klotz associates

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June 16, 2008

Mr. Ron Bottoms
City Manager
City of La Porte
604 W. Fairmont Parkway
La Porte, Texas 77571

RE: City of La Porte, Texas
City-Wide Drainage Study
Creekmont Park Drainage and Overflow Path Short Term Project 2
Klotz Associates Project No. 0127.008.000

Dear Mr. Bottoms:

Klotz Associates was authorized to proceed with the analysis of the Creekmont Park drainage and overflow path for Short Term Project 2. Klotz Associates, Inc is pleased to submit recommendations, preliminary details, and cost estimates

I. Purpose

The purpose of this project is to mitigate flood problems occurring through northern section of Creekmont Subdivision Section 2 during a high frequency storm event by providing an extreme event conveyance pipe or path through Creekmont Park Parking Lot into Big Island Slough (B106-00-00).

II. Study Area

The study area is the Creekmont Park in the Creekmont Subdivision that is located east of Underwood Road and north of Spencer Highway. (see Exhibit 1). The Creekmont Park and Creekmont Subdivision Section 2 is also west of a pipeline easement and west of Big Island Slough (see Exhibit 2). Creekmont Park is elevated in comparison with Creekmont Subdivision Section 2 (see photos in Appendix A) and is a restriction to the sheet flow from the northern part of Creekmont Subdivision Section 2.

III. Data Collected

The data collected were the plans and profiles of North H Street, drainage area map of North H Street, the hydraulic model for Big Island Slough (B106-00-00), and LiDAR based contours. The information was used to develop different alternatives to size the appropriate storm sewer pipe system to provide an extreme

event conveyance path for Creekmont Subdivision Section 2. It should be noted that survey will be needed for the detailed design of the selected alternative.

IV. Analysis of Flooding Conditions

The Creekmont Subdivision Section 2 has experienced several complaints of flooding and ponding water due to the limitation of extreme event conveyance paths to relieve the flows out to Big Island Slough. Using LiDAR-based contours (see Exhibit 2), the area known as Creekmont Subdivision Section 2 naturally drains to Big Island Slough but Creekmont Park currently restricts the overflow path. Creekmont Subdivision Section 2 has its own storm sewer drainage system that can handle a 3 year storm event but does not have an extreme event conveyance path for the large storm events. The storm events analyzed for impact are the 5-, 10-, 25-, 50-, 100-year storms since these frequencies generate sheet flow.

The areas labeled "Additional Drainage Areas" in Exhibit 3 are the areas of concern that this report addresses. Reconstruction of the park could consist of removing soil, regarding the park area and rebuilding the park, adding an overland flow path that would require significant improvements for it to function properly. This idea was not discussed considering the park is in place, would be significantly expensive and the park is already being used by the community. Creekmont Subdivision Section 2 storm sewer system connects into a 42-inch pipe that is part of Creekmont Subdivision Section 1 (see Exhibit 4).

The drainage limitations have been addressed by the different alternatives that are briefly described below. The profiles for the existing conditions and alternatives are in Appendix B Hydraflow Storm Sewer Output. Adding flow to the current existing state may have to be mitigated and the effect will be analyzed with HEC-RAS. A conceptual estimate of the pipes sizes and costs for each option can be found in Tables 3 to 5 and the detail cost estimated are in Table 6 to 8. These cost estimates are based on using a contractor to construct the improvements and the cost could be cheaper if part or the entire selected alternative were built by city force and if High Density Polyethylene (HDPE) Pipe were used instead of concrete pipe. HDPE pipe are only built up to a 60-inch and greater size pipes would have to be concrete pipe.

i. Alternative 1

Alternative 1 consist of placing inlets at the entrance of the park to collect the sheet flow from a larger storm event and directing the flow with storm sewer pipes that will connect to the storm sewer system in North H Street (see Exhibit 5). Alternative 1 is a separate system that will affect the

performance of North H Street system. Table 1 shows the comparison of Hydraulic Grade Line (HGL) difference from the existing and proposed Alternative 1. There will be adverse affect along North H Street. Table 1 shows LiDAR elevations and Hydraulic Grade Line elevations. Table 1 shows that at a 10 year storm event, the system will be filled to capacity and ponding will occur. Table 4 shows the pipe sizes and cost estimates for the 5-, 10-, 25-, 50-, 100-year storms that will lower the Hydraulic Grade Line the most without upsizing any part of North H Street. Alternative 1, while helpful, will be able to convey the sheet flow from a 5 year storm event. This alternative does not meet our goal and is therefore not recommended.

ii. Alternative 2

Alternative 2 requires placing inlets at the entrance of the park to collect the sheet flow from a larger storm event and directing the flow with storm sewer pipes to the storm sewer system in North H Street and placing a new parallel system on the north side of the street to handle the additional flow (see Exhibit 6). This alternative will add flow to the existing storm sewer system in North H Street and affect the current system in place. However, a parallel system is sized to have no adverse effect. The systems will be connected to North H Street with modifications downstream of the connection to accommodate the additional flow. A parallel system in combination with the existing system will be adequate to accommodate the additional flow. Alternative 2 will have inlets and manholes at the entrance of the park and in the park that will drain into a storm sewer pipe system and connect to North H Street. The existing Hydraulic Grade Line is above the Critical Elevation for the larger storm events (see Table 2). A Hydraulic Grade Line comparison is shown in Table 2. Calculations were done to estimate the needed capacity of North H Street system that would handle the additional flows. Alternative 2 was designed to not have any adverse effects and have the same or lower Hydraulic Grade Line along North H Street as the existing system that is in place now. Table 4 shows the pipe sizes and cost estimates required for the 5-, 10-, 25-, 50-, 100-year storms. The existing system drains both North H Street and Underwood Street and it was not designed to handle the 100 year storm event. Alternative 2 will handle Creekmont Subdivision Section 2 flow for the 100-year event and also have positive benefits for both North H Street and Underwood Street. Alternative 2 will require HCFCD review and approval since new outfall would be required. Right-of-Way (ROW) or easement will be needed for this alternative and the costs for the easement or ROW is not included in the cost estimate. There are several properties that could provide a reasonable route to North H Street.

iii. Alternative 3

Alternative 3 includes the placing of inlets at the entrance of the park to collect the sheet flow from a larger storm event of Creekmont Subdivision Section 2 and directing the flow with storm sewer pipes to Big Island Sough within a 10 foot easement that the City owns (see Exhibit 7). Alternative 3 is a completely separate system that will convey only the "Additional Drainage" Areas of 48.6 acres to Big Island Slough shown in Exhibit 3. This system will go across the pipeline corridor that is to the east of Creekmont Park. A survey needs to be conducted before this alternative can be finalized. It is assumed that the pipeline easement will not interfere with the Alternative 3 storm sewer system, but if it does, a siphon may be required to cross the pipeline corridor. This alternative will not connect to North H Street or be in the Right-of-Way of North H Street and will have its own outlet at Big Island Slough. Table 5 show the pipe sizes and cost estimated for the 5-, 10-, 25-, 50-, 100-year storms. Alternative 3 will require HCFCD review and approval since new outfall would be required. Same additional Right-of-Way and/or construction easement may be required for this alternative and the costs for these are not included in the cost estimate.

V. Observations and Recommended Improvements

The initial assessment of the data shows that any of the alternatives will collect the sheet flow from a larger storm event from the Creekmont Subdivision Section 2 at the location of the Creekmont Park entrance. The alternatives show possible ways to convey this flow to provide some relief Creekmont Subdivision Section 2. Alternative 1 consists of 910 feet of pipe that will connect to the existing storm sewer on North H Street. The total cost estimate for alternative 1 will range from $344,000 to $428,000 depending on what storm event is chosen (refer to Table 6 for details). Alternative 2 consists of 1,885 feet of pipe that will connect to North H Street and run parallel on North H Street. The total cost estimate for alternative 2 will range from $725,000 to $1,294,000 depending on what storm event is chosen (refer to Table 7 for details). Alternative 3 consists of 1,322 feet of pipe that will outfall into Big Island Slough. The total cost estimate for alternative 3 ranges from $474,000 to $571,000 depending on what storm event is chosen (refer to Table 8 for details).

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VI Conclusion

The costs for the various alternatives are listed in Tables 6 through 8. We recommend that the City first work with the identified property owners to determine if an economical sheet flow path with any needed easements could be acceptable to all. Each alternative presented requires that the City coordinate with property owners in determining an appropriate alternative to be considered in Phase 2 Detail Design. Mitigation may be needed during the design phase with HCFCD depending on the selected alternative. Using HEC-RAS, Big Island Slough water surface elevation will raise about 0.05 feet upstream of Big Island Slough because of the additional flow that is directed during a 100 year storm event (See Appendix C).

We are available to discuss the report with you at your convenience should you have any questions regarding our findings. We look forward to moving into the next phase of this study.

Sincerely,

Jorge E. Gutierrez

Jorge E. Gutierrez

For:
Gary L. Struzick, P.E., CFM
Vice President

GLS

Attachments

CC: Mr. Steve Gillett, City of La Porte
Mr. John Joerns, City of La Porte
Mr. Rodney Slaton, City of La Porte

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Appendix C HEC-RAS Output

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY
KLOTZ ASSOCIATES PROJECT NO. 0127.008.000
HGL COMPARISON FOR ALTERNATIVE 1

Table 1

Alternative 1																	
			5 Year Storm Event			10 Year Storm Event			25 Year Storm Event			50 Year Storm Event			100 Year Storm Event		
Location	**Natural Ground**	**Description**	**Existing**	**Proposed**	**Difference**	**Existing**	**Proposed**	**Difference**	**Existing**	**Proposed**	**Difference**	**Existing**	**Proposed**	**Difference**	**Existing**	**Proposed**	**Difference**
	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
Outfall	25	At the Outfall going to Big Island Slough	19.64	19.96	0.32	19.83	20.33	0.5	20.09	20.87	0.78	21.38	22.42	1.04	22.56	23.85	1.29
Connection	25	At the connection of North H Street and the extreme event convevance pipe	21.43	23.51	2.08	22.32	25.54	3.22	23.6	28.57	4.97	25.81	29.23	3.42	27.91	32.9	4.99
Underwood	27	At the connection of North H Street and Underwood Street	23.88	25.96	2.08	25.67	28.89	3.22	28.25	33.31	5.06	31.63	35.05	3.42	34.89	39.89	5.00
At Park	24	At the entrance of Creekmont Park parking lot	---	23.94	---	---	25.97	---	---	28.77	---	---	29.44	---	---	33.05	---

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY
KLOTZ ASSOCIATES PROJECT NO. 0127.008.000
HGL COMPARISON FOR ALTERNATIVE 2

Table 2

Alternative 2																	
			5 Year Storm Event			10 Year Storm Event			25 Year Storm Event			50 Year Storm Event			100 Year Storm Event		
Location	**Natural Ground**	**Description**	**Existing**	**Proposed**	**Difference**	**Existing**	**Proposed**	**Difference**	**Existing**	**Proposed**	**Difference**	**Existing**	**Proposed**	**Difference**	**Existing**	**Proposed**	**Difference**
	(ft)		**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**	**(ft)**
Outfall	25	At the Outfall going to Big Island Slough	19.64	19.32	-0.32	19.83	19.4	-0.43	20.09	19.51	-0.58	21.38	20.55	-0.83	22.56	21.38	-1.18
Connection at North H Street	25	At the connection of North H Street and the extreme event conveyance pipe	21.43	21.4	-0.03	22.32	22.2	-0.12	23.6	23.6	0	25.81	24.01	-1.8	27.91	24.12	-3.79
Underwood	27	At the connection of North H Street and Underwood Street	23.88	23.85	-0.03	25.67	25.55	-0.12	28.25	28.25	0	31.63	29.83	-1.8	34.89	31.1	-3.79
At Park	24	At the entrance of Creekmont Park parking lot	---	22.88	---	---	23.92	---	---	23.82	---	---	23.98	---	---	23.98	---

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY
KLOTZ ASSOCIATES PROJECT NO. 0127.008.000
PIPE SIZES FOR ALTERNATIVE 1

Table 3

Alternative 1				
Storm Events	**Pipe 1**	**Pipe 2**	**Pipe 3**	**Cost**
5 Year	24"	30"	54"	$ 344,000
10 Year	24"	36"	60"	$ 355,000
25 Year	24"	48"	66"	$ 403,000
50 Year	24"	72"	54"	$ 424,000
100 Year	24"	60"	78"	$ 428,000

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY
KLOTZ ASSOCIATES PROJECT NO. 0127.008.000
PIPE SIZES FOR ALTERNATIVE 2

Table 4

Alternative 2								
Storm Events	**Pipe 1**	**Pipe 2**	**Pipe 3**	**Pipe 4**	**Pipe 5**	**Pipe 6**	**Pipe 7**	**Cost**
5 Year	24"	30"	42"	42"	48"	66"	66"	$ 725,000
10 Year	24"	36"	48"	48"	48"	66"	66"	$ 770,000
25 Year	24"	54"	66"	48"	54"	66"	66"	$ 858,000
50 Year	24"	66"	72"	72"	72"	78"	78"	$ 971,000
100 Year	24"	66"	78"	84"	90"	90"	90"	$ 1,294,000

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY
KLOTZ ASSOCIATES PROJECT NO. 0127.008.000
PIPE SIZES FOR ALTERNATIVE 3

Table 5

Alternative 3									
Storm Events	**Pipe 1**	**Pipe 2**	**Pipe 3**	**Pipe 4**	**Pipe 5**	**Pipe 6**	**Pipe 7**	**Pipe 8**	**Cost**
5 Year	24"	36"	36"	42"	42"	42"	42"	42"	$ 474,000
10 Year	24"	36"	36"	48"	48"	48"	48"	48"	$ 509,000
25 Year	24"	42"	42"	54"	54"	54"	54"	54"	$ 535,000
50 Year	24"	48"	48"	54"	54"	66"	66"	66"	$ 581,000
100 Year	24"	48"	48"	60"	60"	72"	72"	72"	$ 591,000

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY
KLOTZ ASSOCIATES PROJECT NO. 0127.008.000
COST ESTIMATE FOR ALTERNATIVE 1

Table 6

Alternative 1													
				5-Year Design		10-Year Design		25-Year Design		50-Year Design		100-Year Design	
Item No.	Description		Unit Price	Quantity	Round Total Cost	Quantity	Round Total Cost	Quantity	Round Total Cost	Quantity	Round Total Cost	Quantity	Round Total Cost
1	Storm Sewer Installation	CY	$ 45.70	1784	$ 82,000	1784	$ 82,000	1784	$ 82,000	1784	$ 82,000	1784	$ 82,000
2	Trench Safety	LF	$ 1.50	1784	$ 3,000	1784	$ 3,000	1784	$ 3,000	1784	$ 3,000	1784	$ 3,000
3	24" RCP	LF	$ 124.00	40	$ 5,000	40	$ 5,000	40	$ 5,000	40	$ 5,000	40	$ 5,000
4	30" RCP	LF	$ 135.00	290	$ 39,000		$ -		$ -		$ -		$ -
5	36" RCP	LF	$ 146.00		$ -	290	$ 42,000		$ -		$ -		$ -
6	42" RCP	LF	$ 172.00		$ -		$ -	290	$ 50,000		$ -		$ -
7	48" RCP	LF	$ 206.00		$ -		$ -		$ -		$ -		$ -
8	54" RCP	LF	$ 217.00	530	$ 115,000		$ -		$ -	290	$ 63,000		$ -
9	60" RCP	LF	$ 228.00		$ -	530	$ 121,000		$ -		$ -	290	$ 66,000
10	66" RCP	LF	$ 285.00		$ -		$ -	530	$ 151,000		$ -		$ -
11	72" RCP	LF	$ 293.00		$ -		$ -		$ -	530	$ 155,000	530	$ 155,000
12	Type B-B Inlet	EA	$ 2,700.00	2	$ 5,000	2	$ 5,000	2	$ 5,000	2	$ 5,000	2	$ 5,000
13	Type E Inlet	EA	$ 2,500.00	5	$ 13,000	5	$ 13,000	5	$ 13,000	5	$ 13,000	5	$ 13,000
14	Manhole	EA	$ 2,609.00	5	$ 13,000	5	$ 13,000	5	$ 13,000	5	$ 13,000	5	$ 13,000
15	Hydro mulching	ACRE	$ 1,700.00	0.16	$ -	0.16	$ -	0.16	$ -	0.16	$ -	0.16	$ -
	Alternative 1 Subtotal				**$ 275,000**		**$ 284,000**		**$ 322,000**		**$ 339,000**		**$ 342,000**
	Contingency (25%)				**$ 69,000**		**$ 71,000**		**$ 81,000**		**$ 85,000**		**$ 86,000**
	Alternative 1 Total				**$ 344,000**		**$ 355,000**		**$ 403,000**		**$ 424,000**		**$ 428,000**

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY
KLOTZ ASSOCIATES PROJECT NO. 0127.008.000
COST ESTIMATE FOR ALTERNATIVE 2

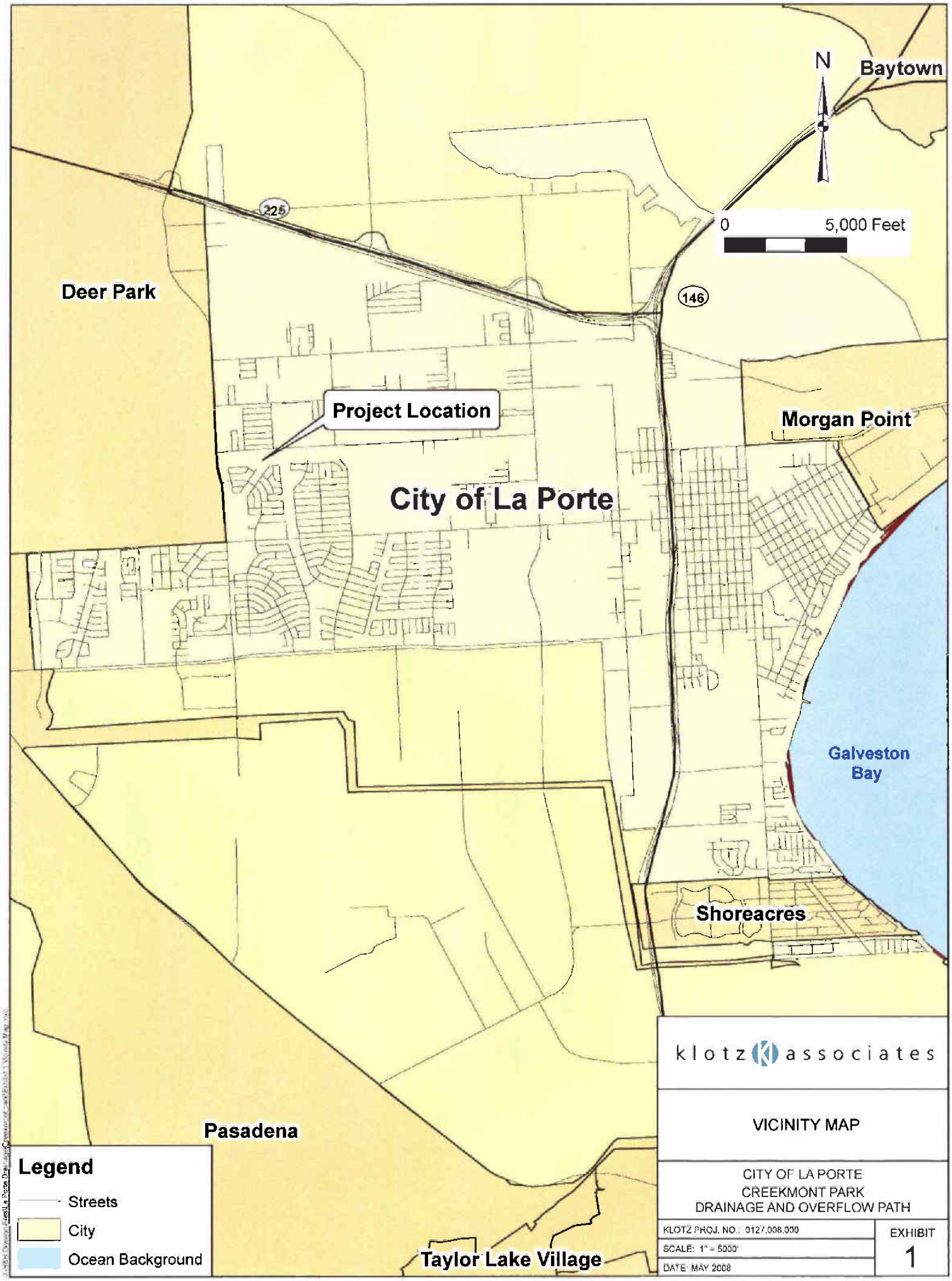
Table 7

Alternative 2													
				5-Year Design		10-Year Design		25-Year Design		50-Year Design		100-Year Design	
Item No.	Description	Unit	Unit Price	Quantity	Round Total Cost	Quantity	Round Total Cost	Quantity	Round Total Cost	Quantity	Round Total Cost	Quantity	Round Total Cost
1	Storm Sewer Installation	CY	$ 45.70	4013	$ 183,000	4013	$ 183,000	4013	$ 183,000	4013	$ 183,000	4013	$ 183,000
2	Trench Safety	LF	$ 1.50	4013	$ 6,000	4013	$ 6,000	4013	$ 6,000	4013	$ 6,000	4013	$ 6,000
3	24" RCP	LF	$ 124.00	40	$ 5,000	40	$ 5,000	40	$ 5,000	40	$ 5,000	40	$ 5,000
4	30" RCP	LF	$ 134.00	290	$ 39,000		$ -		$ -		$ -		$ -
5	36" RCP	LF	$ 146.00		$ -	290	$ 42,000		$ -		$ -		$ -
6	42" RCP	LF	$ 172.00	960	$ 165,000		$ -		$ -		$ -		$ -
7	48" RCP	LF	$ 206.00	300	$ 62,000	1260	$ 260,000	380	$ 78,000		$ -		$ -
8	54" RCP	LF	$ 217.00		$ -		$ -	590	$ 128,000		$ -		$ -
9	60" RCP	LF	$ 228.00		$ -		$ -		$ -		$ -		$ -
10	66" RCP	LF	$ 285.00	345	$ 98,000	345	$ 98,000	925	$ 264,000	290	$ 83,000	290	$ 83,000
11	72" RCP	LF	$ 293.00		$ -		$ -		$ -	1260	$ 369,000		$ -
12	78" RCP	LF	$ 315.00		$ -		$ -		$ -	345	$ 109,000	580	$ 183,000
13	84" RCP	LF	$ 470.00		$ -		$ -		$ -		$ -	380	$ 179,000
14	90" RCP	LF	$ 580.00		$ -		$ -		$ -		$ -	645	$ 374,000
15	Type B-B Inlet	EA	$ 2,700.00	2	$ 5,000	2	$ 5,000	2	$ 5,000	2	$ 5,000	2	$ 5,000
16	Type E Inlet	EA	$ 2,500.00	1	$ 3,000	1	$ 3,000	1	$ 3,000	1	$ 3,000	1	$ 3,000
17	Manhole	EA	$ 2,609.00	5	$ 13,000	5	$ 13,000	5	$ 13,000	5	$ 13,000	5	$ 13,000
18	Hydro mulching	ACRE	$ 1,700.00	0.36	$ 1,000	0.36	$ 1,000	0.36	$ 600	0.36	$ 600	0.36	$ 600
Alternative 2 Subtotal					**$ 580,000**		**$ 616,000**		**$ 686,000**		**$ 777,000**		**$ 1,035,000**
Contingency (25%)					**$ 145,000**		**$ 154,000**		**$ 172,000**		**$ 194,000**		**$ 259,000**
Alternative 2 Total					**$ 725,000**		**$ 770,000**		**$ 858,000**		**$ 971,000**		**$ 1,294,000**

CITY OF LA PORTE
CITY-WIDE DRAINAGE STUDY
KLOTZ ASSOCIATES PROJECT NO. 0127.008.000
COST ESTIMATE FOR ALTERNATIVE 3

Table 8

Alternative 3															
				5-Year Design		10-Year Design		25-Year Design		50-Year Design		100-Year Design	
Item No.	Description	Unit	Unit Price	Quantity	Round Total Cost	Quantity	Round Total Cost	Quantity	Round Total Cost	Quantity	Round Total Cost	Quantity	Round Total Cost
1	Storm Sewer Installation	CY	$ 45.70	2742	$ 125,000	2742	$ 125,000	2742	$ 125,000	2742	$ 125,000	2742	$ 125,000
2	Trench Safety	LF	$ 1.50	2742	$ 4,000	2742	$ 4,000	2742	$ 4,000	2742	$ 4,000	2742	$ 4,000
3	24" RCP	LF	$ 124.00	40	$ 5,000	40	$ 5,000	40	$ 5,000	40	$ 5,000	40	$ 5,000
4	36" RCP	LF	$ 146.00	463	$ 68,000	463	$ 68,000		$ -		$ -		$ -
5	42" RCP	LF	$ 172.00	819	$ 141,000		$ -	463	$ 80,000		$ -		$ -
6	48" RCP	LF	$ 206.00		$ -	819	$ 169,000		$ -	463	$ 95,000	463	$ 95,000
7	54" RCP	LF	$ 217.00		$ -		$ -	819	$ 178,000	490	$ 106,000		$ -
8	60" RCP	LF	$ 228.00		$ -		$ -		$ -		$ -	490	$ 112,000
	66" RCP		$ 285.00		$ -		$ -		$ -	329	$ 94,000		
9	72" RCP	LF	$ 293.00		$ -		$ -		$ -		$ -	329	$ 96,000
10	Type B-B Inlet	EA	$ 2,700.00	2	$ 5,000	2	$ 5,000	2	$ 5,000	2	$ 5,000	2	$ 5,000
11	Type E Inlet	EA	$ 2,500.00	6	$ 15,000	6	$ 15,000	6	$ 15,000	6	$ 15,000	6	$ 15,000
12	Manhole	EA	$ 2,609.00	6	$ 16,000	6	$ 16,000	6	$ 16,000	6	$ 16,000	6	$ 16,000
13	Hydro mulching	ACRE	$ 1,700.00	0.24	$ -	0.24	$ -	0.24	$ -	0.24	$ -	0.24	$ -
	Alternative 3 Subtotal				**$ 379,000**		**$ 407,000**		**$ 428,000**		**$ 465,000**		**$ 473,000**
	Contingency (25%)				**$ 95,000**		**$ 102,000**		**$ 107,000**		**$ 116,000**		**$ 118,000**
	Alternate 3 Total				**$ 474,000**		**$ 509,000**		**$ 535,000**		**$ 581,000**		**$ 591,000**



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VICINITY MAP

CITY OF LA PORTE
CREEKMONT PARK
DRAINAGE AND OVERFLOW PATH

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
SCALE: 1" = 5000'	1
DATE: MAY 2008	

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AERIAL MAP WITH
LiDAR BASED CONTOURS
Aerial Source: AE April 2006

CITY OF LA PORTE
CREEKMONT PARK
DRAINAGE AND OVERFLOW PATH

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
SCALE: 1" = 200'	2
DATE: MAY 2008	

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AERIAL MAP WITH
DRAINAGE AREAS
Aerial Source: AE April 2006

CITY OF LA PORTE
CREEKMONT PARK
DRAINAGE AND OVERFLOW PATH

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
SCALE: 1" = 500'	3
DATE: MAY 2008	

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CREEKMONT SUBDIVISION
SECTION 2
EXISTING STORM SEWER

CITY OF LA PORTE
CREEKMONT PARK
DRAINAGE AND OVERFLOW PATH

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
SCALE: 1" = 500'	4
DATE: MAY 2008	

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ALTERNATIVE 1
CONNECTING TO NORTH H STREET

CITY OF LA PORTE
CREEKMONT PARK
DRAINAGE AND OVERFLOW PATH

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT
SCALE: 1" = 200'	5
DATE: MAY 2008	

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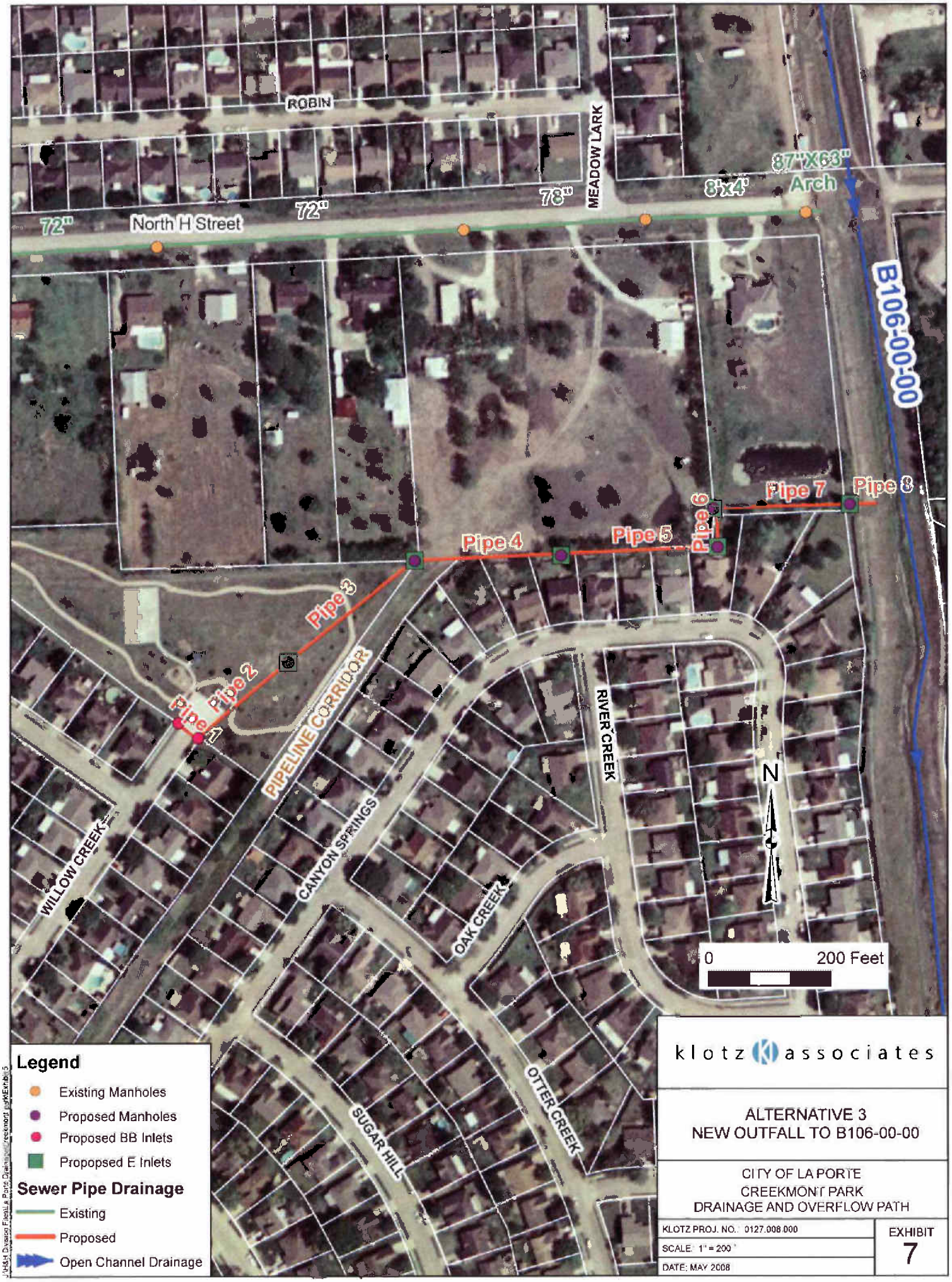
ALTERNATIVE 2
PARALLEL TO NORTH H STREET

CITY OF LA PORTE
CREEKMONT PARK
DRAINAGE AND OVERFLOW PATH

KLOTZ PROJ. NO. 0127.008.000	EXHIBIT
SCALE: 1" = 200'	6
DATE: MAY 2008	



klotz associates

ALTERNATIVE 3
NEW OUTFALL TO B106-00-00

CITY OF LA PORTE
CREEKMONT PARK
DRAINAGE AND OVERFLOW PATH

KLOTZ PROJ. NO.: 0127.008.000	EXHIBIT 7
SCALE: 1" = 200'	
DATE: MAY 2008	

Appendix A
Representative Photographs

Photographs Taken: February 26, 2008

Creekmont Park

Photographs Taken: February 26, 2008

Creekmont Park Parking Lot

Photographs Taken: February 26, 2008

Creekmont Park Playground Equipment

Photographs Taken: February 26, 2008

Creekmont Park Entrance

Photographs Taken: February 26, 2008

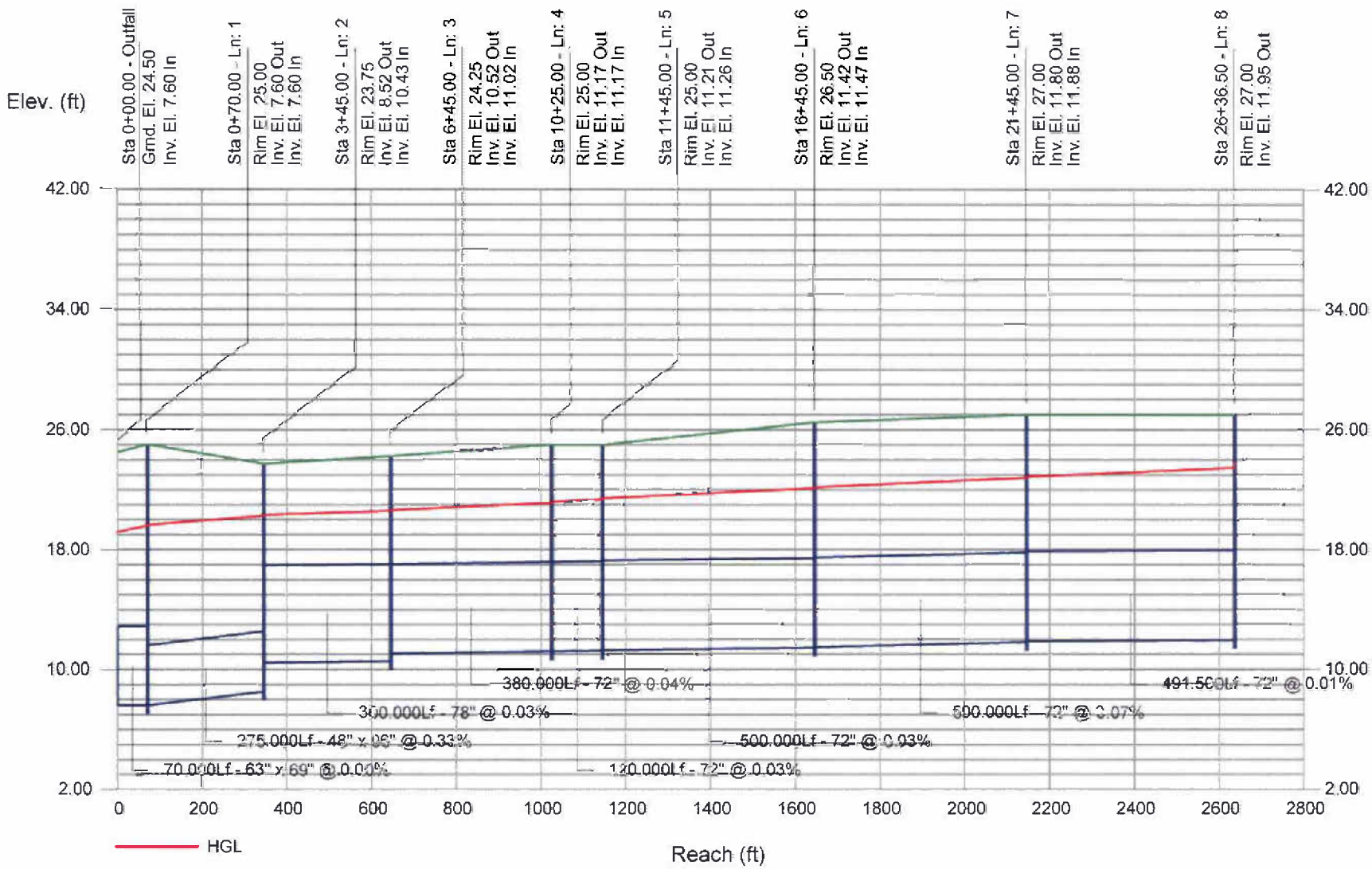
Creekmont Park

Appendix B
Hydraflow Storm Sewer Output

EXISTING NORTH H STREET

Storm Sewer Profile

Proj. file: North_H_Existing.stm



Storm Sewer Summary Report

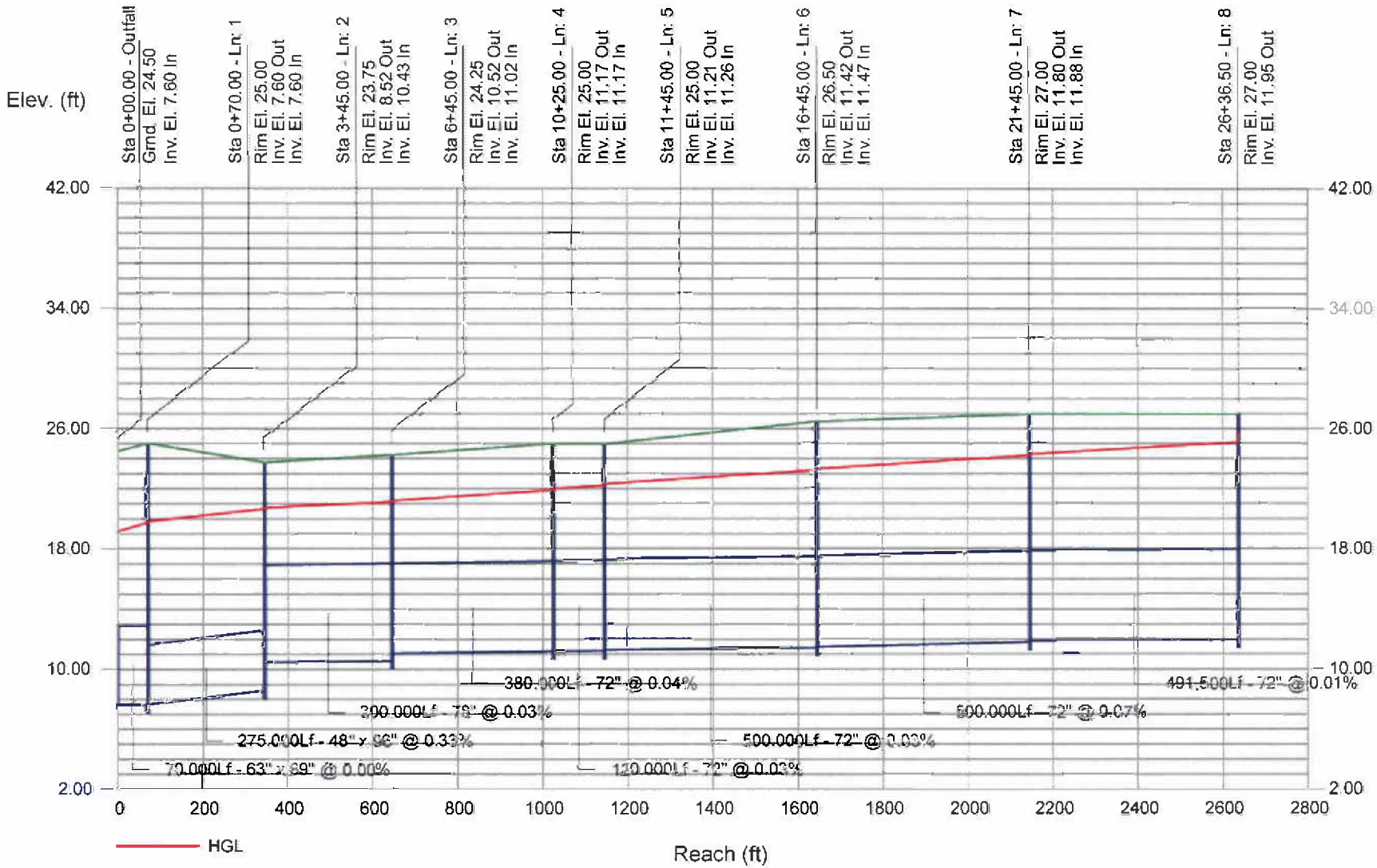
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		175.5	63x69	Box	70.000	7.60	7.60	0.000	19.16*	19.56*	0.08	19.64	End	Manhole
2		178.1	48x96	Box	275.000	7.60	8.52	0.335	19.64*	20.23*	0.07	20.31	1	Manhole
3		156.5	78	Cir	300.000	10.43	10.52	0.030	20.31*	20.57*	0.05	20.63	2	Manhole
4		154.2	72	Cir	380.000	11.02	11.17	0.039	20.63*	21.13*	0.07	21.20	3	Manhole
5		155.4	72	Cir	120.000	11.17	11.21	0.033	21.20*	21.36*	0.07	21.43	4	Manhole
6		153.9	72	Cir	500.000	11.26	11.42	0.032	21.43*	22.09*	0.07	22.16	5	Manhole
7		151.6	72	Cir	500.000	11.47	11.80	0.066	22.16*	22.80*	0.07	22.87	6	Manhole
8		147.2	72	Cir	491.500	11.88	11.95	0.014	22.87*	23.46*	0.42	23.88	7	Manhole

North H Street (Existing) | Number of lines: 8 | Run Date: 06-03-2008

NOTES: Return period = 5 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

Proj. file: North_H_Existing 10 Yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Summary Report

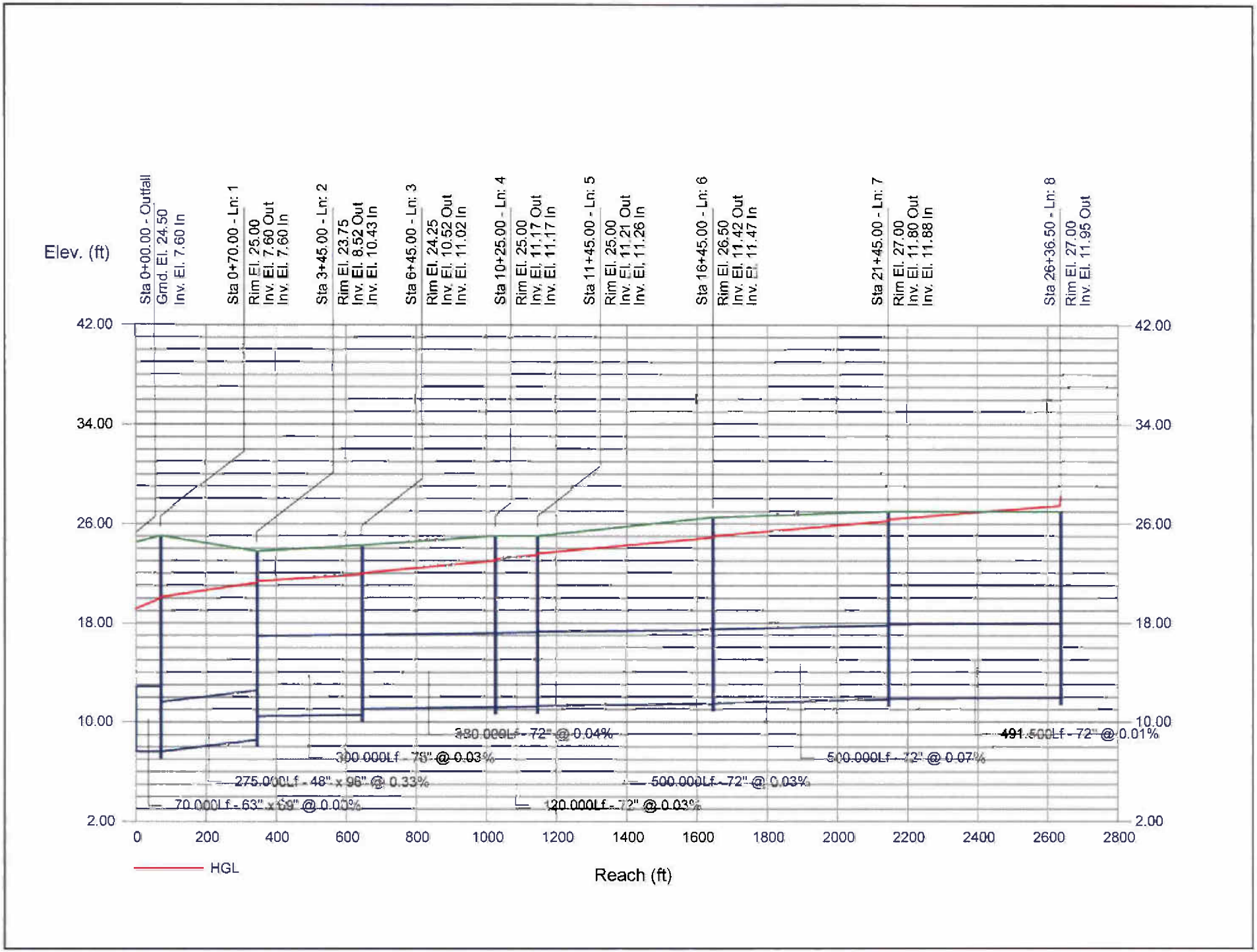
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		206.2	63x69	Box	70.000	7.60	7.60	0.000	19.16*	19.72*	0.11	19.83	End	Manhole
2		208.7	48x96	Box	275.000	7.60	8.52	0.335	19.83*	20.64*	0.10	20.74	1	Manhole
3		186.2	78	Cir	300.000	10.43	10.52	0.030	20.74*	21.12*	0.07	21.19	2	Manhole
4		182.7	72	Cir	380.000	11.02	11.17	0.039	21.19*	21.90*	0.10	22.00	3	Manhole
5		183.9	72	Cir	120.000	11.17	11.21	0.033	22.00*	22.22*	0.10	22.32	4	Manhole
6		181.1	72	Cir	590.000	11.26	11.42	0.032	22.32*	23.24*	0.10	23.33	5	Manhole
7		177.4	72	Cir	500.000	11.47	11.80	0.066	23.33*	24.21*	0.09	24.30	6	Manhole
8		171.1	72	Cir	491.500	11.88	11.95	0.014	24.30*	25.10*	0.57	25.67	7	Manhole

North H Street (Existing) | Number of lines: 8 | Run Date: 06-03-2008

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

Proj. file: North_H_Existing 25 Yr.stm



Storm Sewer Summary Report

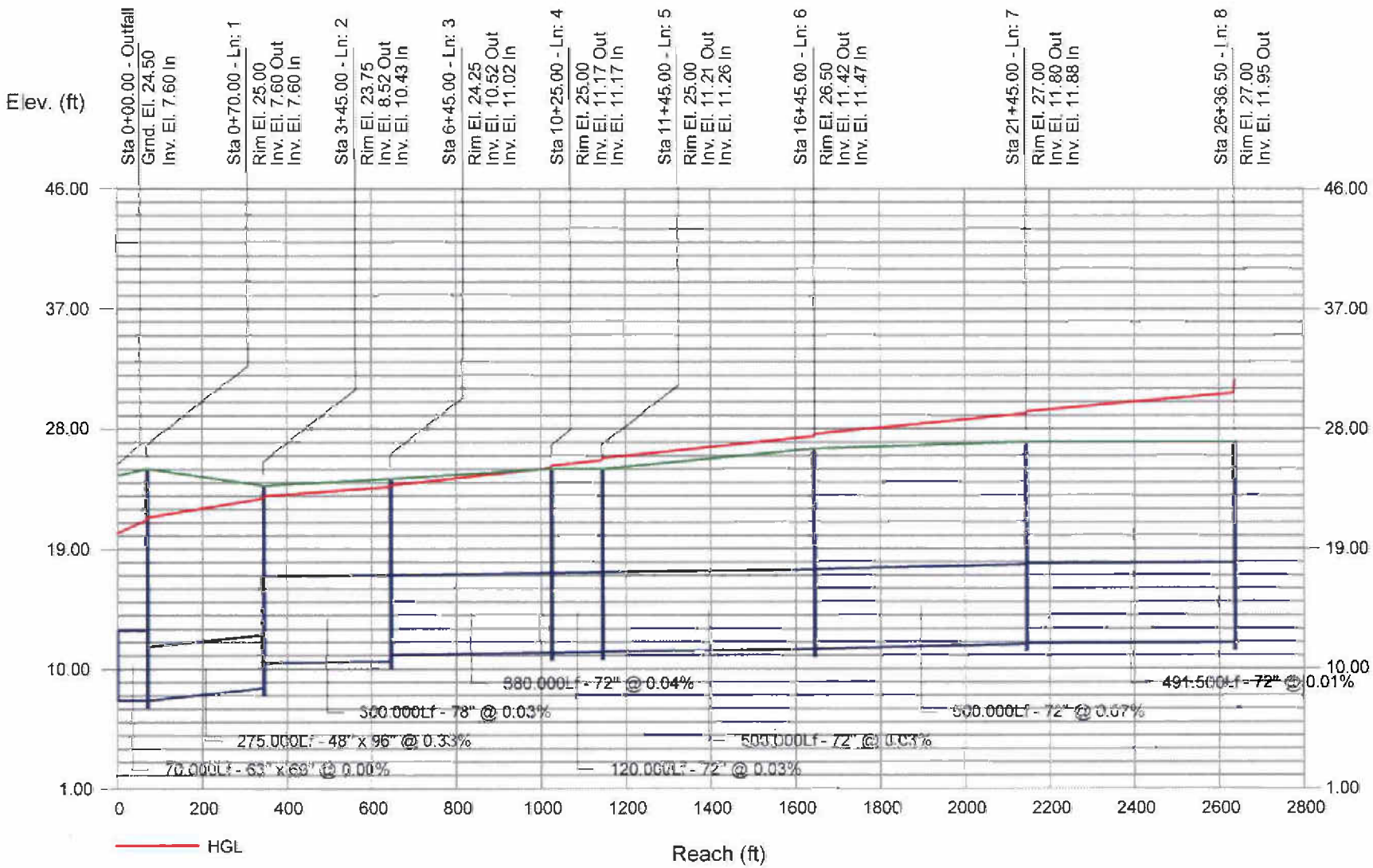
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		243.5	63x69	Box	70.000	7.60	7.60	0.000	19.16*	19.94*	0.15	20.09	End	Manhole
2		246.0	48x96	Box	275.000	7.60	8.52	0.335	20.09*	21.22*	0.14	21.36	1	Manhole
3		222.4	78	Cir	300.000	10.43	10.52	0.030	21.36*	21.90*	0.10	22.00	2	Manhole
4		217.6	72	Cir	380.000	11.02	11.17	0.039	22.00*	23.01*	0.14	23.14	3	Manhole
5		218.7	72	Cir	120.000	11.17	11.21	0.033	23.14*	23.46*	0.14	23.60	4	Manhole
6		214.4	72	Cir	500.000	11.26	11.42	0.032	23.60*	24.89*	0.13	25.02	5	Manhole
7		208.9	72	Cir	500.000	11.47	11.80	0.066	25.02*	26.24*	0.13	26.36	6	Manhole
8		200.6	72	Cir	491.500	11.88	11.95	0.014	26.36*	27.47*	0.78	28.25	7	Manhole

North H Street (Existing) | Number of lines: 8 | Run Date: 06-03-2008

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

Proj. file: North_H_Existing 50 Yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Summary Report

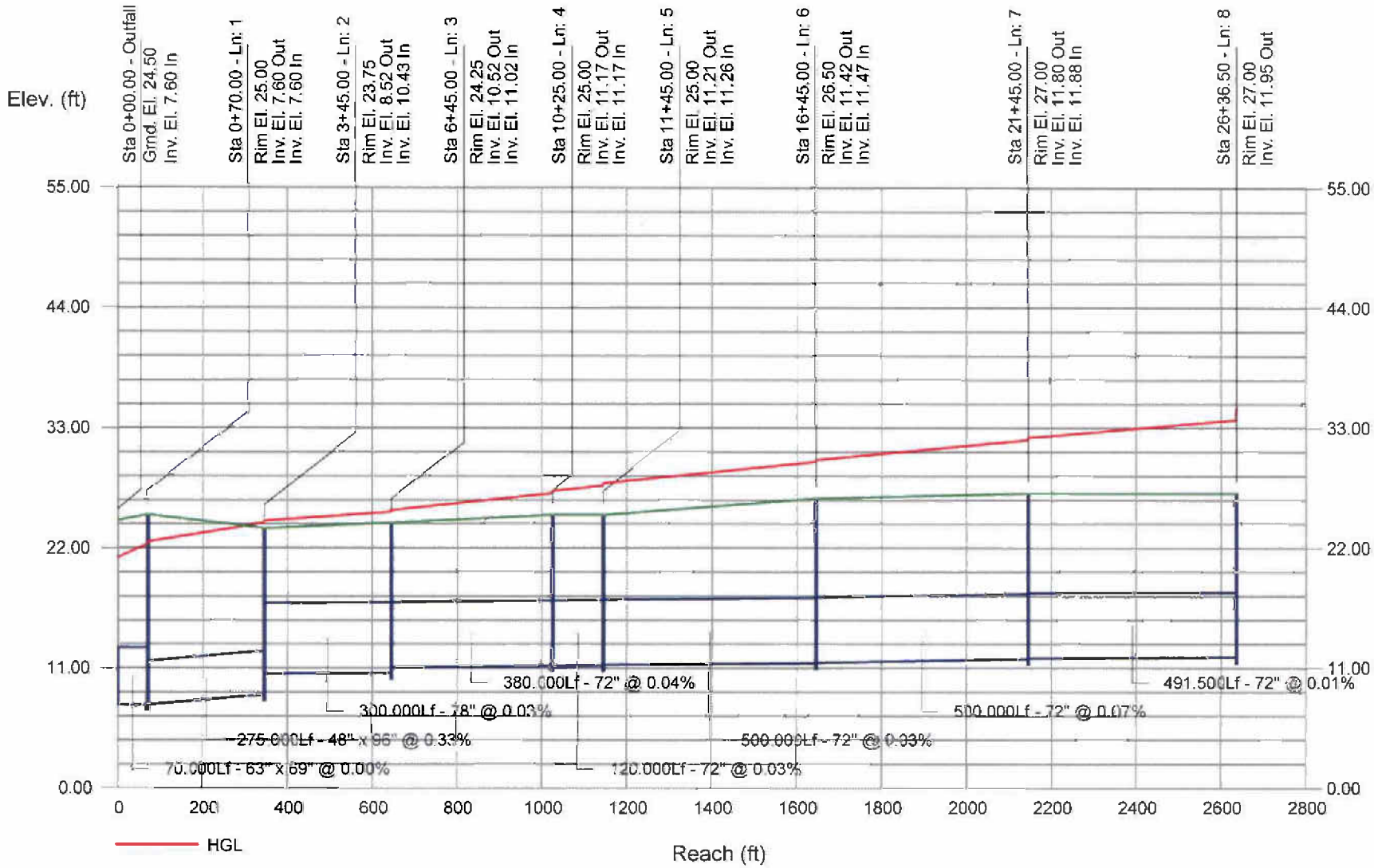
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		272.9	63x69	Box	70.000	7.60	7.60	0.000	20.21*	21.19*	0.19	21.38	End	Manhole
2		275.3	48x96	Box	275.000	7.60	8.52	0.335	21.38*	22.79*	0.17	22.96	1	Manhole
3		250.8	78	Cir	300.000	10.43	10.52	0.030	22.96*	23.65*	0.13	23.79	2	Manhole
4		244.9	72	Cir	380.000	11.02	11.17	0.039	23.79*	25.06*	0.18	25.23	3	Manhole
5		246.0	72	Cir	120.000	11.17	11.21	0.033	25.23*	25.64*	0.18	25.81	4	Manhole
6		240.6	72	Cir	500.000	11.26	11.42	0.032	25.81*	27.43*	0.17	27.60	5	Manhole
7		233.8	72	Cir	500.000	11.47	11.80	0.066	27.60*	29.12*	0.16	29.28	6	Manhole
8		223.9	72	Cir	491.500	11.88	11.95	0.014	29.28*	30.65*	0.97	31.63	7	Manhole

North H Street (Existing) | Number of lines: 8 | Run Date: 06-03-2008

NOTES: Return period = 50 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

Proj. file: North_H_Existing 100 Yr.stm



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		299.2	63x69	Box	70.000	7.60	7.60	0.000	21.15*	22.33*	0.23	22.56	End	Manhole
2		301.6	48x96	Box	275.000	7.60	8.52	0.335	22.56*	24.25*	0.21	24.46	1	Manhole
3		276.3	78	Cir	300.000	10.43	10.52	0.030	24.46*	25.29*	0.16	25.45	2	Manhole
4		269.5	72	Cir	380.000	11.02	11.17	0.039	25.45*	26.99*	0.21	27.20	3	Manhole
5		270.5	72	Cir	120.000	11.17	11.21	0.033	27.20*	27.69*	0.21	27.91	4	Manhole
6		264.1	72	Cir	500.000	11.26	11.42	0.032	27.91*	29.85*	0.20	30.06	5	Manhole
7		256.2	72	Cir	500.000	11.47	11.80	0.066	30.06*	31.88*	0.19	32.08	6	Manhole
8		244.8	72	Cir	491.500	11.88	11.95	0.014	32.08*	33.72*	1.17	34.89	7	Manhole

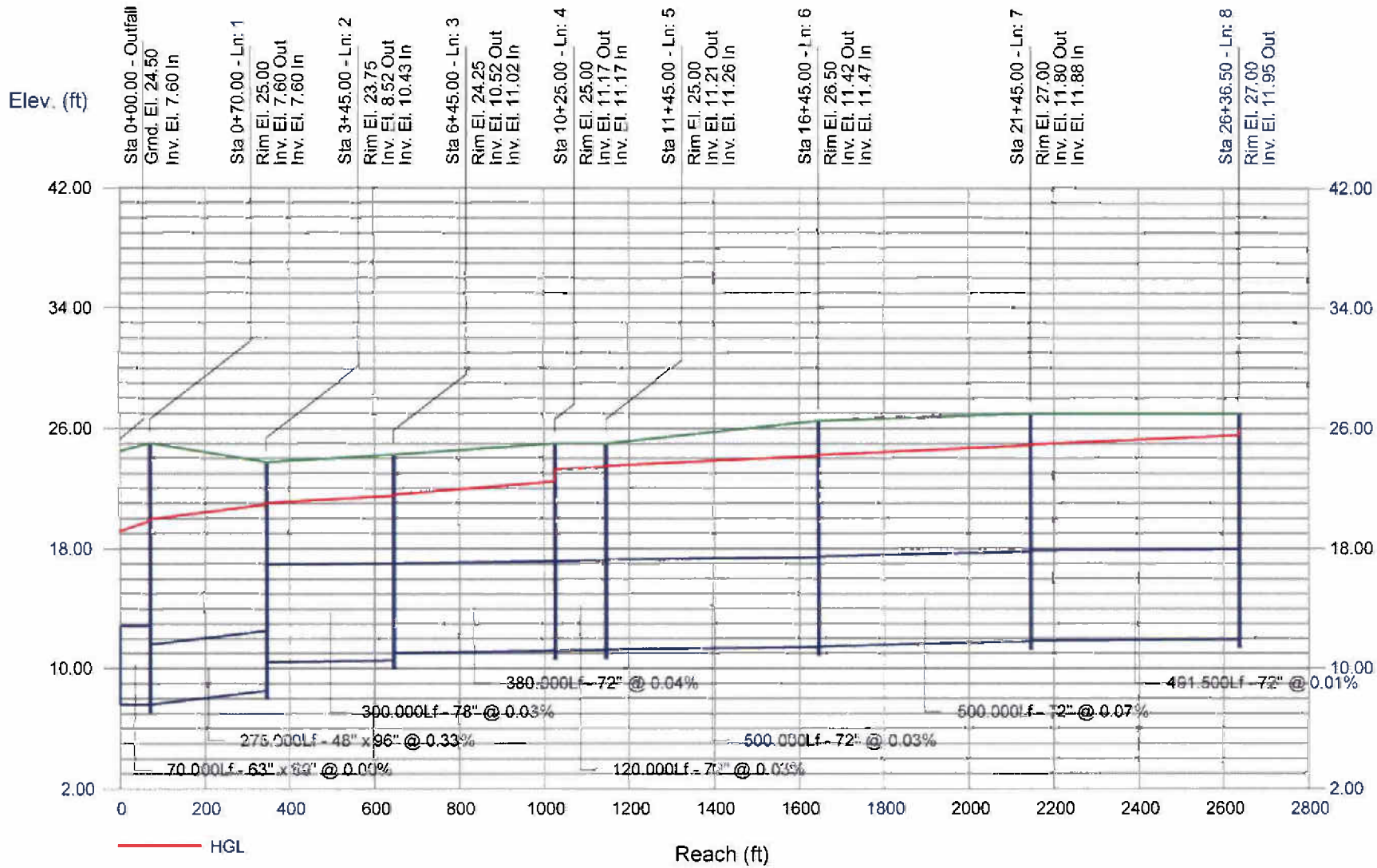
North H Street (Existing) | Number of lines: 8 | Run Date: 06-03-2008

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown).

ALTERNATIVE 1

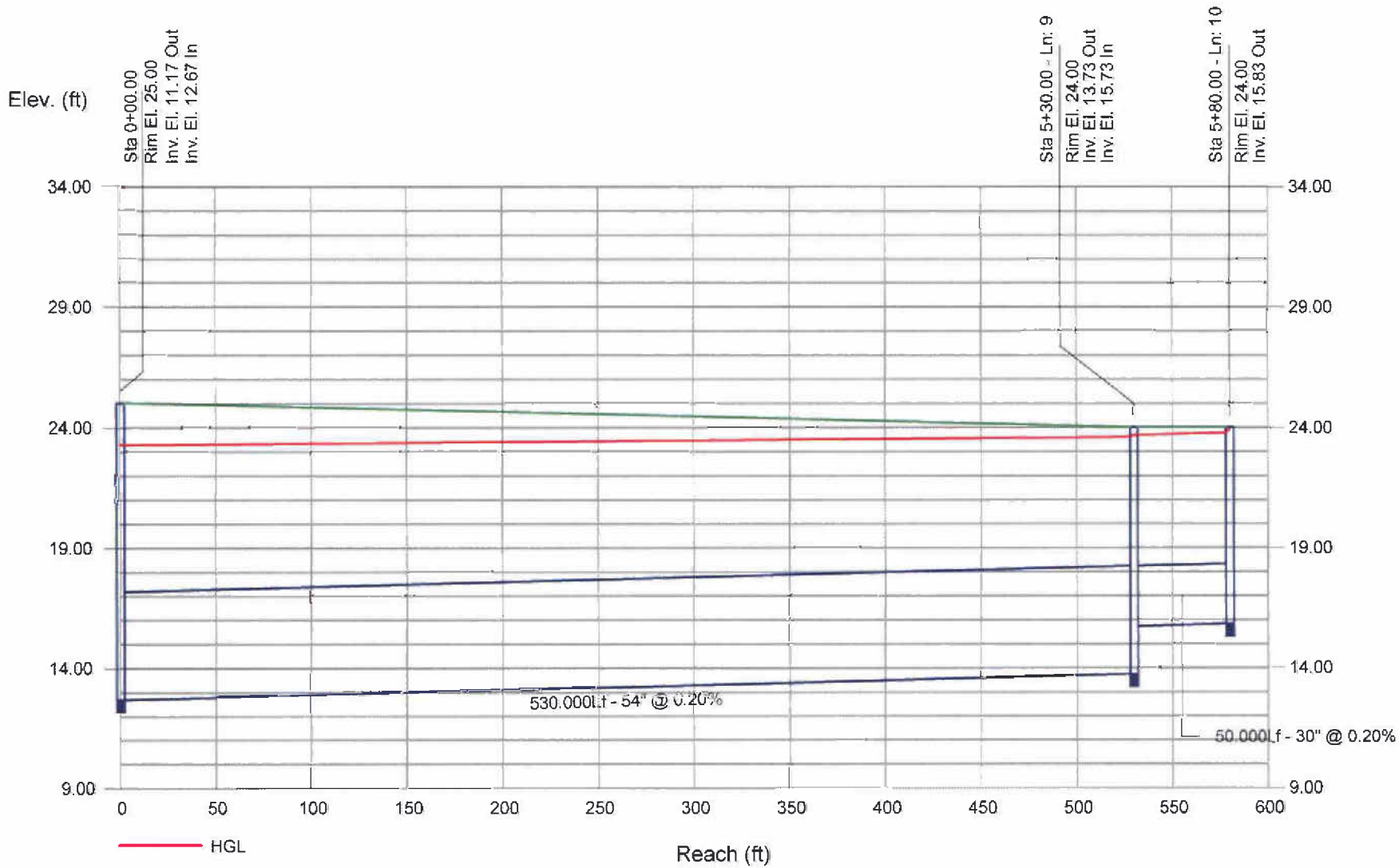
Storm Sewer Profile

Proj. file: Alternative 1.stm



Storm Sewer Profile

Proj. file: Alternative 1.stm



Storm Sewer Summary Report

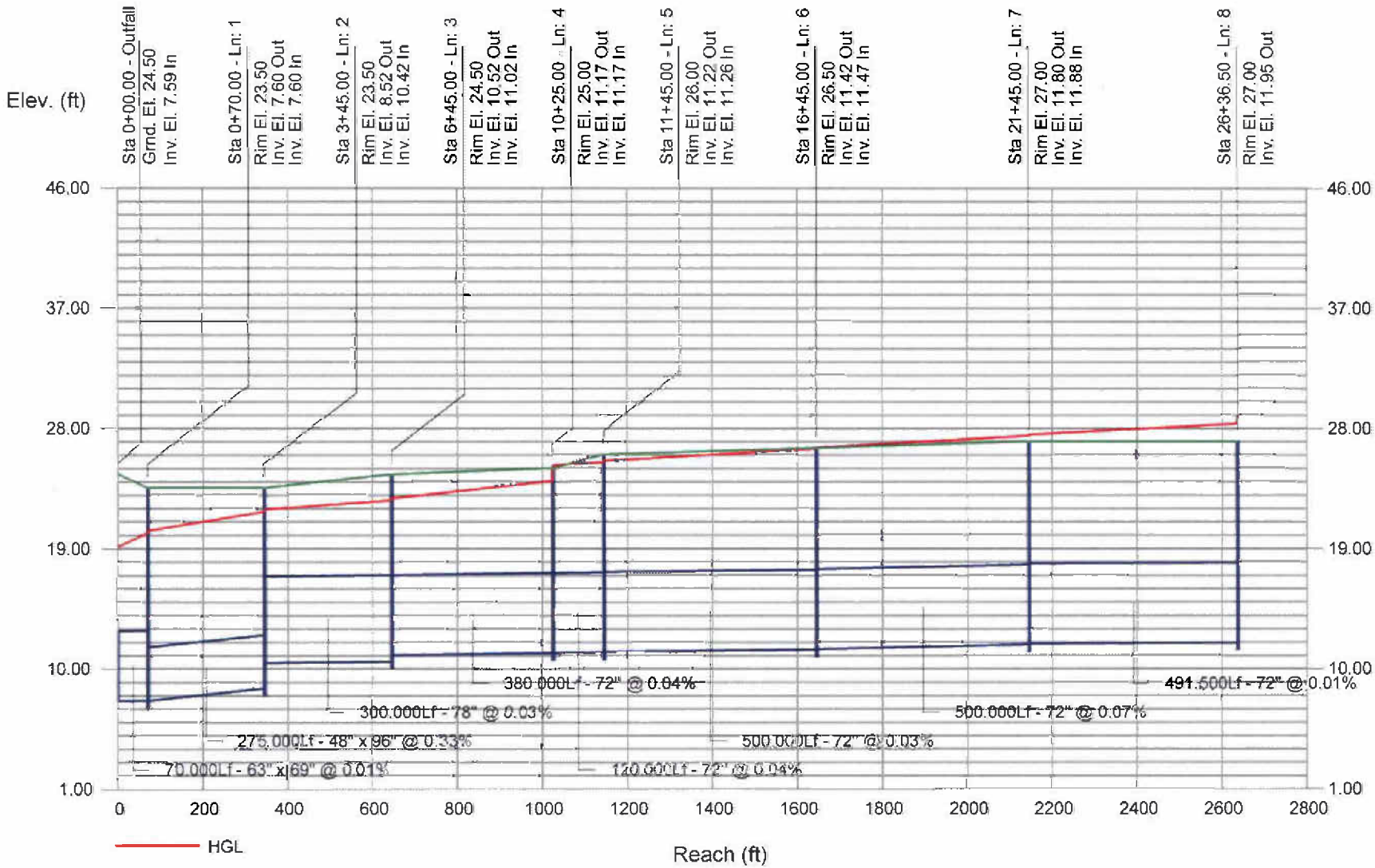
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		226.2	63x69	Box	70.000	7.60	7.60	0.000	19.16*	19.83*	0.13	19.96	End	Manhole
2		228.3	48x96	Box	275.000	7.60	8.52	0.335	19.96*	20.93*	0.12	21.05	1	Manhole
3		205.9	78	Cir	300.000	10.43	10.52	0.030	21.05*	21.52*	0.09	21.61	2	Manhole
4		202.7	72	Cir	380.000	11.02	11.17	0.039	21.61*	22.48*	0.80	23.28	3	Manhole
5		155.4	72	Cir	120.000	11.17	11.21	0.033	23.28*	23.44*	0.07	23.51	4	Manhole
6		153.9	72	Cir	500.000	11.26	11.42	0.032	23.51*	24.17*	0.07	24.24	5	Manhole
7		151.6	72	Cir	500.000	11.47	11.80	0.066	24.24*	24.88*	0.07	24.95	6	Manhole
8		147.2	72	Cir	491.500	11.88	11.95	0.014	24.95*	25.54*	0.42	25.96	7	Manhole
9		48.50	54	Cir	530.000	12.67	13.73	0.200	23.28*	23.60*	0.08	23.68	4	Manhole
10		16.60	30	Cir	50.000	15.73	15.83	0.200	23.68*	23.76*	0.18	23.94	9	Manhole

North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 5 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

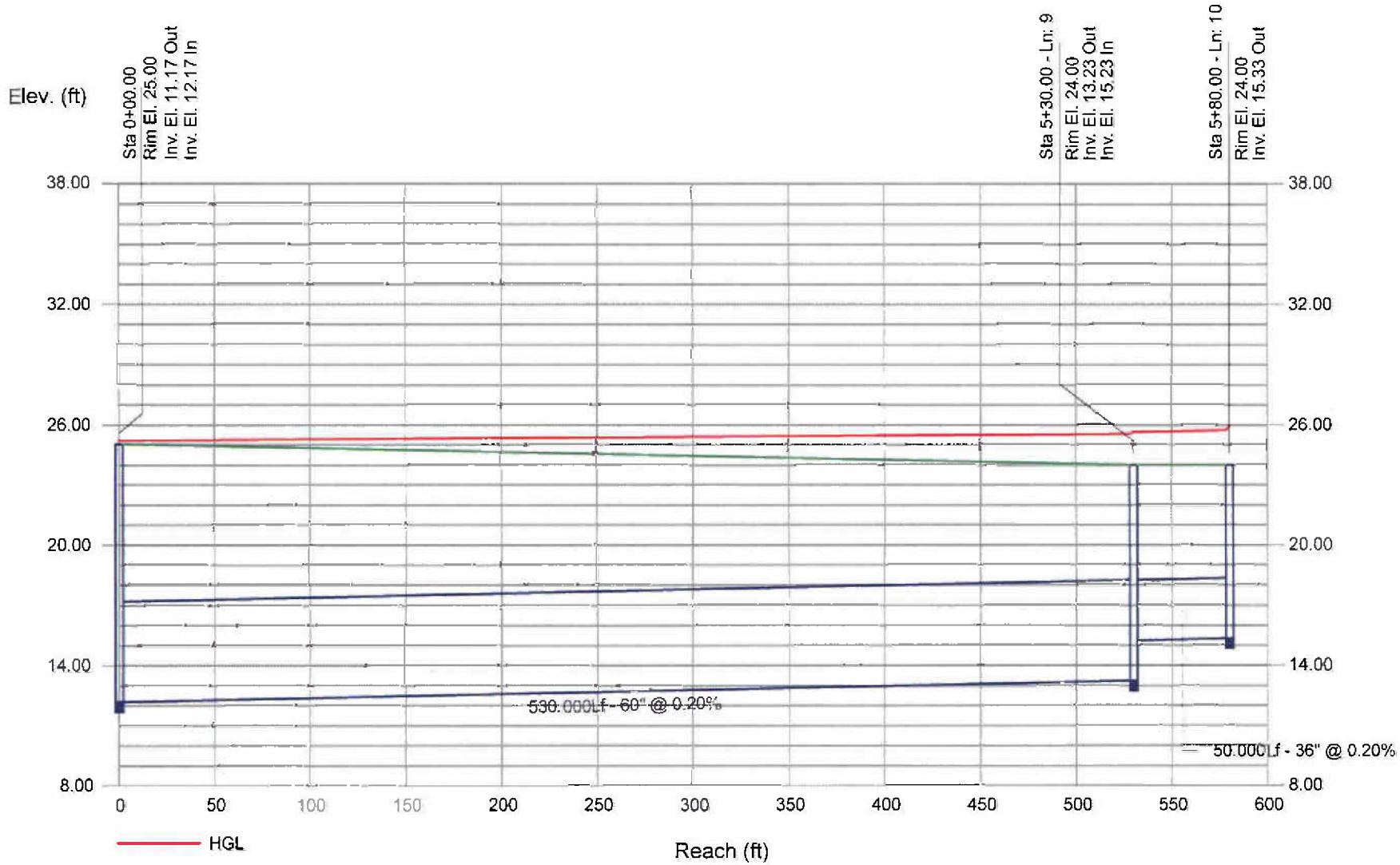
Proj. file: Alternative 1 10yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Profile

Proj. file: Alternative 1 10yr.stm



Storm Sewer Summary Report

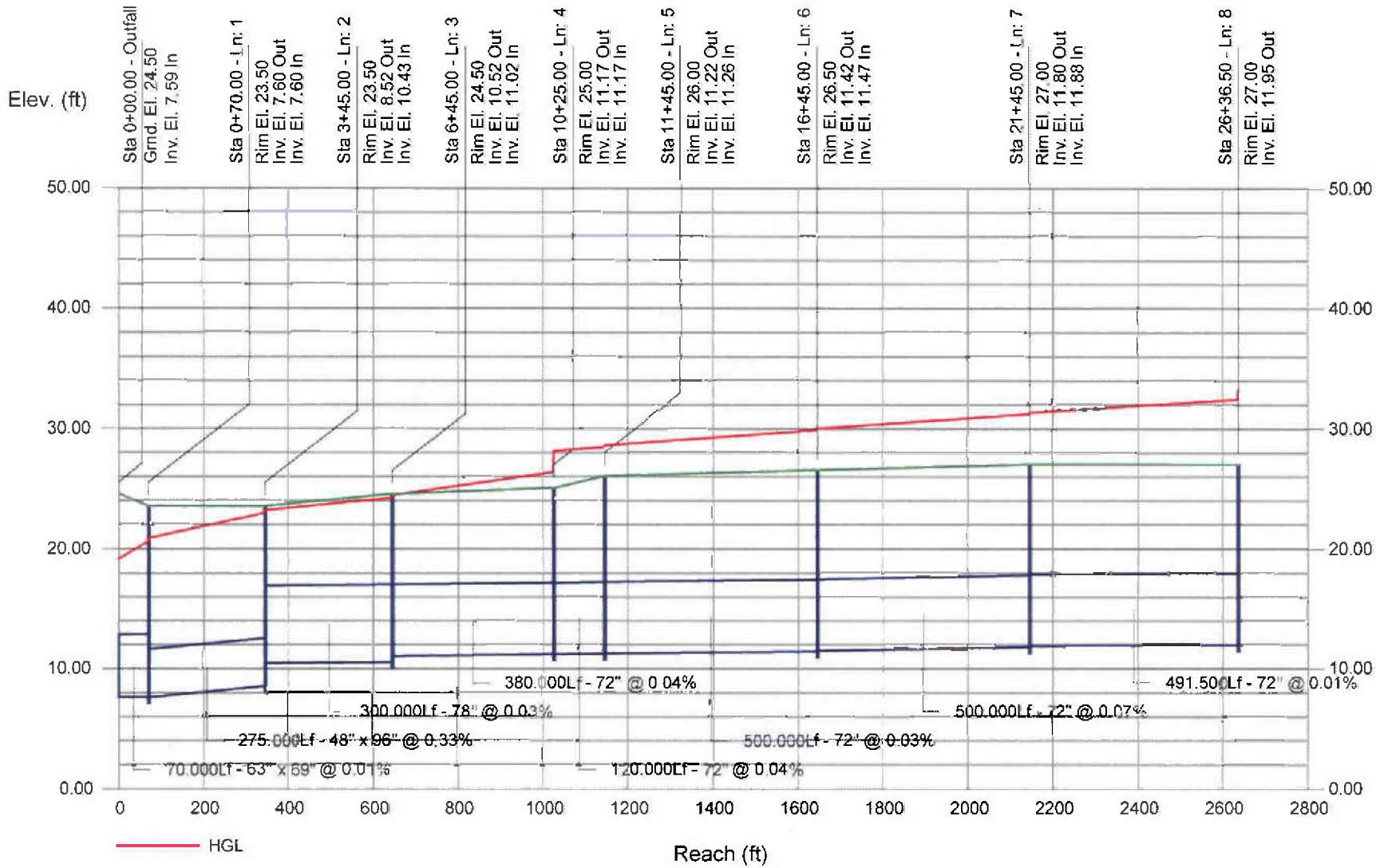
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		272.9	63x69	Box	70.000	7.59	7.60	0.014	19.16*	20.14*	0.19	20.33	End	Manhole
2		274.9	48x96	Box	275.000	7.60	8.52	0.335	20.33*	21.74*	0.17	21.91	1	Manhole
3		251.5	78	Cir	300.000	10.42	10.52	0.033	21.91*	22.60*	0.13	22.73	2	Manhole
4		247.1	72	Cir	380.000	11.02	11.17	0.039	22.73*	24.03*	1.19	25.22	3	Manhole
5		183.9	72	Cir	120.000	11.17	11.22	0.042	25.22*	25.44*	0.10	25.54	4	Manhole
6		181.1	72	Cir	500.000	11.26	11.42	0.032	25.54*	26.46*	0.10	26.55	5	Manhole
7		177.4	72	Cir	500.000	11.47	11.80	0.066	26.55*	27.43*	0.09	27.52	6	Manhole
8		171.1	72	Cir	491.500	11.88	11.95	0.014	27.52*	28.32*	0.57	28.89	7	Manhole
9		64.40	60	Cir	530.000	12.17	13.23	0.200	25.22*	25.54*	0.09	25.63	4	Manhole
10		28.00	36	Cir	50.000	15.23	15.33	0.200	25.63*	25.72*	0.24	25.97	9	Manhole

North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

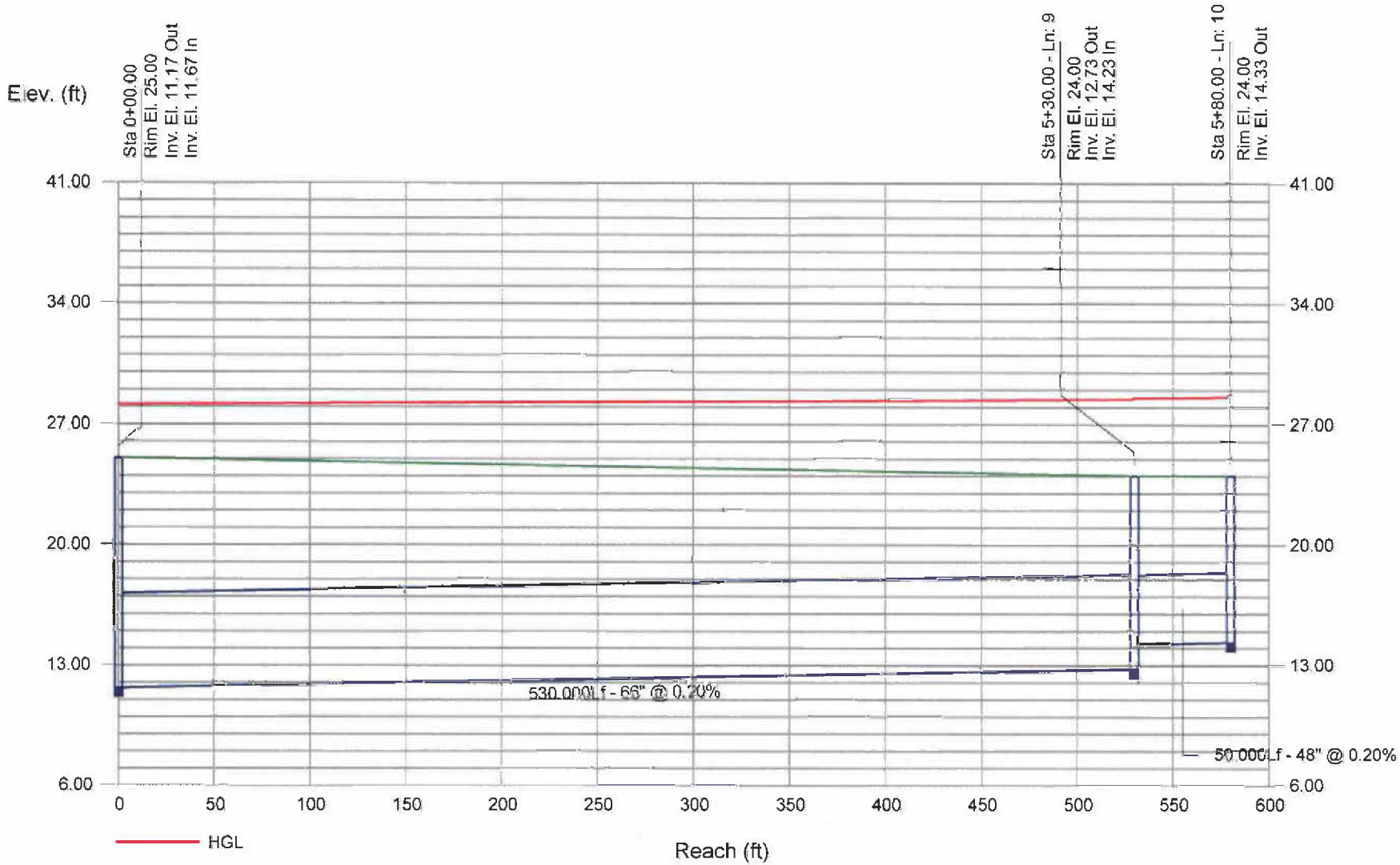
Proj. file: Alternative 1 25yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Profile

Proj. file: Alternative 1 25yr.stm



Storm Sewer Summary Report

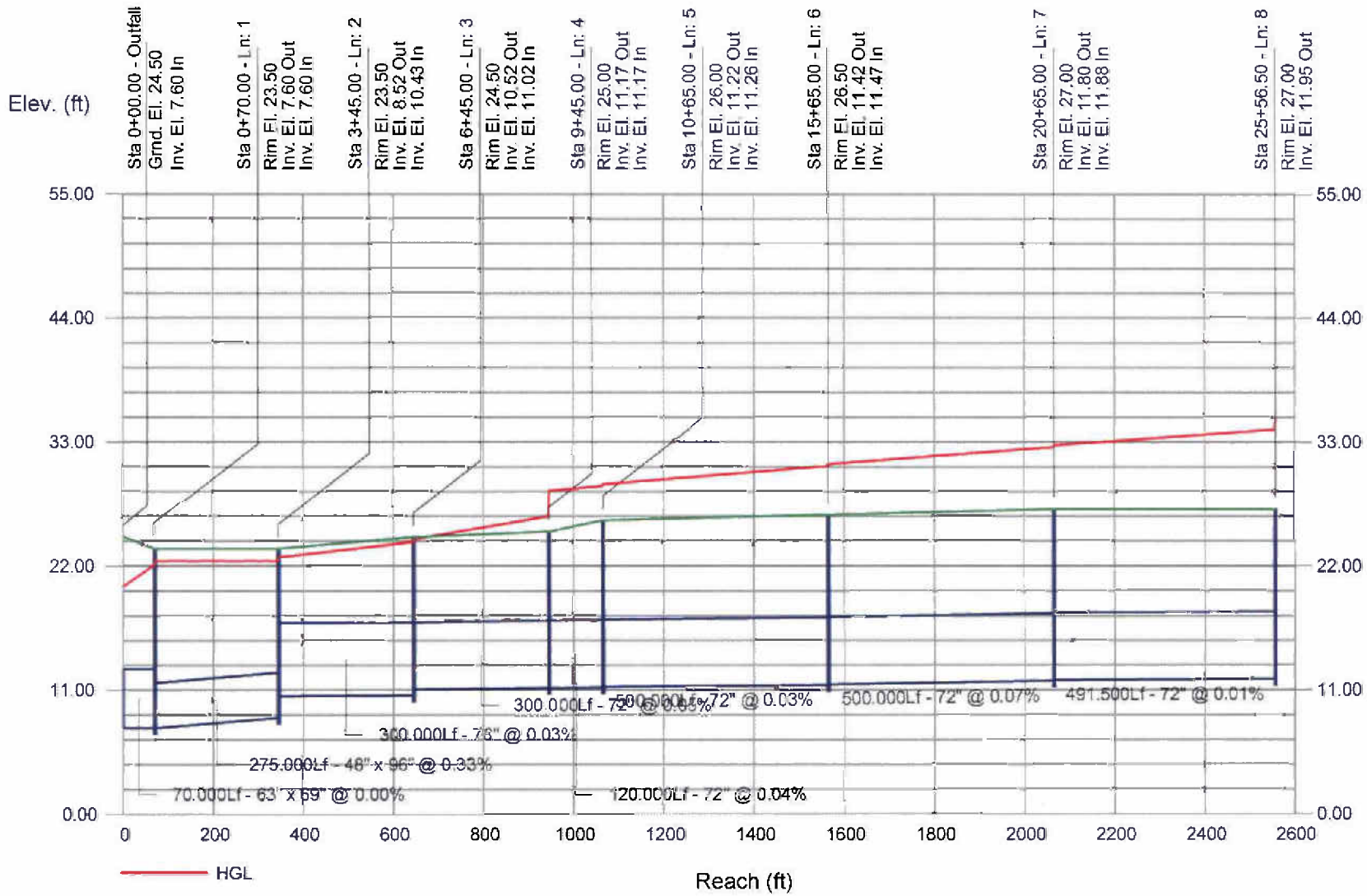
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		330.1	63x69	Box	70.000	7.59	7.60	0.014	19.16*	20.59*	0.28	20.87	End	Manhole
2		332.0	48x96	Box	275.000	7.60	8.52	0.335	20.87*	22.93*	0.25	23.18	1	Manhole
3		307.5	78	Cir	300.000	10.43	10.52	0.030	23.18*	24.21*	0.20	24.41	2	Manhole
4		301.7	72	Cir	380.000	11.02	11.17	0.039	24.41*	26.34*	1.77	28.11	3	Manhole
5		218.7	72	Cir	120.000	11.17	11.22	0.042	28.11*	28.43*	0.14	28.57	4	Manhole
6		214.4	72	Cir	500.000	11.26	11.42	0.032	28.57*	29.85*	0.13	29.98	5	Manhole
7		208.9	72	Cir	500.000	11.47	11.80	0.066	29.98*	31.20*	0.13	31.33	6	Manhole
8		200.6	72	Cir	491.500	11.88	11.95	0.014	31.33*	32.43*	0.78	33.21	7	Manhole
9		84.10	66	Cir	530.000	11.67	12.73	0.200	28.11*	28.44*	0.11	28.55	4	Manhole
10		42.10	48	Cir	50.000	14.23	14.33	0.200	28.55*	28.59*	0.17	28.77	9	Manhole

North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

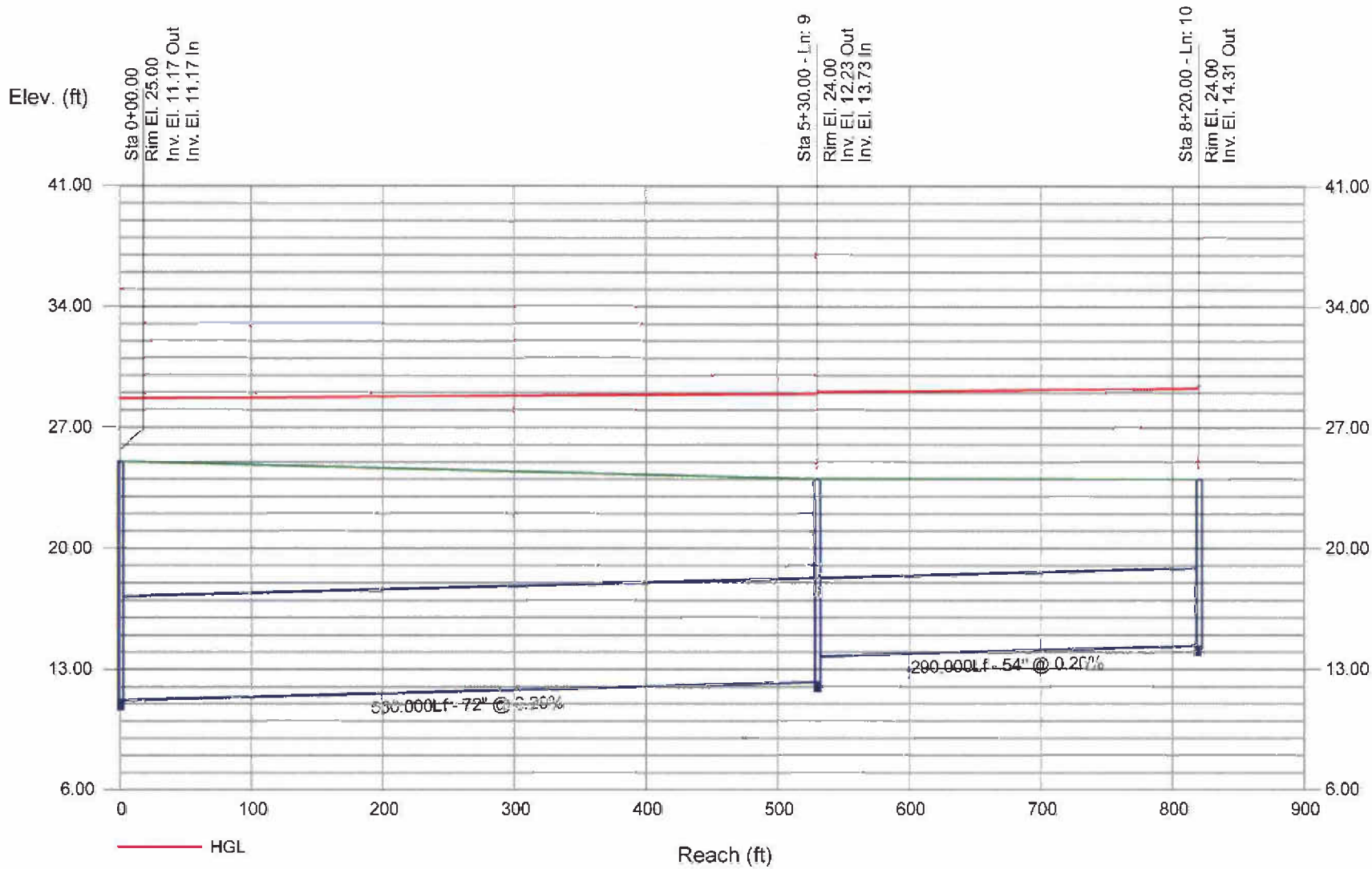
Proj. file: Alternative 1 50yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Profile

Proj. file: Alternative 1 50yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Summary Report

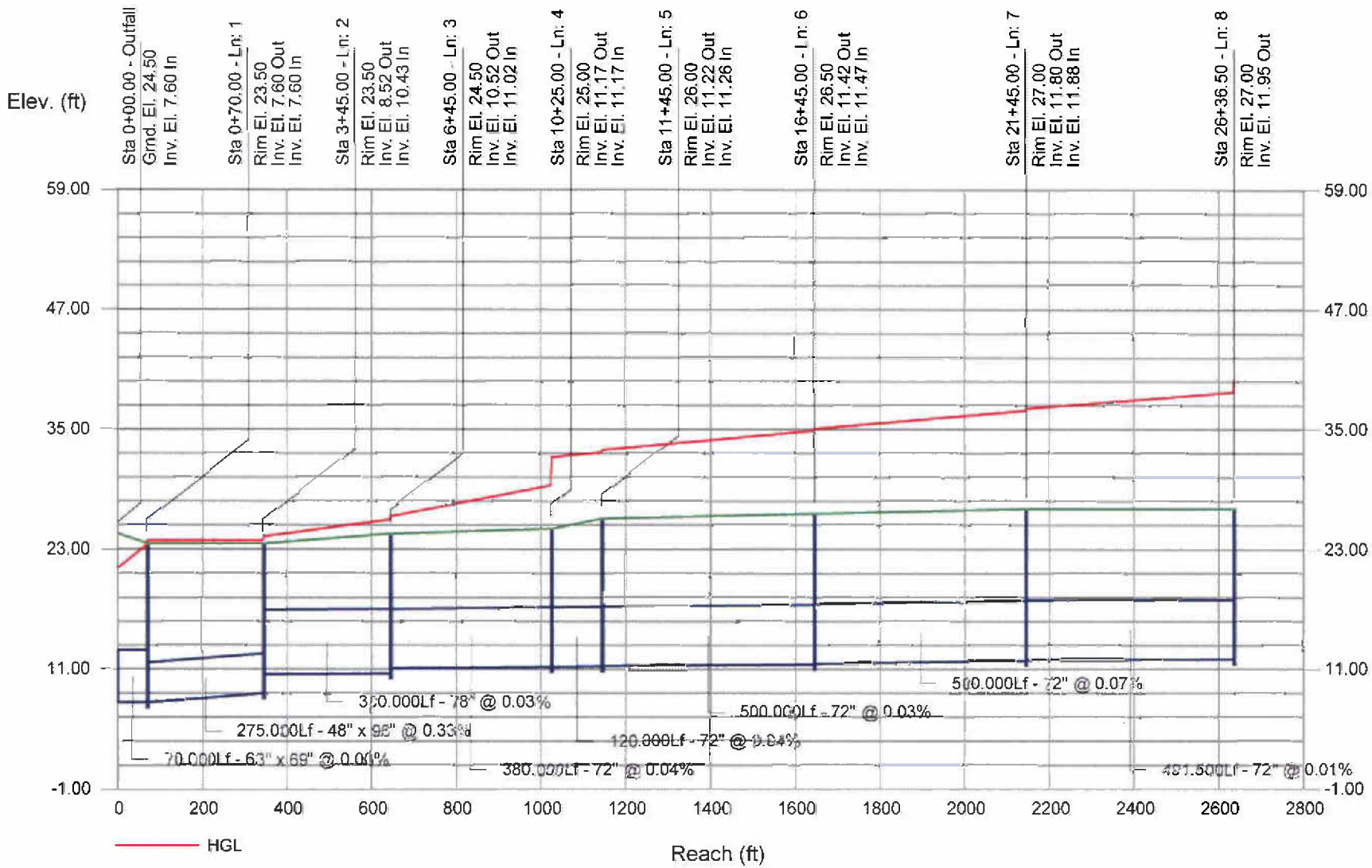
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		375.4	63x69	Box	70.000	7.60	7.60	0.000	20.21*	22.06*	0.36	22.42	End	Manhole
2		377.2	48x96	Box	275.000	7.60	8.52	0.335	22.42*	22.42*	n/a	22.75	1	Manhole
3		351.8	78	Cir	300.000	10.43	10.52	0.030	22.75*	24.10*	0.26	24.36	2	Manhole
4		344.4	72	Cir	300.000	11.02	11.17	0.050	24.36*	26.34*	2.31	28.65	3	Manhole
5		246.0	72	Cir	120.000	11.17	11.22	0.042	28.65*	29.06*	0.18	29.23	4	Manhole
6		240.6	72	Cir	500.000	11.26	11.42	0.032	29.23*	30.85*	0.17	31.02	5	Manhole
7		233.8	72	Cir	500.000	11.47	11.80	0.066	31.02*	32.54*	0.16	32.70	6	Manhole
8		223.9	72	Cir	491.500	11.88	11.95	0.014	32.70*	34.07*	0.97	35.05	7	Manhole
9		99.50	72	Cir	530.000	11.17	12.23	0.200	28.65*	28.94*	0.11	29.05	4	Manhole
10		53.10	54	Cir	290.000	13.73	14.31	0.200	29.05*	29.26*	0.17	29.44	9	Manhole

North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 50 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

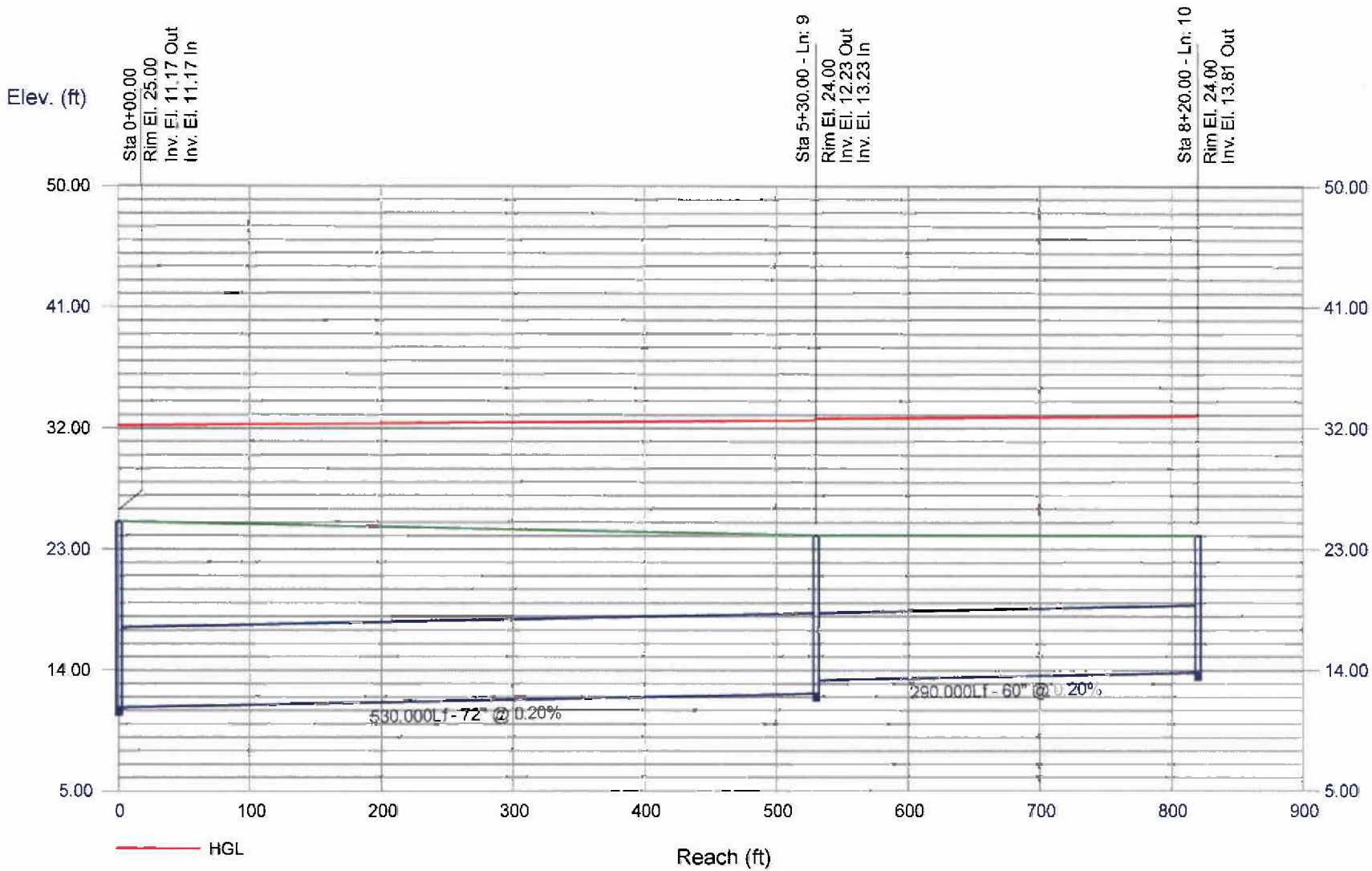
Proj. file: Alternative 1 100yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Profile

Proj. file: Alternative 1 100yr.stm



Hydraflow Storm Sewers Extension

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		415.1	63x69	Box	70.000	7.60	7.60	0.000	21.15*	23.41*	n/a	23.85	End	Manhole
2		416.9	48x96	Box	275.000	7.60	8.52	0.335	23.85*	23.85*	n/a	24.25	1	Manhole
3		390.7	78	Cir	300.000	10.43	10.52	0.030	24.25*	25.92*	0.32	26.24	2	Manhole
4		382.9	72	Cir	380.000	11.02	11.17	0.039	26.24*	29.35*	2.85	32.20	3	Manhole
5		270.5	72	Cir	120.000	11.17	11.22	0.042	32.20*	32.69*	0.21	32.90	4	Manhole
6		264.1	72	Cir	500.000	11.26	11.42	0.032	32.90*	34.85*	0.20	35.05	5	Manhole
7		256.2	72	Cir	500.000	11.47	11.80	0.066	35.05*	36.88*	0.19	37.07	6	Manhole
8		244.8	72	Cir	491.500	11.88	11.95	0.014	37.07*	38.71*	1.17	39.88	7	Manhole
9		113.4	72	Cir	530.000	11.17	12.23	0.200	32.20*	32.58*	0.14	32.72	4	Manhole
10		63.00	60	Cir	290.000	13.23	13.81	0.200	32.72*	32.89*	0.16	33.05	9	Manhole

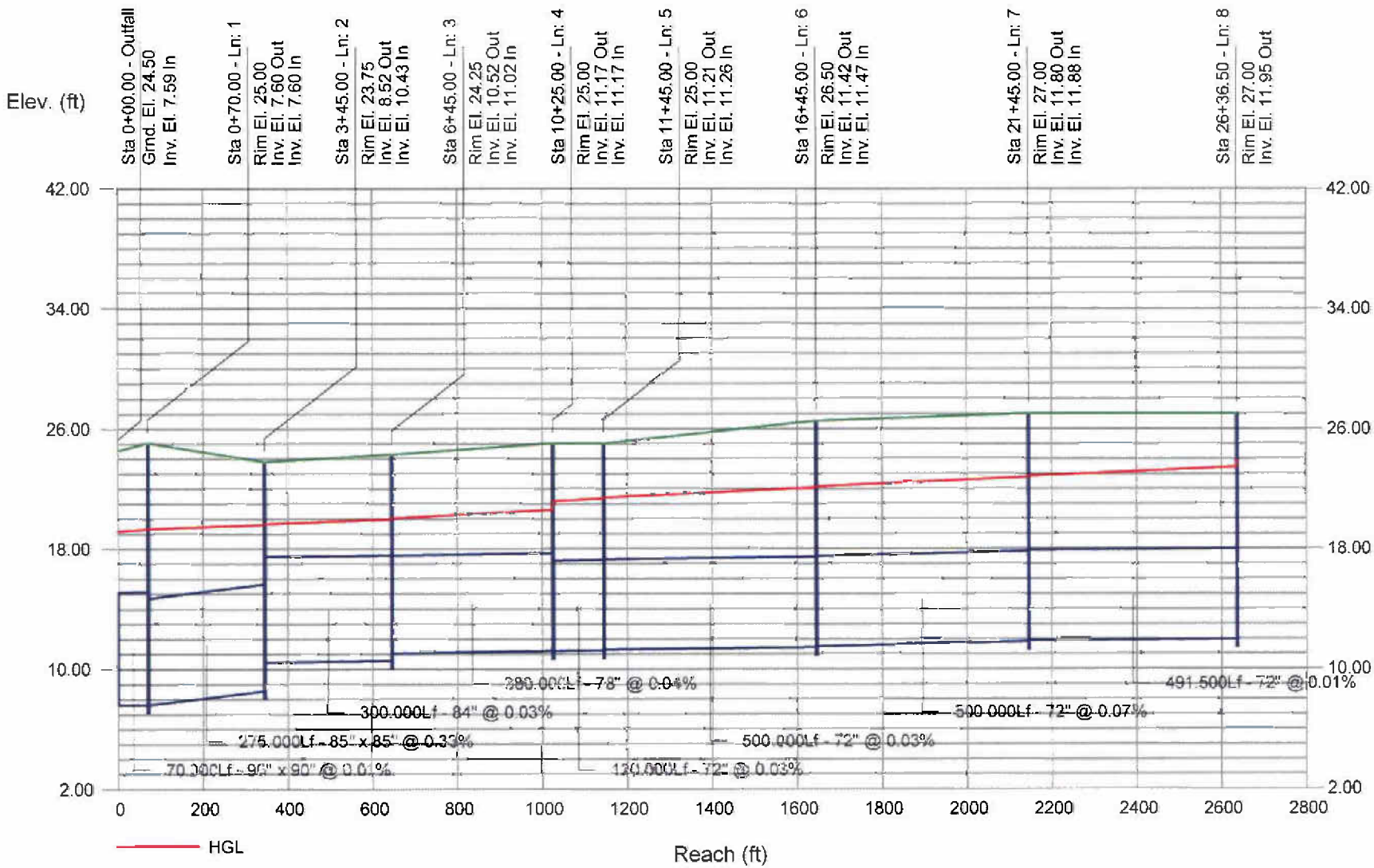
North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown).

ALTERNATIVE 2

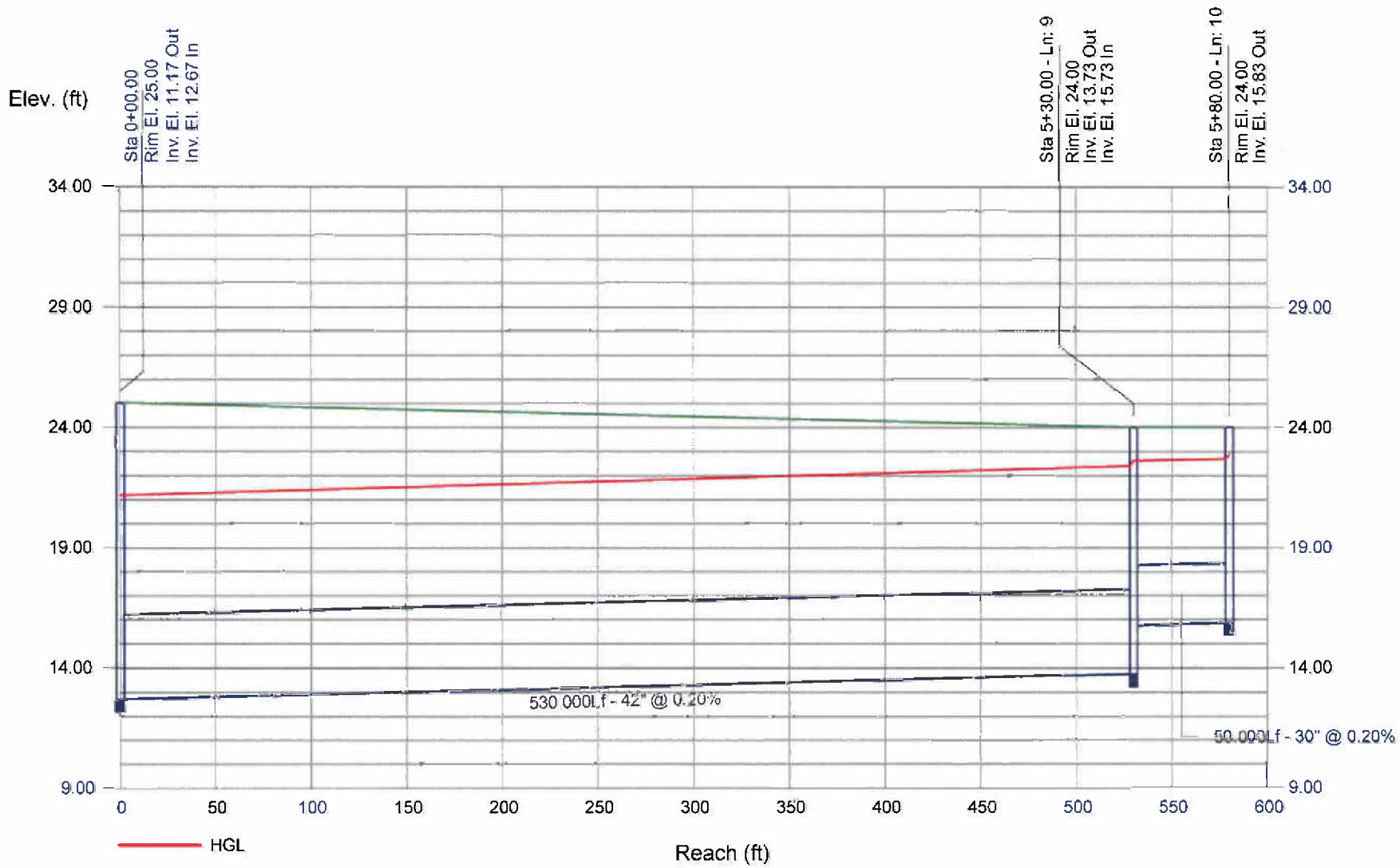
Storm Sewer Profile

Proj. file: Alternative 2.stm



Storm Sewer Profile

Proj. file: Alternative 2.stm



Storm Sewer Summary Report

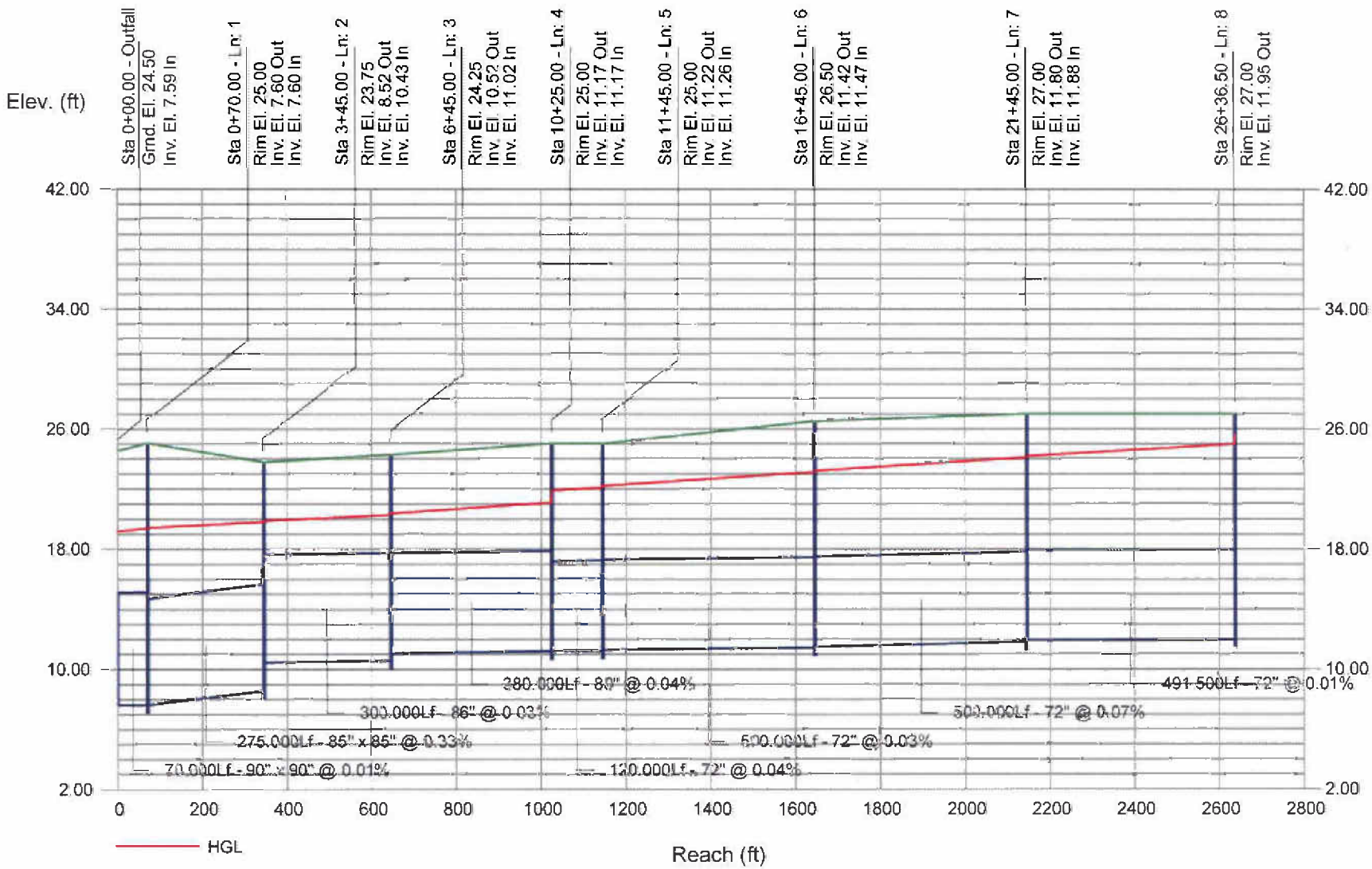
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		224.2	90x90	Box	70.000	7.59	7.60	0.014	19.16*	19.29*	0.04	19.32	End	Manhole
2		227.4	85x85	Box	275.000	7.60	8.52	0.335	19.32*	19.59*	0.05	19.64	1	Manhole
3		205.4	84	Cir	300.000	10.43	10.52	0.030	19.64*	19.95*	0.07	20.02	2	Manhole
4		202.7	78	Cir	380.000	11.02	11.17	0.039	20.02*	20.58*	0.58	21.16	3	Manhole
5		155.4	72	Cir	120.000	11.17	11.21	0.033	21.16*	21.33*	0.07	21.40	4	Manhole
6		153.9	72	Cir	500.000	11.26	11.42	0.032	21.40*	22.06*	0.07	22.13	5	Manhole
7		151.6	72	Cir	500.000	11.47	11.80	0.066	22.13*	22.77*	0.07	22.83	6	Manhole
8		147.2	72	Cir	491.500	11.88	11.95	0.014	22.83*	23.43*	0.42	23.85	7	Manhole
9		48.50	42	Cir	530.000	12.67	13.73	0.200	21.16*	22.40*	0.22	22.62	4	Manhole
10		16.60	30	Cir	50.000	15.73	15.83	0.200	22.62*	22.70*	0.18	22.88	9	Manhole

North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 5 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

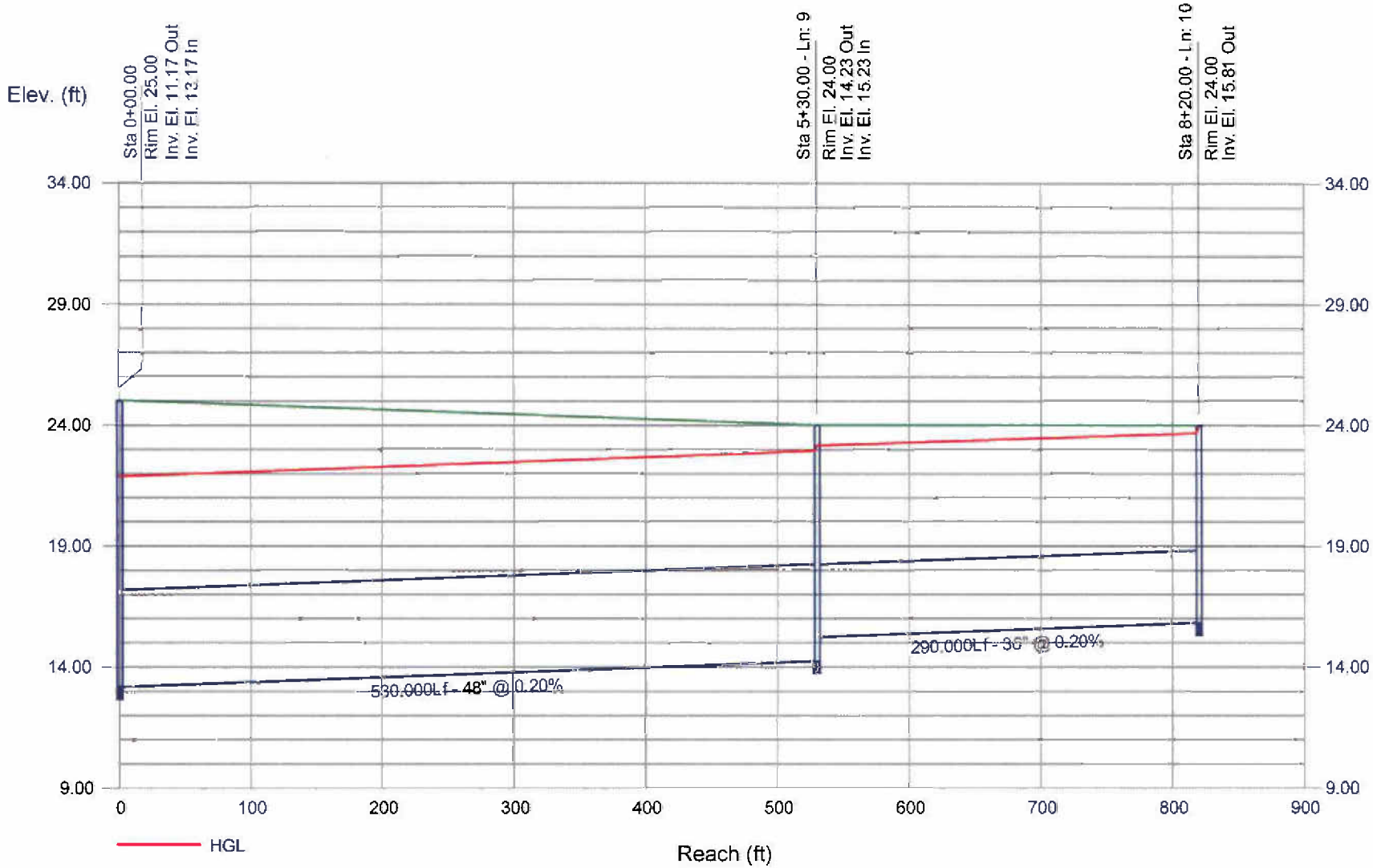
Proj. file: Alternative 2 10yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Profile

Proj. file: Alternative 2 10yr.stm



Storm Sewer Summary Report

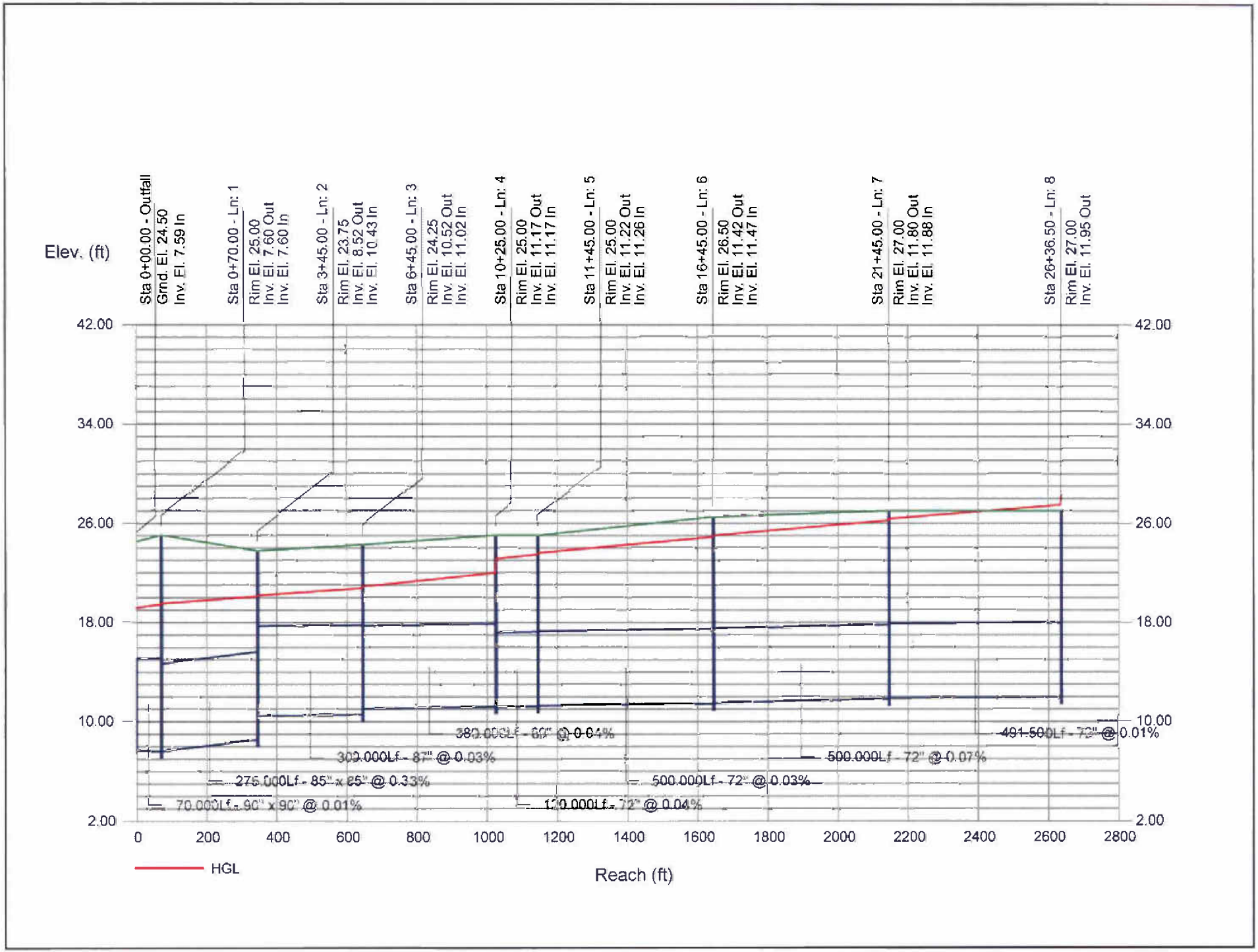
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		270.7	90x90	Box	70.000	7.59	7.60	0.014	19.16*	19.34*	0.05	19.40	End	Manhole
2		273.7	85x85	Box	275.000	7.60	8.52	0.335	19.40*	19.79*	0.07	19.86	1	Manhole
3		250.9	86	Cir	300.000	10.43	10.52	0.030	19.86*	20.26*	0.09	20.35	2	Manhole
4		247.1	80	Cir	380.000	11.02	11.17	0.039	20.35*	21.09*	0.78	21.87	3	Manhole
5		183.9	72	Cir	120.000	11.17	11.22	0.042	21.87*	22.10*	0.10	22.20	4	Manhole
6		181.1	72	Cir	500.000	11.26	11.42	0.032	22.20*	23.11*	0.10	23.21	5	Manhole
7		177.4	72	Cir	500.000	11.47	11.80	0.066	23.21*	24.08*	0.09	24.18	6	Manhole
8		171.1	72	Cir	491.500	11.88	11.95	0.014	24.18*	24.98*	0.57	25.55	7	Manhole
9		64.40	48	Cir	530.000	13.17	14.23	0.200	21.87*	22.94*	0.23	23.17	4	Manhole
10		28.00	36	Cir	290.000	16.23	16.81	0.200	23.17*	23.68*	0.24	23.92	9	Manhole

North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

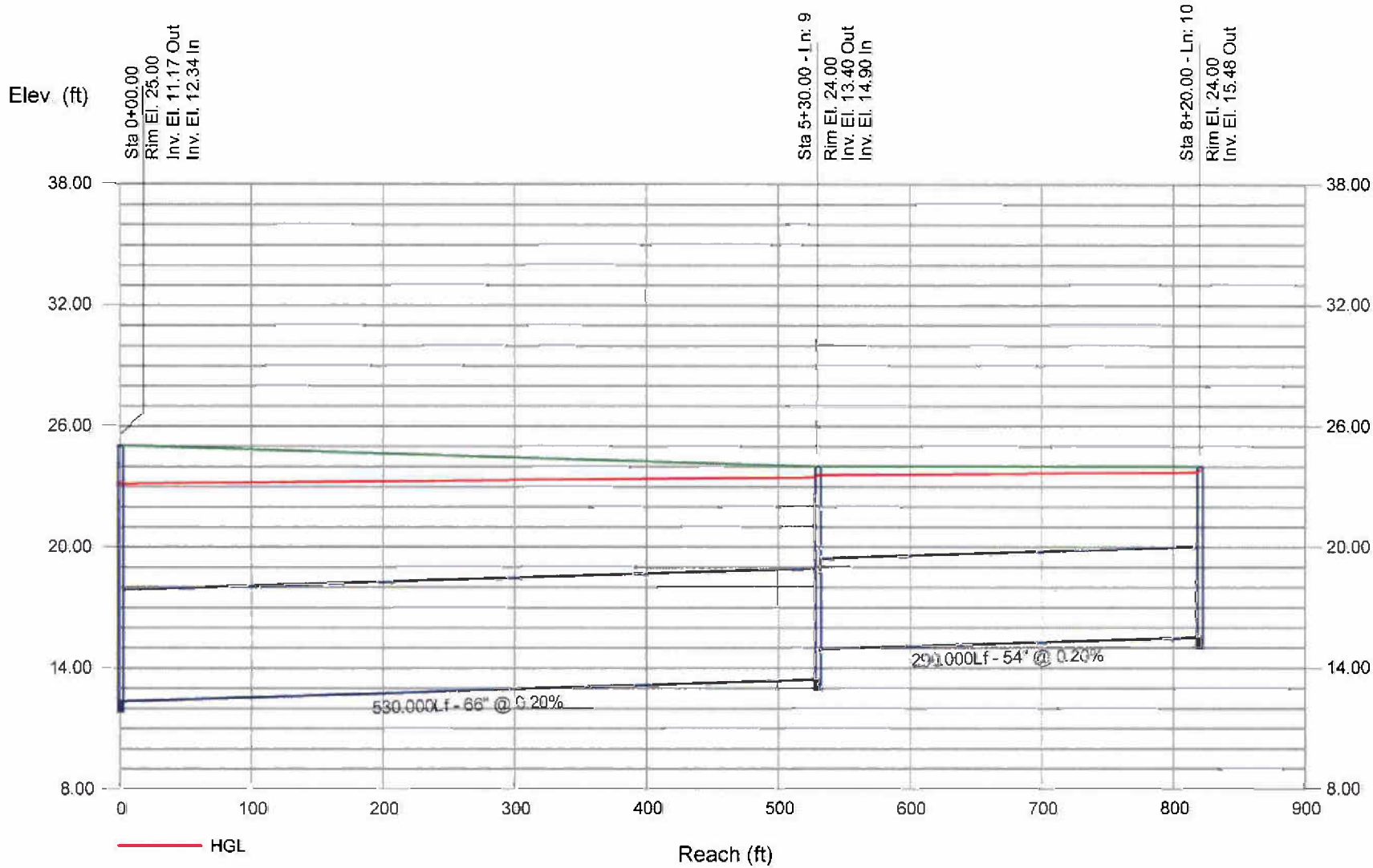
Proj. file: Alternative 2 25yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Profile

Proj. file: Alternative 2 25yr.stm



Storm Sewer Summary Report

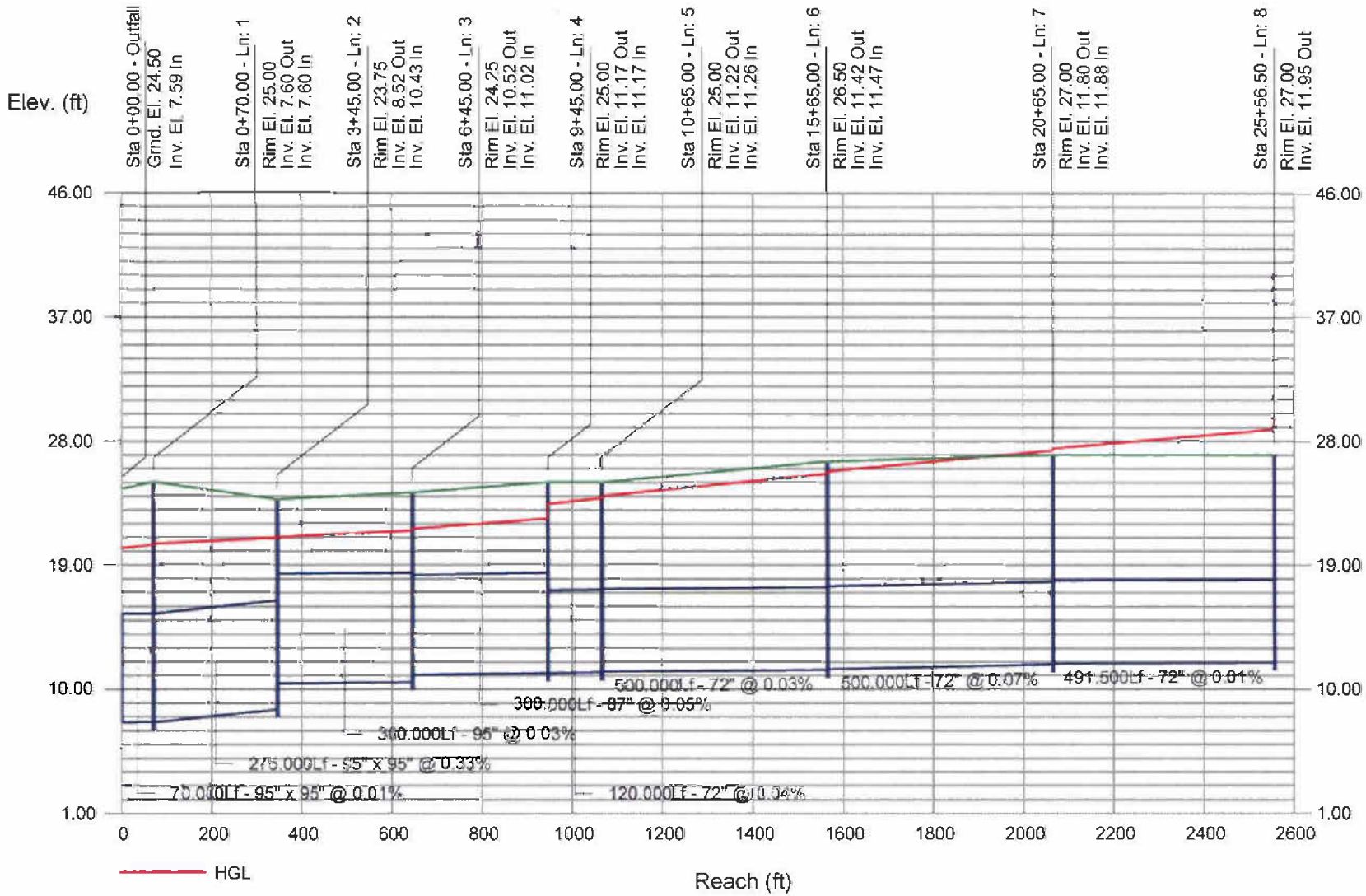
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		327.9	90x90	Box	70.000	7.59	7.60	0.014	19.16*	19.43*	0.08	19.51	End	Manhole
2		330.8	85x85	Box	275.000	7.60	8.52	0.335	19.51*	20.08*	0.10	20.18	1	Manhole
3		306.9	87	Cir	300.000	10.43	10.52	0.030	20.18*	20.75*	0.13	20.88	2	Manhole
4		301.7	80	Cir	380.000	11.02	11.17	0.039	20.88*	21.98*	1.16	23.14	3	Manhole
5		218.7	72	Cir	120.000	11.17	11.22	0.042	23.14*	23.46*	0.14	23.60	4	Manhole
6		214.4	72	Cir	500.000	11.26	11.42	0.032	23.60*	24.88*	0.13	25.02	5	Manhole
7		208.9	72	Cir	500.000	11.47	11.80	0.066	25.02*	26.23*	0.13	26.36	6	Manhole
8		200.6	72	Cir	491.500	11.88	11.95	0.014	26.36*	27.46*	0.78	28.25	7	Manhole
9		84.10	66	Cir	530.000	12.34	13.40	0.200	23.14*	23.47*	0.11	23.58	4	Manhole
10		42.10	54	Cir	290.000	14.90	15.48	0.200	23.58*	23.72*	0.11	23.82	9	Manhole

North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown).

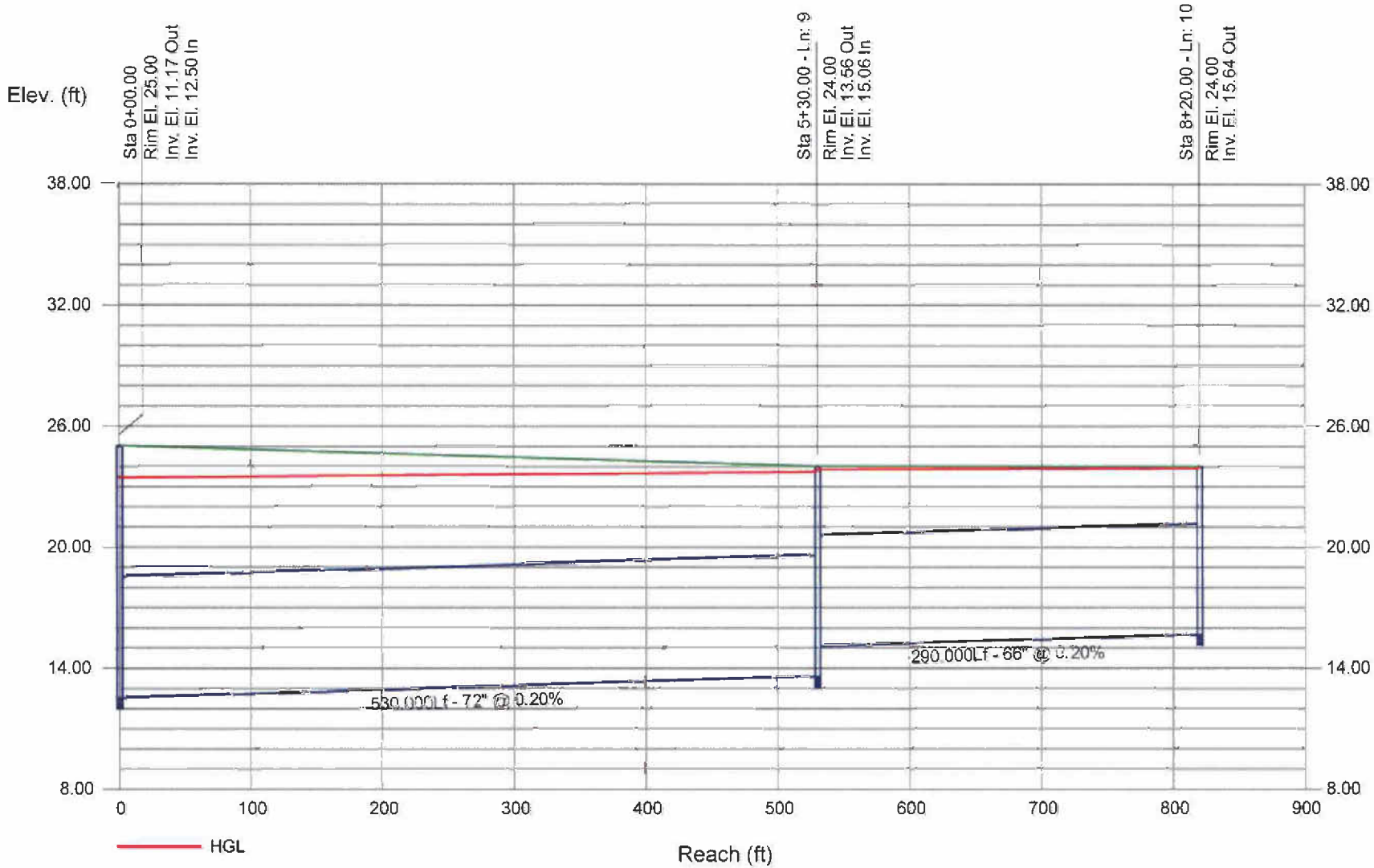
Storm Sewer Profile

Proj. file: Alternative 2 50yr.stm



Storm Sewer Profile

Proj. file: Alternative 2 50yr.stm



Storm Sewer Summary Report

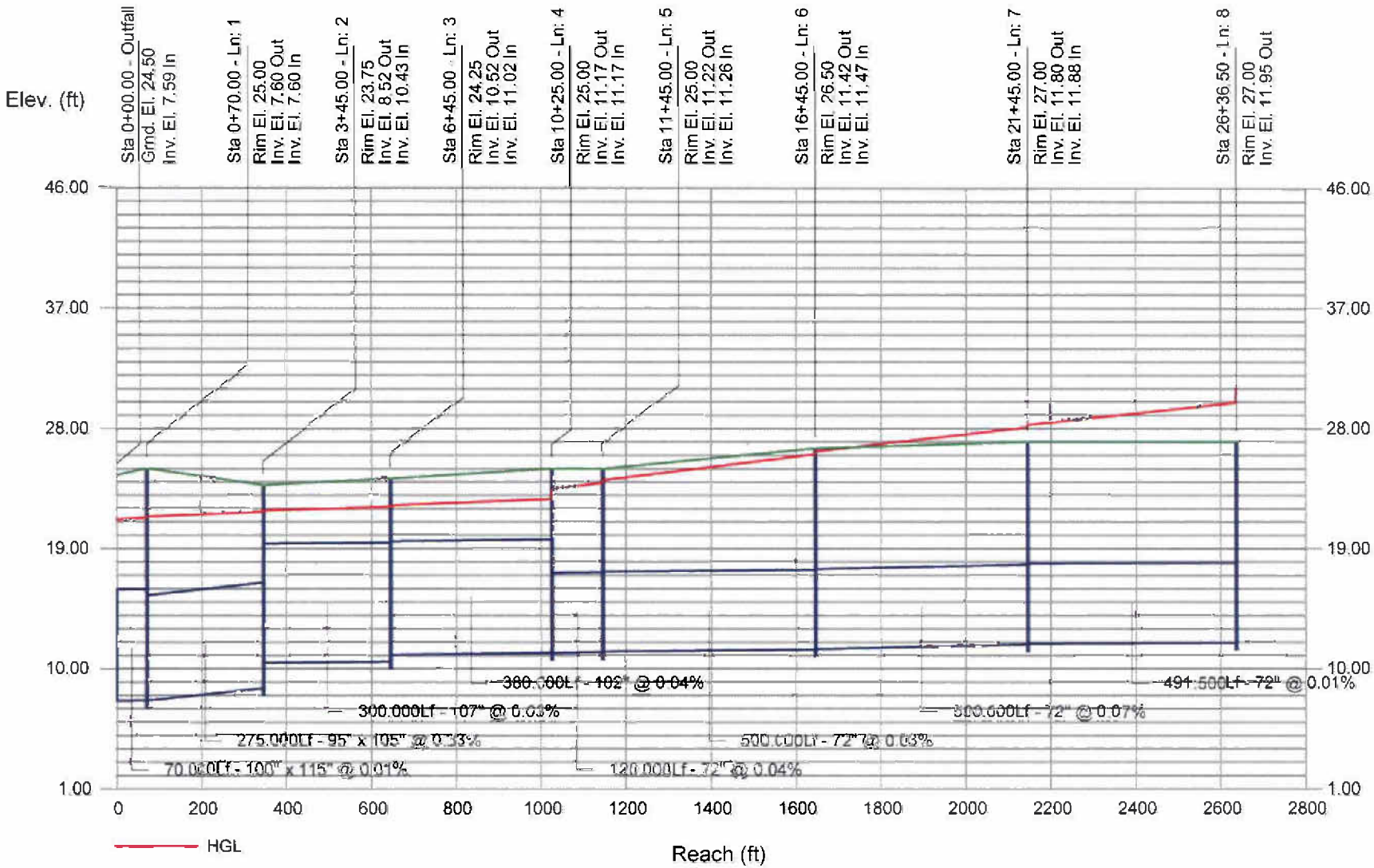
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		371.8	95x95	Box	70.000	7.59	7.60	0.014	20.21*	20.47*	0.08	20.55	End	Manhole
2		375.3	95x95	Box	275.000	7.60	8.52	0.335	20.55*	20.95*	0.08	21.04	1	Manhole
3		350.9	95	Cir	300.000	10.43	10.52	0.030	21.04*	21.51*	0.12	21.63	2	Manhole
4		344.4	87	Cir	300.000	11.02	11.17	0.050	21.63*	22.35*	1.08	23.43	3	Manhole
5		246.0	72	Cir	120.000	11.17	11.22	0.042	23.43*	23.84*	0.18	24.01	4	Manhole
6		240.6	72	Cir	500.000	11.26	11.42	0.032	24.01*	25.63*	0.17	25.80	5	Manhole
7		233.8	72	Cir	500.000	11.47	11.80	0.066	25.80*	27.32*	0.16	27.48	6	Manhole
8		223.9	72	Cir	491.500	11.88	11.95	0.014	27.48*	28.85*	0.97	29.83	7	Manhole
9		99.50	72	Cir	530.000	12.50	13.56	0.200	23.43*	23.73*	0.11	23.83	4	Manhole
10		53.10	66	Cir	290.000	15.06	15.64	0.200	23.83*	23.91*	0.08	23.98	9	Manhole

North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 50 Yrs. ; *Surcharged (HGL above crown).

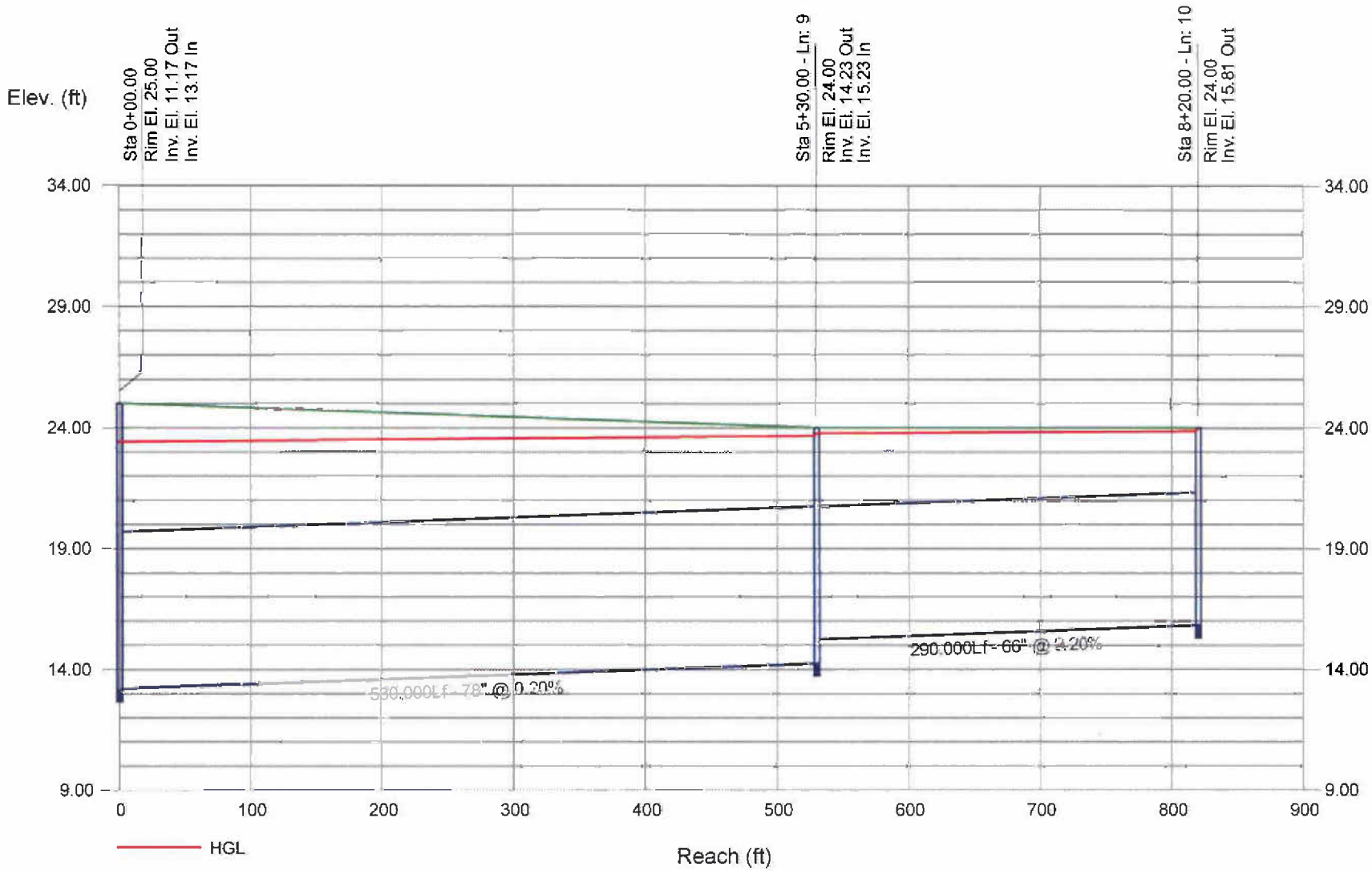
Storm Sewer Profile

Proj. file: Alternative 2 100yr.stm



Storm Sewer Profile

Proj. file: Alternative 2 100yr.stm



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		408.9	100x115	Box	70.000	7.59	7.60	0.014	21.15*	21.31*	0.06	21.38	End	Manhole
2		412.6	95x105	Box	275.000	7.60	8.52	0.335	21.38*	21.75*	0.08	21.83	1	Manhole
3		388.4	107	Cir	300.000	10.43	10.52	0.030	21.83*	22.14*	0.09	22.23	2	Manhole
4		382.9	102	Cir	380.000	11.02	11.17	0.039	22.23*	22.71*	0.71	23.42	3	Manhole
5		270.5	72	Cir	120.000	11.17	11.22	0.042	23.42*	23.91*	0.21	24.12	4	Manhole
6		264.1	72	Cir	500.000	11.26	11.42	0.032	24.12*	26.07*	0.20	26.27	5	Manhole
7		256.2	72	Cir	500.000	11.47	11.80	0.066	26.27*	28.10*	0.19	28.29	6	Manhole
8		244.8	72	Cir	491.500	11.88	11.95	0.014	28.29*	29.94*	1.17	31.10	7	Manhole
9		113.4	78	Cir	530.000	13.17	14.23	0.200	23.42*	23.67*	0.10	23.77	4	Manhole
10		63.00	66	Cir	290.000	14.73	15.31	0.200	23.77*	23.87*	0.11	23.98	9	Manhole

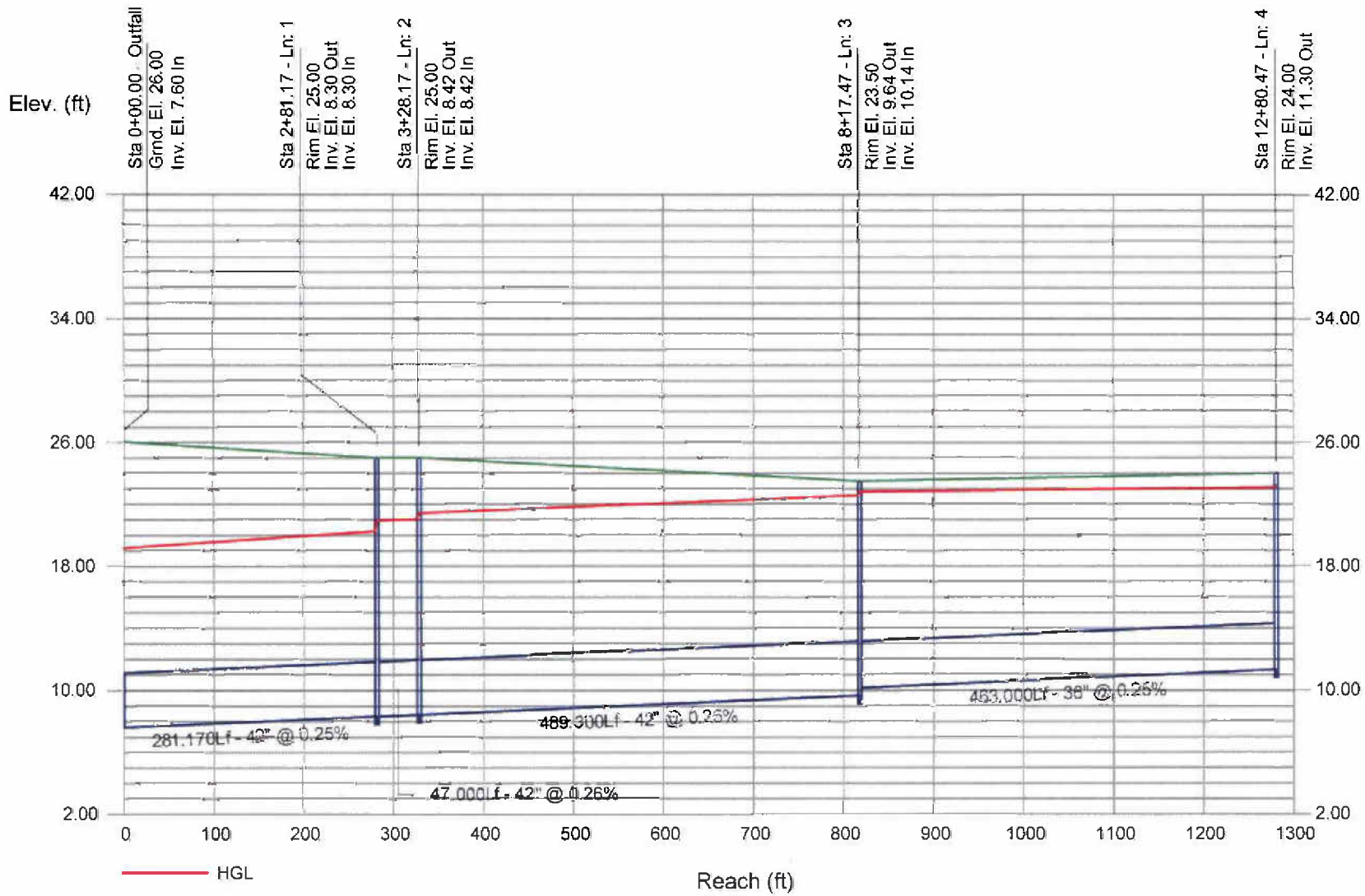
North H Street (Existing) | Number of lines: 10 | Run Date: 06-03-2008

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown).

ALTERNATIVE 3

Storm Sewer Profile

Proj. file: Alternative 3 5Yr.stm



Storm Sewer Summary Report

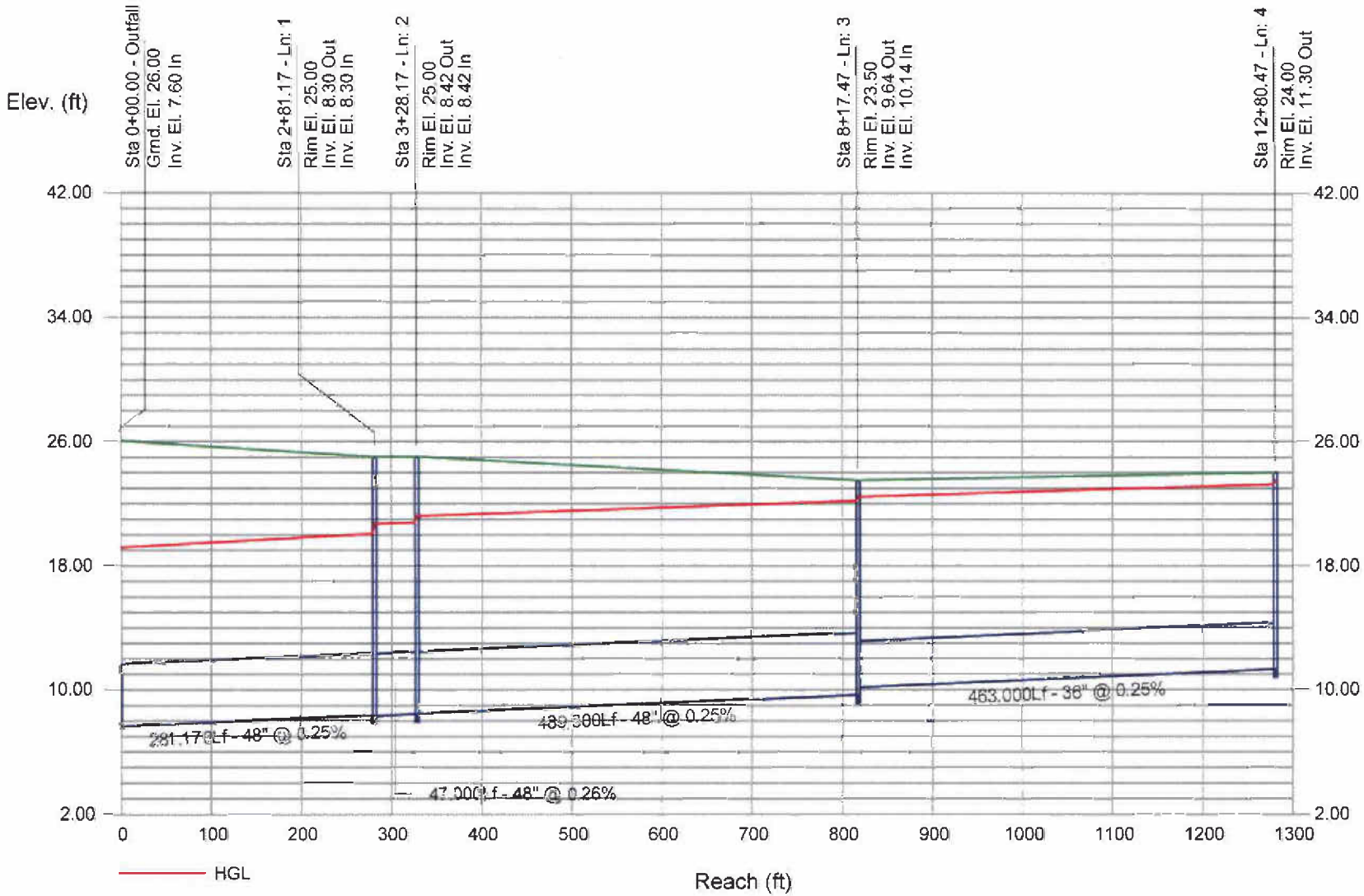
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		63.00	42	Cir	281.170	7.60	8.30	0.249	19.16*	20.26*	0.67	20.93	End	Manhole
2		48.50	42	Cir	47.000	8.30	8.42	0.255	20.93*	21.04*	0.40	21.43	1	Manhole
3		48.50	42	Cir	489.300	8.42	9.64	0.249	21.43*	22.57*	0.25	22.82	2	Manhole
4		16.60	36	Cir	463.000	10.14	11.30	0.251	22.82*	23.11*	0.09	23.19	3	Manhole

North H St | Number of lines: 4 | Run Date: 06-03-2008

NOTES: Return period = 5 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

Proj. file: Alternative 3 10Yr.stm



Storm Sewer Summary Report

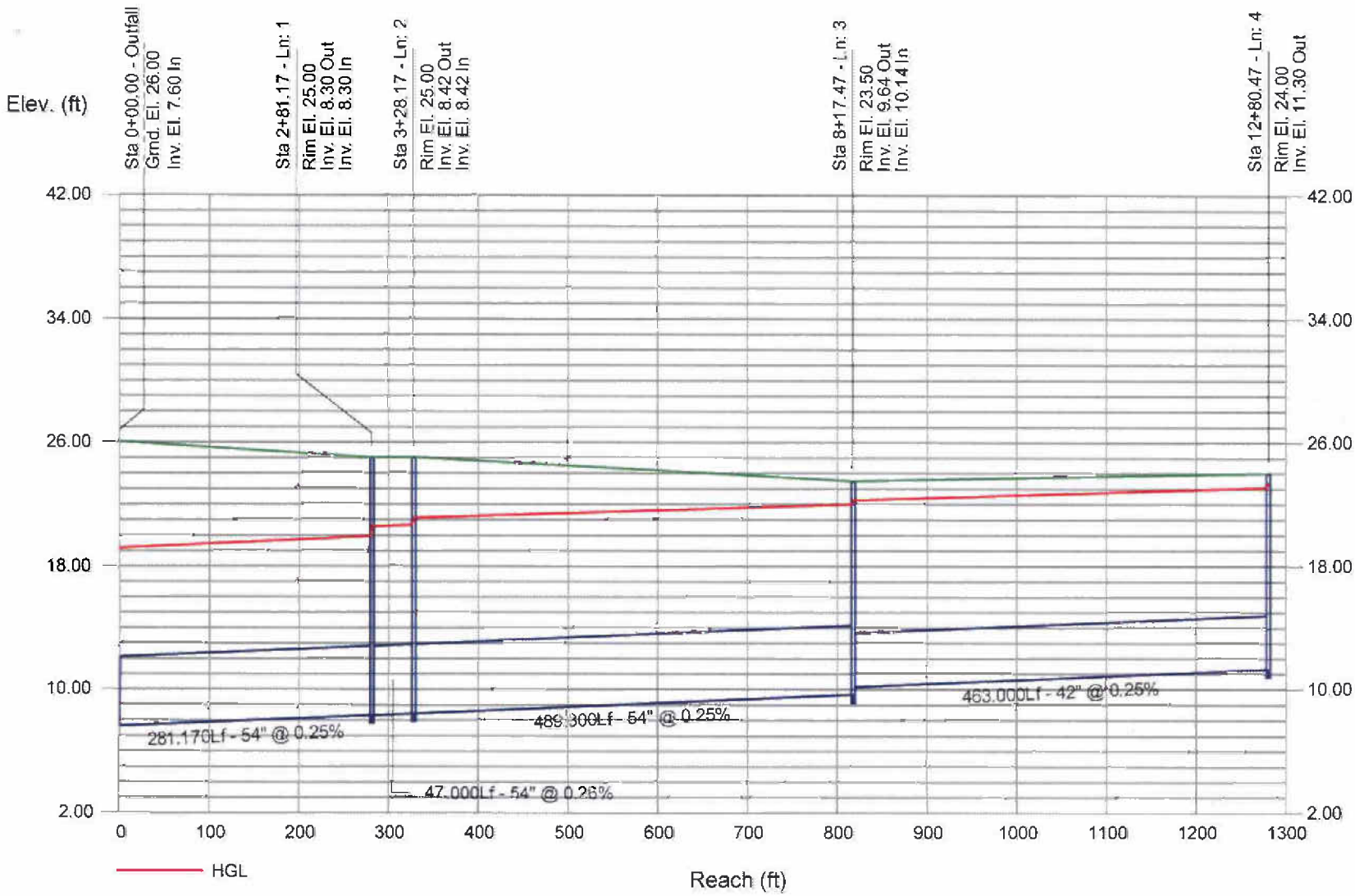
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		80.90	48	Cir	281.170	7.60	8.30	0.249	19.16*	20.05*	0.64	20.70	End	Manhole
2		64.40	48	Cir	47.000	8.30	8.42	0.255	20.70*	20.79*	0.41	21.20	1	Manhole
3		64.40	48	Cir	489.300	8.42	9.64	0.249	21.20*	22.18*	0.26	22.44	2	Manhole
4		28.00	36	Cir	463.000	10.14	11.30	0.251	22.44*	23.26*	0.24	23.50	3	Manhole

North H St | Number of lines: 4 | Run Date: 06-03-2008

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

Proj. file: Alternative 3 25yr.stm



Hydraflow Storm Sewers Extension

Storm Sewer Summary Report

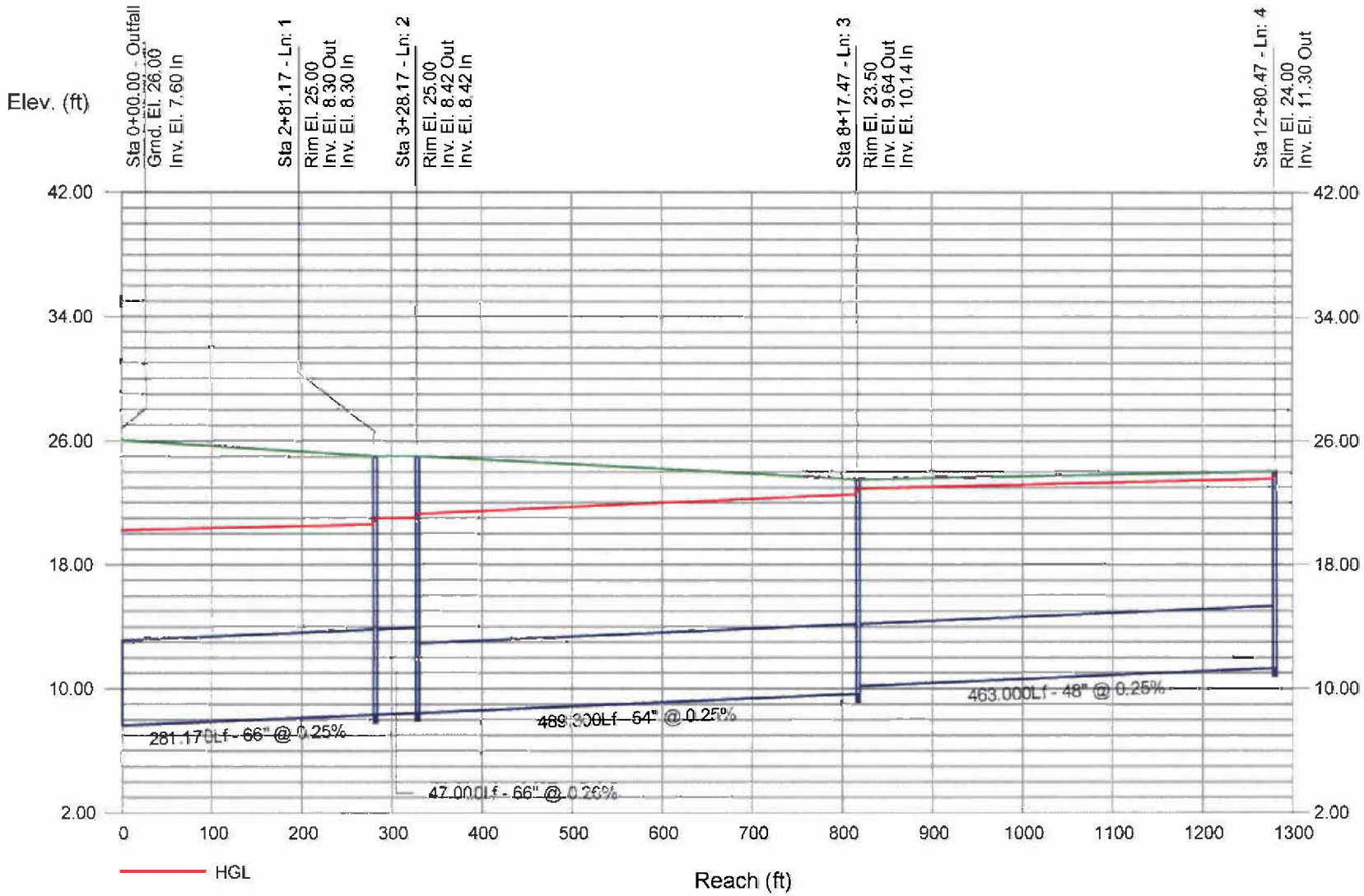
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		103.0	54	Cir	281.170	7.60	8.30	0.249	19.16*	19.93*	0.65	20.58	End	Manhole
2		84.10	54	Cir	47.000	8.30	8.42	0.255	20.58*	20.67*	0.43	21.10	1	Manhole
3		84.10	54	Cir	489.300	8.42	9.64	0.249	21.10*	22.00*	0.27	22.27	2	Manhole
4		42.10	42	Cir	463.000	10.14	11.30	0.251	22.27*	23.08*	0.30	23.38	3	Manhole

North H St | Number of lines: 4 | Run Date: 06-03-2008

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

Proj. file: Alternative 3 50yr.stm



Storm Sewer Summary Report

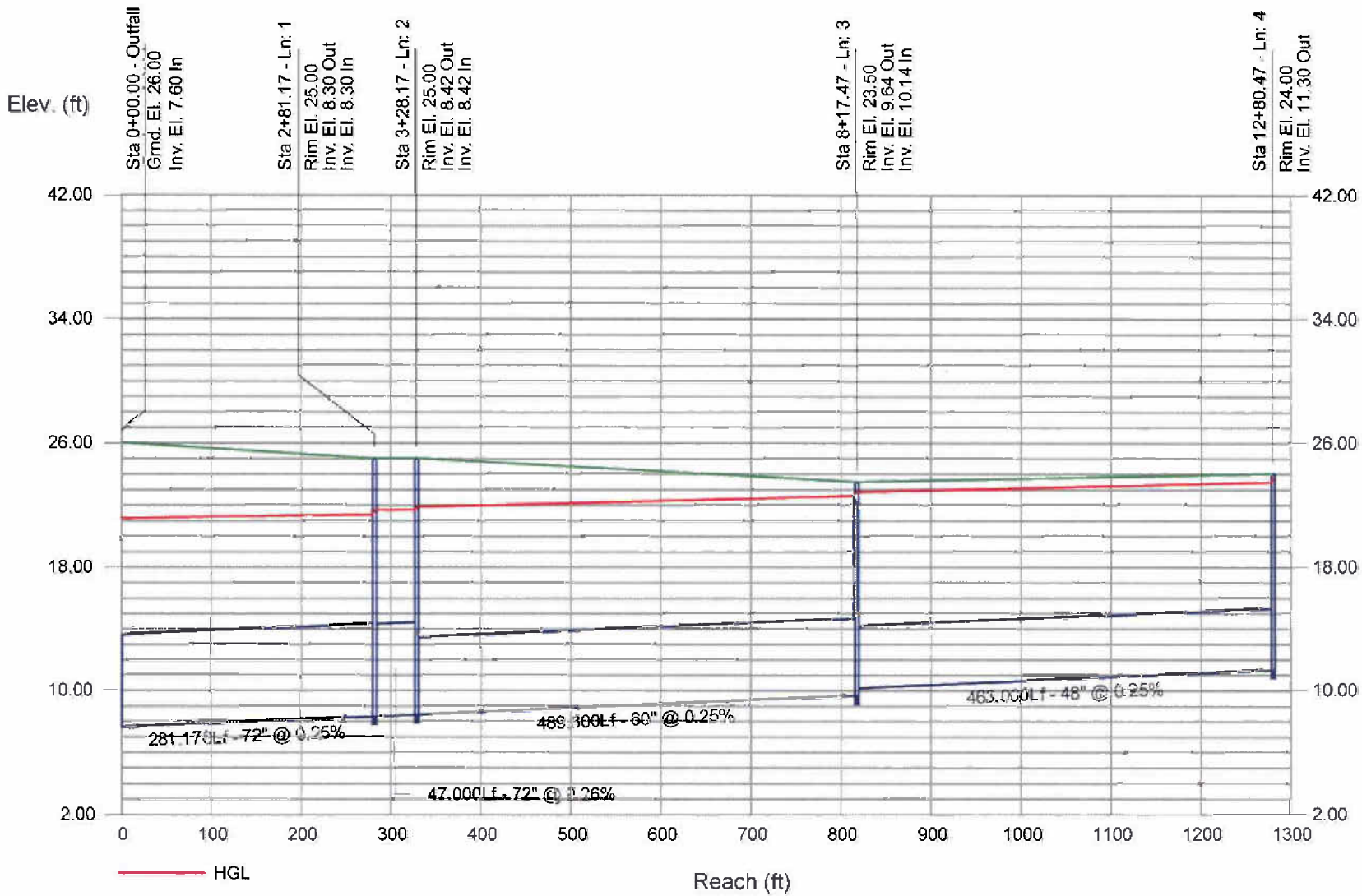
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		120.4	66	Cir	281.170	7.60	8.30	0.249	20.21*	20.57*	0.40	20.97	End	Manhole
2		99.50	66	Cir	47.000	8.30	8.42	0.255	20.97*	21.01*	0.27	21.28	1	Manhole
3		99.50	54	Cir	489.300	8.42	9.64	0.249	21.28*	22.54*	0.38	22.92	2	Manhole
4		53.10	48	Cir	463.000	10.14	11.30	0.251	22.92*	23.55*	0.28	23.83	3	Manhole

North H St | Number of lines: 4 | Run Date: 06-03-2008

NOTES: Return period = 50 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Profile

Proj. file: Alternative 3 100yr.stm



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		120.4	72	Cir	281.170	7.60	8.30	0.249	21.15*	21.38*	0.28	21.66	End	Manhole
2		99.50	72	Cir	47.000	8.30	8.42	0.255	21.66*	21.69*	0.19	21.88	1	Manhole
3		99.50	60	Cir	489.300	8.42	9.64	0.249	21.88*	22.59*	0.25	22.84	2	Manhole
4		53.10	48	Cir	463.000	10.14	11.30	0.251	22.84*	23.48*	0.28	23.75	3	Manhole

North H St | Number of lines: 4 | Run Date: 06-03-2008

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown)

Appendix C
HEC-RAS Output

EXISTING
HEC-RAS Output

HEC RAS Plan: B106 00 FH River: B106 00-00 Reach: MAIN

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	36378.55	498.00	16.36	20.89		21.01	0.000864	2.75	180.97	62.32	0.26
MAIN	36378.55	733.00	16.36	22.25		22.37	0.000572	2.70	271.50	70.25	0.24
MAIN	36378.55	854.00	16.36	22.99		23.10	0.000463	2.63	324.87	74.52	0.22
MAIN	36378.55	1207.00	16.36	24.92		25.02	0.000306	2.52	479.50	85.72	0.19
MAIN	35071.34	508.00	14.49	20.07		20.14	0.000448	2.17	233.81	70.08	0.21
MAIN	35071.34	747.00	14.49	21.73		21.79	0.000288	2.07	361.33	83.51	0.18
MAIN	35071.34	871.00	14.49	22.57		22.63	0.000235	2.01	434.37	90.30	0.16
MAIN	35071.34	1230.00	14.49	24.58		24.64	0.000260	1.89	651.18	160.31	0.17
MAIN	35019.49	508.00	14.49	20.03	17.23	20.11	0.000460	2.19	231.60	69.81	0.21
MAIN	35019.49	747.00	14.49	21.70	17.77	21.77	0.000292	2.08	359.35	83.32	0.18
MAIN	35019.49	871.00	14.49	22.55	18.01	22.61	0.000238	2.01	432.52	90.14	0.16
MAIN	35019.49	1230.00	14.49	24.57	18.60	24.63	0.000183	1.93	682.65	247.89	0.15
MAIN	34959.15	Bridge									
MAIN	34898.81	508.00	14.49	19.96	17.23	20.03	0.000494	2.24	226.57	69.81	0.22
MAIN	34898.81	747.00	14.49	21.64	17.77	21.71	0.000304	2.10	356.56	84.17	0.18
MAIN	34898.81	871.00	14.49	22.49	18.01	22.55	0.000246	2.02	430.59	91.35	0.16
MAIN	34898.81	1230.00	14.49	24.38	18.60	24.44	0.000277	1.95	631.31	1226.86	0.17
MAIN	34675.54	527.00	14.49	19.82	17.28	19.91	0.000600	2.43	216.73	63.33	0.24
MAIN	34675.54	774.00	14.49	21.56	17.82	21.64	0.000344	2.22	348.52	82.78	0.19
MAIN	34675.54	903.00	14.49	22.42	18.07	22.49	0.000275	2.14	422.68	89.89	0.17
MAIN	34675.54	1275.00	14.49	24.32	18.67	24.39	0.000183	2.04	769.92	542.58	0.15
MAIN	33904.71	697.00	12.75	19.37	16.27	19.48	0.000519	2.58	269.78	69.28	0.23
MAIN	33904.71	1024.00	12.75	21.28	16.91	21.37	0.000337	2.48	413.46	81.53	0.19
MAIN	33904.71	1184.00	12.75	22.17	17.19	22.26	0.000320	2.44	489.84	95.16	0.19
MAIN	33904.71	1687.00	12.75	24.13	17.89	24.20	0.000376	2.14	896.87	724.21	0.20
MAIN	32723.5	703.00	11.49	18.88	15.08	18.96	0.000353	2.31	303.81	68.41	0.19
MAIN	32723.5	1033.00	11.49	20.95	15.76	21.03	0.000241	2.26	457.81	80.15	0.17
MAIN	32723.5	1205.00	11.49	21.87	16.05	21.94	0.000215	2.26	533.64	85.34	0.16
MAIN	32723.5	1702.00	11.49	23.80	16.76	23.87	0.000182	2.13	1340.49	1693.26	0.15
MAIN	32685.24	754.00	11.49	18.84	15.19	18.94	0.000414	2.50	301.57	68.22	0.21
MAIN	32685.24	1109.00	11.49	20.92	15.89	21.01	0.000282	2.44	455.02	79.97	0.18
MAIN	32685.24	1293.00	11.49	21.84	16.18	21.93	0.000250	2.43	531.47	85.19	0.17
MAIN	32685.24	1827.00	11.49	23.79	16.93	23.85	0.000253	2.19	1332.14	1683.50	0.17
MAIN	32585.4	Bridge									
MAIN	32485.56	807.00	11.49	18.72	15.31	18.84	0.000514	2.75	293.22	67.52	0.23
MAIN	32485.56	1187.00	11.49	20.84	16.02	20.95	0.000336	2.64	449.18	79.53	0.20
MAIN	32485.56	1385.00	11.49	21.74	16.32	21.85	0.000299	2.65	523.27	84.65	0.19
MAIN	32485.56	1956.00	11.49	23.47	17.09	23.59	0.000300	2.80	930.20	808.21	0.19
MAIN	32292.9	871.00	11.49	18.57	15.44	18.72	0.000661	3.08	283.19	66.68	0.26
MAIN	32292.9	1278.00	11.49	20.74	16.16	20.87	0.000409	2.90	441.30	78.97	0.22
MAIN	32292.9	1490.00	11.49	21.65	16.47	21.78	0.000361	2.89	515.66	84.13	0.21
MAIN	32292.9	2100.00	11.49	23.37	17.27	23.52	0.000391	3.12	672.93	302.02	0.22
MAIN	31793.46	974.00	9.02	18.33	13.97	18.44	0.000402	2.69	362.05	70.90	0.21
MAIN	31793.46	1425.00	9.02	20.58	14.80	20.69	0.000287	2.66	534.99	82.13	0.18
MAIN	31793.46	1661.00	9.02	21.51	15.17	21.62	0.000265	2.71	612.98	86.29	0.18
MAIN	31793.46	2336.00	9.02	23.19	16.06	23.33	0.000342	3.03	770.64	240.56	0.20
MAIN	31048.03	1007.00	8.46	18.04	13.32	18.15	0.000378	2.68	375.78	70.31	0.20
MAIN	31048.03	1472.00	8.46	20.37	14.18	20.48	0.000276	2.66	554.06	82.50	0.18
MAIN	31048.03	1716.00	8.46	21.31	14.56	21.43	0.000259	2.71	633.93	87.41	0.18
MAIN	31048.03	2411.00	8.46	22.93	15.53	23.08	0.000346	3.06	787.49	979.04	0.20
MAIN	31028.02	1007.00	8.46	18.03	13.32	18.14	0.000380	2.68	375.22	70.27	0.20
MAIN	31028.02	1472.00	8.46	20.37	14.18	20.48	0.000276	2.66	553.58	82.47	0.18
MAIN	31028.02	1716.00	8.46	21.31	14.57	21.42	0.000259	2.71	633.46	87.38	0.18
MAIN	31028.02	2411.00	8.46	22.92	15.53	23.07	0.000312	3.07	784.87	1008.75	0.20
MAIN	30827.98	1038.00	8.46	17.94	13.38	18.06	0.000424	2.81	368.74	69.79	0.22
MAIN	30827.98	1516.00	8.46	20.30	14.25	20.42	0.000301	2.77	548.02	82.11	0.19
MAIN	30827.98	1767.00	8.46	21.24	14.65	21.37	0.000282	2.81	627.88	87.04	0.18
MAIN	30827.98	2481.00	8.46	22.85	15.62	23.00	0.000355	3.16	784.83	767.70	0.21

HEC-RAS Plan: B106-00-FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W S Elev	Crit W.S	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	30747.98	1038.00	7.38	17.92	12.65	18.03	0.000342	2.59	400.15	72.56	0.19
MAIN	30747.98	1516.00	7.38	20.29	13.62	20.39	0.000255	2.58	588.36	86.48	0.17
MAIN	30747.98	1767.00	7.38	21.23	14.05	21.34	0.000241	2.63	672.77	92.04	0.17
MAIN	30747.98	2481.00	7.38	22.83	15.09	22.97	0.000360	2.93	847.66	790.66	0.21
MAIN	30627.31	1213.00	7.38	17.82		17.97	0.000491	3.09	393.10	71.98	0.23
MAIN	30627.31	1765.00	7.38	20.21		20.35	0.000356	3.04	581.37	85.99	0.21
MAIN	30627.31	2057.00	7.38	21.15		21.30	0.000337	3.03	665.44	91.56	0.20
MAIN	30627.31	2877.00	7.38	22.73		22.91	0.000427	3.44	867.70	218.01	0.23
MAIN	29590.01	1438.00	5.35	17.17	12.57	17.38	0.000675	3.62	397.24	72.17	0.27
MAIN	29590.01	2083.00	5.35	19.74	13.66	19.93	0.000466	3.43	605.49	90.64	0.23
MAIN	29590.01	2426.00	5.35	20.72	14.16	20.90	0.000436	3.47	698.14	123.81	0.23
MAIN	29590.01	3380.00	5.35	22.17	15.33	22.41	0.000541	3.98	849.36	581.10	0.26
MAIN	28463.24	1688.00	4.63	16.65	10.57	16.78	0.000341	2.89	583.14	90.56	0.20
MAIN	28463.24	2435.00	4.63	19.38	11.62	19.50	0.000257	2.84	857.47	110.81	0.18
MAIN	28463.24	2835.00	4.63	20.97	12.09	20.50	0.000251	2.92	971.04	211.87	0.18
MAIN	28463.24	3934.00	4.63	21.72	13.22	21.91	0.000318	3.46	1138.02	3397.87	0.20
MAIN	27399.88	1791.00	3.41	16.27	9.81	16.41	0.000364	2.97	603.21	94.36	0.21
MAIN	27399.88	2580.00	3.41	19.10	10.93	19.22	0.000269	2.84	908.30	551.69	0.18
MAIN	27399.88	3003.00	3.41	20.09	11.45	20.22	0.000274	2.90	1039.22	1191.60	0.19
MAIN	27399.88	4163.00	3.41	21.48	12.69	21.58	0.000259	2.76	4882.93	4143.01	0.18
MAIN	27004.57	1858.00	3.41	16.09	9.91	16.26	0.000391	3.23	575.08	83.03	0.22
MAIN	27004.57	2673.00	3.41	18.95	11.04	19.11	0.000296	3.20	834.96	173.19	0.19
MAIN	27004.57	3112.00	3.41	19.93	11.57	20.10	0.000301	3.33	934.99	1263.55	0.20
MAIN	27004.57	4309.00	3.41	21.36	12.82	21.48	0.000238	3.06	5243.11	3750.80	0.18
MAIN	26964.57	1858.00	3.85	16.08	9.85	16.22	0.000408	2.97	624.79	107.18	0.22
MAIN	26964.57	2673.00	3.85	18.96	10.97	19.08	0.000270	2.72	982.66	144.61	0.18
MAIN	26964.57	3112.00	3.85	19.95	11.49	20.06	0.000250	2.72	1303.78	968.69	0.18
MAIN	26964.57	4309.00	3.85	21.37	12.83	21.46	0.000188	2.62	4985.20	4060.14	0.16
MAIN	26863.5	Bridge									
MAIN	26762.42	1953.00	3.85	16.05	10.00	16.20	0.000458	3.15	620.57	106.71	0.23
MAIN	26762.42	2813.00	3.85	18.74	11.14	18.88	0.000324	2.95	952.47	189.55	0.20
MAIN	26762.42	3264.00	3.85	19.80	11.67	19.94	0.000322	2.94	1110.81	1054.36	0.20
MAIN	26762.42	4497.00	3.85	21.19	13.02	21.29	0.000318	2.75	4873.64	3839.86	0.20
MAIN	26562.23	1953.00	3.85	15.94	9.99	16.10	0.000480	3.21	609.24	105.42	0.23
MAIN	26562.23	2813.00	3.85	18.69	11.15	18.81	0.000308	2.88	1525.58	1019.26	0.19
MAIN	26562.23	3264.00	3.85	19.76	11.66	19.86	0.000249	2.67	2921.08	2433.82	0.18
MAIN	26562.23	4497.00	3.85	21.15	13.03	21.21	0.000160	2.40	7840.02	3597.20	0.15
MAIN	26226.91	1953.00	3.75	15.82	9.54	15.95	0.000334	2.94	664.97	99.71	0.20
MAIN	26226.91	2813.00	3.75	18.58	10.63	18.71	0.000281	2.89	974.07	1549.22	0.19
MAIN	26226.91	3264.00	3.75	19.64	11.13	19.77	0.000338	2.89	1136.24	2560.13	0.20
MAIN	26226.91	4497.00	3.75	21.11	12.30	21.16	0.000151	2.04	8862.65	3824.18	0.14
MAIN	26216.9	1979.00	3.75	15.81	9.58	15.95	0.000344	2.98	664.12	99.64	0.20
MAIN	26216.9	2850.00	3.75	18.57	10.67	18.70	0.000287	2.93	972.92	1755.53	0.19
MAIN	26216.9	3304.00	3.75	19.63	11.17	19.76	0.000339	2.93	1127.32	2590.96	0.20
MAIN	26216.9	4547.00	3.75	21.11	12.34	21.15	0.000161	1.85	9382.85	3844.67	0.14
MAIN	26166.84	Bridge									
MAIN	26116.78	1979.00	3.75	15.63	9.98	15.84	0.000594	3.69	535.98	86.69	0.26
MAIN	26116.78	2850.00	3.75	18.29	11.39	18.49	0.000475	3.58	795.55	953.96	0.24
MAIN	26116.78	3304.00	3.75	19.42	11.98	19.59	0.000390	3.39	1599.36	2129.79	0.22
MAIN	26116.78	4547.00	3.75	21.01	13.31	21.09	0.000196	2.71	7755.32	3383.47	0.16
MAIN	26075.36	2190.00	3.75	15.56	10.09	15.80	0.000646	3.96	552.86	86.04	0.28
MAIN	26075.36	3158.00	3.75	18.22	11.33	18.46	0.000548	3.88	813.43	625.05	0.26
MAIN	26075.36	3638.00	3.75	19.35	11.87	19.56	0.000624	3.70	1291.60	1813.62	0.27
MAIN	26075.36	4955.00	3.75	20.98	13.16	21.07	0.000279	2.89	6820.32	3245.81	0.19
MAIN	24973.02	2267.00	2.00	15.02	8.52	15.20	0.000411	3.35	677.28	96.45	0.22
MAIN	24973.02	3279.00	2.00	17.78	9.84	17.96	0.000330	3.37	970.16	468.65	0.21
MAIN	24973.02	3759.00	2.00	18.86	10.35	19.04	0.000318	3.42	1099.39	1276.69	0.20
MAIN	24973.02	5103.00	2.00	20.65	11.58	20.78	0.000252	3.11	5509.91	3562.58	0.18

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	24933.01	2267.00	2.00	15.00	8.63	15.17	0.000415	3.36	674.78	96.26	0.22
MAIN	24933.01	3270.00	2.00	17.77	9.84	17.93	0.000337	3.37	969.16	390.85	0.21
MAIN	24933.01	3759.00	2.00	18.84	10.34	19.02	0.000363	3.40	1104.12	1407.71	0.21
MAIN	24933.01	5103.00	2.00	20.65	11.57	20.76	0.000257	3.03	5518.96	3388.45	0.18
MAIN	24655.82	Bridge									
MAIN	24778.62	2267.00	2.00	14.90	8.63	15.08	0.000431	3.41	664.95	95.52	0.23
MAIN	24778.62	3270.00	2.00	17.53	9.84	17.72	0.000362	3.47	941.53	333.63	0.21
MAIN	24778.62	3759.00	2.00	18.49	10.34	18.68	0.000362	3.56	1056.52	883.07	0.22
MAIN	24778.62	5103.00	2.00	20.45	11.57	20.59	0.000294	3.22	4774.40	2875.56	0.20
MAIN	24597.37	2448.00	2.00	14.76	8.97	14.98	0.000535	3.73	655.85	98.85	0.25
MAIN	24597.37	3533.00	2.00	17.42	10.12	17.63	0.000449	3.76	940.88	333.66	0.24
MAIN	24597.37	4042.00	2.00	18.38	10.62	18.60	0.000469	3.79	1066.88	868.42	0.24
MAIN	24597.37	5445.00	2.00	20.39	11.86	20.53	0.000297	3.31	5063.52	2730.11	0.20
MAIN	23766.16	2607.00	0.30	14.39	7.98	14.57	0.000411	3.44	757.30	103.53	0.22
MAIN	23766.16	3756.00	0.30	17.10	9.36	17.29	0.000348	3.55	1060.70	122.13	0.21
MAIN	23766.16	4292.00	0.30	18.05	9.87	18.26	0.000347	3.63	1181.99	205.14	0.21
MAIN	23766.16	5745.00	0.30	20.06	10.99	20.25	0.000381	3.54	3175.60	2476.84	0.22
MAIN	23079.37	2786.00	-0.20	14.00	7.84	14.24	0.000571	3.95	705.20	99.63	0.26
MAIN	23079.37	4026.00	-0.20	16.77	9.26	17.02	0.000456	4.00	1005.95	117.88	0.24
MAIN	23079.37	4570.00	-0.20	17.73	9.81	17.99	0.000437	4.07	1122.57	124.24	0.24
MAIN	23079.37	6077.00	-0.20	19.64	11.17	19.94	0.000496	4.39	1456.39	2408.79	0.26
MAIN	22360.17	2811.00	-0.71	13.63		13.85	0.000500	3.79	741.77	100.85	0.25
MAIN	22360.17	4084.00	-0.71	16.47		16.70	0.000395	3.88	1048.55	115.06	0.23
MAIN	22360.17	4610.00	-0.71	17.45		17.69	0.000381	3.96	1162.97	119.92	0.22
MAIN	22360.17	6124.00	-0.71	19.31		19.61	0.000410	4.39	1396.47	130.85	0.24
MAIN	22259.92	2923.00	-0.71	13.51	7.48	13.78	0.000591	4.22	693.47	90.16	0.27
MAIN	22259.92	4225.00	-0.71	16.36	8.81	16.65	0.000507	4.32	979.25	110.02	0.25
MAIN	22259.92	4783.00	-0.71	17.34	9.29	17.64	0.000492	4.39	1090.14	116.82	0.25
MAIN	22259.92	6329.00	-0.71	19.19	10.51	19.55	0.000522	4.80	1318.28	129.20	0.26
MAIN	22049.1	Bridge									
MAIN	21838.21	2985.00	-0.71	13.06	7.57	13.34	0.000733	4.11	727.10	117.45	0.29
MAIN	21838.21	4321.00	-0.71	15.71	8.98	15.97	0.000524	4.08	1058.21	133.96	0.26
MAIN	21838.21	4897.00	-0.71	16.59	9.53	16.86	0.000497	4.16	1178.32	139.47	0.25
MAIN	21838.21	6482.00	-0.71	18.81	11.14	19.09	0.000442	4.31	1502.38	1617.91	0.24
MAIN	21441.61	2985.00	-0.71	12.84	7.46	13.06	0.000572	3.77	792.63	122.40	0.25
MAIN	21441.61	4321.00	-0.71	15.55	8.68	15.77	0.000419	3.76	1148.17	140.56	0.23
MAIN	21441.61	4897.00	-0.71	16.43	9.16	16.66	0.000401	3.84	1275.67	146.66	0.23
MAIN	21441.61	6482.00	-0.71	18.64	10.28	18.89	0.000506	3.97	1633.32	1721.01	0.25
MAIN	20735.69	3040.00	-0.80	12.52	6.80	12.70	0.000426	3.42	888.45	127.17	0.23
MAIN	20735.69	4404.00	-0.80	15.31	7.97	15.50	0.000319	3.49	1261.05	139.87	0.20
MAIN	20735.69	4996.00	-0.80	16.20	8.62	16.40	0.000317	3.60	1388.03	209.36	0.21
MAIN	20735.69	6614.00	-0.80	18.34	9.53	18.55	0.000412	3.71	1782.88	5226.14	0.23
MAIN	19794.28	3106.00	2.17	12.07	6.87	12.27	0.000497	3.57	868.96	128.19	0.24
MAIN	19794.28	4503.00	2.17	14.97	8.05	15.16	0.000376	3.57	1261.52	143.30	0.21
MAIN	19794.28	5116.00	2.17	15.84	8.49	16.05	0.000421	3.68	1389.11	1662.05	0.21
MAIN	19794.28	6774.00	2.17	17.92	9.41	18.14	0.000463	3.81	2638.02	4919.94	0.20
MAIN	18685.77	3195.00	-2.85	11.65	6.08	11.81	0.000323	3.20	997.67	126.34	0.20
MAIN	18685.77	4638.00	-2.85	14.62	6.17	14.79	0.000278	3.30	1403.80	152.18	0.19
MAIN	18685.77	5279.00	-2.85	15.46	6.60	15.65	0.000295	3.43	1537.22	1056.81	0.20
MAIN	18685.77	6992.00	-2.85	17.65	7.65	17.73	0.000177	2.64	9734.02	5446.06	0.15
MAIN	17927.3	3195.00	-3.25	11.38	5.17	11.55	0.000356	3.29	970.88	149.28	0.21
MAIN	17927.3	4638.00	-3.25	14.39	6.20	14.56	0.000341	3.28	1413.15	231.48	0.21
MAIN	17927.3	5279.00	-3.25	15.23	6.61	15.41	0.000335	3.36	1568.87	738.79	0.21
MAIN	17927.3	6992.00	-3.25	17.36	7.62	17.54	0.000330	3.45	2025.76	4437.98	0.21
MAIN	17421.75	3195.00	-3.43	11.25	3.59	11.38	0.000259	2.87	1113.98	145.23	0.18
MAIN	17421.75	4638.00	-3.43	14.28	4.94	14.41	0.000218	2.91	1594.62	228.39	0.17
MAIN	17421.75	5279.00	-3.43	15.11	5.39	15.25	0.000224	3.02	1745.78	607.68	0.17
MAIN	17421.75	6992.00	-3.43	17.22	6.45	17.35	0.000262	3.22	2170.76	4154.10	0.19

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	17381.61	3195.00	-3.43	11.23	3.59	11.37	0.000256	2.99	1069.27	125.98	0.18
MAIN	17381.61	4638.00	-3.43	14.23	4.93	14.39	0.000220	3.15	1474.00	143.44	0.17
MAIN	17381.61	5279.00	-3.43	15.06	5.36	15.23	0.000229	3.31	1595.40	433.12	0.18
MAIN	17381.61	6992.00	-3.43	17.15	6.42	17.35	0.000269	3.62	1929.10	4674.98	0.19
MAIN	17298.1	Bridge									
MAIN	17214.6	3273.00	-3.43	11.06	3.71	11.20	0.000272	2.97	1100.99	137.99	0.19
MAIN	17214.6	4757.00	-3.43	13.96	5.03	14.11	0.000238	3.10	1534.82	163.54	0.18
MAIN	17214.6	5422.00	-3.43	15.00	5.47	15.15	0.000236	3.17	1709.84	668.12	0.18
MAIN	17214.6	7184.00	3.43	17.12	6.52	17.21	0.000176	2.71	6328.61	2706.32	0.15
MAIN	17053.81	3273.00	3.43	10.98	3.68	11.15	0.000304	3.23	1012.66	119.73	0.20
MAIN	17053.81	4757.00	3.43	13.88	5.01	14.06	0.000283	3.40	1397.80	145.95	0.19
MAIN	17053.81	5422.00	3.43	14.91	5.44	15.10	0.000320	3.48	1557.99	776.16	0.20
MAIN	17053.81	7184.00	3.43	16.94	6.50	17.14	0.000384	3.59	2001.72	2870.73	0.22
MAIN	15961.79	3342.00	-4.58	10.73	1.83	10.85	0.000212	2.85	1173.28	130.82	0.17
MAIN	15961.79	4861.00	-4.58	13.64	3.26	13.79	0.000200	3.07	1584.28	151.13	0.17
MAIN	15961.79	5548.00	-4.58	14.65	3.82	14.80	0.000204	3.19	1739.59	318.17	0.17
MAIN	15961.79	7353.00	-4.58	16.61	5.03	16.80	0.000233	3.56	2067.59	2948.98	0.18
MAIN	15951.73	3342.00	-4.58	10.72	1.84	10.85	0.000213	2.85	1172.34	130.77	0.17
MAIN	15951.73	4861.00	-4.58	13.64	3.28	13.78	0.000201	3.07	1583.25	151.09	0.17
MAIN	15951.73	5548.00	-4.58	14.64	3.81	14.80	0.000204	3.19	1738.49	305.01	0.17
MAIN	15951.73	7353.00	-4.58	16.60	5.04	16.80	0.000233	3.56	2066.17	2940.97	0.18
MAIN	15851.44	3342.00	-4.58	10.70	1.84	10.83	0.000214	2.86	1170.01	130.65	0.17
MAIN	15851.44	4861.00	-4.58	13.62	3.28	13.77	0.000202	3.08	1580.72	150.97	0.17
MAIN	15851.44	5548.00	-4.58	14.62	3.81	14.78	0.000205	3.20	1735.79	158.43	0.17
MAIN	15851.44	7353.00	-4.58	16.58	5.04	16.78	0.000234	3.56	2062.73	2935.33	0.18
MAIN	15812.37	3342.00	-4.58	10.69	1.83	10.82	0.000215	2.86	1168.87	130.59	0.17
MAIN	15812.37	4861.00	-4.58	13.61	3.28	13.76	0.000202	3.08	1579.49	150.91	0.17
MAIN	15812.37	5548.00	-4.58	14.61	3.82	14.77	0.000205	3.20	1734.47	158.36	0.17
MAIN	15812.37	7353.00	-4.58	16.57	5.04	16.77	0.000234	3.57	2061.03	2880.57	0.18
MAIN	14880.77	3421.00	-4.57	10.48	1.72	10.62	0.000225	2.93	1167.10	128.15	0.17
MAIN	14880.77	4961.00	-4.57	13.41	3.23	13.56	0.000215	3.17	1571.10	148.23	0.17
MAIN	14880.77	5694.00	-4.57	14.40	3.73	14.57	0.000224	3.30	1723.46	157.69	0.18
MAIN	14880.77	7548.00	-4.57	16.32	4.92	16.53	0.000282	3.65	2061.34	2159.89	0.20
MAIN	13669.39	3478.00	4.54	10.20	1.37	10.34	0.000231	3.00	1158.91	126.74	0.17
MAIN	13669.39	5067.00	4.54	13.13	2.83	13.30	0.000221	3.25	1559.52	146.10	0.18
MAIN	13669.39	5796.00	4.54	14.12	3.42	14.30	0.000227	3.40	1705.65	423.12	0.18
MAIN	13669.39	7688.00	4.54	15.97	4.71	16.20	0.000262	3.84	2000.13	4348.48	0.20
MAIN	12815.75	3565.00	4.77	9.97	1.21	10.13	0.000265	3.18	1121.29	123.11	0.19
MAIN	12815.75	5200.00	4.77	12.92	2.53	13.10	0.000260	3.41	1524.98	149.45	0.19
MAIN	12815.75	5959.00	4.77	13.90	3.17	14.09	0.000267	3.56	1675.11	157.10	0.19
MAIN	12815.75	7903.00	4.77	15.71	4.57	15.96	0.000311	4.01	1973.06	4730.48	0.21
MAIN	12003.06	3565.00	4.54	9.75	1.29	9.91	0.000288	3.17	1124.08	131.65	0.19
MAIN	12003.06	5200.00	4.54	12.71	3.01	12.88	0.000260	3.37	1543.80	153.60	0.19
MAIN	12003.06	5959.00	4.54	13.68	3.85	13.87	0.000267	3.51	1697.49	161.68	0.19
MAIN	12003.06	7903.00	4.54	15.45	5.25	15.69	0.000340	3.94	2093.63	5246.74	0.22
MAIN	11534.3	3637.00	7.65	9.67	-0.12	9.78	0.000188	2.71	1340.21	142.19	0.16
MAIN	11534.3	5309.00	7.65	12.63	1.38	12.77	0.000175	2.99	1776.11	153.45	0.15
MAIN	11534.3	6093.00	7.65	13.60	2.91	13.76	0.000192	3.16	1928.64	165.07	0.16
MAIN	11534.3	8082.00	7.65	15.34	4.18	15.54	0.000269	3.58	2370.93	5378.57	0.20
MAIN	10505.78	3637.00	-5.56	9.43	1.04	9.57	0.000232	2.93	1242.92	143.76	0.18
MAIN	10505.78	5309.00	-5.56	12.42	2.38	12.57	0.000213	3.11	1705.12	695.15	0.17
MAIN	10505.78	6093.00	-5.56	13.38	2.92	13.54	0.000226	3.26	1871.18	2942.68	0.18
MAIN	10505.78	8082.00	-5.56	15.03	4.15	15.23	0.000332	3.61	2248.14	6293.74	0.21
MAIN	10495.47	3676.00	-5.56	9.43	1.08	9.56	0.000237	2.96	1242.00	143.71	0.18
MAIN	10495.47	5370.00	-5.56	12.41	2.42	12.57	0.000218	3.15	1703.93	653.05	0.17
MAIN	10495.47	6166.00	-5.56	13.37	2.97	13.54	0.000232	3.30	1869.76	2963.82	0.18
MAIN	10495.47	8181.00	-5.56	15.01	4.20	15.22	0.000337	3.66	2244.26	6259.78	0.21
MAIN	10272.1	Bridge									

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	10048.67	3676.00	-3.96	9.12	1.11	9.26	0.000235	3.01	1221.73	135.95	0.18
MAIN	10048.67	5370.00	-3.96	12.07	2.37	12.24	0.000215	3.26	1645.74	729.93	0.17
MAIN	10048.67	6166.00	-3.96	12.99	2.90	13.18	0.000229	3.45	1787.32	1963.33	0.18
MAIN	10048.67	8181.00	-3.96	14.47	4.05	14.72	0.000315	4.02	2033.00	5877.89	0.21
MAIN	9989.7	Bridge									
MAIN	9930.678	3825.00	-3.96	9.06	1.23	9.21	0.000261	3.15	1214.12	136.36	0.19
MAIN	9930.678	5573.00	-3.96	12.02	2.52	12.19	0.000245	3.37	1700.10	214.47	0.18
MAIN	9930.678	6412.00	-3.96	12.92	3.05	13.12	0.000278	3.54	1913.97	2607.97	0.20
MAIN	9930.678	8483.00	-3.96	14.40	4.21	14.65	0.000331	4.02	2448.58	4840.84	0.22
MAIN	9890.046	3825.00	-3.96	9.05	1.23	9.20	0.000261	3.15	1212.52	135.93	0.19
MAIN	9890.046	5573.00	-3.96	12.00	2.52	12.18	0.000240	3.39	1669.07	993.40	0.18
MAIN	9890.046	6412.00	-3.96	12.90	3.06	13.10	0.000255	3.59	1856.59	2765.30	0.19
MAIN	9890.046	8483.00	-3.96	14.37	4.21	14.63	0.000334	4.13	2270.04	4680.95	0.22
MAIN	8433.446	3825.00	-4.73	8.68	1.02	8.83	0.000255	3.08	1240.48	141.82	0.18
MAIN	8433.446	5573.00	-4.73	11.61	2.28	11.74	0.000383	2.90	1988.16	564.40	0.21
MAIN	8433.446	6412.00	-4.73	12.52	2.89	12.64	0.000396	2.77	2909.46	1538.35	0.21
MAIN	8433.446	8483.00	-4.73	14.07	3.94	14.16	0.000243	2.51	6427.44	3113.24	0.17
MAIN	7639.533	3825.00	-5.22	8.48		8.62	0.000262	3.10	1234.34	138.49	0.18
MAIN	7639.533	5573.00	-5.22	11.28		11.46	0.000304	3.37	1654.58	189.59	0.20
MAIN	7639.533	6412.00	-5.22	12.16		12.35	0.000328	3.51	1828.30	266.57	0.21
MAIN	7639.533	8483.00	-5.22	13.68		13.90	0.000415	3.78	2704.35	1210.23	0.23
MAIN	6580.048	3825.00	-5.48	8.23		8.36	0.000243	2.81	1361.67	174.30	0.18
MAIN	6580.048	5573.00	-5.48	11.01		11.13	0.000281	2.79	1999.42	291.66	0.19
MAIN	6580.048	6412.00	-5.48	11.82		11.95	0.000414	2.81	2279.85	441.88	0.22
MAIN	6580.048	8483.00	-5.48	13.34		13.47	0.000352	2.79	3174.95	1234.27	0.21
MAIN	6533.497	3825.00	-5.48	8.21	0.26	8.34	0.000244	2.62	1358.09	173.62	0.18
MAIN	6533.497	5573.00	-5.48	10.98	1.36	11.12	0.000201	2.94	1894.47	306.55	0.17
MAIN	6533.497	6412.00	-5.48	11.77	1.86	11.93	0.000204	3.13	2050.51	487.17	0.17
MAIN	6533.497	8483.00	-5.48	13.34	3.02	13.44	0.000410	2.51	3494.56	1281.37	0.21
MAIN	6273.6	Bridge									
MAIN	6013.685	3825.00	-5.48	7.93	0.26	8.06	0.000431	2.87	1332.46	169.12	0.18
MAIN	6013.685	5573.00	-5.48	10.70	1.35	10.84	0.000386	3.02	1847.35	242.42	0.18
MAIN	6013.685	6412.00	-5.48	11.38	1.87	11.54	0.000418	3.23	1986.17	295.05	0.18
MAIN	6013.685	8483.00	-5.48	12.89	3.03	13.05	0.000921	3.25	2725.85	1220.88	0.25
MAIN	5837.123	3932.00	-5.48	7.81		7.97	0.000514	3.18	1238.30	152.92	0.20
MAIN	5837.123	5720.00	-5.48	10.59		10.76	0.000507	3.33	1722.66	221.70	0.20
MAIN	5837.123	6590.00	-5.48	11.25		11.45	0.000563	3.55	1892.79	293.42	0.21
MAIN	5837.123	8702.00	-5.48	12.64		12.89	0.000676	3.99	2434.54	604.82	0.23
MAIN	5280.757	3932.00	-6.28	7.53		7.69	0.000500	3.15	1248.27	152.44	0.19
MAIN	5280.757	5720.00	-6.28	10.30		10.41	0.000714	2.62	2184.72	468.68	0.21
MAIN	5280.757	6590.00	-6.28	10.98		11.09	0.000638	2.62	2513.47	501.35	0.21
MAIN	5280.757	8702.00	-6.28	12.40		12.51	0.000528	2.68	3320.13	709.95	0.19
MAIN	4511.779	3932.00	-6.45	7.12		7.28	0.000570	3.20	1227.87	162.95	0.21
MAIN	4511.779	5720.00	-6.45	9.71		9.88	0.000654	3.27	1748.66	250.60	0.22
MAIN	4511.779	6590.00	-6.45	10.37		10.55	0.000734	3.42	1924.68	281.12	0.23
MAIN	4511.779	8702.00	-6.45	11.78		11.99	0.000902	3.67	2371.73	365.70	0.25
MAIN	2969.15	3932.00	-6.17	6.37	-0.08	6.46	0.000459	2.47	1589.36	267.10	0.18
MAIN	2969.15	5720.00	-6.17	8.90	1.43	8.99	0.000461	2.33	2451.65	452.08	0.18
MAIN	2969.15	6590.00	-6.17	9.52	1.82	9.61	0.000461	2.41	2737.45	481.79	0.18
MAIN	2969.15	8702.00	-6.17	10.81	2.66	10.91	0.000461	2.56	3402.63	547.56	0.18

PROPOSED
HEC-RAS Output

HEC RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	36378.55	498.00	16.36	20.89		21.01	0.000858	2.75	181.40	62.36	0.28
MAIN	36378.55	733.00	16.36	22.24		22.38	0.000567	2.69	272.29	70.31	0.24
MAIN	36378.55	854.00	16.36	23.01		23.11	0.000458	2.62	326.13	74.62	0.22
MAIN	36378.55	1207.00	16.36	24.92		25.02	0.000306	2.52	479.50	85.72	0.19
MAIN	35071.34	508.00	14.49	20.08		20.15	0.000443	2.16	234.77	70.19	0.21
MAIN	35071.34	747.00	14.49	21.74		21.81	0.000265	2.06	362.68	83.64	0.17
MAIN	35071.34	871.00	14.49	22.59		22.65	0.000232	2.00	436.34	90.48	0.16
MAIN	35071.34	1230.00	14.49	24.58		24.64	0.000260	1.89	651.18	160.31	0.17
MAIN	35019.49	508.00	14.49	20.05	17.23	20.12	0.000455	2.19	232.49	69.93	0.21
MAIN	35019.49	747.00	14.49	21.72	17.77	21.79	0.000289	2.07	360.72	83.45	0.18
MAIN	35019.49	871.00	14.49	22.57	18.01	22.63	0.000235	2.00	434.49	90.31	0.16
MAIN	35019.49	1230.00	14.49	24.57	18.60	24.63	0.000183	1.93	882.65	247.89	0.15
MAIN	34959.15	Bridge									
MAIN	34898.81	508.00	14.49	19.97	17.23	20.05	0.000488	2.23	227.63	69.94	0.22
MAIN	34898.81	747.00	14.49	21.66	17.77	21.73	0.000300	2.09	357.97	84.32	0.18
MAIN	34898.81	871.00	14.49	22.51	18.01	22.57	0.000243	2.01	432.53	91.53	0.16
MAIN	34898.81	1230.00	14.49	24.38	18.60	24.44	0.000277	1.95	631.31	1226.85	0.17
MAIN	34675.54	527.00	14.49	19.83	17.28	19.93	0.000590	2.42	217.90	68.47	0.24
MAIN	34675.54	774.00	14.49	21.58	17.82	21.66	0.000340	2.21	349.99	82.92	0.19
MAIN	34675.54	903.00	14.49	22.44	18.07	22.51	0.000272	2.13	424.67	90.07	0.17
MAIN	34675.54	1275.00	14.49	24.32	18.67	24.39	0.000183	2.04	769.92	542.58	0.15
MAIN	33904.71	697.00	12.75	19.40	16.27	19.50	0.000510	2.57	271.49	69.44	0.23
MAIN	33904.71	1024.00	12.75	21.30	16.91	21.39	0.000333	2.47	415.17	81.66	0.19
MAIN	33904.71	1194.00	12.75	22.19	17.19	22.28	0.000319	2.43	492.14	96.18	0.19
MAIN	33904.71	1687.00	12.75	24.13	17.89	24.20	0.000376	2.14	896.87	724.23	0.20
MAIN	32723.5	703.00	11.49	18.91	15.08	18.99	0.000345	2.30	306.17	68.60	0.19
MAIN	32723.5	1033.00	11.49	20.97	15.76	21.05	0.000238	2.25	459.79	80.29	0.17
MAIN	32723.5	1205.00	11.49	21.89	16.05	21.97	0.000212	2.25	535.83	85.48	0.16
MAIN	32723.5	1792.00	11.49	23.80	16.76	23.87	0.000182	2.13	1340.48	1693.24	0.15
MAIN	32685.24	754.00	11.49	18.88	15.19	18.97	0.000405	2.48	303.97	68.42	0.21
MAIN	32685.24	1109.00	11.49	20.94	15.89	21.03	0.000279	2.42	457.33	80.11	0.18
MAIN	32685.24	1293.00	11.49	21.87	16.18	21.96	0.000247	2.42	533.69	85.34	0.17
MAIN	32685.24	1827.00	11.49	23.79	16.93	23.85	0.000253	2.19	1332.13	1683.49	0.17
MAIN	32585.4	Bridge									
MAIN	32485.56	807.00	11.49	18.76	15.31	18.87	0.000501	2.73	295.79	67.74	0.23
MAIN	32485.56	1187.00	11.49	20.87	16.02	20.97	0.000332	2.63	451.26	79.63	0.19
MAIN	32485.56	1385.00	11.49	21.77	16.32	21.88	0.000298	2.64	525.41	84.79	0.19
MAIN	32485.56	1956.00	11.49	23.47	17.09	23.59	0.000300	2.80	930.19	808.20	0.19
MAIN	32292.9	871.00	11.49	18.61	15.44	18.76	0.000642	3.05	285.99	66.92	0.26
MAIN	32292.9	1278.00	11.49	20.77	16.16	20.90	0.000404	2.88	443.47	79.13	0.21
MAIN	32292.9	1490.00	11.49	21.68	16.47	21.81	0.000357	2.88	517.87	84.28	0.20
MAIN	32292.9	2100.00	11.49	23.37	17.27	23.52	0.000391	3.12	672.93	302.01	0.22
MAIN	31793.46	974.00	9.02	18.38	13.97	18.49	0.000392	2.66	365.50	71.16	0.21
MAIN	31793.46	1425.00	9.02	20.61	14.80	20.72	0.000283	2.65	537.41	82.26	0.18
MAIN	31793.46	1661.00	9.02	21.54	15.17	21.65	0.000262	2.70	615.38	86.42	0.18
MAIN	31793.46	2335.00	9.02	23.19	16.06	23.33	0.000342	3.03	770.63	240.56	0.20
MAIN	31048.03	1007.00	8.46	18.10	13.32	18.20	0.000367	2.65	379.78	70.61	0.20
MAIN	31048.03	1472.00	8.46	20.40	14.18	20.51	0.000272	2.64	556.72	82.66	0.18
MAIN	31048.03	1716.00	8.46	21.34	14.56	21.46	0.000256	2.70	636.56	87.56	0.18
MAIN	31048.03	2411.00	8.46	22.93	15.53	23.08	0.000346	3.06	787.49	979.04	0.20
MAIN	31028.02	1007.00	8.46	18.09	13.32	18.20	0.000369	2.66	379.23	70.57	0.20
MAIN	31028.02	1472.00	8.46	20.40	14.18	20.51	0.000273	2.65	556.25	82.63	0.18
MAIN	31028.02	1716.00	8.46	21.34	14.57	21.45	0.000256	2.70	636.09	87.54	0.18
MAIN	31028.02	2411.00	8.46	22.92	15.53	23.07	0.000312	3.07	784.87	1008.75	0.20
MAIN	30827.98	1038.00	8.46	18.00	13.38	18.12	0.000411	2.78	372.93	70.10	0.21
MAIN	30827.98	1516.00	8.46	20.33	14.25	20.45	0.000297	2.75	550.76	82.29	0.19
MAIN	30827.98	1767.00	8.46	21.27	14.65	21.40	0.000278	2.80	630.57	87.21	0.18
MAIN	30827.98	2481.00	8.46	22.85	15.62	23.00	0.000355	3.16	784.83	767.70	0.21

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	30747.98	1034.00	7.38	17.98	12.65	18.08	0.000332	2.57	404.54	72.91	0.19
MAIN	30747.98	1516.00	7.38	20.32	13.62	20.42	0.000252	2.58	591.25	86.67	0.17
MAIN	30747.98	1767.00	7.38	21.25	14.05	21.37	0.000239	2.62	675.63	92.22	0.17
MAIN	30747.98	2481.00	7.38	22.89	15.09	22.97	0.000360	2.93	847.68	790.65	0.21
MAIN	30627.31	1323.00	7.38	17.85		18.02	0.000577	3.35	395.02	72.13	0.25
MAIN	30627.31	1885.00	7.38	20.22		20.38	0.000407	3.24	582.14	86.04	0.22
MAIN	30627.31	2194.20	7.38	21.16		21.33	0.000362	3.29	666.01	91.59	0.22
MAIN	30627.31	2877.00	7.38	22.73		22.91	0.000427	3.44	887.70	218.01	0.23
MAIN	29590.01	1438.00	5.35	17.17	12.57	17.38	0.000675	3.62	397.24	72.17	0.27
MAIN	29590.01	2083.00	5.35	19.74	13.66	19.93	0.000466	3.43	606.47	90.64	0.23
MAIN	29590.01	2426.00	5.35	20.72	14.16	20.90	0.000436	3.47	698.14	123.81	0.23
MAIN	29590.01	3380.00	5.35	22.17	15.33	22.41	0.000541	3.98	849.36	581.10	0.26
MAIN	28463.24	1688.00	4.63	16.65	10.57	16.78	0.000341	2.89	583.14	90.56	0.20
MAIN	28463.24	2435.00	4.63	19.38	11.62	19.50	0.000257	2.84	857.45	110.81	0.18
MAIN	28463.24	2835.00	4.63	20.37	12.09	20.50	0.000251	2.92	971.04	211.67	0.18
MAIN	28463.24	3934.00	4.63	21.72	13.22	21.91	0.000318	3.46	1138.01	3397.87	0.20
MAIN	27399.88	1791.00	3.41	16.27	9.81	16.41	0.000364	2.97	603.21	94.36	0.21
MAIN	27399.88	2580.00	3.41	19.10	10.93	19.22	0.000269	2.84	908.28	551.61	0.18
MAIN	27399.88	3003.00	3.41	20.09	11.45	20.22	0.000274	2.90	1039.22	1191.60	0.19
MAIN	27399.88	4163.00	3.41	21.48	12.69	21.58	0.000259	2.76	4882.91	4143.00	0.18
MAIN	27004.57	1858.00	3.41	16.09	9.91	16.26	0.000391	3.23	575.06	83.03	0.22
MAIN	27004.57	2673.00	3.41	18.95	11.04	19.11	0.000296	3.20	834.93	173.13	0.19
MAIN	27004.57	3112.00	3.41	19.93	11.57	20.10	0.000301	3.33	934.99	1263.55	0.20
MAIN	27004.57	4309.00	3.41	21.36	12.82	21.48	0.000238	3.06	5243.09	5750.80	0.18
MAIN	26964.57	1858.00	3.85	16.08	9.85	16.22	0.000408	2.97	624.79	107.18	0.22
MAIN	26964.57	2673.00	3.85	18.96	10.97	19.08	0.000270	2.72	982.63	144.60	0.18
MAIN	26964.57	3112.00	3.85	19.95	11.49	20.06	0.000250	2.72	1303.78	988.69	0.18
MAIN	26964.57	4309.00	3.85	21.37	12.83	21.46	0.000188	2.62	4985.17	4060.13	0.16
MAIN	26863.5	Bridge									
MAIN	26762.42	1953.00	3.85	16.05	10.00	16.20	0.000458	3.15	620.57	106.71	0.23
MAIN	26762.42	2813.00	3.85	18.74	11.14	18.88	0.000324	2.95	952.44	169.47	0.20
MAIN	26762.42	3264.00	3.85	19.80	11.67	19.94	0.000322	2.94	1110.81	1054.36	0.20
MAIN	26762.42	4497.00	3.85	21.19	13.02	21.29	0.000318	2.75	4873.60	3839.85	0.20
MAIN	26562.23	1953.00	3.85	15.94	9.99	16.10	0.000480	3.21	609.24	105.42	0.23
MAIN	26562.23	2813.00	3.85	18.69	11.15	18.81	0.000308	2.88	1525.39	1018.97	0.19
MAIN	26562.23	3264.00	3.85	19.76	11.66	19.86	0.000249	2.67	2921.09	2433.82	0.18
MAIN	26562.23	4497.00	3.85	21.15	13.03	21.21	0.000160	2.40	7839.99	3597.19	0.15
MAIN	26225.91	1953.00	3.75	15.82	9.54	15.95	0.000334	2.94	664.97	99.71	0.20
MAIN	26225.91	2813.00	3.75	18.58	10.63	18.71	0.000281	2.89	974.04	1548.84	0.19
MAIN	26225.91	3264.00	3.75	19.64	11.13	19.77	0.000338	2.89	1136.24	2560.13	0.20
MAIN	26225.91	4497.00	3.75	21.11	12.30	21.16	0.000151	2.04	8862.61	3824.18	0.14
MAIN	26216.9	1979.00	3.75	15.81	9.58	15.95	0.000344	2.98	664.12	99.64	0.20
MAIN	26216.9	2850.00	3.75	18.57	10.67	18.70	0.000287	2.93	972.89	1756.30	0.19
MAIN	26216.9	3304.00	3.75	19.63	11.17	19.76	0.000339	2.93	1127.32	2590.96	0.20
MAIN	26216.9	4547.00	3.75	21.11	12.34	21.15	0.000161	1.86	9382.62	3844.67	0.14
MAIN	26166.84	Bridge									
MAIN	26116.78	1979.00	3.75	15.63	9.98	15.84	0.000594	3.69	535.98	86.69	0.26
MAIN	26116.78	2850.00	3.75	18.29	11.39	18.49	0.000475	3.58	795.52	953.89	0.24
MAIN	26116.78	3304.00	3.75	19.42	11.98	19.59	0.000390	3.39	1599.36	2129.79	0.22
MAIN	26116.78	4547.00	3.75	21.01	13.31	21.09	0.000196	2.71	7755.29	3383.47	0.16
MAIN	26075.36	2190.00	3.75	15.56	10.09	15.80	0.000646	3.96	552.86	86.04	0.28
MAIN	26075.36	3158.00	3.75	18.22	11.33	18.46	0.000548	3.88	813.40	624.90	0.26
MAIN	26075.36	3638.00	3.75	19.35	11.87	19.56	0.000624	3.70	1291.60	1813.82	0.27
MAIN	26075.36	4955.00	3.75	20.98	13.16	21.07	0.000273	2.89	6820.29	3245.80	0.19
MAIN	24973.02	[illegible]7.00	2.00	15.02	8.62	15.20	0.000411	3.65	677.28	96.45	0.22
MAIN	24973.02	3270.00	2.00	17.78	9.84	17.96	0.000330	3.37	970.13	468.51	0.21
MAIN	24973.02	3709.00	2.00	18.86	10.35	19.04	0.000318	3.42	1099.39	1276.69	0.20
MAIN	24973.02	5103.00	2.00	20.65	11.58	20.78	0.000252	3.11	5509.88	3562.58	0.18

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	24933.01	2267.00	2.00	15.00	8.63	15.17	0.000415	3.36	674.78	96.26	0.22
MAIN	24933.01	3270.00	2.00	17.77	9.84	17.93	0.000337	3.37	969.13	390.71	0.21
MAIN	24933.01	3759.00	2.00	18.84	10.34	19.02	0.000363	3.40	1104.12	1407.71	0.21
MAIN	24933.01	5103.00	2.00	20.65	11.57	20.76	0.000257	3.03	5518.93	3388.44	0.18
MAIN	24855.82	Bridge									
MAIN	24778.62	2267.00	2.00	14.90	8.63	15.08	0.000431	3.41	664.95	95.52	0.23
MAIN	24778.62	3270.00	2.00	17.53	9.84	17.72	0.000362	3.47	941.50	333.60	0.21
MAIN	24778.62	3759.00	2.00	18.49	10.34	18.68	0.000362	3.56	1056.52	683.07	0.22
MAIN	24778.62	5103.00	2.00	20.45	11.57	20.59	0.000294	3.22	4774.37	2875.66	0.20
MAIN	24597.37	2448.00	2.00	14.76	8.87	14.98	0.000535	3.73	655.65	96.85	0.25
MAIN	24597.37	3533.00	2.00	17.41	10.12	17.63	0.000449	3.76	940.64	333.56	0.24
MAIN	24597.37	4042.00	2.00	18.38	10.62	18.60	0.000469	3.79	1066.88	866.42	0.24
MAIN	24597.37	5445.00	2.00	20.39	11.86	20.53	0.000297	3.31	5063.49	2730.09	0.20
MAIN	23766.16	2607.00	0.30	14.39	7.98	14.57	0.000411	3.44	757.30	103.53	0.22
MAIN	23766.16	3766.00	0.30	17.10	9.36	17.29	0.000348	3.55	1060.66	122.13	0.21
MAIN	23766.16	4292.00	0.30	18.05	9.87	18.26	0.000347	3.63	1181.99	205.14	0.21
MAIN	23766.16	5745.00	0.30	20.06	10.99	20.25	0.000381	3.54	3175.57	2476.81	0.22
MAIN	23079.37	2786.00	-0.20	14.00	7.84	14.24	0.000571	3.95	705.20	99.63	0.26
MAIN	23079.37	4026.00	-0.20	16.77	9.26	17.02	0.000456	4.00	1006.91	117.88	0.24
MAIN	23079.37	4570.00	-0.20	17.73	9.81	17.99	0.000437	4.07	1122.57	124.24	0.24
MAIN	23079.37	6077.00	-0.20	19.64	11.17	19.94	0.000496	4.39	1456.38	2408.75	0.26
MAIN	22360.17	2811.00	-0.71	13.63		13.85	0.000500	3.79	741.77	100.85	0.25
MAIN	22360.17	4064.00	-0.71	16.47		16.70	0.000395	3.88	1046.51	115.05	0.23
MAIN	22360.17	4610.00	-0.71	17.45		17.69	0.000381	3.96	1162.97	119.92	0.22
MAIN	22360.17	6124.00	-0.71	19.31		19.61	0.000410	4.39	1396.46	130.85	0.24
MAIN	22259.92	2923.00	-0.71	13.51	7.48	13.78	0.000591	4.22	693.47	90.16	0.27
MAIN	22259.92	4226.00	-0.71	16.36	8.81	16.65	0.000507	4.32	979.21	110.02	0.25
MAIN	22259.92	4783.00	-0.71	17.34	9.29	17.64	0.000492	4.39	1090.14	116.82	0.25
MAIN	22259.92	6329.00	-0.71	19.19	10.51	19.55	0.000522	4.60	1318.28	129.20	0.26
MAIN	22049.1	Bridge									
MAIN	21838.21	2985.00	0.71	13.08	7.57	13.34	0.000733	4.11	727.10	117.45	0.29
MAIN	21838.21	4321.00	-0.71	15.71	8.98	15.97	0.000524	4.08	1058.16	133.96	0.26
MAIN	21838.21	4897.00	0.71	16.59	9.53	16.86	0.000497	4.16	1178.32	139.47	0.25
MAIN	21838.21	6482.00	-0.71	18.81	11.14	19.09	0.000442	4.31	1502.38	1617.90	0.24
MAIN	21441.61	2985.00	-0.71	12.84	7.46	13.06	0.000572	3.77	792.63	122.40	0.26
MAIN	21441.61	4321.00	-0.71	15.55	8.68	15.77	0.000419	3.76	1148.12	140.56	0.23
MAIN	21441.61	4897.00	-0.71	16.43	9.16	16.66	0.000401	3.84	1275.67	146.66	0.23
MAIN	21441.61	6482.00	-0.71	18.64	10.28	18.89	0.000506	3.97	1633.31	1720.98	0.25
MAIN	20735.69	3040.00	-0.80	12.52	6.86	12.70	0.000426	3.42	888.45	127.17	0.23
MAIN	20735.69	4404.00	-0.80	15.31	7.97	15.50	0.000319	3.49	1260.99	139.87	0.20
MAIN	20735.69	4996.00	-0.80	16.20	8.62	16.40	0.000317	3.60	1388.03	209.36	0.21
MAIN	20735.69	6614.00	-0.80	18.34	9.53	18.55	0.000412	3.71	1782.88	5226.11	0.23
MAIN	19794.28	3106.00	2.17	12.07	6.87	12.27	0.000497	3.57	868.96	128.19	0.24
MAIN	19794.28	4503.00	2.17	14.96	8.05	15.16	0.000376	3.57	1261.46	143.30	0.21
MAIN	19794.28	5116.00	2.17	15.84	8.49	16.05	0.000421	3.68	1389.11	1662.05	0.21
MAIN	19794.28	6774.00	2.17	17.92	9.41	18.14	0.000483	3.81	2638.00	4919.93	0.20
MAIN	18685.77	3195.00	-2.85	11.65	5.08	11.81	0.000323	3.20	997.67	126.34	0.20
MAIN	18685.77	4638.00	-2.85	14.62	6.17	14.79	0.000278	3.30	1403.73	152.17	0.19
MAIN	18685.77	5279.00	-2.85	15.46	6.60	15.65	0.000295	3.43	1537.22	1056.81	0.20
MAIN	18685.77	6992.00	-2.85	17.65	7.65	17.73	0.000177	2.64	9733.93	5446.05	0.15
MAIN	17927.3	3195.00	-3.25	11.38	5.17	11.55	0.000356	3.29	970.88	149.28	0.21
MAIN	17927.3	4638.00	-3.25	14.39	6.20	14.56	0.000341	3.28	1413.05	231.47	0.21
MAIN	17927.3	5279.00	-3.25	15.23	6.61	15.41	0.000335	3.36	1568.87	738.79	0.21
MAIN	17927.3	6992.00	-3.25	17.36	7.62	17.54	0.000330	3.45	2025.76	4437.97	0.21
MAIN	17421.75	3195.00	-3.43	11.25	3.59	11.38	0.000259	2.87	1113.98	145.28	0.18
MAIN	17421.75	4638.00	-3.43	14.28	4.94	14.41	0.000218	2.91	1594.52	226.34	0.17
MAIN	17421.75	5279.00	-3.43	15.11	5.39	15.26	0.000224	3.02	1745.78	607.68	0.17
MAIN	17421.75	6992.00	-3.43	17.22	6.45	17.38	0.000262	3.22	2170.75	4154.06	0.19

HEC-RAS Plan: B106-00 FH River: B106-00-C0 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	17381.61	3195.00	-3.43	11.23	3.59	11.37	0.000256	2.99	1069.27	125.98	0.18
MAIN	17381.61	4638.00	-3.43	14.23	4.93	14.39	0.000220	3.15	1473.92	143.44	0.17
MAIN	17381.61	5279.00	-3.43	15.06	5.36	15.23	0.000229	3.31	1595.40	433.12	0.18
MAIN	17381.61	5992.00	-3.43	17.15	6.42	17.35	0.000269	3.62	1929.09	4674.92	0.19
MAIN	17298.1	Bridge									
MAIN	17214.6	3273.00	-3.43	11.06	3.71	11.20	0.000272	2.97	1100.99	137.99	0.19
MAIN	17214.6	4757.00	-3.43	13.96	5.03	14.11	0.000238	3.10	1534.71	163.53	0.18
MAIN	17214.6	5422.00	-3.43	15.00	5.47	15.15	0.000236	3.17	1709.84	668.12	0.18
MAIN	17214.6	7184.00	-3.43	17.12	6.52	17.21	0.000176	2.71	6328.56	2706.32	0.15
MAIN	17053.81	3273.00	-3.43	10.98	3.68	11.15	0.000304	3.23	1012.66	119.73	0.20
MAIN	17053.81	4757.00	-3.43	13.88	5.01	14.06	0.000283	3.40	1397.70	145.94	0.19
MAIN	17053.81	5422.00	-3.43	14.91	5.44	15.10	0.000320	3.48	1557.99	776.16	0.20
MAIN	17053.81	7184.00	-3.43	16.94	6.50	17.14	0.000384	3.59	2001.72	2870.72	0.22
MAIN	15961.79	3342.00	-4.58	10.73	1.83	10.85	0.000212	2.85	1173.28	130.82	0.17
MAIN	15961.79	4861.00	-4.58	13.64	3.28	13.79	0.000200	3.07	1584.17	151.13	0.17
MAIN	15961.79	5548.00	-4.58	14.65	3.82	14.80	0.000204	3.19	1739.59	318.17	0.17
MAIN	15961.79	7353.00	-4.58	16.61	5.03	16.80	0.000233	3.56	2067.59	2948.98	0.18
MAIN	15951.73	3342.00	-4.58	10.72	1.84	10.85	0.000213	2.85	1172.34	130.77	0.17
MAIN	15951.73	4861.00	-4.58	13.64	3.28	13.78	0.000201	3.07	1583.15	151.08	0.17
MAIN	15951.73	5548.00	-4.58	14.64	3.81	14.80	0.000204	3.19	1738.49	305.01	0.17
MAIN	15951.73	7353.00	-4.58	16.60	5.04	16.80	0.000233	3.56	2066.17	2940.97	0.18
MAIN	15851.44	3342.00	-4.58	10.70	1.84	10.83	0.000214	2.86	1170.01	130.65	0.17
MAIN	15851.44	4861.00	-4.58	13.62	3.28	13.77	0.000202	3.08	1580.61	150.97	0.17
MAIN	15851.44	5548.00	-4.58	14.62	3.81	14.78	0.000205	3.20	1735.79	158.43	0.17
MAIN	15851.44	7353.00	-4.58	16.58	5.04	16.78	0.000234	3.56	2062.71	2935.32	0.18
MAIN	15812.37	3342.00	-4.58	10.69	1.83	10.82	0.000215	2.86	1168.87	130.59	0.17
MAIN	15812.37	4861.00	-4.58	13.61	3.28	13.76	0.000202	3.08	1579.38	150.91	0.17
MAIN	15812.37	5548.00	-4.58	14.61	3.82	14.77	0.000205	3.20	1734.47	158.36	0.17
MAIN	15812.37	7353.00	-4.58	16.57	5.04	16.77	0.000234	3.57	2061.03	2880.57	0.18
MAIN	14880.77	3421.00	-4.57	10.48	1.72	10.62	0.000226	2.93	1167.10	128.15	0.17
MAIN	14880.77	4981.00	-4.57	13.41	3.23	13.56	0.000215	3.17	1570.99	148.23	0.17
MAIN	14880.77	5694.00	-4.57	14.40	3.73	14.57	0.000224	3.30	1723.46	157.69	0.18
MAIN	14880.77	7548.00	-4.57	16.32	4.92	16.53	0.000282	3.86	2081.34	2159.89	0.20
MAIN	13669.39	3478.00	-4.54	10.20	1.37	10.34	0.000231	3.00	1158.91	126.74	0.17
MAIN	13669.39	5067.00	-4.54	13.13	2.83	13.30	0.000221	3.25	1559.40	146.10	0.18
MAIN	13669.39	5798.00	-4.54	14.12	3.42	14.30	0.000227	3.40	1706.85	423.12	0.18
MAIN	13669.39	7688.00	-4.54	15.97	4.71	16.20	0.000262	3.94	2000.13	4348.45	0.20
MAIN	12815.75	3565.00	-4.77	9.97	1.21	10.13	0.000265	3.18	1121.29	123.11	0.19
MAIN	12815.75	5200.00	-4.77	12.92	2.53	13.10	0.000260	3.41	1524.85	149.45	0.19
MAIN	12815.75	5959.00	-4.77	13.90	3.17	14.09	0.000267	3.56	1675.11	157.10	0.19
MAIN	12815.75	7903.00	-4.77	15.71	4.57	15.96	0.000311	4.01	1973.05	4730.45	0.21
MAIN	12003.06	3565.00	-4.54	9.75	1.29	9.91	0.000268	3.17	1124.08	131.65	0.19
MAIN	12003.06	5200.00	-4.54	12.71	3.01	12.88	0.000261	3.37	1543.68	153.60	0.19
MAIN	12003.06	5959.00	-4.54	13.68	3.85	13.87	0.000267	3.51	1697.49	161.68	0.19
MAIN	12003.06	7903.00	-4.54	15.45	5.25	15.69	0.000340	3.94	2093.62	5246.73	0.22
MAIN	11534.3	3637.00	-7.65	9.67	-0.12	9.78	0.000188	2.71	1340.21	142.19	0.16
MAIN	11534.3	5309.00	-7.65	12.62	1.38	12.77	0.000175	2.99	1775.98	153.44	0.15
MAIN	11534.3	6093.00	-7.65	13.60	2.91	13.76	0.000192	3.16	1928.64	165.07	0.16
MAIN	11534.3	8082.00	-7.65	15.34	4.18	15.54	0.000269	3.58	2370.92	5378.53	0.20
MAIN	10505.78	3637.00	-5.56	9.43	1.04	9.57	0.000232	2.93	1242.92	143.76	0.18
MAIN	10505.78	5309.00	-5.56	12.42	2.38	12.57	0.000213	3.11	1704.95	693.46	0.17
MAIN	10505.78	6093.00	-5.56	13.38	2.92	13.54	0.000226	3.26	1871.18	2942.68	0.18
MAIN	10505.78	8082.00	-5.56	15.03	4.15	15.23	0.000332	3.61	2248.13	6233.73	0.21
MAIN	10495.47	3676.00	-5.56	9.43	1.08	9.56	0.000237	2.96	1242.00	143.71	0.18
MAIN	10495.47	5370.00	-5.56	12.41	2.42	12.57	0.000218	3.15	1703.77	651.39	0.17
MAIN	10495.47	6166.00	-5.56	13.32	2.97	13.54	0.000232	3.30	1869.76	2963.82	0.18
MAIN	10495.47	8181.00	-5.56	15.01	4.20	15.22	0.000337	3.66	2244.25	6259.77	0.21
MAIN	10272.1	Bridge									

HEC-RAS Plan: B106-00 FH River: B106-00-00 Reach: MAIN (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MAIN	10048.67	3676.00	-3.96	9.12	1.11	9.26	0.000235	3.01	1221.73	135.95	0.16
MAIN	10048.67	5370.00	-3.96	12.07	2.37	12.24	0.000215	3.26	1645.58	729.43	0.17
MAIN	10048.67	6166.00	-3.96	12.99	2.90	13.18	0.000228	3.45	1787.32	1963.33	0.18
MAIN	10048.67	8181.00	-3.96	14.47	4.05	14.72	0.000315	4.02	2033.00	5877.82	0.21
MAIN	9989.7	Bridge									
MAIN	9930.678	3825.00	-3.96	9.06	1.23	9.21	0.000261	3.15	1214.12	136.36	0.19
MAIN	9930.678	5573.00	-3.96	12.01	2.52	12.19	0.000245	3.37	1699.67	214.42	0.18
MAIN	9930.678	6412.00	-3.96	12.92	3.05	13.12	0.000278	3.54	1913.97	2607.97	0.20
MAIN	9930.678	8483.00	-3.96	14.40	4.21	14.65	0.000331	4.02	2448.57	4840.79	0.22
MAIN	9890.046	3825.00	-3.96	9.05	1.23	9.20	0.000261	3.15	1212.52	135.93	0.19
MAIN	9890.046	5573.00	-3.96	12.00	2.52	12.18	0.000240	3.39	1668.86	991.74	0.18
MAIN	9890.046	6412.00	-3.96	12.90	3.06	13.10	0.000255	3.59	1856.59	2765.30	0.19
MAIN	9890.046	8483.00	-3.96	14.37	4.21	14.63	0.000334	4.13	2270.03	4680.92	0.22
MAIN	8433.446	3825.00	-4.73	8.68	1.02	8.83	0.000255	3.08	1240.48	141.82	0.18
MAIN	8433.446	5573.00	-4.73	11.61	2.28	11.74	0.000383	2.90	1987.51	563.69	0.21
MAIN	8433.446	6412.00	-4.73	12.52	2.89	12.64	0.000396	2.77	2909.46	1538.35	0.21
MAIN	8433.446	8483.00	-4.73	14.07	3.94	14.16	0.000243	2.51	6427.32	3113.22	0.17
MAIN	7639.533	3825.00	-5.22	8.48		8.62	0.000252	3.10	1234.34	138.49	0.18
MAIN	7639.533	5573.00	-5.22	11.28		11.46	0.000304	3.37	1654.36	189.57	0.20
MAIN	7639.533	6412.00	-5.22	12.16		12.35	0.000323	3.51	1828.30	206.57	0.21
MAIN	7639.533	8483.00	-5.22	13.68		13.90	0.000415	3.78	2704.29	1210.16	0.23
MAIN	6580.048	3825.00	-5.48	8.23		8.36	0.000243	2.81	1361.67	174.30	0.18
MAIN	6580.048	5573.00	-5.48	11.01		11.13	0.000282	2.79	1999.08	291.58	0.19
MAIN	6580.048	6412.00	-5.48	11.82		11.95	0.000414	2.81	2279.85	441.88	0.22
MAIN	6580.048	8483.00	-5.48	13.34		13.46	0.000352	2.79	3174.88	1234.18	0.21
MAIN	6533.497	3825.00	-5.48	8.21	0.26	8.34	0.000244	2.82	1356.09	173.62	0.18
MAIN	6533.497	5573.00	-5.48	10.98	1.36	11.11	0.000201	2.94	1894.25	306.49	0.17
MAIN	6533.497	6412.00	-5.48	11.77	1.86	11.93	0.000204	3.13	2050.51	487.17	0.17
MAIN	6533.497	8483.00	-5.48	13.34	3.02	13.44	0.000411	2.51	3494.49	1281.29	0.21
MAIN	6273.6	Bridge									
MAIN	6013.685	3825.00	-5.48	7.93	0.26	8.06	0.000431	2.87	1332.46	169.12	0.16
MAIN	6013.685	5573.00	-5.48	10.70	1.35	10.84	0.000386	3.02	1847.13	242.36	0.18
MAIN	6013.685	6412.00	-5.48	11.38	1.87	11.54	0.000418	3.23	1986.17	295.05	0.18
MAIN	6013.685	8483.00	-5.48	12.89	3.03	13.05	0.000921	3.25	2725.55	1220.79	0.25
MAIN	5837.123	3932.00	-5.48	7.81		7.97	0.000514	3.18	1238.30	152.92	0.20
MAIN	5837.123	5720.00	-5.48	10.58		10.76	0.000507	3.33	1722.41	221.58	0.20
MAIN	5837.123	6590.00	-5.48	11.25		11.45	0.000563	3.55	1892.79	293.42	0.21
MAIN	5837.123	8702.00	-5.48	12.64		12.89	0.000676	3.99	2434.48	604.77	0.23
MAIN	5280.757	3932.00	-6.28	7.53		7.69	0.000500	3.15	1248.27	152.44	0.19
MAIN	5280.757	5720.00	-6.28	10.30		10.41	0.000714	2.62	2184.11	468.62	0.21
MAIN	5280.757	6590.00	-6.28	10.98		11.09	0.000638	2.62	2513.47	501.35	0.21
MAIN	5280.757	8702.00	-6.28	12.40		12.51	0.000528	2.68	3320.05	709.91	0.19
MAIN	4511.779	3932.00	-6.45	7.12		7.28	0.000570	3.20	1227.87	162.95	0.21
MAIN	4511.779	5720.00	-6.45	9.71		9.87	0.000654	3.27	1748.25	250.52	0.22
MAIN	4511.779	6590.00	-6.45	10.37		10.55	0.000734	3.42	1924.68	281.12	0.23
MAIN	4511.779	8702.00	-6.45	11.78		11.99	0.000902	3.67	2371.68	365.69	0.25
MAIN	2969.15	3932.00	-6.17	6.37	-0.08	6.46	0.000459	2.47	1589.36	267.10	0.18
MAIN	2969.15	5720.00	-6.17	8.90	1.43	8.99	0.000461	2.33	2451.55	452.08	0.18
MAIN	2969.15	6590.00	-6.17	9.52	1.82	9.61	0.000461	2.41	2737.45	481.79	0.18
MAIN	2969.15	8702.00	-6.17	10.81	2.66	10.91	0.000461	2.56	3402.63	547.56	0.18