

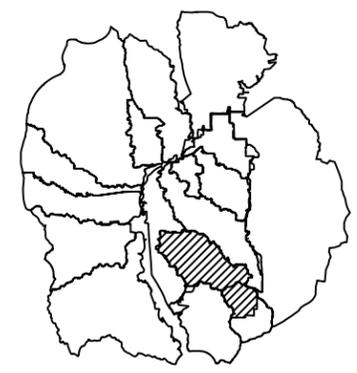
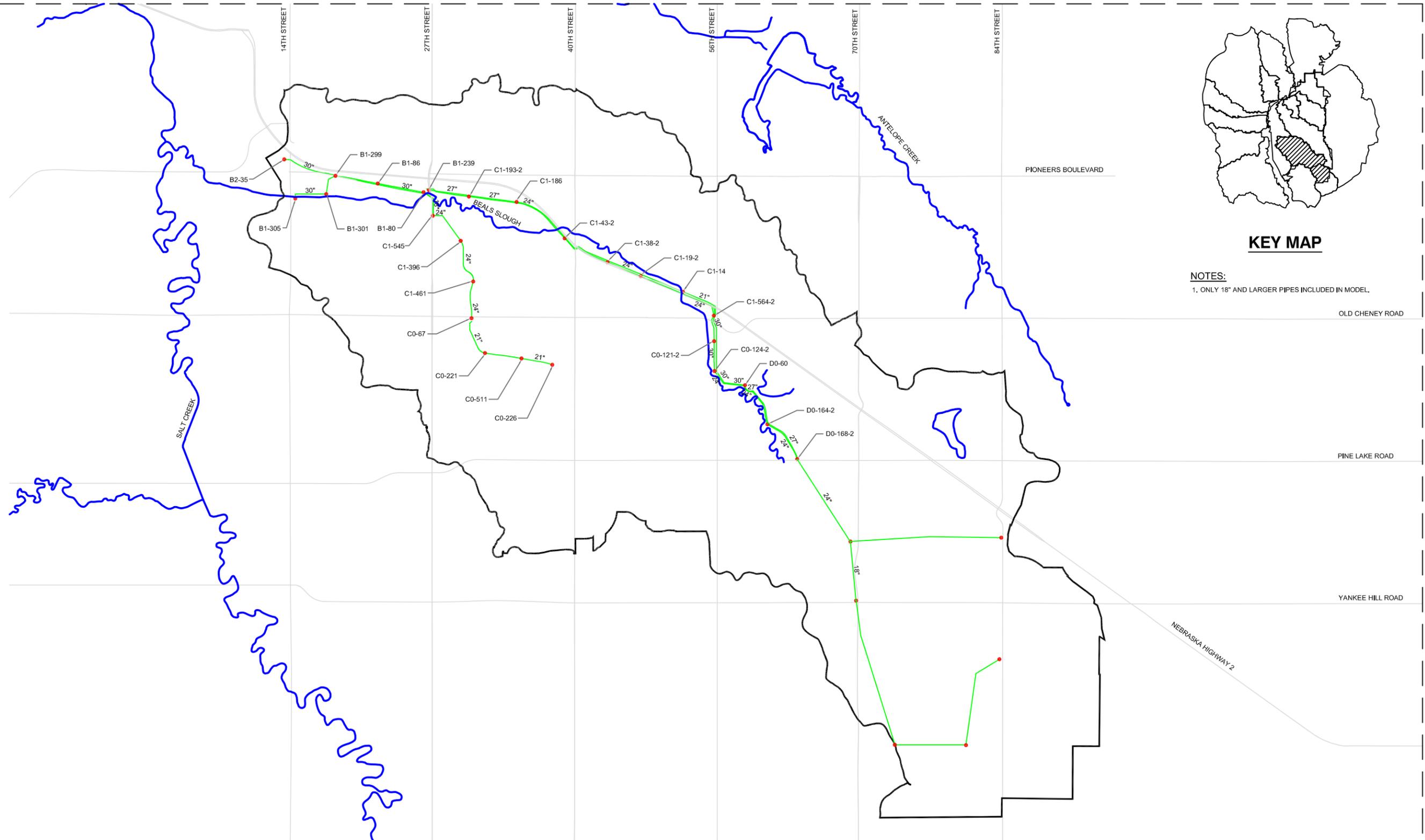
**BEAL SLOUGH BASIN****12.1 BEAL SLOUGH TRUNK SEWER SYSTEM**

The existing Beal Slough Trunk Sewer system drains to the Salt Valley Trunk Sewer System. Currently the system consists of a single trunk sewer that connects to the Salt Valley System at manhole B2-37 (14th St and Nebraska Hwy 2). Construction is currently underway for Phase I of a parallel trunk sewer system that will serve Beal Slough. This new system will drain into the Salt Valley Trunk Sewer system at Manhole B1-310 (east of 1st St and Pioneers Blvd). The following projects are currently in the construction, design, or planning stages have been included in the model of the existing system:

1. Beal Slough Relief Sewer Phase I, 27th to 40th St.
2. Beal Slough Relief Sewer Phase II, 40th to 56th St.
3. Upper Beal Slough Trunk Sewer Extension, 70th and Travis to Yankee Hill Road.
4. Upper Beal Slough Trunk Sewer Extension, 70th and Travis to 84th St.
5. Upper Beal Slough Trunk Sewer Extension, 70th and Yankee Hill to Rokeby Rd.
6. Upper Beal Slough Trunk Sewer Extension, Rokeby Rd and 70th to 84th St.

Shown in Table 12.1 below are the areas that have been used for the modeling effort. Currently it is planned that this basin will be built-out in the Tier I planning period, therefore no modeling was performed for Tier II and Tier III conditions. A schematic plan of the Beal Slough Trunk Sewer system is shown in Figure 12.1.

<b>Table 12.1 Beal Slough Trunk Sewer Tributary Areas (ac) <sup>(1,2)</sup></b> <b>Wastewater Facilities Master Plan Update - 2007</b> <b>City of Lincoln, Nebraska</b>				
Beal Slough	Existing		Existing and Tier I	
	Area (ac)	Flow (cfs)	Area (ac)	Flow (cfs)
Model Input Values	6,874	40.8	8,750	50.8
Notes:				
1 - Based on information provided by LWWS.				
2 - Areas as of July 2006.				



**KEY MAP**

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

**Figure No. 12.1**  
**BEAL SLOUGH BASIN TRUNK SEWER SYSTEM**  
**WASTEWATER FACILITIES MASTER PLAN UPDATE - 2007**  
**CITY OF LINCOLN, NEBRASKA**



## **12.2 EXISTING CONDITIONS**

### **12.2.1 Model Results**

The existing system was modeled using a total tributary area to the system of 6,874 acres, with a peak flow of 40.8 cfs. The model simulations of the existing conditions indicated that no surcharging or SSOs occurred during the peak flows. The simulated d/D ratio varied between 0.42 and 0.84. The model results for this scenario are located in Appendix D.

### **12.2.2 Improvements**

The model results indicated that much of the Beal Slough system as modeled with the listed improvements is flowing under design capacity, therefore no physical improvements are recommended.

Velocities less than 2 ft/sec were identified using the calculated dry weather flow conditions. Velocities less than 2 ft/sec occurred in 20,656 feet or 35 percent of pipes in the Beal Slough Basin Trunk Sewer System as shown in Figure 12.2. It is recommended that the City monitor these areas to determine if solids deposition is a concern. If deposition is identified, periodic flushing or other means of pipe cleaning may need to be initiated.

## **12.3 TIER I CONDITIONS**

### **12.3.1 Model Results**

The Tier I conditions were modeled using existing plus the Tier I areas as outlined in Table 12.1. Shown in Table 12.2 are the pipes with d/D greater than 1.0. It should be noted that the surcharging shown in Figure 12.3 between manhole B1-305 and B1-298 (from south of 14th St and Pioneers Blvd to between 14th and 27th St and Pioneers Blvd) is associated with the backwater effect from the Tier I surcharging in the Salt Valley trunk Sewer. This surcharging is eliminated with the Tier I improvements identified in Chapter 10 and is not considered to be an operational issue. The locations of the surcharged pipes are graphically shown in Figure 12.3.

### **12.3.2 Alternative Identification**

#### ***12.3.2.1 Surcharging***

The surcharging shown in Figure 12.3 between manhole B1-79 and B1-80 (south of 27th St and Pioneers Blvd) is very minor and of a short duration. Due to minimal height and duration of surcharging it is not expected to cause any operational or environmental problems. Therefore, no improvements are recommended at this time to address surcharging.

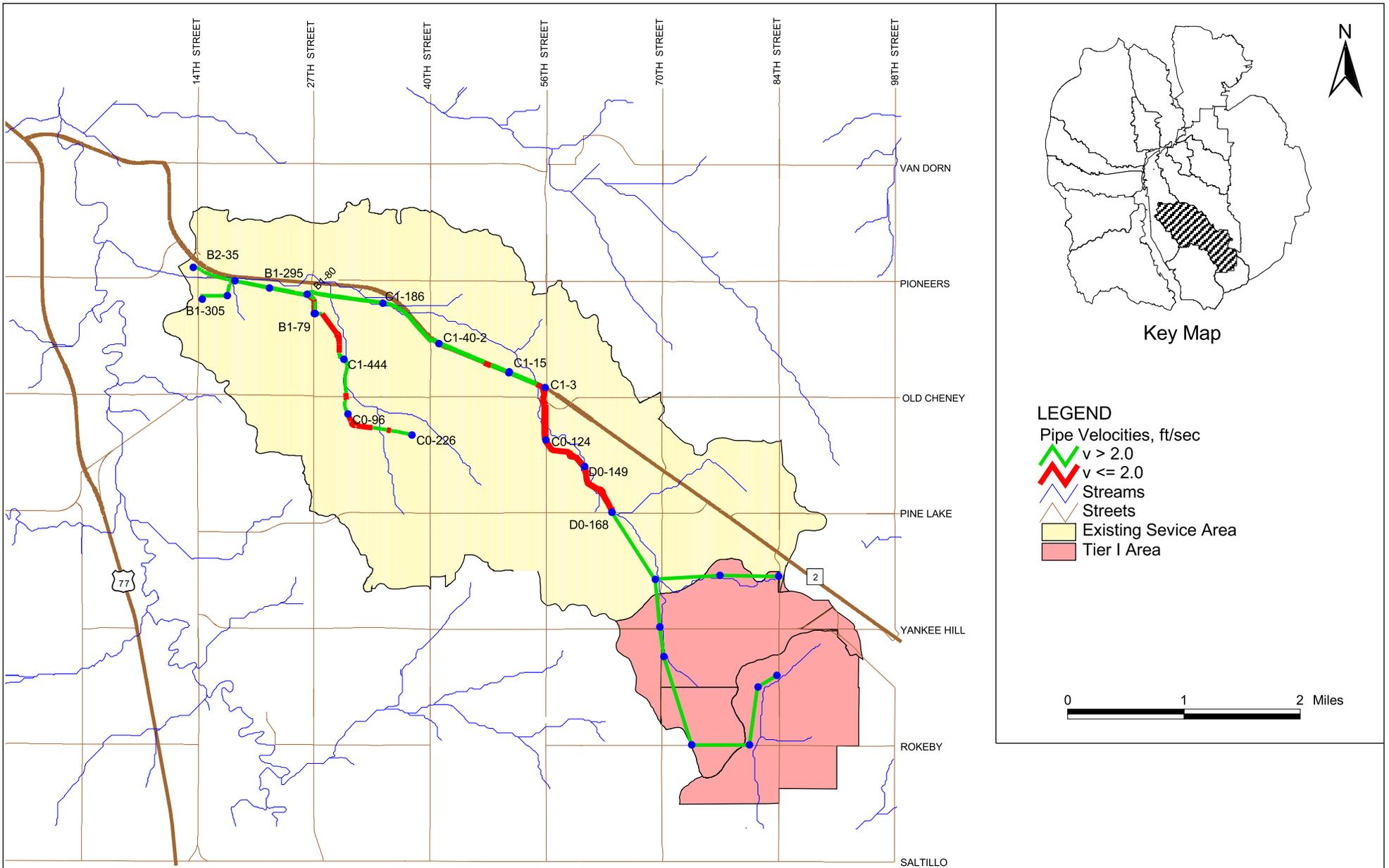
### 12.3.2.2 New Sewers

The Beal Slough Phases I, II, and III projects, as well as the four identified Upper Beal Slough sewer extension projects should be constructed as flows in the system deem necessary. These projects should include the planned interconnections with flow control equipment to direct the flow between the two pipes as necessary.

### 12.3.2.3 Flow Maximization

It is recommended that the planned crossovers and interconnections between the new and existing system be constructed as planned. Flow control features should be incorporated into the interconnections to allow flow in the existing (older) system to be maximized.

<b>Pipe ID</b>	<b>US Manhole</b>	<b>DS Manhole</b>	<b>Diameter (ft)</b>	<b>Length (ft)</b>	<b>Flow (cfs)</b>	<b>d/D</b>
PP130	B1-79	B1-80	1.50	395.00	4.09	1.17
PP206	B1-298	B1-299	2.50	106.00	31.52	1.10
PP207	B1-299	B1-300	2.50	285.00	31.47	1.14
PP208	B1-300	B1-301	2.50	557.00	31.33	1.25
PP209	B1-301	B1-302	2.50	574.00	31.06	1.32
PP210	B1-302	B1-303	2.50	574.00	30.78	1.39
PP211	B1-303	B1-305	2.50	162.00	30.77	1.43
PP212	B1-305	B1-306	3.00	631.00	30.70	1.37
PP213	B1-306	B1-307	3.00	1160.00	30.53	1.83



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Figure 12.2 Location of Pipes with Velocities  $\leq 2.0$  ft/sec Existing Conditions  
Beal Slough Basin Trunk Sewer  
Wastewater Facilities Master Plan Update - 2007  
City of Lincoln, Nebraska



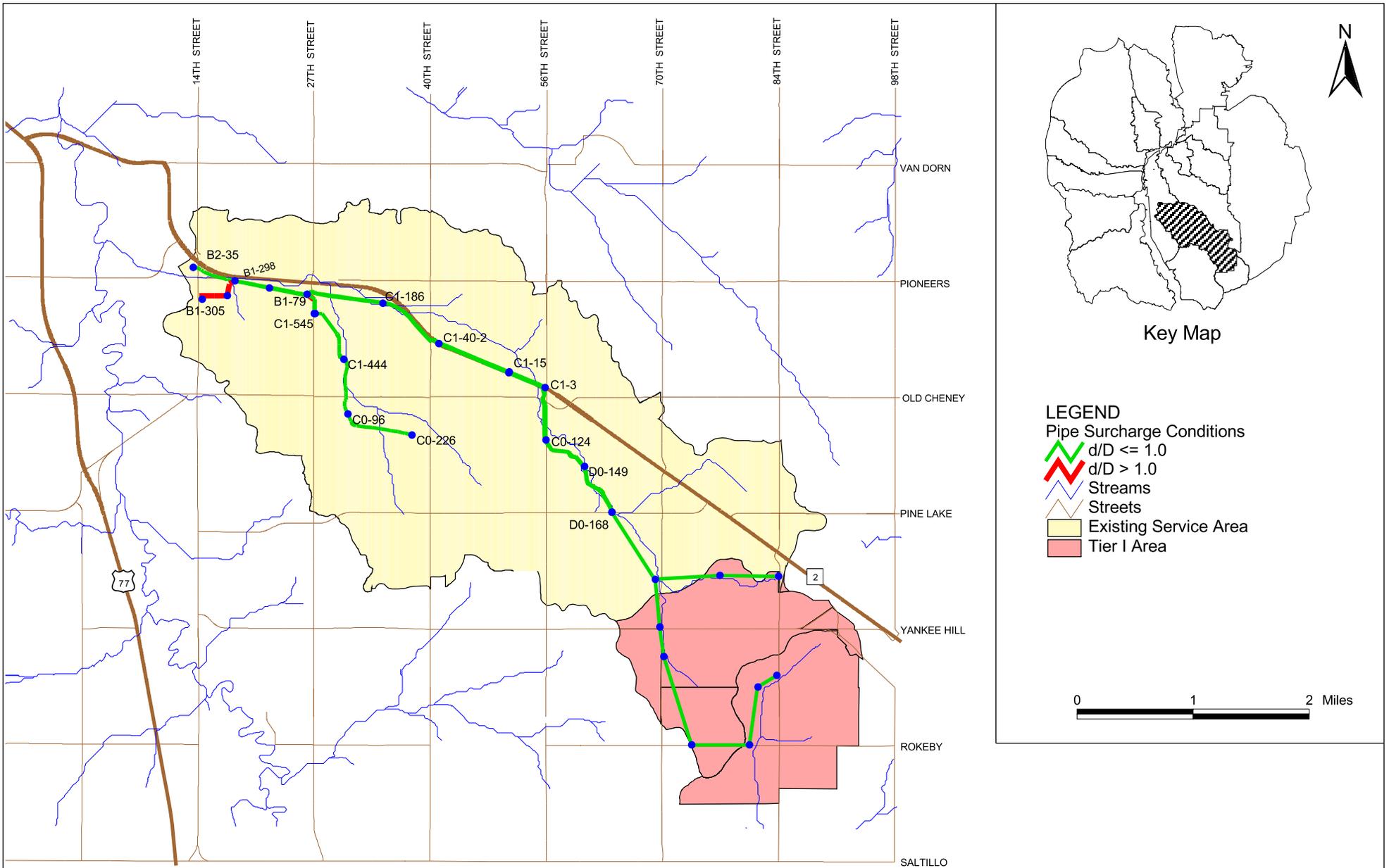


Figure 12.3 Surcharged Pipes  
 Tier I Conditions  
 Beal Slough Basin Trunk Sewer  
 Wastewater Facilities Master Plan Update - 2007  
 City of Lincoln, Nebraska

## **12.4 SUMMARY OF RECOMMENDED IMPROVEMENTS**

Recommendations for maintenance and improvements of the Beal Slough Basin Sewer System include:

- Existing Flows:
  - Monitor and provide regular cleaning of existing sewer lines to maintain full pipe capacity.
  - Evaluate I/I flow reduction to reduce surcharging.
- Tier I Flows:
  - Planned sewer construction Phase I, II, and III projects, as well as the four identified Upper Beal Slough sewer extension projects
  - Flow control features should be incorporated into the planned interconnection projects to allow flow in the existing (older) system to be maximized

A summary of the improvement projects identified with planning costs is outlined in Table 12.3.

**Table 12.3 Recommended Improvements - Beal Slough Trunk Sewer System  
Wastewater Facilities Master Plan Update - 2007  
City of Lincoln, Nebraska**

Tier (Timing)	ID	Description	Location	Parameters	Unit Price	Planning Cost <sup>(1)</sup>
I	BS-1	Construct Beal Slough Relief Sewer Phase I	Manhole B1-310 to 27th Street			<sup>(4)</sup>
I	BS-2	Maximize Flow into the older 48-inch SVT	27th Street to 56th Street			\$200,000 <sup>(2)</sup>
I	BS-3	Construct Beal Slough Relief Sewer Phase II (CIP project 7.a)	27th Street to 40th Street			\$3,286,000 <sup>(5)</sup>
I	BS-4	Construct Beal Slough Relief Sewer Phase III (CIP Project 7.b)	40th Street to 56th Street			\$3,498,000 <sup>(5)</sup>
I	BS-5	Construct Upper Beal Slough Extension (CIP Project 7.c.)	70th and Travis to Yankee Hill Road			\$550,000 <sup>(5)</sup>
I	BS-6	Construct Upper Beal Slough Extension (CIP Project 7.d)	70th and Travis to 84th Street			\$500,000 <sup>(5)</sup>
I	BS-7	Construct Upper Beal Slough Extension (CIP Project 7.e)	70th and Yankee Hill to Rokeby Rd			\$953,000 <sup>(5)</sup>
I	BS-8	Construct Upper Beal Slough Extension (CIP Project 7.f)	Rokeby Rd and 70th to 84th			\$535,000 <sup>(5)</sup>

Notes:

1. ENR CCI for Kansas City = 8512 (July 2006).
2. Assumed values to modify existing structures.
3. It was assumed that the costs for I/I reduction would be funded under Sewer Maintenance as recommended in Chapter 24.
4. This project is under construction at the time this document was prepared.
5. Costs are from current City CIP.