

LITTLE SALT CREEK BASIN

18.1 LITTLE SALT CREEK TRUNK SEWER SYSTEM

The existing Little Salt Creek drainage basin is shown schematically in Figure 18.1. Table 18.1 shows the existing and planned service areas that were used to determine the flows for the different modeling scenarios.

Basin	Existing		Existing and Tier I		Existing and Tiers I & II		Existing and Tiers I, II & III	
	Area (ac)	Flow (cfs)	Area (ac)	Flow (cfs)	Area (ac)	Flow (cfs)	Area (ac)	Flow (cfs)
Little Salt Creek	3,314	21.47	3,864	24.63	5,308	32.73	9,376	54.62

1. Based on Information Provided by LWWS.
2. As of July, 2006.

18.2 MODELING RESULTS

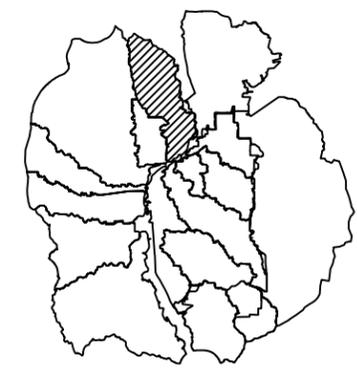
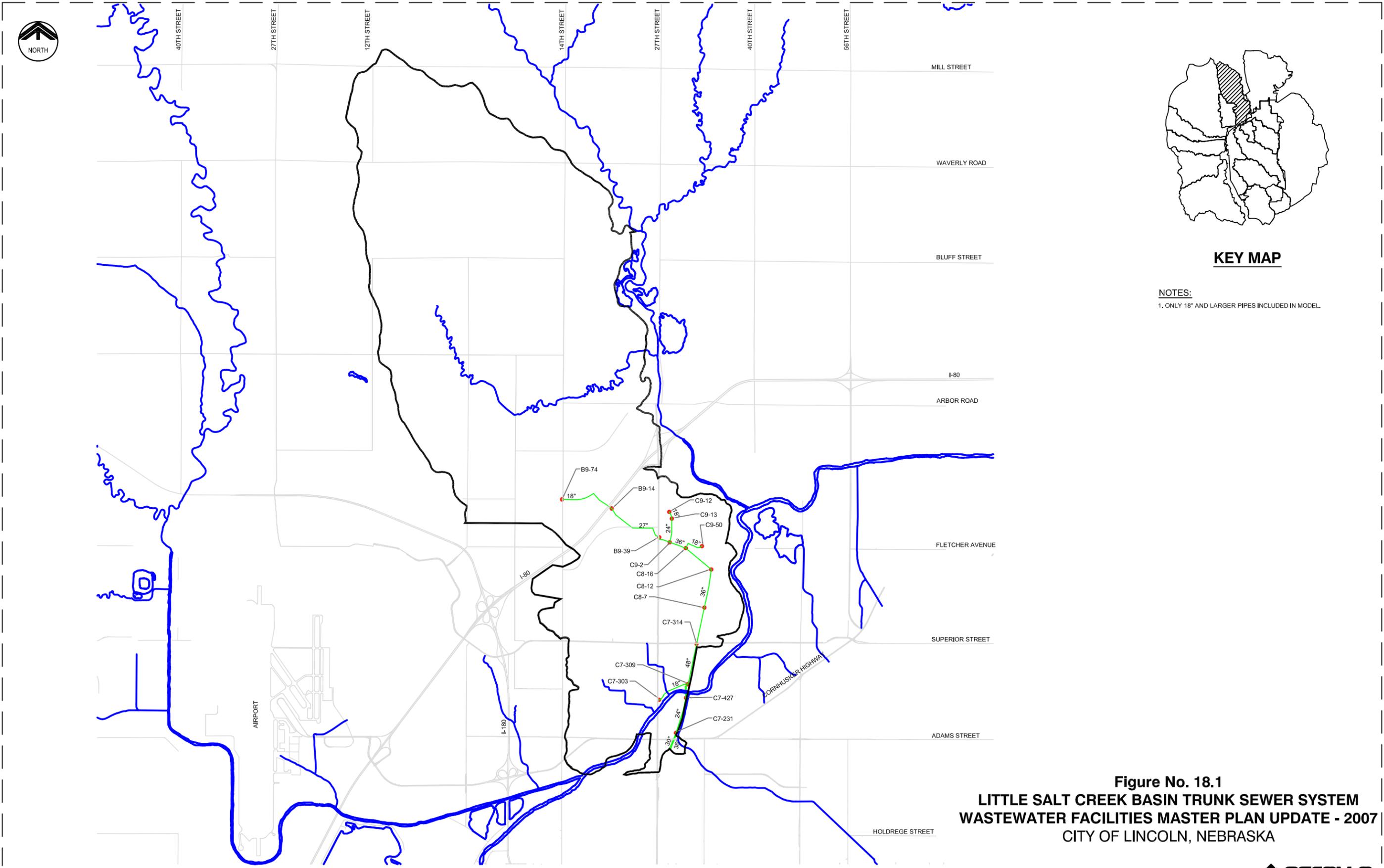
The modeling results for the scenarios discussed in this Chapter are located in Appendix D.

18.2.1 Existing Conditions

18.2.1.1 Pipelines

As shown in Table 18.1, the Little Salt Creek basin currently contributes about 21.47 cfs of sanitary flow to the Theresa WWTF. This corresponds to a developed service area of approximately 3,314 acres. The existing model simulation run indicates the existing Little Salt Creek system has sufficient capacity to convey the existing flows. The d/D values at this condition ranged from 0.31 to 0.95.

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KEY MAP

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

Figure No. 18.1
LITTLE SALT CREEK BASIN TRUNK SEWER SYSTEM
WASTEWATER FACILITIES MASTER PLAN UPDATE - 2007
CITY OF LINCOLN, NEBRASKA



18.2.1.2 Lift Station C-11

Lift Station C-11 (northeast of N. 27th St and US Highway 6) is currently undergoing renovations. After the renovations, the lift station will house two pumps, each with a capacity of approximately 4,000 gpm. The lift station is designed for a total of four pumps. For this study, it was assumed that additional pumps would be added to the lift station as needed to adequately convey the flows modeled. This issue should be re-visited as the basin develops into the Tier II areas.

18.2.2 Tier I Conditions

It is anticipated that the Tier I area will contribute approximately 24.63 cfs to the Theresa Street WWTF. As shown in Table 18.1, this corresponds to an anticipated developed area of about 3,864 acres. The Tier I flows were routed through the existing system. The simulation results indicate that the existing system is adequate to convey the Tier I flows.

18.2.3 Tier II Conditions

As shown in Table 18.1, the Little Salt Creek basin will contribute about 32.73 cfs of sanitary flow to the Theresa WWTF under Tier II conditions. The simulation results indicate that the existing system does not have sufficient capacity to adequately convey the Tier II flows to Theresa Street WWTF.

18.2.4 Tier III Conditions

As shown in Table 18.1 for Tier III conditions, the Little Salt Creek basin will contribute about 54.62 cfs of sanitary flow to the Theresa WWTF. This flow corresponds to an estimated service area of approximately 9,376 acres. The simulation results indicate that the existing system does not have sufficient capacity to adequately convey the Tier III flows to Theresa Street WWTF.

18.3 IMPROVEMENTS

The improvements discussed in this Chapter are shown graphically in Figures 18.2 and 18.3 and outlined in Tables 18.2 and 18.3. The saline wetland areas shown in Figures 18.2 and 18.3 are environmentally sensitive areas which require additional planning and permitting for construction, especially in areas with endangered tiger beetle habitat. The proposed sewer improvements in the Little Salt Creek Basin are located outside of the tiger beetle/saline wetland areas.

18.3.1 Existing Conditions

The simulation results indicate the existing Little Salt Creek sewer system can adequately convey existing sanitary flows to Theresa Street WWTF without surcharging. Based on these results no improvements are recommended for the existing conditions.

18.3.2 Tier I Improvements

18.3.2.1 New Pipes

The proposed Tier I sewers were added to the Existing SWMM model as shown in Figure 18.2 and outlined in Table 18.2. The model simulation runs show that the proposed sewers have adequate capacity to convey the Tier I flows to the existing sewer system. The sewer sub-basin boundaries and stream network were derived from the City contour data. The modeling results are summarized in Table 18.3.

18.3.3 Tier II Improvements

18.3.3.1 New Pipes

In order to represent the Tier II flows in the SWMM model, new pipes were designed and added to the Tier I model. The layout of the proposed sewer system for the Little Salt Creek basin is presented in Figure 18.2 and pipe design characteristics are presented in Table 18.2. The modeling results are summarized in Table 18.3.

18.3.3.2 Increased Conveyance Capacity of Existing System

The simulation results show that sanitary sewers upstream of the C-11 Lift Station are undersized for the Tier II flows. The 54-inch parallel piping to increase the capacity for Tier II flows is shown in Figure 18.2 and is located from manholes B9-74 to B9-72 near N. 14th St and Humphrey Ave and from manholes C9-12 to C7-309 near N. 27th St and Fletcher Ave to southeast of N. 27th St and Superior St). The costs for this alternative are included in Table 18.4.

18.3.3.3 Storage

An alternative to the parallel 54-inch sewer discussed above would be to install a 2.5 MG off-line storage facility at approximately 27th St and Fletcher Avenue. The location of the storage facility is shown in Figure 18.3.

18.3.4 Tier III Improvements

18.3.4.1 New Pipes

The proposed Tier III sewers were added to the Tier II SWMM model as shown in Figure 18.2 and outlined in Table 18.2. The model simulation runs show that the proposed sewers

have adequate capacity to convey the Tier III flows to the existing sewer system. The modeling results are summarized in Table 18.3.

18.3.4.2 Increased Conveyance Capacity of Existing System

The simulation results indicate that the new parallel piping identified under Tier II conditions has adequate capacity to convey the Tier III flows. The costs presented in Table 18.4 include this alternative.

18.3.4.3 Storage Alternative

The proposed 2.5 MG storage facility proposed at 27th St and Fletcher Ave would be expanded to 3.5 MG of offline storage designed to temporarily hold wet weather flows that exceed the capacity of the sewer system. After flow subsides, the stored wastewater can be conveyed back to the system.

Table 18.2 Design Characteristics of Proposed Sewers - Little Salt Basin Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska							
Pipe ID	US Manhole	DS Manhole	Diameter (ft)	Length (ft)	Slope (%)	Design Capacity (cfs)	Tier
LSP-4	LS-5	B9-74	1.50	1,707	0.25	5.25	I
LSP-8	LS-9	LS-10	3.00	2,353	0.25	33.35	
LSP-9	LS-10	C9-12	3.00	1,323	0.25	33.35	
LSP-3	LS-3	LS-18	2.00	4,208	0.25	11.31	II
LSP-33	LS-4	LS-18	2.00	2,757	0.25	11.31	
LSP-40	LS-18	LS-19	2.50	3,735	0.25	20.51	
LSP-50	LS-19	LS-20	3.00	3,569	0.25	33.35	
LSP-77	LS-20	LS-9	3.00	3,219	0.25	33.35	
LSP-1	LS-1	LS-2	1.50	4,739	0.25	5.25	
LSP-2	LS-2	LS-3	2.00	3,122	0.25	11.31	
LSP-5	LS-6	LS-7	1.75	5,402	0.25	7.92	
LSP-10	LS-11	LS-12	1.50	4,835	0.25	5.25	
LSP-11	LS-12	LS-13	1.75	3,977	0.25	7.92	
LSP-12	LS-13	LS-14	2.00	3,190	0.25	11.31	
LSP-13	LS-14	LS-15	2.00	2,975	0.25	11.31	
LSP-14	LS-15	LS-8	2.00	3,171	0.25	11.31	
LSP-6	LS-7	LS-8	1.75	2,167	0.25	7.92	
LSP-7	LS-8	LS-20	3.00	1,493	0.25	33.35	

Table 18.3 Modeling Results of Proposed Sewers - Little Salt Basin Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska										
Pipe ID	US Manhole	DS Manhole	Capacity ,cfs	Tier I Conditions		Tier I & II Conditions		Tier I, II, & III Conditions		Tier
				Q, cfs	d/D	Q, cfs	d/D	Q, cfs	d/D	
LSP-4	LS-5	B9-74	5.25	2.45	0.60	2.45	0.60	2.45	0.60	I
LSP-8	LS-9	LS-10	33.35	1.81	0.16	11.53	0.43	32.75	0.83	
LSP-9	LS-10	C9-12	33.35	1.86	0.18	11.49	0.43	32.75	0.83	
LSP-3	LS-3	LS-18	11.31	NA	NA	3.26	0.59	10.83	0.89	II
LSP-33	LS-4	LS-18	11.31			5.97	0.59	5.85	0.89	
LSP-40	LS-18	LS-19	20.51			9.16	0.47	16.67	0.71	
LSP-50	LS-19	LS-20	33.35			10.25	0.38	17.76	0.80	
LSP-77	LS-20	LS-9	33.35			10.32	0.41	32.76	0.81	
LSP-1	LS-1	LS-2	5.25	NA	NA	NA	NA	3.63	0.75	III
LSP-2	LS-2	LS-3	11.31					6.88	0.79	
LSP-5	LS-6	LS-7	7.92					5.64	0.62	
LSP-10	LS-11	LS-12	5.25					5.22	0.87	
LSP-11	LS-12	LS-13	7.92					7.15	0.80	
LSP-12	LS-13	LS-14	11.31					9.39	0.70	
LSP-13	LS-14	LS-15	11.31					9.39	0.70	
LSP-14	LS-15	LS-8	11.31					9.39	0.71	
LSP-6	LS-7	LS-8	7.92					5.64	0.81	
LSP-7	LS-8	LS-20	33.35					15.01	0.80	

18.4 SUMMARY OF RECOMMENDED IMPROVEMENTS

Recommendations for maintenance and improvements of the Little Salt Creek Basin Sewer System include:

- Tier I Flows:
 - Construct new sewer lines to service the Tier I area.
- Tier II Flows:
 - Construct new sewer lines to service the Tier II area.
 - Construct 54-inch parallel piping to increase the capacity for Tier II flows or Construct 2.5 MG storage facility near N. 27th St and Fletcher Ave.
- Tier III Flows
 - Construct new sewer lines to service the Tier III area or, Expand 2.5 MG storage facility by 1.0 MG (total. 3.5 MG) to handle additional Tier III flow.

The proposed improvements have been located outside of the endangered tiger beetle/saline wetland areas within this basin.

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 to make certain conformance with existing and proposed development and to determine project phasing. In most cases, the alignments shown closely follow natural drainage ways. 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.

A summary of the improvement projects identified with planning costs is outlined in Table 18.4.

**Table 18.4 Recommended Improvements – Little Salt Creek Basin
Wastewater Facilities Master Plan Update - 2007
City of Lincoln, Nebraska**

Tier	ID	Description	Location ⁽¹⁾	Parameters	Unit Price	Planning Cost ⁽²⁾
I	LSC-1	Lift station improvements	N. 31st St Lift Station, C-11 (CIP 5.a)			\$275,000 ⁽³⁾
I	LSC-2	36-inch	LS-9 to C9-12	3,676 lf	\$360.00	\$1,323,000
I	LSC-3	30-inch	LS-5 to B9-74	1,707 lf	\$300.00	\$512,000
I	LSC-4	10-inch	See Figure 18.2.	3,559 lf	\$100.00	\$356,000
II	LSC-5	36-inch	LS-8 to LS-9	4,698 lf	\$360.00	\$1,691,000
II	LSC-6	30-inch	LS-4 to LS-5	3,863 lf	\$300.00	\$1,159,000
II	LSC-7	27-inch	LS-7 to LS-8	2,175 lf	\$270.00	\$587,000
II	LSC-8	24-inch	LS-3 to LS-4	4,445 lf	\$240.00	\$1,067,000
II	LSC-9	54-inch parallel sewer	C9-2 to C7-309	9,100 lf	\$540.00	\$4,914,000
II	LSC-10	36-inch parallel sewer	C9-12 to C9-2	1,700 lf	\$360.00	\$612,000
II	LSC-11	15-inch parallel sewer	B9-74 to B9-72	1,000 lf	\$150.00	\$150,000
III	LSC-12	27-inch	LS-13 to LS-8	9,336 lf	\$270.00	\$2,521,000
III	LSC-13	24-inch	LS-14 to LS-13, LS-2 to LS-3	7,099 lf	\$240.00	\$1,704,000
III	LSC-14	21-inch	LS-11 to LS-12, LS-6 to LS-7	10,237 lf	\$210.00	\$2,150,000
III	LSC-15	18-inch	LS-1 to LS-2	4,739 lf	\$180.00	\$853,000

Notes:

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