City of Mount Vernon

Urban Growth Area Sewer Service Study

October 2003

Prepared by:

HDR

CERTIFICATION PAGE

FOR

City of Mount Vernon
Urban Growth Area Sewer Service Study
Project No. 000 000 000 005237 002

The engineering material and data contained in this Report were prepared under the supervision and direction of the undersigned, whole seal as registered professional engineer is affixed below.

EXPIRES 4/24/

Eric C.M. Bergstrom
Supervising Engineer

City of Mount Vernon

Urban Growth Area Sewer Service Study
Technical Memorandum

Date: October 15, 2003

To: Walt Enquist, Fred Buckenmeyer

From: Eric Bergstrom

Subject: Urban Growth Area Sewer Service Study

INTRODUCTION AND OBJECTIVE

The City is required to establish a plan to provide sewer service to properties within the Urban Growth Area (UGA). This study identifies at a planning level the facilities that would be required to provide sewer service to four major areas within the UGA. These UGA areas are situated to the north, south, east and west of City limits and as illustrated in Figure 1. The areas vary in size from 175 to 1,400 acres.

DRAINAGE BASIN DELINEATION

Each of the UGA service areas shown in Figure 1 was divided into a number of drainage basins. The drainage basins were delineated based on contour and mapping data provided by City of Mt. Vernon geographical information system (GIS) as well as some field reconnaissance. Figures 2, 3, 4, and 5 show the approximate drainage basin boundaries within north, south, east and west UGAs, respectively. Each drainage basin is designated an ID such as E-12, which serves to clarify new sewer locations. The first letter of basin ID refers to a specific UGA, i.e. S for south etc. The basin ID's follow a format set forth in the *City of Mount Vernon Comprehensive Sewer Plan Update*, February 2003.

DESIGN FLOWS

Design flows from each of the drainage basins were estimated based on an assumed population density of 2.5 persons per house and a house density of 4 houses per acre. Average daily flow per capita was assumed to be 100 gallons. Consistent with Comprehensive Sewer Plan, a peaking factor was applied to predict peak daily sanitary flow. The peaking factor for the sanitary flows at any point in the system is based on the following equation:

$$PF = -0.6 \log Q + 2.6$$

where,

PF peaking factor

Q average sanitary flow in million gallons per day (mgd)

Inflow and infiltration (I&I), is independent of sanitary flow and is assumed to be 1,100 gallons per acre per day (gpda). The sanitary sewer peaking factor is not applied to the allowance for I&I.

Table 1 summarizes the drainage basins and calculated average and peak flow for each basin.

Table 1
Drainage Basins Flows

Drainage Basin ID[1]	Basin Area (acres)	Estimated Population[2]	Average Sanitary Flow (gpm)	Peaking Factor	Inflow and Infiltration (gpm)	Peak Design Flow (gpm)
North UGA						
N11-T	26	260	18	3.6	20	84
N15-A	101	1007	70	3.2	77	300
N15-B	132	1320	92	3.1	101	388
N15-C	64	640	44	3.3	49	196
N15-D	59	590	41	3.3	45	182
N16	47	469	33	3.4	36	146
N9-F	25	249	17	3.6	19	80
South UGA						
S1-D	141	1407	98	3.1	107	411
S3-A1	69	689	48	3.3	53	211
S3-A2	167	1672	116	3.1	128	484
S3-B2	84	835	58	3.2	64	252
S3-C	139	1389	96	3.1	106	407
S4-A1	66	661	46	3.3	50	202
S4-A2	99	988	69	3.2	75	295
S4-B	124	1236	86	3.1	94	364
S4-C	274	2737	190	2.9	209	767
S5-B	185	1854	129	3.0	142	533
East UGA						
E-1	209	2088	145	3.0	160	596
E-10	172	1718	119	3.1	131	496
E-11	90	896	62	3.2	68	269
E-12	104	1044	73	3.2	80	311
E-13	129	1286	89	3.1	98	378
E-14	86	861	60	3.2	66	259
E-15	40	400	28	3.4	31	126
E-2	35	347	24	3.5	27	110
E-3	42	416	29	3.4	32	131
E-4	90	903	63	3.2	69	271
E-5	57	575	40	3.3	44	177
E-6	28	285	20	3.5	22	92
E-7	63	633	44	3.3	48	194
E-8	178	1782	124	3.0	136	513
E-9	140	1400	97	3.1	107	410
N10-C	37	375	26	3.5	29	119
N10-E	44	439	30	3.4	34	138
N10-H	55	548	38	3.4	42	169
West UGA						
W1	178	1781	124	3.0	136	513
W2-A	98	977	68	3.2	75	292
W2-B	75	751	52	3.3	57	228

(1) See Figures 2 through 5 for drainage basin designations in each UGA.
(2) Saturated development.

SEWER LAYOUT AND SIZING

Figures 6, 7, 8, and 9 illustrate proposed sewer locations within the UGAs. Where possible, proposed sewers were located in existing right-of-ways. In several locations proposed sewers are shown outside of right-of-way boundaries where these routes provide a more cost effective alignment. Some sewers are shown outside the boundary of the East UGA in order maximize the natural drainage of the area. For this study it was assumed that the sewers outside the UGA boundaries are strictly for conveyance and there are no service connections along the alignment. The piping shown on the figures only includes trunk sewers and interceptors. Small collector sewers that would serve individual properties generally have not been identified.

After proposed alignment of interceptors and major trunk lines was established, grade elevations at approximately 1,000-foot intervals were established based on City's contour mapping. For the purposes of this study it was assumed that the minimum pipe depth to the invert would be 8 feet below grade. In some cases, in order to provide greater slope to improve the flow, greater depths of pipe were assumed. The hydraulic analysis of proposed sewers was completed based on fully developed UGAs for each individual drainage basin. In the model the flows from the drainage basin or portions of the drainage basin are routed into the upstream end of pipe segments.

PROPOSED IMPROVEMENTS

Based on the UGA evaluation proposed sewer improvements were identified. Table 2 summarizes the improvements proposed for each UGA. For detailed list of improvements refer to Appendix A. Figures 6 through 9 illustrate the location of the sewers, forcemains and pump stations and show sewer sizing within each basin.

Table 2
Summary of Proposed Improvements for all UGAs

UGA	Sewer (linear feet)	Pump Stations (ea)	Force Main (linear feet)
North	22,000	3	5,000
South	45,000	2	2,000
East	53,000	1	5,000
West	12,000	1	800

Improvement S3-A2 (1) extends sewer service to intercept flows from basin S4-A2. Initially, sewer service in this basin can be served through SE-A2 (1). Ultimately, as the basin development proceeds, sewer flows will need to be routed down the proposed interceptor on the south side of Maddox Creek and includes sewer segments S4-A1 (1), (2), and (3) so that the sewers on South 19th Street do not become overloaded. The City should monitor flows in the sewer to determine when sewer segments S4-A1 (1), (2), and (3) are required.

Pump station S4-A2 PS1 has been identified at the end of Crosby Drive because the grade to the west may be excessive for a gravity sewer. It may be feasible to extend a gravity sewer to the

west and connect to proposed sewer segments S4-A1 (1), (2), and (3) and the City should evaluate the potential for extending gravity service to Crosby Drive as development proceeds.

COST ESTIMATES

Construction Costs

Construction costs for the facilities required to provide sewer service to the Urban Growth Areas were based on cost established in the Comprehensive Sewer Plan Update as well as King County's cost estimating software TABULA. TABULA is a free software developed to estimate costs for sewer projects in the King County area. Use of TABULA allows for cost analysis that is always consistent. The costs can be adjusted to present day values using the ENR cost indexes and/or escalated to future years by using an annual projected inflation multiplier. The inflation multiplier can be defined in the program as any chosen percentage, however, 3 percent is commonly used. An effective 1.13 multiplier was used in the analysis to account for increase in construction cost from 1999 to the end of 2003.

For an example of TABULA's assumptions and item cost breakdown see Appendix B. Note that all assumptions can be defined within the program to better suit a specific project. Table 3 lists costs of pipe, at varying depths, based on TABULA. See Appendix C, column 7, for construction costs for major items associated with each UGA. Costs listed in Table 5 are also construction costs.

The construction costs include excavation and native backfill based on depth and pipe size, standard trench safety, backfill and pipe zone fill, manholes at average spacing of 500 feet, protecting/relocating average complexity utilities, minimal dewatering, traffic control for light traffic conditions, complete pavement restoration for width of trench, and mobilization/demobilization (10 percent of total). These particular costs do not include land acquisition or easements as these elements are difficult to define at the planning stages of design.

Table 3
Construction Cost Estimate Summary Table

Sewer Depth (ft)	Construction Cost per Liner Foot of Sewer								
	8-inch	10-inch	12-inch	15-inch	18-inch	24-inch	27-inch	30-inch	36-inch
8	$177	$187	$207	$237	$258	$316	$341	$385	$452
10	$185	$195	$215	$246	$267	$327	$351	$396	$465
12	$192	$203	$223	$255	$276	$337	$362	$408	$477
15	$205	$216	$238	$270	$292	$355	$381	$429	$500

Notes:
1) Costs are for year 2003.
2) Construction costs include mobilization, excavation, backfill and pipe zone fill, pavement restoration, trench safety, pipe material and installation, manholes, protecting/relocating existing utilities, dewatering, and traffic control.

The costs listed in Table 3 do not include taxes, construction contingency, or engineering and administration costs, which are briefly described below.

Contingency
The construction contingency is an allowance for additional costs not identified in the planning phase. Generally, these costs are not identified because they are unknown at the planning stages of the project. The contingency costs may include complex utility crossings, unique soil conditions, traffic control for heavy traffic conditions, land acquisition, easements, and other unidentified costs. See Appendix C, column 9, for contingency costs on construction costs for major items associated with each UGA.

Engineering and Administration
Engineering and administration costs include engineering and design, permitting process and fees, and City construction management costs. See Appendix C, column 10, for engineering and administration costs on construction costs for major items associated with each UGA.

Project Cost
Project costs include construction costs with an escalation for the following items:

- Sales Tax – 8.8 percent
- Contingency – 40 percent
- Engineering and Administration – 25 percent.

The major construction items and respective costs associated with each UGA are presented in Appendix C. See column 11 of Appendix C, for project costs on construction costs for major items associated with each UGA. Note that Figures 6 through 9 identify individual pipe segments, which are listed in Appendix C. The approximate construction and project costs estimated for each of the UGAs are summarized in Table 4. They include gravity and forcemain piping costs as well as pump station costs.

Table 4
Approximate UGA Construction and Project Costs

Urban Growth Area	Construction Cost (1) (2003)	Project Cost (2) (2003)
North	$6,030,000	$11,580,000
South	$10,510,000	$20,230,000
East	$15,720,000	$30,110,000
East (+ 1,200 ac) (3)	$8,540,000	$16,270,000
East (+ 5,600 ac) (3)	$12,840,000	$24,450,000
West	$2,820,000	$5,440,000

Notes:
(1) Construction costs include mobilization, excavation, backfill and pipe zone fill, pavement restoration, trench safety, pipe material and installation, manholes, protecting & relocating existing utilities, dewatering, and traffic control.
(2) Project costs include sales tax, contingency (unidentified item, such as complex utilities, soil conditions, traffic control, land acquisition, easements, etc.), and engineering and administration costs (engineering and design, permitting, management, etc.).
(3) The expended East service area is described in the proceeding section. Costs for additional 1,200 and 5,600 acres assumes PS1-E, E-8 (4), E-1(4), E-1(5), and N10-C(1) improvements only.

EXPANDED EAST SERVICE AREA

There is potential that sewer service may be provided east of the UGA. The impacts of this service on the sewer sizing within the City was evaluated for different size drainage areas to the east. Table 5 summarizes the impact on the existing sewers within the City along with the sizing of new facilities identified within this study.

Table 5
Expanded Service Area Impacts on Sewer Sizing

Improvement	Sewer Length (linear feet)	Assumed Slope (ft/ft)	Urban Growth Area Service			1,200 Additional Acres			5,600 Additional Acres		
			Design Flows (mgd)	Pipe Size (in)	Construction Cost [4] (million dollars)	Design Flows (mgd)	Pipe Size (in)	Construction Cost (million dollars)	Design Flows (mgd)	Pipe Size (in)	Construction Cost (million dollars)
PS1 - E	--	--	2.5	--	$2.74 [1]	6.6	--	$4.50 [1]	20.1	--	$7.01 [1]
Forcemain	4,300	--	2.5	12	--	6.6	24[5]	--	20.1	36[5]	--
E-8 (4)	2,000	0.008	2.5	15	$0.51	6.6	24	$0.67	20.1	36	$0.95
E-1 (4)	2,300	0.016	2.7	15	$0.59	7.3	24	$0.78	20.9	36	$1.10
E-1 (5)	3,600	0.007	2.7	15	$0.92	7.3	24	$1.21	20.9	36	$1.72
N10-C (1)	4,000	0.016	4.7	15	$1.08	8.3	24	$1.38	21.8	36	$2.06
East College Way Pump Station	--	--	9.6	--		13.3	--		24.4	--	
East College Way Pump Station Forcemain	6,300	--	9.6 [2]	24		13.3	30		24.4	36	
Kulshan Interceptor	6,860	0.006	18.9 [2]	24 & 30 [3]	--	22.5	30		35.1	36	

Notes:
(1) Cost Includes FM.
(2) Existing flows plus East UGA flows.
(3) Existing piping at capacity is approximately 18 mgd.
(4) Construction costs include mobilization, excavation, backfill and pipe zone fill, pavement restoration, trench safety, pipe material and installation, manholes, protecting/relocating existing utilities, dewatering, and traffic control.
(5) Multiple forcemains could be constructed with this effective pipe size diameter.

Note that costs listed Table 5 are construction costs only. See Appendix B for cost escalations to arrive at project costs.

LIST OF APPENDICES

Appendix A – Hydraulic Analysis Output of the City of Mount Vernon's Urban Growth Area Wastewater Collection System

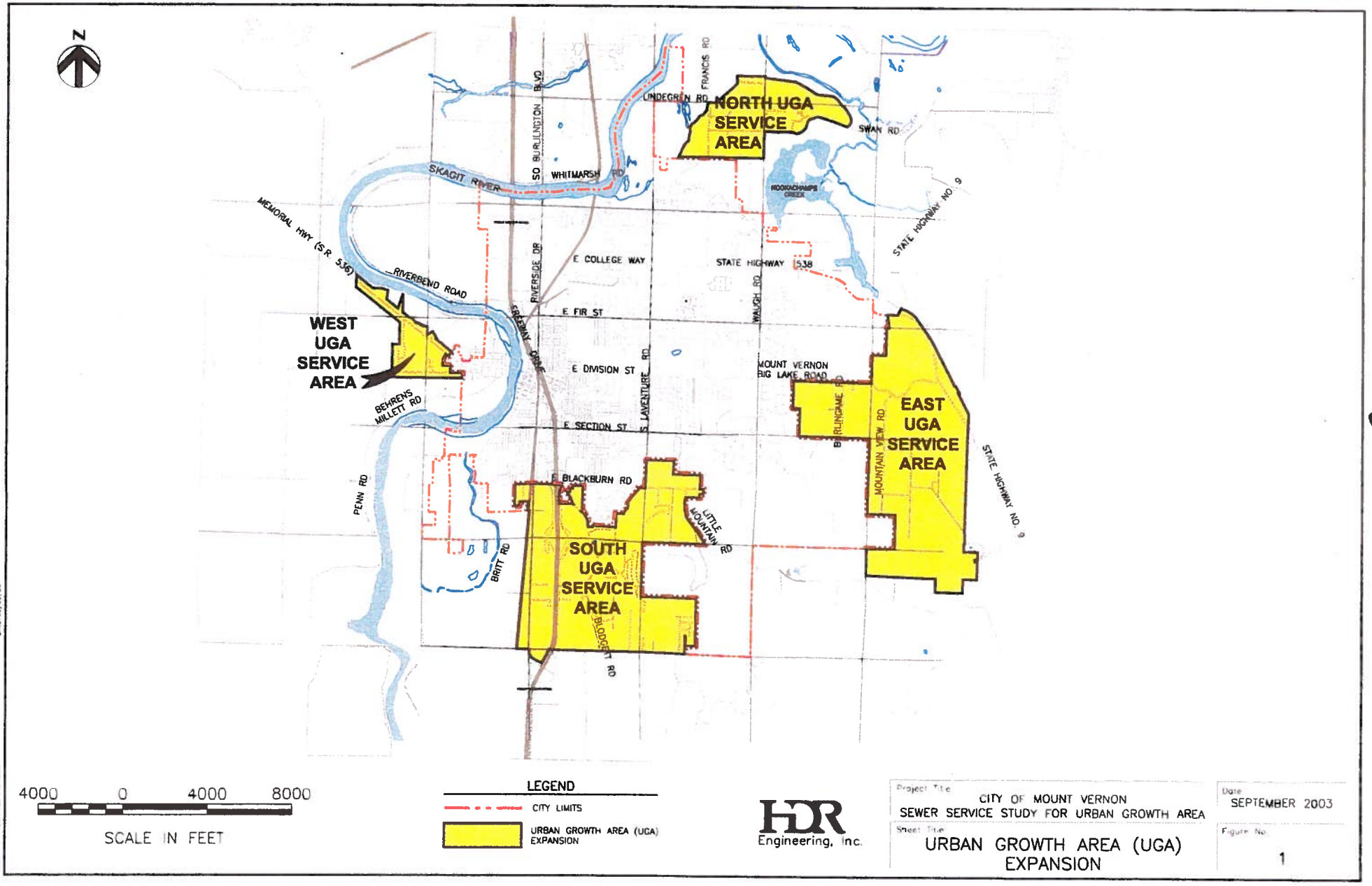
Appendix B – Example of TABULA Cost Output and Additional Information

Appendix C – UGA Cost Estimates

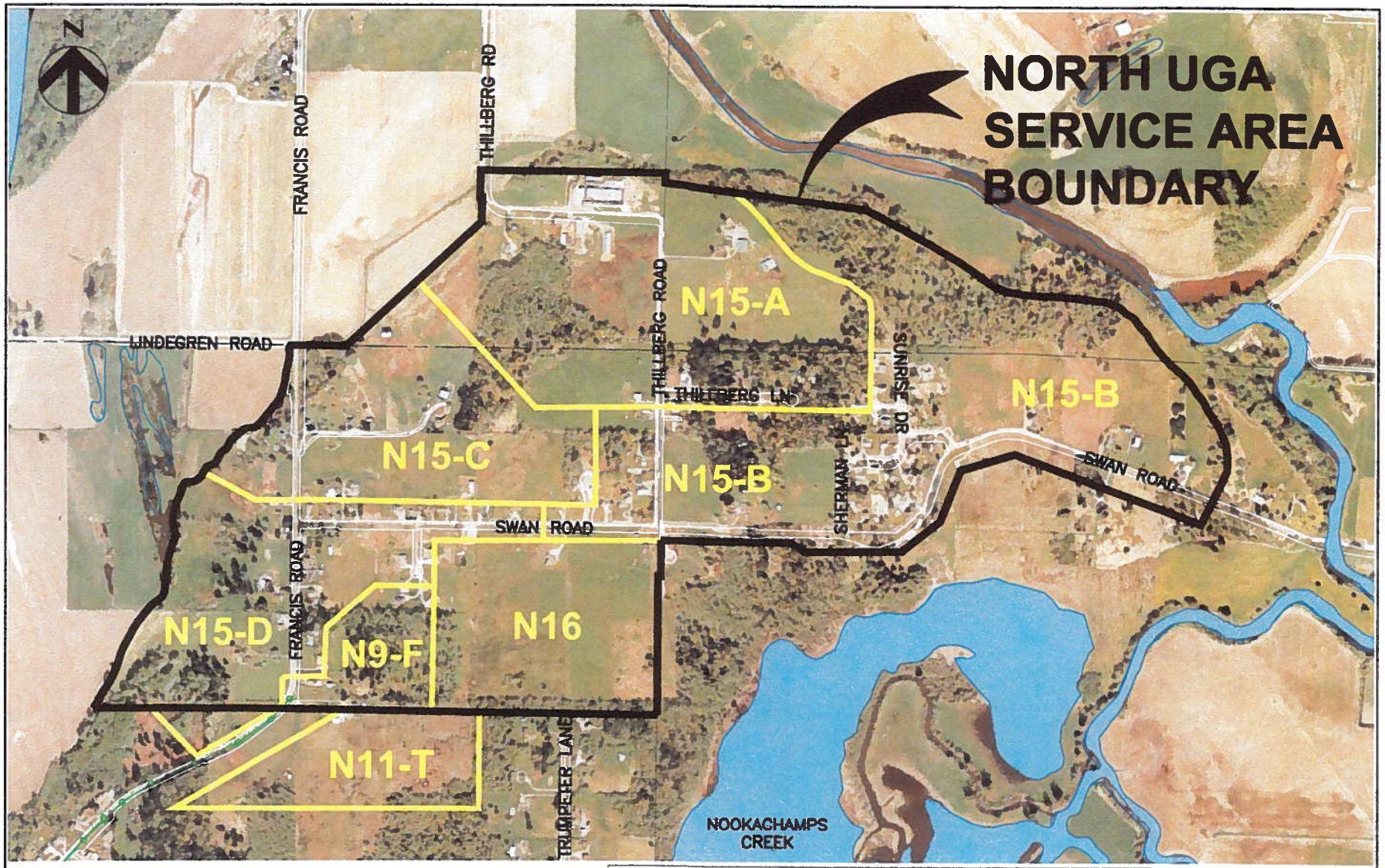
Appendix D – Related Documents

APPENDIX A

Hydraulic Analysis Output of the City of Mount Vernon's Urban Growth Area Wastewater Collection System


N
NORTH UGA SERVICE AREA
WEST UGA SERVICE AREA
EAST UGA SERVICE AREA
SOUTH UGA SERVICE AREA
SKAGIT RIVER
MEMORIAL HWY (S.R. 536)
RIVERBEND ROAD
BEHRENS MILLETT RD
PENN RD
BRITT RD
SO BURLINGTON BLVD
WHITMARSH RD
LINDEGREN RD
FRANCIS RD
SWAN RD
STATE HIGHWAY NO. 9
E COLLEGE WAY
STATE HIGHWAY 538
RIVERSIDE DR
E FIR ST
E DIVISION ST
E SECTION ST
E BLACKBURN RD
S LAVENTURE RD
WAUGH RD
MOUNT VERNON BIG LAKE ROAD
BURLINGAME RD
MOUNTAIN VIEW RD
LITTLE MOUNTAIN RD
BLODGETT RD
4000 0 4000 8000
SCALE IN FEET
LEGEND
CITY LIMITS
URBAN GROWTH AREA (UGA) EXPANSION
HDR Engineering, Inc.
Project Title
CITY OF MOUNT VERNON
SEWER SERVICE STUDY FOR URBAN GROWTH AREA
Date
SEPTEMBER 2003
Sheet Title
URBAN GROWTH AREA (UGA) EXPANSION
Figure No.
1

12



LEGEND

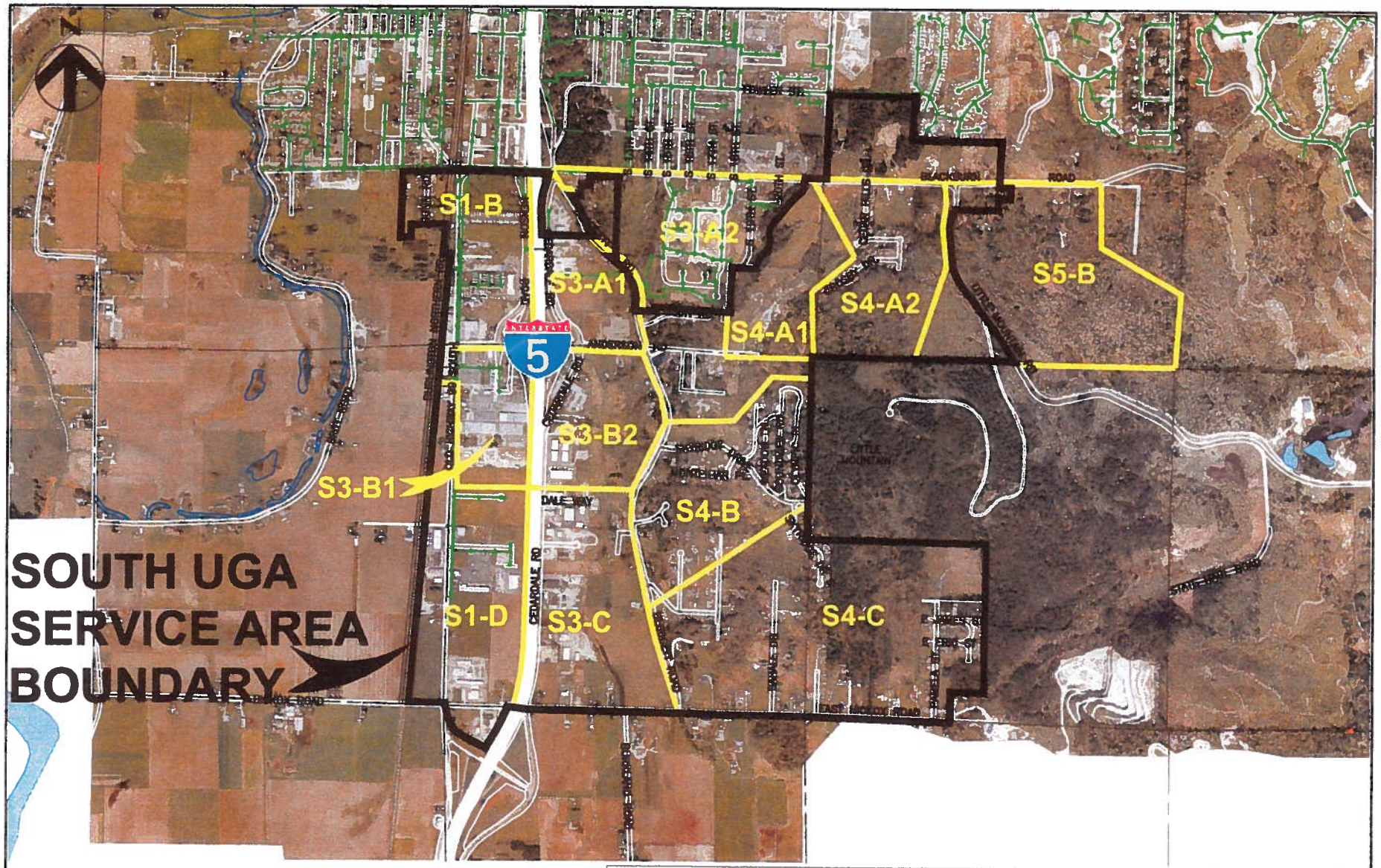
DRAINAGE BASIN BOUNDARY

EXISTING SEWER

HDR Engineering, Inc.

Project Title	CITY OF MOUNT VERNON SEWER SERVICE STUDY FOR URBAN GROWTH AREA
Sheet Title	URBAN GROWTH AREA (UGA) NORTH SERVICE AREA DRAINAGE BASINS
Figure No.	2
Date	AUGUST 2003
Scale	1" = 1000'

MV-UGA-NORTH-FIG2A.dwg 06/20/03 BLUMENFELD



LEGEND

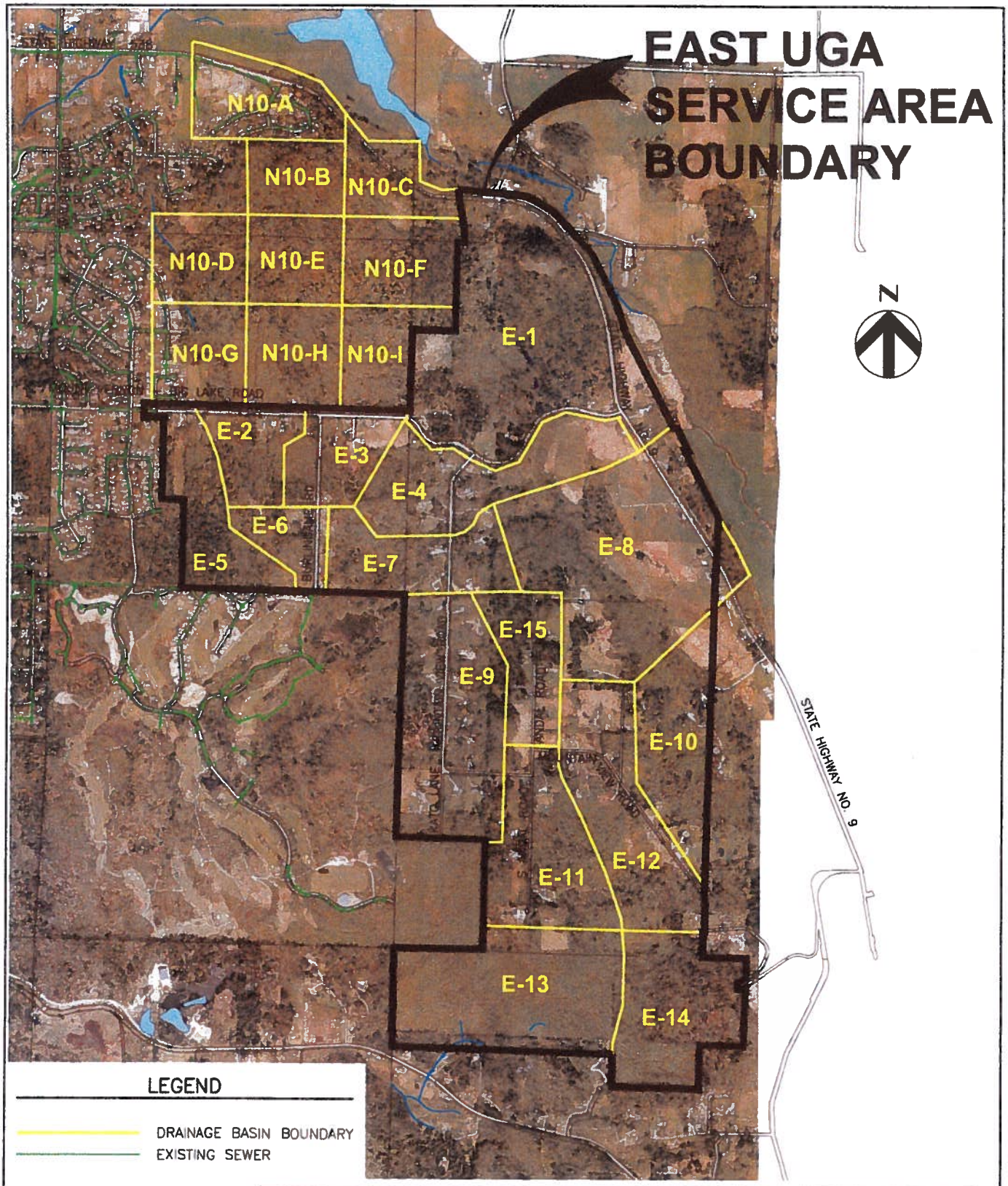
DRAINAGE BASIN BOUNDARY
EXISTING SEWER

HDR Engineering, Inc.

Project Title	CITY OF MOUNT VERNON SEWER SERVICE STUDY FOR URBAN GROWTH AREA
Sheet Title	URBAN GROWTH AREA (UGA) SOUTH SERVICE AREA DRAINAGE BASINS
Figure No.	3
Date	SEPTEMBER 2003
Scale	1" = 2000'

MV-UGA-SOUTH-FIG3.dwg 09/12/03 GUNDY

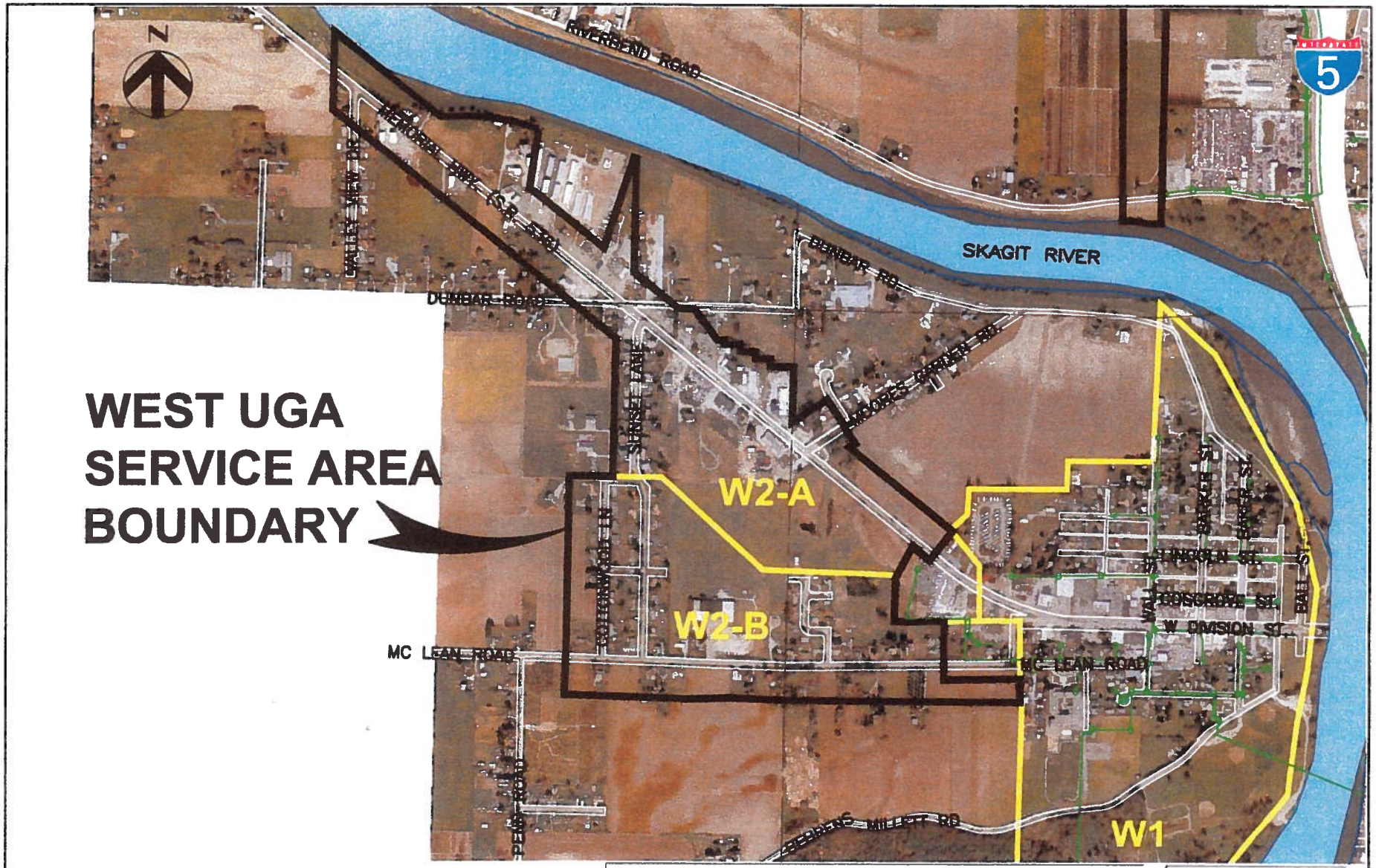
14



Project Title	CITY OF MOUNT VERNON SEWER SERVICE STUDY FOR URBAN GROWTH AREA
Sheet Title	URBAN GROWTH AREA (UGA) DRAINAGE BASINS EAST SERVICE AREA
Figure No	4
Date	AUGUST 2003
Scale	1" = 2000'

HDR Engineering, Inc.

MV-UGA-EAST-FIG5A.dwg 08/20/03 BLUMENFELD



LEGEND

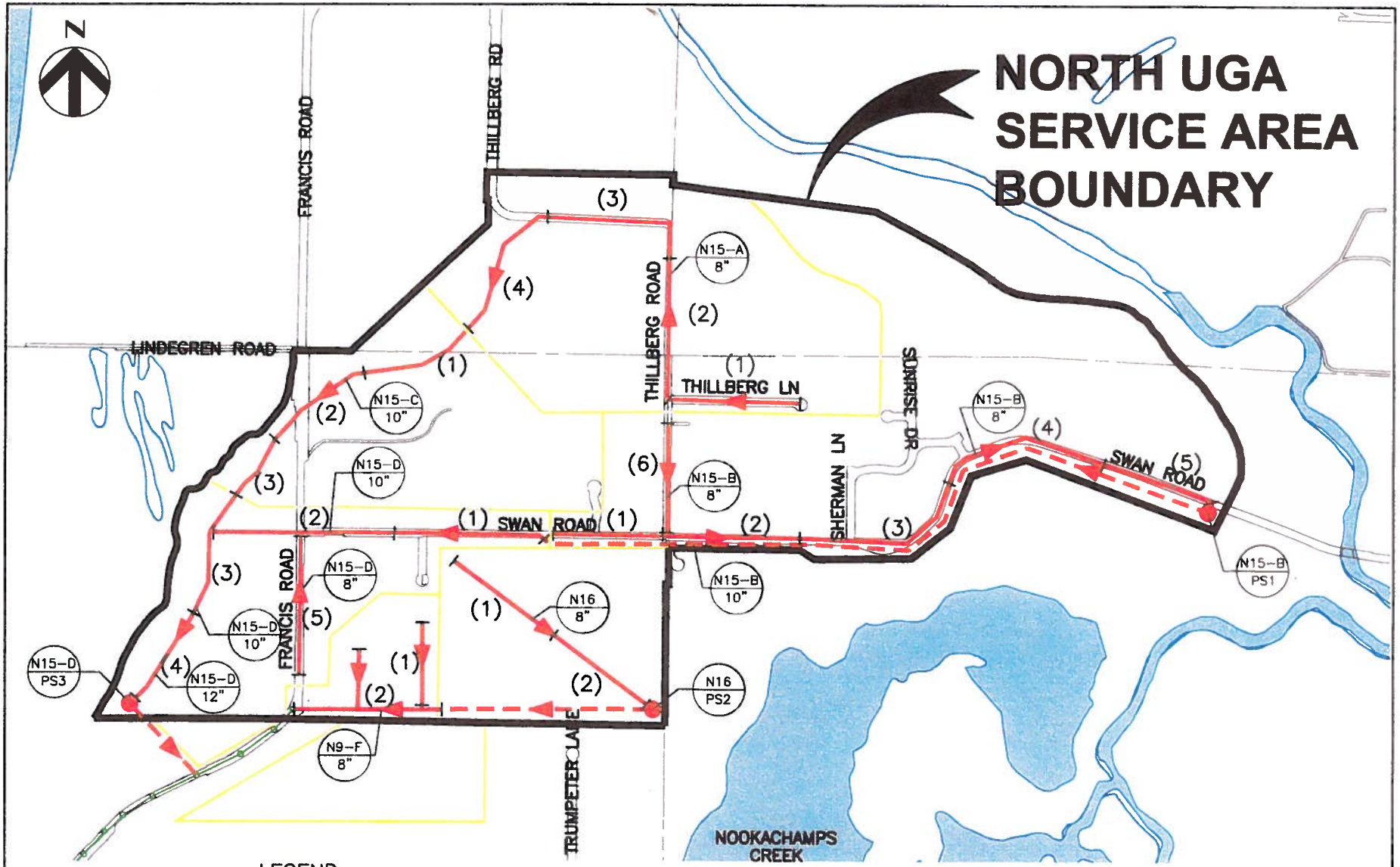
DRAINAGE BASIN BOUNDARY

EXISTING SEWER

HDR Engineering, Inc.

Project Title	CITY OF MOUNT VERNON SEWER SERVICE STUDY FOR URBAN GROWTH AREA
Sheet Title	URBAN GROWTH AREA (UGA) WEST SERVICE AREA DRAINAGE BASINS
Figure No.	5
Date	AUGUST 2003
Scale	1" = 1000'

MV-UGA-WEST-FIG5.dwg 08/20/03 BLUMENFELD



LEGEND

- DRAINAGE BASIN BOUNDARY
- EXISTING SEWER
- PROPOSED SEWER
- PROPOSED SEWER FORCEMAIN
- DRAINAGE BASIN ID
- PIPE SIZE B/W TICKS OR PUMP STA #
- PROPOSED PUMP STATION
- DIRECTION OF FLOW

HDR Engineering, Inc.

Project Title: CITY OF MOUNT VERNON SEWER SERVICE STUDY FOR URBAN GROWTH AREA

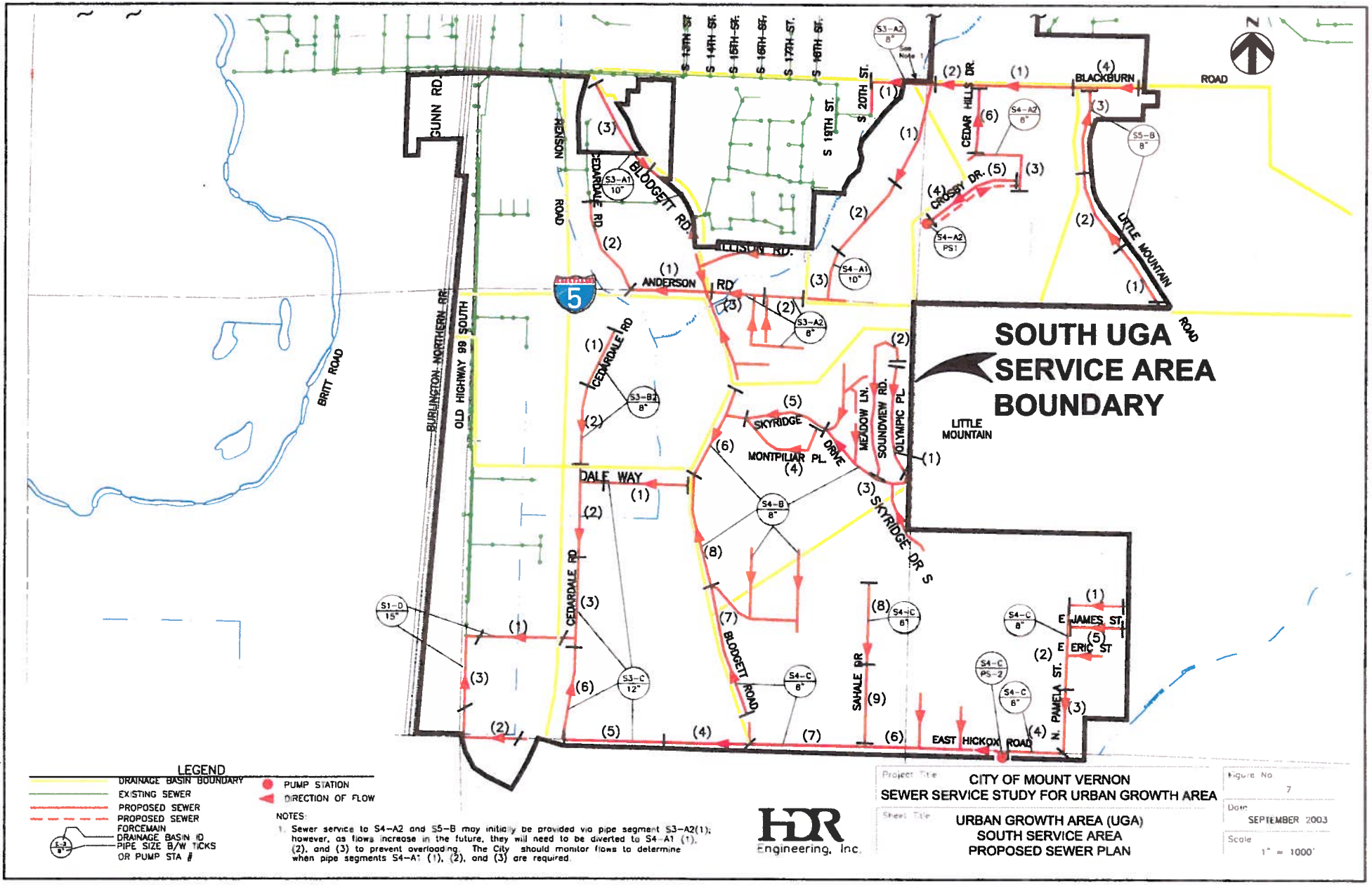
Sheet Title: URBAN GROWTH AREA (UGA) NORTH SERVICE AREA PROPOSED SEWER PLAN

Figure No. 6

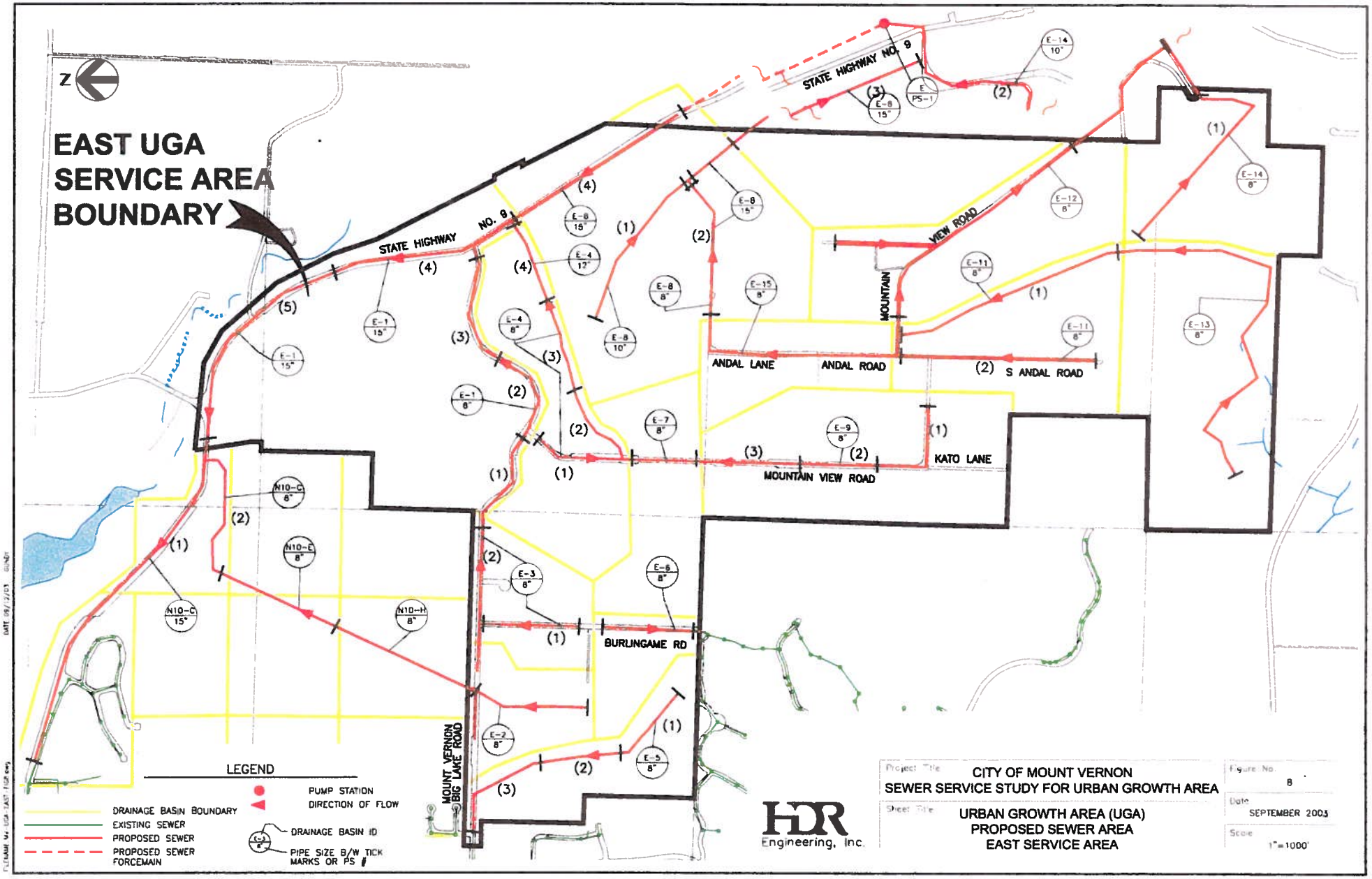
Date: AUGUST 2003

Scale: 1" = 1000'

MV-UGA-NORTH-FIG6.dwg 09/08/03 GUNDY


SOUTH UGA
SERVICE AREA
BOUNDARY
LITTLE MOUNTAIN
LITTLE MOUNTAIN ROAD
BLACKBURN ROAD
CEDAR HILLS DR.
CROSBY DR.
S 20TH ST.
S 19TH ST.
S 18TH ST.
S 17TH ST.
S 16TH ST.
S 15TH ST.
S 14TH ST.
S 13TH ST.
GUNN RD.
HENSON ROAD
CEDARDALE RD
BLODGETT RD.
ILLISON RD.
ANDERSON RD
BURLINGTON NORTHERN RR
OLD HIGHWAY 99 SOUTH
BRITT ROAD
DALE WAY
SKYRIDGE DRIVE
MONTPILIAR PL.
MEADOW LN.
SOUNDVIEW RD.
OLYMPIC PL.
SKYRIDGE DR S
SAHALE DR
EAST HICKOX ROAD
N. PAMELA ST.
E JAMES ST.
E ERIC ST
S3-A2 8"
S4-A2 8"
S5-B 8"
S3-A1 10"
S4-A1 10"
S4-A2 PS1
S3-A2 8"
S3-B2 8"
S4-B 8"
S1-D 15"
S3-C 12"
S4-C 8"
S4-C PS-2
S4-C 8"
S4-C 8"
LEGEND
DRAINAGE BASIN BOUNDARY
EXISTING SEWER
PROPOSED SEWER
PROPOSED SEWER FORCEMAIN
DRAINAGE BASIN ID
PIPE SIZE B/W TICKS OR PUMP STA #
PUMP STATION
DIRECTION OF FLOW
NOTES:
1. Sewer service to S4-A2 and S5-B may initially be provided via pipe segment S3-A2(1); however, as flows increase in the future, they will need to be diverted to S4-A1 (1), (2), and (3) to prevent overloading. The City should monitor flows to determine when pipe segments S4-A1 (1), (2), and (3) are required.
HDR Engineering, Inc.
Project Title
CITY OF MOUNT VERNON
SEWER SERVICE STUDY FOR URBAN GROWTH AREA
Sheet Title
URBAN GROWTH AREA (UGA)
SOUTH SERVICE AREA
PROPOSED SEWER PLAN
Figure No.
7
Date
SEPTEMBER 2003
Scale
1" = 1000'

18


EAST UGA SERVICE AREA BOUNDARY
N
STATE HIGHWAY NO. 9
STATE HIGHWAY NO. 9
MOUNTAIN VIEW ROAD
MOUNTAIN
ANDAL LANE
ANDAL ROAD
S ANDAL ROAD
KATO LANE
MOUNTAIN VIEW ROAD
BURLINGAME RD
MOUNT VERNON BIG LAKE ROAD
LEGEND
DRAINAGE BASIN BOUNDARY
EXISTING SEWER
PROPOSED SEWER
PROPOSED SEWER FORCEMAIN
PUMP STATION
DIRECTION OF FLOW
DRAINAGE BASIN ID
PIPE SIZE B/W TICK MARKS OR PS #
HDR Engineering, Inc.
Project Title
CITY OF MOUNT VERNON
SEWER SERVICE STUDY FOR URBAN GROWTH AREA
Sheet Title
URBAN GROWTH AREA (UGA)
PROPOSED SEWER AREA
EAST SERVICE AREA
Figure No.
8
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SEPTEMBER 2003
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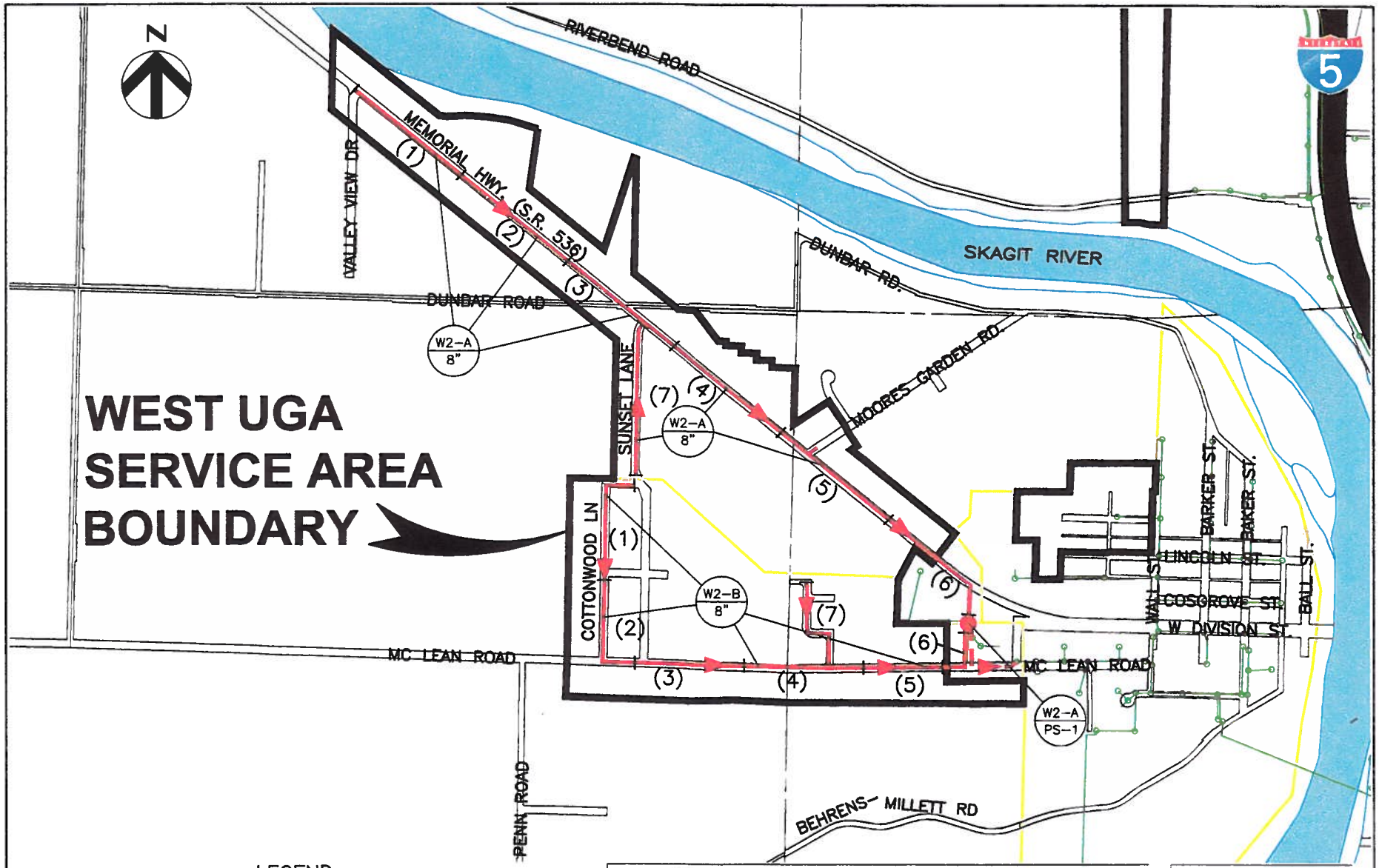

LEGEND

- DRAINAGE BASIN BOUNDARY
- EXISTING SEWER
- PROPOSED SEWER
- PROPOSED SEWER FORCEMAIN
- DRAINAGE BASIN ID
- PIPE SIZE B/W TICKS OR PUMP STA #
- PROPOSED PUMP STATION
- DIRECTION OF FLOW

HDR Engineering, Inc.

Project Title	CITY OF MOUNT VERNON SEWER SERVICE STUDY FOR URBAN GROWTH AREA
Sheet Title	URBAN GROWTH AREA (UGA) WEST SERVICE AREA PROPOSED SEWER PLAN
Figure No.	9
Date	SEPTEMBER 2003
Scale	1" = 1000'

MV-UGA- C9.dwg 09/12/03 GUNDY

Drainage Segment ID	1 Upstream MH at Grade Elevation	2 Down-stream MH at Grade Elevation	3 Up-stream MH Invert Elevation	4 Down-stream MH Invert Elevation	5 Average Sewer Depth (ft)	6 Length (ft)	7 Dia-meter (in)	8 Slope	9 Service Area (ac)	10 Upstream Infilt (mgd)	11 Upstream Avg San (mgd)	12 Infilt (mgd)	13 Avg San Flow (mgd)	14 Peak Factor	15 Peak Flow (mgd)	16 Avail Capacity (mgd)	17 Percent Utilized (%)	Notes
North UGA																		
Thillberg Trunk																		
N15-A (1)	155.0	153.9	147.0	143.0	9.5	1000	8	0.004	101	0.00	0.00	0.111	0.101	3.20	0.43	0.49	87.59	
N15-A (2)	153.9	112.0	143.0	104.0	9.5	1000	8	0.039		0.11	0.10	0.000	0.000	3.20	0.43	1.54	28.05	
N15-A (3)	112.0	85.0	104.0	77.0	8.0	1000	8	0.027		0.11	0.10	0.000	0.000	3.20	0.43	1.28	33.71	
N15-A (4)	85.0	58.0	77.0	50.0	8.0	1300	8	0.0208		0.11	0.10	0.000	0.000	3.20	0.43	1.13	38.44	
N15-C (1)	58.0	57.3	50.0	46.0	9.7	700	10	0.0057	64	0.11	0.10	0.070	0.064	3.07	0.69	1.07	64.15	
N15-C (2)	57.3	56.4	46.0	42.0	12.9	1000	10	0.004		0.18	0.16	0.000	0.000	3.07	0.69	0.90	76.67	
N15-C (3)	56.4	55.8	42.0	40.0	15.1	600	10	0.0033		0.18	0.16	0.000	0.000	3.07	0.69	0.82	83.99	
Swan Road Trunk																		
N15-B (1)	134.1	122.2	126.1	112	9.1	1100	8	0.0128	130	0.00	0.00	0.143	0.130	3.13	0.55	0.88	62.21	
N15-B (2)	122.2	117.5	112	102	12.9	1100	8	0.0091		0.14	0.13	0.000	0.000	3.13	0.55	0.74	73.87	
N15-B (3)	117.5	90.0	102.0	82.0	11.8	1100	8	0.0182		0.14	0.13	0.000	0.000	3.13	0.55	1.05	52.24	
N15-B (4)	90.0	67.6	82.0	59.6	8.0	1000	8	0.0224		0.14	0.13	0.000	0.000	3.13	0.55	1.17	47.06	
N15-B (5)	67.6	57.2	59.6	49.2	8.0	1000	8	0.0104		0.14	0.13	0.000	0.000	3.13	0.55	0.80	69.07	
N15-B (6)	158.7	122.2	150.7	114.2	8.0	800	8	0.0456	2	0.00	0.00	0.002	0.002	4.22	0.01	1.67	0.64	
N15-D (1)	134.1	122.9	126.1	114.9	8.0	1000	10	0.0112	57	0.14	0.13	0.063	0.057	3.04	0.77	1.50	51.62	
N15-D (2)	122.9	44.0	114.9	36.0	8.0	1250	10	0.0631		0.21	0.19	0.000	0.000	3.04	0.77	3.56	21.74	
N15-D (3)	56.0	43.0	40.0	30.0	14.5	1000	10	0.01		0.21	0.19	0.000	0.000	3.04	0.77	1.42	54.63	
N15-D (4)	43.0	42.0	30.0	26.0	14.5	800	12	0.005		0.21	0.19	0.000	0.000	3.04	0.77	1.63	47.51	
N15-D (5)	130.0	105.0	122.0	97.0	8.0	1000	8	0.025	2	0.00	0.00	0.002	0.002	4.22	0.01	1.23	0.86	
N16 (1)	134.7	118.0	126.7	110.0	8.0	1000	8	0.0167	47	0.00	0.00	0.052	0.047	3.40	0.21	1.01	20.89	
N16 (2)	118.0	70.0	110.0	62.0	8.0	800	8	0.06		0.05	0.05	0.000	0.000	3.40	0.21	1.91	11.02	
N9-F (1)	152.0	150.0	144.0	142.0	8.0	600	8	0.0033	25	0.00	0.00	0.028	0.025	3.56	0.31	0.45	68.75	
N9-F (2)	151.0	130.0	143.0	122.0	8.0	1100	8	0.0191		0.08	0.07	0.000	0.000	3.29	0.32	1.08	29.22	
West UGA																		
Dunbar/Sunset Trunk																		
W2-A (1)	23.7	22.3	15.7	14.3	8.0	1000	8	0.0014	47	0.00	0.00	0.052	0.047	3.40	0.21	0.29	72.14	1/2 of W2-A basin
W2-A (2)	22.3	20.9	14.3	12.9	8.0	1000	8	0.0014		0.05	0.05	0.000	0.000	3.40	0.21	0.29	72.32	
W2-A (3)	20.9	19.5	12.9	11.0	8.3	1000	8	0.0019		0.05	0.05	0.000	0.000	3.40	0.21	0.34	62.08	
W2-A (4)	19.5	19.1	11.0	9.1	9.3	1000	8	0.0019		0.05	0.05	0.000	0.000	3.40	0.21	0.34	62.14	1/2 of W2-A basin
W2-A (5)	19.1	18.7	9.1	7.7	10.5	1000	8	0.0014		0.05	0.05	0.000	0.000	3.40	0.21	0.29	73.54	
W2-A (6)	18.7	18.4	7.7	6.4	11.5	1000	8	0.0014		0.05	0.05	0.000	0.000	3.40	0.21	0.29	73.54	
W2-A (7)	20.7	19.9	12.7	11.4	8.3	1100	8	0.0012	2	0.00	0.00	0.002	0.002	4.22	0.01	0.27	3.96	
Cottonwood/Mc Lean Trunk																		

Drainage Segment ID	1 Upstream MH at Grade Elevation	2 Down-stream MH at Grade Elevation	3 Up-stream MH Invert Elevation	4 Down-stream MH Invert Elevation	5 Average Sewer Depth (ft)	6 Length (ft)	7 Dia-meter (in)	8 Slope	9 Service Area (ac)	10 Upstream Infilt (mgd)	11 Upstream Avg San (mgd)	12 Infilt (mgd)	13 Avg San Flow (mgd)	14 Peak Factor	15 Peak Flow (mgd)	16 Avail Capacity (mgd)	17 Percent Utilized (%)	Notes
W2-B (1)	20.6	17.4	12.6	9.4	8.0	800	8	0.004	36	0.00	0.00	0.040	0.036	3.47	0.16	0.49	33.28	1/2 of W2-B basin
W2-B (2)	17.4	20.2	9.4	8.2	10.0	800	8	0.0015		0.04	0.04	0.000	0.000	3.47	0.16	0.30	54.34	
W2-B (3)	20.2	21.0	8.2	7.0	13.0	800	8	0.0015		0.04	0.04	0.000	0.000	3.47	0.16	0.30	54.34	
W2-B (4)	21.0	23.4	7.0	5.1	16.2	800	8	0.0024		0.04	0.04	0.000	0.000	3.47	0.16	0.38	43.19	
W2-B (5)	23.4	22.6	5.1	4.6	18.2	800	8	0.0006		0.04	0.04	0.000	0.000	3.47	0.16	0.20	84.19	1/2 of W2-B basin
W2-B (6)	22.6	18.3	4.6	3.3	16.5	500	8	0.0026		0.04	0.04	0.000	0.000	3.47	0.16	0.40	41.28	
W2-B (7)	19.0	23.4	11.0	5.4	13.0	500	8	0.0112	2	0.00	0.00	0.002	0.002	4.22	0.01	0.83	1.29	
South UGA																		
Little Mountain/Blackburn Trunk																		
S5-B (1)	372.9	363.0	364.9	355.0	8.0	1000	10	0.0099	123	0.00	0.00	0.135	0.123	3.15	0.52	1.41	37.07	1/3 of S5-B basin
S5-B (2)	363.0	322.5	355.0	314.5	8.0	1000	10	0.0405		0.14	0.12	0.000	0.000	3.15	0.52	2.85	18.33	2/3 of S5-B basin
S5-B (3)	322.5	260.0	314.5	252.0	8.0	990	10	0.0631		0.14	0.12	0.000	0.000	3.15	0.52	3.56	14.68	
S5-B (4)	310.0	260.0	302.0	252.0	8.0	820	10	0.061		0.14	0.12	0.000	0.000	3.15	0.52	3.50	14.94	
S4-A2 (1)	260.0	194.9	252.0	186.9	8.0	1000	10	0.0651	91	0.14	0.12	0.100	0.091	3.00	1.15	3.61	31.83	
S4-A2 (2)	194.9	175.0	186.9	167.0	8.0	600	10	0.0332		0.24	0.21	0.000	0.000	3.00	0.88	2.58	34.04	
S3-A2 (1)	175.0	146.0	167.0	138.0	8.0	1100	10	0.0264	167	0.24	0.21	0.184	0.167	2.85	1.51	2.30	65.51	exist. SS present
Cedar Hills Dr. Trunk																		
S4-A2 (5)	294.0	265.0	286.0	257.0	8.0	550	8	0.0527	4	0.00	0.00	0.004	0.004	4.04	0.02	1.79	1.15	
S4-A2 (4)	265.0	243.0	257.0	235.0	8.0	600	8	0.0367		0.00	0.00	0.000	0.000	4.04	0.02	1.50	1.37	
S4-A2 (3)	294.0	197.0	286.0	189.0	8.0	950	8	0.1021	4	0.00	0.00	0.004	0.004	4.04	0.02	2.50	0.82	
S4-A2 (6)	197.0	194.9	190.0	186.9	7.5	800	8	0.0039		0.00	0.00	0.000	0.000	4.04	0.02	0.49	4.23	
S4-A1 (1)	155.0	150.0	147.0	137.0	10.5	1000	10	0.01	66	0.24	0.21	0.073	0.066	2.93	1.13	1.42	79.75	
S4-A1 (2)	150.0	125.0	137.0	117.0	10.5	1000	10	0.02		0.31	0.28	0.000	0.000	2.93	1.13	2.00	56.39	
S4-A1 (3)	125.0	113.5	117.0	105.5	8.0	1000	10	0.0115		0.31	0.28	0.000	0.000	2.93	1.13	1.52	74.36	
S3-A2 (2)	113.5	80.0	105.5	72.0	8.0	500	8	0.067	167	0.31	0.28	0.184	0.167	2.81	1.75	2.02	86.47	exist. SS present
S3-A2 (3)	80.0	37.6	72.0	29.6	8.0	650	8	0.0652		0.49	0.45	0.000	0.000	2.81	1.75	1.99	87.63	
Blodgett/Anderson Trunk																		
S3-A1 (1)	37.6	20.0	29.6	12.0	8.0	1200	10	0.0147	67	0.31	0.28	0.074	0.067	2.88	1.38	1.71	80.47	
S3-A1 (2)	20.0	18.0	12.0	-1.0	13.5	1000	10	0.013		0.38	0.35	0.000	0.000	2.88	1.38	1.61	85.47	
S3-A1 (3)	65.3	30.0	57.3	22.0	8.0	1700	10	0.0208	2	0.00	0.00	0.002	0.002	4.22	0.01	2.04	0.52	
Cedardale Rd Trunk																		
S3-B2 (1)	21.0	18.0	13.0	10.0	8.0	800	8	0.0038	84	0.00	0.00	0.092	0.084	3.25	0.36	0.48	75.89	
S3-B2 (2)	18.0	16.0	10.0	7.0	8.5	900	8	0.0033		0.09	0.08	0.000	0.000	3.25	0.36	0.45	80.50	
Montpilar/Skyridge Trunk																		
S4-B (1)	340.0	300.0	332.0	292.0	8.0	1400	8	0.0286	124	0.00	0.00	0.136	0.124	3.14	0.52	1.32	39.73	
S4-B (3)	300.0	200.0	292.0	192.0	8.0	1000	8	0.1		0.14	0.12	0.000	0.000	3.14	0.52	2.47	21.24	
S4-B (4)	173.0	96.0	165.0	88.0	8.0	1200	8	0.0642		0.14	0.12	0.000	0.000	3.14	0.52	1.98	26.51	

Drainage Segment ID	1 Upstream MH at Grade Elevation	2 Down-stream MH at Grade Elevation	3 Up-stream MH Invert Elevation	4 Down-stream MH Invert Elevation	5 Average Sewer Depth (ft)	6 Length (ft)	7 Dia-meter (in)	8 Slope	9 Service Area (ac)	10 Upstream Infilt (mgd)	11 Upstream Avg San (mgd)	12 Infilt (mgd)	13 Avg San Flow (mgd)	14 Peak Factor	15 Peak Flow (mgd)	16 Avail Capacity (mgd)	17 Percent Utilized (%)	Notes
S4-B (5)	173.0	96.0	165.0	88.0	8.0	1100	8	0.07		0.14	0.12	0.000	0.000	3.14	0.52	2.07	25.38	
S4-B (6)	82.0	38.0	74.0	30.0	8.0	1200	8	0.0367		0.14	0.12	0.000	0.000	3.14	0.52	1.50	35.07	
S4-B (7)	50.0	38.3	42.0	30.3	8.0	1500	8	0.0078		0.14	0.12	0.000	0.000	3.14	0.52	0.69	76.04	
S4-B (8)	38.3	38.0	30.3	22.0	12.0	1300	8	0.0064		0.14	0.12	0.000	0.000	3.14	0.52	0.62	84.05	
S4-B (2)	290.0	245.0	282.0	237.0	8.0	1800	8	0.025	2	0.00	0.00	0.002	0.002	4.22	0.01	1.23	0.86	
East Hickox Road/PamelaTrunk																		
S4-C (1)	275.0	225.0	267.0	217.0	8.0	700	8	0.0714	136	0.00	0.00	0.150	0.136	3.12	0.57	2.09	27.49	1/2 of S4-C basin
S4-C (2)	225.0	115.0	217.0	107.0	8.0	1000	8	0.11		0.15	0.14	0.000	0.000	3.12	0.57	2.59	22.16	
S4-C (3)	115.0	65.0	107.0	57.0	8.0	1000	8	0.05		0.15	0.14	0.000	0.000	3.12	0.57	1.75	32.86	
S4-C (4)	65.0	58.0	57.0	50.0	8.0	550	8	0.0127		0.15	0.14	0.000	0.000	3.12	0.57	0.88	65.13	
S4-C (5)	220.0	176.0	212.0	168.0	8.0	700	8	0.0629	1	0.00	0.00	0.001	0.001	4.40	0.01	1.96	0.28	
S4-C (6)	58.0	65.0	50.0	41.0	16.0	1250	8	0.0072	137	0.00	0.00	0.151	0.137	3.12	0.58	0.66	87.20	1/2 of S4-C basin
S4-C (7)	70.0	30.0	41.0	22.0	18.5	1350	8	0.0141		0.15	0.14	0.000	0.000	3.12	0.57	0.93	61.94	
Sahale Drive																		
S4-C (8)	190.0	150.0	182.0	142.0	8.0	950	8	0.0421	2	0.00	0.00	0.002	0.002	4.22	0.01	1.60	0.66	
S4-C (9)	150.0	70.0	142.0	62.0	8.0	950	8	0.0842		0.00	0.00	0.000	0.000	4.22	0.01	2.27	0.47	
Cedardale/Dale Way Trunk																		
S3-C (1)	38.0	16.0	22.0	8.0	12.0	1300	12	0.0108	93	0.23	0.21	0.102	0.093	2.91	1.20	2.39	50.35	2/3 of S3-C basin
S3-C (2)	16.0	14.7	8.0	0.7	11.0	1000	12	0.0073		0.33	0.30	0.000	0.000	2.91	1.20	1.97	61.15	
S3-C (3)	14.7	12.0	0.7	-6.0	16.0	900	12	0.0074		0.33	0.30	0.000	0.000	2.91	1.20	1.99	60.56	
S3-C (4)	30.0	17.0	22.0	9.0	8.0	1000	10	0.013	93	0.15	0.14	0.102	0.093	2.98	0.94	1.61	57.93	1/3 of S3-C basin
S3-C (5)	17.0	13.5	9.0	3.5	9.0	1200	12	0.0046		0.25	0.23	0.000	0.000	2.98	0.94	1.56	59.99	
S3-C (6)	13.5	12.0	3.9	-6.0	13.8	1100	12	0.009		0.25	0.23	0.000	0.000	2.98	0.94	2.18	42.81	
S1-D (1)	12.0		4.0	-8.0	8.0	1100	15	0.005	141	0.48	0.44	0.155	0.141	2.74	2.22	2.95	75.05	no contour data
S1-D (2)					8.0	800	10	0.005	141	0.00	0.00	0.155	0.141	3.11	0.59	1.00	59.29	no contour data
S1-D (3)					8.0	1150	10	0.005		0.16	0.14	0.000	0.000	3.11	0.59	1.00	59.29	no contour data
East UGA																		
E-13	500.0	494.0	492.0	484.0	9.0	4500	8	0.0018	65	0.00	0.00	0.071	0.065	3.31	0.28	0.33	86.46	
Andal Road Trunk																		
E-11 (1)	496.0	476.0	484.0	458.0	15.0	3000	8	0.0087	90	0.07	0.06	0.099	0.090	3.09	0.65	0.73	88.96	
E-11 (2)	541.0	484.0	533.0	476.0	8.0	2300	8	0.0248		0.10	0.09	0.000	0.000	3.23	0.39	1.23	31.68	
E-15	484.0	350.0	476.0	342.0	8.0	2500	8	0.0536	40	0.17	0.15	0.044	0.040	3.03	0.80	1.81	44.39	

Drainage Segment ID	1 Upstream MH at Grade Elevation	2 Down-stream MH at Grade Elevation	3 Up-stream MH Invert Elevation	4 Down-stream MH Invert Elevation	5 Average Sewer Depth (ft)	6 Length (ft)	7 Dia-meter (in)	8 Slope	9 Service Area (ac)	10 Upstream Infilt (mgd)	11 Upstream Avg San (mgd)	12 Infilt (mgd)	13 Avg San Flow (mgd)	14 Peak Factor	15 Peak Flow (mgd)	16 Avail Capacity (mgd)	17 Percent Utilized (%)	Notes
E-12	484.0	400.0	476.0	392.0	8.0	3000	8	0.028	104	0.00	0.00	0.114	0.104	3.19	0.45	1.31	34.14	
Mountain View Road Trunk																		
E-14(1)	483.0	231.0	475.0	223.0	8.0	2000	8	0.126	86	0.00	0.00	0.095	0.086	3.24	0.37	2.77	13.46	
E-14(2)	231.0	100.0	223.0	92.0	8.0	2200	8	0.0595		0.21	0.19	0.000	0.000	3.03	0.79	1.91	41.20	
State Highway 9 Trunk																		
E-8 (2)	337.0	112.0	329.0	104.0	8.0	1900	8	0.1184	176	0.21	0.19	0.194	0.176	2.86	1.47	2.69	54.57	
E-8 (3)	112.0	100.0	104.0	92.0	8.0	4800	15	0.0025		0.41	0.37	0.000	0.000	2.86	1.47	2.09	70.26	
E-8 (1)	145.0	112.0	137.0	104.0	8.0	2300	10	0.0143	2	0	0.00	0.002	0.002	4.22	0.22	1.70	13.24	
E-8 (4)	163.9	158.0	155.9	140.0	13.0	2000	15	0.008		0.62	0.56	0.000	0.000	2.86	2.22	3.72	59.61	
Burlingame Road / Big Lake Road Trunk																		
E-3 (1)	391.0	393.0	383.0	381.0	10.0	1200	8	0.0017	42	0.00	0.00	0.046	0.042	3.43	0.19	0.32	59.62	
E-3 (2)	393.0	395.0	385.0	383.0	10.0	1200	8	0.0017		0.05	0.04	0.000	0.000	3.43	0.19	0.32	59.62	
E-1 (1)	395.0	317.7	383.0	307.0	11.3	1000	8	0.076	209	0.05	0.04	0.230	0.209	2.96	1.02	2.15	47.33	
E-1 (2)	317.7	240.3	307.0	231.0	10.0	1000	8	0.076		0.28	0.25	0.000	0.000	2.96	1.02	2.15	47.33	
E-1 (3)	240.3	163.0	231.0	155.0	8.7	1000	8	0.076		0.28	0.25	0.000	0.000	2.96	1.02	2.15	47.33	
E-6	391.0	355.0	383.0	347.0	8.0	1100	8	0.0327	28	0.00	0.00	0.031	0.028	3.53	0.13	1.41	9.18	
Kato Lane/Mountainview Road Trunk																		
E-9 (1)	522.0	500.0	514.0	492.0	8.0	1000	8	0.022	140	0.00	0.00	0.154	0.140	3.11	0.59	1.16	50.91	
E-9 (2)	500.0	340.0	492.0	332.0	8.0	1250	8	0.128		0.15	0.14	0.000	0.000	3.11	0.59	2.79	21.10	
E-9 (3)	340.0	230.0	332.0	222.0	8.0	1250	8	0.088		0.15	0.14	0.000	0.000	3.11	0.59	2.32	25.45	
E-7	235.0	207.0	227.0	199.0	8.0	800	8	0.035	63	0.15	0.14	0.069	0.063	3.02	0.84	1.46	57.18	
E-4 (1)	305.0	207.0	297.0	199.0	8.0	1200	8	0.0817	30	0.00	0.00	0.033	0.030	3.51	0.14	2.23	6.20	1/3 of E-4 basin
E-4 (2)	207.0	195.0	199.0	172.5	15.3	1100	8	0.0241	60	0.22	0.20	0.066	0.060	2.95	1.06	1.21	87.82	2/3 of E-4 basin
E-4 (3)	195.0	150.0	172.5	142.0	15.3	1000	8	0.0305		0.29	0.26	0.000	0.000	2.95	1.06	1.36	78.05	
E-4 (4)	150.0	158.0	142.0	139.0	13.5	1100	12	0.0027		0.29	0.26	0.000	0.000	2.95	1.06	1.20	88.53	
State Highway 9 Trunk, cont'd																		
E-1 (4)	163.0	117.0	146.0	109.0	12.5	2300	15	0.0161		0.89	0.56	0.000	0.000	2.75	2.43	5.30	45.97	
E-1 (5)	117.0	100.0	109.0	85.0	11.5	3600	15	0.0067		0.89	0.56	0.000	0.000	2.75	2.43	3.41	71.42	
N10-C (1)	100.0	43.0	85.0	22.0	18.0	4000	15	0.0158	37	1.19	1.08	0.041	0.037	2.57	4.11	5.24	78.43	
E-2	382.0	379.0	374.0	371.0	8.0	1500	8	0.002	35	0.00	0.00	0.039	0.035	3.47	0.16	0.35	45.83	
N10-H	379.0	360.0	371.0	352.0	8.0	1750	8	0.0109	55	0.04	0.04	0.061	0.055	3.23	0.39	0.81	47.86	
N10-E	360.0	300.0	352.0	292.0	8.0	1000	8	0.06	44	0.099	0.090	0.048	0.044	3.12	0.57	1.91	29.58	
N10-C (2)	300.0	100.0	292.0	92.0	8.0	1400	8	0.1429	37	0.14	0.04	0.041	0.037	3.29	0.41	2.95	14.05	
E-5 (1)	394.0	391.3	386.0	383.3	8.0	1000	8	0.0027	57	0.00	0.00	0.063	0.057	3.35	0.25	0.41	62.45	
E-5 (2)	391.3	388.6	383.3	380.6	8.0	1000	8	0.0027		0.06	0.06	0.000	0.000	3.35	0.25	0.41	62.45	
E-5 (3)	388.6	385.9	380.6	377.9	8.0	1000	8	0.0027		0.06	0.06	0.000	0.000	3.35	0.25	0.41	62.45	

Drainage Segment ID	1 Upstream MH at Grade Elevation	2 Down-stream MH at Grade Elevation	3 Up-stream MH Invert Elevation	4 Down-stream MH Invert Elevation	5 Average Sewer Depth (ft)	6 Length (ft)	7 Dia-meter (in)	8 Slope	9 Service Area (ac)	10 Upstream Infilt (mgd)	11 Upstream Avg San (mgd)	12 Infilt (mgd)	13 Avg San Flow (mgd)	14 Peak Factor	15 Peak Flow (mgd)	16 Avail Capacity (mgd)	17 Percent Utilized (%)	Notes
E-10		2.7							78	0.00	0.00	0.086	0.078					no individual collector pipe

APPENDIX B

Example of TABULA Cost Output and Additional Information

Appendix B – Example of TABULA Cost Output and Additional Information

The preceding examples are for 8-inch sewer pipe at different depths.

For additional information or to download the TABULA software, go to http://www.bugbytes.com/tabula/.

Cost Calculations for Pipe: **8" - 8' depth**

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2003
Length: 1000 ft
Conduit Type: Gravity Sewer
Depth of Cover: 8 ft
Trench Backfill Type: Native
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Trench Width
Traffic: Light
Land Acquisition: None
Required Easements: None
Trench Safety: Standard
Pipe Diameter: 8 in.

Geometry

Outer Diameter	0.875 ft
Trench Width	3.64 ft
Excavation Depth	9.88 ft
Complete Surface Rest. Width	5.64 ft

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	ItemCost
Excavation	1,330	CY	10.00	13,300
Backfill	943	CY	5.00	4,720
Complete Pavement Restoration	626	SY	50.00	31,300
Trench Safety	19,750	SF	0.50	9,880
Spoil Load and Haul	387	CY	10.00	3,870
Pipe Unit Material Cost	1,000	lf	10.00	10,000
Pipe Installation	1,000	lf	10.00	10,000
Place Pipe Zone Fill	365	CY	25.00	9,130
Manholes	2	MH	3,000.00	6,000
Existing Utilities	1,000	lf	20.00	20,000
Dewatering	1,000	lf	20.00	20,000
Traffic Control	1,000	lf	5.00	5,000

Year 1999 subtotal	143,000
Mobilization/Demobilization at 10%	1.10
1999 to 2003	1.13
Effective Multiplier	1.24
Subtotal	177,000

Total: $177,000

Cost Calculations for Pipe: 8" - 10' depth

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2003
Length: 1000 ft
Conduit Type: Gravity Sewer
Depth of Cover: 10 ft
Trench Backfill Type: Native
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Trench Width
Traffic: Light
Land Acquisition: None
Required Easements: None
Trench Safety: Standard
Pipe Diameter: 8 in.

Geometry

Outer Diameter	0.875 ft
Trench Width	3.64 ft
Excavation Depth	11.9 ft
Complete Surface Rest. Width	5.64 ft

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	ItemCost
Excavation	1,600	CY	10.00	16,000
Backfill	1,213	CY	5.00	6,060
Complete Pavement Restoration	626	SY	50.00	31,300
Trench Safety	23,750	SF	0.50	11,900
Spoil Load and Haul	387	CY	10.00	3,870
Pipe Unit Material Cost	1,000	lf	10.00	10,000
Pipe Installation	1,000	lf	10.00	10,000
Place Pipe Zone Fill	365	CY	25.00	9,130
Manholes	2	MH	3,000.00	6,000
Existing Utilities	1,000	lf	20.00	20,000
Dewatering	1,000	lf	20.00	20,000
Traffic Control	1,000	lf	5.00	5,000

Year 1999 subtotal	149,000
Mobilization/Demobilization at 10%	1.10
1999 to 2003	1.13
Effective Multiplier	1.24
Subtotal	185,000

Total: $185,000

Cost Calculations for Pipe: 8" - 12' depth

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2003
Length: 1000 ft
Conduit Type: Gravity Sewer
Depth of Cover: 12 ft
Trench Backfill Type: Native
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Trench Width
Traffic: Light
Land Acquisition: None
Required Easements: None
Trench Safety: Standard
Pipe Diameter: 8 in.

Geometry

Outer Diameter	0.875 ft
Trench Width	3.64 ft
Excavation Depth	13.9 ft
Complete Surface Rest. Width	5.64 ft

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	ItemCost
Excavation	1,869	CY	10.00	18,700
Backfill	1,482	CY	5.00	7,410
Complete Pavement Restoration	626	SY	50.00	31,300
Trench Safety	27,750	SF	0.50	13,900
Spoil Load and Haul	387	CY	10.00	3,870
Pipe Unit Material Cost	1,000	lf	10.00	10,000
Pipe Installation	1,000	lf	10.00	10,000
Place Pipe Zone Fill	365	CY	25.00	9,130
Manholes	2	MH	3,000.00	6,000
Existing Utilities	1,000	lf	20.00	20,000
Dewatering	1,000	lf	20.00	20,000
Traffic Control	1,000	lf	5.00	5,000

Year 1999 subtotal	155,000
Mobilization/Demobilization at 10%	1.10
1999 to 2003	1.13
Effective Multiplier	1.24
Subtotal	192,000

Total: $192,000

Cost Calculations for Pipe: **8" - 15' depth**

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2003
Length: 1000 ft
Conduit Type: Gravity Sewer
Depth of Cover: 15 ft
Trench Backfill Type: Native
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Trench Width
Traffic: Light
Land Acquisition: None
Required Easements: None
Trench Safety: Standard
Pipe Diameter: 8 in.

Geometry

Outer Diameter	0.875 ft
Trench Width	3.64 ft
Excavation Depth	16.9 ft
Complete Surface Rest. Width	5.64 ft

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	ItemCost
Excavation	2,273	CY	10.00	22,700
Backfill	1,886	CY	5.00	9,430
Complete Pavement Restoration	626	SY	50.00	31,300
Trench Safety	33,750	SF	0.50	16,900
Spoil Load and Haul	387	CY	10.00	3,870
Pipe Unit Material Cost	1,000	lf	10.00	10,000
Pipe Installation	1,000	lf	10.00	10,000
Place Pipe Zone Fill	365	CY	25.00	9,130
Manholes	2	MH	3,750.00	7,500
Existing Utilities	1,000	lf	20.00	20,000
Dewatering	1,000	lf	20.00	20,000
Traffic Control	1,000	lf	5.00	5,000

Year 1999 subtotal	166,000
Mobilization/Demobilization at 10%	1.10
1999 to 2003	1.13
Effective Multiplier	1.24
Subtotal	205,000

Total: $205,000

APPENDIX C

UGA Cost Estimates

Cost Estimate by Basin/Segment

1	2	3	4	5	6	7	8	9	10	11
Description	Average Sewer Depth (ft)	Sewer Length/ Quantity (ft)	Diameter (in)	Unit	Unit Cost	Construction Cost [1]	Taxes (8.8%)	Contingency [2] (40%)	Engineering and Administration Costs [3] (25%)	Project Cost [4]
North UGA										
N15-A (1)	9.5	1000	8	LF	$ 185	$ 185,000	$ 16,280	$ 80,512	$ 70,448	**$ 360,000**
N15-A (2)	9.5	1000	8	LF	$ 185	$ 185,000	$ 16,280	$ 80,512	$ 70,448	**$ 360,000**
N15-A (3)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
N15-A (4)	8.0	1300	8	LF	$ 177	$ 230,100	$ 20,249	$ 100,140	$ 87,622	**$ 440,000**
N15-C (1)	9.7	700	10	LF	$ 195	$ 136,500	$ 12,012	$ 59,405	$ 51,979	**$ 260,000**
N15-C (2)	12.9	1000	10	LF	$ 203	$ 203,000	$ 17,864	$ 88,346	$ 77,302	**$ 390,000**
N15-C (3)	15.1	600	10	LF	$ 216	$ 129,600	$ 11,405	$ 56,402	$ 49,352	**$ 250,000**
N15-B (1)	9.1	1100	8	LF	$ 185	$ 203,500	$ 17,908	$ 88,563	$ 77,493	**$ 390,000**
N15-B (2)	12.9	1100	8	LF	$ 192	$ 211,200	$ 18,586	$ 91,914	$ 80,425	**$ 410,000**
N15-B (3)	11.8	1100	8	LF	$ 192	$ 211,200	$ 18,586	$ 91,914	$ 80,425	**$ 410,000**
N15-B (4)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
N15-B (5)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
N15-B (6)	8.0	800	8	LF	$ 177	$ 141,600	$ 12,461	$ 61,624	$ 53,921	**$ 270,000**
N15-D (1)	8.0	1000	10	LF	$ 187	$ 187,000	$ 16,456	$ 81,382	$ 71,210	**$ 360,000**
N15-D (2)	8.0	1250	10	LF	$ 187	$ 233,750	$ 20,570	$ 101,728	$ 89,012	**$ 450,000**
N15-D (3)	14.5	1000	10	LF	$ 216	$ 216,000	$ 19,008	$ 94,003	$ 82,253	**$ 420,000**
N15-D (4)	14.5	800	12	LF	$ 238	$ 190,400	$ 16,755	$ 82,862	$ 72,504	**$ 370,000**
N15-D (5)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
N16 (1)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
N16 (2)	8.0	800	8	LF	$ 177	$ 141,600	$ 12,461	$ 61,624	$ 53,921	**$ 270,000**
N9-F (1)	8.0	600	8	LF	$ 177	$ 106,200	$ 9,346	$ 46,218	$ 40,441	**$ 210,000**
N9-F (2)	8.0	1100	8	LF	$ 177	$ 194,700	$ 17,134	$ 84,733	$ 74,142	**$ 380,000**
PS 1/N15-B & 3,400 lf FM		390		GPM	$ 2,100	$ 819,000	$ 72,072	$ 356,429	$ 311,875	**$ 1,560,000**
PS 2/N16 & 1,600 lf FM		150		GPM	$ 4,000	$ 600,000	$ 52,800	$ 261,120	$ 228,480	**$ 1,150,000**
PS 3/N15-D & 600 lf FM		875		GPM	$ 700	$ 612,500	$ 53,900	$ 266,560	$ 233,240	**$ 1,170,000**
						$ 6,030,000				**$ 11,580,000**

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Cost Estimate by Basin/Segment

1	2	3	4	5	6	7	8	9	10	11
Description	Average Sewer Depth (ft)	Sewer Length/ Quantity (ft)	Diameter (in)	Unit	Unit Cost	Construction Cost [1]	Taxes (8.8%)	Contingency [2] (40%)	Engineering and Administration Costs [3] (25%)	Project Cost [4]
South UGA										
S5-B (1)	8.0	1000	10	LF	$ 187	$ 187,000	$ 16,456	$ 81,382	$ 71,210	**$ 360,000**
S5-B (2)	8.0	1000	10	LF	$ 187	$ 187,000	$ 16,456	$ 81,382	$ 71,210	**$ 360,000**
S5-B (3)	8.0	990	10	LF	$ 187	$ 185,130	$ 16,291	$ 80,569	$ 70,498	**$ 360,000**
S5-B (4)	8.0	820	10	LF	$ 187	$ 153,340	$ 13,494	$ 66,734	$ 58,392	**$ 300,000**
S4-A2 (1)	8.0	1000	10	LF	$ 187	$ 187,000	$ 16,456	$ 81,382	$ 71,210	**$ 360,000**
S4-A2 (2)	8.0	600	10	LF	$ 187	$ 112,200	$ 9,874	$ 48,829	$ 42,726	**$ 220,000**
S4-A2 (3)	7.5	800	8	LF	$ 177	$ 141,600	$ 12,461	$ 61,624	$ 53,921	**$ 270,000**
S4-A2 (4)	8.0	950	8	LF	$ 177	$ 168,150	$ 14,797	$ 73,179	$ 64,032	**$ 330,000**
S4-A2 (5)	8.0	550	8	LF	$ 177	$ 97,350	$ 8,567	$ 42,367	$ 37,071	**$ 190,000**
S4-A2 (6)	8.0	600	8	LF	$ 177	$ 106,200	$ 9,346	$ 46,218	$ 40,441	**$ 210,000**
S3-A2 (1)	8.0	1100	10	LF	$ 187	$ 205,700	$ 18,102	$ 89,521	$ 78,331	**$ 400,000**
S4-A1 (1)	10.5	1000	10	LF	$ 203	$ 203,000	$ 17,864	$ 88,346	$ 77,302	**$ 390,000**
S4-A1 (2)	10.5	1000	10	LF	$ 203	$ 203,000	$ 17,864	$ 88,346	$ 77,302	**$ 390,000**
S4-A1 (3)	8.0	1000	10	LF	$ 187	$ 187,000	$ 16,456	$ 81,382	$ 71,210	**$ 360,000**
S3-A2 (2)	8.0	500	8	LF	$ 177	$ 88,500	$ 7,788	$ 38,515	$ 33,701	**$ 170,000**
S3-A2 (3)	8.0	650	8	LF	$ 177	$ 115,050	$ 10,124	$ 50,070	$ 43,811	**$ 220,000**
S3-A1 (1)	8.0	1200	10	LF	$ 187	$ 224,400	$ 19,747	$ 97,659	$ 85,452	**$ 430,000**
S3-A1 (2)	13.5	1000	10	LF	$ 216	$ 216,000	$ 19,008	$ 94,003	$ 82,253	**$ 420,000**
S3-A1 (3)	8.0	1700	10	LF	$ 187	$ 317,900	$ 27,975	$ 138,350	$ 121,056	**$ 610,000**
S3-B2 (1)	8.0	800	8	LF	$ 177	$ 141,600	$ 12,461	$ 61,624	$ 53,921	**$ 270,000**
S3-B2 (2)	8.5	900	8	LF	$ 185	$ 166,500	$ 14,652	$ 72,461	$ 63,403	**$ 320,000**
S4-B (1)	8.0	1400	8	LF	$ 177	$ 247,800	$ 21,806	$ 107,843	$ 94,362	**$ 480,000**
S4-B (2)	8.0	1800	8	LF	$ 177	$ 318,600	$ 28,037	$ 138,655	$ 121,323	**$ 610,000**
S4-B (3)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
S4-B (4)	8.0	1200	8	LF	$ 177	$ 212,400	$ 18,691	$ 92,436	$ 80,882	**$ 410,000**
S4-B (5)	8.0	1100	8	LF	$ 177	$ 194,700	$ 17,134	$ 84,733	$ 74,142	**$ 380,000**
S4-B (6)	8.0	1200	8	LF	$ 177	$ 212,400	$ 18,691	$ 92,436	$ 80,882	**$ 410,000**

Cost Estimate by Basin/Segment

1	2	3	4	5	6	7	8	9	10	11
Description	Average Sewer Depth (ft)	Sewer Length/ Quantity (ft)	Diameter (in)	Unit	Unit Cost	Construction Cost [1]	Taxes (8.8%)	Contingency [2] (40%)	Engineering and Administration Costs [3] (25%)	Project Cost [4]
S4-B (7)	8.0	1500	8	LF	$ 177	$ 265,500	$ 23,364	$ 115,546	$ 101,102	**$ 510,000**
S4-B (8)	12.0	1300	8	LF	$ 192	$ 249,600	$ 21,965	$ 108,626	$ 95,048	**$ 480,000**
S4-C (1)	8.0	700	8	LF	$ 177	$ 123,900	$ 10,903	$ 53,921	$ 47,181	**$ 240,000**
S4-C (2)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
S4-C (3)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
S4-C (5)	8.0	700	8	LF	$ 177	$ 123,900	$ 10,903	$ 53,921	$ 47,181	**$ 240,000**
S4-C (4)	8.0	550	8	LF	$ 177	$ 97,350	$ 8,567	$ 42,367	$ 37,071	**$ 190,000**
S4-C (6)	16.0	1250	8	LF	$ 205	$ 256,250	$ 22,550	$ 111,520	$ 97,580	**$ 490,000**
S4-C (7)	18.5	1350	8	LF	$ 177	$ 238,950	$ 21,028	$ 103,991	$ 90,992	**$ 460,000**
S4-C (8)	8.0	950	8	LF	$ 177	$ 168,150	$ 14,797	$ 73,179	$ 64,032	**$ 330,000**
S4-C (9)	8.0	950	8	LF	$ 177	$ 168,150	$ 14,797	$ 73,179	$ 64,032	**$ 330,000**
S3-C (1)	12.0	1300	12	LF	$ 223	$ 289,900	$ 25,511	$ 126,164	$ 110,394	**$ 560,000**
S3-C (2)	11.0	1000	12	LF	$ 223	$ 223,000	$ 19,624	$ 97,050	$ 84,918	**$ 430,000**
S3-C (3)	16.0	900	12	LF	$ 223	$ 200,700	$ 17,662	$ 87,345	$ 76,427	**$ 390,000**
S3-C (4)	8.0	1000	10	LF	$ 203	$ 203,000	$ 17,864	$ 88,346	$ 77,302	**$ 390,000**
S3-C (5)	9.0	1200	12	LF	$ 223	$ 267,600	$ 23,549	$ 116,460	$ 101,902	**$ 510,000**
S3-C (6)	13.8	1100	12	LF	$ 223	$ 245,300	$ 21,586	$ 106,755	$ 93,410	**$ 470,000**
S1-D (1)	8.0	1100	15	LF	$ 270	$ 297,000	$ 26,136	$ 129,254	$ 113,098	**$ 570,000**
S1-D (2)	8.0	800	10	LF	$ 216	$ 172,800	$ 15,206	$ 75,203	$ 65,802	**$ 330,000**
S1-D (3)	8.0	1150	10	LF	$ 216	$ 248,400	$ 21,859	$ 108,104	$ 94,591	**$ 480,000**
PS 1/S4-C & 300 lf FM		770		GPM	$ 780	$ 600,600	$ 52,853	$ 261,381	$ 228,708	**$ 1,150,000**
PS 2/S4-A2 & 1,300 lf FM		150		GPM	$ 5,000	$ 750,000	$ 66,000	$ 326,400	$ 285,600	**$ 1,430,000**
						$ 10,510,000				**$ 20,230,000**
West UGA							$ -	$ -	$ -	
W2-A (1)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
W2-A (2)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**
W2-A (3)	8.3	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	**$ 340,000**

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Cost Estimate by Basin/Segment

1	2	3	4	5	6	7	8	9	10	11
Description	Average Sewer Depth (ft)	Sewer Length/ Quantity (ft)	Diameter (in)	Unit	Unit Cost	Construction Cost [1]	Taxes (8.8%)	Contingency [2] (40%)	Engineering and Administration Costs [3] (25%)	Project Cost [4]
W2-A (4)	9.3	1000	8	LF	$ 185	$ 185,000	$ 16,280	$ 80,512	$ 70,448	$ 360,000
W2-A (5)	10.5	1000	8	LF	$ 192	$ 192,000	$ 16,896	$ 83,558	$ 73,114	$ 370,000
W2-A (6)	11.5	1000	8	LF	$ 192	$ 192,000	$ 16,896	$ 83,558	$ 73,114	$ 370,000
W2-A (7)	8.3	1100	8	LF	$ 177	$ 194,700	$ 17,134	$ 84,733	$ 74,142	$ 380,000
W2-B (1)	8.0	800	8	LF	$ 177	$ 141,600	$ 12,461	$ 61,624	$ 53,921	$ 270,000
W2-B (2)	10.0	800	8	LF	$ 185	$ 148,000	$ 13,024	$ 64,410	$ 56,358	$ 290,000
W2-B (3)	13.0	800	8	LF	$ 192	$ 153,600	$ 13,517	$ 66,847	$ 58,491	$ 300,000
W2-B (4)	16.2	800	8	LF	$ 205	$ 164,000	$ 14,432	$ 71,373	$ 62,451	$ 320,000
W2-B (5)	18.2	800	8	LF	$ 205	$ 164,000	$ 14,432	$ 71,373	$ 62,451	$ 320,000
W2-B (6)	16.5	500	8	LF	$ 205	$ 102,500	$ 9,020	$ 44,608	$ 39,032	$ 200,000
W2-B (7)	13.0	500	8	LF	$ 192	$ 96,000	$ 8,448	$ 41,779	$ 36,557	$ 190,000
PS 1/W2-A & 600 lf FM		550		GPM	$ 1,000	$ 550,000	$ 48,400	$ 239,360	$ 209,440	$ 1,050,000
						$ 2,820,000				$ 5,440,000
East UGA										
E-13	9.0	4500	8	LF	$ 185	$ 832,500	$ 73,260	$ 362,304	$ 317,016	$ 1,590,000
E-11 (1)	15.0	3000	8	LF	$ 205	$ 615,000	$ 54,120	$ 267,648	$ 234,192	$ 1,180,000
E-11 (2)	8.0	2300	8	LF	$ 177	$ 407,100	$ 35,825	$ 177,170	$ 155,024	$ 780,000
E-15	8.0	2500	8	LF	$ 177	$ 442,500	$ 38,940	$ 192,576	$ 168,504	$ 850,000
E-14(1)	8.0	2000	8	LF	$ 177	$ 354,000	$ 31,152	$ 154,061	$ 134,803	$ 680,000
E-12	8.0	3000	8	LF	$ 177	$ 531,000	$ 46,728	$ 231,091	$ 202,205	$ 1,020,000
E-14(2)	8.0	2200	8	LF	$ 177	$ 389,400	$ 34,267	$ 169,467	$ 148,284	$ 750,000
E-8 (2)	8.0	1900	8	LF	$ 177	$ 336,300	$ 29,594	$ 146,358	$ 128,063	$ 650,000
E-8 (1)	8.0	2300	10	LF	$ 187	$ 430,100	$ 37,849	$ 187,180	$ 163,782	$ 820,000
E-8 (3)	8.0	4800	15	LF	$ 237	$ 1,137,600	$ 100,109	$ 495,084	$ 433,198	$ 2,170,000
E-8 (4)	13.0	2000	15	LF	$ 255	$ 510,000	$ 44,880	$ 221,952	$ 194,208	$ 980,000
E-3 (1)	10.0	1200	8	LF	$ 185	$ 222,000	$ 19,536	$ 96,614	$ 84,538	$ 430,000
E-3 (2)	10.0	1200	8	LF	$ 185	$ 222,000	$ 19,536	$ 96,614	$ 84,538	$ 430,000

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Cost Estimate by Basin/Segment

1	2	3	4	5	6	7	8	9	10	11
Description	Average Sewer Depth (ft)	Sewer Length/ Quantity (ft)	Diameter (in)	Unit	Unit Cost	Construction Cost [1]	Taxes (8.8%)	Contingency [2] (40%)	Engineering and Administration Costs [3] (25%)	Project Cost [4]
E-1 (1)	11.3	1000	8	LF	$ 192	$ 192,000	$ 16,896	$ 83,558	$ 73,114	$ 370,000
E-1 (2)	10.0	1000	8	LF	$ 185	$ 185,000	$ 16,280	$ 80,512	$ 70,448	$ 360,000
E-1 (3)	8.7	1000	8	LF	$ 185	$ 185,000	$ 16,280	$ 80,512	$ 70,448	$ 360,000
E-6	8.0	1100	8	LF	$ 177	$ 194,700	$ 17,134	$ 84,733	$ 74,142	$ 380,000
E-9 (1)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	$ 340,000
E-9 (2)	8.0	1250	8	LF	$ 177	$ 221,250	$ 19,470	$ 96,288	$ 84,252	$ 430,000
E-9 (3)	8.0	1250	8	LF	$ 177	$ 221,250	$ 19,470	$ 96,288	$ 84,252	$ 430,000
E-7	8.0	800	8	LF	$ 177	$ 141,600	$ 12,461	$ 61,624	$ 53,921	$ 270,000
E-4 (1)	8.0	1200	8	LF	$ 177	$ 212,400	$ 18,691	$ 92,436	$ 80,882	$ 410,000
E-4 (2)	15.3	1100	8	LF	$ 205	$ 225,500	$ 19,844	$ 98,138	$ 85,870	$ 430,000
E-4 (3)	15.3	1000	8	LF	$ 205	$ 205,000	$ 18,040	$ 89,216	$ 78,064	$ 400,000
E-4 (4)	13.5	1100	12	LF	$ 238	$ 261,800	$ 23,038	$ 113,935	$ 99,693	$ 500,000
E-1 (4)	12.5	2300	15	LF	$ 255	$ 586,500	$ 51,612	$ 255,245	$ 223,339	$ 1,120,000
E-1 (5)	11.5	3600	15	LF	$ 255	$ 918,000	$ 80,784	$ 399,514	$ 349,574	$ 1,750,000
N10-C (1)	18.0	4000	15	LF	$ 270	$ 1,080,000	$ 95,040	$ 470,016	$ 411,264	$ 2,060,000
E-2	8.0	1500	8	LF	$ 177	$ 265,500	$ 23,364	$ 115,546	$ 101,102	$ 510,000
N10-H	8.0	1750	8	LF	$ 177	$ 309,750	$ 27,258	$ 134,803	$ 117,953	$ 590,000
N10-E	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	$ 340,000
N10-C (2)	8.0	1400	8	LF	$ 177	$ 247,800	$ 21,806	$ 107,843	$ 94,362	$ 480,000
E-5 (1)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	$ 340,000
E-5 (2)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	$ 340,000
E-5 (3)	8.0	1000	8	LF	$ 177	$ 177,000	$ 15,576	$ 77,030	$ 67,402	$ 340,000
E-10				LF	$ -	$ -	$ -	$ -	$ -	$ -
PS 1/East UGA &4,300 lf FM		1770		GPM	$ 1,550	$ 2,743,500	$ 241,428	$ 1,193,971	$ 1,044,725	$ 5,230,000
						$ 15,720,000				$ 30,110,000

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Cost Estimate by Basin/Segment

1	2	3	4	5	6	7	8	9	10	11
Description	**Average Sewer Depth (ft)**	**Sewer Length/ Quantity (ft)**	**Diameter (in)**	**Unit**	**Unit Cost**	**Construction Cost (1)**	**Taxes (8.8%)**	**Contingency (2) (40%)**	**Engineering and Administration Costs (3) (25%)**	**Project Cost (4)**

Notes:

(1) Construction costs include mobilization, excavation, backfill and pipe zone fill, pavement restoration, trench safety, pipe material and installation, manholes, protecting & relocating existing utilities, dewatering, and traffic control.

(2) The construction contingency is an allowance for additional costs not identified in the planning phase and may include utility crossings or unique soil conditions.

(3) Engineering and Administration costs include engineering and design, permitting fees, and City management costs.

(4) Project Costs include taxes (8.8%), contingency (40%), and engineering and administration costs (25%).

APPENDIX D

Related Documents

City of Mount Vernon
Development Services

910 Cleveland Avenue
Post Office Box 809
Mount Vernon, WA 98273

Phone (360) 336-6214
FAX (360) 336-6283
E-Mail DS@ci.mount-vernon.wa.us
www.ci.mount-vernon.wa.us

August 22, 2003

Chris Parsons
Community, Trade and Economic Development
Growth Management Division
P.O. Box 48300
Olympia, Washington 98504-8300

Dear Chris:

I have enclosed for your information an update to **Mount Vernon's Comprehensive Sewer Plan** adding some additional specificity regarding service to the Urban Growth area. We will be taking this to the Planning Commission and City Council for public hearing later in October.

If you have any questions, please give me a call.

Sincerely,

Elizabeth Sjostrom

Elizabeth Sjostrom
Economic Development Planner

Encl.

City of Mount Vernon
Wastewater Division

1401 Britt Road
Mount Vernon, WA 98273-6511

Phone (360) 336-6219
FAX (360) 424-8749
E-Mail mvwwtp@ci.mount-vernon.wa.us
www.ci.mount-vernon.wa.us

August 25, 2003

Bernard Jones
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Subject: Notification of sewer line extensions, including pump stations.

Dear Mr. Jones:

In accordance with WAC 173-240-030(5), the City of Mount Vernon is providing notice of planning for sewer pipe extensions, including pump stations in the urban growth area. The sewer expansion areas are shown in Figure 1 attached. The extension plan is in conformance with the Comprehensive Sewer Plan approved by Ecology on March 4, 2003.

If you have any questions on this matter please contact Walt Enquist at (360) 336-6219.

Sincerely,

Walt Enquist

Walt Enquist
Wastewater Utility Supervisor

Attachments

cc: John Buckley, Pubic Works Director
Elizabeth Sjostrom, Economic Development P
NPDES File

7002 0860 0008 7867 1471

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Sent To: Bernard Jones
Department of Ecology
Northwest Regional Office
Street, Apt. No.; or PO Box No.: 3190 160th Avenue SE
City, State, ZIP+4: Bellevue, WA 98008-5452

PS Form 3800, April 2002 See Reverse for Instructions

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