CHAPTER 11
Capital Improvement Program

This Chapter presents the recommended CIP for the City’s existing and future (buildout) water systems, and associated construction and capital cost estimates. Improvements for the contiguous service area are based on the evaluations described previously in Chapters 8 and 9. In addition, separate evaluations of the City’s outlying service areas have also been conducted, and summaries of these evaluations for the Del Rio, Turlock and Grayson service areas are provided in Appendices Q, R and S, respectively.

It should be noted that the recommended CIP only identifies improvements at a Master Plan level and does not necessarily include all required on-site infrastructure, or provide design of improvements. Subsequent detailed design is required to determine the exact sizes and locations of these recommended improvements.

11.1 CAPITAL IMPROVEMENT PROGRAM CATEGORIES

The City’s water system CIP is divided into twenty-two categories, which are described in detail in the Final 2016 Water System Engineer’s Report (Engineer’s Report). These categories are used to group and develop budgets for each of these water system improvements/programs, based on the type of improvement, and to allocate costs between existing and future customers. Error! Reference source not found. summarizes the CIP categories used in the Engineer’s Report and identifies the categories that were updated by the recommendations from this Water Master Plan.

The City’s complete water system CIP contains categories that may not have been evaluated in this Water Master Plan because this Water Master Plan provides recommendations that are intended for water system capital improvements (e.g., pipelines in Category 9 or tanks in Category 18). As shown in Table 11-1, some improvement categories are intended to fund on-going operations and maintenance activities, planning and engineering studies, or the design and construction of previously identified and required water system infrastructure improvement projects. All of these categories are required to continue to support the overall operation and reliability of the City’s water system. Therefore, all twenty-two water system CIP categories must continue to be funded. While the need for these improvement categories is on-going, the specific program funding needs may vary from year to year.

1 Improvements for the future (buildout) of the contiguous service area are based on serving projected water demands estimated for the City’s Adopted General Plan (as described in Chapter 3). Appendix A contains a feasibility-level evaluation of the Alternative General Plan land use plan, and identifies potential future water system improvements required to serve the Alternative General Plan.
Table 11-1. Summary of CIP Categories

<table>
<thead>
<tr>
<th>Category No.</th>
<th>Project Category</th>
<th>Updated as Part of Water Master Plan or Engineer’s Report</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MRWTP Phase II Expansion</td>
<td>Project Complete</td>
<td>This project is complete and provided funding to expand MID’s MRWTP capacity from 30 mgd to 60 mgd.</td>
</tr>
<tr>
<td>2</td>
<td>City-Side Downstream Improvements</td>
<td>Engineer’s Report</td>
<td>This project is near completion and provides funding for the Industrial Tank and Booster Pump Station, Codoni Transmission Mains, and the Yosemite Transmission Mains.</td>
</tr>
<tr>
<td>3</td>
<td>Improvements for South Modesto</td>
<td>Water Master Plan</td>
<td>Provides funding to increase the delivery reliability to customers in South Modesto, by providing additional transmission mains, distribution mains, tanks, and booster pumping capacity.</td>
</tr>
<tr>
<td>4</td>
<td>Water Quality Related Studies</td>
<td>Engineer’s Report</td>
<td>Provides funding for system-wide water quality related studies to manage the City’s groundwater/surface water resources.</td>
</tr>
<tr>
<td>5</td>
<td>SCADA System Upgrades</td>
<td>Engineer’s Report</td>
<td>Provides funding for SCADA system upgrades to improve the City’s operation and management of the water system.</td>
</tr>
<tr>
<td>6</td>
<td>New Corporation Yard</td>
<td>Engineer’s Report</td>
<td>Provides funding for a new Water Division Corporation Yard.</td>
</tr>
<tr>
<td>7</td>
<td>Existing Tank Improvements</td>
<td>Engineer’s Report</td>
<td>Provides funding for interior and exterior enhancements to water storage tanks to improve efficiency and prolong their useful life.</td>
</tr>
<tr>
<td>8</td>
<td>Extend Water Mains</td>
<td>Engineer’s Report</td>
<td>Provides funding to extend water mains into developing areas and to complete distribution pipeline “looping”.</td>
</tr>
<tr>
<td>9</td>
<td>Strengthen and Replace Water System</td>
<td>Water Master Plan</td>
<td>Provides funding to replace and upgrade deficient water mains, which may also include “looping” improvements.</td>
</tr>
<tr>
<td>10</td>
<td>Install New Wells</td>
<td>Water Master Plan</td>
<td>Provides funding to replace older wells (taken out of service for water quality or production capacity) or construct new wells.</td>
</tr>
<tr>
<td>11</td>
<td>Wellhead Treatment</td>
<td>Water Master Plan</td>
<td>Provides funding for wellhead treatment or blending facilities for wells that are offline due to water quality.</td>
</tr>
<tr>
<td>12</td>
<td>Purchase &amp; Install New Generators</td>
<td>Water Master Plan</td>
<td>Provides funding to purchase and install new generators to ensure reliable water service throughout the water system.</td>
</tr>
<tr>
<td>13</td>
<td>Water System Security Enhancements</td>
<td>Engineer’s Report</td>
<td>Provides funding to make security enhancements (e.g. fencing, signage) to facilities identified in the 2003 Water System Vulnerability Assessment.</td>
</tr>
<tr>
<td>14</td>
<td>Groundwater Management Program</td>
<td>Engineer’s Report</td>
<td>Provides funding to support projects and studies related to managing groundwater resources.</td>
</tr>
<tr>
<td>15</td>
<td>Urban Water Management Plan</td>
<td>Engineer’s Report</td>
<td>Provides funding to support completion of an UWMP every five years to help ensure reliability of water supply.</td>
</tr>
<tr>
<td>16</td>
<td>Water Master Plan</td>
<td>Engineer’s Report</td>
<td>Provides funding to support completion future WMPs to evaluate the adequacy of water system to serve existing and future customers.</td>
</tr>
<tr>
<td>17</td>
<td>Water System Evaluation</td>
<td>Engineer’s Report</td>
<td>Provides funding to support as-needed engineering studies and water system evaluations.</td>
</tr>
<tr>
<td>18</td>
<td>New Water Tanks</td>
<td>Water Master Plan</td>
<td>Provides funding to construct new tanks and booster pumping stations and other associated facilities.</td>
</tr>
<tr>
<td>19</td>
<td>Water Meters</td>
<td>Engineer’s Report</td>
<td>Provides funding to purchase and install new automated meter readers throughout the service area.</td>
</tr>
<tr>
<td>21</td>
<td>New or Replacement Pumps</td>
<td>Engineer’s Report</td>
<td>Provides funding to replace deficient water pumps at wells and booster pump station that are too costly to repair.</td>
</tr>
<tr>
<td>22</td>
<td>Utility Cuts</td>
<td>Engineer’s Report</td>
<td>Provides funding to cover costs associated with utility construction (e.g., paving, valve replacement, leak repairs, valve replacement).</td>
</tr>
</tbody>
</table>
Capital costs presented in the Engineer’s Report were developed prior to the completion of this Water Master Plan, and, thus, differ from the capital cost estimates presented in the sections below (e.g., different Engineering News Record Construction Cost Indices were used). Although costs differ, the Engineer’s Report was intended to summarize costs for each of the different CIP categories through Fiscal Year (FY) 2020/21 for near-term planning purposes. The existing improvements identified as part of this Water Master Plan are also generally intended to be complete within this same time frame (i.e., FY 2020/21). The total capital costs identified in the Engineer’s Report through FY 2020/21 are less than the costs of improvements identified for the Existing Water System CIP (refer to Table 11-5)\(^2\). However, an update to the Engineer’s Report is not warranted until the City has better estimates of when projects in the Existing Water System CIP would occur. West Yost recommends that costs be reviewed in future updates to the Engineer’s Report.

### 11.2 COST ASSUMPTIONS

Construction cost estimates for recommended water system improvements are presented in March 2017 dollars based on an Engineering News Record (ENR) Construction Cost Index (CCI) of 11,609.44 (San Francisco Average). Construction costs were developed based on bids on other water facilities design projects and from standard cost estimating guides. The total CIP cost includes a mark-up equal to 50 percent of the base construction costs, which includes a design and construction contingency of 20 percent and an additional markup of 30 percent for professional services such as engineering, construction management and program implementation, as listed below.

- **Design and Construction Contingency:** 20 percent
- **Professional Services:** 30 percent as follows:
  - Engineering: 10 percent
  - Construction Management: 10 percent
  - Program Implementation: 10 percent
  - **Total:** 30 percent

For this Water Master Plan, it is assumed that recommended distribution system facilities, except new storage reservoir facilities, will be developed in public rights-of-way or on public property; therefore, land acquisition costs have not been included. The construction cost estimates do not include costs for annual operation and maintenance. A complete description of the assumptions used in the development of the estimated of probable construction cost is provided in Appendix T.

\(^2\) The total costs for Categories 3, 9, 10, 11, 12 and 18 for the 2016 Engineer’s Report and the Existing System CIP are $81.0M and $109.7M, respectively.
11.3 RECOMMENDED WATER SYSTEM CAPITAL IMPROVEMENT PROGRAM

The recommended water system capital improvement projects for the existing and future (buildout) contiguous service area are described below and are listed in Table 11-2 and Table 11-3, respectively. Since there are numerous pipeline improvements identified within the contiguous water service area, improvement areas were defined so that recommended pipeline improvements could be grouped by improvement area. As shown on Figure 11-1, thirteen (13) improvement areas were defined (Salida, North Modesto 1, North Modesto 2, etc.). Grid Improvements and all other facility improvements were identified independently and were not grouped by improvement area, since these projects are more distinct and provide regional benefits to the overall contiguous area water system.

Figure 11-1 shows the recommended improvements for existing and future water systems and shows the delineated improvement areas for the contiguous water system.

Figure 11-2 through 11-14 show each improvement area individually, to illustrate recommended improvements in more detail.

Recommended water system capital improvement projects for the City’s outlying service areas are also summarized in the sections below. Specific details, such as project location maps, quantities or construction costs, are provided in Appendices Q, R, and S.

11.3.1 Existing Water System Capital Improvement Program

Chapter 8 provided a summary of the evaluation of the City’s existing contiguous water system and its ability to meet the recommended water system planning and design criteria described in Chapter 6. Separate evaluations were conducted for the City’s outlying service areas in Del Rio, Turlock and Grayson (see Appendices Q, R and S). Based on the existing water system evaluations, water system improvements were recommended to eliminate identified existing system deficiencies such as inability to meet minimum fire flows, system pressures, storage volumes, etc. Improvements to the existing contiguous service area are summarized in Table 11-2.
<table>
<thead>
<tr>
<th>CIP ID</th>
<th>Improvement Area</th>
<th>Improvement Type</th>
<th>Improvement Description</th>
<th>Quantity(ft)</th>
<th>Estimated Construction Cost (in 1000s of $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXGRID-01</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along Standiford Avenue between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-02</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 2nd Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-03</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 1st Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-04</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 3rd Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-05</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 5th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-06</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 7th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-07</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 9th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-08</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 11th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-09</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 13th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-10</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 15th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-11</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 17th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-12</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 19th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-13</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 21st Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-14</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 23rd Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-15</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 25th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-16</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 27th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-17</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 29th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-18</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 31st Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-19</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 33rd Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>EXGRID-20</td>
<td>West Modesto 1</td>
<td>Pipeline Improvement</td>
<td>New 8-inch diameter pipelines along 35th Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
</tr>
<tr>
<td>Backup Power Improvements</td>
<td>West Modesto 1</td>
<td>New 12-inch diameter pipelines along Main Street between 4th Street and 5th Street</td>
<td>1,870</td>
<td>$224,900</td>
<td></td>
</tr>
</tbody>
</table>

**Total Subtotal: $11,294,400**

*Note: Costs are based on 2015 San Francisco Engineering News Record (ENR) construction cost index (dec) of 1.089.44.*

City of Modesto
Water Master Plan
## Table 11-3: Summary of Estimated Costs for the Recommended Improvements to the Future Contiguous Area Water System(a)

<table>
<thead>
<tr>
<th>Improvement Plan</th>
<th>Improvement Type</th>
<th>Improvement Description</th>
<th>Quantity(c)</th>
<th>Cost of Capital Improvement (includes mark-up)(d,e)</th>
<th>Estimated Capital Improvements</th>
<th>Estimated Construction Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contiguous Area</td>
<td>Pipeline</td>
<td>New 8-inch diameter pipelines</td>
<td>113,370 ft</td>
<td>$1,842,000</td>
<td>$2,763,000</td>
<td>$2,763,000</td>
</tr>
<tr>
<td></td>
<td>Pipeline</td>
<td>New 12-inch diameter pipelines</td>
<td>120,750 ft</td>
<td>$1,635,000</td>
<td>$2,350,000</td>
<td>$2,350,000</td>
</tr>
<tr>
<td>North Modesto</td>
<td>Pipeline</td>
<td>New 8-inch diameter pipelines</td>
<td>18,525 ft</td>
<td>$277,250</td>
<td>$318,000</td>
<td>$318,000</td>
</tr>
<tr>
<td></td>
<td>Pipeline</td>
<td>New 12-inch diameter pipelines</td>
<td>208,870 ft</td>
<td>$2,253,750</td>
<td>$2,470,000</td>
<td>$2,470,000</td>
</tr>
<tr>
<td></td>
<td>Storage Tank</td>
<td>New 12-foot diameter storage tanks</td>
<td>900 ft</td>
<td>$188,750</td>
<td>$216,500</td>
<td>$216,500</td>
</tr>
<tr>
<td></td>
<td>Booster Pump</td>
<td>New booster pumping station associated with planned storage in North Modesto</td>
<td>970 ft</td>
<td>$18,125</td>
<td>$20,850</td>
<td>$20,850</td>
</tr>
<tr>
<td></td>
<td>Pipeline</td>
<td>New 12-inch diameter pipelines</td>
<td>79,040 ft</td>
<td>$1,297,200</td>
<td>$1,550,000</td>
<td>$1,550,000</td>
</tr>
<tr>
<td></td>
<td>Booster Pump</td>
<td>New booster pumping station associated with planned storage in North Modesto</td>
<td>79,040 ft</td>
<td>$1,297,200</td>
<td>$1,550,000</td>
<td>$1,550,000</td>
</tr>
</tbody>
</table>

### Distribution/Transmission

- **North Modesto**: Construct new 16-inch diameter pipelines along Oakdale Road between Merle Avenue (downstream from Turnout 5) and Lapham Drive; which include a portion along Oakdale Road, south of Scoric Avenue, that may be constructed using trenchless methods (to be determined during design stage).
- **South Modesto**: Construct new 16-inch diameter pipelines along Kansas Avenue and Pine Cone Drive (North of Turnout 14A); Along O Street between Nevada Street and 8th Street.

### Booster Pump Station Improvements

- **North Modesto**: Construct new booster pumping station associated with planned storage in North Modesto
- **South Modesto**: Construct new booster pumping station associated with planned storage in South Modesto

### Additional Grid Improvements

- **FTGRID-01**: Construct new 16-inch diameter pipelines along South Santa Cruz Avenue between Mono Drive and Monterey Avenue; Along South Santa Cruz Avenue from Monterey Avenue across the Tuolumne River (assuming Deep HDD) to River Road; Along Harrison Road between River Road and Joyce Avenue; Across Highway 89 (Assuming Deep HDD) to East Hatch Road and Morgan Road; Along Morgan Road between East Hatch Road and East Whitmore Avenue.

### Strengthen and Replace (S&R) Improvements

- **Central Modesto 1**: S&R Improvement - Upsize existing small diameter pipelines to 8-inches in diameter
- **Central Modesto 2**: S&R Improvement - Upsize existing small diameter pipelines to 8-inches in diameter

### Pipeline Improvement

- **North Modesto 1**: Extend new 16-inch diameter pipelines along Oakdale Road between Merle Avenue (downstream from Turnout 5) and Lapham Drive; which include a portion along Oakdale Road, south of Scoric Avenue, that may be constructed using trenchless methods (to be determined during design stage).
- **South Modesto**: Construct new 12-inch diameter pipelines along Kansas Avenue and Pine Cone Drive (North of Turnout 14A); Along O Street between Nevada Street and 8th Street.

### Additional Water Main to Future Development Areas (Read for by Others)

- **Central Modesto 1**: Extend new 12-inch diameter pipelines along Oakdale Road between Merle Avenue (downstream from Turnout 5) and Lapham Drive; which include a portion along Oakdale Road, south of Scoric Avenue, that may be constructed using trenchless methods (to be determined during design stage).
- **Central Modesto 2**: Extend new 12-inch diameter pipelines along Oakdale Road between Merle Avenue (downstream from Turnout 5) and Lapham Drive; which include a portion along Oakdale Road, south of Scoric Avenue, that may be constructed using trenchless methods (to be determined during design stage).
- **Empire**: Extend new 12-inch diameter pipelines along Oakdale Road between Merle Avenue (downstream from Turnout 5) and Lapham Drive; which include a portion along Oakdale Road, south of Scoric Avenue, that may be constructed using trenchless methods (to be determined during design stage).
- **South Modesto**: Extend new 12-inch diameter pipelines along Oakdale Road between Merle Avenue (downstream from Turnout 5) and Lapham Drive; which include a portion along Oakdale Road, south of Scoric Avenue, that may be constructed using trenchless methods (to be determined during design stage).
- **West Modesto 1**: Extend new 12-inch diameter pipelines along Oakdale Road between Merle Avenue (downstream from Turnout 5) and Lapham Drive; which include a portion along Oakdale Road, south of Scoric Avenue, that may be constructed using trenchless methods (to be determined during design stage).

### Storage Tank Improvements

- **Central Modesto 1**: Construct new storage tank in South Modesto to mitigate the future storage deficiency
- **North Modesto 18**: Construct new storage tank at the Terminal Reservoir to mitigate the future storage deficiency and maximize the existing pumping capacity of Terminal Reservoir Booster Pump Station
- **North Modesto 18**: Construct new storage tank in North Modesto to mitigate the future storage deficiency
- **North Modesto 18**: Construct new storage tank in North Modesto to mitigate the future storage deficiency

### Booster Pump Station Improvements

- **South Modesto**: Construct new booster pumping station associated with planned storage in South Modesto
- **North Modesto**: Construct new booster pumping station associated with planned storage in North Modesto

### Backup Power Improvements

- **West Modesto**: Construct new booster pumping station associated with planned storage in North Modesto

### Groundwater Well Improvements

- **North Modesto**: Construct 13 new wells, resulting in an additional 11,700 gpm (16.8 mgd) firm groundwater supply capacity, to mitigate the future supply deficiency

### City of Modesto Water Master Plan

- **City of Modesto**: Install new backup power generators at Wells 017, 046, 059, 204, 212, 216, 250, 277, 283, 293, 297, 301, and 302 to mitigate future storage deficiency

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(a) Costs are based on March 2017 San Francisco Engineering News Record (SF ENR) construction cost index (CCI) of 11,609.44.
(b) City Capital Improvement Plan Category (b)
(c) Pipeline lengths were estimated to the nearest 10 feet.
(d) Booster pump station sizing was assumed based on draining the full storage in 8 hours, providing 150 feet of head, and a 75% overall efficiency.
(e) Total costs were rounded to the nearest $100.
(f) Total rounded to the nearest $100.
(g) Costs include mark-up equal to 25 percent (Construction-Contingency: 20 percent; Engineering Costs: 10 percent; Construction Management Costs: 10 percent; Program Implementation: 10 percent).
(h) Costs include mark-up equal to 25 percent (Construction-Contingency: 20 percent; Engineering Costs: 10 percent; Construction Management Costs: 10 percent; Program Implementation: 10 percent).
(i) Total costs were rounded to the nearest $100.
Chapter 11
Capital Improvement Program

The recommended existing water system improvements are as follows:

11.3.1.1 Contiguous Service Area

- **Pipelines**
  - Construct approximately 234,550 (lf) (44.4 miles) of new pipelines ranging between 8- to 12-inches in diameter to strengthen and replace existing pipelines and mitigate severely deficient fire flow locations, as defined in Chapter 8. These improvements are shown on Figure 11-1 through 11-14 and are colored in red and orange. These projects could be further prioritized by targeting areas where the City has historically had leak and main break issues.
  - Construct approximately 147,830 lf (28.0 miles) of larger diameter system grid improvements, ranging between 12- to 16-inches in diameter to improve the hydraulic transmission of treated surface water within the contiguous service area. These improvements are also shown on Figure 11-1 through 11-14 and are colored in dark green.

- **Backup Power**
  - Install backup power at 18 existing wells (summarized in Table 11-2) to increase the Emergency Groundwater Storage Credit and alleviate the existing storage capacity deficit.

11.3.1.2 Del Rio Service Area (Appendix Q)

- **Pipelines**
  - Construct 2,600 lf (0.5 miles) of new 16-inch diameter pipeline from the proposed tank, booster pump station and well site to the existing distribution system (a proportionate share of these new pipelines will be used and should be paid for by future users).
  - Construct 850 lf of new 12-inch diameter pipeline from Replacement Well 271 to the existing distribution system.
  - Construct 230 lf of new 8-inch diameter pipelines to mitigate fire flow deficiencies.

- **Wells**
  - Construct a replacement well for Well 271, and provide this replacement well with a backup generator.
  - Construct a new well (with a backup generator), with a pumping capacity of approximately 1,000 gpm (a proportionate share of the production capacity of this new well will be used and should be paid for by future users).

- **Tank and Booster Pump Stations**
  - Construct a new 0.23 MG storage tank, associated booster pump station (BPS) with a firm capacity of 2.4 mgd, and a backup generator.
11.3.1.3 Turlock Service Area (Appendix R)

- **Pipelines**
  - Construct 10,400 lf (2.0 miles) of 8-inch diameter pipelines to replace existing pipelines and mitigate fire flow deficiencies.
  - Explore institutional arrangements with the City of Turlock to upsize two existing system emergency interconnections, and construct a new emergency intertie.

- **Wells**
  - Rehabilitate or construct a replacement for Well 255.

- **Backup Power**
  - Install backup power at all three well sites (Wells 255, 256 and 275).

11.3.1.4 Grayson Service Area (Appendix S)

- **Pipelines**
  - Construct 4,600 lf (0.9 miles) of 8-inch diameter pipelines to replace existing pipelines and mitigate fire flow deficiencies.

- **Wells**
  - Construct a new well (with a backup generator) with a pumping capacity of approximately 400 gpm.

- **Backup Power**
  - Install a backup generator at Well 274.
  - Install a backup generator at existing Tank 9 BPS (located adjacent to Well 295).

- **Tank and Booster Pump Stations**
  - Install 900 gpm of additional pumping capacity at existing Tank 9 BPS.
  - Replace existing Tank 9.

- **Wellhead Treatment**
  - Construct a new treatment system for Replacement Well 274\(^3\).

---

\(^3\) City should perform evaluation to determine whether the existing treatment system at Well 295 could be replaced with another treatment system that would meet the needs of both Well 295 and the Well 274 replacement.
11.3.2 Future Water System Capital Improvement Program

Chapter 9 provided a summary of the evaluation of the City’s future (buildout) contiguous water system and its ability to meet the recommended water system planning and design criteria described in Chapter 6. Separate evaluations were conducted for the City’s outlying service areas in Del Rio, Turlock and Grayson (see Appendices Q, R and S). Based on the future potable water system evaluations, water system improvements were recommended to eliminate identified future system deficiencies and be able to convey future demands at buildout. Improvements to the buildout contiguous service area are summarized in Table 11-3.

The recommended buildout water system improvements are as follows:

11.3.2.1 Contiguous Service Area

- Pipelines

  - Construct approximately 37,060 lf (7.0 miles) of new pipelines ranging between 8- to 12-inches in diameter to replace existing pipelines and to mitigate fire flow deficiencies. These improvements are shown on Figure 11-1 through 11-14 and are colored in yellow.

  - Construct approximately 34,540 lf (6.5 miles) of additional large diameter pipeline grid improvements, ranging between 12- to 16-inches in diameter to improve the hydraulic transmission of surface water within the water system. These improvements are shown on Figure 11-1 through 11-14 and are colored in light green.

  - Construct approximately 1,379,580 lf (261.3 miles) of new 8-inch diameter pipelines to replace existing small diameter pipelines (pipelines less than 8-inches in diameter). These improvements are to be completed on an on-going, annual basis as part of the City’s Strengthen & Replace program. These improvements are shown on Figure 11-1 through 11-14 and are colored in light purple.

- Wells

  - Construct 13 new groundwater wells, each assumed to be constructed with backup power, to provide an additional 11,700 gpm (16.8 mgd) of firm groundwater supply capacity.

---

4 Costs associated with future development pipelines are assumed to be paid for by developers and are not included in the overall CIP.

5 These improvements are in addition to the on-going Strengthen and Replace improvements and have been identified to prioritize the replacement of older undersized pipelines to mitigate fire flow deficiencies.
• Tanks and Booster Pump Stations
  — Construct a new 2.6 MG tank to mitigate the future storage capacity deficit in South Modesto. To access this storage, also construct a new booster pump station with a firm capacity of 7.8 mgd.
  — Construct a total of 10.8 MG of storage capacity to alleviate the future storage capacity deficit in North Modesto. For planning and cost estimating purposes, the following was assumed:
    ▪ Construction of a new 5 MG tank at the existing Terminal Reservoir site to maximize the existing pumping capacity.\(^6\)
    ▪ Construct two new 2.9 MG tanks at new locations in North Modesto. To access this storage, construct two new booster pump stations with a firm capacity of 8.7 mgd each.\(^7\)

• Backup Power
  — Install backup power at 12 existing wells (summarized in Table 11-3) to maximize the Emergency Groundwater Storage Credit and alleviate the buildout storage capacity deficit.

11.3.2.2 Del Rio Service Area (Appendix Q)

• Pipelines\(^8\)
  — A proportionate share of the 2,600 lf of 16-inch diameter pipeline installed as part of the existing system improvements from the proposed tank, booster pump station and well site to the existing distribution system was required to provide service for buildout of this service area.

• Wells
  — A proportionate share of the new well and backup generator recommended for the existing system was required to provide service for buildout of this service area.

• Tanks and Booster Pump Stations
  — Construct an additional 1.0 mgd in firm pumping capacity at the previously proposed pump station, resulting in an overall 3.4 mgd firm pumping capacity.

---

\(^6\) It should be noted that additional pumping capacity is currently not recommended at Terminal Reservoir, since the peaking characteristics of the Phase Two Expansion have not yet been determined. Once the peaking capacity with the Phase Two Expansion is determined, additional pumping capacity may be recommended if the City wants to maximize the overall MRWTP supply.

\(^7\) A specific tank siting analysis should be performed to confirm the number of tanks and evaluate the hydraulic effectiveness of potential sites.

\(^8\) Costs associated with future development pipelines are assumed to be paid for by developers and are not included in the overall CIP.
Chapter 11
Capital Improvement Program

11.3.3 Summary of Overall Water System Improvement Costs

The construction cost estimates for the recommended existing and future contiguous service area water system improvements are presented Table 11-2 and Table 11-3, respectively. Appendices Q, R, and S contain construction cost estimates for the recommended existing and future water system improvements for the Del Rio, Turlock and Grayson outlying water systems, respectively.

Table 11-4 summarizes planning-level capital cost estimates by improvement type to mitigate existing system deficiencies, and to meet future growth in the City’s contiguous and outlying water systems as identified by evaluations performed for this Water Master Plan. It should be noted that any pipelines required to be installed as part of new development projects are assumed to be fully funded and installed by the project proponents and their corresponding costs are not included.

<table>
<thead>
<tr>
<th>Improvement Type</th>
<th>Capital Costs by Service Area, $M</th>
<th>Total Capital Costs, $M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing System Improvements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipelines</td>
<td>$84.62</td>
<td>$88.27</td>
</tr>
<tr>
<td>Wells and Wellhead Treatment</td>
<td>$0.00</td>
<td>$11.87</td>
</tr>
<tr>
<td>Tanks</td>
<td>$0.00</td>
<td>$1.20</td>
</tr>
<tr>
<td>Booster Pump Stations</td>
<td>$0.00</td>
<td>$2.90</td>
</tr>
<tr>
<td>Backup Power</td>
<td>$4.29</td>
<td>$5.48</td>
</tr>
<tr>
<td><strong>Subtotal Existing CIP</strong></td>
<td>$88.91</td>
<td>$109.72</td>
</tr>
<tr>
<td><strong>Future System Improvements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipelines</td>
<td>$273.18</td>
<td>$273.56</td>
</tr>
<tr>
<td>Wells and Wellhead Treatment</td>
<td>$44.85</td>
<td>$46.58</td>
</tr>
<tr>
<td>Tanks</td>
<td>$33.00</td>
<td>$33.00</td>
</tr>
<tr>
<td>Booster Pump Stations</td>
<td>$9.16</td>
<td>$10.23</td>
</tr>
<tr>
<td>Backup Power</td>
<td>$2.86</td>
<td>$2.86</td>
</tr>
<tr>
<td><strong>Subtotal Future CIP</strong></td>
<td>$363.05</td>
<td>$366.23</td>
</tr>
<tr>
<td><strong>Total CIP</strong></td>
<td>$451.96</td>
<td>$475.95</td>
</tr>
</tbody>
</table>

(a) Costs associated with future development pipelines are not included because they are assumed to be paid for by developers.

The total planning-level capital cost for potable water system improvements identified from the Water Master Plan to support the City’s existing and future water demands is $476 million (M). The total CIP cost for the City’s contiguous area is approximately $452M. Of this amount, approximately $89M is required to address existing system deficiencies, and approximately $363M is required to support future demands. Pipeline improvements account for approximately 80 percent of the contiguous service area total CIP costs. Approximately $24M of the total CIP cost is required to address deficiencies in the City’s outlying service areas.
Chapter 11
Capital Improvement Program

Table 11-5 summarizes the planning-level capital cost estimates for potable water system improvements identified from the Water Master Plan and categorized by the City’s pre-defined CIP categories. As previously mentioned, some of the City’s CIPs categories were previously evaluated as part of the Engineer’s Report, but were not re-evaluated for this Water Master Plan. While they were not evaluated in this Water Master Plan, these CIP categories are still required to continue to support the overall operation and reliability of the City’s water system, and the costs presented in the Engineer’s Report for these other CIP categories are still valid.

Table 11-5. Summary of Existing and Future System Capital Improvement Costs by Capital Improvement Plan Category

<table>
<thead>
<tr>
<th>Capital Improvement Plan Category</th>
<th>Capital Costs by Service Area, $M</th>
<th>Contiguous</th>
<th>Del Rio</th>
<th>Grayson</th>
<th>Turlock</th>
<th>Total Capital Costs, $M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing System Improvement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Improvements to South Modesto</td>
<td>$10.39</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td><strong>$10.39</strong></td>
</tr>
<tr>
<td>9 Strengthen and Replace Water System</td>
<td>$74.23</td>
<td>$0.63</td>
<td>$0.84</td>
<td>$1.89</td>
<td>$77.59</td>
<td></td>
</tr>
<tr>
<td>10 Install New Wells</td>
<td>$0.00</td>
<td>$5.18</td>
<td>$3.45</td>
<td>$0.99</td>
<td>$9.62</td>
<td></td>
</tr>
<tr>
<td>11 Well Head Treatment</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$2.25</td>
<td>$0.29</td>
<td>$2.54</td>
<td></td>
</tr>
<tr>
<td>12 Purchase &amp; Install New Generators</td>
<td>$4.29</td>
<td>$0.00</td>
<td>$0.47</td>
<td>$0.72</td>
<td>$5.48</td>
<td></td>
</tr>
<tr>
<td>18 New Water Tanks</td>
<td>$0.00</td>
<td>$1.67</td>
<td>$2.43</td>
<td>$0.00</td>
<td>$4.10</td>
<td></td>
</tr>
<tr>
<td><em>Subtotal Existing CIP</em></td>
<td>$88.91</td>
<td>$7.48</td>
<td>$9.44</td>
<td>$3.89</td>
<td><strong>$109.72</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Future System Improvements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Improvements to South Modesto</td>
<td>$33.62</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$33.62</td>
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<tr>
<td>9 Strengthen and Replace Water System</td>
<td>$248.85</td>
<td>$0.38</td>
<td>$0.00</td>
<td>$0.00</td>
<td><strong>$249.23</strong></td>
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<tr>
<td>10 Install New Wells</td>
<td>$44.85</td>
<td>$1.73</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$46.58</td>
<td></td>
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<tr>
<td>11 Well Head Treatment</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td>12 Purchase &amp; Install New Generators</td>
<td>$2.86</td>
<td>$0.00</td>
<td>$0.00</td>
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<tr>
<td>18 New Water Tanks</td>
<td>$32.87</td>
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<td>$0.00</td>
<td>$33.94</td>
<td></td>
</tr>
<tr>
<td><em>Subtotal Future CIP</em></td>
<td>$363.05</td>
<td>$3.18</td>
<td>$0.00</td>
<td>$0.00</td>
<td><strong>$366.23</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total CIP Program</strong></td>
<td>$451.96</td>
<td>$10.66</td>
<td>$9.44</td>
<td>$3.89</td>
<td><strong>$475.95</strong></td>
<td></td>
</tr>
</tbody>
</table>

(a) Category 8, Extend Water Mains was not estimated as part of the Water Master Plan because these pipelines are intended to serve future development, and costs associated with future development pipelines are assumed to be paid for by developers.

(b) All other CIP categories not listed in the table were not addressed as part of this Water Master Plan. These categories, however, were addressed in Engineer’s Report and the costs presented in the Engineer’s Report for those other categories are still valid. Subsequent updates to the Engineer’s Report should re-evaluate these categories and should also update the costs for the six categories listed above.
11.4 CAPITAL IMPROVEMENT PROGRAM IMPLEMENTATION

Figure 11-15 presents a conceptual implementation sequencing for construction of recommended improvements to eliminate deficiencies in the existing and future (buildout) water systems.

Several improvements are recommended for the existing water system and they should be implemented in the near-term as funding for these improvements permits, and are anticipated to be completed by 2025.

The construction of capital improvements for future (buildout) conditions should be coordinated with the proposed schedules of new development to ensure that required infrastructure will be in place when needed, to serve future customers. However, improvements that are based on addressing future fire flow or future grid improvements should be prioritized first. In addition, it is recommended that the City continue to prioritize its Strengthen & Replace program and make on-going efforts to upsize small diameter pipelines to a minimum diameter of 8-inches; and it is recommended that the City target completion of this program by buildout (approximately 2050).
FIGURE 11-1

City of Modesto
Water Master Plan

PROPOSED EXISTING AND FUTURE CONTIGUOUS AREA IMPROVEMENTS

Notes
1. Tank locations are approximate and are placed for completeness and cost estimating purposes. Additional siting evaluations are recommended to confirm size and location of proposed future storage.
2. Emergency backup power locations for existing and future are summarized in Tables 11-1 and 11-2, respectively.
3. It is recommended that 13 new wells be installed in the future system to provide firm capacity (which assumes that only 60% of the total future well capacity is available). However, only the locations of 8 new wells were evaluated in the hydraulic model; the remaining well locations recommended for supply reliability and redundancy are not shown and will need to be determined in additional planning studies.

LEGEND
- High Priority FF Improvements
- Lower Priority FF Improvements
- Grid Improvements
- Future Fire Flow Improvements
- Future Grid Improvements
- Strengthen and Replace
- Buildout Extension Pipelines
- Existing Pipelines
- Future Well
- Active Well
- Out of Service Well
- Future Tank and Booster Pump Station
- Existing Tank and Booster Pump Station
- MID Turnout
- Contiguous Service

Improvement Area Figure Directory

<table>
<thead>
<tr>
<th>Improvement Area</th>
<th>Associated Figure</th>
<th>Improvement Area</th>
<th>Associated Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salida</td>
<td>Figure 11-2</td>
<td>West Modesto 2</td>
<td>Figure 11-8</td>
</tr>
<tr>
<td>North Modesto 1</td>
<td>Figure 11-3</td>
<td>Downtown</td>
<td>Figure 11-10</td>
</tr>
<tr>
<td>East Modesto 1</td>
<td>Figure 11-5</td>
<td>Empire</td>
<td>Figure 11-11</td>
</tr>
<tr>
<td>Central Modesto 1</td>
<td>Figure 11-7</td>
<td>South Modesto</td>
<td>Figure 11-12</td>
</tr>
<tr>
<td>South Modesto</td>
<td>Figure 11-11</td>
<td>North Ceres</td>
<td>Figure 11-13</td>
</tr>
<tr>
<td>Central Modesto 2</td>
<td>Figure 11-8</td>
<td></td>
<td>Figure 11-14</td>
</tr>
</tbody>
</table>
FIGURE 11-7
City of Modesto
Water Master Plan

PROPOSED EXISTING AND FUTURE
CONTIGUOUS AREA
IMPROVEMENTS

Central Modesto 1

Notes
1. Map locations are approximate and are placed for
comparability and cost estimating purposes. Additional site
evaluations are recommended to confirm size and location of
proposed future storage.
2. Emergency backup power locations for existing and future
proposed facilities identified in Table 11.1 and 11.2, respectively.
3. Slab and infrastructure for larger improvement areas;
4. Strengthen and Replace improvements assured to be a
minimum diameter of 8 inches.

LEGEND
High Priority FF Improvements
Lower Priority FF Improvements
Grid Improvements
Future Fire Flow Improvements
Future Grid Improvements
Strengthen and Replace
Improvements
Existing Extension Pipelines
Future Well
Active Well
Out of Service Well
Future Tank and Booster Pump
Station
Tank and Booster Pump Station
MID Turnout
Contiguous Service Area
FIGURE 11-11
City of Modesto
Water Master Plan

PROPOSED EXISTING
AND FUTURE
CONTIGUOUS AREA
IMPROVEMENTS

East Modesto 2

Notes
1. Site locations are approximate and are placed for comprehension and cost estimating purposes. Additional site
   evaluations are recommended to confirm size and location of
   proposed future storage.
2. Emergency backup water source locations for existing and future
   improvements are identified on Figure 11-2, respectively.
3. Exterior improvements for larger improvement areas, in
   alignment with Figure 11-2.
4. Strengthen and Replace improvements assumed to be a
   minimum diameter of 6-inches.

LEGEND
High Priority FF Improvements
Lower Priority FF Improvements
Grid Improvements
Future Fire Flow Improvements
Future Grid Improvements
Strengthen and Replace
Improvements
Buildout Extension Pipelines
Existing Pipelines
Future Well
Active Well
Out of Service Well
Future Tank and Booster Pump
Station
Tank and Booster Pump Station
MID Turnout
Contiguous Service Area
FIGURE 11-13
City of Modesto
Water Master Plan

PROPOSED EXISTING
AND FUTURE
CONTIGUOUS AREA
IMPROVEMENTS

South Modesto

Notes:
1. Tank locations are approximate and are placed for convenience.
2. Additional evaluation are recommended to confirm size and location of future storage.
3. Emerging locations are for existing and future wells.
4. Tank and replacement or other improvement are.
5. Tank and replacement or other improvement are.

LEGEND
- High Priority FF Improvements
- Lower Priority FF Improvement
- Grid Improvements
- Future Fire Flow Improvements
- Future Grid Improvements
- Strengthen and Replace Improvements
- Buildout Extension Pipelines
- Existing Pipelines
- Future Well
- Active Well
- Out of Service Well
- Future Tank and Booster Pump Station
- Tank and Booster Pump Station
- MID Turnout
- Contiguous Service Area

City of Modesto
Water Master Plan

PROPOSED EXISTING
AND FUTURE
CONTIGUOUS AREA
IMPROVEMENTS

South Modesto

Notes:
1. Tank locations are approximate and are placed for convenience.
2. Additional evaluation are recommended to confirm size and location of future storage.
3. Emerging locations are for existing and future wells.
4. Tank and replacement or other improvement are.
5. Tank and replacement or other improvement are.

LEGEND
- High Priority FF Improvements
- Lower Priority FF Improvement
- Grid Improvements
- Future Fire Flow Improvements
- Future Grid Improvements
- Strengthen and Replace Improvements
- Buildout Extension Pipelines
- Existing Pipelines
- Future Well
- Active Well
- Out of Service Well
- Future Tank and Booster Pump Station
- Tank and Booster Pump Station
- MID Turnout
- Contiguous Service Area
Figure 11-15

Summary of Demand Projections and Sequencing of Recommended CIP

City of Modesto
Water Master Plan