DRAINAGE REPORT

CASTLE PEAK
SENIOR CARE COMMUNITY
EAGLE RANCH

EAGLE, COLORADO

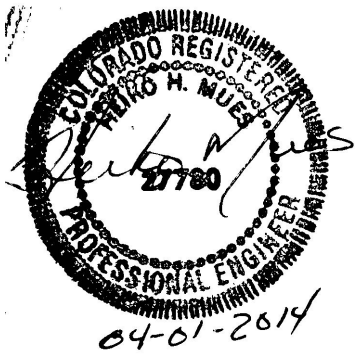
APRIL 2014

DRAINAGE REPORT

CASTLE PEAK
SENIOR CARE COMMUNITY
EAGLE RANCH

EAGLE, COLORADO

APRIL 2014



Prepared for: Senior Care Land Company LLC ("SCLC")
c/o Diane H. Mauriello
Assistant County Attorney
500 Broadway
Post Office Box 850
Eagle, CO 81631

Prepared by: Alpine Engineering, Inc.
P.O. Box 97
Edwards, Co 81632
(970) 926-3373

TABLE OF CONTENTS

I. Vicinity Map

II. Introduction 1

III. Peak Flow Determination 1

IV. Floodplain Determination 2

V. Detention 2

VI. Water Quality 2

VII. Inlets/Storm Sewer Design 2

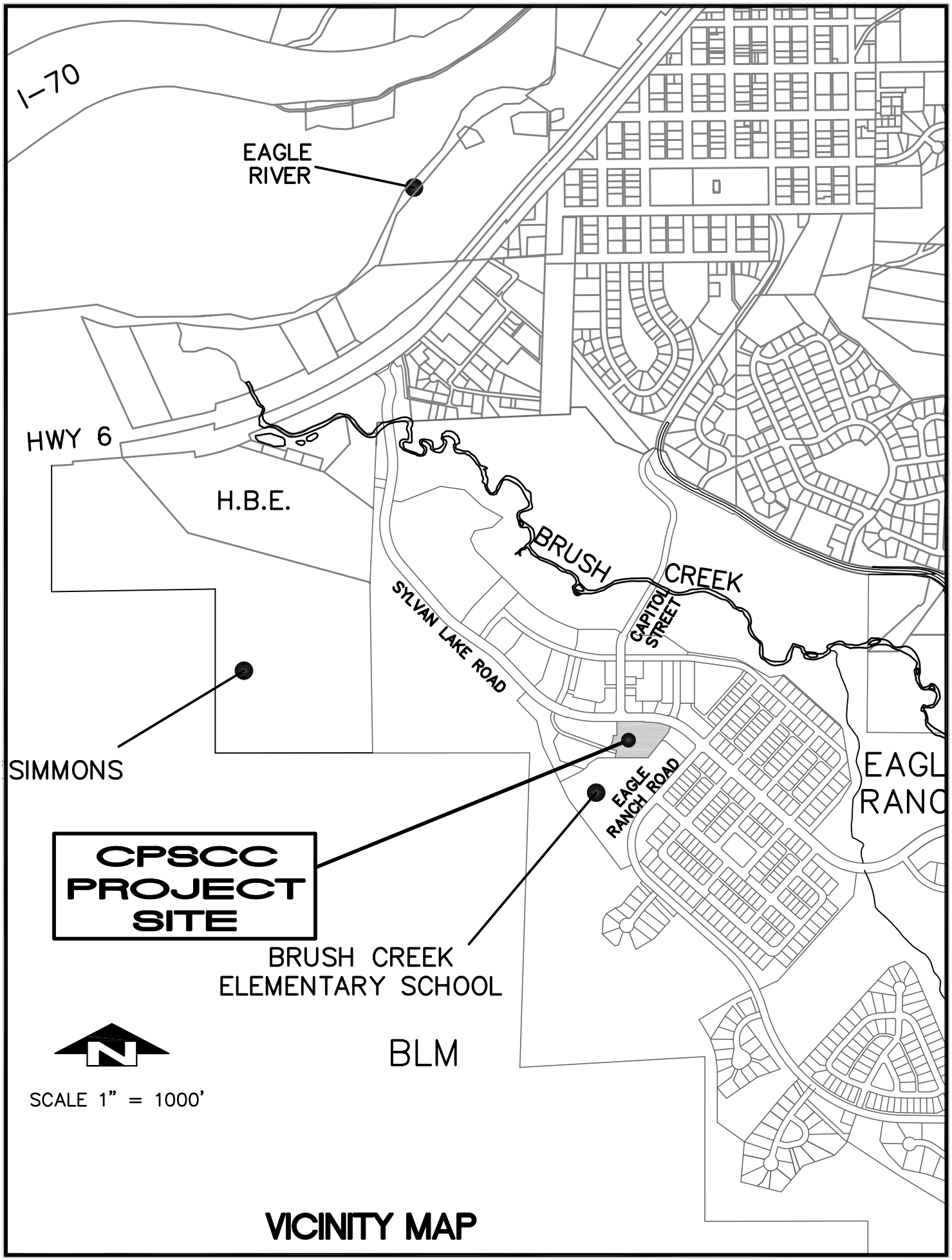
VIII. Summary 3

IX. Appendices:

Appendix A – Peak Flow Determination
Appendix B – Hydraulic Gradient Calculations and Profiles
Appendix C – Inlet Calculations

X. Maps:

Sheet 1 – On-site Drainage Area Map 1” = 30’
Sheet 2 – Off-Site Drainage Area Map 1” = 50’
Sheet 3 – Overall Drainage Area Map 1” = 100’



VICINITY MAP

II. INTRODUCTION

The Castle Peak Senior Care Community (CPSCC) at Eagle Ranch project is located in the south of the Town of Eagle in Eagle County, Colorado. The Eagle Ranch site was historically used as farmland with sagebrush covered hills on the south side and Brush Creek to the north. The soils on-site are classified as the Yamo series according to the USDA – SCS Soil Survey of Aspen – Gypsum Area, Colorado, parts of Eagle, Garfield and Pitkin Counties. Yamo series consists of deep, well-drained soils on fans and toe slopes. This land was previously flood irrigated. Existing on the Eagle Ranch site is an 18-hole golf course surrounded by residential and commercial development pods and open space. This report addresses drainage issues for the proposed CPSCC development which is part of Eagle Ranch, Filing 26. CPSCC has relatively flat topography with slopes generally in the 2-4% range. CPSCC storm sewer will tie into the public improvements previously constructed with Filings 1, 10 and 11. The proposed future development consists of an assisted living facility and a skilled nursing facility and associated parking. Off-site drainage enters the site mainly from the south and runs through the site primarily from south to north. A ditch at the toe of the sagebrush covered slopes to the south diverts the majority of the off-site drainage area to the west.

III. PEAK FLOW DETERMINATION

The site is proposed to have inlets, storm sewer, curb and gutter and concrete pans to transport drainage through and off the site. The drainage areas to each inlet are relatively small and therefore the “Rational Method” was selected to determine flow rates to each inlet as was done for the inlet/curb and gutter sections in Filing 1 & 2.

"C" values (Runoff Coefficients) were taken from Table 3-1 "Recommended Runoff Coefficients and Percent Impervious" from the Urban Drainage and Flood Control District Manual. The proposed culverts were designed using the proposed land use for each tributary drainage area. The rainfall intensity was taken from a chart in the Master Drainage Study for the Town of Avon, Colorado. With the isopluvials prepared by NOAA being higher in Avon than in Eagle, this should be somewhat conservative.

IV. FLOODPLAIN DETERMINATION

The floodplain for Brush Creek and the Eagle River do not impact the CPSCC site.

V. DETENTION

Detention for CPSCC is provided by the Eagle Ranch Regional Detention Ponds 3, 4 and 5. The drainage areas that the ponds were designed for are similar to the final areas determined in this report.

VI. WATER QUALITY

Water quality for CPSCC will be provided by the Eagle Ranch Regional Detention Ponds 3, 4 and 5. These ponds have a wet permanent pool for permanent water quality controls.

VII. INLETS/STORM SEWER DESIGN

Storm sewer pipes and inlets have been designed using the "Rational Method" for the 10-year frequency storm as described in the Peak Flow Determination section of this

report. Runoff coefficients and flows are tabulated in Tables 1, 2 and 3 in Appendix A. Hydraulic gradient calculations and profiles may be found in Appendix B. The hydraulic gradient and pipe calculations were performed using Hydraflow Storm Sewers 2008 using the flows calculated in Appendix A. Inlet calculations are also performed in the Hydraflow calculations and maybe found in Appendix C. The storm sewer is designed for the 10-year storm and during a greater frequency storm event the inlets may not capture all of the runoff. Stormwater that is not captured by inlets will be carried by the roadways away from and off the site.

VIII. SUMMARY

All inlets and pipes have been designed for the appropriate design storm. Curb inlets have been designed for the curb and gutter areas of the development. Stormwater detention in existing ponds will attenuate flows from developed to historic levels and provide stormwater quality for the development.

APPENDIX A

PEAK FLOW DETERMINATION

TABLE 1

CCRC Rational Method RCN

DEVELOPED 100-YEAR WEIGHTED RUNOFF COEFFICIENTS
STUDY POINT #E

TYPE OF AREA		10-YEAR RCN	100-YEAR RCN	
PAVEMENT		0.90	0.93	
ROOFS		0.90	0.90	
GRASS		0.25	0.50	

BASIN #	TOTAL AREA (acres)	PAVEMENT (acres)	ROOFS (acres)	GRASS (acres)	10-YR RUNOFF COEFF.	100-YR RUNOFF COEFF.
ID1=E1	1.00	0.23	0.00	0.77	0.40	0.60
E2	0.63	0.06	0.00	0.57	0.31	0.54
E2a	0.11	0.07	0.00	0.04	0.66	0.77
E3	0.79	0.17	0.00	0.62	0.39	0.59
E3a	0.20	0.16	0.00	0.04	0.77	0.84
E3b	0.02	0.01	0.00	0.01	0.58	0.72
E3c	0.08	0.07	0.00	0.01	0.82	0.88
E4	1.72	0.60	0.74	0.38	0.76	0.82
TOTAL	4.55	1.37	0.74	2.44		4.55

TABLE 1

CCRC Rational Method RCN

RATIONAL METHOD SUMMARY
STUDY POINT #E
Q = C * I * A

BASIN	AREA (acres)	C_{10}	I_{10}	Q_{10} (cfs)	C_{100}	I_{100}	Q_{100} (cfs)
ID1=E1	1.00	0.40	2.70	1.08	0.60	4.30	2.58
E2	0.63	0.31	2.70	0.53	0.54	4.30	1.47
E2a	0.11	0.66	2.70	0.20	0.77	4.30	0.37
E3	0.79	0.39	2.70	0.83	0.59	4.30	2.01
E3a	0.20	0.77	2.70	0.42	0.84	4.30	0.73
E3b	0.02	0.58	2.70	0.03	0.72	4.30	0.06
E3c	0.08	0.82	2.70	0.18	0.88	4.30	0.30
E4	1.72	0.76	2.70	3.51	0.82	4.30	6.08

TABLE 2

CCRC Rational Method RCN

DEVELOPED 100-YEAR WEIGHTED RUNOFF COEFFICIENTS
STUDY POINT #N

TYPE OF AREA		10-YEAR RCN	100-YEAR RCN	
PAVEMENT		0.90	0.93	
ROOFS		0.90	0.90	
GRASS		0.25	0.50	

BASIN #	TOTAL AREA (acres)	PAVEMENT (acres)	ROOFS (acres)	GRASS (acres)	10-YR RUNOFF COEFF.	100-YR RUNOFF COEFF.
IC1=N1	0.65	0.48	0.00	0.17	0.73	0.82
N2	0.38	0.00	0.38	0.00	0.90	0.90
N3	0.07	0.05	0.00	0.02	0.71	0.81
N3A	0.27	0.00	0.27	0.00	0.90	0.90
TOTAL	1.37	0.53	0.65	0.19		1.37

TABLE 2

CCRC Rational Method RCN

RATIONAL METHOD SUMMARY
STUDY POINT #N
Q = C * I * A

BASIN	AREA (acres)	C_{10}	I_{10}	Q_{10} (cfs)	C_{100}	I_{100}	Q_{100} (cfs)
IC1=N1	0.65	0.73	2.70	1.28	0.82	4.30	2.29
N2	0.38	0.90	2.70	0.92	0.90	4.30	1.47
N3	0.07	0.71	2.70	0.14	0.81	4.30	0.24
N3A	0.27	0.90	2.70	0.66	0.90	4.30	1.04

TABLE 3

CCRC Rational Method RCN

DEVELOPED 100-YEAR WEIGHTED RUNOFF COEFFICIENTS
STUDY POINT #S

TYPE OF AREA		10-YEAR RCN	100-YEAR RCN	
PAVEMENT		0.90	0.93	
ROOFS		0.90	0.90	
GRASS		0.25	0.50	

BASIN #	TOTAL AREA (acres)	PAVEMENT (acres)	ROOFS (acres)	GRASS (acres)	10-YR RUNOFF COEFF.	100-YR RUNOFF COEFF.
S1	0.00	0.00	0.00	0.00		
S2	0.25	0.22	0.00	0.03	0.82	0.88
S3	0.17	0.15	0.00	0.02	0.82	0.88
S4	0.02	0.01	0.00	0.01	0.58	0.72
S4a	0.02	0.01	0.00	0.01	0.58	0.72
S5	0.00	0.00	0.00	0.00		
S5a	0.07	0.07	0.00	0.00	0.90	0.93
S6	0.11	0.00	0.07	0.04	0.66	0.75
S7	0.09	0.00	0.06	0.03	0.68	0.77
TOTAL	0.73	0.46	0.13	0.14		0.73

TABLE 3

CCRC Rational Method RCN

RATIONAL METHOD SUMMARY
STUDY POINT #S
Q = C * I * A

BASIN	AREA (acres)	C_{10}	I_{10}	Q_{10} (cfs)	C_{100}	I_{100}	Q_{100} (cfs)
S1	0.00	0.00	2.70	0.00	0.00	4.30	0.00
S2	0.25	0.82	2.70	0.55	0.88	4.30	0.94
S3	0.17	0.82	2.70	0.38	0.88	4.30	0.64
S4	0.02	0.58	2.70	0.03	0.72	4.30	0.06
S4a	0.02	0.58	2.70	0.03	0.72	4.30	0.06
S5	0.00	0.00	2.70	0.00	0.00	4.30	0.00
S5a	0.07	0.90	2.70	0.17	0.93	4.30	0.28
S6	0.11	0.66	2.70	0.20	0.75	4.30	0.36
S7	0.09	0.68	2.70	0.17	0.77	4.30	0.30

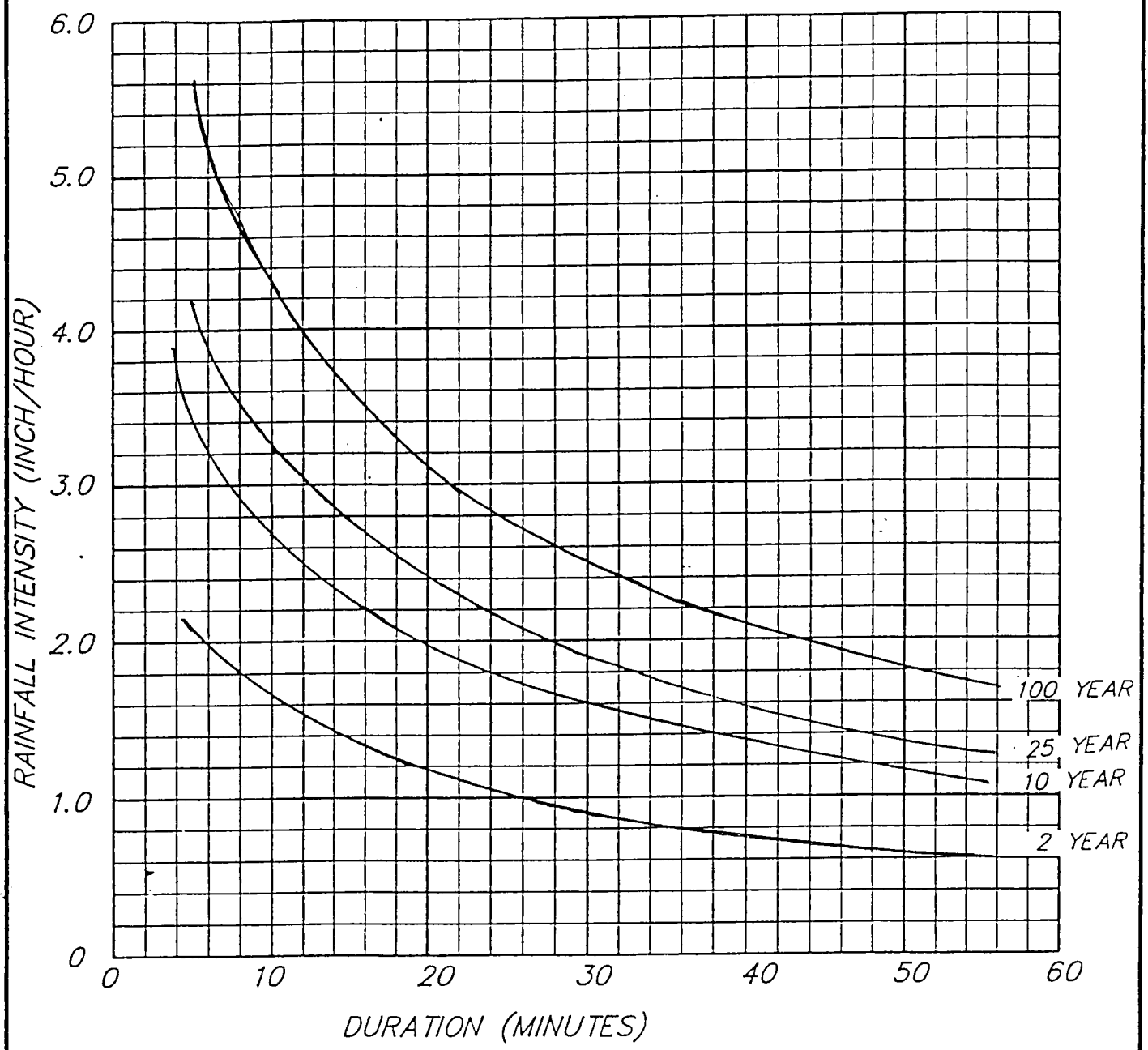
TABLE 3-1 (42)

RECOMMENDED RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY 2	5	10	100
Business:					
Commercial Areas	95	.87	.87	.88	.89
Neighborhood Areas	70	.60	.65	.70	.80
Residential:					
Single-Family	*	.40	.45	.50	.60
Multi-Unit (detached)	50	.45	.50	.60	.70
Multi-Unit (attached)	70	.60	.65	.70	.80
1/2 Acre Lot or Larger	*	.30	.35	.40	.60
Apartments	70	.65	.70	.70	.80
Industrial:					
Light Areas	80	.71	.72	.76	.82
Heavy Acres	90	.80	.80	.85	.90
Parks, Cemetaries:	7	.10	.18	.25	.45
Playgrounds:	13	.15	.20	.30	.50
Schools:	50	.45	.50	.60	.70
Railroad Yard Areas	20	.20	.25	.35	.45
Undeveloped Areas:					
Historic Flow Analysis- Greenbelts, Agricultural	2	(See "Lawns")			
Offsite Flow Analysis (when land use not defined)	45	.43	.47	.55	.65
Streets:					
Paved	100	.87	.88	.90	.93
Gravel (Packed)	40	.40	.45	.50	.60
Drive and Walks:	96	.87	.87	.88	.89
Roofs:	90	.80	.85	.90	.90
Lawns, Sandy Soil	0	.00	.01	.05	.20
Lawns, Clayey Soil	0	.05	.15	.25	.50

NOTE: These Rational Formula coefficients may not be valid for large basins.

*See Figure 2-1 for percent impervious.



RAINFALL INTENSITY- DURATION CURVE FOR AVON

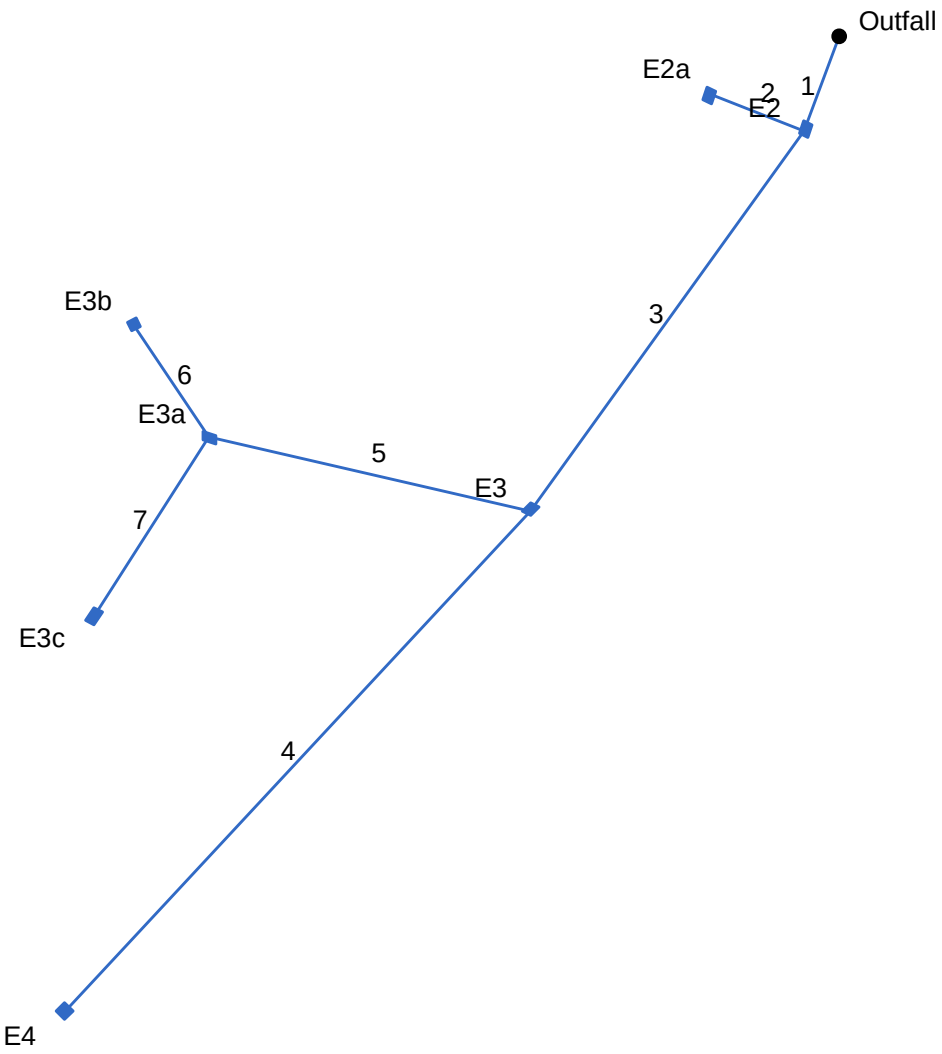
MASTER DRAINAGE STUDY
TOWN OF AVON
EAGLE COUNTY, COLORADO

DRAWN BY: MLM	SCALE: ---	DATE: 5/1/94	PROJECT NO.: 93026E
			DRAWING NO.: 3-1

APPENDIX B

HYDRAULIC GRADIENT CALCULATIONS AND PROFILES

Hydraflow Storm Sewers Plan



Project File: ALIGN-E.stm	Number of lines: 7	Date: 03-28-2014

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	24	110	Comb	0.53	0.00	0.00	10.0	6609.20	0.96	6609.43	18	Cir	0.010	1.58	6613.76	E1-E2
2	1	24	91	Comb	0.20	0.00	0.00	10.0	6609.53	1.98	6610.00	12	Cir	0.010	1.00	6613.76	E2-E2a
3	1	112	15	Comb	0.83	0.00	0.00	10.0	6609.53	0.96	6610.60	18	Cir	0.010	1.40	6615.00	E2-E3
4	3	163	7	Grate	3.51	0.00	0.00	10.0	6610.80	1.49	6613.23	18	Cir	0.010	1.00	6618.50	E3-E4
5	3	79	67	Grate	0.42	0.00	0.00	10.0	6610.80	0.97	6611.56	12	Cir	0.013	1.43	6614.40	E3-E3a
6	5	32	43	Grate	0.03	0.00	0.00	10.0	6611.76	0.96	6612.07	12	Cir	0.010	1.00	6614.71	E3a-E3b
7	5	50	-70	Grate	0.18	0.00	0.00	10.0	6611.76	0.98	6612.25	12	Cir	0.013	1.00	6615.60	E3A-E3c

Project File: ALIGN-E.stm | Number of lines: 7 | Date: 03-28-2014

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	E1-E2	5.70	18	Cir	24	6609.20	6609.43	0.957	6610.11	6610.34	n/a	6610.34	End	Combination
2	E2-E2a	0.20	12	Cir	24	6609.53	6610.00	1.981	6610.73	6610.73	0.00	6610.73	1	Combination
3	E2-E3	4.97	18	Cir	112	6609.53	6610.60	0.959	6610.62	6611.45	n/a	6611.45 j	1	Combination
4	E3-E4	3.51	18	Cir	163	6610.80	6613.23	1.493	6611.75	6613.95	n/a	6613.95 j	3	Grate
5	E3-E3a	0.63	12	Cir	79	6610.80	6611.56	0.967	6611.80	6611.90	n/a	6612.06 j	3	Grate
6	E3a-E3b	0.03	12	Cir	32	6611.76	6612.07	0.957	6612.15	6612.16	0.01	6612.17	5	Grate
7	E3A-E3c	0.18	12	Cir	50	6611.76	6612.25	0.977	6612.17	6612.43	n/a	6612.43 j	5	Grate

Project File: ALIGN-E.stm | Number of lines: 7 | Run Date: 03-28-2014

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Hydraulic Grade Line Computations

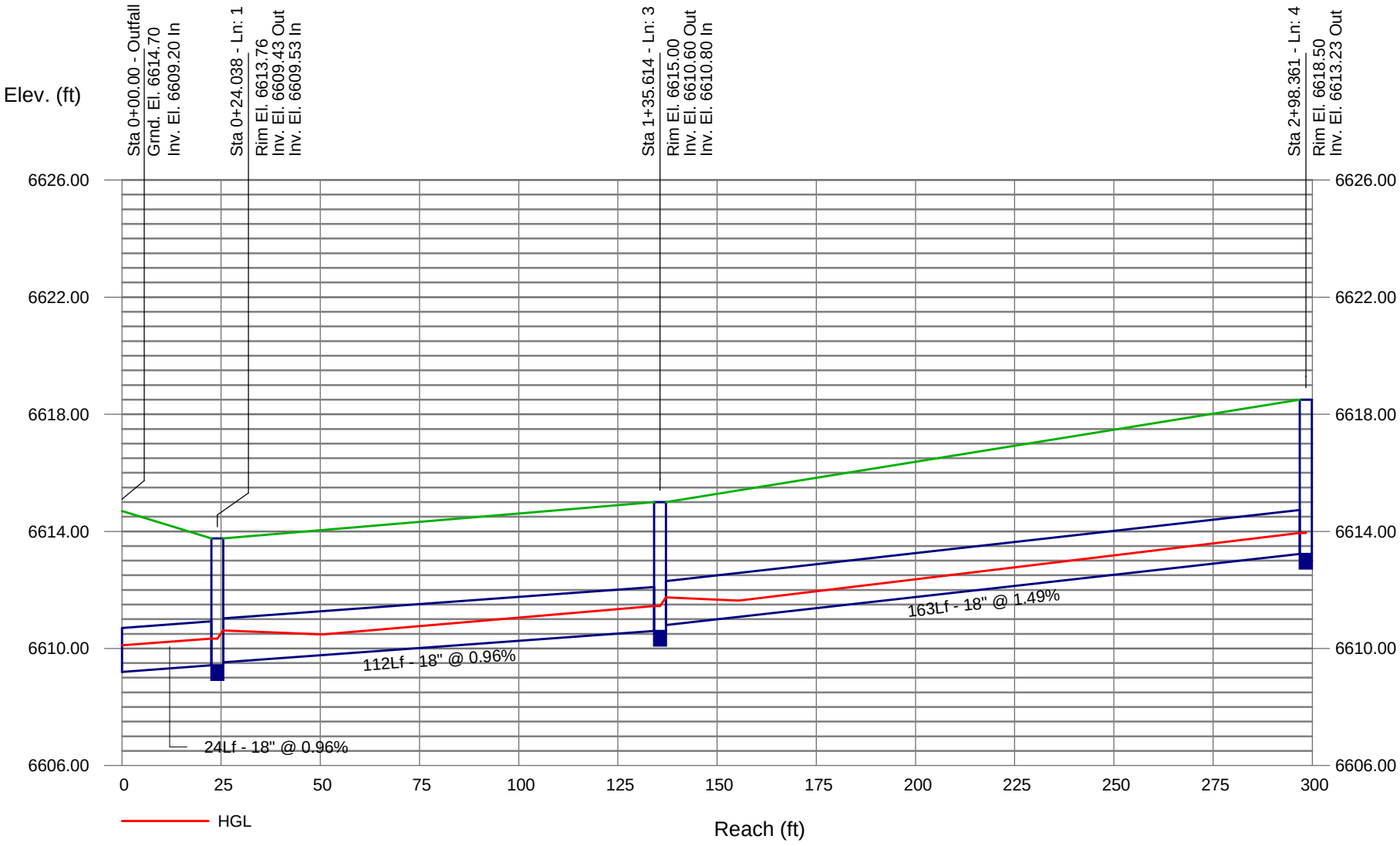
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	18	5.70	6609.20	6610.11	0.91	1.12	5.07	0.40	6610.51	0.372	24	6609.43	6610.34	0.91**	1.12	5.07	0.40	6610.74	0.372	0.372	n/a	1.58	n/a
2	12	0.20	6609.53	6610.73	1.00	0.79	0.25	0.00	6610.73	0.002	24	6610.00	6610.73	0.73	0.62	0.33	0.00	6610.73	0.002	0.002	0.001	1.00	0.00
3	18	4.97	6609.53	6610.62	1.09	1.37	3.62	0.20	6610.82	0.173	112	6610.60	6611.45 j	0.85**	1.03	4.80	0.36	6611.81	0.350	0.261	n/a	1.40	0.50
4	18	3.51	6610.80	6611.75	0.95	1.18	2.98	0.14	6611.89	0.125	163	6613.23	6613.95 j	0.72**	0.83	4.22	0.28	6614.22	0.311	0.218	n/a	1.00	0.28
5	12	0.63	6610.80	6611.80	1.00	0.79	0.80	0.01	6611.81	0.031	79	6611.56	6611.90 j	0.34**	0.24	2.64	0.11	6612.01	0.485	0.258	0.203	1.43	0.15
6	12	0.03	6611.76	6612.15	0.38	0.28	0.11	0.00	6612.15	0.000	32	6612.07	6612.16	0.09	0.03	0.88	0.01	6612.17	0.162	0.081	0.026	1.00	0.01
7	12	0.18	6611.76	6612.17	0.41	0.30	0.60	0.01	6612.17	0.021	50	6612.25	6612.43 j	0.18**	0.10	1.87	0.05	6612.49	0.512	0.267	n/a	1.00	0.05

Project File: ALIGN-E.stm | Number of lines: 7 | Run Date: 03-28-2014

Notes: ; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

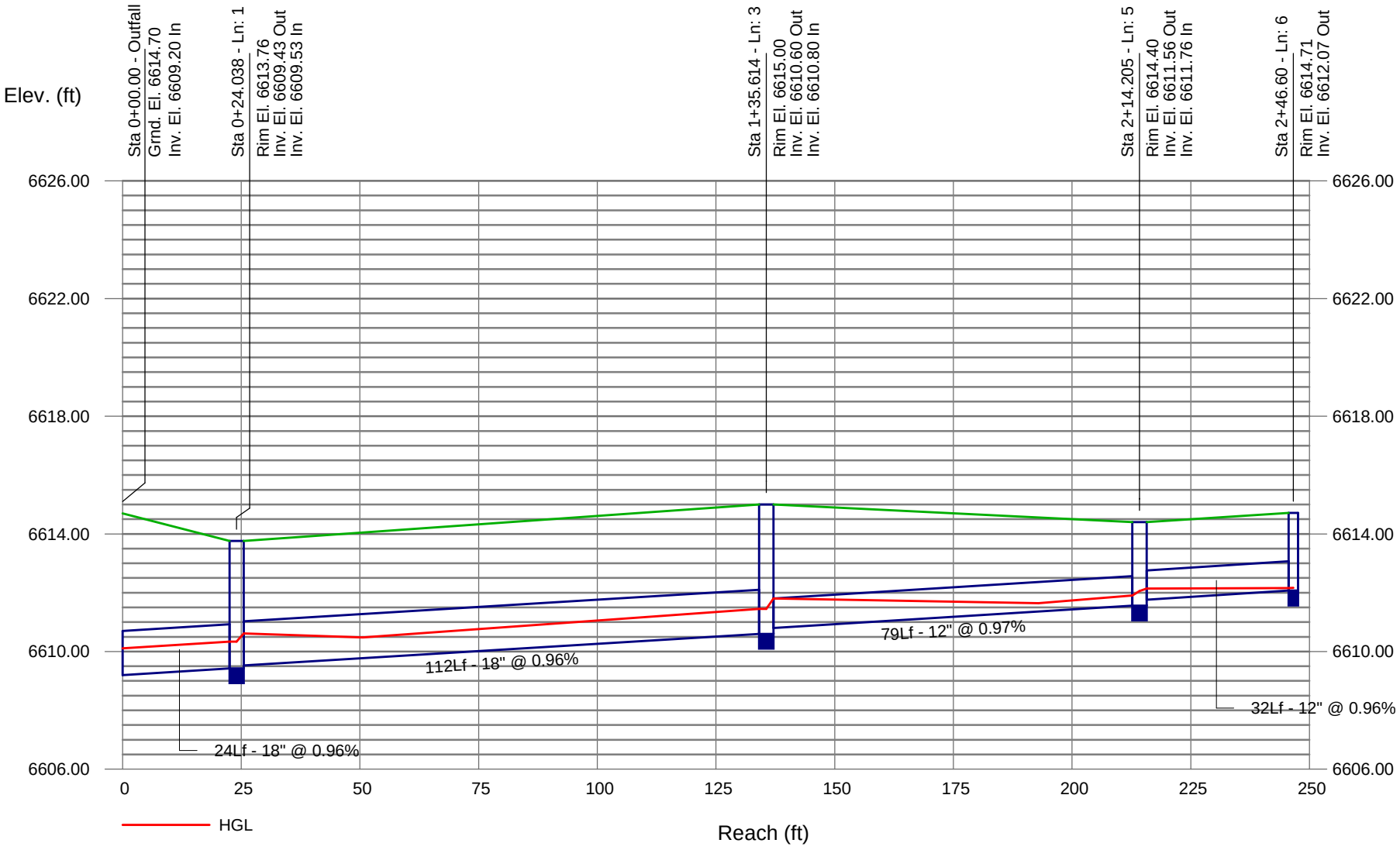
Storm Sewer Profile

Proj. file: ALIGN-E.stm



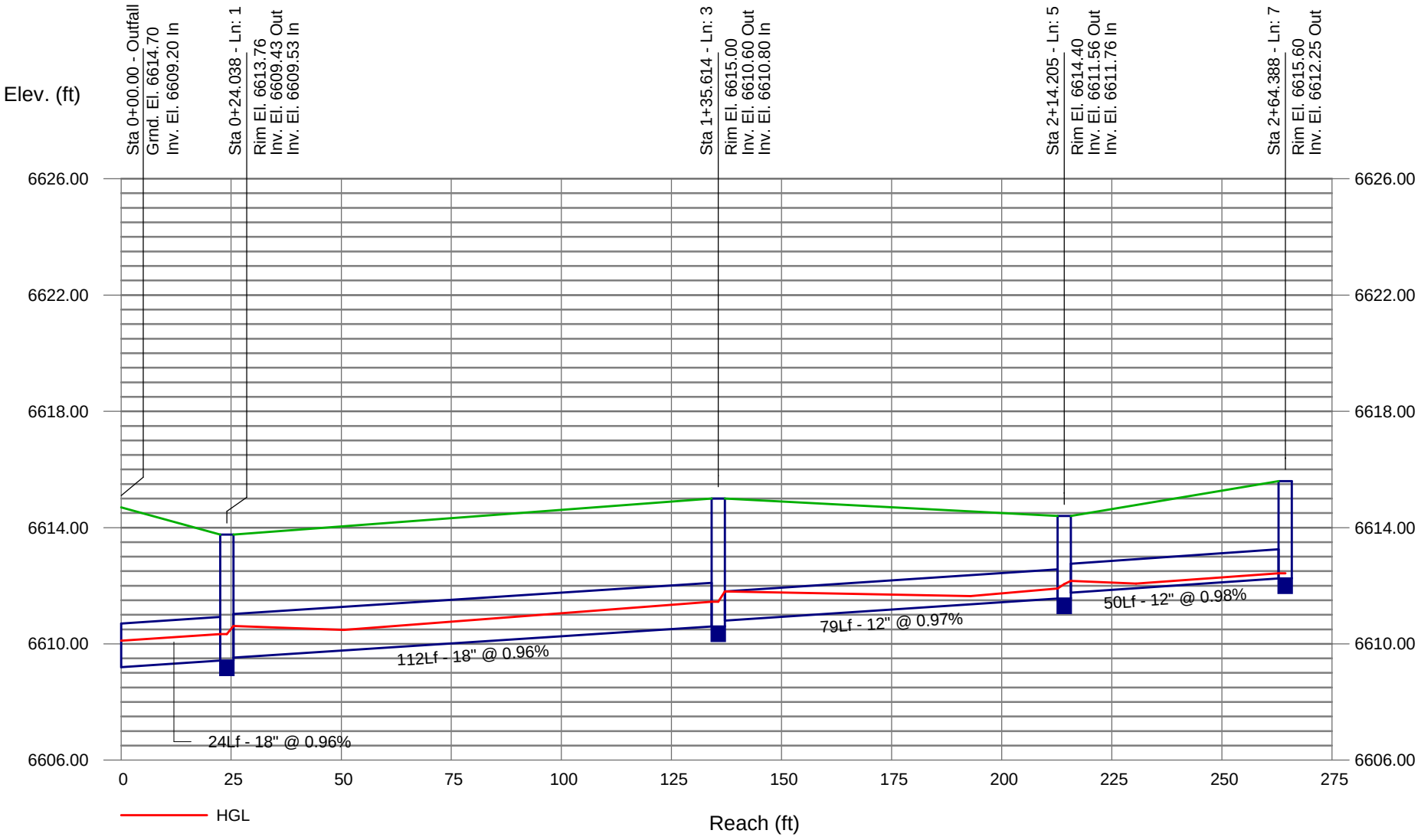
Storm Sewer Profile

Proj. file: ALIGN-E.stm

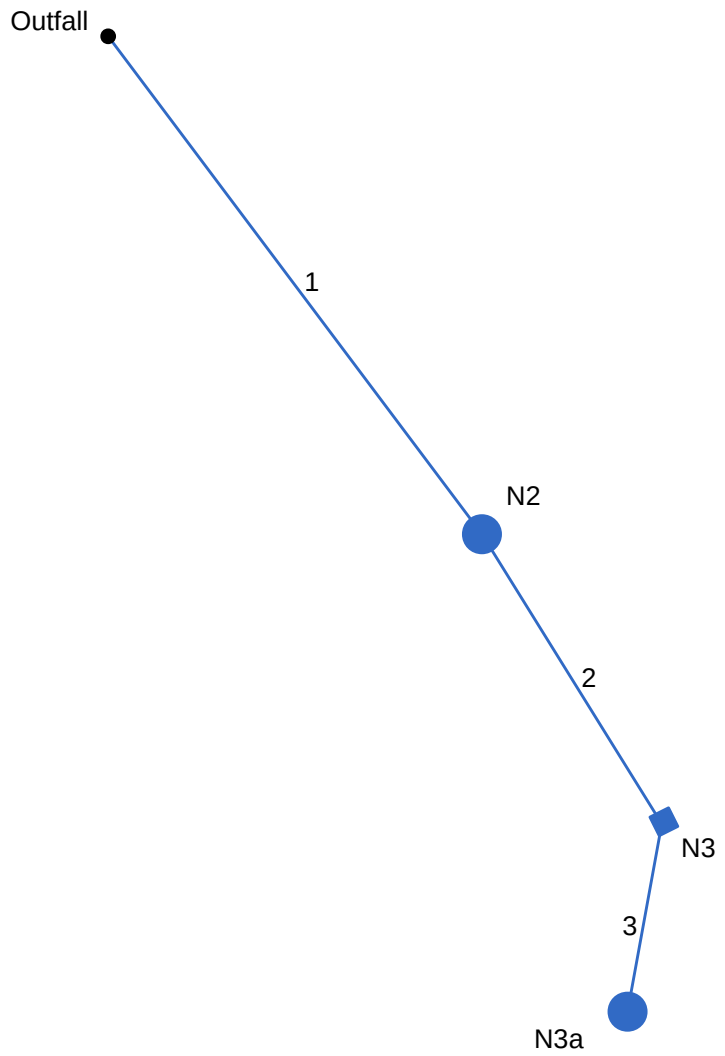


Storm Sewer Profile

Proj. file: ALIGN-E.stm



Hydraflow Storm Sewers Plan



Project File: ALIGN-N.stm	Number of lines: 3	Date: 03-28-2014

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	67	53	MH	0.92	0.00	0.00	10.0	6603.50	2.55	6605.21	12	Cir	0.010	0.15	6613.50	N1-N2
2	1	37	5	Grate	0.14	0.00	0.00	10.0	6606.79	8.44	6609.89	12	Cir	0.010	1.08	6614.17	N2-N3
3	2	21	42	MH	0.66	0.00	0.00	10.0	6610.09	2.04	6610.51	12	Cir	0.010	1.00	6615.00	N3-N3a

Project File: ALIGN-N.stm | Number of lines: 3 | Date: 03-28-2014

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	N1-N2	1.72	12	Cir	67	6603.50	6605.21	2.547	6604.06	6605.77	n/a	6605.77 j	End	Manhole
2	N2-N3	0.80	12	Cir	37	6606.79	6609.89	8.437	6607.17	6610.27	0.14	6610.27	1	Grate
3	N3-N3a	0.66	12	Cir	21	6610.09	6610.51	2.038	6610.44	6610.85	0.12	6610.85	2	Manhole

Project File: ALIGN-N.stm | Number of lines: 3 | Run Date: 03-28-2014

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Hydraulic Grade Line Computations

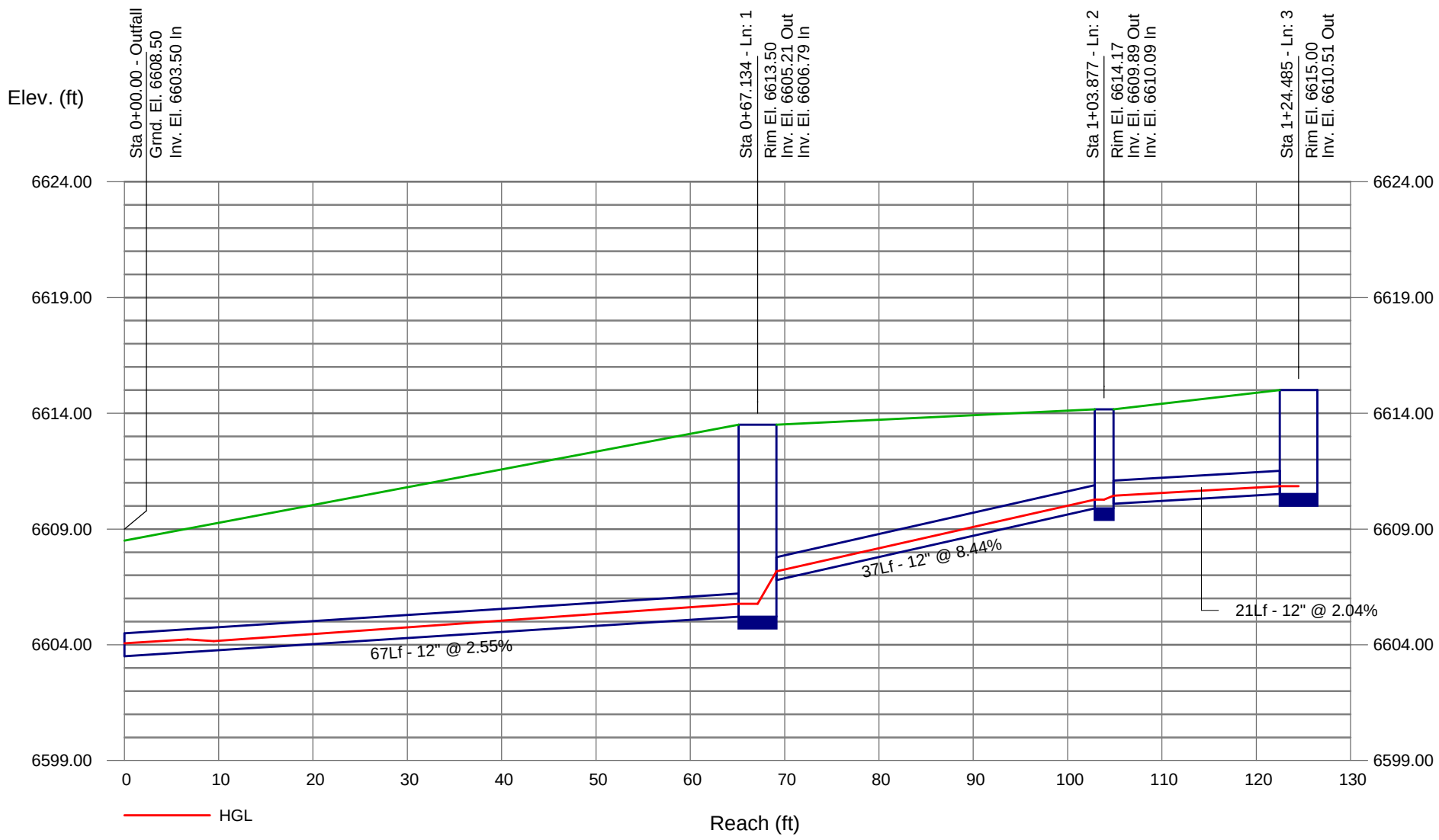
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	12	1.72	6603.50	6604.06	0.56	0.45	3.80	0.22	6604.29	0.380	67	6605.21	6605.77 j	0.56**	0.45	3.83	0.23	6606.00	0.388	0.384	n/a	0.15	n/a
2	12	0.80	6606.79	6607.17	0.38*	0.27	2.93	0.13	6607.30	0.320	37	6609.89	6610.27	0.38**	0.27	2.93	0.13	6610.40	0.320	0.320	n/a	1.08	0.14
3	12	0.66	6610.09	6610.44	0.34*	0.24	2.75	0.12	6610.55	0.311	21	6610.51	6610.85	0.34**	0.24	2.75	0.12	6610.97	0.312	0.312	n/a	1.00	0.12

Project File: ALIGN-N.stm | Number of lines: 3 | Run Date: 03-28-2014

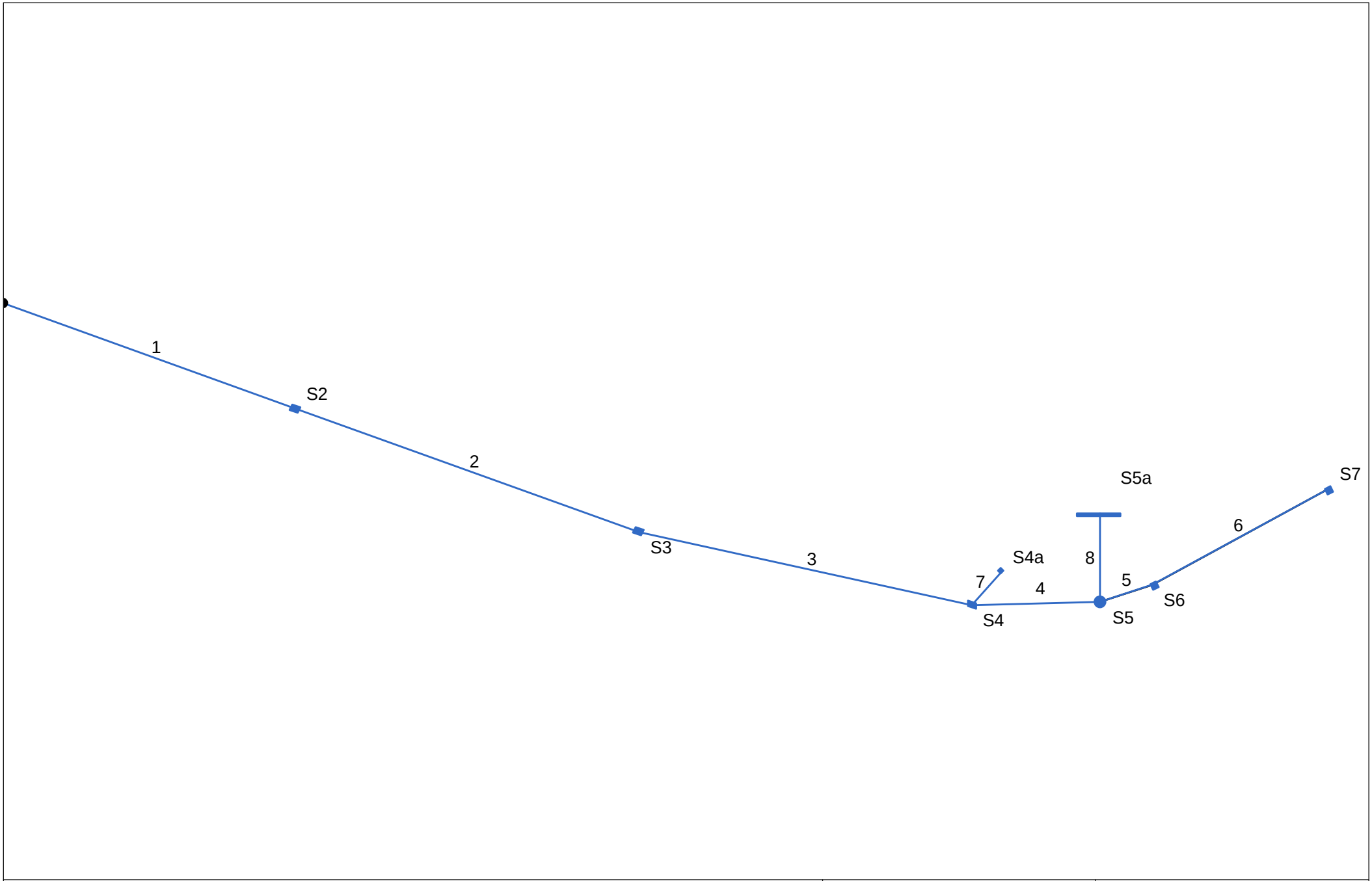
Notes: * Critical depth assumed.; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: ALIGN-N.stm



Hydraflow Storm Sewers Plan



Project File: ALIGN-S.stm	Number of lines: 8	Date: 03-28-2014

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	S1-S2	1.53	12	Cir	114	6603.72	6604.83	0.973	6604.25	6605.35	n/a	6605.35 j	End	Combination
2	S2-S3	0.98	12	Cir	134	6605.03	6606.34	0.976	6605.54	6606.76	n/a	6606.76 j	1	Combination
3	S3-S4	0.60	12	Cir	125	6606.54	6607.76	0.976	6606.90	6608.09	n/a	6608.09 j	2	Grate
4	S4-S5	0.54	12	Cir	47	6607.96	6608.40	0.934	6608.27	6608.71	n/a	6608.71	3	Manhole
5	S5-S6	0.37	12	Cir	20	6608.60	6608.79	0.935	6608.86	6609.05	n/a	6609.05	4	Grate
6	S6-S7	0.17	12	Cir	74	6608.99	6609.70	0.966	6609.17	6609.88	n/a	6609.88	5	Grate
7	S4-S4a	0.03	8	Cir	16	6610.00	6611.50	9.105	6610.08	6611.58	n/a	6611.58	3	Grate
8	S5-S5a	0.17	12	Cir	32	6608.60	6609.22	1.915	6608.82	6609.40	n/a	6609.40 j	4	Grate

Project File: ALIGN-S.stm | Number of lines: 8 | Run Date: 03-28-2014

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	114	20	Comb	0.55	0.00	0.00	0.0	6603.72	0.97	6604.83	12	Cir	0.010	0.50	6610.20	S1-S2
2	1	134	0	Comb	0.38	0.00	0.00	0.0	6605.03	0.98	6606.34	12	Cir	0.010	0.50	6612.94	S2-S3
3	2	125	-7	Grate	0.03	0.00	0.00	0.0	6606.54	0.98	6607.76	12	Cir	0.010	1.34	6615.00	S3-S4
4	3	47	-14	MH	0.00	0.00	0.00	0.0	6607.96	0.93	6608.40	12	Cir	0.010	1.00	6613.30	S4-S5
5	4	20	-17	Grate	0.20	0.00	0.00	0.0	6608.60	0.94	6608.79	12	Cir	0.010	0.50	6612.50	S5-S6
6	5	74	-11	Grate	0.17	0.00	0.00	0.0	6608.99	0.97	6609.70	12	Cir	0.010	1.00	6613.40	S6-S7
7	3	16	-61	Grate	0.03	0.00	0.00	0.0	6610.00	9.10	6611.50	8	Cir	0.010	1.00	6614.69	S4-S4a
8	4	32	-88	Grate	0.17	0.00	0.00	0.0	6608.60	1.92	6609.22	12	Cir	0.010	1.00	6612.75	S5-S5a

Project File: ALIGN-S.stm | Number of lines: 8 | Date: 03-28-2014

Hydraulic Grade Line Computations

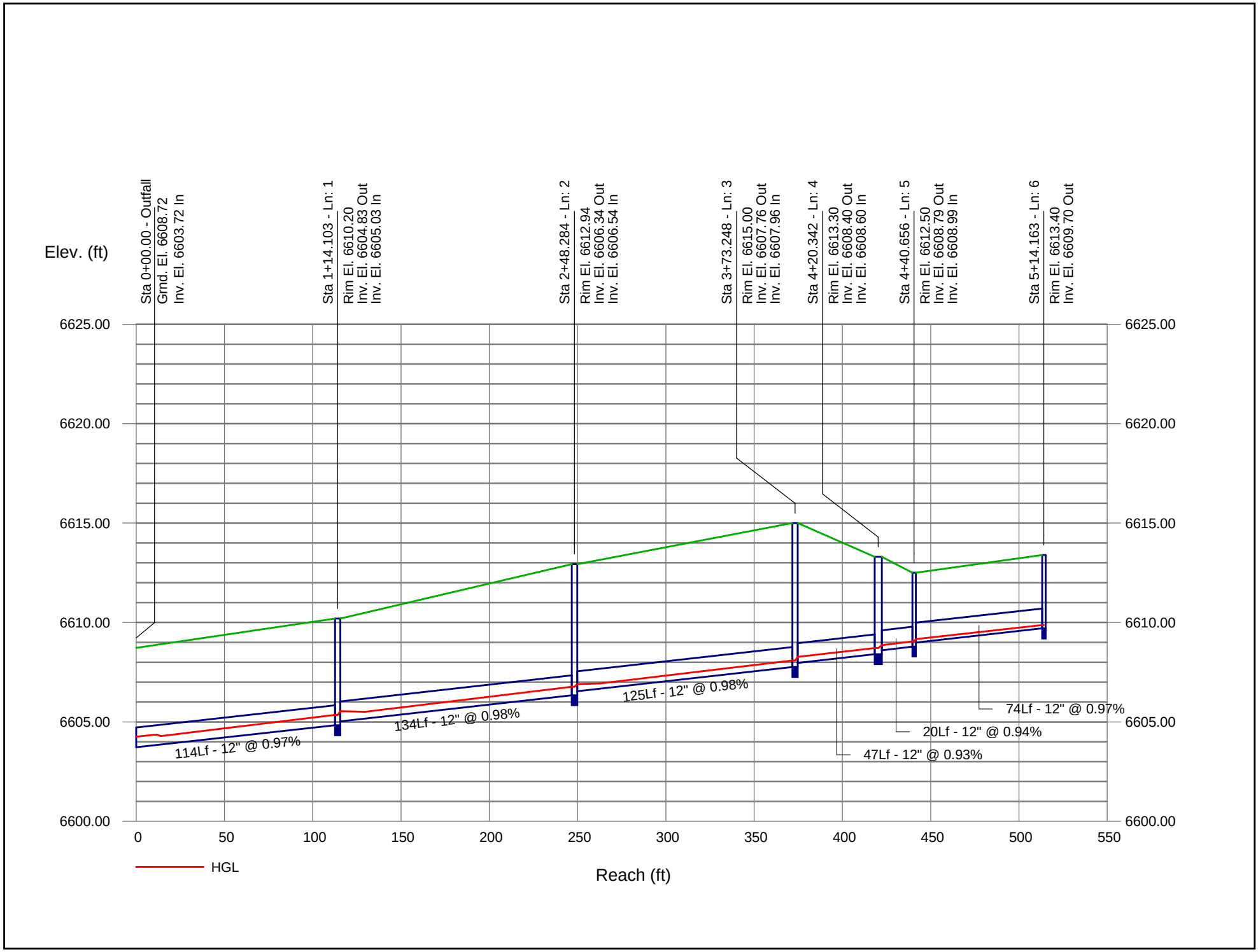
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	12	1.53	6603.72	6604.25	0.53	0.42	3.62	0.20	6604.45	0.360	114	6604.83	6605.35 j	0.52**	0.42	3.67	0.21	6605.56	0.372	0.366	n/a	0.50	n/a
2	12	0.98	6605.03	6605.54	0.51	0.40	2.44	0.09	6605.63	0.168	134	6606.34	6606.76 j	0.42**	0.31	3.13	0.15	6606.91	0.331	0.250	n/a	0.50	0.08
3	12	0.60	6606.54	6606.90	0.36	0.26	2.33	0.08	6606.99	0.212	125	6607.76	6608.09 j	0.33**	0.22	2.67	0.11	6608.20	0.309	0.261	n/a	1.34	0.15
4	12	0.54	6607.96	6608.27	0.31*	0.21	2.59	0.10	6608.38	0.307	47	6608.40	6608.71	0.31**	0.21	2.58	0.10	6608.82	0.306	0.307	n/a	1.00	n/a
5	12	0.37	6608.60	6608.86	0.26*	0.16	2.31	0.08	6608.94	0.301	20	6608.79	6609.05	0.26**	0.16	2.31	0.08	6609.13	0.301	0.301	n/a	0.50	n/a
6	12	0.17	6608.99	6609.17	0.17*	0.09	1.84	0.05	6609.22	0.304	74	6609.70	6609.88	0.17**	0.09	1.84	0.05	6609.93	0.304	0.304	n/a	1.00	n/a
7	8	0.03	6610.00	6610.08	0.08*	0.02	1.23	0.02	6610.11	0.361	16	6611.50	6611.58	0.08**	0.02	1.23	0.02	6611.61	0.359	0.360	n/a	1.00	n/a
8	12	0.17	6608.60	6608.82	0.21	0.12	1.37	0.03	6608.84	0.132	32	6609.22	6609.40 j	0.17**	0.09	1.84	0.05	6609.45	0.304	0.218	n/a	1.00	n/a

Project File: ALIGN-S.stm | Number of lines: 8 | Run Date: 03-28-2014

Notes: * Critical depth assumed.; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

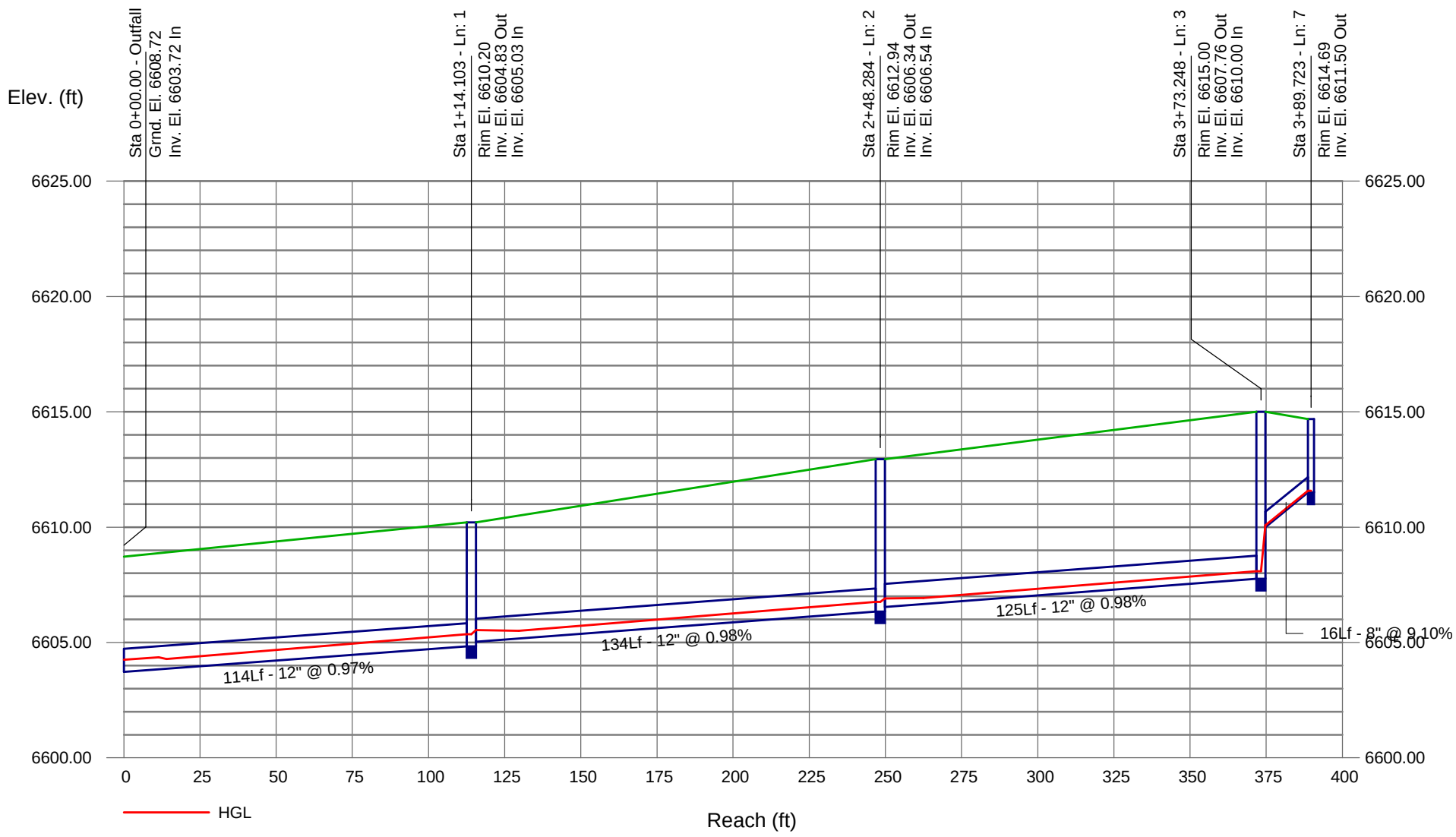
Storm Sewer Profile

Proj. file: ALIGN-S.stm



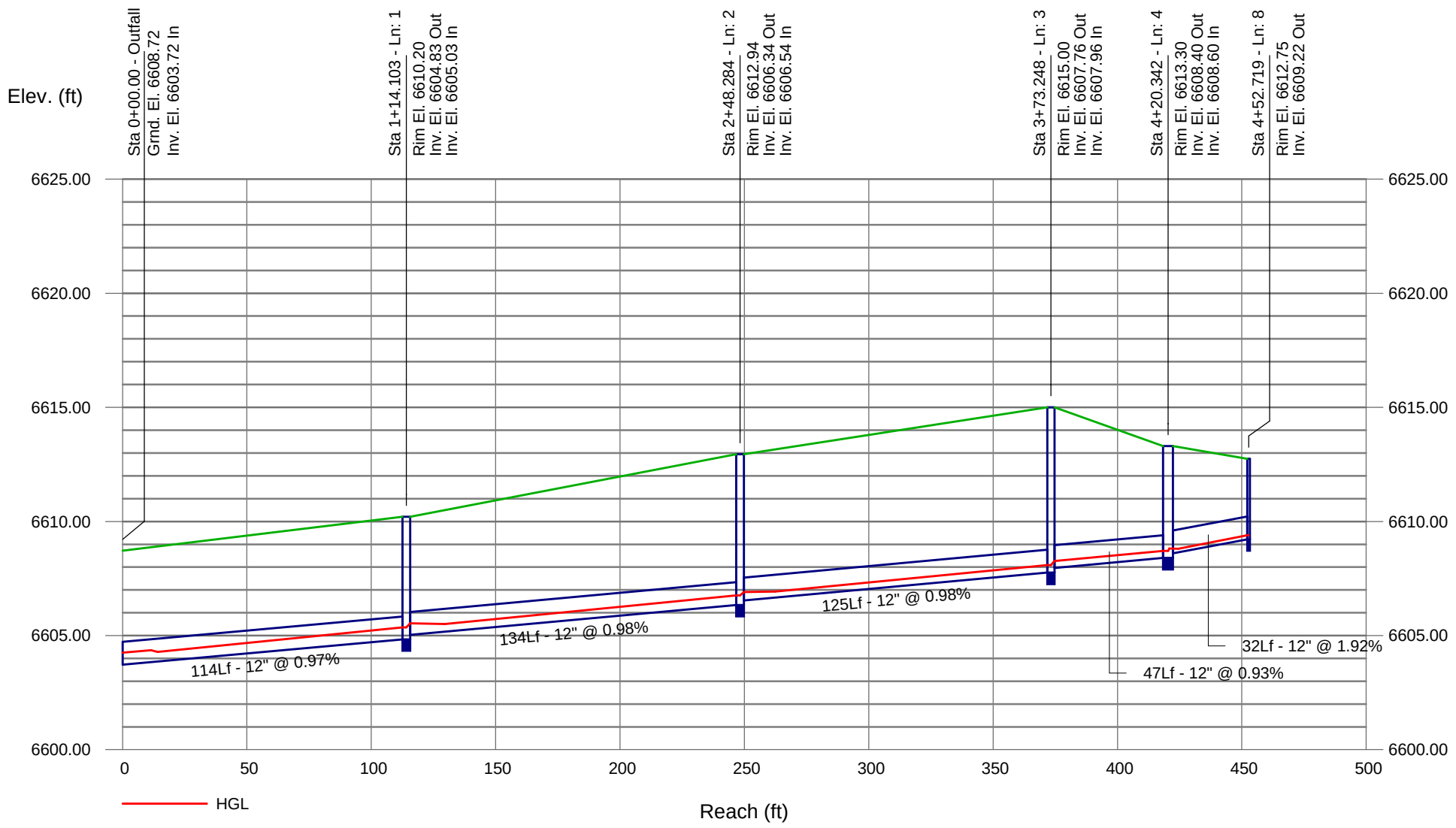
Storm Sewer Profile

Proj. file: ALIGN-S.stm



Storm Sewer Profile

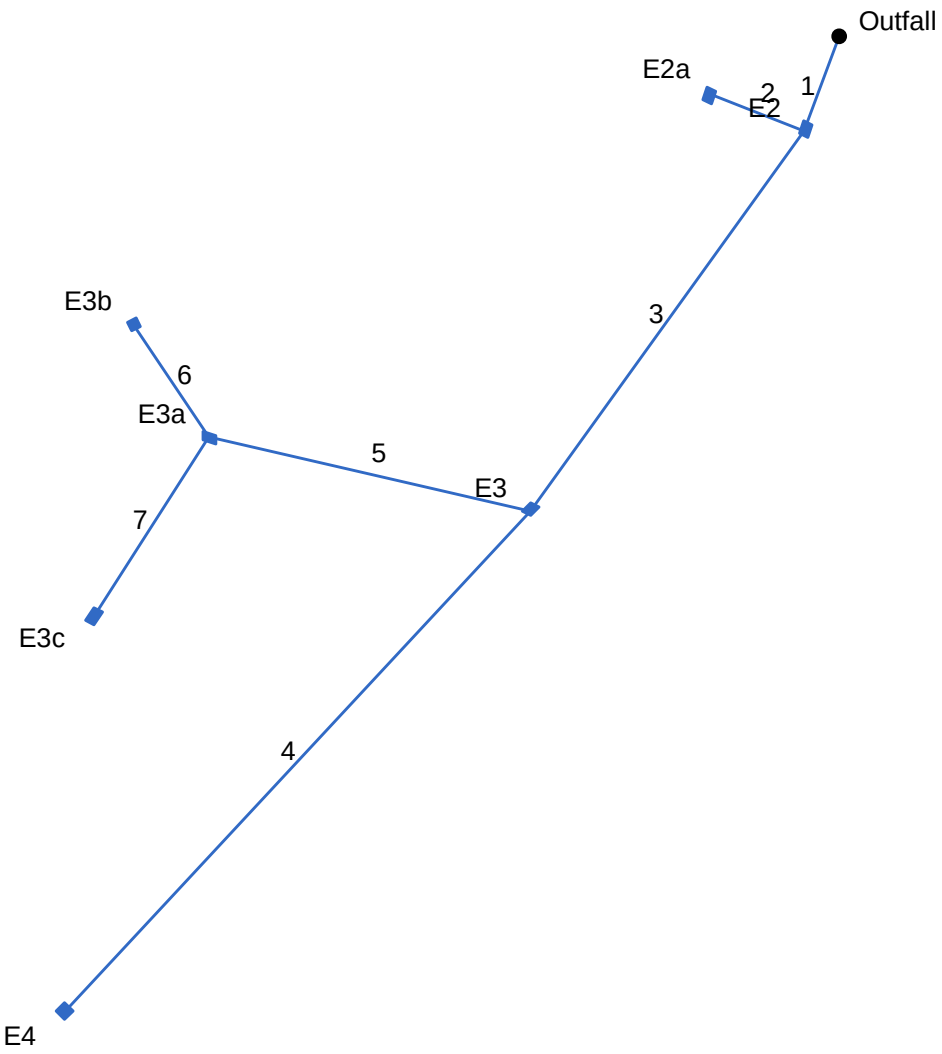
Proj. file: ALIGN-S.stm



APPENDIX C

INLET CALCULATIONS

Hydraflow Storm Sewers Plan



Project File: ALIGN-E.stm	Number of lines: 7	Date: 03-28-2014

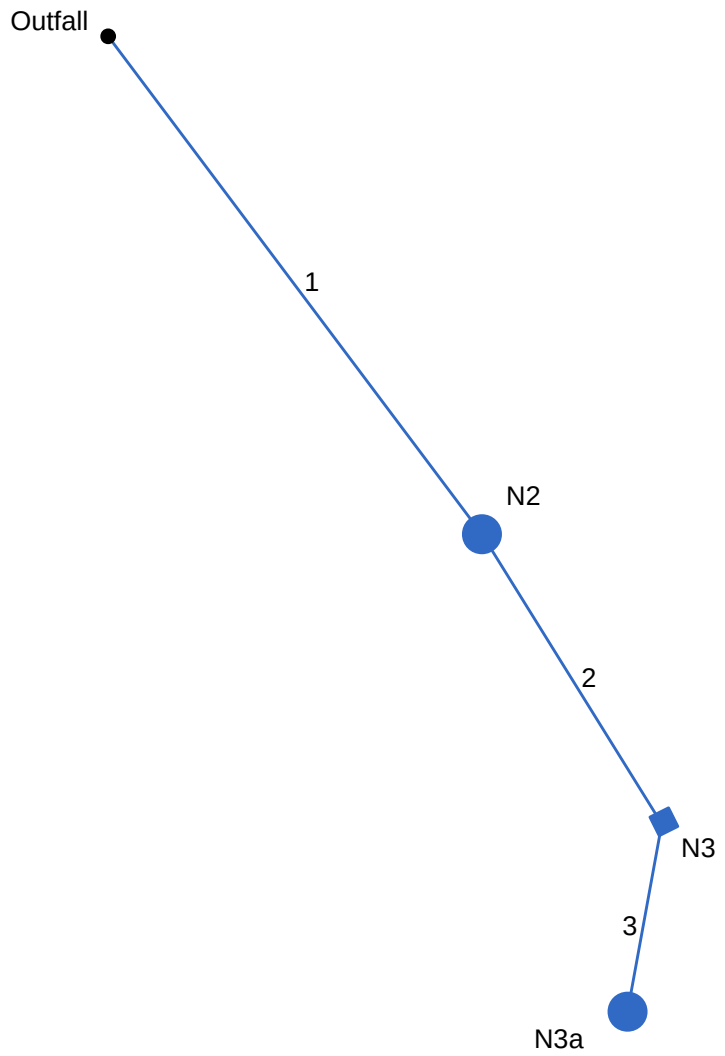
Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	E2	0.53*	0.15	0.68	0.00	Comb	4.0	3.00	0.18	3.00	2.00	Sag	1.50	0.080	0.020	0.000	0.19	5.08	0.11	5.08	0.1	Off
2	E2a	0.20*	0.00	0.20	0.00	Comb	4.0	3.00	0.07	2.00	3.00	Sag	1.50	0.080	0.020	0.000	0.14	2.58	0.06	2.58	0.1	Off
3	E3	0.83*	0.00	0.68	0.15	Comb	4.0	3.00	0.00	3.00	2.00	0.012	1.50	0.080	0.020	0.013	0.19	4.95	0.13	5.98	0.1	1
4	E4	3.51*	0.00	3.51	0.00	Grate	0.0	0.00	1.19	3.00	3.00	Sag	2.00	0.050	0.020	0.000	0.35	14.65	0.30	14.65	0.1	Off
5	E3a	0.42*	0.00	0.42	0.00	Grate	0.0	0.00	0.14	3.00	2.00	Sag	2.00	0.050	0.020	0.000	0.36	15.17	0.31	15.17	0.1	Off
6	E3b	0.03*	0.00	0.03	0.00	Grate	0.0	0.00	0.01	2.00	2.00	Sag	2.00	0.050	0.020	0.000	0.36	15.17	0.31	15.17	0.1	Off
7	E3c	0.18*	0.00	0.18	0.00	Grate	0.0	0.00	0.00	3.00	2.00	0.020	2.00	0.050	0.020	0.013	0.09	1.76	0.07	2.93	0.1	5

Project File: ALIGN-E.stm | Number of lines: 7 | Run Date: 03-28-2014

NOTES: Inlet N-Values = 0.016 ; Intensity = 51.00 / (Inlet time + 14.50) ^ 0.91; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Hydraflow Storm Sewers Plan



Project File: ALIGN-N.stm	Number of lines: 3	Date: 03-28-2014

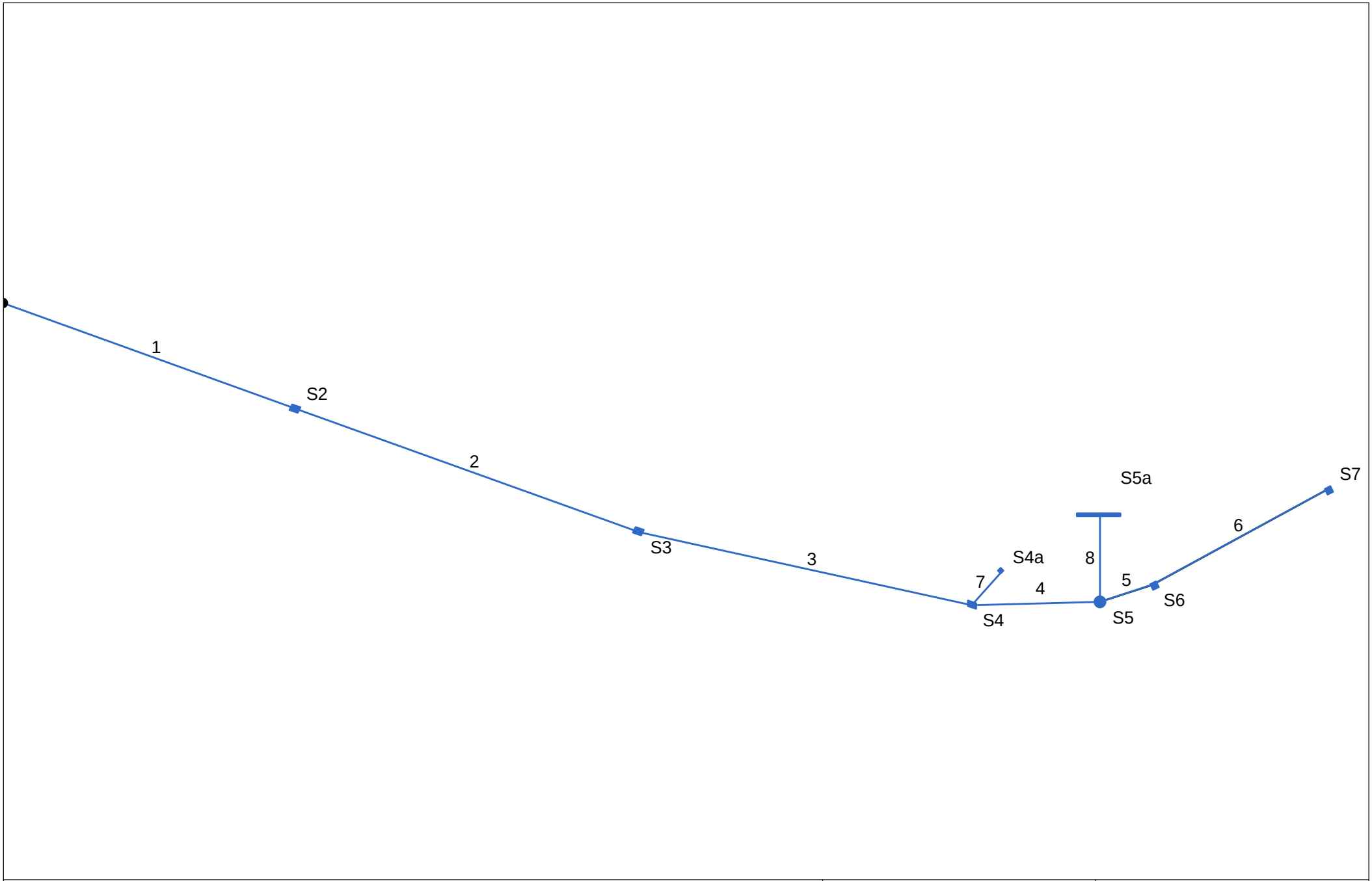
Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	N2	0.92*	0.00	0.00	0.92	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	N3	0.14*	0.00	0.14	0.00	Grate	0.0	0.00	0.05	2.00	2.00	Sag	2.00	0.050	0.020	0.000	0.27	10.58	0.27	10.58	0.0	Off
3	N3a	0.66*	0.00	0.00	0.66	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off

Project File: ALIGN-N.stm | Number of lines: 3 | Run Date: 03-28-2014

NOTES: Inlet N-Values = 0.016 ; Intensity = 51.00 / (Inlet time + 14.50) ^ 0.91; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Hydraflow Storm Sewers Plan



Project File: ALIGN-S.stm	Number of lines: 8	Date: 03-28-2014

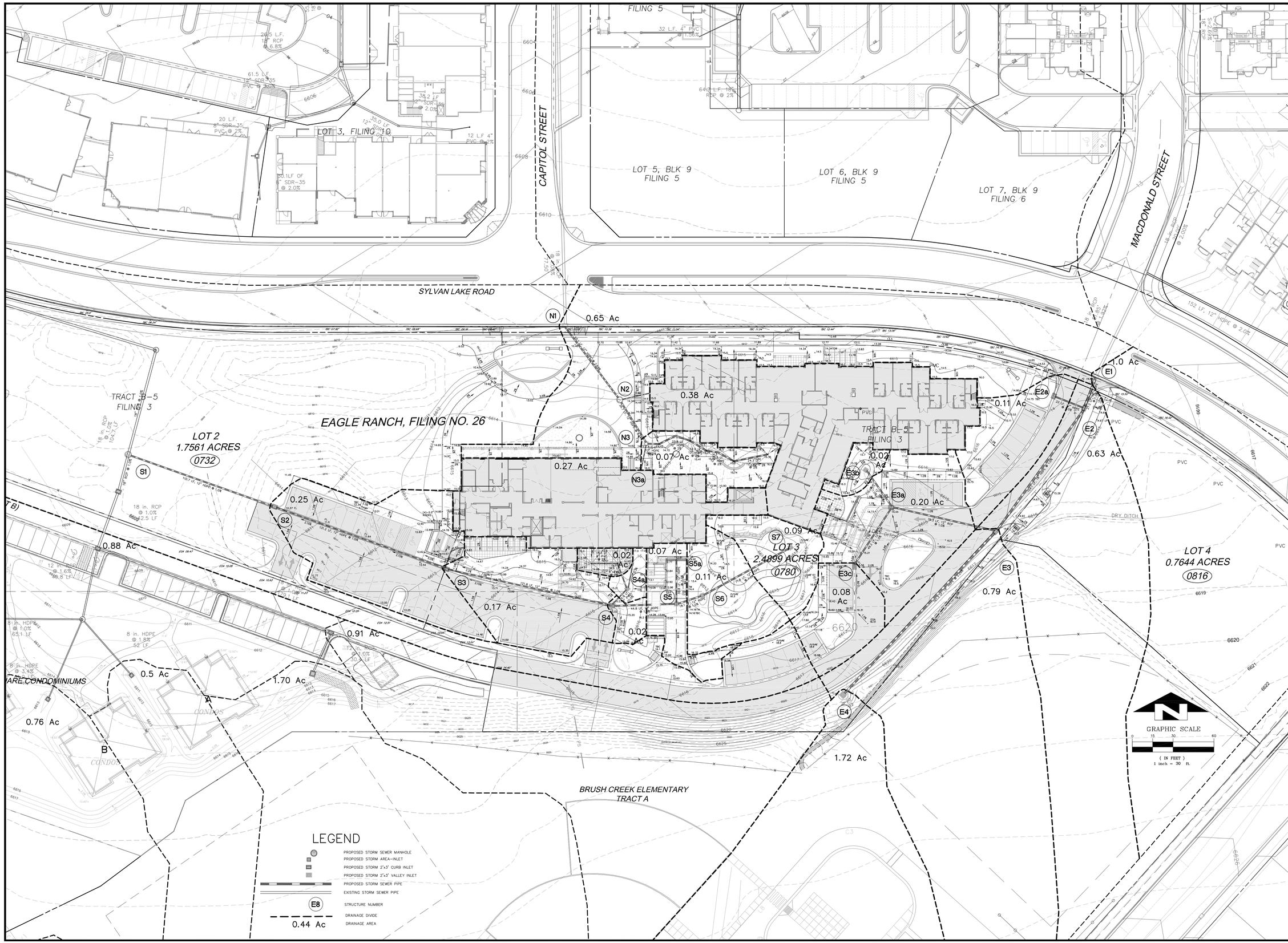
Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	S2	0.55*	0.00	0.53	0.02	Comb	4.0	3.00	0.00	3.00	1.50	0.022	2.00	0.050	0.020	0.013	0.13	3.45	0.13	3.45	0.0	Off
2	S3	0.38*	0.00	0.38	0.00	Comb	4.0	3.00	0.00	3.00	1.50	0.022	2.00	0.050	0.020	0.013	0.11	2.65	0.11	2.65	0.0	1
3	S4	0.03*	0.00	0.03	0.00	Grate	0.0	0.00	0.00	3.00	2.00	0.013	2.00	0.050	0.020	0.013	0.05	0.98	0.05	0.98	0.0	2
4	S5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	S6	0.20*	0.00	0.20	0.00	Grate	0.0	0.00	0.07	2.00	2.00	Sag	2.00	0.050	0.020	0.000	0.28	11.14	0.28	11.14	0.0	Off
6	S7	0.17*	0.00	0.17	0.00	Grate	0.0	0.00	0.06	2.00	2.00	Sag	2.00	0.050	0.020	0.000	0.28	10.90	0.28	10.90	0.0	Off
7	S4a	0.03*	0.00	0.03	0.00	Grate	0.0	0.00	0.01	2.00	2.00	Sag	2.00	0.050	0.020	0.000	0.31	12.59	0.31	12.59	0.0	Off
8	S5a	0.17*	0.00	0.17	0.00	Grate	0.0	0.00	0.06	1.00	16.00	Sag	2.00	0.050	0.020	0.000	0.28	10.90	0.28	10.90	0.0	Off

Project File: ALIGN-S.stm | Number of lines: 8 | Run Date: 03-28-2014

NOTES: Inlet N-Values = 0.016 ; Intensity = 51.00 / (Inlet time + 14.50) ^ 0.91; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

MAPS



ALPINE ENGINEERING INC
EDWARDS BUSINESS CENTER • P.O. BOX 97
EDWARDS, COLORADO 81632
• 970-926-3373 • FAX 926-3390 •

CASTLE PEAK SENIOR CARE COMMUNITY

EAGLE, COLORADO

ON-SITE DRAINAGE AREA MAP

(SEAL)

NO.	DATE	REVISIONS	BY

DESIGNED HHM
DRAWN HHM
CHECKED KAK, GLB
JOB NO. –
DATE 04/28/2014

SHEET 1

ALPINE ENGINEERING INC

EDWARDS BUSINESS CENTER • P.O. BOX 97
EDWARDS, COLORADO 81632
• 970-926-3373 • FAX 926-3380 •

(SEAL)

CASTLE PEAK SENIOR CARE COMMUNITY

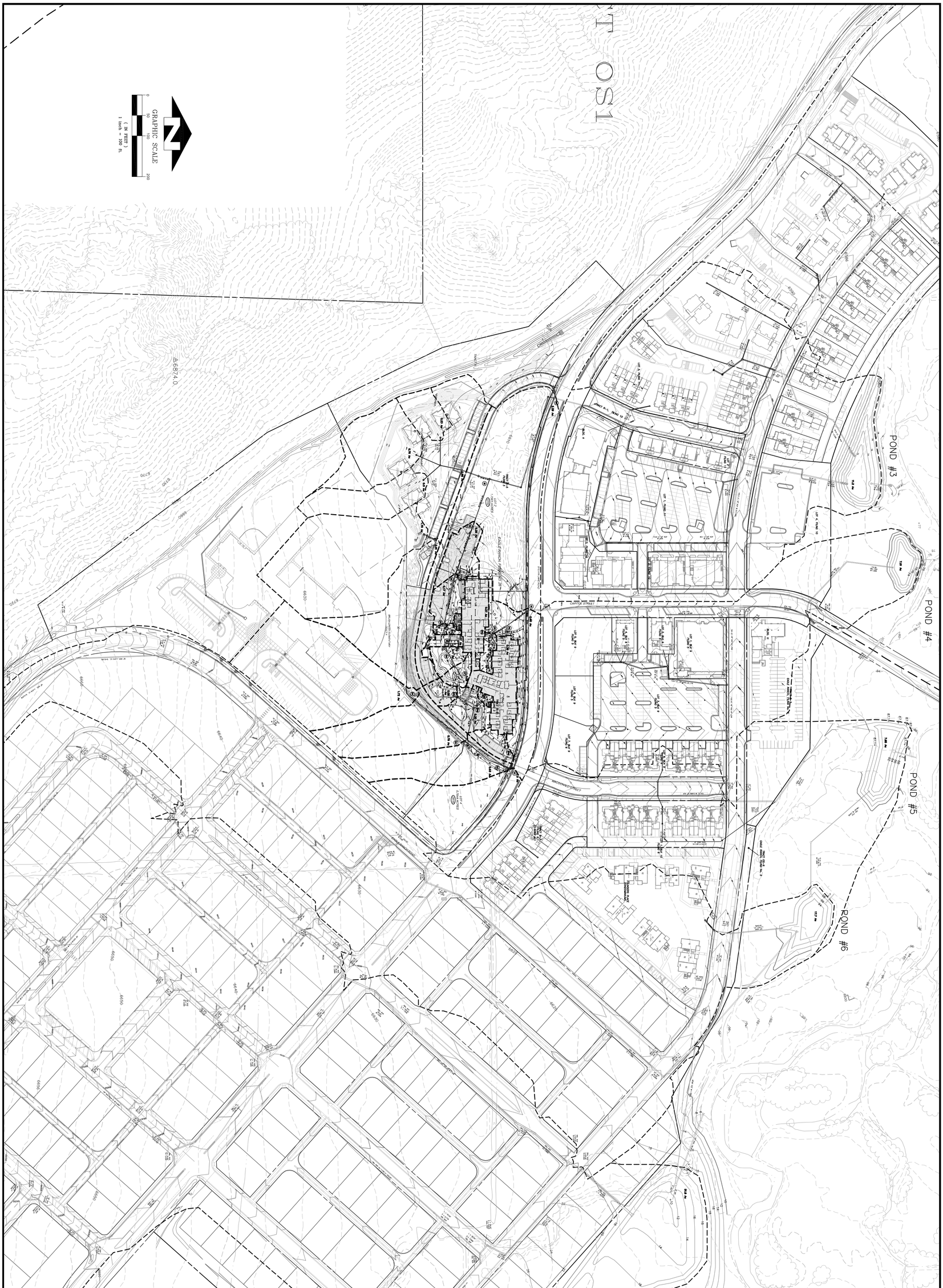
EAGLE, COLORADO

OFF-SITE DRAINAGE AREA MAP

NO.	DATE	REVISIONS	BY

DESIGNED HHM
DRAWN HHM
CHECKED KAK, GLB
JOB NO. —
DATE 04/28/2014

SHEET 2



SHEET 3

DESIGNED	HHM
DRAWN	HHM
CHECKED	KAK, GLB
JOB NO.	–
DATE	04/28/2014

NO.	DATE	REVISIONS	BY

CASTLE PEAK SENIOR CARE COMMUNITY

EAGLE, COLORADO

OVERALL DRAINAGE AREA MAP

(SEAL)

ALPINE AEI ENGINEERING INC
EDWARDS BUSINESS CENTER • P.O. BOX 97
EDWARDS, COLORADO 81632
• 970 926-3373 • FAX 926-3390 •