cfs}}{7 \text{ INLETS}}$
= 8 cfs TO EACH
INLET

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	57.10	%
Intercepted Flow	4.57	ft³/s
Bypass Flow	3.43	ft³/s
Spread	14.26	ft
Depth	0.29	ft
Flow Area	2.03	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	3.93	ft/s
Splash Over Velocity	9.69	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.33	
Equivalent Cross Slope	0.05801	ft/ft
Active Grate Length	2.83	ft
Length Factor	0.14	
Total Interception Length	27.84	ft

ASSUME
3 CFS/INLET

Worksheet for AP 31.91 - 2inlets on lang at jeff

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s
Slope	0.01250	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	2.00	ft
Grate Width	2.00	ft
Grate Length	6.66	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	6.66	ft

SEE NOTE
ON 1ST PAGE
AP 31.91

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	61.14	%
Intercepted Flow	4.89	ft³/s
Bypass Flow	3.11	ft³/s
Spread	13.95	ft
Depth	0.28	ft
Flow Area	1.95	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.11	ft/s
Splash Over Velocity	14.32	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.36	
Grate Flow Ratio	0.34	
Equivalent Cross Slope	0.05875	ft/ft
Active Grate Length	5.66	ft
Length Factor	0.03	
Total Interception Length	28.63	ft

ASSUME
5 CFS / INLET

Worksheet for AP 31.91 - 1inlet on lang at jeff

Project Description

Solve For	Efficiency	

Input Data

Discharge	8.00	ft^3/s
Slope	0.02000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	2.00	ft
Grate Width	2.00	ft
Grate Length	6.66	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	6.66	ft

SEE NOTE ON
1ST PAGE
AP 31-91

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	58.26	%
Intercepted Flow	4.66	ft^3/s
Bypass Flow	3.34	ft^3/s
Spread	12.77	ft
Depth	0.26	ft
Flow Area	1.63	ft^2
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.90	ft/s
Splash Over Velocity	14.32	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.29	
Grate Flow Ratio	0.37	
Equivalent Cross Slope	0.06183	ft/ft
Active Grate Length	5.66	ft
Length Factor	0.03	
Total Interception Length	31.97	ft

ASSUME
5 CFS INLET

Worksheet for AP 31.91 - 2 type D inlets lang at jeff

Project Description

Solve For	Spread	

Input Data

Discharge	8.00	ft^3/s
Left Side Slope	50.00	ft/ft (H:V)
Right Side Slope	50.00	ft/ft (H:V)
Bottom Width	2.00	ft
Grate Width	2.00	ft
Grate Length	6.66	ft
Local Depression	0.01	in
Local Depression Width	2.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	25.00	%

- ASSUME $\frac{8 \text{ CFS}}{\text{INLET}}$

SEE NOTE 1 AT PAGE AP 31.91

Results

Spread	31.80	ft
Depth	0.30	ft
Wetted Perimeter	31.81	ft
Top Width	31.80	ft
Open Grate Area	8.99	ft^2
Active Grate Weir Length	16.32	ft

Worksheet for AP 32.91 - 5 med. inlets in bas 32

Project Description

5 (SUMP INLETS

Solve For	Spread	

Input Data

Discharge		2.00	ft³/s
Left Side Slope		50.00	ft/ft (H:V)
Right Side Slope		50.00	ft/ft (H:V)
Bottom Width		2.00	ft
Grate Width		2.00	ft
Grate Length		3.33	ft
Local Depression		0.01	in
Local Depression Width		2.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		25.00	%

TOTAL 100YR QP
BASIN 32 = 51 CFS
ASSUME 25% OF 51 cfs
= 13 cfs DIVIDE BY
7 SUMP INLETS
$\frac{13}{7}$ = 2 CFS/INLET

Results

Spread	18.74	ft
Depth	0.17	ft
Wetted Perimeter	18.74	ft
Top Width	18.74	ft
Open Grate Area	4.50	ft²
Active Grate Weir Length	9.66	ft

Worksheet for AP 32.91- 2 inlets in bas 32

Project Description

2 (SUMP INLETS)

Solve For	Spread	

Input Data

Discharge	2.00	ft^3/s
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Grate Width	2.00	ft
Grate Length	3.33	ft
Local Depression	0.01	in
Local Depression Width	2.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%

SEE NOTE
1ST PAGE OF
AP32.91

Results

Spread	12.18	ft
Depth	0.24	ft
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Open Grate Area	5.09	ft^2
Active Grate Weir Length	6.73	ft

Worksheet for AP 32.91 - 3 type B inlets jeff nr PDN

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s
Slope	0.01739	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	3.00	ft
Grate Width	5.00	ft
Grate Length	3.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	3.00	ft

TOTAL 100-YR QP
BASIN 32 = 51 cfs
ASSUME 75% OF 51 cfs
= 38 cfs TO 5 INLETS
IN JEFFERSON JUST
SOUTH OF PDN

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	58.56	%
Intercepted Flow	4.68	ft³/s
Bypass Flow	3.32	ft³/s
Spread	13.11	ft
Depth	0.26	ft
Flow Area	1.72	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.65	ft/s
Splash Over Velocity	14.32	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.31	
Grate Flow Ratio	0.36	
Equivalent Cross Slope	0.04726	ft/ft
Active Grate Length	5.66	ft
Length Factor	0.03	
Total Interception Length	36.01	ft

ASSUME
5 cfs/INLET

Worksheet for AP 32.91 - 1 type B inlet jeff nr PDN

Project Description

Solve For	Efficiency	

Input Data

Discharge		8.00	ft³/s
Slope		0.02500	ft/ft
Gutter Width		2.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Roughness Coefficient		0.013	
Local Depression		2.75	in
Local Depression Width		3.00	ft
Grate Width		5.00	ft
Grate Length		3.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		3.00	ft

SEE NOTE FOR
3 TYPE B INLETS
AT AP 32.91

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	58.56	%
Intercepted Flow	4.68	ft³/s
Bypass Flow	3.32	ft³/s
Spread	13.11	ft
Depth	0.26	ft
Flow Area	1.72	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.65	ft/s
Splash Over Velocity	14.32	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.31	
Grate Flow Ratio	0.00	
Equivalent Cross Slope	0.04726	ft/ft
Active Grate Length	5.66	ft
Length Factor	0.03	
Total Interception Length	36.01	ft

ASSUME
5 QA/INLET

Worksheet for AP 32.91 - 1 very long inlet jeff nr PDN

Project Description

Solve For	Efficiency		

Input Data

Discharge		8.00	ft³/s
Slope		0.01379	ft/ft
Gutter Width		1.33	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Roughness Coefficient		0.013	
Local Depression		2.75	in
Local Depression Width		1.33	ft
Grate Width		1.33	ft
Grate Length		10.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		10.00	ft

SEE NOTE FOR
3 TYPE B INLETS
AT AP 32.91

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	71.53	%
Intercepted Flow	5.72	ft³/s
Bypass Flow	2.28	ft³/s
Spread	13.69	ft
Depth	0.27	ft
Flow Area	1.88	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.27	ft/s
Splash Over Velocity	23.72	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.57	
Grate Flow Ratio	0.24	
Equivalent Cross Slope	0.06110	ft/ft
Active Grate Length	8.50	ft
Length Factor	0.05	
Total Interception Length	28.80	ft

ASSUME
6 CFS/INLET

Worksheet for AP 28.91 med.1- inlet on grade

Project Description

Solve For	Efficiency

Input Data

Discharge	4.00	ft³/s
Slope	0.01818	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

TOTAL 100-YR QP
BASIN 28 = 14 CFS
14/3 INLETS
= 4 CFS TO EACH INLET

Options

Grate Flow Option	Exclude None

Results

Efficiency	74.21	%
Intercepted Flow	2.97	ft³/s
Bypass Flow	1.03	ft³/s
Spread	10.58	ft
Depth	0.21	ft
Flow Area	1.12	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.57	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.25	
Grate Flow Ratio	0.66	
Active Grate Length	4.00	ft

ASSUME
3 CFS/inlet

Worksheet for AP 28.91 med.2- inlet on grade

Project Description

Solve For	Efficiency

Input Data

Discharge	4.00	ft³/s
Slope	0.01429	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

SEE NOTE FOR AP 28.91 "med.1-inlet on grade"

Options

Grate Flow Option	Exclude None

Results

Efficiency	73.82	%
Intercepted Flow	2.95	ft³/s
Bypass Flow	1.05	ft³/s
Spread	11.07	ft
Depth	0.22	ft
Flow Area	1.22	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.27	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.28	
Grate Flow Ratio	0.64	
Active Grate Length	4.00	ft

ASSUME 3 CFS/inlet

Worksheet for AP 28.91 med.3- inlet on grade

Project Description

Solve For	Efficiency	

Input Data

Discharge	4.00	ft³/s
Slope	0.02000	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

SEE NOTE FOR AP 28-91 "med. 1 - inlet on grade"

Options

Grate Flow Option	Exclude None	

Results

Efficiency	74.43	%
Intercepted Flow	2.98	ft³/s
Bypass Flow	1.02	ft³/s
Spread	10.39	ft
Depth	0.21	ft
Flow Area	1.08	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.70	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.23	
Grate Flow Ratio	0.67	
Active Grate Length	4.00	ft

- ASSUME 3 CFS/inlet

Worksheet for AP 27.91 med.1- inlet on grade

Project Description

Solve For	Efficiency

Input Data

Discharge	7.50	ft³/s
Slope	0.05000	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

TOTAL 100-YR. QP
BASIN 27 = 15 CFS
$\frac{15}{2\ \text{INLETS}} = \frac{7.5\ \text{CFS}}{\text{INLET}}$

Options

Grate Flow Option	Exclude None

Results

Efficiency	67.73	%
Intercepted Flow	5.08	ft³/s
Bypass Flow	2.42	ft³/s
Spread	11.08	ft
Depth	0.22	ft
Flow Area	1.23	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	6.11	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.64	
Active Grate Length	4.00	ft

ASSUME
5 cfs/inlet

Worksheet for AP 27.91 med.2- inlet on grade

Project Description

Solve For	Efficiency

Input Data

Discharge	7.50	ft³/s
Slope	0.02667	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

TOTAL 100-YR Q.P.
BASIN 27 = 15 CFS
$\frac{15}{2 \text{ INLETS}} = \frac{7.5 \text{ CFS}}{\text{INLET}}$

Options

Grate Flow Option	Exclude None

Results

Efficiency	65.15	%
Intercepted Flow	4.89	ft³/s
Bypass Flow	2.61	ft³/s
Spread	12.46	ft
Depth	0.25	ft
Flow Area	1.55	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	4.83	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.16	
Grate Flow Ratio	0.59	
Active Grate Length	4.00	ft

ASSUME
5 cfs / inlet

Worksheet for AP 26.91 curb inlet 1

Project Description

Solve For	Efficiency	

Input Data

Discharge	11.00	ft³/s
Slope	0.01818	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

TOTAL 100-YR QP

BASIN 26 = 58 CFS

$\frac{58}{5 \text{ inlets}} = 11$ cfs/INLET

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	37.92	%
Intercepted Flow	4.17	ft³/s
Bypass Flow	6.83	ft³/s
Spread	14.65	ft
Depth	0.29	ft
Flow Area	2.15	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.12	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.16	
Grate Flow Ratio	0.22	
Equivalent Cross Slope	0.05862	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	36.66	ft

ASSUME

4 CFS/INLET

Worksheet for AP 26.91 curb inlet 2

Project Description

Solve For	Efficiency		

Input Data

Discharge		11.00	ft³/s
Slope		0.02857	ft/ft
Gutter Width		1.33	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Roughness Coefficient		0.013	
Local Depression		2.75	in
Local Depression Width		1.33	ft
Grate Width		1.33	ft
Grate Length		5.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		5.00	ft

SEE NOTE
FOR AP 26.91
"curb inlet 1"

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	36.34	%
Intercepted Flow	4.00	ft³/s
Bypass Flow	7.00	ft³/s
~~Spread~~	13.46	ft
Depth	0.27	ft
Flow Area	1.81	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	6.07	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.13	
Grate Flow Ratio	0.24	
Equivalent Cross Slope	0.06175	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	40.70	ft

ASSUME
4 cfs/inlet

Worksheet for AP 26.91 curb inlet 3

Project Description

Solve For	Efficiency	

Input Data

Discharge	11.00	ft³/s
Slope	0.06667	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

SEE NOTE FOR AP 26-91 "curb inlet 2"

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	35.52	%
Intercepted Flow	3.91	ft³/s
Bypass Flow	7.09	ft³/s
Spread	11.48	ft
Depth	0.23	ft
Flow Area	1.32	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	8.34	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.08	
Grate Flow Ratio	0.28	
Equivalent Cross Slope	0.06822	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	49.43	ft

ASSUME 4 cfs / inlet

Worksheet for AP 26.91 2 sag curb inlets jeff

Project Description

Solve For	Spread	2 SAG INLETS

Input Data

Discharge		11.00	ft³/s
Gutter Width		1.33	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Local Depression		2.75	in
Local Depression Width		1.33	ft
Grate Width		1.33	ft
Grate Length		5.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		25.00	%
Curb Opening Length		5.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Throat Incline Angle		90.00	degrees

SEE NOTE FOR AP 26-91 "curb inlet 1"

Options

Calculation Option	Use Both

Results

Spread	24.61	ft
Depth	0.49	ft
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Open Grate Area	4.49	ft²
Active Grate Weir Length	7.00	ft

ASSUME EACH SAG INLET CAPACITY = 11 cfs

AP 21.91 1 med- inlet on grade bas 21

Project Description

Solve For	Efficiency	

Input Data

Discharge	37.00	ft³/s
Slope	0.04444	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 21.28
Q100-YR = 37 cfs
only 1 inlet
so 37 cfs/inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	38.99	%
Intercepted Flow	14.43	ft³/s
Bypass Flow	22.57	ft³/s
Spread	20.60	ft
Depth	0.41	ft
Flow Area	4.24	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	8.72	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	0.90	
Side Flow Factor	0.06	
Grate Flow Ratio	0.39	
Active Grate Length	4.00	ft

14 cfs

AP 19.91 1 med- inlet bas. 19

Project Description

Solve For	Efficiency	

Input Data

Discharge	28.00	ft³/s
Slope	0.02220	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 19.99
Q_{100} = 28 cfs
only 1 inlet

Options

Grate Flow Option	Exclude None	

Results

Efficiency	44.88	%
Intercepted Flow	12.57	ft³/s
Bypass Flow	15.43	ft³/s
Spread	21.14	ft
Depth	0.42	ft
Flow Area	4.47	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	6.27	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.38	
Active Grate Length	4.00	ft

13 cfs

AP 18.91 2 med inlets bas.18

Project Description

Solve For	Efficiency

Input Data

Discharge	6.50	ft³/s
Slope	0.01212	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 18.99

$Q_{100} = 13$ cfs

$\frac{13}{2 \text{ inlets}}$

$= 6.5$ cfs / inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	66.19	%
Intercepted Flow	4.30	ft³/s
Bypass Flow	2.20	ft³/s
Spread	13.69	ft
Depth	0.27	ft
Flow Area	1.88	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.47	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.26	
Grate Flow Ratio	0.55	
Active Grate Length	4.00	ft

4 cfs

Worksheet for AP 25.91 sump inlet bas 25

Project Description

Solve For	Spread

Input Data

Discharge		20.00	ft^3/s
Left Side Slope		10.00	ft/ft (H:V)
Right Side Slope		10.00	ft/ft (H:V)
Bottom Width		3.50	ft
Grate Width		3.50	ft
Grate Length		4.00	ft
Local Depression		0.01	in
Local Depression Width		3.50	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%

TOTAL 100-YR.
BASIN 25 QP
= 29 cfs
ASSUME 70% (29) cfs
= 20 cfs TO THIS
INLET

Results

Spread	15.71	ft
Depth	0.61	ft
Wetted Perimeter	15.77	ft
Top Width	15.71	ft
Open Grate Area	10.71	ft^2
Active Grate Weir Length	13.95	ft

Worksheet for AP 25.91pdn inlet

Project Description

Solve For	Efficiency		

Input Data

Discharge		9.00	ft^3/s
Slope		0.02667	ft/ft
Gutter Width		1.33	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Roughness Coefficient		0.015	
Local Depression		2.75	in
Local Depression Width		1.33	ft
Grate Width		1.33	ft
Grate Length		5.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		5.00	ft

TOTAL 100-YR
BASIN 25 Qp
=29 cfs
ASSUME 30% (29)
=9 cfs TO THIS
INLET

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	40.05	%
Intercepted Flow	3.60	ft^3/s
Bypass Flow	5.40	ft^3/s
Spread	13.34	ft
Depth	0.27	ft
Flow Area	1.78	ft^2
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.05	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.17	
Grate Flow Ratio	0.24	
Equivalent Cross Slope	0.06208	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	33.52	ft

ASSUME
4 cfs

AP 24.91 bas 24

Project Description

Solve For	Efficiency

Input Data

Discharge		13.00	ft^3/s
Slope		0.02000	ft/ft
Gutter Width		1.33	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Roughness Coefficient		0.015	
Local Depression		2.75	in
Local Depression Width		1.33	ft
Grate Width		1.33	ft
Grate Length		5.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		5.00	ft

AP 24.99
Q_{100} = 13 cfs
1 inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	36.78	%
Intercepted Flow	4.78	ft^3/s
Bypass Flow	8.22	ft^3/s
Spread	16.17	ft
Depth	0.32	ft
Flow Area	2.61	ft^2
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.97	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.17	
Grate Flow Ratio	0.20	
Equivalent Cross Slope	0.05526	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	38.48	ft

AP 22.91 bas 22

Project Description

Solve For	Efficiency	

Input Data

Discharge	4.00	ft³/s
Slope	0.02353	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

AP 22.97
$Q_{100} = 4$ cfs
1 inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	52.08	%
Intercepted Flow	2.08	ft³/s
Bypass Flow	1.92	ft³/s
Spread	10.08	ft
Depth	0.20	ft
Flow Area	1.02	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	3.94	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.24	
Grate Flow Ratio	0.31	
Equivalent Cross Slope	0.07416	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.04	
Total Interception Length	20.64	ft

AP 20.91 2 med inlets bas 20

Project Description

Solve For	Efficiency

Input Data

Discharge	20.00	ft³/s
Slope	0.04000	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 20.99

Q_{100} = 61 cfs

$\frac{61}{3 \text{ inlets}}$

= 20 cfs/inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	51.20	%
Intercepted Flow	10.24	ft³/s
Bypass Flow	9.76	ft³/s
Spread	16.68	ft
Depth	0.33	ft
Flow Area	2.78	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	7.18	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.09	
Grate Flow Ratio	0.47	
Active Grate Length	4.00	ft

AP 20.91 1 med inlets assume in bas 20

Project Description

Solve For	Efficiency

Input Data

Discharge	20.00	ft³/s
Slope	0.04000	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 20.99
Q100 = 61 cfs
3 inlets
= 20 cfs/inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	51.20	%
Intercepted Flow	10.24	ft³/s
Bypass Flow	9.76	ft³/s
Spread	16.68	ft
Depth	0.33	ft
Flow Area	2.78	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	7.18	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.09	
Grate Flow Ratio	0.47	
Active Grate Length	4.00	ft

10

AP 17.91 1 med inlet bas 17

Project Description

Solve For	Efficiency

Input Data

Discharge	49.00	ft³/s
Slope	0.01429	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 17.99
$Q_{100} = 49$ cfs
1 inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	37.47	%
Intercepted Flow	18.36	ft³/s
Bypass Flow	30.64	ft³/s
Spread	28.32	ft
Depth	0.57	ft
Flow Area	8.02	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	6.11	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.30	
Active Grate Length	4.00	ft

AP 16.91 1 med inlet bas 16

Project Description

Solve For	Efficiency	

Input Data

Discharge	16.00	ft³/s
Slope	0.01176	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 16.99
$Q_{100} = 16$ cfs
1 inlet

Options

Grate Flow Option	Exclude None	

Results

Efficiency	52.53	%
Intercepted Flow	8.40	ft³/s
Bypass Flow	7.60	ft³/s
Spread	19.30	ft
Depth	0.39	ft
Flow Area	3.73	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	4.29	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.19	
Grate Flow Ratio	0.41	
Active Grate Length	4.00	ft

AP 14.91 curb inlet 2- bas 14

Project Description

Solve For	Efficiency	

Input Data

Discharge	12.00	ft³/s
Slope	0.02222	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

AP 14.98
100-YR. QP = 37 cfs
$\frac{37}{3}$ inlets
= 12 cfs / inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	37.23	%
Intercepted Flow	4.47	ft³/s
Bypass Flow	7.53	ft³/s
Spread	15.38	ft
Depth	0.31	ft
Flow Area	2.37	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.07	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.17	
Grate Flow Ratio	0.21	
Equivalent Cross Slope	0.05692	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	37.72	ft

AP 14.91 sump inlet bas 14

Project Description

Solve For	Spread

Input Data

Discharge		12.00	ft³/s
Left Side Slope		10.00	ft/ft (H:V)
Right Side Slope		10.00	ft/ft (H:V)
Bottom Width		3.50	ft
Grate Width		3.50	ft
Grate Length		4.00	ft
Local Depression		0.01	in
Local Depression Width		3.50	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		25.00	%

AP 14.98
100-YR Qp = 37 cfs
$\frac{37}{3}$ inlets
= 12 cfs/inlet

Results

Spread	12.48	ft
Depth	0.45	ft
Wetted Perimeter	12.53	ft
Top Width	12.48	ft
Open Grate Area	9.45	ft²
Active Grate Weir Length	13.25	ft

ASSUME
INLET
CAPACITY
= 12 cfs

AP 14.91 curb inlet 1- bas 14

Project Description

Solve For	Efficiency	

Input Data

Discharge	12.00	ft³/s
Slope	0.02353	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

AP 14.98
100-YR Qp = 37 CFS
$\frac{37}{3 \text{ inlets}}$
= 12 cfs/inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	36.97	%
Intercepted Flow	4.44	ft³/s
Bypass Flow	7.56	ft³/s
Spread	15.22	ft
Depth	0.30	ft
Flow Area	2.32	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.18	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.16	
Grate Flow Ratio	0.22	
Equivalent Cross Slope	0.05729	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	38.23	ft

AP 7.91 - 3 inlets on lorraine ct.

Project Description

Solve For	Efficiency	

Input Data

Discharge	5.00	ft³/s
Slope	0.01481	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	2.00	ft
Grate Width	2.00	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	3.33	ft

AP 7.00
100-YR QP=15 cfs
$\frac{15}{3 \text{ inlets}}$
=5 cfs/inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	49.69	%
Intercepted Flow	2.48	ft³/s
Bypass Flow	2.52	ft³/s
Spread	11.33	ft
Depth	0.23	ft
Flow Area	1.28	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	3.90	ft/s
Splash Over Velocity	9.69	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.40	
Equivalent Cross Slope	0.06633	ft/ft
Active Grate Length	2.83	ft
Length Factor	0.02	
Total Interception Length	22.99	ft

AP 6.91 1-17" dia. sump grate

Project Description

Solve For	Spread	

Input Data

Discharge		7.00	ft³/s
Left Side Slope		10.00	ft/ft (H:V)
Right Side Slope		10.00	ft/ft (H:V)
Bottom Width		1.50	ft
Grate Width		1.50	ft
Grate Length		1.50	ft
Local Depression		0.01	in
Local Depression Width		1.50	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		25.00	%

AP 6-00
100-YR QP = 22 cfs
ASSUME 30% OF BASIN DRAIN TO THIS INLET
= 22 (0.3) = 7 cfs

Results

Spread	16.19	ft
Depth	0.73	ft
Wetted Perimeter	16.27	ft
Top Width	16.19	ft
Open Grate Area	1.52	ft²
Active Grate Weir Length	5.25	ft

AP 6.91 bas 6 large sump inlet

Project Description

Solve For	Spread		

Input Data

Discharge		15.00	ft³/s
Gutter Width		2.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.00	ft/ft
Local Depression		2.75	in
Local Depression Width		2.00	ft
Grate Width		2.00	ft
Grate Length		3.33	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		10.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Throat Incline Angle		90.00	degrees

AP 6.00
100-YR QP = 22 cfs
ASSUME 70% OF
BASIN DRAIN TO
THIS INLET
22(0.7) = 15 cfs

Options

Calculation Option	Use Both

Results

Spread	0.00	ft
Depth	0.00	ft
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Open Grate Area	0.00	ft²
Active Grate Weir Length	0.00	ft

AP2.91 2 inlets in El Pueblo Rd

Project Description

Solve For	Efficiency	

Input Data

Discharge	90.00	ft³/s
Slope	0.00976	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	4.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	4.33	ft

AP 2.99

100-YR QP = 271 cfs

$\frac{271}{3 \text{ inlets}}$ =

90 cfs/inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	17.52	%
Intercepted Flow	15.77	ft³/s
Bypass Flow	74.23	ft³/s
Spread	36.21	ft
Depth	0.72	ft
Flow Area	13.11	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	6.86	ft/s
Splash Over Velocity	11.03	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.08	
Grate Flow Ratio	0.10	
Equivalent Cross Slope	0.03636	ft/ft
Active Grate Length	3.68	ft
Length Factor	0.01	
Total Interception Length	97.95	ft

AP 2.91 1 sump inlet

Project Description

Solve For	Spread

Input Data

Discharge		90.00	ft³/s
Left Side Slope		10.00	ft/ft (H:V)
Right Side Slope		10.00	ft/ft (H:V)
Bottom Width		3.50	ft
Grate Width		3.50	ft
Grate Length		4.00	ft
Local Depression		0.01	in
Local Depression Width		3.50	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		25.00	%

AP 2.99

$Q_{100} = 271$ cfs

$\frac{271}{3 \text{ inlets}} =$ 90 cfs / inlet

Results

Spread	66.28	ft
Depth	3.14	ft
Wetted Perimeter	66.60	ft
Top Width	66.28	ft
Open Grate Area	9.45	ft²
Active Grate Weir Length	13.25	ft

NOTE:

SINCE THIS IS A SUMP INLET FLOWMASTER ASSUMES ENTIRE Q CAN ENTER INLET.
THAT IS NOT POSSIBLE, DEPTH OVER ABOUT 1 FT. WILL SPILL WEST ON EL PUEBLO RD.
THEREFORE, ASSUME INLET CAPACITY = $\boxed{15 \text{ cfs}}$ (Currently inlet could not be found
IT IS COVERED WITH SEDIMENT AND BUSHES

APPEARS NO MAINTENANCE

EXISTING STORM DRAIN CAPACITY SUMMARY

AND

FLOW MASTER OUTPUT

TABLE A2

EXISTING- STORM DRAIN CAPACITY (Non-Pressure full pipe flow)

El Pueblo Road Drainage Analysis.

AHYMO Model Analysis Point	Storm Drain Pipe Data and Capacity Summary (non-pressure full pipe flow)							
	Pipe Diameter - or Street Inter-section	Approx. beggining Pipe elevation	Approx. end pipe elevation	Approx. Pipe Length	Comptued Pipe Slope (approx.)	Pipe Slope from Plans or As-builts	Manning's "n"	**Full pipe Capacity** (non-pressure flow)
	(in.)	(ft)	(ft)	(ft)	(ft/ft)	(ft/ft)		(cfs)
(a)	(b)	(b)	(b)	(b)				(c)
30.91	30	----	----	----	----	0.0298	0.013	71
31.91	54	----	----	----	----	0.0055	0.013	146
32.91	66	----	----	----	----	0.0047	0.013	230
28.91	30	5116	5116	65	0.0015	0.0015	0.023	9
27.91	30	----	----	----	----	0.0200	0.023	33
26.91	30	----	----	----	----	0.0200	0.023	33
21.91	24	----	----	----	----	0.0167	0.023	17
19.91	24	----	----	----	----	0.01 (n)	0.023	13
18.91	24	----	----	----	----	0.01 (n)	0.023	13
25.91	24	----	----	----	----	0.0167	0.023	17
24.91	24	----	----	----	----	0.01 (n)	0.023	13
22.91	24	----	----	----	----	0.01 (n)	0.023	13
20.91	24	----	----	----	----	0.0167	0.023	17
17.91	24	----	----	----	----	0.0100	0.023	13
16.91	24	----	----	----	----	0.01 (n)	0.023	13
14.91	24	----	----	----	----	0.0154	0.023	16
7.91	24	----	----	----	----	0.0289	0.023	22
6.91	24	----	----	----	----	0.0289	0.023	22
2.91	30	5076	5073	247	0.0121	----	0.023	26

(a) See AHYMO modeling schematic and Drainage Basin Map
(b) Measurements based on Drainage Basin Map combined with available plan or as-built information
(c) Computed with Flow Master Program - See Appendix for printed output
(n) Not found in plans or as-builts - diameter measured in field, slope assumed at 1%

AP 30.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02980	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	70.80	ft^3/s

Results

Discharge	70.80	ft^3/s
Normal Depth	2.50	ft
Flow Area	4.91	ft^2
Wetted Perimeter	7.85	ft
Top Width	0.00	ft
Critical Depth	2.44	ft
Percent Full	100.0	%
Critical Slope	0.02654	ft/ft
Velocity	14.42	ft/s
Velocity Head	3.23	ft
Specific Energy	5.73	ft
Froude Number	0.00	
Maximum Discharge	76.16	ft^3/s
Discharge Full	70.80	ft^3/s
Slope Full	0.02980	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 31.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00550	ft/ft
Normal Depth	4.50	ft
Diameter	4.50	ft
Discharge	145.83	ft³/s

Results

Discharge	145.83	ft³/s
Normal Depth	4.50	ft
Flow Area	15.90	ft²
Wetted Perimeter	14.14	ft
Top Width	0.00	ft
Critical Depth	3.55	ft
Percent Full	100.0	%
Critical Slope	0.00593	ft/ft
Velocity	9.17	ft/s
Velocity Head	1.31	ft
Specific Energy	5.81	ft
Froude Number	0.00	
Maximum Discharge	156.87	ft³/s
Discharge Full	145.83	ft³/s
Slope Full	0.00550	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 32.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00470	ft/ft
Normal Depth	5.50	ft
Diameter	5.50	ft
Discharge	230.21	ft³/s

Results

Discharge	230.21	ft³/s
Normal Depth	5.50	ft
Flow Area	23.76	ft²
Wetted Perimeter	17.28	ft
Top Width	0.00	ft
Critical Depth	4.24	ft
Percent Full	100.0	%
Critical Slope	0.00530	ft/ft
Velocity	9.69	ft/s
Velocity Head	1.46	ft
Specific Energy	6.96	ft
Froude Number	0.00	
Maximum Discharge	247.63	ft³/s
Discharge Full	230.21	ft³/s
Slope Full	0.00470	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 28.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.00150	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	8.98	ft^3/s

Results

Discharge	8.98	ft^3/s
Normal Depth	2.50	ft
Flow Area	4.91	ft^2
Wetted Perimeter	7.85	ft
Top Width	0.00	ft
Critical Depth	1.00	ft
Percent Full	100.0	%
Critical Slope	0.01327	ft/ft
Velocity	1.83	ft/s
Velocity Head	0.05	ft
Specific Energy	2.55	ft
Froude Number	0.00	
Maximum Discharge	9.66	ft^3/s
Discharge Full	8.98	ft^3/s
Slope Full	0.00150	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 27.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.02000	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	32.78	ft³/s

Results

Discharge	32.78	ft³/s
Normal Depth	2.50	ft
Flow Area	4.91	ft²
Wetted Perimeter	7.85	ft
Top Width	0.00	ft
Critical Depth	1.95	ft
Percent Full	100.0	%
Critical Slope	0.02206	ft/ft
Velocity	6.68	ft/s
Velocity Head	0.69	ft
Specific Energy	3.19	ft
Froude Number	0.00	
Maximum Discharge	35.27	ft³/s
Discharge Full	32.78	ft³/s
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 26.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.02000	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	32.78	ft³/s

Results

Discharge		32.78	ft³/s
Normal Depth		2.50	ft
Flow Area		4.91	ft²
Wetted Perimeter		7.85	ft
Top Width		0.00	ft
Critical Depth		1.95	ft
Percent Full		100.0	%
Critical Slope		0.02206	ft/ft
Velocity		6.68	ft/s
Velocity Head		0.69	ft
Specific Energy		3.19	ft
Froude Number		0.00	
Maximum Discharge		35.27	ft³/s
Discharge Full		32.78	ft³/s
Slope Full		0.02000	ft/ft
Flow Type	SubCritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 21.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01670	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	16.52	ft³/s

Results

Discharge	16.52	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.47	ft
Percent Full	100.0	%
Critical Slope	0.02122	ft/ft
Velocity	5.26	ft/s
Velocity Head	0.43	ft
Specific Energy	2.43	ft
Froude Number	0.00	
Maximum Discharge	17.77	ft³/s
Discharge Full	16.52	ft³/s
Slope Full	0.01670	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 19.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula	
Solve For	Full Flow Capacity	

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft³/s

Results

Discharge	12.79	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft³/s
Discharge Full	12.79	ft³/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 18.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft^3/s

Results

Discharge	12.79	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft^3/s
Discharge Full	12.79	ft^3/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 25.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01670	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	16.52	ft^3/s

Results

Discharge	16.52	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.47	ft
Percent Full	100.0	%
Critical Slope	0.02122	ft/ft
Velocity	5.26	ft/s
Velocity Head	0.43	ft
Specific Energy	2.43	ft
Froude Number	0.00	
Maximum Discharge	17.77	ft^3/s
Discharge Full	16.52	ft^3/s
Slope Full	0.01670	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 24.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft³/s

Results

Discharge	12.79	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft³/s
Discharge Full	12.79	ft³/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 22.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft³/s

Results

Discharge	12.79	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft³/s
Discharge Full	12.79	ft³/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 20.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01670	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	16.52	ft³/s

Results

Discharge	16.52	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.47	ft
Percent Full	100.0	%
Critical Slope	0.02122	ft/ft
Velocity	5.26	ft/s
Velocity Head	0.43	ft
Specific Energy	2.43	ft
Froude Number	0.00	
Maximum Discharge	17.77	ft³/s
Discharge Full	16.52	ft³/s
Slope Full	0.01670	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 17.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft^3/s

Results

Discharge	12.79	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft^3/s
Discharge Full	12.79	ft^3/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 16.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula		
Solve For	Full Flow Capacity		

Input Data

Roughness Coefficient		0.023	
Channel Slope		0.01000	ft/ft
Normal Depth		2.00	ft
Diameter		2.00	ft
Discharge		12.79	ft³/s

Results

Discharge		12.79	ft³/s
Normal Depth		2.00	ft
Flow Area		3.14	ft²
Wetted Perimeter		6.28	ft
Top Width		0.00	ft
Critical Depth		1.29	ft
Percent Full		100.0	%
Critical Slope		0.01802	ft/ft
Velocity		4.07	ft/s
Velocity Head		0.26	ft
Specific Energy		2.26	ft
Froude Number		0.00	
Maximum Discharge		13.75	ft³/s
Discharge Full		12.79	ft³/s
Slope Full		0.01000	ft/ft
Flow Type	SubCritical		

GVF Input Data

Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	

GVF Output Data

Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Average End Depth Over Rise		0.00	%
Normal Depth Over Rise		100.00	%

AP 14.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01540	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	15.87	ft³/s

Results

Discharge	15.87	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.44	ft
Percent Full	100.0	%
Critical Slope	0.02057	ft/ft
Velocity	5.05	ft/s
Velocity Head	0.40	ft
Specific Energy	2.40	ft
Froude Number	0.00	
Maximum Discharge	17.07	ft³/s
Discharge Full	15.87	ft³/s
Slope Full	0.01540	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 7.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.02890	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	21.74	ft^3/s

Results

Discharge	21.74	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.67	ft
Percent Full	100.0	%
Critical Slope	0.02808	ft/ft
Velocity	6.92	ft/s
Velocity Head	0.74	ft
Specific Energy	2.74	ft
Froude Number	0.00	
Maximum Discharge	23.38	ft^3/s
Discharge Full	21.74	ft^3/s
Slope Full	0.02890	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 6.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.02890	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	21.74	ft³/s

Results

Discharge	21.74	ft³/s
Normal Depth	2.00	ft
Flow Area	3.14	ft²
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.67	ft
Percent Full	100.0	%
Critical Slope	0.02808	ft/ft
Velocity	6.92	ft/s
Velocity Head	0.74	ft
Specific Energy	2.74	ft
Froude Number	0.00	
Maximum Discharge	23.38	ft³/s
Discharge Full	21.74	ft³/s
Slope Full	0.02890	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 2.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01210	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	25.50	ft³/s

Results

Discharge		25.50	ft³/s
Normal Depth		2.50	ft
Flow Area		4.91	ft²
Wetted Perimeter		7.85	ft
Top Width		0.00	ft
Critical Depth		1.72	ft
Percent Full		100.0	%
Critical Slope		0.01804	ft/ft
Velocity		5.19	ft/s
Velocity Head		0.42	ft
Specific Energy		2.92	ft
Froude Number		0.00	
Maximum Discharge		27.43	ft³/s
Discharge Full		25.50	ft³/s
Slope Full		0.01210	ft/ft
Flow Type	SubCritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

EXISTING CULVERT CAPACITY

COMPUTED WITH

CULVERT MASTER

Culvert Calculator Report
Ex. 21" RCP from PND Pond

AP 4.91

DIVIDE 17 CFS

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	5,076.00 ft	Headwater Depth/Height	6.29
Computed Headwater Eleva	5,076.00 ft	Discharge	16.91 cfs
Inlet Control HW Elev.	5,070.75 ft	Tailwater Elevation	5,070.75 ft
Outlet Control HW Elev.	5,076.00 ft	Control Type	Outlet Control

Grades

Upstream Invert	5,065.00 ft	Downstream Invert	5,064.25 ft
Length	380.00 ft	Constructed Slope	0.001974 ft/ft

Hydraulic Profile

Profile	PressureProfile	Depth, Downstream	6.50 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	1.51 ft
Velocity Downstream	7.03 ft/s	Critical Slope	0.010513 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.75 ft
Section Size	21 inch	Rise	1.75 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,076.00 ft	Upstream Velocity Head	0.77 ft
Ke	0.20	Entrance Loss	0.15 ft

Inlet Control Properties

Inlet Control HW Elev.	5,070.75 ft	Flow Control	Submerged
Inlet Type	Groove end w/headwall	Area Full	2.4 ft²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Culvert Calculator Report
Ex. 30" CMP at N. Div. Chan.

AP 1.96

DIVIDE

48 CFS

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	5,071.50 ft	Headwater Depth/Height	2.60
Computed Headwater Elev:	5,071.50 ft	Discharge	47.54 cfs
Inlet Control HW Elev.	5,070.26 ft	Tailwater Elevation	5,066.75 ft
Outlet Control HW Elev.	5,071.50 ft	Control Type	Outlet Control

Grades

Upstream Invert	5,065.00 ft	Downstream Invert	5,064.25 ft
Length	56.00 ft	Constructed Slope	0.013393 ft/ft

Hydraulic Profile

Profile	PressureProfile	Depth, Downstream	2.50 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	2.27 ft
Velocity Downstream	9.68 ft/s	Critical Slope	0.040089 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	2.50 ft
Section Size	30 inch	Rise	2.50 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,071.50 ft	Upstream Velocity Head	1.46 ft
Ke	0.50	Entrance Loss	0.73 ft

Inlet Control Properties

Inlet Control HW Elev.	5,070.26 ft	Flow Control	Submerged
Inlet Type	Headwall	Area Full	4.9 ft²
K	0.00780	HDS 5 Chart	2
M	2.00000	HDS 5 Scale	1
C	0.03790	Equation Form	1
Y	0.69000		

Culvert Calculator Report
Ex. 49" x 33" arch pipe - outfall of ex. 42" CMP under PDN

AP 12.9/

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	5,077.72 ft	Headwater Depth/Height	1.33
Computed Headwater Elev:	5,077.72 ft	Discharge	35.19 cfs
Inlet Control HW Elev.	5,076.64 ft	Tailwater Elevation	5,072.70 ft
Outlet Control HW Elev.	5,077.72 ft	Control Type	Outlet Control

ASSUME 35 CFS

Grades

Upstream Invert	5,074.22 ft	Downstream Invert	5,069.95 ft
Length	840.00 ft	Constructed Slope	0.005083 ft/ft

Hydraulic Profile

Profile	PressureProfile	Depth, Downstream	2.75 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	1.59 ft
Velocity Downstream	4.14 ft/s	Critical Slope	0.012524 ft/ft

Section

Section Shape	Horizontal Ellipse	Mannings Coefficient	0.024
Section Material	Concrete	Span	4.13 ft
Section Size	32x50 inch	Rise	2.63 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,077.72 ft	Upstream Velocity Head	0.27 ft
Ke	0.50	Entrance Loss	0.13 ft

Inlet Control Properties

Inlet Control HW Elev.	5,076.64 ft	Flow Control	Unsubmerged
Inlet Type: Square edge with headwall (horizontal ellipse)		Area Full	8.5 ft²
K	0.01000	HDS 5 Chart	29
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report
Ex. 42" CMP under Paseo Del Norte

Solve For: Discharge

AP 12.91

Culvert Summary

Allowable HW Elevation	5,082.00 ft	Headwater Depth/Height	1.86
Computed Headwater Elev:	5,082.00 ft	Discharge	100.66 cfs
Inlet Control HW Elev.	5,082.00 ft	Tailwater Elevation	5,077.22 ft
Outlet Control HW Elev.	5,081.52 ft	Control Type	Inlet Control

ASSUME THE 49" x 33" ARCH PIPE CONTROLS

Grades

Upstream Invert	5,075.50 ft	Downstream Invert	5,074.22 ft
Length	96.00 ft	Constructed Slope	0.036458 ft/ft

Hydraulic Profile

Profile	S2	Depth, Downstream	2.77 ft
Slope Type	Steep	Normal Depth	2.77 ft
Flow Regime	Supercritical	Critical Depth	3.08 ft
Velocity Downstream	12.32 ft/s	Critical Slope	0.030745 ft/ft

ASSUME 35 cfs FOR AP12.91

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	3.50 ft
Section Size	42 inch	Rise	3.50 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,081.52 ft	Upstream Velocity Head	1.96 ft
Ke	0.50	Entrance Loss	0.98 ft

Inlet Control Properties

Inlet Control HW Elev.	5,082.00 ft	Flow Control	Submerged
Inlet Type	Headwall	Area Full	9.6 ft²
K	0.00780	HDS 5 Chart	2
M	2.00000	HDS 5 Scale	1
C	0.03790	Equation Form	1
Y	0.69000		

PROJECT EL PUEBLO RD SHEET NO. 1 OF 2
SUBJECT EXISTING CULVERT HYDRAULICS PROJECT NO.
BY PS DATE 12/1/06 CHECKED BY DATE / /

PURPOSE – BASED ON FIELD MEASURMENTS WITH A TAPE MEASURE FOR MAX. HEADWATER DEPTH ON CULVERTS, COMPUTE MAX. CULVERT CAPACITIES WITH FOLLOWING ASSUMPTIONS.

ASSUMPTIONS –

1. ASSUME ELEV.'A FROM CONTOUR MAP
2. ASSUME TAILWATER DEPTH IS AT SOFFIT
3. CMP "n" = 0.024
4. RCP "n" = 0.013
5. MEASURE LENGTHS FROM DRAINAGE BASIN MAP

CULVERTS AND ANALYSIS POINTS AND DATA

AP 12.91 = EX. 42" CMP UNDER PDN

SEE PAGE 2

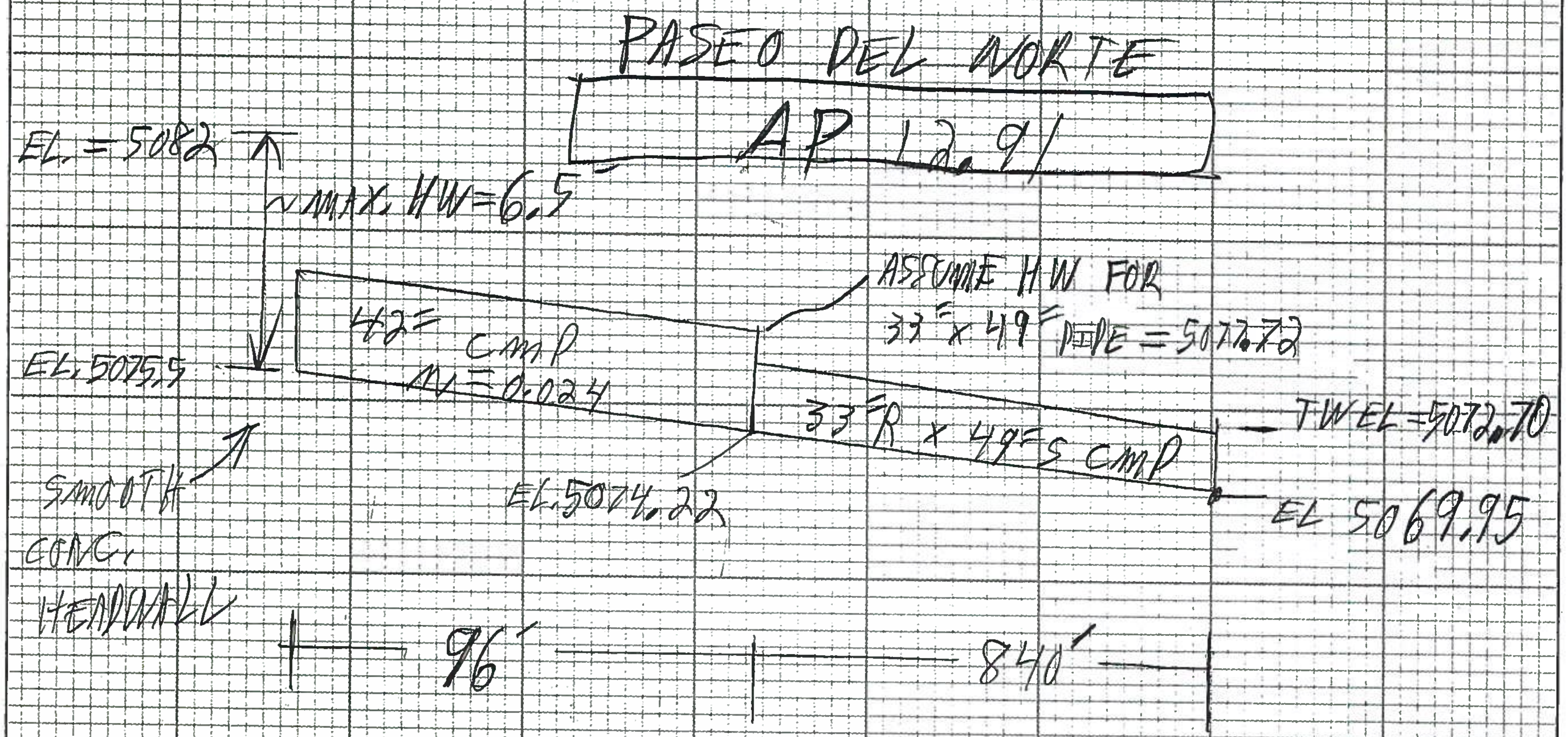
AM

S = 0.0133 PDN PLANS
96

Smith Engineering Company
2201 San Pedro NE Bldg. #4, Suite 200 Albuquerque, New Mexico 87110 505/884-0700

T840 49"S × 33"R and ... S = 0.0051

PROJECT EL PUEBLO RD
SUBJECT EXIST. CULVER HYDRAULICS
BY ____ DATE / / CHECKED BY ____ DA / /
SHEET NO. 2
PROJECT NO.



METHOD – MODEL EACH PIPE SEGMENT WITH CULVERTMASTER

★ CHOOSE LOWEST CAPACITY

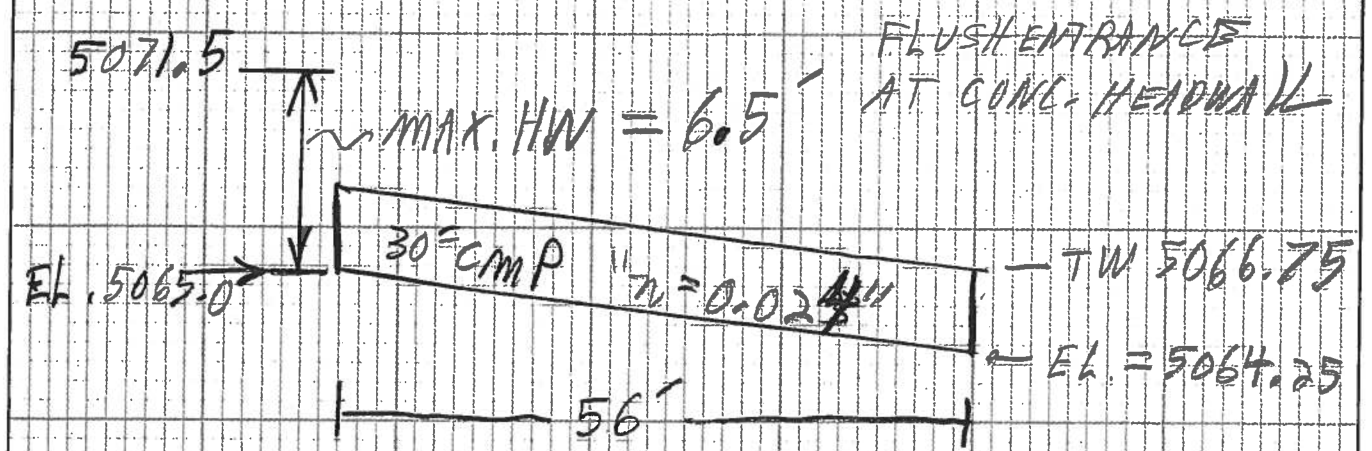
Smith Engineering Company
6400 Uptown Boulevard, N.E. Suite 500E Albuquerque, New Mexico 87110 505/884-0

PROJECT ______ SHEET NO. 2 OF ______

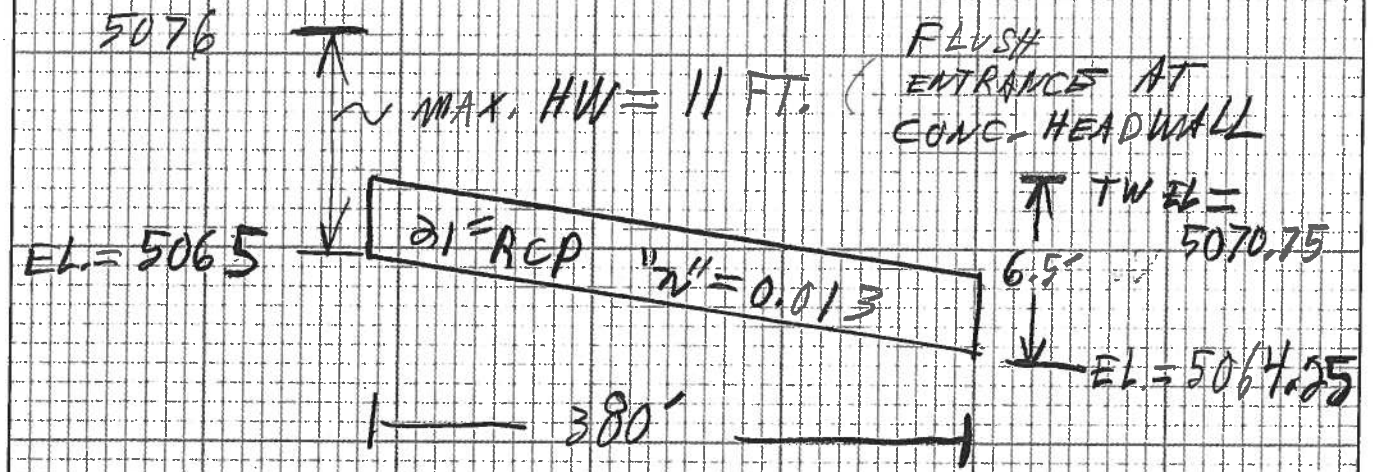
SUBJECT EXISTING CULVERT HYDRAULICS PROJECT NO. ______

BY PS DATE 12/1/06 CHECKED BY ______ DATE / /

AP 1.96 = EX 30" CMP AT N. DIV. CHAN.



AP 4.91 = PNM 21" RCP (POND TO 30" CMP AT N. DIV. CHAN.)



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