WASTEWATER MASTER PLAN

Prepared by:
Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

154 East 14000 South
Draper, Utah 84020

May 2012
Project No. 204-10-03
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chapter 1 – Introduction and Background</strong></td>
<td>1-1</td>
</tr>
<tr>
<td>Introduction</td>
<td>1-1</td>
</tr>
<tr>
<td>Background</td>
<td>1-1</td>
</tr>
<tr>
<td>Scope of Services</td>
<td>1-1</td>
</tr>
<tr>
<td>Project Staff</td>
<td>1-2</td>
</tr>
<tr>
<td><strong>Chapter 2 – Existing System Description</strong></td>
<td>2-1</td>
</tr>
<tr>
<td>Service Area</td>
<td>2-1</td>
</tr>
<tr>
<td>Collection System</td>
<td>2-1</td>
</tr>
<tr>
<td>Lift Stations</td>
<td>2-1</td>
</tr>
<tr>
<td>Diversions and Interceptors</td>
<td>2-2</td>
</tr>
<tr>
<td>Siphons</td>
<td>2-3</td>
</tr>
<tr>
<td>Treatment Plant</td>
<td>2-3</td>
</tr>
<tr>
<td><strong>Chapter 3 – Future Growth</strong></td>
<td>3-1</td>
</tr>
<tr>
<td>Population Projections</td>
<td>3-1</td>
</tr>
<tr>
<td>Future Sewer Flow Estimates</td>
<td>3-3</td>
</tr>
<tr>
<td>Distribution of Future Development</td>
<td>3-4</td>
</tr>
<tr>
<td><strong>Chapter 4 – Hydraulic Modeling</strong></td>
<td>4-1</td>
</tr>
<tr>
<td>Model Selection</td>
<td>4-1</td>
</tr>
<tr>
<td>Geometric Model Development</td>
<td>4-1</td>
</tr>
<tr>
<td>Modeled Pipelines and Manholes</td>
<td>4-1</td>
</tr>
<tr>
<td>Lift Stations</td>
<td>4-1</td>
</tr>
<tr>
<td>Sediment and Debris</td>
<td>4-2</td>
</tr>
<tr>
<td>Water Treatment Plant</td>
<td>4-2</td>
</tr>
<tr>
<td>Flow Data Development</td>
<td>4-2</td>
</tr>
<tr>
<td>Domestic Flow</td>
<td>4-2</td>
</tr>
<tr>
<td>Infiltration</td>
<td>4-4</td>
</tr>
<tr>
<td>Inflow</td>
<td>4-7</td>
</tr>
<tr>
<td>Calibration</td>
<td>4-7</td>
</tr>
<tr>
<td>Meter 4</td>
<td>4-9</td>
</tr>
<tr>
<td>Meter 5</td>
<td>4-9</td>
</tr>
<tr>
<td>Meter 7A</td>
<td>4-9</td>
</tr>
<tr>
<td>Meter 7B</td>
<td>4-9</td>
</tr>
<tr>
<td>Meter 7C</td>
<td>4-9</td>
</tr>
<tr>
<td>Meter 11</td>
<td>4-10</td>
</tr>
<tr>
<td>Meter 15</td>
<td>4-10</td>
</tr>
<tr>
<td>Future Domestic Flow Distribution</td>
<td>4-10</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS (continued)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 5 – Collection System Evaluation</td>
<td>Evaluation Criteria</td>
<td>5-1</td>
</tr>
<tr>
<td></td>
<td>System Analysis</td>
<td>5-1</td>
</tr>
<tr>
<td></td>
<td>Existing System Analysis</td>
<td>5-2</td>
</tr>
<tr>
<td></td>
<td>Observed Deficiencies</td>
<td>5-2</td>
</tr>
<tr>
<td></td>
<td>Build-Out System Analysis</td>
<td>5-3</td>
</tr>
<tr>
<td></td>
<td>Lift Station Analysis</td>
<td>5-4</td>
</tr>
<tr>
<td></td>
<td>Potential Maintenance Problems</td>
<td>5-4</td>
</tr>
<tr>
<td>Chapter 6 – Recommended Collection System Improvements</td>
<td>Improvement Alternatives</td>
<td>6-1</td>
</tr>
<tr>
<td></td>
<td>Collection System Improvements</td>
<td>6-1</td>
</tr>
<tr>
<td></td>
<td>1 – 200 East 36-inch Sewer Trunk</td>
<td>6-1</td>
</tr>
<tr>
<td></td>
<td>2 – 1850 North Main to WWTP</td>
<td>6-2</td>
</tr>
<tr>
<td></td>
<td>3 – Spanish Fork/Mapleton (Ensign-Bickford Company) Sewer Trunk</td>
<td>6-2</td>
</tr>
<tr>
<td></td>
<td>4 – Main St. Industrial Trunk</td>
<td>6-2</td>
</tr>
<tr>
<td></td>
<td>5 – 1550 West Sewer Trunk</td>
<td>6-2</td>
</tr>
<tr>
<td></td>
<td>6 – Canyon Road Diversion/Interceptor</td>
<td>6-3</td>
</tr>
<tr>
<td></td>
<td>7 – Southwest Sewer Lift Station and Sewer Mains</td>
<td>6-3</td>
</tr>
<tr>
<td></td>
<td>8 – 8800 South Sewer Trunk</td>
<td>6-3</td>
</tr>
<tr>
<td></td>
<td>9 – Airport Sewer Main and Lift Station</td>
<td>6-3</td>
</tr>
<tr>
<td></td>
<td>10 – 1450 North Sewer Main</td>
<td>6-3</td>
</tr>
<tr>
<td></td>
<td>11 – Jail Lift Station Upgrade</td>
<td>6-3</td>
</tr>
<tr>
<td></td>
<td>12 – Industrial Lift Station</td>
<td>6-4</td>
</tr>
<tr>
<td></td>
<td>13 – Spanish Fields Lift Station</td>
<td>6-4</td>
</tr>
<tr>
<td></td>
<td>14 – 1600 North, 300 West to Main</td>
<td>6-4</td>
</tr>
<tr>
<td></td>
<td>Project Costs</td>
<td>6-4</td>
</tr>
<tr>
<td>Chapter 7 – Wastewater Treatment Plant System Improvements</td>
<td>WWTP History</td>
<td>7-1</td>
</tr>
<tr>
<td></td>
<td>Design Parameters</td>
<td>7-2</td>
</tr>
<tr>
<td></td>
<td>Effluent Requirements</td>
<td>7-2</td>
</tr>
<tr>
<td></td>
<td>Water Treatment Plant Improvements</td>
<td>7-2</td>
</tr>
<tr>
<td></td>
<td>Project 1</td>
<td>7-2</td>
</tr>
<tr>
<td></td>
<td>Project 2</td>
<td>7-3</td>
</tr>
<tr>
<td></td>
<td>Project 3</td>
<td>7-3</td>
</tr>
<tr>
<td></td>
<td>Future Permit Changes</td>
<td>7-4</td>
</tr>
<tr>
<td></td>
<td>Chlorine</td>
<td>7-4</td>
</tr>
<tr>
<td></td>
<td>Phosphorus</td>
<td>7-5</td>
</tr>
<tr>
<td></td>
<td>Nitrate</td>
<td>7-5</td>
</tr>
<tr>
<td></td>
<td>Pharmaceuticals/Endocrine Disruptors</td>
<td>7-6</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS
(continued)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Treatment Facility</td>
<td>7-6</td>
</tr>
<tr>
<td>Spanish Fork Contingency Plan</td>
<td>7-7</td>
</tr>
<tr>
<td><strong>Chapter 8 – System Renewal</strong></td>
<td>8-1</td>
</tr>
<tr>
<td>System Renewal</td>
<td>8-1</td>
</tr>
<tr>
<td>Condition Assessment</td>
<td>8-1</td>
</tr>
<tr>
<td>Concrete Pipe Assessment and Rehabilitation</td>
<td>8-1</td>
</tr>
<tr>
<td>System Renewal Budget</td>
<td>8-2</td>
</tr>
<tr>
<td>System Pipes</td>
<td>8-2</td>
</tr>
<tr>
<td>Lift Stations</td>
<td>8-3</td>
</tr>
<tr>
<td>Water Treatment Plant</td>
<td>8-4</td>
</tr>
<tr>
<td>System Renewal Priorities</td>
<td>8-4</td>
</tr>
<tr>
<td><strong>APPENDIX</strong></td>
<td></td>
</tr>
<tr>
<td>APPENDIX A - Flow Meter Figures</td>
<td></td>
</tr>
<tr>
<td>APPENDIX B - Small Area Peaking Factors</td>
<td></td>
</tr>
<tr>
<td>APPENDIX C - Interlocal Agreements</td>
<td></td>
</tr>
<tr>
<td>APPENDIX D - Lift Station Data</td>
<td></td>
</tr>
<tr>
<td>APPENDIX E – Electronic Data</td>
<td></td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS
(continued)

TABLES

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Estimated Pipe Length by Diameter in 2010</td>
<td>2-1</td>
</tr>
<tr>
<td>2-2</td>
<td>Characteristics of Existing Wastewater Pump Stations</td>
<td>2-2</td>
</tr>
<tr>
<td>2-3</td>
<td>Spanish Fork City Potential Diversions</td>
<td>2-2</td>
</tr>
<tr>
<td>3-1</td>
<td>Projected Population for Spanish Fork City and Mapleton City</td>
<td>3-1</td>
</tr>
<tr>
<td>3-2</td>
<td>Approximate Density of Development by Zoned Land Use</td>
<td>3-2</td>
</tr>
<tr>
<td>3-3</td>
<td>Projected Average Daily Sewer Flow from Spanish Fork and Mapleton City</td>
<td>3-3</td>
</tr>
<tr>
<td>4-1</td>
<td>Wastewater Production Pattern for Spanish Fork Wastewater Collection System Model</td>
<td>4-3</td>
</tr>
<tr>
<td>4-2</td>
<td>Estimated Infiltration for March 2011 at Various Flow Meter Sites</td>
<td>4-6</td>
</tr>
<tr>
<td>4-3</td>
<td>Observed Flows vs. Simulated Flows at Flow Meter Locations</td>
<td>4-8</td>
</tr>
<tr>
<td>4-4</td>
<td>Increase in Domestic Wastewater Flow to Sewer Collection Areas at Build-out</td>
<td>4-11</td>
</tr>
<tr>
<td>5-1</td>
<td>Lift Station Capacities and Peak Design Flows</td>
<td>5-4</td>
</tr>
<tr>
<td>5-2</td>
<td>Sewer Mains Requiring Routine Maintenance in Spanish Fork City</td>
<td>5-5</td>
</tr>
<tr>
<td>6-1</td>
<td>Recommended Collection System Improvements</td>
<td>6-5</td>
</tr>
<tr>
<td>7-1</td>
<td>Recommended WWTP Improvements</td>
<td>7-4</td>
</tr>
<tr>
<td>8-1</td>
<td>Required System Renewal Budgets for Various Rehabilitation/Replacement Scenarios</td>
<td>8-3</td>
</tr>
<tr>
<td>8-2</td>
<td>Required System Renewal Budgets for Various System Components</td>
<td>8-4</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

(continued)

## FIGURES

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Following Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Spanish Fork and Mapleton Wastewater Service Area</td>
<td>1-1</td>
</tr>
<tr>
<td>2-1</td>
<td>Existing Collection System</td>
<td>2-1</td>
</tr>
<tr>
<td>3-1</td>
<td>Salem City/Spanish Fork City Interlocal Agreement Area</td>
<td>3-2</td>
</tr>
<tr>
<td>3-2</td>
<td>Future Domestic Wastewater Flow Distribution</td>
<td>3-4</td>
</tr>
<tr>
<td>4-1</td>
<td>Diurnal Patterns Applied to Hydraulic Model</td>
<td>4-3</td>
</tr>
<tr>
<td>4-2</td>
<td>Flow Monitoring Locations and Areas</td>
<td>4-4</td>
</tr>
<tr>
<td>4-3</td>
<td>Metered Mapleton City Discharges to Spanish Fork City Wastewater Collection System</td>
<td>4-4</td>
</tr>
<tr>
<td>4-4</td>
<td>Average Monthly Flows Observed at the Spanish Fork Wastewater Treatment Plant</td>
<td>4-4</td>
</tr>
<tr>
<td>4-5</td>
<td>Historic Wastewater Treatment Plant Flow Rates</td>
<td>4-4</td>
</tr>
<tr>
<td>4-6</td>
<td>Inflow Response at Spanish Fork Wastewater Treatment Plant</td>
<td>4-7</td>
</tr>
<tr>
<td>5-1</td>
<td>Existing Wastewater Collection System Deficiencies</td>
<td>5-2</td>
</tr>
<tr>
<td>5-2</td>
<td>Future Wastewater Collection System Deficiencies</td>
<td>5-3</td>
</tr>
<tr>
<td>5-3</td>
<td>Pipe with Low Velocity Peak Flows Under Existing Conditions</td>
<td>5-4</td>
</tr>
<tr>
<td>6-1</td>
<td>Capital Improvements for Build-Out</td>
<td>6-1</td>
</tr>
<tr>
<td>6-2</td>
<td>Capital Improvement Pipe Diameters</td>
<td>6-1</td>
</tr>
<tr>
<td>7-1</td>
<td>8 MGD – Option #1 Site Plan</td>
<td>7-4</td>
</tr>
<tr>
<td>7-2</td>
<td>20 MGD Site Plan</td>
<td>7-7</td>
</tr>
<tr>
<td>8-1</td>
<td>Hypothetical Wastewater Collection System Replacement at 100-years of Age Vs. Uniform Replacement on Annual Basis</td>
<td>8-2</td>
</tr>
</tbody>
</table>
### LIST OF ACRONYMS

<table>
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<tr>
<th>Acronym</th>
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</tr>
</thead>
<tbody>
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<td>American Society of Civil Engineers</td>
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<tr>
<td>BC&amp;A</td>
<td>Bowen, Collins &amp; Associates</td>
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<tr>
<td>CIPP</td>
<td>cured-in-place pipe</td>
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<tr>
<td>DEM</td>
<td>digital evaluation model</td>
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<tr>
<td>EBCO</td>
<td>Ensign Bickford Company</td>
</tr>
<tr>
<td>ft</td>
<td>feet</td>
</tr>
<tr>
<td>GASB</td>
<td>Government Accounting Standards Board</td>
</tr>
<tr>
<td>GIS</td>
<td>geographical information system</td>
</tr>
<tr>
<td>GOPB</td>
<td>Governor’s Office of Planning and Budget</td>
</tr>
<tr>
<td>gpd</td>
<td>gallons per day</td>
</tr>
<tr>
<td>gpm</td>
<td>gallons per minute</td>
</tr>
<tr>
<td>H₂S</td>
<td>hydrogen sulfide</td>
</tr>
<tr>
<td>H₂SO₄</td>
<td>Sulfuric Acid</td>
</tr>
<tr>
<td>I&amp;I</td>
<td>Infiltration and Inflow</td>
</tr>
<tr>
<td>in</td>
<td>inch</td>
</tr>
<tr>
<td>MACP</td>
<td>Manhole Assessment and Certification Program</td>
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<tr>
<td>mgd</td>
<td>millions of gallons per day</td>
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<td>NASSCO</td>
<td>National Association of Sewer Service Companies</td>
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<td>O&amp;M</td>
<td>Operations and Maintenance</td>
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<td>Pipeline Assessment and Certification Program</td>
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<td>ppm</td>
<td>parts per million</td>
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<td>Traffic Analysis Zone</td>
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<td>Utah Pollution Discharge Elimination System</td>
</tr>
<tr>
<td>WWTP</td>
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</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION AND BACKGROUND

INTRODUCTION

Bowen Collins & Associates (BC&A) was retained by the Spanish Fork City to prepare a Sewer Master Plan for the Spanish Fork City wastewater collection system. The purpose of this Wastewater Master Plan Report is to identify recommended improvements that will resolve existing and projected future deficiencies in the wastewater collection system in Spanish Fork City.

BACKGROUND

Settlement of Spanish Fork City began in the early 1850’s. Today there are over 134 miles of sewer main pipelines in the City’s collection system ranging in diameter from 4 inches to 36 inches. Mapleton City also utilizes Spanish Fork’s collection system and wastewater treatment plant. Therefore, existing and projected flows from Mapleton City were included as part of this study. However, this study does not include an evaluation of Mapleton City’s collection system. The location of Mapleton City’s connection to Spanish Fork City is shown in Figure 1-1.

The primary purpose of this Wastewater Master Plan is to provide recommended improvements to resolve existing and projected future capacity deficiencies in the Spanish Fork City wastewater collection system based on the City’s adopted General Plan.

This document is a working document. Some of the recommended improvements identified in this report are based on the assumption that development and/or potential annexation will occur in a certain manner. If future growth or development patterns change significantly from those assumed and documented in this report, the recommendations may need to be revised. The status of development should be reviewed at least every five years. This report and the associated recommendations should also be updated every five years as well, or more often if assumed land use characteristics change significantly.

SCOPE OF SERVICES

The general scope of this project involved a thorough hydraulic analysis of Spanish Fork City’s sewer collection system and its ability to meet the present and future wastewater collection needs of its residents. As part of this project, BC&A completed the following tasks:

**Task 1:** Developed and utilized a calibrated computerized hydraulic sewer model to simulate operation of existing facilities under current development conditions.

**Task 2:** Used the hydraulic sewer model to simulate operation of existing collection system facilities under future build-out land use conditions to identify the impacts of future development on existing sewer facilities.
Task 3: Used the hydraulic sewer model to evaluate alternative improvements that would resolve the system hydraulic deficiencies identified in Tasks 1 and 2.

Task 4: Prepared a master plan report to document the analytical procedures used in completing the study and to present recommendations and conclusions.

Task 5: Conducted progress and coordination meetings as required to keep City staff involved and informed of progress and activities.

PROJECT STAFF

The project work was performed by the BC&A team members listed below. Team member’s roles on the project are also listed. The project was completed in BC&A’s Draper, Utah office. Questions may be addressed to Matt Stayner, Project Manager at (801) 495-2224.

Craig Bagley   Senior Review  
Matt Stayner   Project Manager  
Andrew McKinnon  Project Engineer, Sewer Modeling  
Angela Hansen   Word Processing
CHAPTER 2
EXISTING SYSTEM DESCRIPTION

SERVICE AREA

The projected service area for Spanish Fork City wastewater collection system is shown in Figure 2-1. Included in the service area are all areas recently annexed into Spanish Fork City and areas expected to be annexed. The sewer service area consists of a mix of residential, commercial, and industrial customers.

COLLECTION SYSTEM

The topography in Spanish Fork generally slopes from Spanish Fork Canyon in the southeast toward Utah Lake which is northwest of the City. Most of the City’s collection system can gravity flow to the Spanish Fork City Wastewater Treatment Plant (WWTP). The only exceptions include the industrial areas near the Airport and areas at the southwest end of the City as shown in Figure 2-1. Table 2-1 shows the estimated lengths of sewer main pipelines in the City based on data provided by City personnel.

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<th>Length (ft)</th>
<th>Length (mi)</th>
<th>% of Total</th>
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<td>4”</td>
<td>1,248</td>
<td>0.24</td>
<td>0.2%</td>
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<tr>
<td>6”</td>
<td>103,252</td>
<td>19.56</td>
<td>14.5%</td>
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<td>8”</td>
<td>410,338</td>
<td>77.72</td>
<td>57.8%</td>
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<tr>
<td>10”</td>
<td>39,192</td>
<td>7.42</td>
<td>5.5%</td>
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<tr>
<td>12”</td>
<td>50,858</td>
<td>9.63</td>
<td>7.2%</td>
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<tr>
<td>15”</td>
<td>40,672</td>
<td>7.7</td>
<td>5.7%</td>
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<tr>
<td>18”</td>
<td>7,913</td>
<td>1.5</td>
<td>1.1%</td>
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<tr>
<td>21”</td>
<td>12,938</td>
<td>2.45</td>
<td>1.8%</td>
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<td>24”</td>
<td>15,453</td>
<td>2.93</td>
<td>2.2%</td>
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<tr>
<td>30”</td>
<td>16,794</td>
<td>3.18</td>
<td>2.4%</td>
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<tr>
<td>36”</td>
<td>11,828</td>
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<td>1.7%</td>
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<tr>
<td>Total</td>
<td>710,487</td>
<td>135</td>
<td>100%</td>
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Lift Stations

There are three Spanish Fork City owned and operated wastewater lift stations in the collection system. Characteristics for these lift stations are shown in Table 2-2.
Table 2-2
Characteristics of Existing Wastewater Pump Stations

<table>
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<th>Lift Station Name</th>
<th>Address</th>
<th>Year Built</th>
<th>Wet Well Volume (gallons)</th>
<th>Pump Capacityb (gpm)</th>
<th>Total Head (ft)</th>
<th>No. Pumps</th>
<th>Equipped with Backup Power</th>
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</thead>
<tbody>
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<td>Industrial</td>
<td>2400 N. Main</td>
<td>1997</td>
<td>14,400a</td>
<td>600</td>
<td>55</td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td>Jail</td>
<td>3075 N. Main</td>
<td>1994</td>
<td>2,500</td>
<td>430</td>
<td>45+</td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td>Spanish Fields</td>
<td>1137 W. 590 S.</td>
<td>2005</td>
<td>1,500</td>
<td>600</td>
<td>25+</td>
<td>2</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*a maximum available volume based on gravity inlet pipe and pump intake. Control levels unavailable.

b pump data provided by Spanish Fork City personnel

DIVERSIONS AND INTERCEPTORS

Although Spanish Fork does not operate any mechanical diversions in its wastewater collection system, information in the City’s wastewater collection system database indicate that there are five manholes that appear to contain possible diversions or bifurcations. Spanish Fork City personnel identified the primary flow direction at these locations as indicated by the arrows in Figure 2-1 and in Table 2-3.

Table 2-3
Spanish Fork City Potential Diversions

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Possible Flow Direction</th>
<th>Main Flow Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>900 North 50 East</td>
<td>North</td>
<td>West</td>
</tr>
<tr>
<td>800 North 400 East</td>
<td>West</td>
<td>North</td>
</tr>
<tr>
<td>800 North 300 East (southeast of others)</td>
<td>West</td>
<td>North</td>
</tr>
<tr>
<td>600 East 400 South (northeastern)</td>
<td>West</td>
<td>North</td>
</tr>
<tr>
<td>400 South Canyon Road</td>
<td>North</td>
<td>West</td>
</tr>
</tbody>
</table>
The only manhole that currently serves as a hydraulic diversion is located at 900 North 50 East. As the City updates its collection system database, information at the other locations should be updated to reflect that there is no connection.

SIPHONS

Sewer mains siphons or inverted siphons provide a means of conveying wastewater under obstructions such as rivers. Inverted siphons flow under pressure and should have flow velocities greater than 3 ft/sec to keep solids suspended. Spanish Fork has three inverted siphons.

200 East/WWTP Siphon (From South)

This siphon passes underneath the Union Pacific Railroad directly south of the WWTP (flowing north along 200 East). This siphon consists of three pipes: an 8-inch, 10-inch, and 24-inch main.

Fastenal/WWTP Siphon (From West)

This siphon is located west of the WWTP and passes underneath a spur of the Union Pacific Railroad. The upstream end of this siphon surcharged up to 9 feet under normal operating conditions and is within 3 feet of becoming a potential sanitary sewer overflow. The size of this siphon was unknown at the time of this study, and further investigation of this location is recommended.

Quail Hollow Siphon (481 W Riverside Lane)

This siphon is located just west of the home at 481 W. Riverside Lane and flows underneath the Spanish Fork River. This siphon consists of one 8-inch and one 12-inch diameter sewer pipe.

TREATMENT PLANT

The WWTP, located at 175 East 2160 North as shown in Figure 2-1, treats all of the Spanish Fork City wastewater, with the exception of a small amount of discharge that is sent to the Salem Water Treatment Facility. The WWTP also treats discharge from Mapleton City as part of an inter-local agreement. The WWTP was placed into operation in 1956 and has been expanded several times. The most recent expansion occurred in 2011 (see Chapter 7 for additional detail).

RECENT IMPROVEMENT PROJECTS

Several projects were recently completed at the WWTP related to existing deficiencies and future growth. Table 2-4 lists these two projects and their related costs as provided by Spanish Fork City personnel and Aqua Engineering (see Appendix for “Siphon and digester cost attributed to growth” technical memorandum).
### Table 2-4
Recently Completed Capital Projects at the WWTP

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Project Description</th>
<th>Cost</th>
<th>Percent Attributable to Future Growth</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP-0</td>
<td>SUVMWA Land for Regional WWTP</td>
<td>$818,337</td>
<td>100%</td>
<td>2006 - 2011</td>
</tr>
<tr>
<td>TP-1</td>
<td>Trunk Line &amp; Siphon Upsize</td>
<td>$181,346</td>
<td>99%</td>
<td>2010 - 2011</td>
</tr>
<tr>
<td>TP-2</td>
<td>New Digester and Common Equip.</td>
<td>$1,150,460</td>
<td>80%</td>
<td>2009 - 2011</td>
</tr>
<tr>
<td>TP-3</td>
<td>New Digester Engineering</td>
<td>$54,279</td>
<td>100%</td>
<td>2010 - 2011</td>
</tr>
</tbody>
</table>
CHAPTER 3
FUTURE GROWTH

Future growth projections were used in this study to estimate where and what type of future
development will occur, and to identify the capital improvements needed for the wastewater
collection system. The purpose of this chapter is to document the growth projections used as the
basis for evaluation in this report.

POPULATION PROJECTIONS

Population projections for the Spanish Fork City sewer system service area were prepared
through the year 2080 in two steps:

1. Population projections through 2080 for Spanish Fork City were provided by Spanish
   Fork City personnel.

2. Population projections through the year 2030 for Mapleton City, which contributes
   wastewater flow to the WWTP, were obtained from the Governor’s Office of Planning
   and Budget (GOPB). Mapleton City estimates a build-out population of 29,403. No
   projections of the growth rate were available, so build-out for Mapleton has been
   assumed to be the year 2080. A declining growth rate for Mapleton City was assumed
   from 2031 to 2080 as Mapleton begins to approach build-out.

Table 3-1 shows the projected population for both Spanish Fork City and Mapleton City.

Table 3-1
Projected Population for Spanish Fork City and Mapleton City

<table>
<thead>
<tr>
<th>Year</th>
<th>Spanish Fork City</th>
<th>Mapleton City</th>
<th>Spanish Fork &amp; Mapleton</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>34,691</td>
<td>8,764</td>
<td>43,455</td>
</tr>
<tr>
<td>2020</td>
<td>42,871</td>
<td>11,644</td>
<td>54,515</td>
</tr>
<tr>
<td>2030</td>
<td>51,775</td>
<td>16,358</td>
<td>68,133</td>
</tr>
<tr>
<td>2040</td>
<td>61,918</td>
<td>18,967</td>
<td>80,884</td>
</tr>
<tr>
<td>2050</td>
<td>73,322</td>
<td>21,576</td>
<td>94,898</td>
</tr>
<tr>
<td>2060</td>
<td>85,978</td>
<td>24,185</td>
<td>110,163</td>
</tr>
<tr>
<td>2070</td>
<td>99,928</td>
<td>26,794</td>
<td>126,722</td>
</tr>
<tr>
<td>2080</td>
<td>115,971</td>
<td>29,403</td>
<td>145,374</td>
</tr>
</tbody>
</table>

In addition to estimating the future population of Spanish Fork City, the distribution of future
population was also estimated. This was done using the zoning and land use maps in the City’s
existing General Plan and estimating the percentage of existing development (using 2009 aerial
photography). Table 3-2 lists the zoned land use in the General Plan and the estimated fully-
developed equivalent residential units (ERUs) associated with each zoned land use. A single
ERU represents 3.9 persons/unit (based on 2010 census numbers) or a domestic sewer production of 229 gpd/ERU (does not include infiltration).

Table 3-2
Approximate Density of Development by Zoned Land Use

<table>
<thead>
<tr>
<th>Zoned Land Use</th>
<th>ERUs/acre Based on Existing Development Patterns¹</th>
<th>ERUs/acre Based on Planning Densities²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Low Density Residential ²</td>
<td>1.9</td>
<td>3.15</td>
</tr>
<tr>
<td>Medium Density Residential ²</td>
<td>3.4</td>
<td>7.2</td>
</tr>
<tr>
<td>High Density Residential ²</td>
<td>5.3</td>
<td>10.8</td>
</tr>
<tr>
<td>Mixed Use</td>
<td>3.9</td>
<td>3.9</td>
</tr>
<tr>
<td>Commercial</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Industrial</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Floodplain (Floodway)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Public Facilities³</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

¹ – Developed using Spanish Fork water meter data for developed areas.
² – Calculated using planning density from the General Plan and assumes that 10% of developable areas will be dedicated as public right-of-ways.
³ – Most undeveloped areas zoned as public facilities appear to be parks. Developed public facilities include parks, public recreation centers, schools, churches, etc.

The City’s General Plan only lists planning densities for residential zoning types. To estimate the distribution of future flow for other zoned land uses, domestic wastewater production for each zoning type was estimated using water meter data for developed areas of the various zoning types. Because the range of domestic sewer production varies significantly for non-residential zoning types; the average domestic sewer production for existing development was used for the planning densities to estimate ERUs/acre and the associated domestic sewer production for non-residential zones. Note that the planning densities in the City are much higher than observed densities from existing development patterns. Using the planning densities shown in Table 3-2, the estimated build-out population for Spanish Fork based on ERUs is approximately 115,819. This build-out value based on ERUs is approximately equal to the build-out population estimated by Spanish Fork City personnel shown in Table 3-1.

It should be noted that Spanish Fork currently has an interlocal agreement with Salem City to allow wastewater from some of its developable areas to flow to the Salem Wastewater Treatment Facility. The area identified in this interlocal agreement is shown in Figure 3-1. The current interlocal agreement caps the number of units that may be serviced by a Salem City lift station at 400 ERUs. Because Spanish Fork may be able to develop up to 3,600 ERUs within the area of this inter-local agreement, the City should ensure sewer lines are constructed so that wastewater discharges can be conveyed to a future Spanish Fork City owned and operated lift station.
FUTURE SEWER FLOW ESTIMATES

For the purposes of this study, it was assumed that domestic sewer flow will increase proportionally with population. Total domestic wastewater production for 2010 was estimated to be approximately 2.03 mgd based on 90 percent of indoor water use data collected by the City from 2007 to 2009 for the months of December to April. For 2010, this is equivalent to a per capita domestic sewage production rate of approximately 58.5 gpcd based on Spanish Fork City’s current population. The estimated current domestic sewage production rate of 58.5 gpcd has been applied to future populations to estimate future sewer flows for both Spanish Fork and Mapleton. At full build-out, it was estimated that the average daily domestic sewer discharge from Spanish Fork City and Mapleton City will increase to approximately 6.79 mgd and 1.72 mgd respectively as shown in Table 3-3.

Table 3-3
Projected Average Daily Sewer Discharge from Spanish Fork and Mapleton City

<table>
<thead>
<tr>
<th>Year</th>
<th>Spanish Fork City Domestic Sewer Production (mgd)</th>
<th>Mapleton Domestic Sewer Production (mgd)</th>
<th>Combined Spanish Fork/Mapleton Domestic Sewer (mgd)</th>
<th>Combined Spanish Fork/Mapleton Infiltration (mgd)</th>
<th>Combined Spanish Fork/Mapleton Total Sewer Flow (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>2.03</td>
<td>0.51</td>
<td>2.54</td>
<td>2.85</td>
<td>5.39</td>
</tr>
<tr>
<td>2020</td>
<td>2.51</td>
<td>0.68</td>
<td>3.19</td>
<td>2.95</td>
<td>6.14</td>
</tr>
<tr>
<td>2030</td>
<td>3.03</td>
<td>0.96</td>
<td>3.99</td>
<td>3.07</td>
<td>7.05</td>
</tr>
<tr>
<td>2040</td>
<td>3.62</td>
<td>1.11</td>
<td>4.73</td>
<td>3.18</td>
<td>7.91</td>
</tr>
<tr>
<td>2050</td>
<td>4.29</td>
<td>1.26</td>
<td>5.55</td>
<td>3.30</td>
<td>8.86</td>
</tr>
<tr>
<td>2060</td>
<td>5.03</td>
<td>1.42</td>
<td>6.45</td>
<td>3.44</td>
<td>9.88</td>
</tr>
<tr>
<td>2070</td>
<td>5.85</td>
<td>1.57</td>
<td>7.42</td>
<td>3.58</td>
<td>11.00</td>
</tr>
<tr>
<td>2080</td>
<td>6.79</td>
<td>1.72</td>
<td>8.51</td>
<td>3.75</td>
<td>12.25</td>
</tr>
</tbody>
</table>

Infiltration at the WWTP was estimated to be approximately 2.85 mgd in the spring of 2011 based on the difference between average monthly flows at the WWTP and the estimated domestic production. This was a historic high for the WWTP and represents the planning infiltration that should be expected at the facility during a wet climate year. As the City’s population and collection system expands, a small amount of new infiltration was added each year to account for infiltration associated with new construction. For new construction, allowable infiltration should range between 400 and 600 gpd/in-diam/mile\(^1\) compared to a range of 1,000 to 4,000 gpd/in-diam/mile expected for older construction. For new collection systems, this can be estimated to be approximately 15 percent of the domestic sewer production (or approximately 500 gpd/in-diam/mile).

\(^1\)"Chapter 3 Quantity of Wastewater." *Gravity Sanitary Sewer Design and Construction.* NY, NY: American Society of Civil Engineers.
DISTRIBUTION OF FUTURE DEVELOPMENT

The City’s General Plan was used to distribute future domestic flow by types of zoned land use. Figure 3-2 indicates the locations where future sewer flows were added to the collection system in terms of ERUs. Included in Figure 3-2 are the sewer collection areas used to project future growth.
NOTE:
The Future Flow Input Locations shown indicate where flow could be added to the existing system if no new sewer trunks are constructed. This represents a worst case scenario in terms of impacts to the existing collection system.
CHAPTER 4
HYDRAULIC MODELING

The existing Spanish Fork City wastewater collection system was evaluated as part of this study using a hydraulic modeling computer program. A hydraulic computer model is a mathematical representation of the pipes, manholes, pumps, and wastewater flows found in the sewer collection system. Hydraulic computer models are useful because they allow the user to simulate operation of large, complex sewer systems and to evaluate how future changes in development and flow conditions will affect those systems. The purpose of this chapter is to describe the development of the Spanish Fork hydraulic sewer model for existing land use conditions.

MODEL SELECTION

The computer modeling software used in this study was Storm and Sanitary Analysis (SSA) developed by Autodesk. Spanish Fork City obtained the SSA software from Autodesk in association with their Civil 3D license. Although there are many other sanitary sewer software packages available to perform hydraulic simulations, SSA was used in this study because it has increased functionality compared to EPA SWMM 5, and it is more economical than many other software programs.

There are two major types of data required to develop a digitized hydraulic model of a sewer system: geometric data and flow data, as described below.

GEOMETRIC MODEL DEVELOPMENT

Geometric data consists of all information needed to represent the physical characteristics of the system.

Modeled Pipelines & Manholes

Because of budget and time constraints, it was not possible to survey and model every collection line and manhole in the Spanish Fork wastewater collection system. Therefore, only the sewer trunk lines were modeled. This is typical for a collection system master plan. For the purpose of this study, trunk lines were defined as having a diameter of 10 inches or larger. Spanish Fork personnel also assisted in identifying some critical 8-inch diameter pipelines to be modeled. The trunk lines were surveyed by City personnel. Information on the physical characteristics of the trunk lines and associated manholes (invert and rim elevations) was also collected during the survey process and assembled by Spanish Fork City personnel. That information was incorporated into the City’s GIS database along with the diameter, length and location of each pipe.

Lift Stations

There are three Spanish Fork City owned and operated lift stations in its wastewater collection system. Characteristics for these lift stations are presented in Chapter 2. Because the wet well volumes and operational levels of these lift stations were not known at the time of this study,
these lift stations were modeled using a simplified approach. Flows upstream of the lift station are directed to the force main discharge without cycling through on/off cycles of the lift station pumps, similar to the situation that would exist when variable frequency drives are used.
This modeling approach does not reproduce the cycling effects experienced at the discharge end of a force main, but still reasonably represents flow from the lift station after attenuation effects in the downstream gravity main. This was a reasonable representation of these lift stations because cycling effects of the pump station were not observed at the flow meters directly downstream of the lift station force mains.

Sediment and Debris

Because of the transportable nature of grease and sediment in a sewer collection system, it is generally not possible to use a computer model to identify the exact location and quantity of grease or sediment accumulation in the system for any specific point in time. Similarly, the build-up and erosion rates of sediment in sanitary sewer systems are not always well understood. As a result, detailed computer modeling of sediment, grease, and debris on a system wide basis is not possible because of continually changing conditions. Therefore, no sediment was included in the hydraulic model. Instead, the design and evaluation criteria for the Spanish Fork City collection system is based on “clean” pipes, with an allowance for capacity lost due to the potential accumulation of sediment.

It should be noted that the hydraulic modeling software used to simulate the operation of the Spanish Fork City wastewater collection system does have the ability to set sediment depth in pipes. Therefore, if the City collects sediment data for a given section of pipe, the sediment may be added to the model and its effects evaluated. However, it should be emphasized that any sediment levels defined today may change in the future as flow conditions change or as maintenance practices are implemented to address sediment accumulation.

Wastewater Treatment Plant

The WWTP located at 2160 North 175 East was used as the outfall in the hydraulic model.

FLOW DATA DEVELOPMENT

Development of flow data for a dynamic computer model consists of estimating the magnitude of flow, point of entry into the system, and a definition of how flow varies with time (to establish peak flow rates and consider the effects of flow travel time in the system). There are three potential sources of flow in sewer pipelines: domestic flow, infiltration, and inflow. They are each described below.

Domestic Flow

Domestic flow consists of the wastewater generated by residential, commercial, and industrial customers. Domestic flow from residential and commercial customers varies throughout the day and throughout the week. For Spanish Fork City, flow records indicate that the peak flow typically occurs on Saturdays during the afternoon. Therefore, most of the calibration data used
for the hydraulic model used data sampled from Saturdays during various flow-monitoring periods. The diurnal pattern for the City was also developed based on flow monitoring records obtained from locations throughout the City observed on Saturdays. Although commercial and industrial domestic wastewater patterns typically vary from patterns for residential wastewater patterns, no clear commercial or industrial pattern was observed during the flow monitoring. This suggests that while commercial and industrial developments exist in Spanish Fork City, residential flow patterns tend to dominate the overall wastewater production pattern in the City. In addition, industrial wastewater production patterns typically vary greatly depending on the type of industry and therefore cannot be replicated using a single pattern. The diurnal wastewater production pattern shown in Table 4-1 and Figure 4-1 represents most of Spanish Fork City well. While some variation from this pattern is apparent from the various flow meter sites that were monitored in the City, peak flows into the system appear to be simulated well. A separate diurnal pattern was created for Mapleton City because of the large contribution of flow impacting the Spanish Fork collection system.

### Table 4-1

Wastewater Production Pattern for Spanish Fork

<table>
<thead>
<tr>
<th>Hour of the Day</th>
<th>Spanish Fork City Pattern</th>
<th>Mapleton City Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00</td>
<td>0.8</td>
<td>1.03</td>
</tr>
<tr>
<td>1:00</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>2:00</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>3:00</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>4:00</td>
<td>0.15</td>
<td>0.33</td>
</tr>
<tr>
<td>5:00</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>6:00</td>
<td>0.25</td>
<td>0.15</td>
</tr>
<tr>
<td>7:00</td>
<td>0.35</td>
<td>0.17</td>
</tr>
<tr>
<td>8:00</td>
<td>0.55</td>
<td>0.25</td>
</tr>
<tr>
<td>9:00</td>
<td>1.1</td>
<td>0.35</td>
</tr>
<tr>
<td>10:00</td>
<td>1.6</td>
<td>0.6</td>
</tr>
<tr>
<td>11:00</td>
<td>2.1</td>
<td>1.4</td>
</tr>
<tr>
<td>12:00</td>
<td>1.6</td>
<td>1.88</td>
</tr>
<tr>
<td>13:00</td>
<td>1.4</td>
<td>1.85</td>
</tr>
<tr>
<td>14:00</td>
<td>1.2</td>
<td>1.65</td>
</tr>
<tr>
<td>15:00</td>
<td>1.25</td>
<td>1.41</td>
</tr>
<tr>
<td>16:00</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>17:00</td>
<td>1.6</td>
<td>1.25</td>
</tr>
<tr>
<td>18:00</td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>19:00</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>20:00</td>
<td>1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>21:00</td>
<td>1.4</td>
<td>1.3</td>
</tr>
<tr>
<td>22:00</td>
<td>1.1</td>
<td>1.25</td>
</tr>
<tr>
<td>23:00</td>
<td>1.1</td>
<td>1.15</td>
</tr>
<tr>
<td>0:00</td>
<td>0.8</td>
<td>1.03</td>
</tr>
</tbody>
</table>

1 – Saturdays only
Figure 4-1
Diurnal Patterns applied to Hydraulic Model

- Spanish Fork
- Mapleton
For large industrial facilities or developments, the City may consider monitoring wastewater production to develop a unique flow monitoring pattern to input into the model. However, this was not considered necessary to represent system flows as part of this study.

Existing domestic sewer flow data developed for the hydraulic model was based on winter water use data (the sum of water used between the months of December and April) using the City’s water meter data (maximum monthly water usage from 2007 to 2009). To estimate domestic wastewater production, it was assumed that 90 percent of metered indoor water use is converted to domestic wastewater. This is somewhat higher than the State of Utah’s value of 80 percent used for water rights calculations, but it produced domestic flows that appear to match flow monitor results well. Average domestic wastewater production estimated for 2010 was estimated to be approximately 2.03 mgd.

To distribute wastewater production throughout the hydraulic model, discharge data should be assigned to the nearest sewer main that would collect the indoor water use. Normally, water meter use data would be assigned to the nearest manhole in a collection system. However, because only select sewer trunks were included in the hydraulic model, this approach would not accurately distribute the indoor water use data because the nearest sewer trunk or sewer manhole may not represent the correct flow direction. To improve the accuracy of distributing indoor water use to the modeled sewer lines, 41 sewer collection sub-basins were delineated based on the contributing sewer area throughout the City as shown in Figure 3-2 (Chapter 3). Because accurate elevation data is not available throughout the City, Spanish Fork City personnel reviewed the sub-basins to confirm the accuracy. By defining these sewer sub-basins, it was possible to more accurately assign water meter data for existing flows to the correct sewer trunk. As discussed in Chapter 3, these sewer collection basins were also used to project future domestic flows and assign them to nodes in the hydraulic model.

**Infiltration**

Figure 4-2 indicates the flow monitoring tributary areas used to identify the level of infiltration throughout the City. Infiltration is the intrusion of groundwater into the sewer system through cracked pipes, broken and offset joints, improper connections, leaky manholes, etc. In areas with aging sewer lines and high groundwater, infiltration can actually be the largest component of flow being conveyed in the sewer. Infiltration is very difficult to measure because it varies across the service area based on climate conditions, water table levels, pipe diameter, and pipe condition.

Figure 4-3 shows the Mapleton City monthly discharge into the Spanish Fork collection system for 2007 through 2011. It is apparent from this figure that Mapleton City infiltration rises and falls with the irrigation season. For the year 2010, measured flows in September were 2.85 times higher than in February of 2010. The difference between these measurements is likely the result of significant fluctuations in infiltration into the Mapleton collection system. For Spanish Fork City, flows do not appear to fluctuate seasonally (as they do in Mapleton) as seen in Figure 4-4. However, it should be noted that domestic wastewater (from indoor water use) and infiltration have been increasing over the last 7 years as seen by the average monthly flows shown in Figure 4-5. While some of this increase is likely the result of development, some of the increase
Figure 4-3
Metered Mapleton City Discharges to Spanish Fork City Wastewater Collection System
Figure 4-4
Average Monthly Flows Observed at the Spanish Fork Water Reclamation Facility
Figure 4-5
Historic Spanish Fork Water Reclamation Facility Flow Rates
is the likely the result of increased infiltration from varying climate conditions. Based on the
trend seen in Figure 4-5, it would appear that development within the City is beginning to
approach the treatment plant’s hydraulic design capacity (see Chapter 7 for discussion of the
treatment plant).

To estimate the distribution of infiltration into the Spanish Fork collection system, flow was
monitored throughout the City for 15 delineated collection areas (as shown in Figure 4-2). Total
infiltration at each flow meter was estimated, and the net infiltration for each sub-basin area was
estimated by subtracting upstream infiltration. Estimating flow at each flow meter site required
making some assumptions about monitored flows. One approach to estimating infiltration is to
use the assumption that domestic wastewater flows will be very small during the early hours of
the morning. For the purposes of this study, it has been assumed that approximately 12 percent
of the average domestic production measured at flow meter sites is a constant flow into the
collection system. Using this assumption, it is possible to estimate domestic wastewater
production at each flow meter sites using the following calculation:

\[
\text{Average Domestic Wastewater Flow} = \frac{\text{Daily Average} - \text{Daily Minimum}}{0.88}
\]

Infiltration was subsequently estimated by subtracting the domestic wastewater flow rate from
the daily average flow rate. This calculation ignores potential influence of lift stations and
diversions in the collection system. Where diversions and lift stations exist upstream of flow
meter sites, the data was evaluated to determine if the underlying assumptions were adequate.

**Fluctuations in Infiltration.** Although infiltration varies with time when examined over a
period of several months or years, very little variation in time will occur during a single day.
Therefore, when infiltration is added to a hydraulic model as a component of the total estimated
sewer flow, it is added simply as a constant flow.

Because the flow meter data used in the hydraulic model was collected at various times of the
year beginning in approximately November 2009 and ending in March 2011, it was necessary to
make adjustments to some of the data to account for fluctuations in seasonal and/or annual
infiltration. Because the highest infiltration rate observed for Spanish Fork City occurred in
March 2011, infiltration from some flow meter sites was multiplied by a factor to represent
March 2011 infiltration rates. Infiltration at the WWTP was estimated with the assumption that
domestic production was relatively constant from November 2009 to March 2011. The
infiltration adjustment factor was then calculated for each site and is listed in Table 4-3 with the
estimated infiltration at the flow meter site.
Table 4-2
Estimated Infiltration for March 2011 at Various Flow Meter Sites

<table>
<thead>
<tr>
<th>Flow Meter</th>
<th>Address</th>
<th>Infiltration Adjustment Factor</th>
<th>Estimated Infiltration for Collection Area (mgd)</th>
<th>Estimated Infiltration for Collection Area (gal/in-diam-mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - WWTP</td>
<td>2160 N 175 E</td>
<td>1.00</td>
<td>2.921</td>
<td>1,688</td>
</tr>
<tr>
<td>2</td>
<td>1750N 115</td>
<td>1.63</td>
<td>0.465</td>
<td>2,569</td>
</tr>
<tr>
<td>3</td>
<td>1600N 250W</td>
<td>1.63</td>
<td>0.135</td>
<td>1,048</td>
</tr>
<tr>
<td>4</td>
<td>1600N 200E</td>
<td>1.63</td>
<td>0.032</td>
<td>1,865</td>
</tr>
<tr>
<td>5</td>
<td>1550N Kirby Ln</td>
<td>1.68</td>
<td>0.115</td>
<td>10,229</td>
</tr>
<tr>
<td>6</td>
<td>1000N 250E</td>
<td>1.00</td>
<td>0.159</td>
<td>1,866</td>
</tr>
<tr>
<td>7</td>
<td>900N 200W</td>
<td>1.16</td>
<td>0.045</td>
<td>586</td>
</tr>
<tr>
<td>8</td>
<td>800N 100E-East</td>
<td>1.10</td>
<td>0.314</td>
<td>2,089</td>
</tr>
<tr>
<td>9</td>
<td>800N 100E-West</td>
<td>1.10</td>
<td>0.111</td>
<td>4,504</td>
</tr>
<tr>
<td>10</td>
<td>750N Mitchell</td>
<td>1.00</td>
<td>0.113</td>
<td>990</td>
</tr>
<tr>
<td>11</td>
<td>700N 300W</td>
<td>1.15</td>
<td>0.139</td>
<td>1,427</td>
</tr>
<tr>
<td>12</td>
<td>800N 800E</td>
<td>1.68</td>
<td>0.144</td>
<td>3,802</td>
</tr>
<tr>
<td>13</td>
<td>100N 600E</td>
<td>1.10</td>
<td>0.024</td>
<td>189</td>
</tr>
<tr>
<td>14</td>
<td>100W Volunteer Dr</td>
<td>1.00</td>
<td>0.691</td>
<td>2,910</td>
</tr>
<tr>
<td>15</td>
<td>1450E Canyon</td>
<td>1.10</td>
<td>0.011</td>
<td>79</td>
</tr>
<tr>
<td>100</td>
<td>Other Areas</td>
<td>1.00</td>
<td>0.057</td>
<td>1,321</td>
</tr>
<tr>
<td>Mapleton City</td>
<td>--</td>
<td>--</td>
<td>0.369</td>
<td>--</td>
</tr>
</tbody>
</table>

In sub-basins where infiltration for various flow metering basins could not be estimated reliably because of erratic flow meter data, the estimated average infiltration rate for the entire City was applied to that basin (approximately 1,700 gal/in-diam-mile for March 2011).

The American Society of Civil Engineers (ASCE) recommends an allowable infiltration rate for new construction of 500 gpd/in-dia-mile. For older sewer systems, infiltration rates are usually much greater than this. Average infiltration rates for older sewer systems range between 1000 and 4000 gpd/in-dia-mile depending on groundwater depth and age of pipe. Most of the estimated infiltration rates at locations monitored in this study fall within this range of expected values.

Based on ASCE infiltration criteria, Meter locations 5 and 9 appear to have unusually large amounts of infiltration.

- Meter 5 is located in an industrial area and had an indoor winter water use demand of approximately 37 gpm corresponding to approximately 33 gpm of domestic wastewater production. Average flow at this site was measured as 93 gpm for the month of August 2010. This suggests that more than half of the flow in this sewer trunk is a result of infiltration. Flows in this sewer trunk likely fluctuate significantly with the seasons as a
result of changing infiltration conditions. Although this sewer main only contributes a small amount of flow to the City’s collection system, it is recommended this trunk be inspected (using CCTV) to identify any major sources of infiltration.

- Meter 9 is located on the Westside of 100 East and serves neighborhoods between Main Street and 100 East. Indoor winter water use demand for the area was estimated at approximately 43 gpm corresponding to approximately 39 gpm of domestic wastewater production. Flow was monitored for 10 days in February 2011 and averaged as 123 gpm. The sewer main upstream of Meter 9 is located in one of the older areas of Spanish Fork City and may be leaking more than other areas of the collection system. It may be difficult to identify large sources of infiltration for this area because leaks likely come from older service laterals, cracked pipes, broken joints, etc. However, this line should be inspected to determine if rehabilitation efforts would be worthwhile for this area.

**Inflow**

The third and final component of wastewater flow that must be considered for hydraulic modeling purposes is inflow. Inflow is defined as any water that enters into the sewer system which is directly or indirectly related to a storm event. It can come directly from storm runoff through improper connections to the storm water system, missing or leaky manhole covers, roof drains connected to the system, etc. Storm events can also cause the ground water to raise temporarily, which can cause an increase in flow in the sewer system through the same mechanisms that result in groundwater infiltration during dry weather (cracked pipes, leaky laterals, etc.). This temporary increase in sewer flow due to raising levels of ground water is also considered inflow.

To accurately model inflow into the City collection system, it is necessary to estimate both the magnitude and distribution of the inflow in the system. This requires accurate measurements of precipitation around the City and simultaneous flow measurements throughout the City’s collection system. Because this data is not available, inflow was not modeled as part of the hydraulic model.

Figure 4-6 shows the increase in peak flow at the WWTP compared to the corresponding precipitation event. No clear pattern could be obtained from this data, but the figure indicates that inflow can be a significant contribution to sanitary sewer flows in the City. For this study, 25 percent of the pipe’s hydraulic capacity is reserved to accommodate the accumulation of sediment or debris or for higher flows from inflow or higher infiltration.

**CALIBRATION**

Simulated hydraulic flows were calibrated based on March 2011 infiltration conditions because infiltration rates for March 2011 are the highest historical flows observed in Spanish Fork. Where possible, monitored flow meter data was adjusted to reflect March 2011 conditions using estimates of infiltration at the flow meter and fluctuations at the City’s wastewater treatment plant. Simulated flows were compared to observed monitored flows at the various flow meter locations shown in Figure 4-2. Although the timing of the peak varies in some cases, the overall magnitude of flow correlates well for most of the flow monitors (see Appendix for Figures M1 to
Figure 4-6
Inflow Response at Spanish Fork Wastewater Treatment Plant

Precipitation (inches) vs. Peak Flow Increase at Treatment Plant (mgd)
Table 4-3 shows a summary comparison of observed flows to simulated flows in the hydraulic model for each flow monitor site. Based on the table and figures, the following general observations can be made about the hydraulic model simulation:

- **Average Flows** – Average flows for most flow meter sites are within acceptable limits of accuracy (within 20%). At trunks with larger flows (flows greater than 1,000 gpm) the level of accuracy is within 10%. Commentary on sites that exceed this limit are discussed following Table 4.

- **Maximum Flows** – Maximum simulated flows are in most cases higher than those observed within the collection system. Because system deficiencies are controlled by maximum flows, simulated flows should be close to or higher than observed flows to ensure that deficiencies are defined properly in the collection system. Commentary on sites that do not meet this criteria are discussed following Table 4-3.

- **Diurnal Pattern** – The diurnal patterns simulated in the hydraulic model generally follows the observed diurnal patterns in Spanish Fork City for Saturday flows.

### Table 4-3

**Observed Flows vs. Simulated Flows at Flow Meter Locations**

<table>
<thead>
<tr>
<th>Flow Meter</th>
<th>Observed Max (gpm)</th>
<th>Simulated Max (gpm)</th>
<th>Percent Difference</th>
<th>Observed Average (gpm)</th>
<th>Simulated Average (gpm)</th>
<th>Percent Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4,784</td>
<td>5,216</td>
<td>9%</td>
<td>3,745</td>
<td>3,731</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>1,623</td>
<td>1,631</td>
<td>0%</td>
<td>1,150</td>
<td>1,119</td>
<td>-3%</td>
</tr>
<tr>
<td>3</td>
<td>2,570</td>
<td>2,577</td>
<td>0%</td>
<td>1,646</td>
<td>1,766</td>
<td>7%</td>
</tr>
<tr>
<td>4</td>
<td>890</td>
<td>1,109</td>
<td>25%</td>
<td>668</td>
<td>614</td>
<td>-8%</td>
</tr>
<tr>
<td>5</td>
<td>188</td>
<td>181</td>
<td>-4%</td>
<td>174</td>
<td>137</td>
<td>-21%</td>
</tr>
<tr>
<td>6</td>
<td>748</td>
<td>861</td>
<td>15%</td>
<td>520</td>
<td>449</td>
<td>-14%</td>
</tr>
<tr>
<td>7A</td>
<td>799</td>
<td>885</td>
<td>11%</td>
<td>692</td>
<td>583</td>
<td>-16%</td>
</tr>
<tr>
<td>7B</td>
<td>80</td>
<td>98</td>
<td>22%</td>
<td>43</td>
<td>58</td>
<td>36%</td>
</tr>
<tr>
<td>7C</td>
<td>2,451</td>
<td>2,543</td>
<td>4%</td>
<td>1,855</td>
<td>1,756</td>
<td>-5%</td>
</tr>
<tr>
<td>8</td>
<td>575</td>
<td>622</td>
<td>8%</td>
<td>393</td>
<td>395</td>
<td>1%</td>
</tr>
<tr>
<td>9</td>
<td>183</td>
<td>166</td>
<td>-9%</td>
<td>129</td>
<td>116</td>
<td>-10%</td>
</tr>
<tr>
<td>10</td>
<td>376</td>
<td>359</td>
<td>-4%</td>
<td>221</td>
<td>202</td>
<td>-8%</td>
</tr>
<tr>
<td>11 b</td>
<td>1,136</td>
<td>1,428</td>
<td>26%</td>
<td>840</td>
<td>981</td>
<td>17%</td>
</tr>
<tr>
<td>12</td>
<td>240</td>
<td>269</td>
<td>12%</td>
<td>171</td>
<td>148</td>
<td>-13%</td>
</tr>
<tr>
<td>13</td>
<td>325</td>
<td>356</td>
<td>10%</td>
<td>152</td>
<td>165</td>
<td>9%</td>
</tr>
<tr>
<td>14</td>
<td>1,290</td>
<td>1,193</td>
<td>-8%</td>
<td>875</td>
<td>809</td>
<td>-8%</td>
</tr>
<tr>
<td>15 b</td>
<td>195</td>
<td>308</td>
<td>58%</td>
<td>89</td>
<td>152</td>
<td>72%</td>
</tr>
<tr>
<td>16</td>
<td>1,047</td>
<td>1,049</td>
<td>0%</td>
<td>672</td>
<td>639</td>
<td>-5%</td>
</tr>
</tbody>
</table>

Note that observed flows were adjusted to represent March 2011 flows where possible.

Flow monitoring results considered unreliable due to failure to produce agreement between upstream or downstream flow meter results.
**Meter 4**

Flow Meter 4 was placed upstream of the City’s wastewater treatment plant along 200 East. The simulated average flow at Meter 4 was slightly lower than observed flows while the simulated maximum flow was 25% higher than the observed maximum. The simulated maximum and minimum flows at other flow meter sites higher up in the collection system are much closer to observed flows. This suggests that there is a significant amount of attenuation upstream of this flow meter site. Attenuation reduces the amplitude of swings in a typical diurnal pattern and is caused by friction and storage in system pipes and/or structures. Sediment, debris, roots, siphons, may increase attenuation in a collection system by restricting flow and storing flow temporarily in system pipes. This essentially slows down the time of the peak and reduces the amplitude. Because of unknowns about restrictions such as sediment, roots, and debris, it is very difficult to model attenuation. For areas close to the City’s treatment plant, hydraulic deficiencies resulting from peak flows in the hydraulic simulation may be mitigated somewhat by attenuation. This should be considered while defining the priority of system capital improvements.

**Meter 5**

For smaller collection areas, larger variations in simulated flows from observed flows are difficult to avoid due to the potential for larger fluctuations in wastewater production. For example, wastewater production for the Meter 5 collection area is largely dominated by one industry (Alcoa Extrusions Inc) which makes up for about 75% of the indoor water use for this area. A specific diurnal pattern could be developed for this industry. However, it is unknown how this industrial facility operates. The diurnal pattern could change due to changing industrial requirements. Because the peak simulated flow was close to the observed peak flow from this area, the results were considered satisfactory at this site.

**Meter 7A**

Meter 7A was installed by a consultant prior to this study, and the results of the meter were considered questionable. Meter 7B and 7C were installed to evaluate the accuracy of this meter and to provide additional flow distribution detail in the City. After evaluating Meters 7B and 7C, flows appear to be satisfactory and model correlation is adequate.

**Meter 7B**

For smaller collection areas, larger variations in simulated flows from observed flows are difficult to avoid due to the potential for larger fluctuations in wastewater production. The larger difference in simulated to observed flows was considered satisfactory at this site due to the relatively low flows.

**Meter 7C**

The level of accuracy between simulated and observed flows at this flow meter helped to confirm that flows monitored at Meter 7A were satisfactory.
Meter 11

This meter location was monitored twice during this study because the meter results were considered questionable. Note that the observed maximum and average flows at Meter 14 are higher than those observed at Meter 11. Because Meter 14 is upstream of Meter 11 and there are no reported diversions that would convey flow in an alternate direction, this suggests that one of these two meters is not accurate. Because of the relatively small difference in simulated and observed flows at Meter 7C, it would suggest that Meter 11 is less accurate. For future flow monitoring, steps should be taken to try and improve the accuracy of meter data at this location. Relocating this meter further upstream may be necessary to provide improved accuracy.

Meter 15

This meter location was monitored twice during this study because the meter results were considered questionable. The April 2011 monitoring period was conducted further downstream from the March 2011 monitoring period, yet flows were half those observed during March 2011. Because no other information was available to redistribute flows into the collection system, the distribution of simulated flows was considered to be satisfactory. This distribution may result in somewhat higher simulated flows further upstream in the collection system, but this was considered to be a conservative assumption. Any future flow monitoring should be conducted in different locations from those conducted for this study and care should be taken to setup the flow monitor to accurately monitor flows.

FUTURE DOMESTIC FLOW DISTRIBUTION

As discussed in Chapter 3, the City’s general plan was used to estimate the buildout population of the City. By estimating the percentage of development for various blocks of land across the City, it was possible to distribute growth in domestic flow to undeveloped areas using the density of development by zoning type. Figure 3-2 (from Chapter 3) shows the various sewer collection areas used to distribute future flows to the existing collection system. Table 4-4 lists the future flow assigned per area.
### Table 4-4
Increase in Domestic Wastewater Flow to Sewer Collection Areas at Build-out

<table>
<thead>
<tr>
<th>Sewer Collection Area</th>
<th>Future Domestic Flow (gpm)</th>
<th>Future Infiltration (gpm)</th>
<th>Future ERUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>300</td>
<td>102</td>
<td>15</td>
<td>646</td>
</tr>
<tr>
<td>400</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>500</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>600</td>
<td>6</td>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>700</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>800</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>900</td>
<td>8</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>1000</td>
<td>42</td>
<td>6</td>
<td>265</td>
</tr>
<tr>
<td>1100</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1200</td>
<td>5</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>1300</td>
<td>196</td>
<td>29</td>
<td>1,237</td>
</tr>
<tr>
<td>1400</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1500</td>
<td>22</td>
<td>3</td>
<td>140</td>
</tr>
<tr>
<td>1600</td>
<td>6</td>
<td>1</td>
<td>38</td>
</tr>
<tr>
<td>1700</td>
<td>322</td>
<td>48</td>
<td>2,032</td>
</tr>
<tr>
<td>1800</td>
<td>18</td>
<td>3</td>
<td>111</td>
</tr>
<tr>
<td>1900</td>
<td>10</td>
<td>1</td>
<td>61</td>
</tr>
<tr>
<td>2000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2100</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2200</td>
<td>38</td>
<td>6</td>
<td>241</td>
</tr>
<tr>
<td>2300</td>
<td>222</td>
<td>33</td>
<td>1,400</td>
</tr>
<tr>
<td>2310</td>
<td>217</td>
<td>32</td>
<td>1,367</td>
</tr>
<tr>
<td>2320</td>
<td>196</td>
<td>29</td>
<td>1,240</td>
</tr>
<tr>
<td>2330</td>
<td>30</td>
<td>5</td>
<td>192</td>
</tr>
<tr>
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<td>13</td>
<td>2</td>
<td>85</td>
</tr>
<tr>
<td>2400</td>
<td>16</td>
<td>2</td>
<td>101</td>
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<tr>
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<td>23</td>
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<td>145</td>
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<tr>
<td>2600</td>
<td>173</td>
<td>26</td>
<td>1,095</td>
</tr>
<tr>
<td>2700</td>
<td>52</td>
<td>8</td>
<td>328</td>
</tr>
<tr>
<td>2800</td>
<td>25</td>
<td>4</td>
<td>160</td>
</tr>
<tr>
<td>2900</td>
<td>71</td>
<td>11</td>
<td>449</td>
</tr>
<tr>
<td>3000</td>
<td>150</td>
<td>22</td>
<td>947</td>
</tr>
<tr>
<td>3010</td>
<td>850</td>
<td>128</td>
<td>5,367</td>
</tr>
<tr>
<td>3100</td>
<td>11</td>
<td>2</td>
<td>72</td>
</tr>
<tr>
<td>3200</td>
<td>110</td>
<td>16</td>
<td>692</td>
</tr>
<tr>
<td>3300</td>
<td>133</td>
<td>20</td>
<td>837</td>
</tr>
<tr>
<td>3310</td>
<td>228</td>
<td>34</td>
<td>1,436</td>
</tr>
<tr>
<td>3400</td>
<td>19</td>
<td>3</td>
<td>118</td>
</tr>
<tr>
<td>3500</td>
<td>23</td>
<td>3</td>
<td>144</td>
</tr>
<tr>
<td>3600</td>
<td>43</td>
<td>6</td>
<td>271</td>
</tr>
</tbody>
</table>
CHAPTER 5
COLLECTION SYSTEM EVALUATION

The development and calibration of a hydraulic sewer model makes it possible to simulate sewer system operating conditions for both present and future conditions. The purpose of this chapter is to document the evaluation of the hydraulic performance of the collection system and to identify hydraulic deficiencies.

Recommended solutions to identified deficiencies are not included in this chapter. Instead, this chapter identifies the capacity deficiencies identified through modeling, which were used to develop the comprehensive improvement plan presented in Chapter 6.

EVALUATION CRITERIA

In defining what constitutes a hydraulic deficiency, it is important to consider the assumptions made in estimating sewer flows in the model. As described in Chapters 3 and 4, the sewer flow used in hydraulic modeling is composed of two parts: domestic sewer flow and infiltration. The estimated domestic sewer flow for existing conditions came from Spanish Fork water meter data, while future domestic sewer flows were based on an average sewer production as estimated using land area, land use type, and an average unit hydrograph. Infiltration levels in Spanish Fork were developed using the historic high rates in 2011 based on flow data collected at the WWTP. Most of the flow monitoring data used to calibrate the existing hydraulic model was collected from February to March of 2011 or was adjusted to reflect early 2011 conditions. The conditions for defining system deficiencies are therefore based on a historic infiltration year with peak flows from domestic production. Because no inflow data was available for hydraulic model calibration, the criteria for defining deficiencies must be sufficiently conservative to account for inflows into the collection system from snowmelt or storm events. The criteria should also provide a buffer for the potential accumulation of sediment and/or other debris.

The following criteria have been established to help identify capacity deficiencies:

- **Pipeline Capacity** – The most important deficiency to eliminate in the sewer system is inadequate hydraulic capacity. For this master plan, it was decided to define capacity deficiency as any point where the peak daily flow in the pipe exceeds 75 percent of the pipe’s full flow capacity. The remaining 25 percent of the pipe’s capacity was reserved for inflow and/or unaccounted for fluctuations in domestic flow and infiltration.

- **Lift Station Capacity** – A lift station capacity deficiency is defined as anytime peak daily flows exceed 85 percent of the pump station’s pumping capacity.

- **Minimum Velocities** – For the purpose of this report, pipes were identified as having insufficient velocity when the peak daily velocity in the pipe is less than 2.0 feet per second. A velocity of at least 2.0 feet per second is required to keep sediment from accumulating at the bottom of the pipe. Areas identified with this type of deficiency will likely require more frequent maintenance and cleaning than those areas with higher velocities. Many sewer mains for smaller neighborhoods will often have velocities less than 2.0 ft/sec during peak flows. Therefore, only pipes serving approximately 600

...
ERUs or greater with velocities less than 2.0 ft/sec were identified as deficient. For inverted siphons, the minimum velocity that should be maintained through the pipe is 3.0 ft/sec to keep sediment from accumulating in the siphon.

SYSTEM ANALYSIS

The following sections summarize evaluations of the system for both existing and future conditions. Where possible system deficiencies are listed in order of their relative severity based on total flow volume, surcharging severity, and extent of surcharging.

EXISTING SYSTEM ANALYSIS

The hydraulic model was used to simulate discharges and flow conditions in the wastewater collection system under existing conditions. In general, most of the collection system facilities perform well under existing conditions. However, the hydraulic model did identify a few deficient areas. Figure 5-1 shows the performance of the sewer system under existing flow conditions based on flow monitoring and the calibrated hydraulic model. Pipes in the figure are color coded to show the ratio of peak flow in the pipe to the pipe’s full flow capacity. The peak flows under existing conditions were calibrated based on flow monitoring as described in Chapter 3. Existing system deficiencies are summarized below:

A1 – 200 East, 1700 North – The 24-inch sewer main directly south of the Spanish Fork Wastewater Treatment Plant (WWTP) has reached its design capacity and has no additional capacity to accommodate future growth. Development affecting the 100 East, 600 East, or Chappel Dr sewer trunk lines will begin to exceed the capacity of this trunk line.

Observed Deficiencies

Observed deficiencies are deficiencies caused by accumulated sediment and/or debris, or unexplained surcharging of pipes or manholes.

A2 – 150 East, 2160 North – The siphon west of the treatment plant has significant backwater under normal operating conditions. Approximately 2 ft of sediment was measured at the bottom of the upstream and downstream manhole. Hydrogen Sulfide gas was also detected at this location. The siphon and the downstream sewer main should be cleaned and inspected to determine what is causing the backwater condition at the downstream end of the siphon and to assess the capacity of the siphon. This deficiency should be corrected before a sanitary sewer overflow occurs. It should also be noted that the segment of sewer main upstream of this siphon does not have sufficient capacity for build-out flows.
BUILD-OUT SYSTEM ANALYSIS

Figure 5-2 shows the projected performance of the sewer system under build-out development conditions assuming that wastewater discharges from all new growth will be conveyed by the existing collection system. Hydraulic deficiencies observed for build-out conditions include:

**B1 – 2000 East, 600 South to 400 North** – The sewer trunk along 2000 East from 600 South to 400 North will not have sufficient capacity to accommodate all of the future growth east of 2000 East. This will require either upsizing all of the deficient sewer mains or routing new development flows to a new trunk line.

**B2 – Main Street, 2050 North to 2400 North** – The sewer line along Main Street from approximately 2050 North to 2400 North will not have sufficient capacity to accommodate all of the potential future growth from the west. This line may need to be upsized to accommodate future development. Because of the wide variability of flows from industrial areas (the general plan zoning type in the vicinity), the capacity of this main should be considered while approving industrial development.

**B3 – Williams Lane** – The sewer trunk that passes underneath the freeway along Williams Lane does not have sufficient capacity to accommodate buildout flows from the east. The peak flow depth in the pipe is projected to reach approximately 80% of the pipes diameter under dry weather conditions at build-out. Because this sewer main passes underneath I-15 and may not have any local connections, it may not be a significant concern for the City. This pipe should be monitored as the City approaches build-out to determine if there is potential concern for surcharging local connections during a storm event.

**B4 – 630 West, Center Street to 400 North** – The sewer main downstream of the Spanish Fields Lift Station will not have sufficient capacity to accommodate all of the potential growth from the south and west. Peak flows exceed the capacity of the majority of the pipes along this sewer main. This will require constructing a new lift station further west to accommodate additional development west of the Spanish Fields Lift Station.

**B5 – 1400 East, Canyon Road to River Bottom** – Several pipes along this section of sewer main will not have sufficient capacity to accommodate buildout flows. This section of trunk line should be monitored as the City approaches build-out to determine if there is potential concern for surcharging local connections during a storm event.

**B6 – 1600 North, 300 West to Main** – A single pipe along this stretch of pipe may act as a bottleneck at build-out flow conditions. Because this deficiency only affects a single pipe, lower than projected growth may reduce projected flow to within the capacity of this pipeline. This pipe should be monitored as the City approaches build-out to determine if there is potential concern for surcharging local connections during a storm event.

**B7 – Existing Mapleton Connection** – The sewer trunk downstream of Mapleton City’s existing connection to Spanish Fork does not have capacity to accommodate all of the
NOTE:
The deficiencies shown indicate areas that would have deficiencies if all future flow was added to the existing system and no new sewer trunks were constructed. This represents a worst case scenario in terms of impacts to the existing collection system.
future growth from Mapleton City. This will require either upsizing all of the deficient sewer mains downstream of the Mapleton Connection or routing some of the flow from Mapleton to a new trunk line.

**LIFT STATION ANALYSIS**

There are 3 sewer lift stations owned and operated by Spanish Fork City in its sewer collection system. Table 5-1 shows each of the lift stations with their existing capacity and associated peak instantaneous flows for existing and build-out development conditions.

<table>
<thead>
<tr>
<th>Lift Station</th>
<th>Pump Capacity (gpm)</th>
<th>85% Pump Capacity (gpm)</th>
<th>Existing Peak Flow(^1,2) (gpm)</th>
<th>Build-out Peak Flow(^1) (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>600</td>
<td>510</td>
<td>126</td>
<td>775</td>
</tr>
<tr>
<td>Jail</td>
<td>430</td>
<td>366</td>
<td>391</td>
<td>868</td>
</tr>
<tr>
<td>Spanish Fields</td>
<td>600</td>
<td>510</td>
<td>342</td>
<td>510</td>
</tr>
</tbody>
</table>

(1) Different peaking factors were used for each of the lift stations depending on its overall size. For the lift stations that serve smaller areas, there can be much more variation in flow, resulting in peaking factors that can be much higher than for the City as a whole (see Appendix – Peaking Factors).

(2) Sewer flows estimated based on available water meter data contributing to lift station.

(3) Red indicates that the design flows exceed 85 percent of lift station capacity.

From the table, it can be concluded that projected build-out peak instantaneous flows will potentially exceed existing pump station capacities at each of the lift stations. Based on existing flows, no improvements will be needed at the Industrial lift station for many years (depending on the rate of development in the vicinity). However, the Jail lift station may be approaching the lift stations capacity. Flow monitoring should be conducted upstream of the lift station to identify what the peak flow and existing peaking factor is at the lift station.

**POTENTIAL MAINTENANCE PROBLEMS**

While the main purpose of assembling a sewer model is to identify pipe segments with insufficient capacity, a model may also be used to identify areas of low velocity where potential additional maintenance may be required. Low velocities are not a major concern for the day-to-day operation of the system, but may result in the accumulation of sediment and debris over time. Areas identified with this type of deficiency will likely require more frequent maintenance and cleaning than those areas with higher velocities.

Figure 5-3 shows pipes in the collection system that do not have velocities above 2.0 ft/sec despite having at least 600 ERUs of contributing flow. The figure shows velocity ranges to indicate which areas of the system will likely have need for more frequent maintenance. Of particular concern are large diameter concrete pipes (greater than 15-inch) with low velocity.
200 E/WWTP Siphon

Quail Hollow Siphon

Legend
- Spanish Fork Sewer Lift Stations
- Pipes with Low Velocities (ft/sec)
  - <1.0
  - 1.1 - 1.5
  - >1.5
- Large Diameter Concrete Pipes
  - >15"
- Spanish Fork City Sewer Mains
- Roads

SPANISH FORK CITY
WASTEWATER MASTER PLAN

PIPPES WITH LOW VELOCITY PEAK FLOWS UNDER EXISTING CONDITIONS

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

FIGURE NO. 5-3

P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 5-3 - Low Velocity.mxd  amckinnon 10/28/2011
sewer flows. The increased likelihood of sedimentation represents a potential source of hydrogen sulfide gas generation which could reduce the life cycle of the pipes. This figure obviously does not identify all the potential maintenance problems that may exist in the system, but may be useful as a tool to help identify locations that have higher potential for velocity related sedimentation and hydrogen sulfide problems.

Table 5-2 lists areas of the city that require routine maintenance as observed by Spanish Fork City personnel.

<table>
<thead>
<tr>
<th>Location</th>
<th>Maintenance Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canyon Dr. to Nebo Dr.</td>
<td>Monthly</td>
</tr>
<tr>
<td>Canyon Road, 900 E to 1100 E</td>
<td>Monthly</td>
</tr>
<tr>
<td>300 S, 600 E to 700 E</td>
<td>Quarterly</td>
</tr>
<tr>
<td>300 S, 300 E to 400 E</td>
<td>Quarterly</td>
</tr>
<tr>
<td>200 E, 100 N to 200 N</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Main St., 400 S to 500 S</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Fastenal/WWTP Siphon</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Spanish Fields/River Cove River Crossing</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Quail Hollow River Crossing Siphon</td>
<td>Quarterly</td>
</tr>
<tr>
<td>200 E/WWTP Siphon</td>
<td>Quarterly</td>
</tr>
</tbody>
</table>

The 200 E/WWTP Siphon and the Quail Hollow Siphon were both simulated in the hydraulic model under existing and build-out flow conditions. Velocities through both of these siphons are much lower than required to keep material suspended (3.0 ft/sec is required). This will cause sediment to accumulate in the siphons until velocities begin to approach 3 ft/sec. This represents a potential source of hydrogen sulfide that could affect sewer trunks upstream and downstream of the siphons. To reduce maintenance requirements, these siphons should be evaluated to determine if there are any operational changes that can be implemented (such as weir walls, temporary plugs, or control gates) to increase velocities through these siphons for existing flow conditions. No information was available for the Fastenal siphon at the time of this study.
CHAPTER 6
RECOMMENDED COLLECTION SYSTEM IMPROVEMENTS

Based on the deficiencies identified in Chapter 5, a number of improvements will be required to accommodate future growth while providing an acceptable level of service. The purpose of this chapter is to discuss recommended system improvements, their costs, and timing of implementation.

IMPROVEMENT ALTERNATIVES

For most of the deficiencies identified in Chapter 5, there may be multiple alternatives for resolving the deficiency. As part of this study, each of these alternatives was evaluated using a hydraulic model. Because of the large number of alternatives considered, presentation of each one in detail as part of this chapter is not practical. Instead, this chapter only includes the final recommended improvements. The recommended alternatives below were selected based on the effectiveness of the improvement and its relative cost.

Proposed sizes for pipes have been included based on known or estimated pipe slopes and the existing Spanish Fork City General Plan. Once design of sewer mains commences, the design pipe size (capacity) should be based on maintaining a flow depth of less than 75% of the pipes diameter, and should be based on the best available topography and development plans. All pipe improvements should be constructed using acid resistant materials to resist the effects of sulfuric acid (a potential byproduct of wastewater in sanitary sewer pipes). This is particularly important in the construction of large diameter sewer pipes (greater than 8-inch) because of the increased likelihood for hydrogen sulfide production.

COLLECTION SYSTEM IMPROVEMENTS

Many of the deficiencies that appear in Chapter 5 are a result of utilizing existing sewer mains to convey the flow from developing areas. Many of the improvements, therefore, identify possible alignments for new sewer mains to convey flow from developable areas. Figure 6-1 shows the location of improvements recommended to eliminate existing and future hydraulic deficiencies. Figure 6-2 indicates the recommended pipe size.

1 – 200 East 36-inch Sewer Trunk

A new parallel 36-inch sewer trunk should be constructed from the Union Pacific Railroad at 200 East south to approximately 1700 North. A new 24-inch sewer trunk should be constructed parallel to the existing trunk along Williams Lane to accommodate projected growth from Mapleton City. The “Spanish Fork – Mapleton Sewer Trunkline Study” prepared in July 2010 indicates that projected growth in Mapleton City may be higher than GOPB projections for growth. The size of the Williams Lane component should be re-evaluated once a Mapleton City wastewater master plan becomes available. For the purpose of this study, a 24-inch main has been assumed. This new trunk will resolve deficiencies A1 and B3 as noted in Chapter 5. Interconnections between each main should be constructed so that flow may be diverted from one pipe to the other for maintenance purposes.
2–1850 North, Main to WWTP

The last stretch of sewer main leading toward the WWTP from 1850 North Main does not have sufficient capacity to accommodate build-out flows. In addition, the downstream end of the existing Fastenal/WWTP siphon has significant backwater problems under existing conditions. This line should be cleaned and inspected in the near future to determine what is causing the backwater on the main, and the capacity of the siphon should be evaluated to determine if there are any deficiencies. For long term capacity issues, a new 30-inch parallel sewer trunk and redundant siphon should be constructed next to the existing sewer trunk. The existing sewer trunk should be lined to prevent deterioration of the concrete structure. This new parallel trunk will resolve deficiency A2 as noted in Chapter 5. Interconnections between each main should be constructed so that flow may be diverted from one pipe to the other for maintenance purposes.

3 – Spanish Fork/Mapleton (Ensign-Bickford Company) Sewer Trunk

The “Spanish Fork – Mapleton Trunkline Study” completed in July 2010 represents the most up to date plans for development along the east side of Spanish Fork City. This study includes three alternatives to convey sewer flow from eastern parts of Spanish Fork City and parts of Mapleton City. The recommended alternative (Alternative B) includes connecting to Spanish Fork City at approximately 750 South from Mapleton City and using a combination of 15-inch to 21-inch pipes to accommodate future wastewater discharge from Mapleton City (approximately 2,200 ERUs) and surrounding areas of Spanish Fork City. As part of this study, pipe diameters decrease from 21-inch to 18-inch from upstream to downstream in some areas because of increased capacity from higher slopes. This is generally not recommended for maintenance purposes. For this master plan, the pipe diameter is maintained as 21-inch for most of the alignment. Conformance with the Spanish Fork City General Plan and other assumptions regarding flow from the July 2010 study are assumed to be based on the best available information from proposed developers and have not been evaluated as part of this study. The July 2010 study also includes the installation of some 21-inch diameter concrete pipe. BC&A recommends that all sewer pipe materials be acid resistant (to mitigate the effects of hydrogen sulfide gas). The sewer main should connect into the sewer main at approximately 950 North 1800 East to avoid causing hydraulic deficiencies in the relatively flat sewer mains downstream of Mapleton City’s existing flow meter. This improvement resolves deficiency B1 and B7 as noted in Chapter 5.

4–Main St Industrial Trunk

A new 12-inch sewer main should be constructed to replace the existing 8-inch sewer main conveying flow to the Industrial Lift Station. A new sewer main to the west should also be constructed to service the industrial area. Because of the wide variations in potential industrial wastewater use, this project should be re-evaluated as industrial development occurs. This improvement resolves deficiency B2 as noted in Chapter 5.

5–1550 West Sewer Trunk

A combination of 24-inch and 30-inch sewer mains will be needed to service areas along 1550 West and other areas in the southeast portion of Spanish Fork City. The Spanish Fields lift station should also be redirected through a new force main into this new main. The existing sewer mains along 630 West were not constructed to accommodate the build-out flows that may
contribute to the Spanish Fields lift station. Sending the Spanish Fields lift station flows to a new sewer main will eliminate deficiency B4 as noted in Chapter 5.

6–Canyon Road Diversion/Interceptor

A new 8-inch interceptor and diversion at the intersection of 1400 East and Canyon Road will be needed to divert some flow from Canyon Road northwest. This project will eliminate deficiency B5 as noted in Chapter 5 and will provide some additional flexibility in operation of the collection system.

7–Southwest Sewer Lift Station and Sewer Mains

A combination of sewer main sizes will be needed to service areas near Salem City at the Southwest corner of Spanish Fork City. A new lift station will be required at the southwest end of the City that will pump through a force main to cross the Spanish Fork River and discharge into the 1550 West Sewer Trunk (Project No. 5 above). During pre-design of this collection area, consideration should be given to determine if multiple lift stations will be required and/or if multiple force mains are needed to provide adequate velocities and minimize dynamic head for various stages of development.

8–8800 South Sewer Trunk

A combination of 8-inch to 12-inch sewer mains will be needed to service areas at the very south end of Spanish Fork City.

9–Airport Sewer Main and Lift Station

Based on available topography, a new lift station will be needed near the airport at approximately 1100 West (using Spanish Fork addresses) along with associated gravity and force mains. Based on the current general plan, this lift station should be sized to accommodate a peak flow of approximately 600 gpm.

10–1450 North Sewer Main

A new 8-inch main along 1450 North from approximately 800 East to 1600 East will be needed to service future development.

11–Jail Lift Station Upgrade

Based on estimates of flow, the Jail Lift Station is approaching the limits of its existing pump capacity. Because there is a significant amount of developable land that may flow to this lift station, City personnel should conduct flow monitoring upstream of the lift station to verify the existing flow to capacity ratio and survey nearby land owners to determine if there is near term development planned.
12 – Industrial Lift Station

Because there is a significant amount of developable land that may flow to this lift station, City personnel should conduct flow monitoring upstream of the lift station to verify the existing flow to capacity ratio.

13 – West Lift Station

At build-out, the sewer main that the Spanish Fields Lift Station currently discharges to will not have sufficient capacity to accommodate all of the flows that may develop within the Spanish Fields tributary area. To prevent the downstream main from exceeding its design capacity, a new lift station and force main should be constructed to collect areas west of the Spanish Fields lift station and pump to the proposed 1550 West Sewer Trunk (Improvement 5 above). City personnel should periodically monitor flows to the Spanish Fields Lift Station to ensure flows are not approaching its available capacity.

14 – 1600 North, 300 West to Main

A new 36-inch sewer main should be constructed to eliminate the potential bottleneck along this stretch of sewer main. Because the existing pipe is borderline adequate for projected flows, flow monitoring should be conducted to verify the necessity of this project. This improvement resolves deficiency B6 as noted in Chapter 5.

PROJECT COSTS

Tables 6-1 shows the estimated project costs for the improvements recommended above. All costs shown are in 2011 dollars. Only Project 1.1 and 2.2 listed in Table 6-1 (below) will be needed to resolve existing deficiencies. The remaining projects will be needed to resolve potential deficiencies arising from future growth. The timing of the following projects will therefore depend on the timing of future development.
Table 6-1
Recommended Collection System Improvements

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Project Name</th>
<th>Diameter</th>
<th>Length</th>
<th>Design Flow (gpm)</th>
<th>Service ERUs</th>
<th>Percent Attributable to Future Growth</th>
<th>Total Cost in 2011 Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>200 East 36-inch Sewer Trunk</td>
<td>36</td>
<td>1,285</td>
<td>7,650</td>
<td>99</td>
<td>100</td>
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</tr>
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<td>1.2</td>
<td>Williams Lane 24-inch</td>
<td>24</td>
<td>1,301</td>
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<td></td>
<td>100</td>
<td>$578,000</td>
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<td></td>
<td><strong>Project 1 Total</strong></td>
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<td>2.1</td>
<td>1850 N to Main</td>
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<td>2.2</td>
<td>Redundant Siphon</td>
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<td>NA</td>
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<td><strong>Project 2 Total</strong></td>
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<td>3.1</td>
<td>Mapleton-Spanish Fork Trunk</td>
<td>21</td>
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<td></td>
<td>15</td>
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<td>3.4</td>
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<td>12</td>
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<td><strong>Project 3 Total</strong></td>
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<td>4.1</td>
<td>Main St Industrial Trunk</td>
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<td>5.1</td>
<td>1550 West Sewer Trunk</td>
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<td>6.1</td>
<td>Canyon Road Diversion/Interceptor</td>
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<td>69</td>
<td>400</td>
<td>400</td>
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<td>$20,000</td>
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<td>7.1</td>
<td>Southwest Force Main</td>
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<td>15,208</td>
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<td>--</td>
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<td>Southwest Lift Station</td>
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<td>8.1</td>
<td>8800 South Sewer Trunk</td>
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<td><strong>Project 8 Total</strong></td>
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<td>9.1</td>
<td>Airport Gravity Sewer Main</td>
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<td>500</td>
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<td>9.2</td>
<td>Force main</td>
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<td>11.1&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>12.1&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>13.1</td>
<td>West Lift Station</td>
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<td>5700</td>
<td></td>
<td>100</td>
<td>$1,148,000</td>
</tr>
<tr>
<td></td>
<td><strong>Total Project Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$52,318,000</strong></td>
</tr>
</tbody>
</table>

<sup>a</sup>Costs shown for these lift stations are replacement costs. Early projects will likely be much less and consist of minor repairs or upgrades to pumps.
UNIT COSTS

Many of the projects identified in Table 6-1 will be constructed in undeveloped areas. The City normally requires developers to install 8-inch diameter pipes. However, where capital projects are constructed through developing areas, it is recommended that the City require developers to install the larger pipe size(s) recommended by the model in the master plan. Developers should be reimbursed for the difference between the larger pipe cost and the cost of the 8-inch sewer main. Reimbursement for growth related capacity above 8-inch is listed in Table 6-2. Unit price costs are shown in 2011 dollars based on the July 2011 Engineering News Record (ENR) Construction Index value. Note that these costs may be updated on annual basis using the ratio of the current ENR Index value to the July 2011 ENR Index value.

<table>
<thead>
<tr>
<th>Pipe Diameter (in)</th>
<th>Cost per Lineal Foot</th>
<th>% Growth Related</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>$189</td>
<td>0%</td>
</tr>
<tr>
<td>10</td>
<td>$196</td>
<td>3%</td>
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<tr>
<td>12</td>
<td>$203</td>
<td>7%</td>
</tr>
<tr>
<td>15</td>
<td>$236</td>
<td>20%</td>
</tr>
<tr>
<td>18</td>
<td>$270</td>
<td>30%</td>
</tr>
<tr>
<td>21</td>
<td>$304</td>
<td>38%</td>
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<tr>
<td>24</td>
<td>$338</td>
<td>44%</td>
</tr>
<tr>
<td>30</td>
<td>$432</td>
<td>56%</td>
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<tr>
<td>36</td>
<td>$594</td>
<td>68%</td>
</tr>
<tr>
<td>42</td>
<td>$756</td>
<td>75%</td>
</tr>
<tr>
<td>48</td>
<td>$878</td>
<td>78%</td>
</tr>
</tbody>
</table>
CHAPTER 7
WASTEWATER TREATMENT PLANT SYSTEM IMPROVEMENTS

Spanish Fork City retained Aqua Engineering to prepare a facility plan for the Spanish Fork City WWTP. Note that the WWTP facility plan was prepared independently from the scope of work performed by Bowen Collins & Associates. BC&A made minor clerical corrections and Spanish Fork City personnel provided some effluent requirement corrections to the Aqua facility plan. The purpose of this chapter is to provide background for the WWTP and discuss Aqua’s recommended WWTP system improvements, their costs, and timing of implementation.

WWTP HISTORY

The WWTP services most of Mapleton City and all of Spanish Fork City. Currently the ownership of the treatment facility is split between the two Cities with Spanish fork owning 77% and Mapleton owning 23% of the capacity in the treatment facility. As upgrades are made at the facility the financial requirements for the projects are split between the two Cities according to the capacity split.

The original wastewater treatment plant was constructed in 1956. The original treatment facility consisted of a headworks, a primary clarifier, rock trickling filter, secondary clarifier and two anaerobic digesters. The design capacity of the original facility was 1.8 MGD. In 1987 the plan was upgraded through a series of projects that included a new headworks, primary clarifier, plastic media trickling filter, secondary clarifier, and an additional digester. The design capacity of the upgraded facility is 5.0 MGD.

In 1996 there was a permit change that required a dechlorination system. Sodium bisulfate was added to the system along with the equipment to inject it into the end of the chlorine contact basin. In 1998 a small upgrade was completed which expanded the chlorine contact basin. This expansion allowed half of the basin to be shut down for cleaning while the new basin could continue to allow for contact time prior to discharge. In addition, at that time the primary sludge pumps were also replaced.

In 2002 a new sludge dewatering facility was added to the treatment facility. This included a new 2 meter belt press and a dewatering building used to house the equipment. The headworks were also upgraded with two new step screens and washpactors.

In 2003 a new STM Aerotor basin and a 90-foot final clarifier were added to the treatment system. The original rock trickling filter was abandoned due to a concrete failure at the distributor arm connection. In addition the permit was changed to include an ammonia limit which reduced the biological capacity of the existing system. The new biological process replaced the old rock trickling filter and gave the facility the ability to treat for ammonia. However, even with these additions the design capacity of the treatment facility was reduced to 4.9 MGD because of the new permit requirements.

In 2006 an additional STM Aerotor basin was added to the treatment facility along with a thickener facility. In addition, one of the old secondary clarifiers was converted to a primary clarifier. This conversion required a new pumping station for the clarifier. This upgrade increased the design flow to 6MGD.
In 2009 a new 50-foot digester was installed. It was installed to better treat the biosolids in the treatment system and the design flow is currently 6MGD.

**Design Parameters**

*Flow:*
Spanish Fork – 123 gal/capita/day  
Mapleton – 71 gal/capita/day

*BOD:*
Spanish Fork – 0.17 lb/capita/day  
Mapleton – 0.17 lb/capita/day

*Facility Average Concentrations:*
BOD – 180 mg/l  
TSS – 180 mg/l  
TKN – 40 mg/l

*Design Loadings*
BOD – 9007 lb/day  
TSS – 9007 lb/day

*Effluent Requirements:*
BOD – 25 mg/l  
TSS – 25 mg/l  
E-Coli – 30 Day Average: 126 MPN/100 ml  
E-Coli – 70 Day Average: 157 MPN/100 ml  
Dissolved Oxygen – 4.8 mg/l  
Ammonia – Nitrogen – 18 mg/l  
pH – 6.5-9.0

**WASTEWATER TREATMENT PLANT FACILITY IMPROVEMENTS**

There are three main projects planned for the future which will expand the facility to a total capacity of 8MGD. However, the City will eventually contribute to the construction of a regional treatment facility and has already begun encumbering funds to purchase land (approximately $820,000 as of FYE2011). Estimated funding for future land purchases is estimated to be approximately $1.3 million by Fiscal Year 2018.

**Project 1**

*Primary Mechanism Replacement.* The mechanism in the old primary clarifier is 30 years old and it has lasted beyond its anticipated life expectancy. The concrete tank is still in functional shape; therefore, removing the existing mechanism and installing a new mechanism will extend the life of this unit process. Replacing the mechanism will not expand the capacity of the facility. However, it will prevent the facility from losing existing capacity that it already has.
Install Snail Removal System. This part of the project is intended to remove the snails that are growing on the trickling filter before they can accumulate in the STM Aerotor basins and digesters. As the snails accumulate in those structures they reduce the treatment capacity of each of the processes. Snail removal would not be necessary if the trickling filter was removed from the process. However, this project will extend the life of the treatment facility into the future and get as much life out of the existing trickling filter as possible.

Install New Automatic Transfer Switch on Backup Generator. The existing transfer switch is getting old and repair parts are no longer available for repairs. It is assumed that the installation of a new transfer switch will occur in the near future. This could be easily done as a maintenance project if it is found necessary to replace the switch instead of making it part of another project.

Convert Chlorine Contact Basin to UV Disinfection. Installing UV disinfection is a change from the current chlorination process used for disinfection. The driver for this is related to changes in water quality standards. This will be discussed further below. UV systems have become more reliable and efficient over the last few years and it is a better solution than dechlorination. With the risk management plan requirements to store gaseous chlorine and sulfur dioxide most wastewater systems are going to UV for disinfection. This will eliminate the need for a risk management plan at the treatment facility. The cost includes all the lights necessary for the ultimate design flow of 8MGD.

Project 2

New STM Aerotor. New STM Aerotor - This includes the installation of a new aeration basin that will expand the biological capacity of the treatment facility. This new basin will allow the organic loading to the treatment facility to meet the loading required from a design flow of 8MGD.

90-Foot Final Clarifier. A new clarifier is required to handle the additional hydraulic flow allowed by the addition of the biological process. This clarifier is paired with the new STM Aerotor to settle the solids.

Headworks Upgrade. This upgrade is required to allow for the additional flow in the facility. New screens that will allow the additional hydraulic capacity will be required. It is anticipated that the existing screens will have had a full service life at this point in time. If the screens need to be replaced prior to this project, they should be sized for the larger design flow.

Remove Old Trickling Filter. The old rock trickling filter is not functioning. Some of the wall and rocks have been removed but it needs to be completely removed from the facility. Removing this old abandoned structure will help clean up the site.

Project 3

Replace Existing Trickling Filter with STM Aerotor. It is anticipated that the trickling filter will need major renovation in the future to allow it to function. Currently it will not remove nitrogen as well as the STM aerator processes. Snails grow on the media causing problems in downstream processes. In the winter, when the weather gets cold, there have been freezing
problems with the wastewater on the media. For these reasons it is anticipated that this unit process will be replaced.

A summary of these projects is shown in Table 7-1 below. Projections for growth have come from Spanish Fork City personnel. The timing of when these facility projects will need to be constructed will depend on the rate of growth in Spanish Fork City wastewater service area. The future layout of the 8 MGD facility is shown in the Figure 7-1.

Table 7-1
Recommended WWTP Improvements

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Total Population (Spanish Fork City + Mapleton City)</th>
<th>Projected Year of Required Completion</th>
<th>Project Name</th>
<th>Percent Attributable to Future Growth</th>
<th>Total Cost in 2011 Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>--</td>
<td>--</td>
<td>2018</td>
<td>Purchase Land for Future Regional Treatment Plant</td>
<td>100%</td>
<td>$1,277,000</td>
</tr>
<tr>
<td>1.1</td>
<td>54,000</td>
<td>2013</td>
<td>Primary Mechanism Replacement</td>
<td>0</td>
<td>$140,000</td>
</tr>
<tr>
<td>1.2</td>
<td>54,000</td>
<td>2013</td>
<td>Install Snail Removal System</td>
<td>0</td>
<td>$150,000</td>
</tr>
<tr>
<td>1.3</td>
<td>54,000</td>
<td>2020</td>
<td>Install New Automatic Transfer Switch on Backup Generator</td>
<td>0</td>
<td>$10,000</td>
</tr>
<tr>
<td>1.4</td>
<td>54,000</td>
<td>2020</td>
<td>Convert Chlorine Contact Basin to UV Disinfection</td>
<td>25%</td>
<td>$1,000,000</td>
</tr>
<tr>
<td></td>
<td>54,000</td>
<td></td>
<td><strong>Project 1 Total</strong></td>
<td></td>
<td>$1,260,000</td>
</tr>
<tr>
<td>2.1</td>
<td>57,637</td>
<td>2023</td>
<td>New STM Aerotor</td>
<td>100%</td>
<td>$2,600,000</td>
</tr>
<tr>
<td>2.2</td>
<td>57,637</td>
<td>2023</td>
<td>90-Foot Final Clarifier</td>
<td>100%</td>
<td>$700,000</td>
</tr>
<tr>
<td>2.3</td>
<td>57,637</td>
<td>2023</td>
<td>Headworks Upgrade</td>
<td>100%</td>
<td>$200,000</td>
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<tr>
<td>2.4</td>
<td>57,637</td>
<td>2023</td>
<td>Remove Old Trickling Filter</td>
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<td>$100,000</td>
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<td><strong>Project 2 Total</strong></td>
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<td>$3,600,000</td>
</tr>
<tr>
<td>3.1</td>
<td>68,000</td>
<td>2030</td>
<td>Replace Existing Trickling Filter With STM Aerotor</td>
<td>0</td>
<td>$3,000,000</td>
</tr>
<tr>
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<td></td>
<td><strong>Project 3 Total</strong></td>
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<td>$3,000,000</td>
</tr>
<tr>
<td><strong>Total WWTP Improvements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$9,136,030</strong></td>
</tr>
</tbody>
</table>

1- Based on the population projections as described in Chapter 3.
2- This project will need to be done when the existing trickling filter has reached the useful life or when it becomes too difficult to operate.
FUTURE PERMIT CHANGES

One of the primary items that cause changes in treatment facilities are more stringent permitting requirements. There are several issues that will probably be addressed in future UPDES permits as discussed below.

Chlorine

About 10 years ago there was a push to eliminate chlorine from waterways because of the harm it could cause to aquatic species. When this originally happened Spanish Fork City installed a dechlorination system which used sulfur dioxide to remove chlorine from the water after disinfection. Although this process removed the chlorine it also would reduce the dissolved oxygen if the dosing was high. This required constant monitoring to keep the system in balance to prevent either a chlorine violation or a dissolved oxygen violation. This problem was ultimately remedied by addressing the classification of Dry Creek. It had been misclassified as a warm water fishery. The City documented to the Division of Water Quality that this was actually a drainage ditch and that it was man-made. This changed the classification to 3E which did not have a chlorine standard. In the last triennial review the EPA requested the State to apply a chlorine standard to all aquatic life designations. This would include waters that are classified 3E. Therefore, it is anticipated that a chlorine limit will be applied to the discharge permit in the near future.

Phosphorus

Phosphorus is becoming a big issue throughout the United States along with the State of Utah. Phosphorus is a nutrient that enhances the aquatic growth in water bodies which can cause several different problems such as low dissolved oxygen or taste issues with drinking water or aesthetic issues associated with beneficial uses. In Utah the primary phosphorus control mechanism has been Total Maximum Daily Load (TMDL) analysis. If a water body is listed for a study related to dissolved oxygen or phosphorus, historically a new limit has been placed on point sources within these water bodies.

Currently there is a TMDL study being prepared for Utah Lake which has been in process for the last few years. However, at this point in time they are working on addressing issues associated with the carp population in Utah Lake prior to continuing on with the TMDL study. In addition to the TMDL’s requiring a phosphorus limit the State is currently looking at a statewide standard. They have evaluated the cost for setting a limit of 1 mg/l and also of 0.1 mg/l. They are now looking at the benefits associated with this cost study. Based on this it is anticipated that sometime in the future there will be a phosphorus limit in the UPDES permit. The future planning did not consider potential phosphorus limits because, the potential range is somewhere between 1 mg/l and 0.1 mg/l. The treatment requirements will vary greatly based on the final limit. Therefore, it is not practical to forecast costs associated with phosphorus removal until the actual limit is better known. However, the existing facility has the potential to be modified to meet the phosphorus limit. It will most likely include chemical addition and filtration as the primary means of removal.

Nitrate
Nitrate is another nutrient that is becoming a concern with wastewater discharges. The treatment facility was required to remove ammonia in the past. Interestingly, the process of removing ammonia is basically converting it to nitrate, which is now becoming a pollution of greater concern. It looks like this is a little farther out than phosphorus, but scientists are finding that controlling only one of the key nutrients is not solving the problems. Therefore, it is anticipated that nitrate will be regulated in the future. There are unit processes that can be added to the existing treatment system that will convert nitrate to nitrogen gas. Hydraulically the facility will need to add additional pumping and tankage to denitrify.

**Pharmaceuticals / Endocrine Disruptors**

Pharmaceuticals and endocrine disruptors is a relative new area of research and not a lot is known about the effects of these contaminatees. However, this issue is getting quite a bit of attention in the news. This attention is increasing the public’s concern with the potential risks associated with these contaminants. This is an area of research that should be monitored for changes but at this time they are just starting research on methods to remove this from wastewater. Because of this new research, the public is doing a better job of disposing of their medication in a safe manner by taking it to a collection area. Historically, it was common for people to flush medications down their toilet and this is one of the major ways these contaminants reached the treatment plant. However, even with this new awareness some of the medication that people use is filtered out through their bodies and wasted not the normal matter. This will continue to be an issue at the wastewater treatment plant and in the future there will be discharge requirements for these contaminants.

**REGIONAL TREATMENT FACILITY**

The Southern Utah Valley Municipal Water Association (SUVMWA) was tasked with looking at regionalizing wastewater treatment for the southern part of Utah County by the political leaders that is over the organization. The Cities involved with the initial study were all members of SUVMWA and they included Santaquin, Goshen, Genola, Payson, Salem, Elkridge, Woodland Hills, Spanish Fork, Mapleton, and Springville. The first report was finalized in 2001 and the basic conclusion of the report was that the least expensive alternative was to upgrade existing facilities and build a couple of regional facilities. The most expensive alternative was to build a single regional treatment facility. However, the political leaders felt that they should continue to look at a single regional facility. They felt that the even though the cost was higher, having a single facility would have additional benefits that are not accounted for with a simple engineering cost analysis.

The political leaders requested SUVMWA to enhance on the original regionalization study. They wanted to look at more detail of having a single plant site. They also determined from the first study that Goshen and Genola would not be compatible with a regional facility near Utah Lake because they were small and did not contribute much sewage and they would need a substantial lift station. One of the primary purposes of the second study was to locate a potential site for a single plant regional system. As part of the process trunk line routes and lift stations were selected. A general location for a regional facility was selected; several different treatment alternatives were evaluated. One of the tasks of that report was to determine the best time line to combine all the different existing systems. Based on the population predictions given by the Central Utah Project (CUP) it was anticipated that the regional plant would be needed in about
2030. To get to this time period several upgrades to existing facilities would be required. It was anticipated that Spanish Fork would need to get to a design flow of about 8 MGD.

As part of the regionalization plan there was several steps that were outlined that would help facilitate a regional plant they are as follows:

1. Look for an opportunity to purchase a fairly large contiguous piece of property near Utah Lake. It was recommend to find an area at least 100 acres and preferably closer to 300 acres. This would give the treatment plant a large buffer as development occurs in the surrounding area.

2. Create a district that would operate the existing treatment facilities in the area. This would allow for combination of tasks being done at the existing facilities such as pretreatment and maintenance. This would also be the entity that would continue the planning process for the regional facility. It is anticipated that the growth distribution will be different than projected in each of the Cities but this organization would have additional tools to work to a transition to a regional facility. They would have the ability to transfer wastewater from one treatment location to another if it was necessary. This entity would be responsible to work on funding options to facilitate the transfer to a regional facility.

3. Watch the TMDL study that is being prepared for Utah Lake. Jumping to a regional facility would not completely solve the phosphorus issues. However, having a larger group involved will facilitate better treatment alternatives.

4. Many of the existing facilities were going to be operated in the future as scalping plants. This would allow the existing facilities to use water they treat in the summer for reuse. The solids handling would be at the regional facility.

5. It was recommended that a Membrane Bioreactor Facility (MBR) be constructed for the treatment at the regional facility. This would give the best water quality effluent of the evaluated alternatives. It would also have the ability to meet future water quality requirement changes.

At this time SUMVWA has purchased a parcel of land that is intended to be the regional facility in the future. There are quite a few issues that still need to be worked through before a regional facility becomes a reality.

Spanish Fork Contingency Plan

If the regional facility is not installed a contingency plan was briefly evaluated. The purpose of the contingency plan was to see what design flow the Spanish Fork WWTP could get through the existing site without relocating the existing treatment facility. The general site plan is shown in Figure 7-2. The plan was to install a fifth STM Aerotor basin. All the STM Aerotor basins would then be used as pre-air basins for a flat plate membrane facility. The flat plate membranes were selected because they provide air for a large portion of the biological process. With this configuration it was estimated the WWTP could treat up to 20 MGD on the existing site. It was assumed that the membrane treatment would meet the phosphorus limits that are on the horizon. There were no cost estimates done as part of this evaluation. The sole purpose was to see what flow could be treated on the existing site. Another possibility to expand the existing facility would be to move the City’s Power Shops to a new location and expand the plant to the North.
CHAPTER 8
SYSTEM RENEWAL

In addition to the capacity related improvements described in previous chapters, it is recommended that Spanish Fork City consider and prepare for expected future expenditures associated with the general maintenance and renewal of the existing collection system. The purpose of this chapter is to present recommendations regarding system maintenance and renewal. This is not a comprehensive evaluation of existing maintenance procedures or system conditions, nor is it a complete asset management plan. Instead, it is a collection of general recommendations developed assembled during the master planning process relative to system maintenance and renewal.

SYSTEM RENEWAL

Along with system capacity improvements, effective infrastructure planning must also include asset rehabilitation and replacement, commonly termed renewal. To effectively identify which system facilities need replacement and plan for future asset renewal projects, Spanish Fork City needs to accurately assess and document the current condition of system assets. Towards this goal, BC&A would recommend improvements to its data collection and storage practices regarding system facilities and how the condition of existing facilities is assessed.

Condition Assessment

BC&A recommends implementing two programs for condition assessment in Spanish Fork City:

- **Condition Assessment Coding Using PACP** – The Pipeline Assessment and Certification Program (PACP) is a nationally recognized format for documenting sewer system deficiencies. It is recommended that the City adopt the PACP system to maintain more consistent defect coding during inspection and to make the inspection data more useful for asset management purposes.

- **Refine the Existing Inspection Schedule** – City personnel should inspect all pipes about once every 5 years. This will require City personnel to inspect at least 20 percent of the City’s wastewater collection system every year. This will provide sufficient inspection frequency to identify most pipe deterioration issues before they become problems. In some cases, however, groundwater, vegetation, and/or sediment concerns may merit more frequent inspection. If PACP inspection is adopted, the City will be able to establish an inspection history for each pipeline in the system to determine which mains may need more frequent inspection.

Concrete Pipe Assessment and Rehabilitation

One item of concern relative to system renewal is the corrosion of existing concrete pipe. Hydrogen sulfide gas can result in the formation of sulfuric acid (H2SO4) on pipe and manhole walls. Sulfuric acid can result in severe corrosion of ferrous metals and concrete. The top of a moist concrete pipe is a common area for corrosion. This is a significant concern in Spanish Fork because much the City’s larger pipes are constructed of concrete pipe.
Other areas of concern for hydrogen sulfide accumulation are at force main discharge locations. Because force mains flow full, very little corrosion will occur through the force main pipe. However, because they flow full, there is a larger hydrogen sulfide (H₂S) producing slime layer. As these pipes discharge into gravity mains and are aerated, hydrogen sulfide gas can be released. The 30-inch trunk near the City’s wastewater treatment plant has a siphon and two force mains that discharge into it. This configuration may lead to elevated levels of hydrogen sulfide. Each of the trunks upstream of the WWTP should be monitored to determine if hydrogen sulfide is above normal levels. If high levels of H₂S are present, it is recommended that the concrete pipes be rehabilitated to prevent corrosion. Several available rehabilitation technologies include: cured-in-place pipe, thermoformed pipe, and sliplining.

SYSTEM RENEWAL BUDGET

System Pipes

The total cost to replace all of the pipes in the Spanish Fork Collection system would be approximately $163 million based on 2011 construction costs. For the purposes of this evaluation, BC&A recommends that Spanish Fork assume a 100-year system service life. This is probably not unreasonable given the observed performance of historic sewer collection systems and the expected design lives of new materials. To replace 1 percent of the collection system every year (or 100 percent every 100-years), it would cost approximately $1.63 million/year in 2011 dollars.

Figure 8-1 indicates two approaches for system renewal of a hypothetical system that began to be installed around the year 1910. Note that many sewer collection systems in Utah County began to be installed around this time. The first approach assumes that the pipe is replaced at approximately 100-years of age. Based on this approach, replacement costs would be as low as $500,000/year up until approximately the year 2030 when the amount of pipes reaching 100-years of age begins to increase. Note that replacement costs using this approach mimic the development pattern from the previous 100-years. This approach keeps annual renewal costs low initially, but these costs begin to grow rapidly as the overall system progressively ages.

The uniform approach presented in Figure 8-1 assumes that the City either replaces aging pipes on an annual basis or establishes a depreciation fund (or sinking fund) that invests sufficient capital so that pipes may be replaced when they have reached the end of their service life. BC&A recommends this approach for system renewal because the service life of many pipes in the system may fail before reaching 100-years of age, leading to costly emergency repairs. Assuming Spanish Fork City’s development history is similar to the history shown in Figure 8-1, the City should not expect to see significant deterioration of its wastewater collection system in the near future. However, to prevent long-term increases in the cost of system renewal or system failures, the City should begin establishing a depreciation fund or committing to rehabilitation projects soon.

In reality, it will not be necessary to completely replace all system components every 100 years because of new rehabilitation technologies (e.g. sliplining, cast-in-place pipe, etc.). Rehabilitation costs are much lower than replacement costs (20% to 60% depending on pipe diameter). If the City were able to rehabilitate all of its system components once every 100 years (instead of replacements components), it could reduce its annual renewal budget to about $0.5 million/year. It is generally not possible to rehabilitate all system components due to either
**Figure 8-1**

**Hypothetical Wastewater Collection System**

**Replacement at 100-years of Age vs. Uniform Replacement on Annual Basis**

- **Uniform Replacement Budget**
- **Replacement Cost at 100-years of Age**

**Year of Anticipated Replacement based on 100-Year Service Life**

**2011 Dollars**

- $0
- $2,000,000
- $4,000,000
- $6,000,000
- $8,000,000
- $10,000,000
- $12,000,000
condition or capacity concerns. Some components are so far deteriorated that rehabilitation techniques are inadequate and the components must be replaced. Others require upsizing which also necessitates replacement.

To account for the limitations on rehabilitation, BC&A proposes a renewal budget for Spanish Fork City based on a combination of rehabilitation and replacement as shown in Table 8-1. This table shows a comparison of the required annual renewal budgets based on both replacement and rehabilitation with some assumptions about the percentage of the collection system that can be rehabilitated. In most cases, larger diameter pipelines can be rehabilitated while smaller diameter pipelines will need to be replaced. Based on the table, BC&A recommends Spanish Fork City budget about $800,000 annually (based on 2011 dollars) for system renewal.

### Table 8-1

<table>
<thead>
<tr>
<th>Diameter (in)</th>
<th>Length (ft)</th>
<th>Percent Replaced</th>
<th>Percent Rehabilitated</th>
<th>Replacement Costs</th>
<th>Rehabilitation Cost</th>
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</tr>
<tr>
<td>24</td>
<td>15,453</td>
<td>25</td>
<td>75</td>
<td>$1,271,043</td>
<td>$1,390,807</td>
</tr>
<tr>
<td>30</td>
<td>16,794</td>
<td>0</td>
<td>100</td>
<td>$0</td>
<td>$3,022,887</td>
</tr>
<tr>
<td>36</td>
<td>11,828</td>
<td>0</td>
<td>100</td>
<td>$0</td>
<td>$2,957,108</td>
</tr>
<tr>
<td>Total</td>
<td>710,318</td>
<td></td>
<td></td>
<td>$53,116,276</td>
<td>$26,163,873</td>
</tr>
<tr>
<td>Total / 100 Years</td>
<td></td>
<td></td>
<td></td>
<td>$531,163</td>
<td>$261,639</td>
</tr>
</tbody>
</table>

Total Annual Renewal Budget $792,801

As the PACP coding results of the City’s collection system accumulate, it may be possible to re-evaluate the estimated service life of system pipes based on observed deterioration rates. If the data indicates that the service life of system pipes will be longer than 100-years, the annual renewal budget could be reduced. Conversely, if the calculated service life of system pipes is less than 100-years, a larger renewal budget may be required.

### Lift Stations

Lift Stations also represent a significant cost in the City’s collection system. Unlike gravity collection mains, lift stations require frequent maintenance and have a much shorter service life than service mains. The replacement value of the City’s lift stations is estimated at approximately $2.0 million. The expected service life of a lift station is approximately 40 years, after which, significant rehabilitation or replacement is likely required. Lift station pumps have an even shorter service life of approximately 20 years. Based on these estimates, the City should
be spending approximately $54,500/year on lift station rehabilitation. This may include saving funds for future rehabilitation of wet wells, pump replacement, or control repairs.

**Wastewater Treatment Plant**

The City’s Wastewater Treatment Plant is one of the most expensive parts of its wastewater system. Based on data provided by Aqua Engineering, estimated costs for wastewater treatment plant improvements are approximately $7,860,000 over the next 20 years. Therefore the City should be saving approximately $400,000 per year to provide sufficient funds for treatment plant improvements. Table 8-2 shows the total renewal costs that should be spent or saved every year for system rehabilitation and/or replacement.

**Table 8-2**

Required System Renewal Budgets for Various System Components

<table>
<thead>
<tr>
<th>System Component</th>
<th>Renewal Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection System</td>
<td>$800,000</td>
</tr>
<tr>
<td>Lift Stations</td>
<td>$54,500</td>
</tr>
<tr>
<td>Wastewater Treatment Plant</td>
<td>$400,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,254,500</strong></td>
</tr>
</tbody>
</table>

**Planning Costs**

This report, the associated recommendations, and the Capital Facilities Plan should be updated to about every 5 years, or more frequently, depending on how and where the City has developed and proposed or adopted zoning or land use changes. We would also recommend the existing conditions model be updated on an ongoing basis, as development occurs in Spanish Fork City. Regular updates to the model will allow the City to analyze the impact of development on the City’s wastewater facilities. The costs associated with updates to this report, model updates, and other analyzes associated with this report are anticipated by Spanish Fork City to be about $15,000 per year.

**SYSTEM RENEWAL PRIORITIES**

Because of limited funding, it may be necessary to prioritize initial system rehabilitation activities based on the potential consequence of various pipes. The following criteria may aid Spanish Fork City personnel in identifying pipes that are most critical based on their relative importance in the Spanish Fork City collection system:

- **Sewer Flow Rate** – Flow rate in a sewer pipe is the single most important indicator of the importance of a pipe. In most situations, the higher the flow rate, the larger the area that pipe serves. Bypass pumping cost, the risk of property damage, environmental and regulatory consequences, the cost of pipe replacement, and problems from sewage backing up in the system are all greater for larger flow rates. In a worst case scenario, if a pipe collapses or becomes blocked (due to corrosion or a natural disaster) and surcharging in the pipeline results in wastewater flows in basements and the street, there is a greater health hazard to the public with a larger wastewater flow rate.
• **Road Type** – There is a direct connection between the density of traffic and the cost and time associated with maintenance and repairs on sewer pipes. Thus, pipelines in high traffic areas must be considered more critical than similarly sized pipelines in lower traffic areas. For example, the cost of failure for pipes under I-15 would be much higher than equivalent sized pipes in residential streets or open space areas.

• **Pipe Depth** - The depth of the pipe can have a significant impact on the cost of repairs and rehabilitation of sewer pipe. Extensions on backhoes, very wide trenches, possible dewatering, etc. make repairs and maintenance much more expensive and time consuming on deeper pipes. As a result, deep pipelines should be considered higher priority than their similarly sized shallow counterparts.
CHAPTER 9
12-YEAR CAPITAL FACILITY PLAN

The purpose of this chapter is to summarize Spanish Fork City personnel estimates of the timing of various capital projects described in Chapter 6, 7, and 8. BC&A did not participate in the development of the schedule of projects.

COLLECTION SYSTEM PROJECTS

Only two collection system improvements will be required within the next 12-years. Project 1 and 2 are described in further detail as part of Chapter 6. Table 9-1 lists these projects and their associated costs.

Table 9-1
12-Year Collection System Improvements

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Redundant Siphon</td>
<td>$115,000</td>
<td>60%</td>
<td>2,800</td>
<td>5,500</td>
<td>FY2012</td>
</tr>
<tr>
<td>1.2</td>
<td>Williams Lane</td>
<td>$578,000</td>
<td>100%</td>
<td>1,800</td>
<td>3,500</td>
<td>FY2016</td>
</tr>
<tr>
<td>2.1</td>
<td>1850 N to WWTP</td>
<td>$845,000</td>
<td>100%</td>
<td>2,800</td>
<td>5,500</td>
<td>FY2018</td>
</tr>
</tbody>
</table>

WASTEWATER TREATMENT PLANT PROJECTS

Several treatment plant improvements will be required within the next 12-years. Table 9-2 lists these projects and their associated costs.
Table 9-2
12-Year Wastewater Treatment Plant Improvements

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Proj. Description</th>
<th>Total Cost (2011 Dollars)</th>
<th>Percent Attributable to Future Growth</th>
<th>Projected Year of Required Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>--</td>
<td>Purchase Land for Future Regional Treatment Plant</td>
<td>$1,300,000</td>
<td>100%</td>
<td>FY2018</td>
</tr>
<tr>
<td>1.1</td>
<td>Primary Mechanism Replace.</td>
<td>$140,000</td>
<td>0%</td>
<td>FY2013</td>
</tr>
<tr>
<td>1.3</td>
<td>New Auto. Tran. Switch &amp; Backup Gen</td>
<td>$10,000</td>
<td>0%</td>
<td>FY2013</td>
</tr>
<tr>
<td>1.4</td>
<td>Convert Chlorine Cont Basin-UV</td>
<td>$1,000,000</td>
<td>25%</td>
<td>FY2020-2023</td>
</tr>
<tr>
<td>2.1</td>
<td>New STM Aerotor</td>
<td>$2,600,000</td>
<td>100%</td>
<td>FY2020-2023</td>
</tr>
<tr>
<td>2.2</td>
<td>90-Foot Final Clarifier</td>
<td>$700,000</td>
<td>100%</td>
<td>FY2020-2023</td>
</tr>
<tr>
<td>2.3</td>
<td>Headworks Upgrade</td>
<td>$200,000</td>
<td>100%</td>
<td>FY2020-2023</td>
</tr>
</tbody>
</table>

PLANNING PROJECTS

As discussed in Chapter 8, Spanish Fork City personnel estimate annual costs associated with planning documents to be approximately $15,000 per year.
The costs associated with the siphon project and digester project can be attributed to current customers and future users.

The new digester allows the treatment facility operators to take down any of the existing digesters for cleaning, repair or maintenance. Without the new digester it was impossible to meet the digestion treatment requirements when the big digester was taken off line for an extended period of time. The digesters typically are cleaned every 3-5 years and this process takes somewhere between 30 and 60 days. During the cleaning the digester is down and cannot be used. Once the digester is put back on line it will take about 30 days for the process to function normally. It is estimated that the valued of the new digester to the existing community is about 20% of the cost. The other 80% of the cost associated with the new digester should be assigned to new growth.

The siphon project increased the capacity of the wastewater flow that could cross the railroad tracks. The existing siphon is still in use and could handle the flow from existing customers 99% of the time. The new siphon will increase the line capacity for additional growth on the new line. It is assumed that the new siphon should be assigned to growth based on a 99% usage and only 1% would be used by existing customers.

Summary
Digester - 80% to new growth 20% to existing customers.
Siphon - 99% to new growth and 1% to existing customers.
APPENDIX A
FLOW METER FIGURES
Figure M1
Observed Flow at Flow Meter 1 vs. Hydraulic Model Simulation
(Treatment Plant Flows)
Figure M2
Observed Flow at Flow Meter 2 vs. Hydraulic Model Simulation

*Infiltration adjusted to reflect March 2011 conditions.
Figure M3
Observed Flow at Flow Meter 3 vs. Hydraulic Model Simulation

- Model Result
- Flow Meter 3 - May 2010
Figure M4

Observed Flow at Flow Meter 4 vs. Hydraulic Model Simulation

- Model Result
- Flow Meter 4 - Apr 2011
- Flow Meter 4 - Jan 2010
Figure M5
Observed Flow at Flow Meter 5 vs. Hydraulic Model Simulation

*Originally flow monitored in August 2010. Infiltration adjusted to reflect March 2011 conditions.
Figure M6
Observed Flow at Flow Meter 6 vs. Hydraulic Model Simulation
Figure M7-A
Observed Flow at Flow Meter 7A vs. Hydraulic Model Simulation
Figure M7-B
Observed Flow at Flow Meter 7B vs. Hydraulic Model Simulation

- Model Result
- Flow Meter 7B - Mar 2011

Flows (gpm)

0:00 3:00 6:00 9:00 12:00 15:00 18:00 21:00 0:00
Figure M7-C
Observed Flow at Flow Meter 7C vs. Hydraulic Model Simulation
Meter M8

Observed Flow at Flow Meter 8 vs. Hydraulic Model Simulation
Figure M9
Observed Flow at Flow Meter 9 vs. Hydraulic Model Simulation

- Model Result
- Flow Meter 9 - February 2011
Figure M10
Observed Flow at Flow Meter 10 vs. Hydraulic Model Simulation

- Model Result
- Flow Meter 10 - March 2011
Figure M11
Observed Flow at Flow Meter 11 vs. Hydraulic Model Simulation
Figure M12
Observed Flow at Flow Meter 12 vs. Hydraulic Model Simulation

*Originally flow monitored in September 2010. Infiltration adjusted to reflect March 2011 conditions.*
Figure M13
Observed Flow at Flow Meter 13 vs. Hydraulic Model Simulation

![Flow Meter 13 vs. Model Result](chart.png)
Figure M14
Observed Flow at Flow Meter 14 vs. Hydraulic Model Simulation

- Model Result
- Flow Meter 14 - March 2011
Figure M15
Observed Flow at Flow Meter M15 vs. Hydraulic Model Simulation

- Model Result
- Flow Meter 15A - February 2011
- Flow Meter 15B - April 2011
Figure M16
Observed Flow at Flow Meter 16 vs. Hydraulic Model Simulation

- March 26, 2011
- March 29, 2011
- Model Results
Figure

Observed Flow at Mapleton Meter vs. Hydraulic Model Simulation

General Conference Peak starts at 6:00pm, peaks at 8:00pm

Legend:
- 3/19/2011
- 3/26/2011
- 4/2/2011
- 4/9/2011
- Model Results
Figure - Mapleton Saturday
Observed Flow at Mapleton Meter vs. Hydraulic Model Simulation

General Conference Peak starts at 6:00pm, peaks at 8:00pm

Legend:
- 3/19/2011
- 3/26/2011
- 4/2/2011
- 4/9/2011
- Model Results
Figure - Mapleton Sunday
Observed Flow at Mapleton Meter

General Conference Peak
Figure
Small Area Instantaneous Peaking Factor

Peaking Factor vs. Average Day Flow (gpd)
APPENDIX C
INTERLOCAL AGREEMENTS
INTERLOCAL AGREEMENT ALLOWING SEWAGE AND
WASTEWATER FROM PORTIONS OF SPANISH FORK TO FLOW TO
THE SALEM WASTEWATER TREATMENT PLANT

THIS AGREEMENT (the “Agreement”), is made and entered into by and between
SPANISH FORK CITY (Spanish Fork) 40 South Main, Spanish Fork, Utah 84660 and SALEM
CITY (Salem) 30 West 100 South, P.O. Box 901 Salem City, Utah 84653, both entities are
political subdivisions of the State of Utah.

WITNESSETH

WHEREAS, Spanish Fork and Salem each presently own a system for the collection and
disposal of wastewater sewage; and

WHEREAS, In the future, the cities will have a common boundary along State Road 164
(Utah County 8000 South Street), with the area located north of SR 164 being in Spanish Fork
and the area south of SR 164 being in Salem; and

WHEREAS, As each city grows toward each other, there is an area located both north
and south of SR 164 which cannot be sewerred by gravity flow to either City’s wastewater
treatment plant; and

WHEREAS, It makes economic sense for the Cities to cooperate in the collection and
disposal of wastewater sewage in the area where sewage cannot gravity flow to a treatment plant; and

WHEREAS, The Salem Wastewater Treatment Facility is in close proximity to the area
and currently has excess capacity; and

WHEREAS, in order to achieve operational economies, the Cities desire to enter into this
Agreement to provide for each City’s use of the Salem wastewater treatment plant to sewer the
area adjacent to SR 164, as shown on Exhibit A and incorporated herein by this reference; and

WHEREAS, a cooperative effort from each City to provide for the sewage collection and
treatment needs of the citizens is a basic underlying goal of the Cities to this Agreement;

NOW, THEREFORE, be it mutually covenanted and agreed as follows:

SECTION ONE
PURPOSE

The purpose of this Agreement is to provide for: (i) the use, operation and maintenance of
the Salem Wastewater Treatment Facility for the mutual benefit of the Cities; and (ii) the
establishment of a system for sharing the costs and expenses related to the use, operation and
maintenance of the Facility.

SECTION TWO
SCOPE OF SERVICE

Salem shall contract with a developer to construct and install a sewer lift station in the
approximate location shown on Exhibit A. The sewer lift station will pump collected wastewater
to the Salem Wastewater Treatment Plant. The sewer lift station will service the area identified
in Exhibit A, some of which is or will be in Salem and some of which is or will be in Spanish Fork. Salem will own the lift station and be responsible for its operation and maintenance. Spanish Fork shall pay a user fee, as set forth herein for the opportunity to use the lift station and wastewater treatment facility.

SECTION THREE
FEES

For each new residential unit or equivalent residential unit (ERU) in Spanish Fork connected to the wastewater collection system feeding the sewer lift station identified in Exhibit A, Spanish Fork agrees to pay to Salem an impact fee in the amount of the Salem City sewer impact fee in place at the time of connection. Until notified otherwise, the current fee is $1,615.00 per ERU. Spanish Fork agrees to collect the impact fee amount when a building permit is issued. Payment shall be remitted within thirty-days (30) of collection by Spanish Fork. Nothing herein shall preclude Spanish Fork from assessing its own impact fee based upon the impact to its facilities. Spanish Fork shall be obligated to notify Salem monthly of all new building permits issued during that month within the Spanish Fork area of Exhibit A.

Spanish Fork agrees to pay Salem a monthly usage fee of twenty-four dollars ($24.00) per ERU connection. This fee is based upon the average cost for a Salem City resident. The monthly fee shall reflect the average cost of a Salem resident, rounded up to the nearest whole dollar. Payment shall be remitted to Salem monthly. Spanish Fork shall be responsible to remit payment for the number of connections that are being served each month to Salem on or before the 25th day of each month. Spanish Fork agrees to allow Salem, at Salem’s expense, to inspect and verify the number of active accounts.

The parties understand and agree that the impact fee and the monthly service fee are subject to change by the Salem City Council. Salem shall be obligated to notify Spanish Fork of any changes, in the same manner it notifies its own residents. The new charges shall be effective and applicable for Spanish Fork at the same time they are effective and applicable for Salem residents.

SECTION FOUR
OPERATION AND MAINTENANCE

Salem shall own and operate the lift station and the wastewater service mains, laterals, and collection lines located inside its municipal limits and outside its limits in unincorporated areas within its Comprehensive General Plan area. Salem is responsible for all of the costs, including capital costs, operation costs, and maintenance costs of the lift station and lines owned by it.

Spanish Fork shall own the wastewater service mains, laterals, and collection lines located inside its municipal limits and outside its limits in unincorporated areas within its Comprehensive General Plan area. Spanish Fork is responsible for all of the costs, including capital costs, operation costs, and maintenance costs of the lines owned by it.

SECTION FIVE
CAPACITY AND GROWTH LIMITS

Salem City allocates 400 units to Spanish Fork City, within the Exhibit A area, which are allowed to flow to the Salem Wastewater Treatment Facility. A unit is the amount of discharge made by a typical residential user within Salem City. For commercial or industrial users, a residential equivalent shall be calculated and used. If Salem’s growth ends up being faster than
that of Spanish Fork, it has the capability to call back some portion of the 400 units. The exact number and timing shall be subject to availability and negotiation. When the Salem Wastewater Treatment Facility begins to reach capacity, the parties will jointly seek a way to increase capacity at the Wastewater Treatment Facility, provided Salem may veto any proposal which would cause it to incur financial expenditures. Expansion costs will be shared by the parties on a pro-rata basis, or as they may otherwise agree, in writing. Spanish Fork will notify Salem of any proposed industrial or commercial user which may impact the functioning or capacity of the wastewater treatment facility. Spanish Fork will also notify Salem of any applications for plat approval, which will use any portion of the 400 allocated units.

Each City may designate up to three individuals to represent it in any discussions about increasing capacity or of approving new projects.

SECTION SIX
EFFECTIVE DATE, TERM AND DURATION

This Agreement shall be effective on the date it is signed by the parties, and shall continue for a period of fifty (50) years, unless sooner terminated as provided herein.

SECTION SEVEN
FILING OF AGREEMENT

A copy of this Agreement shall be placed on file in the Office of the City Recorder of each City and shall remain on file for public inspection during the term of this Agreement.

SECTION EIGHT
NOTICE OF DEFAULT; CORRECTIVE ACTION

The failure of any party to comply with each and every term and condition of this Agreement shall constitute a breach of this Agreement. The defaulting party shall have thirty (30) days after receipt of written notice from the other party of any breach to correct the conditions specified in the notice, or if the corrections cannot be made within the thirty (30) day period, within a reasonable time if corrective action is commenced within thirty (30) days after receipt of the notice.

SECTION NINE
RIGHTS AND REMEDIES

In the event of any breach hereunder and after the lapse of the cure period as per Section Seven above, the non-breaching party shall have all the rights and remedies available under the laws of the State of Utah. The rights and remedies of the parties hereto shall not be mutually exclusive, but shall be cumulative in all respects. The respective rights and obligations of the parties hereunder shall be enforceable in equity as well as at law or otherwise.

SECTION TEN
GOVERNING LAW, JURISDICTION, AND VENUE

All questions with respect to the construction of this Agreement and all rights and liabilities of the parties shall be governed by the laws of the State of Utah. Jurisdiction and venue for the enforcement of this Agreement shall be found in the courts of Utah County, State of Utah.
SECTION ELEVEN
COSTS OF ENFORCEMENT

In the event of a breach of this Agreement, the non-breaching party shall be entitled to recover from the breaching party all of the non-breaching party’s costs (including, but not limited to, courts fees and expert witness costs and attorneys fees associated with the enforcement of this Agreement.

SECTION TWELVE
NOTICE

Any written notice which must or may be given relating to this Agreement shall be sufficient if mailed postage prepaid, certified mail, in the United States mail addressed to a party at the address given above. Notice shall be mailed to the attention of the City Mayor at the above address. Either party shall notify the other to designate a different address for mailing.

SECTION THIRTEEN
TERMINATION

Any party may terminate this Agreement after the initial term at any time by giving the other party at least one year prior written notice of the same.

SECTION FOURTEEN
GENERAL PROVISIONS

A. Severability. In the event that any condition, covenant, or other provision herein contained is held to be invalid or void by any court of competent jurisdiction, the same shall be deemed severable from the remainder of this Agreement and shall in no way affect any other covenant or condition herein contained. If such condition, covenant, or other provision shall be deemed invalid due to its scope or breadth, such provision shall be deemed valid to the extent of the scope or breadth permitted by law.

B. Entire Agreement. This Agreement contains the entire agreement between the parties. No promise, representation, warranty, or covenant not included in this Agreement has been or is relied upon by the parties. All prior understandings, negotiations, or agreements are merged herein and superseded hereby.

C. Amendments. This Agreement may be modified only by a writing signed by each of the parties hereto.

D. Covenants and Conditions. Each provision of this Agreement performable by each City shall be deemed to be both a covenant and a condition.

E. Not Assignable. This Agreement is specific to the parties hereto and is therefore not assignable.

F. Binding Effect. This Agreement shall bind the parties and their respective successors.

G. Captions. The captions to the various Sections of this Agreement are for convenience and ease of reference only and do not define, limit, augment, or describe the scope,
content, or intent of this Agreement or any part or parts of this Agreement.

H. **Time.** Time is of the essence of each term, provision, and covenant of this Agreement.

I. **Counterparts.** This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which shall constitute one and the same instrument.

J. **Gender and Number.** The singular number includes the plural whenever the context so indicates. The neuter gender includes the feminine and masculine, the masculine includes the feminine and neuter, and the feminine includes the masculine and neuter, and each includes corporation, limited liability company, partnership, or other legal entity when the context so requires. The word "person" means person or persons or other entity or entities or any combination of persons and entities.

K. **Waiver or Forbearance.** No delay or omission in the exercise of any right or remedy by any party hereto shall impair such right or remedy or be construed as a waiver. Any waiver of any breach must be in writing and shall not be a waiver of any other breach concerning the same or any other provision of this Agreement.

L. **No Partnership, Joint Venture, or Third Party Rights.** Except as specifically set forth herein, nothing in this Agreement shall be construed as creating any partnership, joint venture, or business arrangement among the parties hereto, nor any rights or benefits to third parties.

IN WITNESS WHEREOF, the parties have signed and executed this AGREEMENT, after resolutions duly and lawfully passed, on the dates listed below.

DATED this ____ day of July, 2011.

SPANISH FORK CITY by:

G. WAYNE ANDERSEN, Mayor

Attest:

KENT R. CLARK, City Recorder

Approved as to form:

Special City Attorney
SALEM CITY by:

JONATHAN F. COPE, Mayor

Attest:

JEFFREY D. NIELSON, City Recorder

Approved as to form:

Special City Attorney
INTER-LOCAL AGREEMENT FOR CONSTRUCTION, USE, AND MAINTENANCE OF JOINT WASTEWATER FACILITY

This Agreement (the "Agreement") is made and entered into this 5th day of April, 1995, by and between Spanish Fork City, a municipal corporation of the State of Utah ("Spanish Fork") and Mapleton City, a municipal corporation of the State of Utah ("Mapleton"). The parties to this Agreement are sometimes referred to collectively herein as the "Communities" and separately as a "Community".

WITNESSETH

WHEREAS, Spanish Fork presently owns a system for the collection and disposal of wastewater sewage; and

WHEREAS, in order to achieve certain operational economies, the Communities desire to enter into this Agreement to provide for the terms of use, operation and maintenance of the wastewater treatment facility and any other joint treatment plant or facilities that may be constructed in the future; and

WHEREAS, a cooperative effort from each party to provide for the sewage collection and treatment needs of the citizens is a basic underlying goal of each of the parties to this Agreement;

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:
ARTICLE I
DEFINITIONS

For the purposes of this Agreement the following terms shall have the respective meanings set forth below except where the context indicates otherwise:

1. ACT means the Inter-Local Cooperation Act, Utah Code Annotated, Section 11-13-1 et. seq., (1953 as amended).

2. AGREEMENT means this document.

3. ANNUAL BUDGET means the annual budget for the use, operation and maintenance for the Facility for each fiscal year. The Annual Budget shall specify the projected operation and maintenance expenses for the Facility for the relevant fiscal year and any costs for repairs or improvements to the Facility to be accomplished during the fiscal year. The first Annual Budget shall relate to the period of time from the date that the wastewater from Mapleton begins to be transported to the Facility to and including the next June 30th, even though the first Annual Budget may relate to a period of less than twelve (12) months.

4. BILLING PERIOD means a monthly period commencing on the first day of each month during the term of this Agreement, to and including the last day of that month.

5. CAPITAL COSTS means future costs and expenses incurred in any expansion of the Facility including but not limited to all costs of construction, construction period interest costs, costs of architects and engineers, and other similar costs and expenses incurred by way of expansion to the Facility.

6. SPANISH FORK means Spanish Fork City, a municipal corporation and body politic located in Utah County, Utah.
7. CODE means the official compilation published and known as the Utah Code Annotated, 1953 as amended.

8. COLLECTION SYSTEM means the wastewater collector and interceptor pipeline system of each City which is owned and operated, or will be owned and operated exclusively by that City, separate and apart from the Facility, including service laterals, manholes, pump stations, flow-measuring devices and related appurtenances excluding the joint trunk line.

9. CITY OR CITIES means Spanish Fork or Mapleton respectively or in the plural.

10. MAPLETON means Mapleton City, a municipal corporation and body politic located in Utah County, State of Utah.

11. FACILITY means collectively the existing wastewater treatment plant owned and operated by Spanish Fork, including all screens, chambers, pumps, clarifiers, filters, digesters, basins, interconnecting pipes, outfall line, joint trunk line, transfer structures, and other equipment and facilities.

12. FISCAL YEAR means a period of twelve (12) consecutive months commencing on July 1st and ending on June 30th of the following year.

13. GOVERNING BODY means the duly elected mayor and city council.

14. OPERATION AND MAINTENANCE EXPENSES means with respect to the Facility and joint trunk line, all expenses reasonably incurred in connection with the operation and maintenance of the Facility and joint trunk line including:

   a. Repairs and replacements of all existing equipment, buildings, and facilities necessary to keep the Facility in efficient operating condition.
b. Costs incurred in preparing operating reports and other reports as may be required herein;

c. Premiums on insurance for the Facility required herein;

d. Actual costs incurred by Spanish Fork City in carrying out the duties and responsibilities specified in this Agreement, including all wages, overtime, third-party contract expenses for equipment and other special services, employee benefits, general office overhead, administrative expenses and vehicle mileage, provided however that Spanish Fork City costs to be included in Operation and Maintenance Expenses shall only be those fairly attributable to the operation of the Facility, and not include costs attributable to any Collection System.

e. Generally all expenses, exclusive of depreciation, which under generally accepted accounting principles are properly allocated to operation and maintenance of the Facility, but only such expenses as are reasonable and necessary to the efficient operation and maintenance of the Facility shall be included.

15. ORDINANCE means a legislative enactment by a Governing Body of the City.

16. JOINT TRUNK LINE means that collection line running from the west side of the DRGW Railroad to the connection with the existing facility owned by Spanish Fork City.

17. PLANT CAPACITY means total volume of the Spanish Fork Treatment Plant, which the plant is capable of processing, currently 5.0 million gallons per day, average daily flow.

18. JOINT TRUNK LINE CAPACITY means the total volume of sewage capable of being transported to the treatment facility through the joint trunk line.
ARTICLE II

PURPOSE AND TERM OF AGREEMENT

2.1 Purpose. The purpose of this Agreement is to provide for: (i) the use, operation and maintenance of the Facility for the mutual benefit of the Cities; (ii) to provide for an Advisory Group to give recommendations regarding the operation and maintenance of the Facility, and to make recommendations regarding the expansion and replacement of the Facility; and (iii) the establishment of a system for sharing the costs and expenses related to the use, operation and maintenance of the Facility.

2.2 Term of Contract. This Contract shall be in full force and continue in effect for 50 years.
ARTICLE III

OWNERSHIP OF FACILITIES AND PURCHASE OF CAPACITY

3.1 Ownership of Various Facilities. Spanish Fork will retain all ownership interests in its Collection System, the Facility, and land, which constitute the wastewater treatment plant. Mapleton will retain all ownership interest in its Collection System. Nothing herein shall be construed to grant to any City any ownership interest in property or assets of the other City.

3.2 Right to Use. Mapleton shall have the right and power during the term of this Agreement to connect its Collection System to the joint trunk line and thereby cause the sewage and wastewater from its residents and customers to be transmitted to the Facility for treatment, pursuant to the terms of this agreement.

3.3 Purchase of Capacity by Mapleton. The current capacity of the Spanish Fork treatment plant is 5.0 Million Gallons per Day (hereafter "MGD"). Mapleton is purchasing from Spanish Fork a capacity of the plant, defined as up to 0.59 MGD, measured as a daily average for the purchase price of $850,700, which price represents the negotiated price agreed upon by both cities representing the capital costs of Mapleton's capacity purchase. The purchase price shall be paid as follows:

A. $562,000 shall be paid to Spanish Fork upon connection of the Mapleton Collection system to the Joint Trunk Line.

1. Mapleton will install the joint trunk line connecting the Mapleton collection system to the Facility, which connecting line will provide a benefit and use to both cities. It is agreed, that Mapleton will pay all costs associated with the installation of the joint trunk line. Mapleton will receive a credit against the

SFC/Mapleton 4/5/1995 p. 6
$562,000 obligation to Spanish Fork for Spanish Fork's share of the costs of installation of the joint trunk line on the following basis:

All costs, including engineering, inspection, easements and rights-of-way and related construction costs of installation of the joint trunk line from the point where the connecting line crosses the DRGW tracks and continuing to the connection to the existing system, shall be shared by Mapleton and Spanish Fork based on the following ratios:

Mapleton Share  56.18%
Spanish Fork Share  43.82%

2. It is estimated that the cost of installing the Mapleton-Spanish Fork connecting line will be approximately $668,200.00, and that the credit to Mapleton for Spanish Fork's share of those costs will be approximately $292,808.00. However, it is agreed that the calculation of the credit will be based on actual costs incurred and not estimates.

3. If any of the area west of the D&RGW tracks should, during the term of this agreement or any extension thereof, be annexed into Mapleton, Mapleton will reimburse Spanish Fork for Spanish Fork City’s cost of the joint trunk line.

B. The balance of the purchase price, $288,700.00, will be paid by Mapleton to Spanish Fork in five (5) annual payments of $57,740.00 per year, beginning on the sixth year after the connection to the joint trunk line.

1. If Mapleton’s use exceeds 0.39 MGD during the first five years, the annual payments will commence at the end of the first year in which the use exceeds 0.39 MGD.
2. If Mapleton's use does not exceed 0.39 MGD during the first five years, Mapleton will still be obligated to purchase the balance of 0.59 MGD (0.20 MGD) by making the annual payments set forth in paragraph 3.3 (B).

3. With each annual payment of $57,740.00 paid by Mapleton, Mapleton shall be deemed to have purchased an additional 0.04 MGD of capacity usage.

C. No interest shall accrue, nor be paid on any portion of the purchase price.
ARTICLE IV

EXPANSION OR ADJUSTMENTS TO CAPACITIES

4.1 Adjustments to capacities.

a. If Mapleton's wastewater needs require capacity beyond 0.59 MGD at the facility, and if Spanish Fork has additional capacity available, Spanish Fork may sell additional capacity at a price of then current replacement cost less depreciation. Depreciation shall mean the expired term of the useful life of the existing facility at actual historical cost.

b. If Mapleton's wastewater needs require capacity beyond 0.59 MGD at the facility and if Spanish Fork is not willing to sell additional capacity, the cost of expansion shall be paid solely by Mapleton and the additional capacity created will be owned by Mapleton. Spanish Fork City, at Spanish Fork City's option, may participate with Mapleton in any expansion of capacity to the facility at which time each city shall pay for the capital costs of such expansion on the same ratio of each city's capacity within the expanded portion of the plant. Mapleton shall have no financial obligation for expansion of the treatment facility, if such expansion is done based solely on Spanish Fork's need.

c. In the event expansion to the Facility is required by government regulation, each city shall pay for the capital costs of such expansion on the same ratio of each city's capacity to the total plant capacity. In the event an upgrade of the facility is required by government regulation, each city shall pay for the upgrade costs on the same ratio as each city contributes for operation and maintenance.
d. Any expansion to the facility shall be based on the Spanish Fork City 201 Facility Plan, dated November 1980, drawing number X-1 attached.
ARTICLE V

OPERATION AND MAINTENANCE OF THE FACILITY

5.1 Advisory Group. An advisory group shall be created for the purpose of discussing problems, policies, revenues, expenditures, and any other matters affecting the operation of the Facility.

a. Number of Representatives. The Advisory Group shall consist of five members, three of which shall be representatives from Spanish Fork and two from Mapleton.

b. Selecting of Advisory Group Member. Each City's members shall be selected and approved by its Governing Body.

c. Removal or Disability. Each City may remove any of its members with or without cause. Upon such removal or in the event of resignation, a successor shall be appointed for the remainder of that term, by the City who had appointed the member who is no longer serving;

5.2 Duties of Advisory Group. The conclusions, recommendations, or information emanating from a meeting of the Advisory Group shall be presented to Spanish Fork City for its consideration and use in operation, maintenance and/or improvement of the Facilities. It is understood, however, that the function of the group is to further the cooperation between the parties and to render advisory assistance, but in no way to limit the rights of ownership to the facilities set forth in Section 3 above, nor to make binding recommendations, but only advisory.

5.3 Duties and Responsibilities of Spanish Fork City. Spanish Fork City shall be the operator of the facility.
a. Management. Spanish Fork City shall have sole and exclusive responsibility for the day-to-day management of the Facility.

b. Operation and Maintenance. Spanish Fork City shall be responsible for the operation and maintenance of the Facility and shall employ competent and experienced personnel or train such personnel for the Facility and shall use best efforts to operate and maintain the Facility at all times in good repair and condition, and in such a manner that the operating efficiency thereof shall conform to the standards set by Federal, State and Local law.

c. Compliance with Laws. In operating and maintaining the Facility, Spanish Fork City shall comply in every respect with each applicable Federal, State or Local law regulating the safe, sanitary and healthful operation of the Facility, and Spanish Fork City shall make every reasonable effort to prevent a shutdown or bypass of the Facility, or an imposition of penalty by any governmental authority because of a failure to meet or otherwise comply with applicable laws and regulations. If such reasonable effort has been made, but notwithstanding, there is a penalty or requirement imposed by any authorized government authority, the penalty or cost of compliance shall be considered as part of the operation and maintenance expense of the Facility.

d. Insurance. In operating and maintaining the Facility, Spanish Fork City shall obtain and maintain insurance, including but not limited to worker's compensation insurance and public liability insurance in such amounts and to such extent it is customarily carried by other operating utilities of the same type. The cost of such insurance shall be considered an operations and maintenance expense of the Facility. In the event of any loss or
damage to any part of the Facility, insurance proceeds shall be used for the purpose of restoring
or replacing the property lost or damaged.

e. Expenditures. Spanish Fork City shall use its best efforts to keep the
Operation and Maintenance Expenses related to the Facility within the amounts established in the
Annual Budget and shall make no expenditures or incur any obligation in excess of amounts
established in the Annual Budget without revision of the budget.

f. Collections. Spanish Fork shall collect from Mapleton on a monthly basis
Mapleton's proportionate share of Operation and Maintenance Expenses relating to the Facility in
accordance with Article VI of this Agreement, and shall apply those payments against the
budget.

g. Maintain Records. Spanish Fork City shall maintain accurate detailed
records relating to the Facility, including but not limited to flow-measuring records, materials,
and supplies, and payroll records for personnel employed by Spanish Fork City. Spanish Fork
City shall make those records available for inspection at reasonable times to the Advisory Group
and the Governing Body of Mapleton City.

h. Budget Preparation. Spanish Fork City shall prepare and provide a
proposed budget for the next fiscal year by April 1st of each year. Spanish Fork City will make
available, upon request, a copy of the monthly financial report for the Facility. The expenses
incurred in compiling each report shall be regarded as an Operation and Maintenance Expense of
the Facility.

5.4 Duties and Responsibilities of Mapleton City.
a. Sampling. Mapleton shall be responsible for sampling all water entering the joint trunk line. Samples shall take place weekly. Mapleton shall provide to Spanish Fork City a copy of the test results of each sample.
ARTICLE VI

CHARGES FOR OPERATION AND MAINTENANCE EXPENSES

6.1 Sharing of Expenses. All actual operation and maintenance expenses related to the Facility shall be paid on a monthly basis by Mapleton in a ratio determined as follows:

a. A meter will be installed where the joint trunk line crosses the DRGW railroad tracks to measure total flow from Mapleton's collection system. Mapleton will own and read this meter. Spanish Fork may check the readings for accuracy.

b. A meter has been installed at the intake to the treatment plant. Spanish Fork will own and read this meter. Mapleton may check the readings for accuracy.

c. Mapleton shall be responsible to pay to Spanish Fork for the operation of the treatment plant on the ratio of Mapleton's flow as metered at the crossing of the DRGW tracks, to the total flow, as measured at the plant intake.

6.2 Payments to Spanish Fork City. Mapleton shall pay to Spanish Fork the monthly service charge described in Section 6.1 of this Agreement within twenty (20) days after receiving the bill. Mapleton shall have the sole and exclusive right to determine a method of charging residents and customers of its own Collection System. The failure of Mapleton to collect sufficient amounts from its residents and customers shall not relieve Mapleton from its obligations to pay its proportionate share for the operation and maintenance expense of the Facility. If Mapleton fails to pay the full amount due and owing within ten (10) days after the due date thereof, the unpaid balance shall bear an interest rate of one percent (1.0%) per month until paid in full, and all subsequent payments received shall be applied first to interest and then to principal.
6.3 Breach of Agreement. In the event of a breach of this agreement, the non-breaching party shall be entitled to recover its costs and attorneys fees incurred in enforcing the terms hereof. In the event a dispute that the parties cannot amicably resolve, a court of competent jurisdiction in Utah County, or any alternative dispute resolution method agreed upon by the parties may be used to resolve the dispute.
ARTICLE VII

MISCELLANEOUS PROVISIONS

7.1 Adoption of Ordinances. Each City agrees to adopt and enforce such ordinances as are reasonably necessary to permit the purposes of this Agreement to be accomplished. Mapleton further agrees to adopt an ordinance in substantially the same format as Spanish Fork City Municipal Code section 13.32.010. et. seq. (Public Sewer System Regulations and Pretreatment Standards). Mapleton further agrees to be subject to the provisions of section 13.32.

7.2 Joint Cooperation. The Cities hereby agree to cooperate with each other in the planning for the future capital improvements to the Facility or the construction of new treatment facilities for the joint use of the Cities. The installation of such capital improvements or new treatment facilities and costs to be assumed by each city with respect thereto shall be subject to provisions of a separate written Agreement between the Cities.

7.3 Authorized Agreement. Each City hereby represents and warrants that its Governing Body has taken all action as required by law to approve this Agreement and to authorize execution of this Agreement on behalf of that Community.

7.4 Force Majeure. In case by reason of force majeure, either City shall be rendered unable wholly or in part to carry out its obligations under this Agreement, other than the obligation of each City to make the payments required under the terms hereof, then such party shall give notice and full particulars of such force majeure in writing to the other parties within a reasonable time after occurrence of the event or cause relied on, and the obligations of the party giving such notice, so far as they are affected by such force majeure, shall be suspended during the continuance of the inability then claimed, but for no longer period, and such party shall
endeavor to remove and overcome such inability with reasonable dispatch. The term "force majeure" as employed herein shall mean acts of God, strikes, lockouts, or other industrial disturbances, acts or public enemy, an order from any kind of the government of the United States or the State of Utah, insurrections, riots, epidemics, landslides, lightning, earthquakes, fire, hurricanes, storms, floods, washouts, arrests, restraint of government and people, civil disturbance, explosions, breakage, accidents to machinery or collection line, or the partial or complete inability of Spanish Fork City to treat and dispose of such wastewater on account of any other cause not reasonably within the control of Spanish Fork City.

7.5 Miscellaneous Provision.

a. This Agreement shall be governed by and construed under the laws of the State of Utah, including but not limited to the Act.

b. The Cities shall not be deemed to be partners or joint venturers in any manner in the use or operation of the Facility.

c. Spanish Fork City shall be responsible for ascertaining and overseeing compliance by the Facility with all government requirements, including in particular those of the Department of Environmental Quality and the United States Environmental Protection Agency.

d. This Agreement may be amended from time to time by mutual written Agreement between the Cities, provided that said amendment does not jeopardize or adversely affect any notes, bonds or other instruments relating to the financing of the construction of the Facility or the Collection System of any City, and that it does not invalidate or adversely affect the operation or use of the Facility.
e. If any provision of this Agreement is determined by a court of competent jurisdiction to be void, voidable or unenforceable, the validity and enforceability of the remaining provisions of this Agreement shall not be affected thereby.

f. No City may assign its rights or duties under this Agreement without the prior written consent of the other City.

g. Spanish Fork City will maintain ownership of all treated waste water. In the event of sale or lease, the proceeds shall be used to reduce the operation and maintenance expenses at the Facility.

IN WITNESS WHEREOF, the parties have set their hands on the date and the year above written.

SPANISH FORK:

[Corporate Seal]

MARIE HUFF, MAYOR

ATTEST:

KENT R. CLARK
KENT CLARK, CITY RECORDER

Approval as to Form and Compliance with Utah Law.

S. JUNIOR BAKER
SPANISH FORK ATTORNEY
ATTEST:

LORI BRIERLEY, CITY RECORDER

Approval as to Form and Compliance with Utah Law.

M. JAMES BRADY
MAPLETON CITY ATTORNEY
VIA FAX This Date: 4/23/98
To: Glen Peterson  From: Bri Briody
Of: Spanish Fork City  Mapleton City Corp.
Fax: 798-5005  (801) 489-5657

This transmission contains 12 pages, including this cover sheet.

Memo: Give - please take whatever steps necessary to put this on your council agenda. Thanks!

Send minutes 7/7 to Mapleton
March 6, 1998

Mayor Richard Young
Mapleton City
35 East Maple
Mapleton, Utah 84664

RE: Mapleton Sewer - Spanish Fork Outfall

Dear Mayor:

At the time we initially contracted with Spanish Fork City to purchase a capacity of their sewer system, a price was agreed upon requiring an initial buy-in payment of $562,000.00 to be paid by Mapleton City at the time we connected the sewer to the plant. That sewer connection was made slightly more than a year ago, but no payment has been made to Spanish Fork City for our buy-in costs.

One of the offsets to our buy-in costs is the Spanish Fork City’s share of the costs of the installation of the outfall line. This is the main trunk line carrying sewage from Mapleton through Spanish Fork out to the plant. Spanish Fork City agreed to share the costs of the outfall line in that they will use the outfall line for future expansion and development of Spanish Fork City, and the line was designed to accommodate those future additions and use by Spanish Fork.

We have had some difficulty trying to calculate the Spanish Fork share of the installation costs, and therefore the deduction which is to be taken from the Mapleton City buy-in costs. With the help of Russell Brown for Mapleton City, and Richard Heap the Spanish Fork City engineer, we have been able to calculate the Spanish Fork share of the costs of the installation of the outfall line. Having that amount calculated, we can now identify the amount Mapleton City owes Spanish Fork as our initial buy-in cost.

Enclosed please find the letter prepare by Russell Brown on February 26, 1998, identifying the method of calculations and the amounts that the city engineers have agreed should be paid by Mapleton City to Spanish Fork. You will have to check with Lori to be certain, but I believe that Mapleton City has enough funds in their account to make this
payment. As counsel for Mapleton City, I would recommend that the payment be tendered to Spanish Fork City. However, first I would like authorization from the City Council to propose this form of payment to Spanish Fork City attorney so that he may review the same information with his mayor and city council. Perhaps this matter could be brought up as an item in the next city council agenda. If you have any questions, please do not hesitate to contact me.

Very truly yours,

M. JAMES BRADY
Attorney at Law

MJB:cv
Enclosures
February 26, 1998

M. James Brady
Bradford, Brady & Johnson
389 North University Avenue
PO Box 432
Provo, Utah 84603

RE: Mapleton - Spanish Fork Outfall

Dear Jim:

Attached is a copy of a letter I sent to Richard Heap regarding the Spanish Fork City cost of the outfall line.

I talked to Richard and he said that they were comfortable with my recommendation which is shown on sheet 5. Spanish Fork repaired work on the road that leads to their chipping facility. The cost of this work was not included in Mapleton's settlement with Mapleton. The following is Richards compilation of the cost due Spanish Fork.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Spanish Fork Cost Sheets</td>
<td>525,278.66</td>
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<tr>
<td>Less Cost of Road Repair</td>
<td>17,668.89</td>
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<tr>
<td>Spanish Fork Cost</td>
<td>507,609.11</td>
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<tr>
<td>Mapleton Buy in Cost</td>
<td>562,000.00</td>
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<tr>
<td>Less Outfall Cost</td>
<td>507,609.11</td>
</tr>
<tr>
<td>Due Spanish Fork</td>
<td>54,390.89</td>
</tr>
</tbody>
</table>

Please call if you have any questions.

Sincerely,

RB&G ENGINEERING, INC.

Russell O. Brown, P.E.
rob/ar

cc: Charlie Hanna, Mapleton City
November 14, 1997

Mr. Richard Heap  
Spanish Fork City Engineer  
40 South Main  
Spanish Fork, UT 84660

RE: Mapleton Sewer System

Dear Richard:

The contract between Mapleton and Spanish Fork requires Spanish Fork to pay 43 percent of the cost of the sewer outfall line west of the railroad crossing on the Slant Road. An analysis of the cost is attached.

The cost is divided into two parts for the design and construction of the sewer outfall:

1. The cost of the line based on the contractors unit bid prices. This cost is tabulated on Sheet 1.
2. The cost of the claims made by Western Weltek against the project. These claims were settled in arbitration proceedings. The contractors claims are shown on Exhibit A.

Claims are shown on Exhibit A.

Claim 1: Involves two areas near K-Mart. The equipment got stuck in two marsh areas.

Claim 2: Involves the entire pipeline length. The claim is that the trench bottom was unstable and foundation stabilization was required in addition to pipe bedding.

Claim 3: The claim is for the total cost for work by Western Weltek from Station 118+00 to 122+58. It is based on a claimed condition.

Claim 4: The entire cost of the work by a subcontract from Golden State is claimed based on a changed condition. It covers work from Station 122+58 to the end, east of the project.

Claims 6 & 7: These claims are east of the tracks and are Mapleton's responsibility. This claim is for a changed condition.

The total cost of the claims are shown on Sheet 2. The claims were settled for 56.3 percent of the amount claimed.
Richard Heap, P.E.  
November 14, 1997  
Page 2

Sheets 3, 4, and 5 are analysis of Spanish Fork’s share of the cost. Sheet 3 assumes that all claims have equal weight. Sheet 4 assumes that Claim 2 would have been denied and that the settlement does not include this cost.

In my opinion neither of these assumptions are valid. The foundation material from Station 3+00 to 118+00 was clay and it would be difficult to prove that foundation stabilization was necessary. The foundation material from Station 118+00 to 149+00 was mostly fine sand and extra gravel was put under the pipe. It could be argued that it was for dewatering, but the contractor may win on a stabilization argument. Sheet 5 includes Claim 2 from Station 118+00 to 149+00 and is the one I would recommend.

Sincerely,

RB&G ENGINEERING, INC.

Russell O. Brown, P.E.  
rob/bg  
enclosures  
cc: Mayor Peterson
### SCHEDULE IV
COST WEST OF RAILROAD TRACKS

<table>
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<tr>
<th>Bid Items</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>$33.84</td>
<td>$43,687.44</td>
</tr>
<tr>
<td>30&quot; Pipe</td>
<td>1829'</td>
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<td>70,087.28</td>
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<td>30&quot; Pipe</td>
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<td>38,561.00</td>
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<td>30&quot; Pipe</td>
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<td>55,150.15</td>
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<td>$2928.44</td>
<td>105,423.84</td>
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<tr>
<td>42&quot; Casing</td>
<td>86</td>
<td>$441.71</td>
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<td>Granular Base</td>
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<td>39,243.90</td>
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<tr>
<td>Pipe Bedding</td>
<td>14,808'</td>
<td>$7.73</td>
<td>114,465.84</td>
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**CHANGE ORDER NO. 1**
- $32,290.70

**EASEMENTS**
- $44,865.00

**DESIGN ENGINEERING**
- $45,900.00

**TOTAL**
- $879,242.49
SCHEDULE IV
WESTERN WELTEK CLAIMS

Total Claim

Claim 1-7 $1,977,563
Extra Bond 1.5% 29,663
Interest 10% 13 Months 214,170
TOTAL $2,221,396

Settlement 1,250,000.00

1,250,000 = 56.3%
2,221,396

Claim Cost - Legal

RB&G 16,365
Lynn Larson 183,870
Sage Consultants 25,994
TOTAL 225,994

Claim 4 Covers STA 112+58-182+37

West RR Fence is STA 149+00
West of Tracks - 149+00 - 122+58 = 2642' - 44%
East of Tracks - 187+37 - 149+00 = 3337' - 56%

Claim 2 Covers STA 3+00 to 182+37

West of Tracks - 149+00 = 3+00 = 14600'
East of Tracks - 182+37 - 149+00 = 3337
SCHEDULE IV
SPANISH FORK'S COST

Claims West of Tracks

<table>
<thead>
<tr>
<th></th>
<th>Claim</th>
<th>Bond &amp; Interest</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>21,930</td>
<td>2,697</td>
<td>24,627</td>
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<tr>
<td>2.</td>
<td>112,858</td>
<td>13,882</td>
<td>126,740</td>
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<tr>
<td>3.</td>
<td>131,212</td>
<td>16,131</td>
<td>147,351</td>
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<tr>
<td>4.</td>
<td>281,468</td>
<td>34,621</td>
<td>316,089</td>
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Percent of Total Claim West of Tracks

\[
\frac{614,807}{2,221,396} = 27.7\%
\]

Summary West of Tracks

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<tr>
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<td>Construction Cost</td>
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<tr>
<td></td>
<td></td>
<td>1,287,978</td>
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</table>

Spanish Fork = 1,287,978 x .43 = $553,831

Assumes that in the settlement all claims have equal weight.
### SCHEDULE IV
### SPANISH FORK’S COST

**Claims West of Tracks**

<table>
<thead>
<tr>
<th></th>
<th>Claim</th>
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<td>2.</td>
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<td>3.</td>
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<td>16,131</td>
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<tr>
<td>4.</td>
<td>639,700 x .44</td>
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$488,067$

**Percent of Total Claim West of Tracks**

\[
\frac{488067}{220000} = 22.0\%
\]

2221396

**Summary West of Tracks**

<p>| | | | |</p>
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<td>1,203,743</td>
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</tbody>
</table>

Spanish Fork = 1,287,978 x .43 = $517,609

Assumes that in the settlement claim No. 2 was rejected by the arbitration board and is not included in the settlement.
SCHEDULE IV
SPANISH FORK'S COST

Claims West of Tracks

<table>
<thead>
<tr>
<th></th>
<th>Claim</th>
<th>Bond &amp; Interest</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sink Holes</td>
<td>21,930</td>
<td>2,697</td>
</tr>
<tr>
<td>2.</td>
<td>Pipe Bedding 3,100 x 7.73</td>
<td>23,963</td>
<td>2,947</td>
</tr>
<tr>
<td>3.</td>
<td>118+00+0122+60</td>
<td>131,212</td>
<td>16,131</td>
</tr>
<tr>
<td>4.</td>
<td>639,700 x .44</td>
<td>281,468</td>
<td>34,621</td>
</tr>
</tbody>
</table>

Percent of Total Claim West of Tracks

\[ \frac{514,997}{2,221,396} = 0.232\% \]

Summary West of Tracks

<table>
<thead>
<tr>
<th>Claim Cost Legal</th>
<th>225,994 x .232</th>
<th>52,391</th>
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</thead>
<tbody>
<tr>
<td>Claims</td>
<td>514,997 x .563</td>
<td>289,943</td>
</tr>
<tr>
<td>Construction Cost</td>
<td></td>
<td>879,242</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,221,576</td>
</tr>
</tbody>
</table>

Spanish Fork = 1,287,978 x .43 = $525,278

Assumes that in the settlement claim 4 extends only from STA 118 to STA 182+3'.

mapleton.swr/cost2.xls
INTER-LOCAL AGREEMENT FOR CONSTRUCTION, USE, AND MAINTENANCE OF JOINT WASTEWATER FACILITY

This Agreement is made and entered into this 19th day of February, 2004, by and between Spanish Fork City, and Mapleton City. The parties to this Agreement are sometimes referred to collectively herein as the "Cities" and separately as a "City".

WITNESSETH

WHEREAS, Spanish Fork presently owns a system for the collection and disposal of wastewater sewage (the "System"); and

WHEREAS, Mapleton is purchasing hydrological capacity in the System pursuant to an interlocal agreement entered into between the cities on the 5th day of April, 1995; and

WHEREAS, the State of Utah, Department of Environmental Quality, has changed the discharge requirements for the System, causing the System to reach its biologic capacity prior to its hydrological capacity; and

WHEREAS, the changes to the discharge requirements have caused Mapleton to already exceed its share of the biologic capacity; and

WHEREAS, certain expansions to the System need to take place in order to expand the biologic capacity and allow for each City to have growth; and

WHEREAS, in order to achieve operational economies, the Cities desire to enter into this Agreement to provide for the expansion, terms of use, operation and maintenance of the System and any other joint treatment plant or facilities that may be constructed in the future; and

WHEREAS, a cooperative effort from each City to provide for the sewage collection and treatment needs of the citizens is a basic underlying goal of the Cities to this Agreement;

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

ARTICLE I DEFINITIONS

For the purposes of this Agreement the following terms shall have the respective meanings set forth below except where the context indicates otherwise:
1. ACT means the Inter-Local Cooperation Act, Utah Code Annotated §1-13-1 et. seq. (1953 as amended).
2. AGREEMENT means this document.
3. ANNUAL BUDGET means the annual budget for the use, operation and maintenance for
the Facility for each fiscal year. The Annual Budget shall specify the projected operation and maintenance expenses for the Facility for the relevant fiscal year and any costs for repairs or improvements to the Facility to be accomplished during the fiscal year.

4. BILLING PERIOD means a monthly period commencing on the first day of each month during the term of this Agreement, to and including the last day of that month.

5. CAPITAL COSTS means future costs and expenses incurred in any expansion of the Facility including but not limited to all costs of construction, construction period interest costs, costs of architects and engineers, and other similar costs and expenses incurred by way of expansion to the Facility.

6. SPANISH FORK means Spanish Fork City, a municipal corporation and body politic located in Utah County, Utah.

7. CODE means the official compilation published and known as the Utah Code Annotated (1953 as amended).

8. COLLECTION SYSTEM means the wastewater collector and interceptor pipeline system of each City which is owned and operated, or will be owned and operated exclusively by that City, separate and apart from the Facility, including service laterals, manholes, pump stations, flow-measuring devices and related appurtenances, excluding the joint trunk line.

9. CITY or CITIES means Spanish Fork City or Mapleton City respectively, or both of them in the plural.

10. MAPLETON means Mapleton City, a municipal corporation and body politic located in Utah County, State of Utah.

11. FACILITY means collectively the existing wastewater treatment plant owned and operated by Spanish Fork, including all screens, chambers, pumps, clarifiers, filters, digesters, basins, interconnecting pipes, outfall line, transfer structures, and other equipment and facilities.

12. FISCAL YEAR means a period of twelve (12) consecutive months commencing on July 1st and ending on June 30th of the following year.

13. GOVERNING BODY means the duly elected mayor and city council.

14. JOINT TRUNK LINE means that collection line running from the west side of the DRGW Railroad right of way to the connection with the existing Facility owned by Spanish Fork. Mapleton owns 56.18% of the joint trunk line and Spanish Fork owns 43.82% of the joint trunk line.

15. OPERATION AND MAINTENANCE EXPENSES means with, respect to the Facility and joint trunk line, all expenses reasonably incurred in connection with the operation and maintenance of the Facility and joint trunk line including:
   a. Repairs and replacements of all existing equipment, buildings, and facilities necessary to keep the Facility in efficient operating condition;
   b. Costs incurred in preparing operating reports and other reports as may be required herein;
   c. Premiums on insurance for the Facility required herein;
   d. Actual costs incurred by Spanish Fork in carrying out the duties and responsibilities specified in this Agreement, including all wages, overtime, third-party contract expenses for equipment and other special services, employee benefits, general office overhead, administrative expenses and vehicle mileage, provided however that Spanish Fork costs to be included in
Operation and Maintenance Expenses shall only be those fairly attributable to the operation of the Facility, and not include costs attributable to any Collection System.

e. Generally all expenses, exclusive of depreciation, which under generally accepted accounting principles are properly allocated to operation and maintenance of the Facility, but only such expenses as are reasonable and necessary to the efficient operation and maintenance of the Facility shall be included.

16. ORDINANCE means a legislative enactment by a Governing Body of the City.

17. PLANT CAPACITY means the lesser of:
   a. the total hydrologic volume of the Spanish Fork Treatment Plant, which the Facility is capable of processing, currently 5.0 million gallons per day, average daily flow; or
   b. the total biological volume which the Facility is capable of processing, based on the regulations on contaminate discharges, as set forth in the Facility UPDES permit issued by the State of Utah.

18. JOINT TRUNK LINE CAPACITY means the total volume of sewage capable of being transported to the treatment facility through the joint trunk line.

19. PRIOR AGREEMENT means the Inter-local Agreement for Construction, Use, and Maintenance of Joint Wastewater Facility entered into between the Cities, dated April 5th, 1995.

ARTICLE II TERMINATION OF PRIOR AGREEMENT

2.1 Termination. In order to accomplish the purposes of the Cities, given the change in regulations affecting the biological capacity of the Facility, it is in the Cities’ interests to terminate the Prior Agreement and replace it with this Agreement. The Prior Agreement shall be terminated upon the approval and execution of this Agreement by each City’s Governing Body.

ARTICLE III JOINT TRUNK LINE

3.1 Joint Trunk Line. This Agreement does not affect the ownership interests of the Cities in the joint trunk line. Each City shall continue to own the percentage of the line as set forth in paragraph 14 of the definitions. Any O&M expenses incurred on the joint trunk line shall be paid for by the Cities in the same ratio as their ownership interest in the joint trunk line.

ARTICLE IV PURPOSE AND TERM OF AGREEMENT

4.1 Purpose. The purpose of this Agreement is to provide for: (i) the use, operation and maintenance of the Facility for the mutual benefit of the Cities; (ii) to provide for an Advisory Group to give recommendations regarding the operation and maintenance of the Facility, and to make recommendations regarding the expansion and replacement of the Facility; and (iii) the establishment of a system for sharing the costs and expenses related to the use, operation and maintenance of the Facility.

4.2 Term of Contract. This Contract shall be in full force and continue in effect for 50 years.

ARTICLE V OWNERSHIP OF FACILITIES AND PURCHASE OF CAPACITY

5.1 Ownership of Various Facilities. Subject to the provisions of paragraph 6.1(a), Spanish
Fork will retain all ownership interests in its Collection System and land, which constitute the wastewater treatment plant. Mapleton will retain all ownership interest in its Collection System. Nothing herein shall be construed to grant to any City any ownership interest in property or assets of the other City.

5.2 Right to Use. Mapleton shall have the right and power during the term of this Agreement to connect its Collection System to the joint trunk line and thereby cause the sewage and wastewater from its residents and customers to be transmitted to the Facility for treatment, pursuant to the terms of this agreement. Spanish Fork shall lease to Mapleton a 23% interest in the real estate where the Facility is located. The lease shall be effective during the term of the Agreement. Nothing herein shall be construed to grant to Mapleton an ownership interest in the land where the Facility is located. Consideration for the lease shall be the timely payment of the funds set forth in this Agreement, which the Cities acknowledge works to the benefit of each City by allowing an expansion of the Facility.

5.3 Purchase by Mapleton. Mapleton is purchasing from Spanish Fork twenty-three percent (23%) of the Facility (excluding land, but including capacity), for the purchase price of $1,038,404.00, which price represents the negotiated price agreed upon by both Cities representing the capital costs of Mapleton's purchase. Mapleton will also pay for twenty-three percent (23%) of the actual cost of increasing the biological Plant Capacity by adding filters and clarifiers to allow each City growth potential. (Mapleton's share is estimated to be $437,000.00, for a total price of $1,475,404.00). This increase in Plant Capacity will allow Spanish Fork to have a total of 9,472 residential hookups and will allow Mapleton to have a total of 2,418 residential hookups. It is anticipated that each city will have a number of commercial and/or industrial hookups in addition to the residential hookups allocated herein, based upon the existing proportion of commercial/industrial hookups to residential hookups. In the event that an unusually heavy user of sewer services desires to come into either city, the advisory committee shall review the user and determine if capacity exists and if so, how allowing that user to connect to the sewer may limit future industrial/commercial users.

5.4 Due date. The full price, including the estimated amounts, shall be paid to Spanish Fork within one hundred twenty (120) days of the date hereof. If the actual cost of the expansion of the Plant Capacity exceeds the estimate, Mapleton will pay its share of the excess to Spanish Fork within thirty (30) days of the completion of the project. If the actual cost of the expansion of the Plant Capacity is less than the estimate, Spanish Fork will refund Mapleton its share within thirty (30) days of the completion of the project.

ARTICLE VI EXCEEDING OR ADJUSTMENTS TO CAPACITIES

6.1 Adjustments to capacities. a. If Mapleton's wastewater needs require capacity beyond twenty-three percent (23%) at the Facility, the cost of expansion shall be paid solely by Mapleton and the additional capacity created will be owned by Mapleton. The ownership interests will be adjusted to reflect the new capacity. Spanish Fork City, at its option, may participate with Mapleton in any expansion of capacity to the Facility at which time each City shall pay for the capital costs of such expansion on the same ratio of each city's capacity within the expanded portion of the plant. Mapleton shall have no financial obligation for expansion of the treatment
facility, if such expansion is done based solely on Spanish Fork's need. In such event, the additional capacity created will be owned by Spanish Fork. The ownership interests will be adjusted to reflect the new capacity.

b. In the event expansion to the Facility is required by government regulation, each city shall pay for the capital costs of such expansion on the same ratio of each city's capacity to the total plant capacity. Any regulatory fines and/or penalties incurred shall be paid by the City causing the same. In the event the cause cannot be determined, the fines and/or penalties shall be paid based upon the same ratio of each city's capacity to the total plant capacity.

c. Any expansion to the facility shall be based on the Spanish Fork City 201 Facility Plan, dated November 1980, as updated from time to time, drawing number X-1.

6.2 Exceeding capacities. a. In the event Mapleton anticipates it will exceed its 23% capacity (as determined by the number of hookups approved, as set forth in paragraph 5.3), and Spanish Fork has available capacity, the parties may negotiate Mapleton's use of such excess capacity. If the capacity is exceeded without negotiating the use and price, Mapleton will be given thirty (30) days to reduce its flows so as not to exceed its capacity. If it fails to do so, liquidated damages in the amount of $5,000.00 per month shall be awarded. In addition to liquidated damages, an injunction prohibiting the issuance of additional building permits and additional connections to the sewer system shall be granted.

b. In the event Mapleton exceeds its 23% capacity (as determined by the number of hookups approved, as set forth in paragraph 4.3), and Spanish Fork has no available capacity, Mapleton will be given thirty (30) days to reduce its flows so as not to exceed its capacity. If it fails to do so, a monetary penalty in the form of liquidated damages in the amount of $5,000.00 per month shall be assessed. Each party acknowledges that exceeding Plant Capacity has far reaching and serious consequences, for which no monetary damages can readily be determined, nor which can be adequately compensated. In the event any regulatory fines and/or penalties are due as a result of Mapleton exceeding its capacities, it shall be responsible for all costs of remediation, including fines or penalties imposed, costs of labor and materials to correct the problem, and any attorneys fees incurred in defending any regulatory action.

c. Mapleton shall enjoy reciprocal rights against Spanish Fork, including liquidated damages and an injunction, as set forth in paragraphs 6.2(a) and (b), in the event Spanish Fork exceeds its 77% capacity (as determined by the number of hookups approved, as set forth in paragraph 5.3), or causes regulatory fines and/or penalties through no fault of Mapleton.

ARTICLE VII OPERATION AND MAINTENANCE OF THE FACILITY

7.1 Advisory Group. An advisory group shall be created for the purpose of monitoring the number of hookups allowed, as set forth in paragraph 5.3, discussing problems, policies, revenues, expenditures, and any other matters affecting the operation of the Facility.

a. Number of Representatives. The Advisory Group shall consist of five members, three of which shall be representatives from Spanish Fork and two from Mapleton.

b. Selecting of Advisory Group Member. Each City's members shall be selected and approved
by its Governing Body.

c. Removal or Disability. Each City may remove any of its members with or without cause. Upon such removal or in the event of resignation, a successor shall be appointed for the remainder of that term, by the City who had appointed the member who is no longer serving.

7.2 Duties of Advisory Group. The conclusions, recommendations, or information emanating from a meeting of the Advisory Group shall be presented to Spanish Fork for its consideration and use in operation, maintenance and/or improvement of the Facilities. It is understood, however, that the function of the group is to further the cooperation between the parties and to render advisory assistance, but in no way to limit the rights of ownership to the facilities set forth herein, nor to make binding recommendations, but only advisory.

7.3 Duties and Responsibilities of Spanish Fork City. Spanish Fork shall be the operator of the Facility.

a. Management. Spanish Fork shall have sole and exclusive responsibility for the day-to-day management of the Facility.

b. Operation and Maintenance. Spanish Fork shall be responsible for the operation and maintenance of the Facility and shall employ competent and experienced personnel or train such personnel for the Facility and shall use best efforts to operate and maintain the Facility at all times in good repair and condition, and in such a manner that the operating efficiency thereof shall conform to the standards set by Federal, State and Local law.

c. Compliance with Laws. In operating and maintaining the Facility, Spanish Fork shall comply in every respect with each applicable Federal, State or Local law regulating the safe, sanitary, and healthful operation of the Facility, and Spanish Fork shall make every reasonable effort to prevent a shutdown or bypass of the Facility, or an imposition of penalty by any governmental authority because of a failure to meet or otherwise comply with applicable laws and regulations. If such reasonable effort has been made, but notwithstanding, there is a penalty or requirement imposed by any authorized government authority, the penalty or cost of compliance shall be considered as part of the operation and maintenance expense of the Facility.

d. Insurance. In operating and maintaining the Facility, Spanish Fork shall obtain and maintain insurance, including but not limited to worker's compensation insurance and public liability insurance in such amounts and to such extent it is customarily carried by other operating utilities of the same type. The cost of such insurance shall be considered an operations and maintenance expense of the Facility. In the event of any loss or damage to any part of the Facility, insurance proceeds shall be used for the purpose of restoring or replacing the property lost or damaged.

e. Expenditures. Spanish Fork shall use its best efforts to keep the Operation and Maintenance Expenses related to the Facility within the amounts established in the Annual Budget and shall make no expenditures or incur any obligation in excess of amounts established in the Annual Budget without revision of the budget.

f. Collections. Spanish Fork shall collect from Mapleton, on a monthly basis, Mapleton's proportionate share of Operation and Maintenance Expenses relating to the Facility in accordance with this Agreement, and shall apply those payments against the budget.

g. Maintain Records. Spanish Fork shall maintain accurate detailed records relating to the Facility, including but not limited to flow-measuring records, materials, and supplies, and payroll records for personnel employed by Spanish Fork City. Spanish Fork City shall make those
records available for inspection at reasonable times to the Advisory Group and the Governing Body of Mapleton.
h. Budget Preparation. Spanish Fork shall prepare and provide a proposed budget for the next fiscal year by April 1st of each year. Spanish Fork will make available, upon request, a copy of the monthly financial report for the Facility. The expenses incurred in compiling each report shall be regarded as an Operation and Maintenance expense of the Facility.
7.4 Duties and Responsibilities of Mapleton City.
a. Sampling. Mapleton shall be responsible for sampling all water entering the joint trunk line. Samples shall take place weekly. Mapleton shall provide to Spanish Fork City a copy of the test results of each sample.

ARTICLE VIII CHARGES FOR OPERATION AND MAINTENANCE EXPENSES
8.1 Sharing of Expenses. All actual operation and maintenance expenses related to the Facility shall be paid on a monthly basis by Mapleton in a ratio determined as follows:
a. A meter will be installed where the joint trunk line crosses the DRGW railroad tracks to measure total flow and contaminate strength from Mapleton’s collection system. Mapleton will own and read this meter. Spanish Fork may check the readings for accuracy.
b. A meter has been installed at the intake to the treatment plant. Spanish Fork will own and read this meter. Mapleton may check the readings for accuracy.
c. Mapleton shall be responsible to pay to Spanish Fork for the operation of the treatment plant on the ratio of Mapleton’s flow and contaminate strength as metered at the crossing of the DRGW tracks, to the total flow and contaminate strength, as measured at the plant intake.
8.2 Payments to Spanish Fork City. Mapleton shall pay to Spanish Fork the monthly service charge described in Section 8.1 of this Agreement within twenty (20) days after receiving the bill. Mapleton shall have the sole and exclusive right to determine a method of charging residents and customers of its own Collection System. The failure of Mapleton to collect sufficient amounts from its residents and customers shall not relieve Mapleton from its obligations to pay its proportionate share for the operation and maintenance expense of the Facility. If Mapleton fails to pay the fall amount due and owing within ten (10) days after the due date thereof, the unpaid balance shall bear an interest rate of one percent (1.0%) per month until paid in full, and all subsequent payments received shall be applied first to interest and then to principal.
8.3 Breach of Agreement. In the event of a breach of this agreement, the non-breaching party shall be entitled to recover its costs and attorneys fees incurred in enforcing the terms hereof. In the event a dispute that the parties cannot amicably resolve, a court of competent jurisdiction in Utah County, or any alternative dispute resolution method agreed upon by the parties may be used to resolve the dispute.

ARTICLE IX BUY BACK PROVISIONS
9.1 Mapleton System. a. The parties acknowledge Mapleton’s significant capital contributions towards Spanish Fork’s sewer system, and that Mapleton may one day need to construct its own sewer system. If Mapleton decides to construct its own sewer system within the first five years from the date of this agreement, it may terminate this agreement and receive
full reimbursement for its capital contributions, as set forth hereinafter. If Mapleton decides to construct its own sewer system beyond five years from the date of this agreement, it may terminate this agreement and negotiate with Spanish Fork the amount of reimbursement it will receive for its capital contributions, based upon the depreciation of the facilities, their condition, and value.

b. If Mapleton decides to construct its own sewer system, it may phase out of the Spanish Fork plant, but must eventually take all of its sewerage into its own system. Any such phasing may not take longer than three years. As Mapleton phases out of the Spanish Fork plant, it may make additional capacity available to Spanish Fork. Once Mapleton is no longer using its allotted capacity, in whole or in part, Spanish Fork will begin to reimburse Mapleton its contributions towards capital facilities in proportion to the amount Mapleton has reduced its allotted capacity. For example, if Mapleton reduces its use of its allotted capacity by 10%, Spanish Fork will begin to reimburse Mapleton for 10% of its investment in capital facilities.

c. Mapleton shall give one year written notice to Spanish Fork of its intent to construct its own sewer system and terminate this agreement.

d. Unless otherwise agreed to by the parties, the reimbursement period shall be five years and shall commence 30 days from the date Mapleton makes additional capacity available. Spanish Fork will make a down payment of 50% and pay the balance in five annual installments. Upon reimbursement being made, Mapleton will relinquish its ownership interest in the Facility and Spanish Fork will become the owner of the Facility.

e. No interest will accrue on any money owed to Mapleton by Spanish Fork during the reimbursement period.

ARTICLE X MISCELLANEOUS PROVISIONS

10.1 Adoption of Ordinances. Each City agrees to adopt and enforce such ordinances as are reasonably necessary to permit the purposes of this Agreement to be accomplished. Mapleton further agrees to maintain an ordinance in substantially the same format as Spanish Fork City Municipal Code section 13.32.010. et. seq. (Public Sewer System Regulations and Pretreatment Standards). Mapleton further agrees to be subject to the provisions of §13.32.010. et seq. (Public Sewer System Regulations and Pretreatment Standards. Mapleton further agrees to be subject to the provisions of §13.32.

10.2 Joint Cooperation. The Cities hereby agree to cooperate with each other in the planning for the future capital improvements to the Facility or the construction of new treatment facilities for the joint use of the Cities. The installation of such capital improvements or new treatment facilities and costs to be assumed by each city with respect thereto shall be subject to provisions of a separate written Agreement between the Cities.

10.3 Authorized Agreement. Each City hereby represents and warrants that its Governing Body has taken all action as required by law to approve this Agreement and to authorize execution of this Agreement on behalf of that City.

10.4 Force Majeure. In case by reason of force majeure, either City shall be rendered unable wholly or in part to carry out its obligations under this Agreement, other than the obligation of each City to make the payments required under the terms hereof; then such party shall give notice and full particulars of such force majeure in writing to the other party within a reasonable time.
after occurrence of the event or cause relied on, and the obligations of the party giving such notice, so far as they are affected by such force majeure, shall be suspended during the continuance of the inability then claimed, but for no longer period, and such party shall endeavor to remove and overcome such inability with reasonable dispatch. The term "force majeure" as employed herein shall mean acts of God, strikes, lockouts, or other industrial disturbances, acts or public enemy, an order from any kind of the government of the United States or the State of Utah, insurrections, riots, epidemics, landslides, lightning, earthquakes, fire, hurricanes, storms, floods, washouts, arrests, restraint of government and people, civil disturbance, explosions, breakage, accidents to machinery or collection line, or the partial or complete inability of Spanish Fork to treat and dispose of such wastewater on account of any other cause not reasonably within the control of Spanish Fork.

10.5 Miscellaneous Provisions. a. This Agreement shall be governed by and construed under the laws of the State of Utah, including but not limited to the Act.
b. The Cities shall not be deemed to be partners or joint venturers in any manner in the use or operation of the Facility.
c. Spanish Fork shall be responsible for ascertaining and overseeing compliance by the Facility with all government requirements, including in particular those of the Department of Environmental Quality and the United States Environmental Protection Agency.
d. This Agreement may be amended from time to time by mutual written Agreement between the Cities, provided that said amendment does not jeopardize or adversely affect any notes, bonds or other instruments relating to the financing of the construction of the Facility or the Collection System of either City, and that it does not invalidate or adversely affect the operation or use of the Facility.

e. If any provision of this Agreement is determined by a court of competent jurisdiction to be void, voidable, or unenforceable, the validity and enforceability of the remaining provisions of this Agreement shall not be affected thereby.
f. No City may assign its rights or duties under this Agreement without the prior written consent of the other City.
g. Spanish Fork will maintain ownership of all treated waste water. In the event of sale or lease, the proceeds shall be used to reduce the operation and maintenance expenses at the Facility.

IN WITNESS WHEREOF, the parties have set their hands on the date and the year above written.

SPANISH FORK CITY by:

\[Signature\]
DALE R. BARNEY, Mayor

Attest:

\[Signature\]
Kent R. Clark, City Recorder
Approval as to form and compliance with Utah law:

S. Junior Baker, City Attorney

MAPLETON CITY by:

DEAN ALLAN, Mayor

Attest:

Debbie Walser, City Recorder

Approval as to form and compliance with Utah law:

Gordon Duval, City Attorney
May 31, 2005

Spanish Fork City  
Dave Oyler, City Manager  
40 South Main  
Spanish Fork, Utah 84660

RE: Spanish Fork/Mapleton City Sewer Interlocal Agreement  
Phase II

Dear Dave:

I am pleased to confirm that the City Council has now formally approved the Second Phase Interlocal Agreement for the further upgrade of the Spanish Fork Wastewater Treatment Plant and I accordingly enclose a signed copy, thereof, for your information.

Perhaps, at an appropriate time, we can discuss the arrangements for passing over the initial upfront payments to finance the initial costs associated with the expansion scheme.

Yours sincerely,

[Signature]

R.P. Bradshaw  
City Administrator

RPB/dw

Enc: Interlocal Agreement Phase II
LEASE

THIS LEASE made this 19th day of February, 2004, between Spanish Fork City, a municipality of the State of Utah, hereinafter referred to as LANDLORD and Mapleton City, a municipality of the State of Utah, hereinafter referred to as TENANT.

1. **Property Leased.** Landlord does hereby lease unto Tenant real property located at approximately 175 E. 2160 N., Spanish Fork, Utah, representing the land on which the Spanish Fork Wastewater Treatment Facility lies.

2. **Term.** The term of this lease shall be until the interlocal agreement for joint use of the Spanish Fork Wastewater Treatment Facility between the parties is terminated.

3. **Consideration.** No rental payment shall be made, but Mapleton shall be required to timely make the payments due under the interlocal agreement for its capital and expansion purchases and its share of operation and maintenance expenses. The parties acknowledge that those payments represent adequate consideration as Landlord is benefitted by being able to expand the Wastewater Facility for the use of its residents.

4. **Use of Leased Premises.** Mapleton shall make no use of the property other than as a wastewater treatment facility and in accordance with the interlocal agreement between the parties.

5. **Maintenance of the Premises.** Operation and maintenance of the property shall be conducted by Landlord. Costs related to the wastewater treatment facility shall be allocated as set forth in the interlocal agreement between the parties.

6. **Assignability.** This lease is unique to the parties and may not be assigned.

7. **Default.** In the event the interlocal agreement is in default, then this lease agreement shall also be deemed to be in default.

8. **Termination.** This lease terminates simultaneously with the termination of the interlocal agreement.
IN WITNESS WHEREOF this lease has been executed in duplicate the day and year first above written.

SPANISH FORK CITY by:

DALE R. BARNEY, Mayor

Attest:

KENT R. CLARK, City Recorder

MAPLETON CITY by:

DEAN ALLEN, Mayor

Attest:

DEBBIE WALSE, City Recorder
ADDENDUM CONTRACT

Addendum to the Interlocal Agreement for Construction, Use, and Maintenance of Joint Wastewater Facility Contract between Spanish Fork City and Mapleton City dated the 19th day of February 2004.

RECITALS

WHEREAS, Spanish Fork and Mapleton Cities entered into an Interlocal Agreement for the joint use of the Spanish Fork Wastewater Treatment Plant on the 19th day of February, 2004 (the Contract); and

WHEREAS, the Contract limits each City to a specific number of residential hookups to the system to prevent discharges to the system from exceeding the system capacity; and

WHEREAS, each City has allocated its maximum number of hookups, meeting the system’s capacity; and

WHEREAS, the Contract anticipates expansion of the plant and cooperation in planning future capital projects; and

WHEREAS, the parties desire to expand the capacity of the plant and enter this addendum to the Contract in order to define the rights and responsibilities of each of the parties hereto;

NOW THEREFORE, the parties hereby contract, conven, and agree as follows:

AGREEMENT

ARTICLE I RULES OF CONSTRUCTION

The parties intend this addendum to supplement and not replace the Contract of February 19, 2004. Therefore, except as specifically set forth herein or necessarily implied hereby, the terms and conditions of the Contract of February 19, 2004 shall remain in full force and effect.
ARTICLE II DEFINITIONS

The parties adopt the definitions used in the Contract of February 19, 2004.


THE PROJECT means expanding plant capacity by adding a grid system, digester, and converting a secondary clarifier to a primary clarifier.

ARTICLE III EXPANSION PROJECT

The Cities agree to cooperate and participate together to expand the plant capacity by construction of the following project:

Adding a grid system and digester, and converting one of the secondary clarifiers to a primary clarifier.

Upon the completion of the expansion project, each City will maintain its same ratio of ownership and plant capacity of 77% /23% as set forth in the Contract.

ARTICLE IV NEW CAPACITIES

Paragraph 5.3 of The Contract is amended to reflect the new capacities available to each city upon completion of The Project. Spanish Fork City will be allowed 12,362 residential hookups and Mapleton City will be allowed 3,156 residential hookups. It is anticipated that each city will have a number of commercial and/or industrial hookups in addition to the residential hookups allocated herein, based upon the existing proportion of commercial/industrial hookups to residential hookups. In the event that an unusually heavy user of sewer services desires to come
into either city, the advisory committee shall review the user and determine if capacity exists and
if so, how allowing that user to connect to the sewer may limit future industrial/commercial users.

**ARTICLE V FUNDING**

The parties estimate the cost of the project to be 4.39 million dollars. The Cities will
ultimately share the actual cost of the project in the same ratio as their interest in the plant
capacity (77%/23%). However, in order to accelerate the timing of the project, Mapleton will
contribute $1.75 million towards the project. The difference between 23% of the actual cost of
the project and the $1.75 million contributed by Mapleton will be considered a loan to Spanish
Fork City from Mapleton City. (Based on the current estimate, the loan amount would be
$740,300.00, but which number will very upward or downward depending on the actual
construction costs). Spanish Fork City will contribute the balance of its share as costs for the
project come due. At the conclusion of the project, an exhibit will be added to this addendum
indicating the actual costs, each cities total share, and the actual loan amount Spanish Fork is to
repay Mapleton. Spanish Fork shall be obligated to repay its loan from Mapleton over five years,
which obligation will bear no interest. Payment shall be equally divided over the five years, with
the first payment due one year after completion of the project and final acceptance by the Cities,
with a like amount paid each year thereafter for four additional, successive years.

**ARTICLE VI CONSTRUCTION MANAGEMENT**

Spanish Fork will place the project for bid, following its purchasing policy and state law.
Mapleton shall be entitled to have a representative present at each stage of the designs/bid

proceedings and to participate in pre-construction and construction meetings.

DATED this 17 day of May, 2005.

SPANISH FORK CITY by:
Attest:

KEN R. CLARK, City Recorder

DEBBIE WALKER, City Recorder

DALE R. BARNEY, Mayor

MAPLETON CITY by:

DEAN ALLEN, Mayor
AMENDED AND RESTATED INTER-LOCAL AGREEMENT FOR
CONSTRUCTION, USE, AND MAINTENANCE OF
JOINT WASTEWATER FACILITY

This Agreement is made and entered into this 17th day of May, 2011, by and between Spanish Fork City, and Mapleton City. The parties to this Agreement are sometimes referred to collectively herein as the "Cities" and separately as a "City".

WITNESSETH

WHEREAS, the Cities hereto entered into an inter-local agreement for the use and maintenance of a joint wastewater facility on the 19th day of February, 2004, which agreement was supplemented by that Addendum Contract dated the 17th day of May, 2005; and

WHEREAS, pursuant to the terms of the agreements referred to, the Cities jointly own a system for the collection and disposal of wastewater sewage (the "System"); and

WHEREAS, pursuant to the terms of the agreements referred to, Spanish Fork owns the real property the plant is located on and owns 77% of the plant capacity, while Mapleton owns 23% of the plant capacity; and

WHEREAS, the Cities each have an established number of residential connections which can use the plant without causing the plant to exceed its capacity; and

WHEREAS, the Cities have negotiated the transfer of properties from Spanish Fork to Mapleton by way of a boundary line adjustment; and

WHEREAS, based upon the boundary line adjustment, the capacities for each city and the compensation to be paid therefore needs to be adjusted and agreed upon; and

WHEREAS, a cooperative effort from each City to provide for the sewage collection and treatment needs of the citizens is a basic underlying goal of the Cities to this Agreement;

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

ARTICLE I DEFINITIONS

For the purposes of this Agreement the following terms shall have the respective meanings set forth below except where the context indicates otherwise:

1. ACT means the Inter-Local Cooperation Act, Utah Code Annotated §1-13-1 et. seq. (1953 as amended).
2. AGREEMENT means this document.
3. ANNUAL BUDGET means the annual budget for the use, operation and maintenance for the Facility for each fiscal year. The Annual Budget shall specify the projected operation and maintenance expenses for the Facility for the relevant fiscal year and any costs for repairs or improvements to the Facility to be accomplished during the fiscal year.
4. BILLING PERIOD means a monthly period commencing on the first day of each month during the term of this Agreement, to and including the last day of that month.
5. CAPITAL COSTS means future costs and expenses incurred in any expansion of the Facility including but not limited to all costs of construction, construction period interest costs, costs of architects and engineers, and other similar costs and expenses incurred by way of expansion to the Facility.
6. SPANISH FORK means Spanish Fork City, a municipal corporation and body politic located in Utah County, Utah.
7. CODE means the official compilation published and known as the Utah Code Annotated (1953 as amended).
8. COLLECTION SYSTEM means the wastewater collector and interceptor pipeline system of each City which is owned and operated, or will be owned and operated exclusively by that City, separate and apart from the Facility, including service laterals, manholes, pump stations, flow-measuring devices and related appurtenances, excluding the joint trunk line.
9. CITY or CITIES means Spanish Fork City or Mapleton City respectively, or both of them in the plural.
10. MAPLETON means Mapleton City, a municipal corporation and body politic located in Utah County, State of Utah.
11. FACILITY means collectively the existing wastewater treatment plant owned and operated by the Cities, including all screens, chambers, pumps, clarifiers, filters, digesters, basins, interconnecting pipes, outfall line, transfer structures, and other equipment and facilities.
12. FISCAL YEAR means a period of twelve (12) consecutive months commencing on July 1st and ending on June 30th of the following year.
13. GOVERNING BODY means the duly elected mayor and city council.
14. JOINT TRUNK LINE means that collection line running from the west side of the DRGW Railroad right of way to the connection with the existing Facility owned by Spanish Fork. Mapleton owns 76% of the joint trunk line and Spanish Fork owns 24% of the joint trunk line.
15. OPERATION AND MAINTENANCE EXPENSES means with, respect to the Facility and joint trunk line, all expenses reasonably incurred in connection with the operation and maintenance of the Facility and joint trunk line including:
   a. Repairs and replacements of all existing equipment, buildings, and facilities necessary to keep the Facility in efficient operating condition;
   b. Costs incurred in preparing operating reports and other reports as may be required herein;
   c. Premiums on insurance for the Facility required herein;
   d. Actual costs incurred by Spanish Fork in carrying out the duties and
responsibilities specified in this Agreement, including all wages, overtime, third-party contract expenses for equipment and other special services, employee benefits, general office overhead, administrative expenses and vehicle mileage, provided however that Spanish Fork costs to be included in Operation and Maintenance Expenses shall only be those fairly attributable to the operation of the Facility, and not include costs attributable to any Collection System.

e. Generally all expenses, exclusive of depreciation, which under generally accepted accounting principles are properly allocated to operation and maintenance of the Facility, but only such expenses as are reasonable and necessary to the efficient operation and maintenance of the Facility shall be included.

16. ORDINANCE means a legislative enactment by a Governing Body of the City.

17. PLANT CAPACITY means the lesser of:

   a. the total hydrologic volume of the Spanish Fork Treatment Plant, which the Facility is capable of processing, currently 5.0 million gallons per day, average daily flow; or

   b. the total biological volume which the Facility is capable of processing, based on the regulations on contaminate discharges, as set forth in the Facility UPDES permit issued by the State of Utah.

18. JOINT TRUNK LINE CAPACITY means the total volume of sewage capable of being transported to the treatment facility through the joint trunk line.

19. PRIOR AGREEMENT means the Inter-local Agreement for Construction, Use, and Maintenance of Joint Wastewater Facility entered into between the Cities, dated February 19th, 2004, as supplemented by that Addendum Contract entered into between the Cities, dated May 2005.

ARTICLE II TERMINATION OF PRIOR AGREEMENT

2.1 Termination. In order to accomplish the purposes of the Cities, given the change in boundaries of the Cities, it is in the Cities’ interests to terminate the Prior Agreement and replace it with this Agreement. The Prior Agreement shall be terminated upon the approval and execution of this Agreement by each City’s Governing Body.

ARTICLE III JOINT TRUNK LINE

3.1 Joint Trunk Line. This Agreement affects the ownership interests of the Cities in the joint trunk line to reflect the percentages set forth in paragraph 14 the definitions. Any O&M expenses incurred on the joint trunk line shall be paid for by the Cities in the same ratio as their ownership interest in the joint trunk line.

ARTICLE IV PURPOSE AND TERM OF AGREEMENT

4.1 Purpose. The purpose of this Agreement is to provide for: (i) the use, operation and maintenance of the Facility for the mutual benefit of the Cities; (ii) to provide for an Advisory Group to give recommendations regarding the operation and maintenance of the Facility, and to make recommendations regarding the expansion and replacement of the Facility; and (iii) the establishment of a system for sharing the costs and expenses related to the use, operation and maintenance of the Facility.

4.2 Term of Contract. This Contract shall be in full force and continue in effect for 50
years, unless terminated earlier by mutual agreement of the parties.

ARTICLE V OWNERSHIP OF FACILITIES AND PURCHASE OF CAPACITY

5.1 Ownership of Various Facilities. Subject to the provisions of paragraph 6.1(a), Spanish Fork will retain all ownership interests in its Collection System and land, which constitute the wastewater treatment plant. Mapleton will retain all ownership interest in its Collection System. Nothing herein shall be construed to grant to any City any ownership interest in property or assets of the other City.

5.2 Right to Use. Mapleton shall have the right and power during the term of this Agreement to connect its Collection System to the joint trunk line and thereby cause the sewage and wastewater from its residents and customers to be transmitted to the Facility for treatment, pursuant to the terms of this agreement. Spanish Fork shall lease to Mapleton a 26.4% interest in the real estate where the Facility is located. The lease shall be effective during the term of the Agreement. Nothing herein shall be construed to grant to Mapleton an ownership interest in the land where the Facility is located. Consideration for the lease shall be the timely payment of the funds set forth in this Agreement, which the Cities acknowledge works to the benefit of each City by allowing an expansion of the Facility.

5.3 Purchase by Mapleton. Mapleton is purchasing from Spanish Fork an additional three and four tenths percent (3.4%) of the Facility (excluding land, but including capacity), for the purchase price of $2,850,000.00, which will increase, incrementally, Mapleton’s overall capacity in the Facility to twenty six and four tenths percent (26.4%) as payments are made. This adjustment in ownership ratios will allow Spanish Fork to have a total of 11,417 residential hookups and will allow Mapleton to have a total of 4,006 residential hookups, representing an increase of 850 residential hookups. It is anticipated that each city will have a number of commercial and/or industrial hookups in addition to the residential hookups allocated herein, based upon the existing proportion of commercial/industrial hookups to residential hookups. In the event that an unusually heavy user of sewer services desires to come into either city, the advisory committee shall review the user and determine if capacity exists and if so, how allowing that user to connect to the sewer may limit future industrial/commercial users.

5.4 Due date. Fifty thousand dollars ($50,000.00) of the purchase price shall be due upon the completion of the boundary adjustment between the Cities. Thereafter, three thousand three hundred fifty-two dollars and ninety-four cents ($3,352.94) shall be due for each connection to the sewer system within the area being adjusted. Mapleton shall pay said sum prior to recording any plat, or prior to issuing any building permit if a plat is not required. Any balance owing as of April 1, 2026 shall be paid in full on or before April 30, 2026.

ARTICLE VI EXCEEDING OR ADJUSTMENTS TO CAPACITIES

6.1 Adjustments to capacities. a. If Mapleton’s wastewater needs require capacity beyond twenty six and four tenths percent (26.4%) at the Facility, the cost of expansion shall be paid solely by Mapleton and the additional capacity created will be owned by Mapleton. The ownership interests will be adjusted to reflect the new capacity. Spanish Fork City, at its option, may participate with Mapleton in any expansion of capacity to
the Facility at which time each City shall pay for the capital costs of such expansion on
the same ratio of each city's capacity within the expanded portion of the plant. Mapleton
shall have no financial obligation for expansion of the treatment facility, if such
expansion is done based solely on Spanish Fork's need. In such event, the additional
capacity created will be owned by Spanish Fork. The ownership interests will be
adjusted to reflect the new capacity.
b. In the event expansion to the Facility is required by government regulation, each city
shall pay for the capital costs of such expansion on the same ratio of each city's
capacity to the total plant capacity. Any regulatory fines and/or penalties incurred shall
be paid by the City causing the same. In the event the cause cannot be determined, the
fines and/or penalties shall be paid based upon the same ratio of each city's capacity to
the total plant capacity.
c. Any expansion to the facility shall be based on the Spanish Fork City 201 Facility
Plan, dated November 1980, as updated from time to time, drawing number X-1.
6.2 Exceeding capacities. a. In the event Mapleton anticipates it will exceed its
26.4% capacity (as determined by the number of hookups approved, as set forth in
paragraph 5.3), and Spanish Fork has available capacity, the parties may negotiate
Mapleton's use of such excess capacity. If the capacity is exceeded without negotiating
the use and price, Mapleton will be given thirty (30) days to reduce its flows so as not to
exceed its capacity. If it fails to do so, liquidated damages in the amount of $5,000.00
per month shall be awarded. In addition to liquidated damages, an injunction prohibiting
the issuance of additional building permits and additional connections to the sewer
system shall be granted.
b. In the event Mapleton exceeds its 26.4% capacity (as determined by the number of
hookups approved, as set forth in paragraph 4.3), and Spanish Fork has no available
capacity, Mapleton will be given thirty (30) days to reduce its flows so as not to exceed
its capacity. If it fails to do so, a monetary penalty in the form of liquidated damages in
the amount of $5,000.00 per month shall be assessed. Each party acknowledges that
exceeding Plant Capacity has far reaching and serious consequences, for which no
monetary damages can readily be determined, nor which can be adequately
compensated. In the event any regulatory fines and/or penalties are due as a result of
Mapleton exceeding its capacities, it shall be responsible for all costs of remediation,
including fines or penalties imposed, costs of labor and materials to correct the problem,
and any attorneys fees incurred in defending any regulatory action.
c. Mapleton shall enjoy reciprocal rights against Spanish Fork, including liquidated
damages and an injunction, as set forth in paragraphs 6.2(a) and (b), in the event
Spanish Fork exceeds its 73.6% capacity (as determined by the number of hookups
approved, as set forth in paragraph 5.3), or causes regulatory fines and/or penalties
through no fault of Mapleton.

**ARTICLE VII OPERATION AND MAINTENANCE OF THE FACILITY**

7.1 Advisory Group. An advisory group shall be created for the purpose of monitoring
the number of hookups allowed, as set forth in paragraph 5.3, discussing problems,
policies, revenues, expenditures, and any other matters affecting the operation of the
Facility.
a. Number of Representatives. The Advisory Group shall consist of five members, three of which shall be representatives from Spanish Fork and two from Mapleton.
b. Selecting of Advisory Group Member. Each City's members shall be selected and approved by its Governing Body.
c. Removal or Disability. Each City may remove any of its members with or without cause. Upon such removal or in the event of resignation, a successor shall be appointed for the remainder of that term, by the City who had appointed the member who is no longer serving.

7.2 Duties of Advisory Group. The conclusions, recommendations, or information emanating from a meeting of the Advisory Group shall be presented to Spanish Fork for its consideration and use in operation, maintenance and/or improvement of the Facilities. It is understood, however, that the function of the group is to further the cooperation between the parties and to render advisory assistance, but in no way to limit the rights of ownership to the facilities set forth herein, nor to make binding recommendations, but only advisory.

7.3 Duties and Responsibilities of Spanish Fork City. Spanish Fork shall be the operator of the Facility.

a. Management. Spanish Fork shall have sole and exclusive responsibility for the day-to-day management of the Facility.
b. Operation and Maintenance. Spanish Fork shall be responsible for the operation and maintenance of the Facility and shall employ competent and experienced personnel or train such personnel for the Facility and shall use best efforts to operate and maintain the Facility at all times in good repair and condition, and in such a manner that the operating efficiency thereof shall conform to the standards set by Federal, State and Local law.
c. Compliance with Laws. In operating and maintaining the Facility, Spanish Fork shall comply in every respect with each applicable Federal, State or Local law regulating the safe, sanitary, and healthful operation of the Facility, and Spanish Fork shall make every reasonable effort to prevent a shutdown or bypass of the Facility, or an imposition of penalty by any governmental authority because of a failure to meet or otherwise comply with applicable laws and regulations. If such reasonable effort has been made, but notwithstanding, there is a penalty or requirement imposed by any authorized government authority, the penalty or cost of compliance shall be considered as part of the operation and maintenance expense of the Facility.
d. Insurance. In operating and maintaining the Facility, Spanish Fork shall obtain and maintain insurance, including but not limited to worker's compensation insurance and public liability insurance in such amounts and to such extent it is customarily carried by other operating utilities of the same type. The cost of such insurance shall be considered an operations and maintenance expense of the Facility. In the event of any loss or damage to any part of the Facility, insurance proceeds shall be used for the purpose of restoring or replacing the property lost or damaged.
e. Expenditures. Spanish Fork shall use its best efforts to keep the Operation and Maintenance Expenses related to the Facility within the amounts established in the Annual Budget and shall make no expenditures or incur any obligation in excess of
amounts established in the Annual Budget without revision of the budget.
f. Collections. Spanish Fork shall collect from Mapleton, on a monthly basis, Mapleton’s proportionate share of Operation and Maintenance Expenses relating to the Facility in accordance with this Agreement, and shall apply those payments against the budget.
g. Maintain Records. Spanish Fork shall maintain accurate detailed records relating to the Facility, including but not limited to flow-measuring records, materials, and supplies, and payroll records for personnel employed by Spanish Fork City. Spanish Fork City shall make those records available for inspection at reasonable times to the Advisory Group and the Governing Body of Mapleton.
h. Budget Preparation. Spanish Fork shall prepare and provide a proposed budget for the next fiscal year by April 1st of each year. Spanish Fork will make available, upon request, a copy of the monthly financial report for the Facility. The expenses incurred in compiling each report shall be regarded as an Operation and Maintenance expense of the Facility.

7.4 Duties and Responsibilities of Mapleton City.
a. Sampling. Mapleton shall be responsible for sampling all water entering the joint trunk line. Samples shall take place weekly. Mapleton shall provide to Spanish Fork City a copy of the test results of each sample.

ARTICLE VIII CHARGES FOR OPERATION AND MAINTENANCE EXPENSES

8.1 Sharing of Expenses. All actual operation and maintenance expenses related to the Facility shall be paid on a monthly basis by Mapleton in a ratio determined as follows:
a. A meter will be installed where the joint trunk line crosses the DRGW railroad tracks to measure total flow and contaminate strength from Mapleton’s collection system. Mapleton will own and read this meter. Spanish Fork may check the readings for accuracy.
b. A meter has been installed at the intake to the treatment plant. Spanish Fork will own and read this meter. Mapleton may check the readings for accuracy.
c. Mapleton shall be responsible to pay to Spanish Fork for the operation of the treatment plant on the ratio of Mapleton’s flow andcontaminate strength as metered at the crossing of the DRGW tracks, to the total flow and contaminate strength, as measured at the plant intake.

8.2 Payments to Spanish Fork City. Mapleton shall pay to Spanish Fork the monthly service charge described in Section 8.1 of this Agreement within twenty (20) days after receiving the bill. Mapleton shall have the sole and exclusive right to determine a method of charging residents and customers of its own Collection System. The failure of Mapleton to collect sufficient amounts from its residents and customers shall not relieve Mapleton from its obligations to pay its proportionate share for the operation and maintenance expense of the Facility. If Mapleton fails to pay the full amount due and owing within ten (10) days after the due date thereof, the unpaid balance shall bear an interest rate of one percent (1.0%) per month until paid in full, and all subsequent payments received shall be applied first to interest and then to principal.

8.3 Breach of Agreement. In the event of a breach of this agreement, the non-
breaching party shall be entitled to recover its costs and attorneys fees incurred in enforcing the terms hereof. In the event a dispute that the parties cannot amicably resolve, a court of competent jurisdiction in Utah County, or any alternative dispute resolution method agreed upon by the parties may be used to resolve the dispute.

ARTICLE IX BUY BACK PROVISIONS
9.1 Mapleton System. a. The parties acknowledge Mapleton’s significant capital contributions towards Spanish Fork’s sewer system, and that Mapleton may one day need to construct its own sewer system. If Mapleton decides to construct its own sewer system, it may terminate this agreement and negotiate with Spanish Fork the amount of reimbursement it will receive for its capital contributions, based upon the depreciation of the facilities, their condition, and value.
b. If Mapleton decides to construct its own sewer system, it may phase out of the Spanish Fork plant, but must eventually take all of its sewerage into its own system. Any such phasing may not take longer than three years. As Mapleton phases out of the Spanish Fork plant, it may make additional capacity available to Spanish Fork. Once Mapleton is no longer using its allotted capacity, in whole or in part, Spanish Fork will begin to reimburse Mapleton its contributions towards capital facilities in proportion to the amount Mapleton has reduced its allotted capacity. For example, if Mapleton reduces its use of its allotted capacity by 10%, Spanish Fork will begin to reimburse Mapleton for 10% of its investment in capital facilities.
c. Mapleton shall give one year written notice to Spanish Fork of its intent to construct its own sewer system and terminate this agreement.
d. Unless otherwise agreed to by the parties, the reimbursement period shall be five years and shall commence 30 days from the date Mapleton makes additional capacity available. Spanish Fork will make a down payment of 50% and pay the balance in five annual installments. Upon reimbursement being made, Mapleton will relinquish its ownership interest in the Facility and Spanish Fork will become the owner of the Facility.
e. No interest will accrue on any money owed to Mapleton by Spanish Fork during the reimbursement period.

ARTICLE X MISCELLANEOUS PROVISIONS
10.1 Adoption of Ordinances. Each City agrees to adopt and enforce such ordinances as are reasonably necessary to permit the purposes of this Agreement to be accomplished. Mapleton further agrees to maintain an ordinance in substantially the same format as Spanish Fork City Municipal Code section 13.32.010. et. seq. (Public Sewer System Regulations and Pretreatment Standards). Mapleton further agrees to be subject to the provisions of §13.32.010. et seq. (Public Sewer System Regulations and Pretreatment Standards). Mapleton further agrees to be subject to the provisions of Chapter 32 of Title 13.
10.2 Joint Cooperation. The Cities hereby agree to cooperate with each other in the planning for the future capital improvements to the Facility or the construction of new treatment facilities for the joint use of the Cities. The installation of such capital improvements or new treatment facilities and costs to be assumed by each city with respect thereto shall be subject to provisions of a separate written Agreement between
the Cities.
10.3 Authorized Agreement. Each City hereby represents and warrants that its
Governing Body has taken all action as required by law to approve this Agreement and
to authorize execution of this Agreement on behalf of that City.
10.4 Force Majeure. In case by reason of force majeure, either City shall be rendered
unable wholly or in part to carry out its obligations under this Agreement, other than the
obligation of each City to make the payments required under the terms hereof, then
such party shall give notice and full particulars of such force majeure in writing to the
other party within a reasonable time after occurrence of the event or cause relied on,
and the obligations of the party giving such notice, so far as they are affected by such
force majeure, shall be suspended during the continuance of the inability then claimed,
but for no longer period, and such party shall
endeavor to remove and overcome such inability with reasonable dispatch. The term
"force majeure" as employed herein shall mean acts of God, strikes, lockouts, or other
industrial disturbances, acts or public enemy, an order from any kind of the government
of the United States or the State of Utah, insurrections, riots, epidemics, landslides,
lightning, earthquakes, fire, hurricanes, storms, floods, washouts, arrests, restraint of
government and people, civil disturbance, explosions, breakage, accidents to machinery
or collection line, or the partial or complete inability of Spanish Fork to treat and dispose
of such wastewater on account of any other cause not reasonably within the control of
Spanish Fork.
10.5 Miscellaneous Provisions. a. This Agreement shall be governed by and
construed under the laws of the State of Utah.
b. The Cities shall not be deemed to be partners or joint venturers in any manner in the
use or operation of the Facility.
c. Spanish Fork shall be responsible for ascertaining and overseeing compliance by
the Facility with all government requirements, including in particular those of the
Department of Environmental Quality and the United States Environmental Protection
Agency.
d. This Agreement may be amended from time to time by mutual written Agreement
between the Cities, provided that said amendment does not jeopardize or adversely
affect any notes, bonds or other instruments relating to the financing of the construction
of the Facility or the Collection System of either City, and that it does not invalidate or
adversely affect the operation or use of the Facility.
e. If any provision of this Agreement is determined by a court of competent jurisdiction
to be void, voidable, or unenforceable, the validity and enforceability of the remaining
provisions of this Agreement shall not be affected thereby.
f. No City may assign its rights or duties under this Agreement without the prior written
consent of the other City.
g. Spanish Fork will maintain ownership of all treated waste water. In the event of sale
or lease,
the proceeds shall be used to reduce the operation and maintenance expenses at the
Facility.
IN WITNESS WHEREOF, the parties have set their hands on the date and the year above written.

SPANISH FORK CITY by:

G. WAYNE ANDERSEN, Mayor

Attest:

Kent R. Clark, City Recorder

Approval as to form and compliance with Utah law:

S. Junior Baker, City Attorney

MAPLETON CITY by:

BRIAN WALL, Mayor

Attest:

Camille Brown, City Recorder

Approval as to form and compliance with Utah law:

Eric T. Johnson, City Attorney
APPENDIX D
LIFT STATION DATA
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<th>Model</th>
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<th>Size (in)</th>
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<th>Amp</th>
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INDUSTRIAL PARK LIFTSTATION

SPANISH FORK CITY
1996

HALL ENGINEERING
1445 NORTH MAIN, SPANISH FORK, UTAH 84660
WEST ELEVATION
SCALE: 3/4" = 1'-0"

NORTH ELEVATION
SCALE: 3/4" = 1'-0"

EAST ELEVATION
SCALE: 3/4" = 1'-0"

SOUTH ELEVATION
SCALE: 3/4" = 1'-0"
### Valve & Piping Schedule

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**LOWER FLOOR**

SOUND 1/2" = 1'-0"
NOTE: LADDER TO BE STAINLESS STEEL

LADDER SECTION

1/4" x 3" HOOP GUARD @ TOP & BOTTOM

1/4" x 2" BARS ROUND ALL CORNERS

LADDER SECTION

2" x 3/8" BARS

2" x 1/4" "X-10" DRILL 3/4" HOLE

ANCHOR TO FLOOR

FINISHED FLOOR

LADDER DETAIL

SCALE 1/4" = 1'-0"

HATCH DETAIL

SCALE 1/2" = 1'-0"

LADDER SECTION

SCALE 1/2" = 1'-0"

HALL ENGINEERING
CONSULTING ENGINEERS
765 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFT STATION
LADDER, HATCH AND VENT DETAILS
Disclaimer: Spanish Fork City makes no warranty with respect to the accuracy, completeness, or usefulness of these maps. Spanish Fork City assumes no liability for direct, indirect, special, or consequential damages resulting from the use or misuse of these maps or any of the information contained herein. Portions may be copied for incidental uses, but may not be resold.

Spanish Fork City
40 South Main Street
Spanish Fork, UT 84660
(801) 798-5000

1 Inch = 300 Feet

Length: 2810 LF
## Performance Curves for the 610 Series

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Figure 1: Performance Characteristics of 6 x 6 x 12B Series 610 Enclosed Impeller

- **Size:** 6x6x12B
- **Type:** 610
- **Impeller:** Enclosed
- **R. P. M.:** 1750

**Performance Data:**
- Max. Spheres: 3.00 in
- Imp. Patt. No.: 444A281
- Case Patt. No.: 180A361

**Graphs:**
- Head (feet/meters) vs. U.S. GPM (M3/HR)
- RPM: 1750

**Graph 2:**
- Size: 6x6x12B
- Type: 610
- Impeller: Enclosed
- R. P. M.: 1150

**Performance Data:**
- Max. Spheres: 3.00 in
- Imp. Patt. No.: 444A281
- Case Patt. No.: 180A361

**Graphs:**
- Head (feet/meters) vs. U.S. GPM (M3/HR)
- RPM: 1150
**6 x 6 x 12B**

**SERIES 610**

**ENCLOSED IMPELLER**

**SIZE**: 6x6x12B  **TYPE**: 610  **IMPELLER**: Enclosed  **R. P. M.**: 875

**SIZE**: 6x6x12B  **TYPE**: 610  **IMPELLER**: Enclosed  **R. P. M.**: 700

---

**MAX. SPHERES**: 3.00 IN  
**IMP. PATT. NO.**: 444A281  
**CASE PATT. NO.**: 180A361

---

**U.S. GPM**

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<th>400</th>
<th>600</th>
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**L/S**

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**M³/HR**

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**U.S. GPM**

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**L/S**

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**M³/HR**

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<th>200</th>
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<th>300</th>
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</table>
8 x 8 x 15A
SERIES 610
ENCLOSED IMPELLER

SIZE: 8x8x15A  TYPE: 610  IMPELLER: Enclosed  R. P. M.: 1150

SIZE: 8x8x15A  TYPE: 610  IMPELLER: Enclosed  R. P. M.: 875

U.S. GPM 500 1000 1500 2000 2500 3000 3500 4000 4500
M³/HR 150 300 450 600 750 900 1050

U.S. GPM 400 800 1200 1600 2000 2400 2800 3200 3600
M³/HR 150 300 450 600 750

MAX. SPHERES 4.00 IN
IMP. PATT. NO. 444A286
CASE PATT. NO. 180A350

AURORA®
Pentair Pump Group

Section 610 Page 410
Date April 2001
Supersedes Section 610 Page 415A
Dated August 1985
SERIES 610
ENCLOSED IMPELLER

SIZE : 10x10x15
TYPE : 610
IMPELLER : Enclosed
R. P. M. : 700

MAX. SPHERES 4.75 IN
IMP. PATT. NO. 444A132
CASE PATT. NO. 180A189

HEAD (FEET) (METERS)

U.S. GPM
500 1000 1500 2000 2500 3000 3500 4000 4500

L/S
50 100 150 200 250 300

M³/HR
200 400 600 800 1000

SIZE : 10x10x15
TYPE : 610
IMPELLER : Enclosed
R. P. M. : 580

MAX. SPHERES 4.75 IN
IMP. PATT. NO. 444A132
CASE PATT. NO. 180A189

HEAD (FEET) (METERS)

U.S. GPM
400 800 1200 1600 2000 2400 2800 3200 3600 4000

L/S
40 80 120 160 200 240 280 320 360 400

M³/HR
200 400 600 800

8PC-116810

8PC-116811
12 x 14 x 22A
SERIES 610
ENCLOSED IMPELLER

SIZE: 12x14x22A  TYPE: 610  IMPELLER: Enclosed  R. P. M.: 580

MAX. SPHERES: 6.00 IN
IMP. PATT. NO.: 444A103
CASE PATT. NO.: 180A146

U.S. GPM
1000  2000  3000  4000  5000  6000  7000

L/S
80  160  240  320  400  500  600  700  800  1200  1600

M³/HR
400  800  1200  1600

8PC-126832

AP AURORA
Pentair Pump Group

Section 610 Page 423
Date April 2001
Supersedes Section 610 Page 426
Dated March 1993
14 x 14 x 22A
SERIES 610
ENCLOSED IMPELLER

SIZE : 14x14x22A
TYPE : 610
IMPELLER : Enclosed
R. P. M. : 1175

MAX. SPHERES 6.00 IN
IMP. PATT. NO. 444A103
CASE PATT. NO. 180A271

SIZE : 14x14x22A
TYPE : 610
IMPELLER : Enclosed
R. P. M. : 1175

MAX. SPHERES 6.00 IN
IMP. PATT. NO. 444A103
CASE PATT. NO. 180A271

1175 RPM

U.S. GPM

2000 4000 6000 8000 10000 12000 14000 16000

L/S

200 400 600 800 1000 1200 1400 1600

M³/HR

500 1000 1500 2000 2500 3000 3500

PC-150628
16 x 16 x 28
SERIES 610
ENCLOSED IMPELLER

SIZE : 16x16x28
TYPE : 610
IMPELLER : Enclosed
R. P. M. : 875

MAX. SPHERES 5.50 IN
IMP. PATT. NO. 444A188
CASE PATT. NO. 180A272

HEAD (FEET)(METERS)
8PC-127141

U.S. GPM
2000 4000 6000 8000 10000 12000 14000
L/S
500 1000 1500 2000 2500 3000 3500
M³/HR

16 x 16 x 28
SERIES 610
ENCLOSED IMPELLER

SIZE : 16x16x28
TYPE : 610
IMPELLER : Enclosed
R. P. M. : 700

MAX. SPHERES 5.50 IN
IMP. PATT. NO. 444A188
CASE PATT. NO. 180A272

HEAD (FEET)(METERS)
8PC-127142

U.S. GPM
2000 4000 6000 8000 10000 12000 14000
L/S
500 1000 1500 2000 2500 3000 3500
M³/HR

Supersedes Section 610 Page 435
Dated April 2001

Date July 2001
Section 610 Page 429

Dated April 2001

16 x 16 x 28
SERIES 610
ENCLOSED IMPELLER
16 x 16 x 28
SERIES 610
ENCLOSED IMPELLER

SIZE: 16x16x28
TYPE: 610
IMPELLER: Enclosed
R. P. M.: 585

MAX. SPHERES: 5.50 IN
IMP. PATT. NO.: 444A188
CASE PATT. NO.: 180A272

SIZE: 16x16x28
TYPE: 610
IMPELLER: Enclosed
R. P. M.: 585

MAX. SPHERES: 5.50 IN
IMP. PATT. NO.: 444A188
CASE PATT. NO.: 180A272

U.S. GPM
2000 4000 6000 8000 10000 12000

L/S
150 300 450 600 750 900

M³/HR
500 1000 1500 2000 2500 3000

8PC-127143
18 x 18 x 28
SERIES 610
ENCLOSED IMPELLER

SIZE: 18x18x28
TYPE: 610
IMPELLER: Enclosed
R. P. M.: 700

MAX. SPHERES: 6.50 IN
IMP. PATT. NO.: 444A189
CASE PATT. NO.: 180A273

SIZE: 18x18x28
TYPE: 610
IMPELLER: Enclosed
R. P. M.: 585

MAX. SPHERES: 6.50 IN
IMP. PATT. NO.: 444A189
CASE PATT. NO.: 180A273

U.S. GPM
L/S
M³/HR

8PC-127144
8PC-127145
NP 3127 HT 1~489
Technical specification

Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

General
- Head
- Total efficiency
- NPSH-values

Installation: P - Semi permanent, Wet

Motor
- Motor #: N3127.181 21-12-4AL-W 7.5hp
- Stator variant: 12
- Frequency: 60 Hz
- Rated voltage: 220 V
- Number of poles: 4
- Phases: 1~
- Rated power: 5.6 kW
- Rated current: 32 A
- Starting current: 65.9 A
- Rated speed: 1740 rpm
- Power factor: 0.97
- 1/1 Load: 0.97
- 3/4 Load: 1
- 1/2 Load: 0.99
- Efficiency: 82.5 %

Note: Picture might not correspond to the current configuration.
NP 3127 HT 1~ 489
Performance curve

Pump
Outlet diameter 3\(\frac{3}{4}\)"n
Inlet diameter 100 mm
Impeller diameter 7\(\frac{1}{4}\)"n
Number of blades 2
Throughlet diameter

Motor
Motor # N3127.181 21-12-4AL-W 7.5hp
Stator variant 12
Frequency 60 Hz
Rated voltage 220 V
Number of poles 4
Phases 1~
Rated power 5.6 kW
Rated current 32 A
Starting current 65.92 A
Rated speed 1740 rpm

Power factor
1/1 Load 0.97
3/4 Load 1
1/2 Load 0.99

Efficiency
1/1 Load 82.5 %
3/4 Load 84.5 %
1/2 Load 83 %

NP 3127 HT 1~ 489
Inlet diameter

Performance curve

Curve according to: ISO 9906 grade 2 Annex 1 or 2

1 kWh/US gal

0 100 200 300 400 500 600 700 800 900 [US g.p.m.]

0 5 10 15 20 25 30 35 40 45 50 55 60 65 [ft]

0 8 12 16 20 [ft]

0 100 200 300 400 500 600 700 800 900 [US g.p.m.]

0 5 10 15 20 25 30 35 40 45 50 55 60 65 [ft]

0 8 12 16 [ft]

0 100 200 300 400 500 600 700 800 900 [US g.p.m.]

0 5 10 15 20 25 30 35 40 45 50 55 60 65 [ft]

0 8 12 16 [ft]

Curve according to: ISO 9906 grade 2 Annex 1 or 2

Project
Project ID
Created by
Created on
Last update
13.01.2011
EQUIPPED WITH IMPELLER 486-489.

DIMENSION TO ENDS OF GUIDE BARS

MIN LEVEL

GUIDE BARS

Weight

Dimensional drawing

FP, NP 3127 HT
SPANISH FIELDS SUBDIVISION, SEWER LIFT STATION

SPANISH FORK, UTAH

GENERAL NOTES

1. ALL CONSTRUCTION FEATURES OF THIS PROJECT SHALL CONFORM TO UTAH PUBLIC WORKS GENERAL CONDITIONS AND STANDARD SPECIFICATIONS.
2. ALL CONSTRUCTION FEATURES OF THIS PROJECT SHALL CONFORM TO UTAH PUBLIC WORKS GENERAL CONDITIONS AND STANDARD SPECIFICATIONS.
3. ALL CONSTRUCTION FEATURES OF THIS PROJECT SHALL CONFORM TO UTAH PUBLIC WORKS GENERAL CONDITIONS AND STANDARD SPECIFICATIONS.
4. ALL CONSTRUCTION FEATURES OF THIS PROJECT SHALL CONFORM TO UTAH PUBLIC WORKS GENERAL CONDITIONS AND STANDARD SPECIFICATIONS.

CONTENTS

PAGE 1-6   LIFT STATION SITE PLAN
PAGE 1-7   LOWER LEVEL PLAN VIEW
PAGE 1-8   UPPER LEVEL PLAN VIEW
PAGE 1-9   WALL CROSS SECTIONS
PAGE 1-10  DETAILS
PAGE 1-11  ELEVATIONS
PAGE 1-12  ELECTRICAL PLANS
PAGE 1-13  ELECTRICAL PLAN, SCHEDULES, POWER RISER DIAGRAM
PAGE 1-14  ONE-LINE DIAGRAM
PAGE 1-15  SECTION, YAGI ANTENNA DETAIL
PAGE 1-16  ELECTRICAL EQUIPMENT DETAILS

VICINITY MAP

CITY OF SPANISH FORK

MAYOR

COUNCIL MEMBERS

ENGINEER

LEI Consulting Engineers and Surveyors, Inc.
3302 No. Main St.
Spanish Fork, UT 84660
801-798-0655 Fax 801-798-9393
FUTURE DEVELOPMENT

LOT 246

590 SOUTH
NP 3127 MT 1~ 439

Technical specification

Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

General

Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Impeller

- Impeller material: 6/4
- Outlet diameter: 150 mm
- Impeller diameter: 188 mm
- Number of blades: 2
- Throughlet diameter: 40 mm

Motor

- Motor # N3127.181 21-12-4AL-W 7.5 hp
- Stator variant: 12
- Frequency: 60 Hz
- Rated voltage: 220 V
- Number of poles: 4
- Phases: 1
- Rated power: 5.6 kW
- Rated current: 32 A
- Starting current: 65.9 A
- Rated speed: 1740 rpm
- Power factor:
  - 1/1 Load: 0.97
  - 3/4 Load: 1
  - 1/2 Load: 0.99
- Efficiency:
  - 1/1 Load: 82.5 %
  - 3/4 Load: 84.5 %
  - 1/2 Load: 83 %

Installation: P - Semi permanent, Wet

Note: Picture might not correspond to the current configuration.
NP 3127 MT 1~ 439
Performance curve

**Pump**
- Outlet diameter: 5½"
- Inlet diameter: 7½"
- Impeller diameter: 7½"
- Number of blades: 2
- Throughlet diameter: 2

**Motor**
- Motor #: N3127.181 21-12-4AL-W 7.5hp
- Frequency: 60 Hz
- Rated voltage: 220 V
- Number of poles: 4
- Rated power: 5.6 kW
- Rated current: 32 A
- Starting current: 65.92 A
- Rated speed: 1740 rpm

**Head**
- Efficiency: 71.8%

**NPSH-values**
- Efficiency: 439

**Total efficiency**
- Efficiency: 439

Curve according to: ISO 9906 grade 2 annex 1 or 2

0 kWh/US gal

**Notes:**
- Created on: 13.01.2011
- Last update: 13.01.2011
NP 3127 MT 1~ 439
Dimensional drawing

Dimensional drawing
FP, NP 3127 MT

* DIMENSION TO ENDS OF GUIDE BARS

Weight

Project

Project ID

Created by

Created on

13.01.2011

Last update
APPENDIX E
ELECTRONIC DATA
(ON CD)