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## BASIS FOR ALTERNATIVE EVALUATIONS

### 7.1 GENERAL

In addition to the treatment process, pipeline capacity, and design criteria, the economic evaluation of viable alternatives is an important planning tool. The economic evaluation of the viable alternatives will provide the City the tools to plan to fund the design, construction, and operation of future improvements.

The viable alternatives and the associated opinion of costs that are described in this document have been developed through several meetings and workshop with City staff. This has allowed valuable input into the selection of alternatives, funding mechanisms, and the operating and maintenance experience of the City staff to be included in the evaluation of alternatives.

Three planning periods have been used in the analysis for the cost of various alternatives. These planning periods coincide with the Tier I, II, and III growth tiers previously discussed in Chapter 3 of this update.

### 7.2 ECONOMIC EVALUATION

#### 7.2.1 Probable Opinion of Estimated Costs

The planning level cost estimates developed for the alternatives represent an order of magnitude type of cost estimate. All of the cost estimates presented are based on the second quarter of the year 2006, ENR 20 City Construction Cost Index for Kansas City, MO, of 8512. An order of magnitude estimate is considered a reconnaissance level estimate. The estimated costs are approximate because they are developed without detailed engineering design data. Order of magnitude costs may be estimated using cost-capacity curves, scaling factors, ratios, and information from other projects. The anticipated accuracy of an order of magnitude cost estimates, as defined by the American Association of Cost Engineers, is generally considered to be +50 percent to - 30 percent.

It should be noted that costs presented in the following chapters are generally rounded up to the nearest \$1,000.00.

#### 7.2.2 Future Costs

Future costs are in second quarter 2006 estimates and escalated at a 3 percent per year. It should be recognized, however, that construction costs can change drastically over a period of time and the planning level costs presented will need to be reevaluated as time goes on to determine the actual cost of the improvements planned.

### **7.2.3 Assigning Costs**

Where appropriate, costs from previous studies, reports, and recent City Bid tabulations have been incorporated. These costs have been generated from a more detailed engineering analysis and are assumed to be developed than using a more generic method of assigning costs. In the event that these values are not available, costs will be assigned as outlined below.

### **7.2.4 Contingencies**

Master Plans and Facility Plans represent a very preliminary level of detail and are used primarily to plan for future improvements. It is recommended that more detailed engineering studies and preliminary designs be completed as projects are being considered for final design and construction. These more detailed studies will further define and refine the actual improvements installed and provide a more defined level opinion of estimated project costs.

### **7.2.5 Collection System Costs**

The improvement costs were developed based on pipeline size, general character of the terrain and historical cost for similar facilities in the Lincoln area. The actual cost for a specific piping may vary from that stated herein based on the routing, the type of pipe used, the method of construction, and other site specific constraints. The planning level costs used for the collection system improvements are outlined in Table 7.1 below. These costs are considered to be total project costs that include engineering, legal, administration, general conditions (bonds, insurance, right of way, permitting, and easements necessary to implement and construct projects.

### **7.2.6 Wastewater Treatment Facility Costs**

The costs to construct treatment facilities can vary widely from site to site and process to process. These variances are associated with site-specific conditions such as geotechnical conditions, material availability, and similar criteria. The planning level costs used to estimate the wastewater treatment facility improvements costs for this report are shown in Table 7.2 below. These costs are considered to be total project costs that include engineering, legal, administration, general conditions (bonds, insurance, right of way, permitting, and easements necessary to implement and construct projects.

### **7.2.7 Summary or Recommendation**

A summary of the recommendations is located at the end of the Chapters 10 through 24. Chapter 25 builds on the summary of recommendation from the individual Chapters and presents a summary of the Tier I, II, and III planning costs for the wastewater system.

<b>Table 7.1 Collection System Planning Costs Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska</b>	
<b>Improvement</b>	<b>Estimated Unit Cost</b>
Installation of Gravity Sewers	\$10.00/inch-diameter-ft.
Installation of Force Mains	\$8.00/inch-diameter-ft.
Gravity Sewer Rehabilitation	\$4.00/inch-diameter-ft.
Lift Stations	\$1.00/gallon
Storage <sup>(3)</sup>	\$4.00/gallon
Siphons	\$1,000,000

Notes:

1. Costs presented are planning level costs with approximately +50-percent to -30-percent accuracy.
2. Includes contingencies for engineering, legal, administration, and general conditions.
3. Includes a dewatering pump station to empty the storage basin.

<b>Table 7.2 Wastewater Treatment Facility Planning Costs Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska</b>	
<b>Improvement</b>	<b>Estimated Unit Cost</b>
New WWTF	\$12.50/gallon
WWTF Expansions	\$8.00/gallon
Storage at WWTF	\$1.25/gallon
Other Improvements	As Identified

Notes:

1. Costs presented are planning level costs with approximately +50-percent to -30-percent accuracy.
2. Includes contingencies for engineering, legal, administration, and general conditions.