

DEADMANS RUN, EAST CAMPUS, AND HAVELOCK BASINS

19.1 TRUNK SEWER SYSTEMS

The existing Deadmans Run, East Campus, and Havelock drainage basins are shown schematically in Figures 19.1, 19.2, and 19.3. The Deadmans Run sewer system and Havelock Basin sewer system currently drain to the Northeast WWTF, while the East Campus Basin sewer system drains to the Theresa Street WWTF. The flows in the Deadmans Run trunk sewer upstream from manhole C6-194 (south of N. 40th St and Adams St) can be diverted to the Theresa Street WWTF. Shown in Table 19.1 are the existing and planned service areas that were used to determine the flows for the different modeling scenarios. With the exception of Havelock Basin, these basins for the most part are considered completely built-out.

Table 19.1 Service Area and Flows - Deadmans Run, East Campus, & Havelock Basins^{1,2}
Wastewater Facilities Master Plan Update - 2007
City of Lincoln, Nebraska

Basin	Existing		Existing and Tier I	
	Area (ac)	Flow (cfs)	Area (ac)	Flow (cfs)
Deadmans Run	4,898	21.13	N/A	N/A
East Campus	865	6.5	N/A	N/A
Havelock	3,881	16.15	4,681	22.15

1 - Based on information provided by LWWS.
2 - Areas as of July 2006.

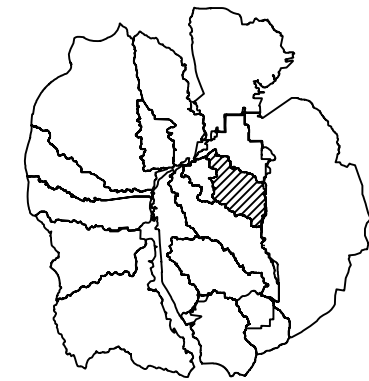
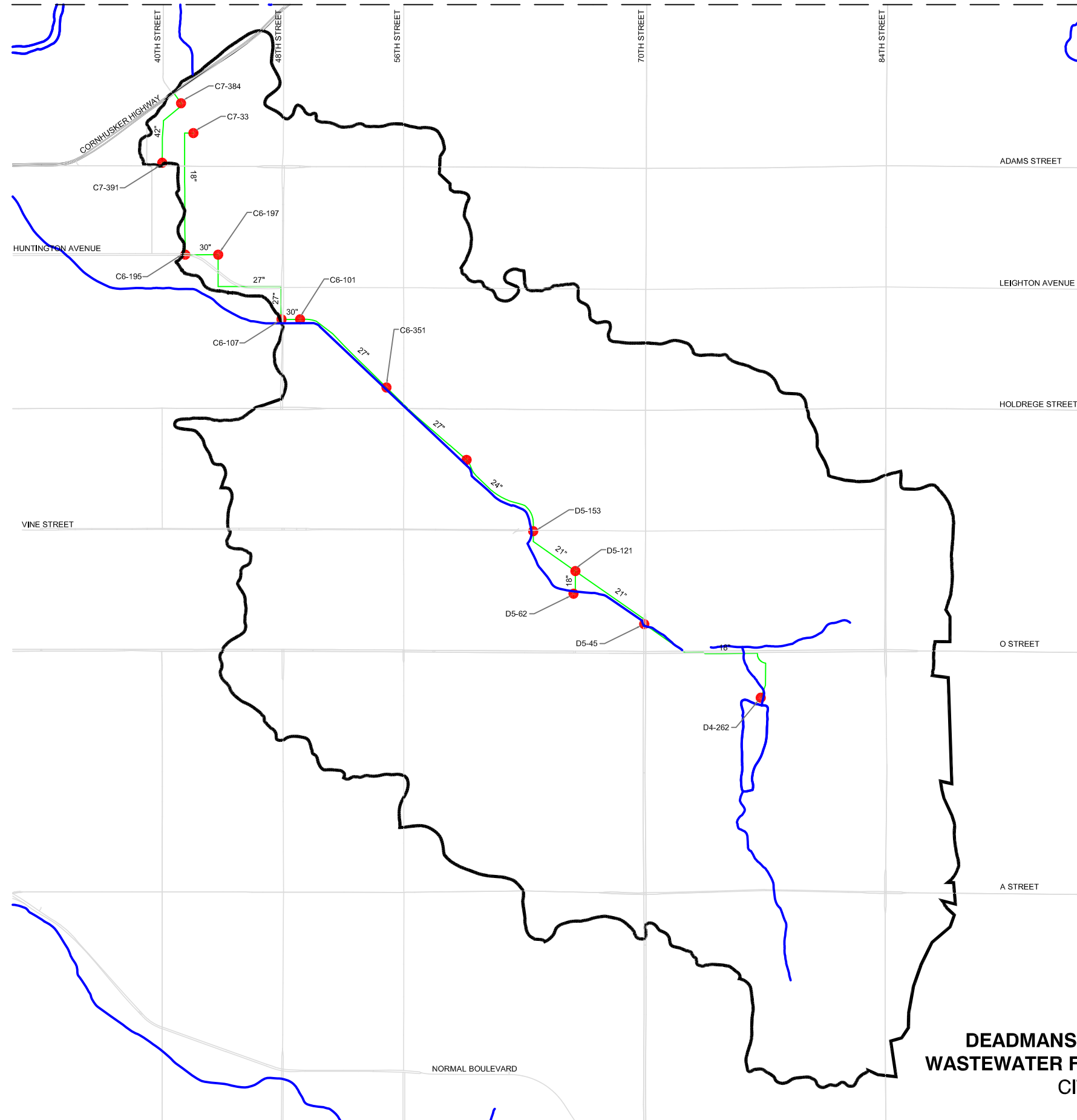
19.2 MODELING RESULTS

The modeling results for the scenarios discussed in this Chapter are located in Appendix D.

19.2.1 Existing Conditions

19.2.1.1 Deadmans Run Basin

The existing Deadmans Run system was modeled using a total tributary area to the system of 4,898 acres. The Deadmans Run sewer system drains into manhole C6-194, where the East Campus system begins. For this modeling effort, a flow diversion was developed based on the assumption that no flow from Deadmans Run will be diverted to the East Campus system. The model was examined during a weekday at diurnal wet weather flow to assess capacity, SSO events, surcharging, and velocity related problems.

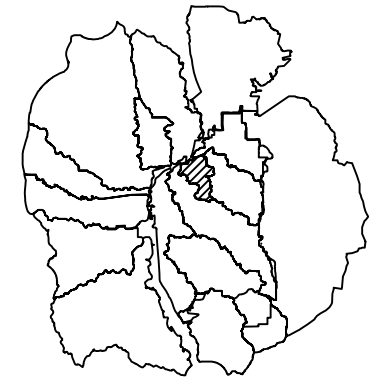
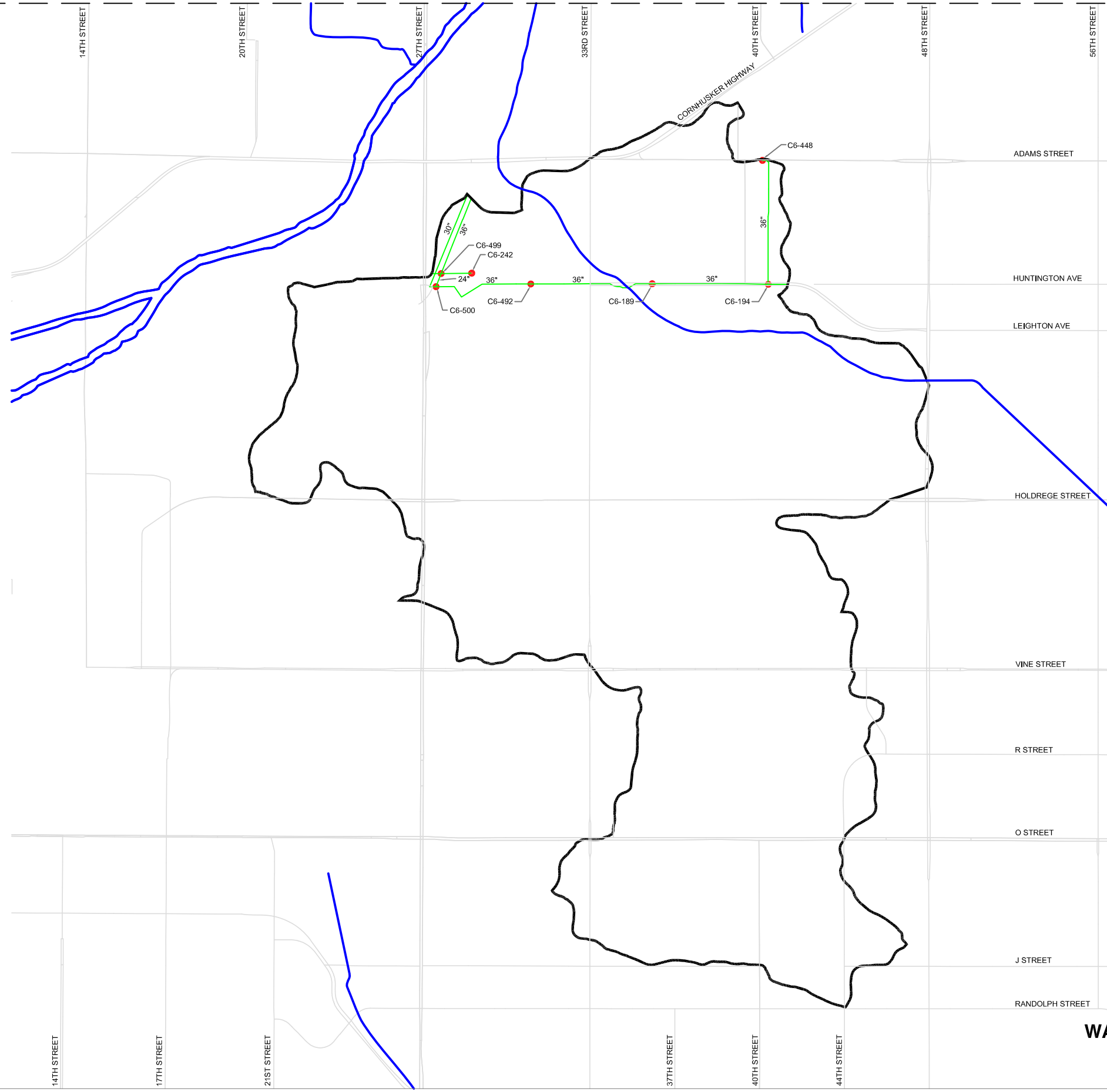


KEY MAP

NOTES:
1. ONLY 18" AND LARGER PIPES INCLUDED IN MODEL.

Figure No. 19.1
DEADMANS RUN BASIN TRUNK SEWER SYSTEM
WASTEWATER FACILITIES MASTER PLAN UPDATE - 2007
CITY OF LINCOLN, NEBRASKA



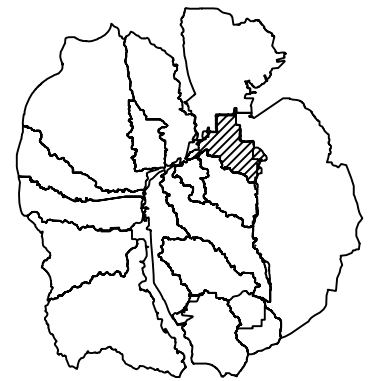
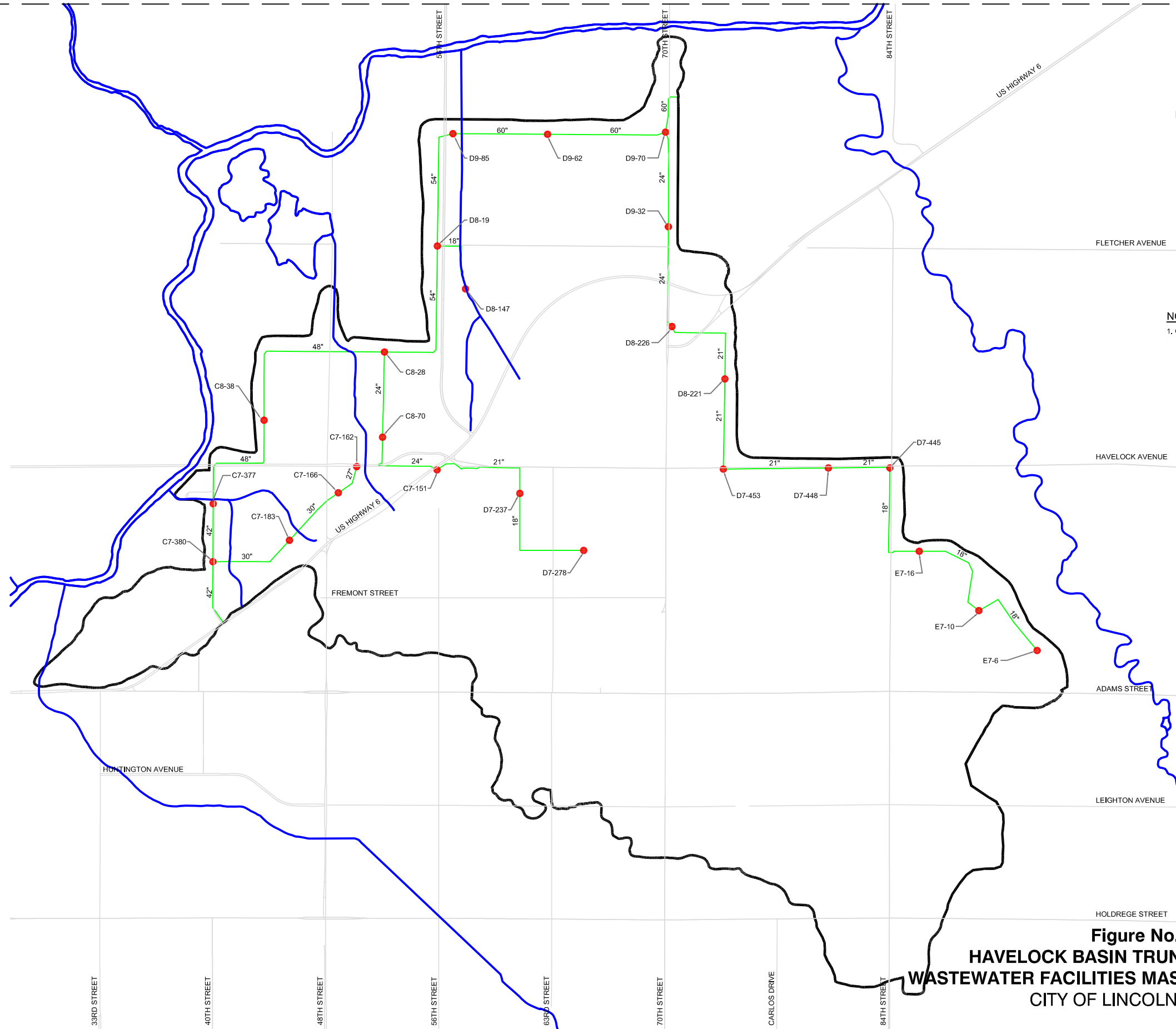


KEY MAP

NOTES:
1. ONLY 18" AND LARGER PIPES INCLUDED IN MODEL.

Figure No. 19.2
EAST CAMPUS BASIN TRUNK SEWER SYSTEM
WASTEWATER FACILITIES MASTER PLAN UPDATE - 2007
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KEY MAP

NOTES:
1. ONLY 18" AND LARGER PIPES INCLUDED IN MODEL.

Figure No. 19.3
HAVELOCK BASIN TRUNK SEWER SYSTEM
WASTEWATER FACILITIES MASTER PLAN UPDATE - 2007
CITY OF LINCOLN, NEBRASKA



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Model simulations of the existing system indicated that no SSO's occurred during the peak wet weather flows. As shown in Table 19.2, segments pipeline segments had minor surcharging with d/D values from 0.49 to 1.80. The location and hydraulic profile of pipes with surcharged conditions are shown in Figures 19.4 and 19.5, respectively.

The peak wet weather flow was used to derive the peak dry weather flow. It was assumed the peak dry weather flow is approximately 20-percent of the peak wet weather flow. The dry weather flow analysis indicated that no pipe segment in this system has flow velocities less than 2 ft/sec. The dry weather flow velocities were between 2.3 and 4.1 ft/sec.

Table 19.2 Surcharged Pipes - Existing Conditions- Deadmans Run Basin Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska						
Pipe ID	US Manhole	DS Manhole	Diameter (ft)	Length (ft)	Flow (cfs)	d/D
LSAM123	D5-483	D5-151	1.75	200	10.85	1.11
LSAM125	D5-151	D5-152	1.75	371	10.79	1.46
LSAM119	D5-152	D5-153	1.75	221	10.78	1.80
LSAM129	D5-153	D5-386	2.00	89	12.66	1.58
LSAM136	D5-386	D5-434	2.00	95	12.65	1.67
LSAM137	D5-434	D5-213	2.00	165	12.65	1.67
LSAM130	D5-213	D5-210	2.00	271	12.65	1.71
LSAM134	D5-210	D5-482	2.00	153	13.19	1.71
LSAM135	D5-482	D5-209	2.00	237	13.19	1.48
LSAM133	D5-209	D5-275	2.00	402	13.19	1.46
LSAM132	D5-275	D5-276	2.00	417	13.19	1.42
LSAM131	D5-276	D5-324	2.00	478	13.19	1.47
LSAM116	D5-324	D5-325	2.25	492	14.09	1.31
LSAM117	D5-325	D5-326	2.25	485	14.09	1.20
LSAM118	D5-326	D5-339	2.25	493	14.09	1.13
LSAM140	D5-339	D5-513	2.25	359	14.08	1.05
LSAM24	D5-513	C6-480	2.25	366	14.08	1.05

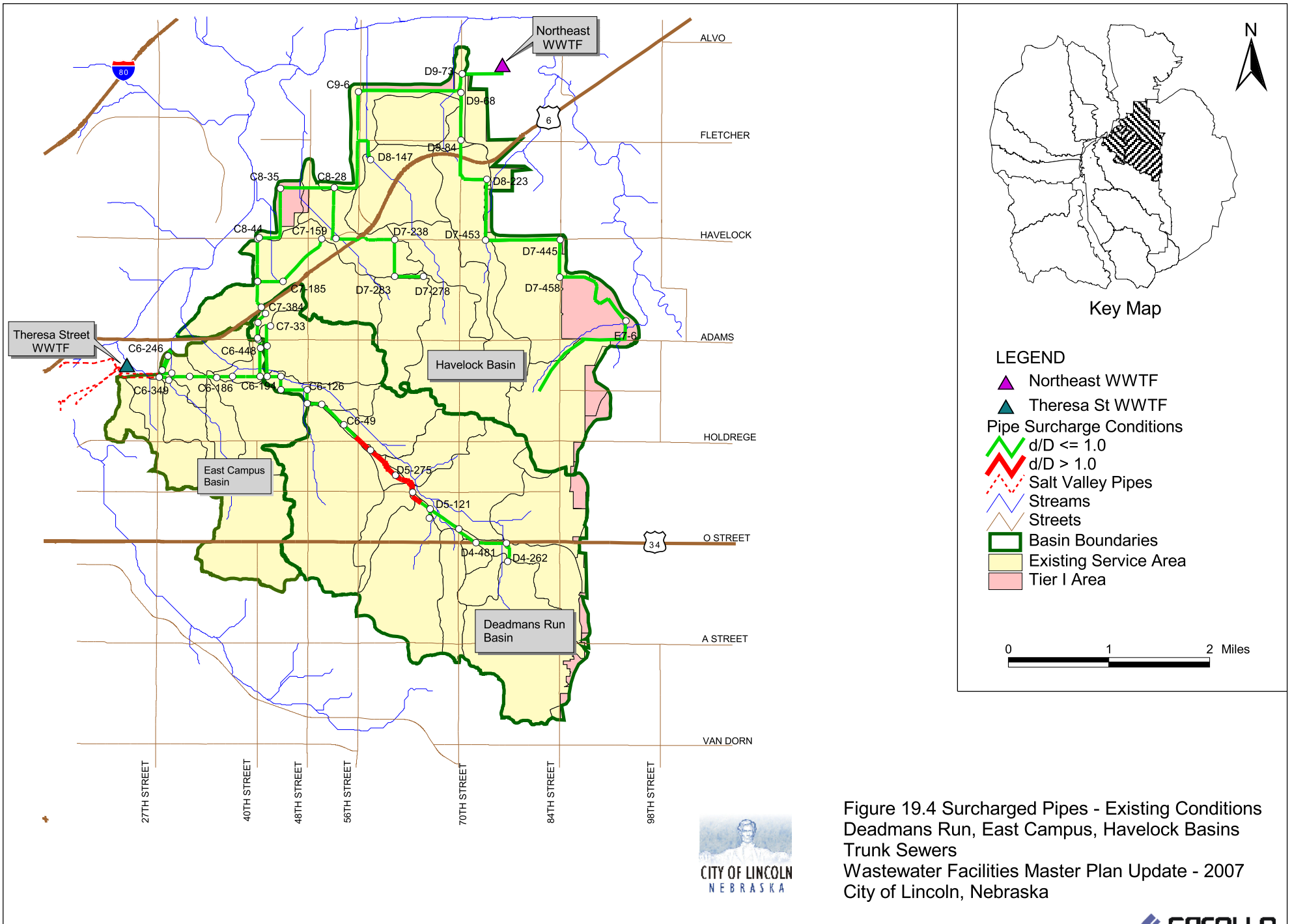
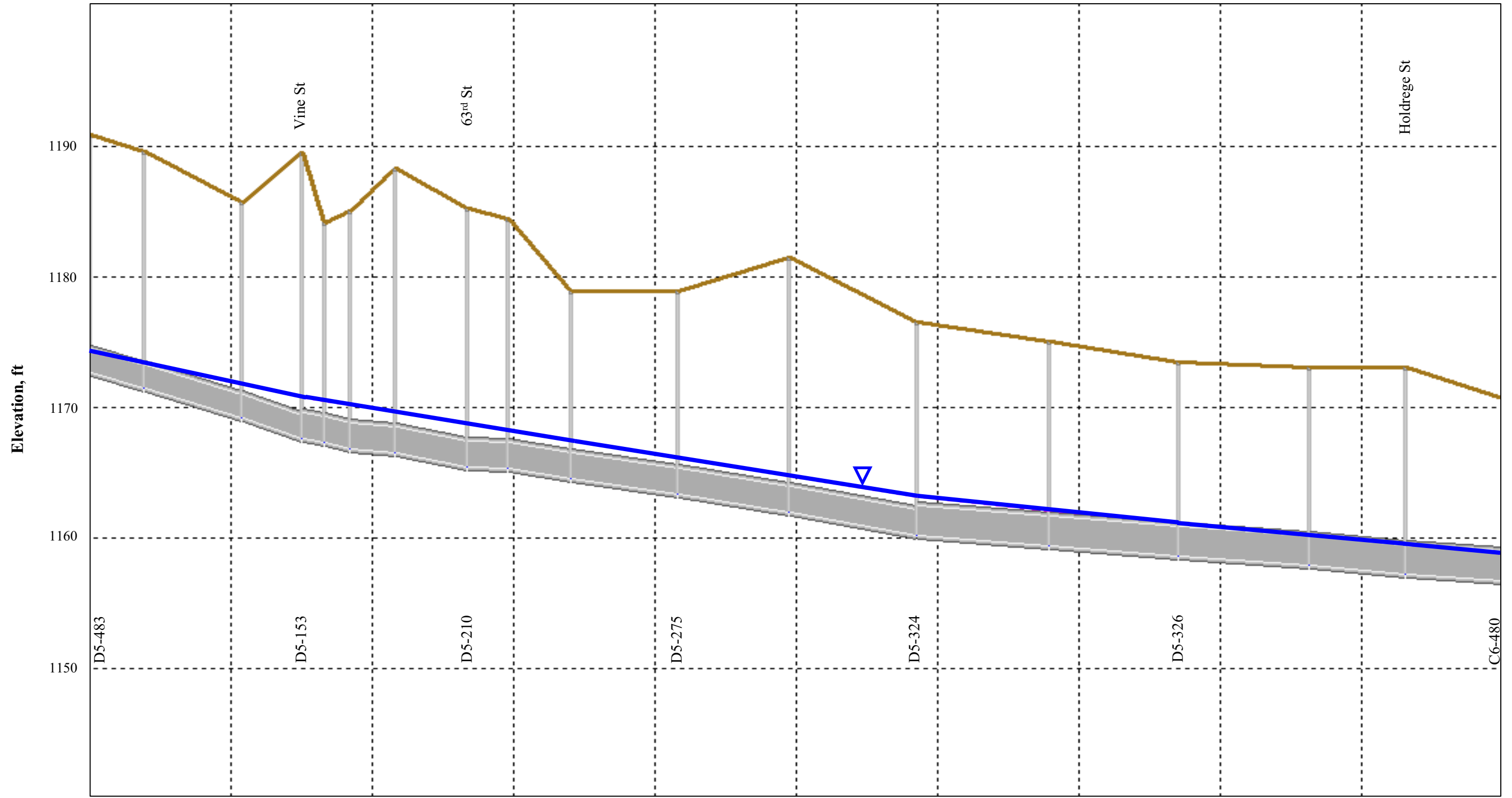


Figure 19.4 Surcharged Pipes - Existing Conditions
 Deadmans Run, East Campus, Havelock Basins
 Trunk Sewers
 Wastewater Facilities Master Plan Update - 2007
 City of Lincoln, Nebraska





Manholes

- Modeled water surface
- Ground surface
- Sanitary sewer pipe



Figure 19.5 Hydraulic Profile of Existing System – Existing Conditions
 Deadmans Run Trunk Sewer
 Wastewater Facilities Master Plan Update - 2007
 City of Lincoln, Nebraska

19.2.1.2 East Campus Basin

The existing East Campus Basin system was modeled using a total tributary area of 1,800 acres. Model simulations of the existing conditions indicate that no surcharging occurred during the wet weather flows. During these conditions, the simulated d/D ratios were between 0.69 and 0.92.

19.2.1.3 Havelock Basin

The existing system was modeled using a total service area of 3,881 acres. Model simulations of the existing conditions indicate that no surcharging occurred during the wet weather flows. The simulated d/D ratios at these conditions were between 0.40 and 0.88.

19.2.2 Tier I Conditions

19.2.2.1 Deadmans Run and East Campus Basins

As shown in Table 19.1, Deadmans Run and East Campus basins do not have Tier I growth areas, therefore these basins were not modeled for Tier I conditions.

19.2.2.2 Havelock Basin

The Havelock Basin was modeled at Tier I conditions as shown in Table 19.1. For this modeling effort it was determined that 6.1 cfs of peak flow would be directed into the proposed 84th Street Sewer discussed in Chapter 21. This results in the Havelock trunk sewers conveying approximately the same flows as the existing conditions previously discussed.

Based on the above assumptions, the Tier I model simulations indicate that no surcharging occurred with simulated d/D ratios between 0.40 and 0.88.

19.3 IMPROVEMENTS

19.3.1 Existing Conditions

19.3.1.1 Deadmans Run Basin

Surcharged Areas

Due to the minor nature of the surcharging, the depth of the sewer at these areas, and the area where the surcharging is occurring, it is recommended that no action be taken at this time. The area of surcharging should be periodically monitored and action taken if needed. One method to monitor the surcharged areas would be to install a liquid level indicator in a manhole where the surcharging is expected to be the greatest. Based on the modeling results this would be manhole D5-152 or D5-153.

However, if the City desired to eliminate the intermittent peak flow surcharging conditions, increased conveyance is required in sewers between manholes D5-483 and C6-480. The increased capacity will be achieved with a 4,967 feet of 15-inch relief sewer paralleling the existing sewers between manholes D5-213 and C6-56. All flows greater than 8.5 cfs would be diverted from the existing sewer at manhole D5-213. These improvements would eliminate the surcharging.

I/I Flow Reduction

Another approach would be to lower the peak flow. The results of the five simulation runs indicate that an I/I flow reduction target between 15 and 20 percent will eliminate the surcharged conditions identified for sewers between manholes D5-483 and C6-480 under existing conditions. The detailed results of all the five simulation runs are presented in Table 19.3.

Table 19.3 Comparison of d/D Ratios for I/I Flow Reduction Target Levels - Deadmans Run Basin Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska								
Pipe ID	US Manhole	DS Manhole	d/D Ratio for I/I Reduction Target Indicated					
			0%	10%	15%	20%	25%	30%
LSAM123	D5-483	D5-151	1.11	0.68	0.66	0.64	0.62	0.60
LSAM125	D5-151	D5-152	1.46	0.68	0.66	0.64	0.62	0.60
LSAM119	D5-152	D5-153	1.80	0.86	0.82	0.79	0.76	0.73
LSAM129	D5-153	D5-386	1.58	0.75	0.72	0.69	0.67	0.64
LSAM136	D5-386	D5-434	1.67	0.86	0.82	0.79	0.76	0.73
LSAM137	D5-434	D5-213	1.67	0.86	0.82	0.79	0.76	0.73
LSAM130	D5-213	D5-210	1.71	0.97	0.93	0.90	0.86	0.83
LSAM134	D5-210	D5-482	1.71	0.97	0.93	0.90	0.86	0.83
LSAM135	D5-482	D5-209	1.48	0.78	0.75	0.72	0.70	0.67
LSAM133	D5-209	D5-275	1.46	0.78	0.75	0.72	0.70	0.67
LSAM132	D5-275	D5-276	1.42	0.79	0.75	0.72	0.69	0.67
LSAM131	D5-276	D5-324	1.47	0.99	0.93	0.89	0.85	0.82
LSAM116	D5-324	D5-325	1.31	0.88	0.83	0.79	0.76	0.73
LSAM117	D5-325	D5-326	1.20	0.87	0.83	0.79	0.75	0.72
LSAM118	D5-326	D5-339	1.13	0.87	0.82	0.79	0.75	0.72
LSAM140	D5-339	D5-513	1.05	0.91	0.87	0.83	0.80	0.77
LSAM24	D5-513	C6-480	1.05	0.91	0.87	0.83	0.80	0.77

19.3.1.2 East Campus

The East Campus basin is nearly built out and the most of the sewers in this system are running within generally accepted values. Due to the satisfactory performance of the modeled system with the peak existing flows, no immediate recommendations are proposed. However, several reaches of the trunk sewer system have modeled velocities less than 2 ft/sec, as shown in Figure 19.6. These areas should be monitored to determine if solids deposition is occurring. If deposition is noted the sewer may periodically need to be hydro-flushed.

19.3.1.3 Havelock

The existing Havelock basin is mostly built out and most of the sewers in this system are running well below design capacity. Due to the satisfactory performance of the modeled system with the peak existing flows, no immediate recommendations are proposed. However, several reaches of the trunk sewer system have modeled velocities less than 2 ft/sec, as shown in Figure 19.6. These areas should be monitored to determine if solids deposition is occurring. If deposition is noted the sewer may periodically need to be hydro-flushed.

19.3.2 Tier I Conditions

No Tier I improvements were identified for these basins.

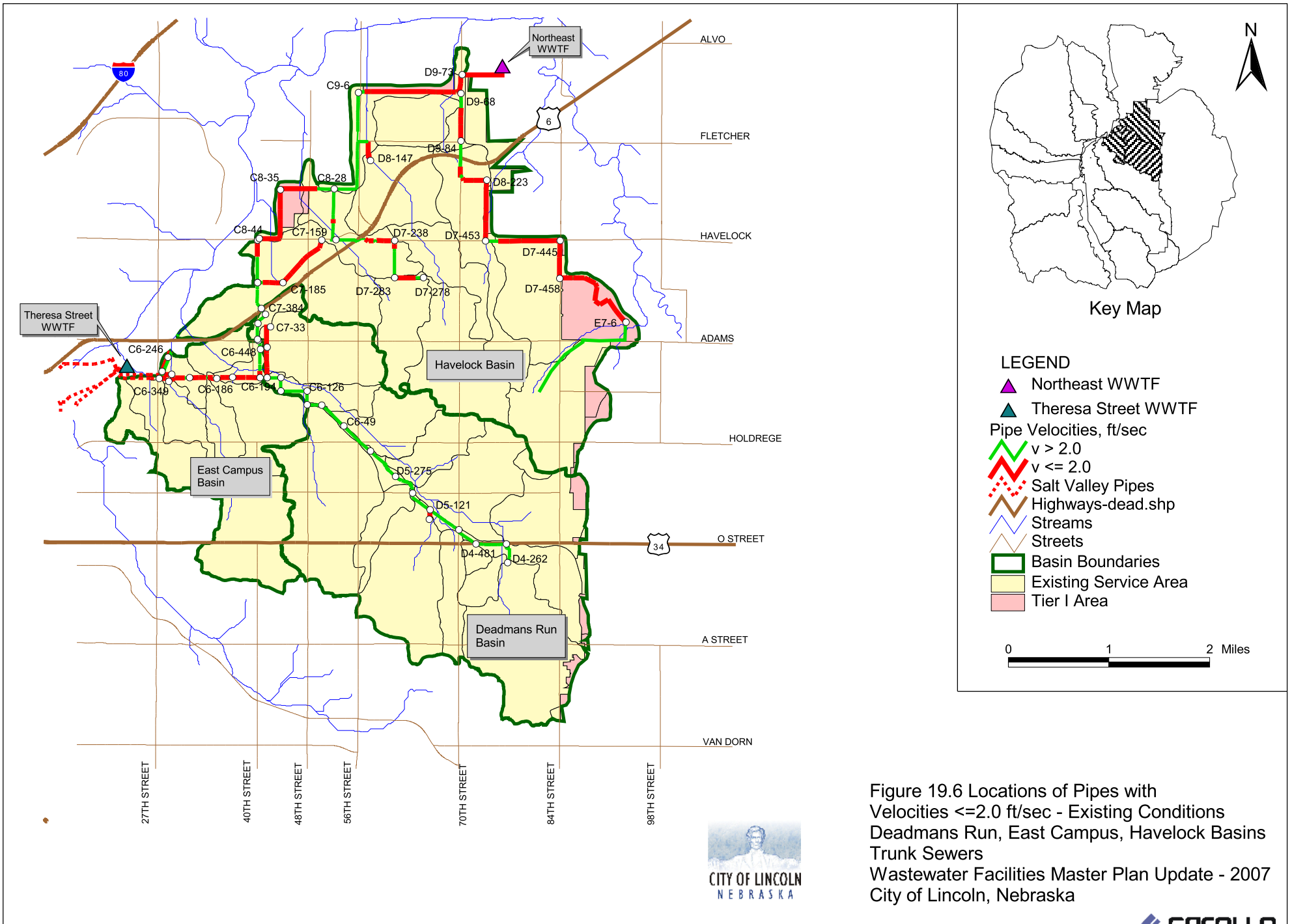


Figure 19.6 Locations of Pipes with Velocities ≤ 2.0 ft/sec - Existing Conditions Deadmans Run, East Campus, Havelock Basins Trunk Sewers Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska

19.4 SUMMARY OF RECOMMENDED IMPROVEMENTS

Recommendations for maintenance and improvements of the Deadmans Run, East Campus, and Havelock Basin Sewer Systems include:

- Existing Flows:
 - Monitor sewer lines for surcharging.
 - Monitor sewer lines for sediment deposition and clean lines as needed to maintain full pipe capacity.

19.4.1 Sewer Monitoring

Areas where the modeled dry weather flows are less than 2 ft/sec as shown in Figure 19.6, should be periodically monitored for solids deposition. If deposition or corrosion is noted, the sewer lines should be flushed and evaluated.

Monitor the liquid level in the manholes where surcharging is anticipated to determine the depth and duration of any surcharging.

19.4.2 84th Street Sewer

It is recommended that the 84th Street Sewer between manhole D7-445 to manhole D8-229 (identified as Project SC-1A, B discussed in Chapter 21) be constructed. This project will divert flow from Regent Heights and the rapidly developing area west of 84th Street near Adams from the Havelock and Deadmans Run Trunk Sewers. Diverting this flow will provide additional capacity in the Deadmans Run Trunk Sewer for Tier I flows from the Northeast Basin as discussed in Chapters 20 and 21.