

UPPER SOUTHEAST SALT CREEK BASIN

13.1 UPPER SOUTHEAST TRUNK SEWER SYSTEM

The Upper Southeast drainage basin consists primarily of Tier I and Tier II growth tiers. This basin is actually an extension of the Salt Valley drainage basin as shown in Figure 13.1. Currently a 48-inch diameter trunk sewer has been designed and awaiting construction to serve the northern portions of this basin. The following projects have been included in the model of the existing system.

1. Upper SE Salt Creek Trunk Sewer
2. Upper SE Salt Creek Sub-Basin Trunk Sewer Phases I and III.

Shown in Table 13.1 below are the basin areas and flows used in the modeling effort. As shown, based on the current growth tiers, this basin will be built out during the Tier II planning period.

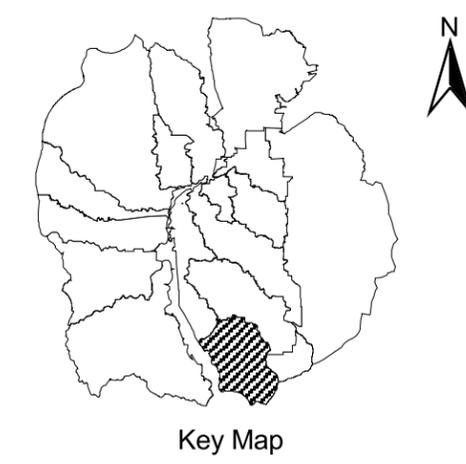
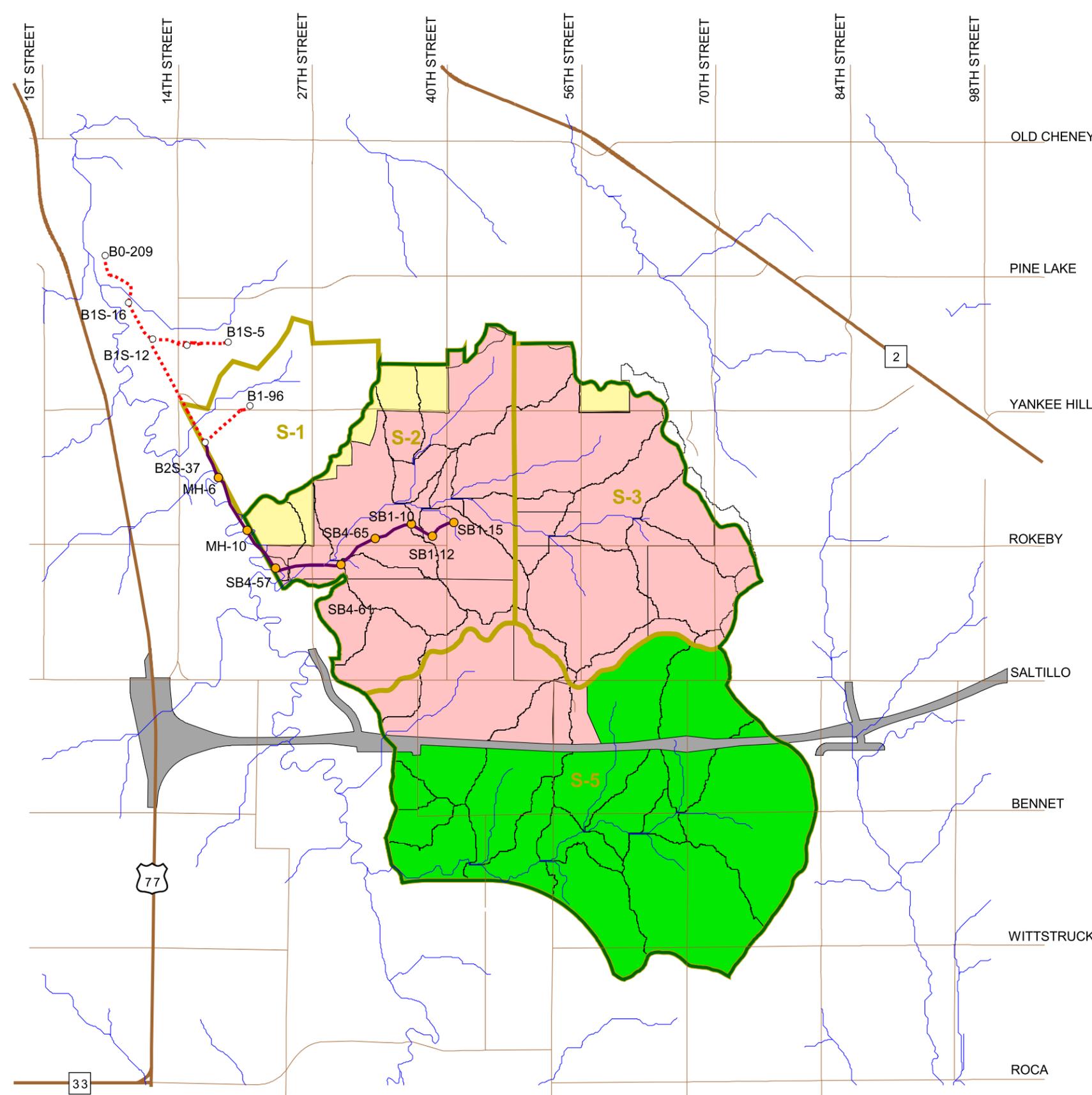
Table 13.1 Service Area and Flows - Upper Southeast Basin ^(1,2) Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska				
Upper Southeast Basins	Tier I		Tiers I and II	
	Area (ac)	Flow (cfs)	Area (ac)	Flow (cfs)
Model Input Values	4,119	25.81	7,279	43.05
1 - Based on Information provided by LWWS.				
2 - As of July 2006.				

13.2 MODELING RESULTS

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

13.2.1 Tier I Conditions

For Tier I model conditions, several capacity limitations occur within the new 30-inch sewer located in Upper SE Salt Basin from manholes SB4-66 to SB4-57 (west of 40th St and Rokeby Rd to southwest of 27th St and Rokeby Rd). The simulated d/D values for this section are attributed to the surcharging of the Salt Valley trunk Sewer downstream from Manhole B1-7 (east of 1st St and Old Cheney Rd). However, when the Salt Valley Trunk Sewer improvements discussed in Chapter 10 are implemented, the surcharged conditions are eliminated and the d/D ratio varied between 0.53 and 0.69. With these improvements, the existing system has adequate capacity to convey the Tier I flows, therefore no recommendations are proposed. The simulation results are summarized in Table 13.2.



- LEGEND**
- Upper Southeast Pipes - Existing
 - Salt Valley - Existing Pipes
 - Streams
 - Streets
 - Basin Boundary
 - Utility Planning Zones
 - Beltway
 - Existing Service Area
 - Tier I Area
 - Tier II Area



Figure 13.1 Basin Map
 Upper Southeast Basin Trunk Sewer
 Wastewater Facilities Master Plan Update - 2007
 City of Lincoln, Nebraska



Pipe ID	US Manhole	DS Manhole	Diameter (ft)	Length (ft)	Flow (cfs)	d/D	Velocity (ft/s)
PPL1	SB1-15	SB1-14	1.75	175.06	6.23	0.53	4.87
PPL2	SB1-14	SB1-13	1.75	487.21	6.23	0.53	4.87
PPL3	SB1-13	SB1-12	1.75	387.56	6.23	0.59	4.83
PPL4	SB1-12	SB1-11	1.75	303.40	7.50	0.63	5.07
PPL5	SB1-11	SB1-10	1.75	576.43	7.50	0.63	4.82
PPL6	SB1-10	SB4-66	1.75	667.91	7.50	0.73	6.44
PPL7	SB4-66	SB4-65	2.00	843.87	11.26	0.73	5.27
PPL8	SB4-65	SB4-64	2.25	746.31	12.05	0.65	4.46
PPL9	SB4-64	SB4-63	2.25	444.83	12.05	0.69	4.66
PPL10	SB4-63	SB4-62	2.50	444.83	12.58	0.62	3.98
PPL11	SB4-62	SB4-61	2.50	123.54	12.58	0.63	4.07
PPL12	SB4-61	SB4-60	2.50	554.88	14.01	0.63	4.30
PPL13	SB4-60	SB4-59	2.50	500.00	14.01	0.64	4.29
PPL14	SB4-59	SB4-58	2.50	721.60	14.01	0.68	4.20
PPL15	SB4-58	SB4-57	2.50	864.38	14.33	0.68	4.17

13.2.2 Tier II Conditions

The Tier II system was modeled using a total area of 7,279 acres, which resulted in a peak flow of 43.05 cfs. Without the Salt Valley Tier II improvements, the model results indicate severe surcharged conditions within the new 30-inch sewer between manholes SB4-66 to SB4-57 (west of 40th St and Rokeby Rd to southwest of 27th St and Rokeby Rd). The simulated d/D values for this section ranged from 2.05 to 2.69. The limited conveyance capacity of the sewers downstream of manhole B1-7 (east of 1st St and Old Cheney Rd) is the cause of the simulated surcharging conditions identified within the new 30-inch sewer in this basin. However, with the implementation of the Salt Valley Tier II recommendation, the model results indicate no surcharged conditions in the Upper Southeast Tiers I and II sewers. Table 13.4 shows the simulated d/D values for the model run with Salt valley Tier II recommendations implemented.

13.3 IMPROVEMENTS

The improvements for the Upper Southeast Basin are shown graphically in Figure 13.2 and summarized in Tables 13.3 and 13.4 below.

13.3.1 Tier I Improvements

The Tier I model includes the existing Upper SE Salt Creek Trunk Sewer and the Upper SE Salt Creek Sub-Basin Trunk Sewer Phase I and III. Currently these sewers have not yet been installed. Additional sewers with smaller diameters were designed to convey sanitary flows from the upper reaches of the basin to connect to the newly designed sewers. This section describes the design and preliminary alignment of the new sewers.

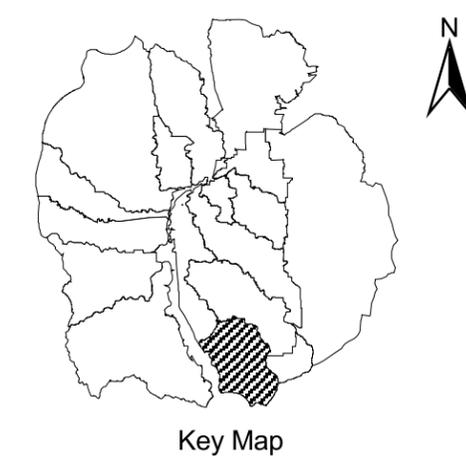
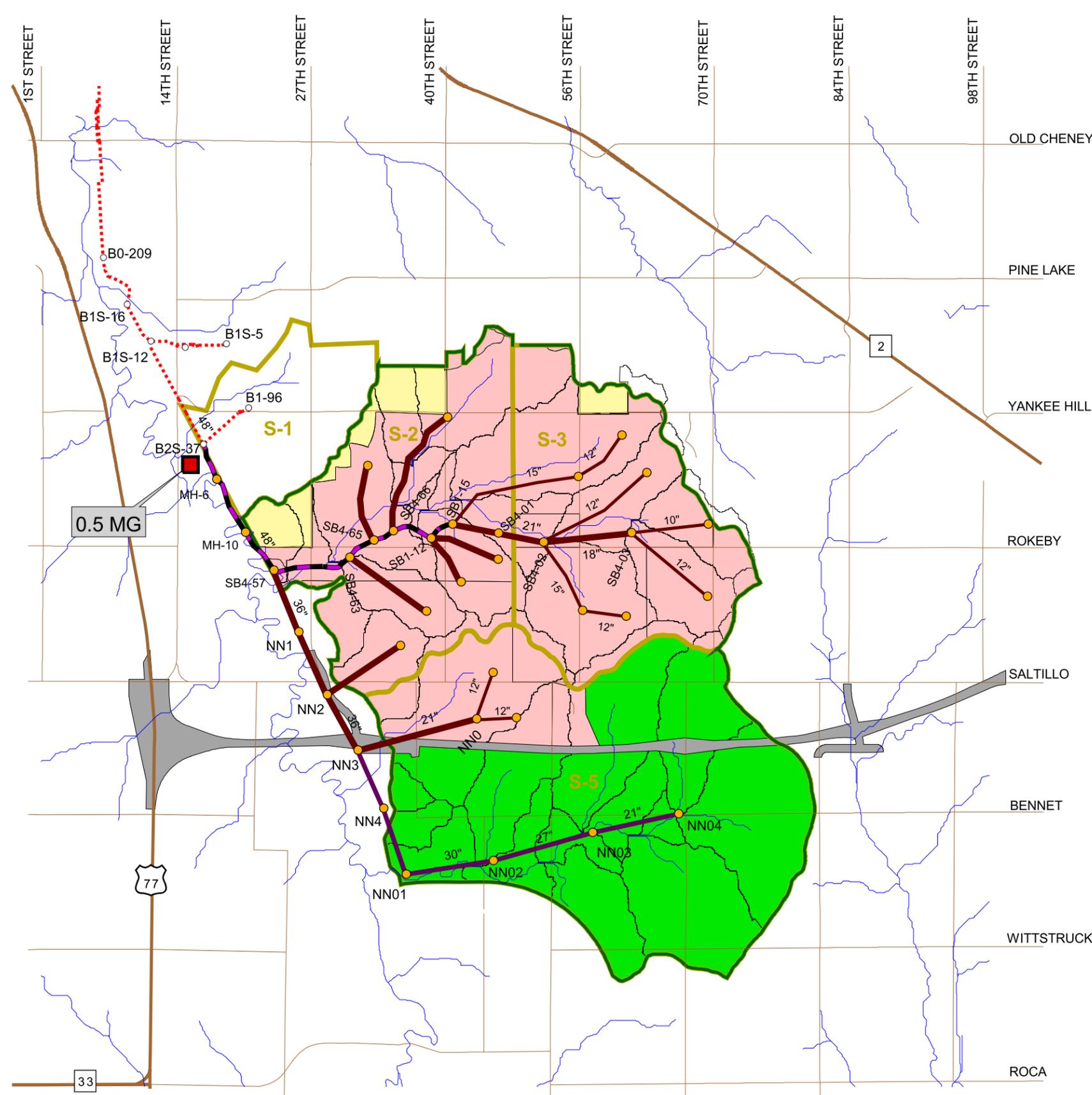
The new pipelines and trunk sewers were sized using the following criteria:

- Minimum velocity of 2 feet per second during dry weather flow.
- Maximizing flow capacity in the new pipelines.

The Tier I development sanitary sewer system layout is presented in Figure 13.2. This schematic drawing shows the major sub-basin boundaries and stream network. The sub-basin boundaries and stream network were derived from the City contour data. Sewer pipe design parameters are presented in Table 13.3.

13.3.2 Tier II Improvements

The proposed sewer alignments shown in Figure 13.2 were added to the Tier I XP-SWMM model and evaluated to verify the anticipated Tier I flows. Modeling results for Tier I and Tier II flow conditions are shown in Table 13.4. The model results indicate the proposed sewers have adequate capacity to convey the Tier II flows.



- LEGEND**
- Upper Southeast Pipes - Existing
 - Tier I Pipes
 - Tier II Pipes
 - Salt Valley - Existing Pipes
 - Streams
 - Highways-use.shp
 - Streets
 - Basin Boundary
 - Utility Planning Zones
 - Beltway
 - Storage
 - Existing Service Area
 - Tier I Area
 - Tier II Area



Notes:
 Pipes less than 15-in are shown for planning purposes.
 Additional 10-in, 12-in, or 15-in pipes may be required depending on the actual land use and development.



Figure 13.2 Proposed Tier I and II Sewer Improvements
 Upper Southeast Basin Trunk Sewer
 Wastewater Facilities Master Plan Update - 2007
 City of Lincoln, Nebraska

Pipe ID	US Manhole	DS Manhole	Diameter (ft)	Length (ft)	Slope (%)	Design Cap. (cfs)	Tier
PPL01	SB4-03	SB4-02	1.50	3375.46	0.25	5.25	I
PPL02	SB4-02	SB4-01	1.75	1873.93	0.25	7.92	
LSE6	NN0	NN3	1.75	5691.95	0.25	7.88	
LSE7	NN3	NN2	3.00	2487.07	0.25	33.36	
LSE1	NN04	NN03	1.75	3455.72	0.25	7.88	II
LSE2	NN03	NN02	2.25	4058.19	0.25	15.41	
LSE3	NN02	NN01	2.50	3463.98	0.25	20.41	
LSE4	NN01	NN4	2.50	2732.62	0.24	20.22	
LSE5	NN4	NN3	2.50	2487.50	0.25	20.51	

Pipe ID	US Manhole	DS Manhole	Capacity cfs	Tier I Conditions		Tier I & II Conditions		Tier
				Q, cfs	d/D	Q, cfs	d/D	
PPL01	SB4-03	SB4-02	5.25	3.60	0.64	3.60	0.64	I
PPL02	SB4-02	SB4-01	7.92	3.60	0.47	3.60	0.47	
LSE6	NN0	NN3	7.88	7.51	1.17	7.51	1.17	
LSE7	NN3	NN2	33.36	25.80	0.69	25.80	0.69	
LSE1	NN04	NN03	7.88	NA	NA	6.52	0.93	II
LSE2	NN03	NN02	15.41			13.57	0.82	
LSE3	NN02	NN01	20.41			18.38	0.80	
LSE4	NN01	NN4	20.22			19.60	0.80	
LSE5	NN4	NN3	20.51			19.60	0.82	

13.4 SUMMARY OF RECOMMENDED IMPROVEMENTS

Recommendations for maintenance and improvements of the Upper Southeast Basin Sewer System include:

- Existing Flows:

- Monitor and provide regular cleaning of existing sewer lines to maintain full pipe capacity.
- Tier I Flows:
 - Implement Salt Valley Tier II recommendations to eliminate surcharged conditions in the Tier I pipes.
 - Construct smaller diameter sewer lines in the upper reaches of the basin (Tier I area).
- Tier II Flows:
 - Implement Salt Valley Tier II recommendations to eliminate surcharged conditions in the Tier II pipes.
 - Construct new sewer lines to service the Tier II area.

Until full development of the system, some pipes will be oversized with regard to interim flows. These sewers should be periodically inspected to determine if deposition is occurring.

To eliminate surcharged conditions in the Tiers I and II pipes, it is recommended that the Salt Valley Tier II recommendations be implemented. The new pipes were sized based on the assumptions that the recommendations identified under Tier II conditions for Salt Valley system will be implemented.

The proposed alignments of the sanitary sewers are preliminary and developed for planning purposes. It is recommended that a detailed study be performed prior to designing the improvements. In most cases, the alignments shown closely follow natural drainage ways.

A summary of the improvement projects identified with planning costs is outlined in Table 13.5.

**Table 13.5 Recommended Improvements - Upper Southeast Basin
Wastewater Facilities Master Plan Update - 2007
City of Lincoln, Nebraska**

Tier (Timing)	ID	Description	Location ⁽¹⁾	Parameters	Unit Price	Planning Cost ⁽²⁾
I	USE-1	Extend Trunk Sewer Upper SE (CIP Project 3.b)	35th and Rokeby to near 40th and Yankee Hill Road			\$250,000 ⁽³⁾
I	USE-2	Extend Trunk Sewer Upper SE (CIP Project 3.c)	40th and Rokeby to 48th and Rokeby			\$2,380,000 ⁽³⁾
I	USE-3	Sub-basin Upper SE (CIP Project 3.f)	Sub-basin north and south of Rokeby west of 40th			\$400,000 ⁽³⁾
I	USE-4	Extend Trunk Sewer Upper SE (CIP Project 3.g.)	Extend Trunk Sewer south to Saltillo Rd			\$2,000,000 ⁽³⁾
I	USE-5	36-inch	NN3 to NN2	2,487 lf	\$360.00	\$895,000
I	USE-6	21-inch	SB4-02 to SB4-01, NN0 to NN3	7,535 lf	\$210.00	\$1,582,000
I	USE-7	18-inch	SB4-03 to SB4-02	3,375 lf	\$180.00	\$608,000
I	USE-8	15-inch	See Figure 13.2.	8,667 lf	\$150.00	\$1,300,000
I	USE-9	12-inch	See Figure 13.2.	16,407 lf	\$120.00	\$1,969,000
I	USE-10	10-inch	See Figure 13.2.	3,072 lf	\$100.00	\$307,000
II	USE-11	30-inch	NN02 to NN3	8,684 lf	\$300.00	\$2,605,000
II	USE-12	27-inch	NN03 to NN02	4,058 lf	\$270.00	\$1,096,000
II	USE-13	21-inch	NN04 to NN03	3,456 lf	\$210.00	\$726,000

Notes:

1. Upstream and downstream nodes for each pipe section.
2. ENR CCI for Kansas City = 8512 (July 2006).
3. Costs are from current City CIP.