

8.0 Recommended Improvements

8.1 General

Based on the findings of the hydraulic analyses, the water quality analyses for both the treatment and distribution system, evaluation of the criticality of transmission mains, condition assessment of the water treatment plants, and overall system growth; a comprehensive capital improvements program was prepared. This comprehensive CIP includes budget costs and is staged and prioritized to identify improvements for additional capacity and reliability through Year 2032.

It should be recognized that the alignments shown for the recommended improvement mains are approximate locations. Specific street locations for the mains should be determined during the preliminary design. Improvement mains in undeveloped areas are subject to location change to conform to growth patterns and actual development. Factors that may accelerate or delay improvement mains include availability of right-of-way, scheduling of street improvements, and construction of other utilities. For residential service it is recommended that the City continue its general policy of installing minimum sizes of 16-inch mains on a 1-mile grid and 12-inch mains on half-section alignments, adjusted to accommodate local street patterns.

8.2 Cost Estimates

In every engineering study that develops a capital improvements program it is necessary to make estimates of the project costs required to implement the program. To that end, basic cost data must be obtained or developed for each type of construction and system components laid out in sufficient detail to permit determination of approximate project costs.

The total project cost necessary to complete a project consists of expenditures for land acquisition, construction costs, all necessary engineering services, contingencies, and such overhead items as legal, administrative and financing services. The various components of project costs are considered in the following paragraphs.

The cost of land acquisition is not included in the project costs presented in this report. In most cases, the construction of pipelines will not require purchase of private property or acquisition of easements. Pipeline routes, insofar as possible, follow public streets and roads. Although land acquisition is a significant activity that determines whether a project occurs, the cost of land acquisition is generally a small portion of the overall program cost. Relative to supply and treatment projects, all proposed facilities will be constructed on property currently owned by the City.

Construction costs cover the material, equipment, labor and services necessary to build the proposed project. Prices used in this study were obtained from a review of previous reports and pertinent sources of construction cost information. Construction costs used in this report are not intended to represent the lowest prices which may be achieved but rather are intended to represent a median of competitive prices submitted by responsible bidders.

Such factors as unexpected construction conditions, competitiveness of the bidding environment, the need for unforeseen mechanical and electrical equipment, and variations in final quantities are a few examples of items that can add to planning level estimates of project cost. To cover such contingencies, an allowance of 20 percent of the construction cost has been included.

Engineering services may include preliminary investigations and reports, site and route surveys, foundation explorations, preparation of design drawings and specifications, engineering services during construction, construction observation, construction surveying, sampling and testing, start-up services, and preparation of operation and maintenance manuals. Overhead charges cover such items as legal fees, financing fees, and administrative costs. The costs presented in this report include a 20 percent allowance for engineering services, legal, and administrative costs.

8.2.1 Basis of Costs

In considering the estimates presented in this report, it is important to realize that they are reported in Year 2019 dollars, and that future changes in the cost of materials, equipment and labor will cause comparable changes in project costs. A good indicator of changes in construction costs is the Engineering News-Record (ENR) Construction Cost Index (CCI), which is computed from prices of construction material and labor and based on a value of 100 in the Year 1913. Cost data in this report are based on an ENR CCI (20-city average) of 11326, which is the annual average value for Year 2019 (though November).

8.2.2 Pipelines

The *2014 Master Plan* used a construction cost of \$7.50 per diameter-inch per lineal foot plus a 25 percent contingency for the basis of pipeline construction costs. A review of the ENR average annual CCI shows that the CCI has increased from 9547 in April 2014 to 11326 in late Year 2019. This represents an increase of 19 percent over that 5.5-year time period.

For this Year 2019 update, opinions of probable construction costs for main improvements in currently undeveloped areas are based upon a unit costs of ($\$7.50 \times 1.2 = \9.00) per diameter-inch per lineal foot plus a 20 percent contingency ($\$9.00 \times 1.2 = \10.80 per diameter-inch when including contingencies). Comparatively, within the last several years the City has been tracking total construction cost on their pipeline installations and determined that a good overall cost is \$11.00 per diameter-inch. The probable project costs are calculated by adding a value equal to 20 percent of the total construction cost (including contingencies) for engineering, legal and administrative costs. The total value for probable project costs in currently undeveloped areas is therefore \$13.20 ($\11.00×1.2) per diameter-inch per lineal foot. This compares to the value of \$11.50 per diameter-inch used in the *2014 Master Plan*. Installation of mains in urban areas is substantially more expensive due to cost associated with utilities, paving, scheduling, and site restoration.

For construction in fully developed and congested areas, a project cost of \$19.00 per diameter-inch per lineal foot was used except for improvements relating to fire flow deficiencies which costs were defined on an individual basis depending on location and diameter. These unit costs and individual fire flow costs typically constitute an allowance for street removal and replacement as well as additional coordination with other utilities.

The costing utilized for main improvements as part of the capital improvement program are as shown in Table 8-1.

Table 8-1 Main Cost Utilized for Capital Improvement Program

Main Size (Inch)	Construction Cost (\$/ft) Rural	Capital Cost (\$/ft) Rural	Capital Cost (\$/ft) Urban
8	\$73	\$106	\$152
12	\$110	\$158	\$228
16	\$147	\$211	\$304
20	\$183	\$264	\$380
24	\$220	\$317	\$456
30	\$275	\$396	\$570
36	\$330	\$475	\$684
42	\$385	\$554	\$798
48	\$440	\$634	\$912
54	\$495	\$713	\$1,026
60	\$550	\$792	\$1,140

As indicated in previous Master Plans, it is recommended that the City continue its general policy of installing minimum sizes of 16-inch mains on a one-mile grid and 12-inch mains on half-section alignments, adjusted to accommodate local street patterns, for residential service. As a general guideline, the cost of one mile of 16-inch main would be about \$1,100,000 and the cost of one mile of 24-inch main would be about \$1,650,000. This report includes distribution main extensions which are necessary for development, but does not account for cost which are the responsibility of the developer.

8.2.3 Pumping

The total opinion of construction costs for a booster pumping station is highly dependent on the overall size of the facility. Specifically, the cost per gallon for small pumping stations is more expensive on a cost per gallon basis as the structure represents a higher overall percentage of the facility cost. The cost of the recently completed Yankee Hill Pumping Station (YHPS) provides a good reference for a small pumping station. The YHPS was designed to provide an initial total capacity of 7 mgd (4 mgd firm) with a buildout capacity of 24 mgd (18 mgd firm). The low bid for the project was \$3,000,000 which represents an initial cost of \$425,000/mgd based upon the initial total capacity. For reference only, other recent larger pumping stations constructed in the Midwest have been completed for approximately \$250,000/mgd. The pumping facilities being completed for this study are smaller in size. Therefore, it is recommended that budgeting be based on a net cost of \$400,000 per mgd of installed capacity plus 20 percent for contingency and 20 percent for engineering, legal, and administrative costs. These costs are based on typical Lincoln Water System pumping stations with permanent structure and sized for expansion. Therefore, the total probable project cost for new pumping stations is \$610,000 per mgd.

The construction costs of installing a new pump in a pumping station which is designed for the addition of a pump, or for replacing a pump in an existing pumping station, are based on a unit cost of \$60,000 per mgd of installed capacity. This cost includes the addition or replacement of electrical

equipment. Probable project costs are calculated by adding a value equal to 20 percent of the total construction cost for engineering, legal and administrative costs. Therefore, the total probable project costs for capacity increases at existing pumping stations is about \$86,400 per mgd. Budgeting for the inclusion of adjustable frequency drives, where applicable, was included as a separate cost.

8.2.4 Storage

The project cost for distribution system storage varies considerably, depending on such factors as type, material, capacity and support system. Estimated total unit project costs were developed for three types of facilities that are similar to those currently in service. The estimated total unit project costs include site work, reservoir foundation, the reservoir, site piping, controls and miscellaneous appurtenances.

Steel or pre-stressed concrete ground level reservoirs would be used primarily for larger reservoirs having capacities of over 2 MG and may be above-grade or buried below-grade. The construction cost of an above-ground ground level reservoir is based on a unit construction cost of \$1.00 per gallon plus a 20 percent contingency. Probable project costs are calculated by adding a value equal to 20 percent of the total construction cost for engineering, legal and administrative costs. Therefore, the total probable project cost for an above-grade ground level reservoir is about \$1.44 per gallon.

The construction cost of a buried below-grade reservoir is based on a unit construction cost of \$1.50 per gallon plus a 20 percent contingency. Probable project costs are calculated by adding a value equal to 20 percent of the total construction cost for engineering, legal and administrative costs. Therefore, the total probable project cost for a buried below-grade ground level reservoir is about \$2.16 per gallon.

The construction cost of elevated reservoirs is based on a unit cost of \$2.00 per gallon plus a 20 percent contingency. Again, probable project costs are calculated by adding a value equal to 20 percent of the total construction cost for engineering, legal and administrative costs. Therefore, the total probable project cost for elevated reservoirs is \$2.88 per gallon.

8.2.5 Pressure Reducing Valve Stations

Pressure reducing valve (PRV) stations transfer water from a higher service level to the next lower service level. It is assumed that the piping, valves, electrical and instrumentation components (including a flow meter) for a PRV station will be housed in a below-grade concrete vault structure. The construction cost for each PRV station is estimated to be \$125,000. With the addition of contingencies, engineering, legal, and administration the total probable project cost for PRV stations is \$180,000.

8.2.6 Pressure Monitoring Stations

Pressure monitoring stations are used monitor pressures in the distribution system in areas of interest. It is assumed that the electrical and instrumentation components will be housed in a small pre-packaged structure including a small enclosure located above grade, complete with necessary instrumentation. The total project cost for each pressure monitoring station is estimated to be \$41,500.

8.3 Recommended Phased Improvements

The recommended phased improvements summarized in this report represent an update to the *2014 Master Plan*. Changes to the capital improvement program are a result of updated demand projections, which in turn impact the schedule for capital project implementation. Other changes to the CIP were predicated on additional input from the City, along with alternative analysis by Black & Veatch. The phases of the program are summarized below:

- The “Phase I – Immediate Improvements” are those that have been identified as higher priority as a result of their immediate need or as a result of currently anticipated development and correspond to FY 2019/2020 thru 2025/2026. These improvements are intended to meet the needs of the Comprehensive Plan – Tier 1 (Priority A) growth areas.
- Improvements recommended to meet FY 2026/2027 thru 2031/2032 demand conditions are referred to as “Phase II – 12-year Short-term Improvements”. The Phase II improvements will extend service to the limits of the Tier I – Priority B area.
- Improvements beyond Year 2032 were not evaluated as part of this report, but cost for selective long-term improvements have been provided.

The recommended phased improvements for the distribution system are shown on Figure 8-1 at the end of this chapter and are described in the following sections. A detailed tabular summary of recommended Phase I and Phase II distribution improvements, along with recommended improvements for supply and treatment, is provided at the end of this chapter. Summary tables for fire flow improvements and distribution main extension projects are also provided.

8.3.1 Phase I – Immediate Improvements (by Year 2026)

Phase I recommended improvements will provide service to the limits of Tier I – Priority A development areas. The Phase I immediate improvements are recommended to correct existing deficiencies and provide a list of projects that should be implemented in the next six years of the LWS capital improvement program (CIP). Phase I also captures “carryover” projects from the previous master plan as well as CIP projects currently in the LWS six-year CIP.

The Phase I immediate improvements should be included in the six-year CIP, and include the following:

- Valve Replacement and Automation at 51st Street Reservoir and Pumping Station (IM-1). Required due to condition of existing valves and desire to automate valves to bypass 51st Street Pumping Station with approximately 14-15 mgd from the WTP straight to the Low Service Level. Benefits include increased operational flexibility, temporary shutdown of at least one 51st Street Reservoir, energy savings, and water age improvements. This improvement is proposed for Year 2020.
- NW 12th Street Pumping Station (IM-2). The existing Northwest 12th Street pumping station has adequate capacity but is reaching the end of its useful life as it was intended as a temporary pumping station. Therefore, we recommend replacement with a permanent facility similar to the recently completed Yankee Hill Pumping Station. Recommendations from the *2014 Master Plan* indicate the facility should have an initial firm capacity of 5 mgd (8 mgd total) and an ultimate firm capacity of 8 mgd (12 mgd total). Modeling conducted under this update indicates that the firm capacity in Year 2032 only needs to be 2.9 mgd. Therefore, the overall sizing should be revisited during preliminary design. This improvement is proposed for Year 2020.

- Vine Street Pumping Station East – Add Pump No. 8 w/ AFD (IM-3). The existing Vine Street Pumping Station East has two pumps, each with a capacity of 10.1 mgd. The *2014 Master Plan* recommended the replacement of one pump with a new 20 mgd pump with AFD capability. While this would add total capacity, it would not increase the overall firm capacity of the facility. Furthermore, the existing facility is already configured to accept a third pump. The existing two pumps are only approximately 20 years old, and do not have any known operational issues, therefore we would recommend that a pump be added versus replaced.

Vine Street Pumping Station East was originally configured to be capable of providing a firm capacity of 40 mgd which would maximize the capacity of the 48-inch transmission main which extends from the Vine Street facilities to the Southeast Service Level. Additional hydraulic analysis indicated that a firm capacity of 30 mgd by the Year 2040 is warranted. Therefore, we recommend that a 20 mgd pump, with adjustable frequency drive, be added for increased conveyance to the Southeast Service Level. This improvement is proposed for Year 2020.
- Innovation Campus – Phase I – 16-inch main (IM-4). One of the improvements identified in the previous master plan to improve the level of service to the Innovation Campus was a new 16-inch main from approximately Highway 6 and North 14th Street to the Innovation Campus pipe network. This main is recommended due to the condition of the existing main serving the area which was installed in 1963 and is in poor condition. This improvement is proposed for Year 2020.
- I-80 & 56th Street - Pumping Station (IM-5). The area north of I-80 near the 56th Street interchange has been discussed from a master planning perspective as far back as the *2007 Facilities Master Plan Update*. To provide adequate pressure for ground elevations in this area, a new pumping station will be required as discussed in Chapter 6 of this report. Our recommendation based upon current demand projections for the area would be to construct a pumping station with an initial capacity of 10 mgd (6 mgd firm). This recommended size is predicated on the Belmont Loop (IM-6) being implemented as well to provide a firm capacity of 10 mgd to the area. Relative to ultimate sizing of the pumping station, the 2040 Comprehensive Plan and populations projection do not identify any additional growth for the area. Therefore, when the pumping station is designed it may be prudent to provide space for an additional future pump. This improvement is proposed for Year 2021.
- I-80 & 56th Street – Belmont Loop (IM-6). Currently all areas served by the Lincoln Water System have redundant means of water service. In order to provide the same level of reliability and redundancy we recommend that a main be constructed to connect the new service area to the Belmont Service Level. In addition to the redundancy provided, this connection also provides the added benefit of floating storage on the system for improved pumping operations and backup during power outages. This improvement is proposed for Year 2021.
- Arsenic/Atrazine Study and Preliminary Design (IM-7). As discussed in Chapter 5 – Water Treatment, the amount of arsenic and atrazine in the raw water are of concern, particularly as the City continues to become more reliant on horizontal collector well water. Specifically, the wells have exhibited a slightly higher background level of arsenic and are substantially impacted by atrazine in the Platte River due to their hydraulic connectivity. An arsenic and atrazine study will evaluate potential treatment alternatives through desktop analysis and

bench-scale testing to develop a basis for conceptual life cycle costs. This project is proposed for Year 2021.

Initial concepts to reduce arsenic and atrazine levels include:

- Post-filter adsorption with arsenic-adsorbing media and ozone/hydrogen peroxide for atrazine removal.
- Ferric sulfate with sedimentation for arsenic removal and powdered activated carbon for atrazine removal.
- NF/RO for removal of both arsenic and atrazine.

- Distribution Water Quality Improvements – Phase I (IM-8). As discussed in Chapter 7 – Distribution Water Quality, installation of chloramine booster systems is recommended to increase the total chlorine residual in areas of the distribution system that suffer from chlorine residual degradation. Phase I of the distribution water quality improvements includes installation of a chloramine booster system at the Yankee Hill Reservoir to address water quality issues in the southern-most portions of the distribution system. Additionally, Phase I includes pilot testing to evaluate the effectiveness of in-plant treatment approaches, such as biological filtration and sodium chlorite feed, to reduce biological activity in the distribution system. The pilot study would likely be conducted over a 9-month period. These improvements are proposed for Year 2022.
- 16-inch Main on NW 56th St. “O” Street to Partridge Lane (IM-9). This improvement is required for redundancy and looping and to support future growth to the northwest area in the Belmont Service Level. Benefits include increased system resiliency and support of future development. It is also significant to note that this main improves the capability to serve the Belmont Service Level from the Pioneers Pumping Station. This improvement is proposed for Year 2022.
- Decommission Merrill Street Pumping Station (IM-10). Required due to small pumping station which is no longer used. The surge standpipe on the Merrill Street property must be kept in service for surge protection of the 36-inch transfer main. Benefits include less maintenance, reduced operational complexity and freed up resources. This project is proposed for Year 2022.
- Rehabilitate Eddy Current Drive Northeast Pumping Station No. 6 (IM-11). Pump No. 6 at the Northeast Pumping Station has been unusable for almost 20-years due to a faulty eddy current drive. A recent inspection was performed by the manufacturer which determined the drive is still viable but needs control components upgraded. The recommended plan for repair includes installation of a new EC-2000 controller along with a factory rehab and service of the drive and the motor since they have been sitting idle for a significant period of time. This improvement is proposed for Year 2022.
- West Water Treatment Plant Rehabilitation (IM-12). It has been almost 30 years since any major rehabilitation work was completed at the West Water Treatment Plant. A condition assessment was completed in conjunction with City staff and list of necessary rehabilitation items were developed to ensure the reliability and continued service of the facility. A detailed listing of improvements is provided in Appendix D, but in general includes coatings, selective valve replacement, crack repair, and HVAC updates. It has also been budgeted for the City to proceed with filter rehab on two filters with dual media so the City can determine the full-scale benefits of converting all the filters to dual media in the future. This improvement is proposed for Year 2022.

- 31st and Randolph Valve Vault Relocation to “A” Street (IM-13). Currently at 31st and Randolph Streets, there is a butterfly valve that is in a vault in the street which is used to control the transfer of water from the Vine Street Reservoir to “A” Street Reservoirs. This valve has been used to throttle gravity flows and the seat is worn and will not shut tight. Working conditions in the vault are less than desirable with no head room to work. LWS would like to see the valve replaced as a buried valve for shut off purposes and a new ball valve and mag meter should be placed near the “A” Street Reservoirs Nos. 8 and 9 (30th Street and Capital Parkway). The old vault at 31st Street and Randolph should be demolished. Benefits include increased transfer control, enhanced operations, and better access to the vault. This improvement is proposed for Year 2023.
- Water Treatment Plant South Pumping Station Pump No. 13 (IM-14). Additional WTP High Service Pumping will be required as growth occurs. A new Pump No. 13, with a rated capacity of 20 mgd and rated head of 350 feet (similar to the existing Pump No. 11 and Pump No. 12) should be installed by Year 2023. The addition of Pump No. 13 will fill all existing high service pumping bays at the WTP. Benefits include increased operational flexibility and high service pumping capacity into the transmission system. This improvement is proposed for Year 2023.
- 2023 Water Facilities Master Plan (IM-15). Systems planning is fundamental to management of the utility and ensures prudent investment on behalf of your ratepayers. LWS historically has completed master plans every six years, alternating between a comprehensive plan followed by a condensed update to the plan. The *2023 Water Facilities Master Plan* will be a comprehensive version. This project is proposed for Year 2023.
- Add AFD’s at Pioneers Pumping Station (IM-16). The *2014 Master Plan* recommended the addition of AFD’s at multiple pumping stations in the distribution system, with Pioneers Pumping Station having the highest priority. Although more expensive initially, AFD’s were recommended instead of eddy current drives or discharge control valves due to their comparative inefficiencies. It was recommended that AFD’s should be installed on all of the pumps in the pumping stations to maximum flexibility of operations and enable the smaller pumps to be used during lower flow conditions. At a minimum, it was recommended AFD’s should be added to Pump Nos. 1 and 2 at Pioneers Pumping Station since they are operated most frequently to smooth out operations in the Belmont Service Level. Benefits include improved flow control, reduced cavitation issues, and controlled pressure variations during pump start-up and shut-down. This improvement is proposed for Year 2024.
- Pressure Monitoring Stations (IM-17). Additional monitoring locations are recommended to provide feedback on low and high pressures. Three low pressure and one high pressure monitoring locations are recommended in each improvement phase. The pressure monitoring locations can be built at any time as recommended in each phase; however, all four locations recommended in each phase should be constructed in one project for potential cost savings. Benefits are increased awareness of system performance, improved operations warning system, and additional data for hydraulic model calibration. These improvements are proposed for Year 2024.
- East Water Treatment Plant Rehabilitation (IM-18). With the exception of upgrades to the Ozone generation system, the East Water Treatment Plant has had minimal rehabilitation work since it was originally constructed almost 30 years ago. A condition assessment was completed in conjunction with City staff and list of necessary rehabilitation items were developed to ensure the reliability and continued service of the facility. A detailed listing of improvements is provided in Appendix D, but in general replacement of the ambient ozone

analyzers, coatings in the filter pipe gallery, and other miscellaneous rehabilitation items is recommended. This improvement is proposed for Year 2024.

- Decommission South 56th Street Pumping Station (IM-19). Required to take the pumping station out of service by removing pumps and VSDs (which should be salvaged, if possible). The facility itself must remain in order to maintain operation of the PRV at the facility which transfers water from Southwest Service Level to the High Service Level. Benefits include reduced maintenance efforts and reuse of the building as a potential maintenance storage facility. This project is proposed for Year 2024.
- Condition Assessment of 36-inch Cast Iron Main from 51st Street to “A” Street (IM-20). Historical knowledge of this main would indicate that in general the cast iron has not experienced corrosion of significance and any leakage is occurring at the joints. Therefore, to keep cost to a minimum, we recommend that the first step would be implementation of a technology to examine joint leakage. As indicated in Appendix C, we recommend that the SmartBall® technology be used for condition assessment of the 1930’s 36-inch cast iron main. Dependent upon results, additional testing may be required, and may also trigger inspection of the segment from Ashland to 51st Street Pumping Station. It should be noted that Hydromax (Nautilus) also offers similar technology which could be considered at a slightly lower cost, but it is less proven in the US market. This project is proposed for Year 2024.
- Condition Assessment of 48-inch PCCP from Ashland to Northeast Pumping Station (IM-21). As discussed in Appendix C, the gold standard for inspection of PCCP mains is the use of electromagnetic (EM) inspection, but this is simply cost prohibitive given that the main has not shown any indications or degradation or leakage. Therefore, as a first step for determining condition we recommend inspection with the SmartBall® or Nautilus technology, which will determine if any leaks are occurring. Quotes received from the vendors indicate that SmartBall® will cost almost double that of Nautilus, so this may be a good opportunity to test Nautilus. If areas of concern are detected, future EM inspection may be warranted. This project is proposed for Year 2024.
- Condition Assessment of 48-inch PCCP from Northeast Pumping Station to Vine Street (IM-22). The 48-inch PCCP from Northeast Pumping Station to Vine Street Pumping Station is arguably one of the most critical assets in the distribution system. In addition, this pipe was installed during a time period (early 1970’s) when the prestressing wires in PCCP were known to have brittle properties. Therefore, a more robust assessment is recommended, specifically EM inspection using a tethered robot. This main is approximately 5 miles in length, but our recommendation is to begin with inspection of approximately 16,000 feet. This can be accomplished through two entry points. This project is proposed for Year 2024.
- Water Treatment Plant Improvements for Arsenic Removal (IM-23). Additional studies are recommended to further develop the effectiveness and cost of these alternatives. For the purposes of establishing a placeholder for the CIP, costs were developed based upon post filter adsorption with AS media. This alternative includes the construction of a low lift pumping station downstream of the East WTP Filter Complex to convey water through adsorption vessels located in a new facility. Based upon high level assumptions for adsorption efficiency, and an effluent arsenic goal of 6 ppb, up to 18 adsorption vessels will be required. This improvement is proposed for Year 2025.

8.3.2 Phase II - Short-term Improvements (by Year 2032)

The Phase II short-term improvements will provide service to the limits of Tier 1 – Priority B development in the 12-year CIP, and include the following:

- Northwest Reservoir (2 MG) and Pipeline (ST-1). Required due to lack of redundancy to Northwest 12th Street Pumping Station and need for floating storage in the Northwest Service Level. This 2 MG storage facility should have an overflow elevation of 1460 and be located near the existing NW 12th Street Reservoir to reduce transmission main cost and minimize water quality impacts. Benefits include smoother operation of Northwest 12th Street Pumping Station, service level supply redundancy, emergency storage for multiple service levels, and more uniform service level pressures. This improvement is proposed for Year 2026.
- Belmont to Low PRV Station – “O” Street and N 12th (ST-2). Required due to fire flow deficiencies at the edge of the Low Service Level in this vicinity. Benefits include additional supply during high flow and fire flow periods and reduced estimated fire flow deficiencies. This improvement is proposed for Year 2026.
- Decommission NW 12th Street Pumping Station (ST-3). Required due to deteriorating condition of existing Northwest 12th Street Pumping Station and its scheduled replacement. Benefits include reduced maintenance and addition of permanent pumping facilities for the Northwest Service Level. This project is proposed for Year 2027.
- Decommission Cheney Pumping Station (ST-4). Required due to deteriorating condition of existing Cheney Pumping Station. Benefits include reduced maintenance and addition of permanent pumping facilities for the Cheney Service Level. This project is proposed for Year 2027.
- Yankee Hill Pumping Station – Add Pump No. 4 (ST-5). Upon decommissioning of the Cheney Pumping Station, the firm capacity of the Yankee Hill Pumping Station will need to increase. In order to maintain firm pumping capacity to the Cheney Service Level, we recommend that a 6.0 mgd pump be installed into the available pump slot at that time. This improvement is proposed for Year 2027.
- Southeast to High PRV Station at Southeast Pumping Station (ST-6). The existing PRV at the South 56th Street Pumping Station is commonly used to transfer water from the Southeast Service Level to the High Service Level. Furthermore, it is an essential asset for operations when the Yankee Hill Reservoir is out of service for cleaning and maintenance. In order to provide redundancy and increased operational control between the Southeast Service Level and High Service Level, the *2014 Master Plan* recommended a similar PRV be added near the Southeast Pumping Station. Benefits include increased operational flexibility and increased ability to take the South 56th or Southeast Reservoirs offline for maintenance. This improvement is proposed for Year 2027.
- Innovation Campus – Phase II – 12-inch (ST-7). The Phase II connection to Innovation Campus involves extending a 12-inch main from North 20th and Cornhusker to the campus as shown on Figure 8-1. This main extension would have a length of 4,600 feet and would provide redundant supply to the campus. This improvement is proposed for Year 2027.
- Distribution Water Quality Improvements – Phase II (ST-8). The second phase for improvement to the Distribution Water Quality is implementation of a chloramine booster system at Pioneers Reservoir or the Northwest 12th Street Reservoir to address chlorine residual degradation in the western-most portions of the distribution system. Source trace

modeling has indicated installation at Pioneers would be more impactful. However, this would require running Pioneers Pumping Station at high rates as compared to the Belmont Pumping Station. These improvement are proposed for Year 2028.

- Adams Street Reservoir and Pipeline (ST-9). Required to support growing demands in High Service Level. Benefits include increased storage to support development and operational flexibility from Vine Street and “A” Street Pumping Stations into the High Service Level. This improvement is proposed for Year 2030.
- 54-inch Main from Northeast Pumping Station to 88th and Holdrege (ST-10). The 2014 *Master Plan* recommended this pipeline be constructed by Year 2025. Based solely on the total hydraulic capacity of the system, this improvement could be deferred beyond Year 2032. However, it does provide desirable benefits beyond hydraulic capacity which make it recommended in the short term. Specifically, this main will provide increased reliability/redundancy to a critical area in the system, increase operational flexibility, and will provide the ability to avoid re-pumping at Northeast Pumping Station. Results of the condition assessment for the existing 54-inch main (IM-22) should be monitored closely as they could impact timing of this improvement. This improvement is proposed for Year 2032.

8.3.3 Other Improvements – Long-Term

Some other significant projects, evaluated as part of this study but which fall outside the 12-Year CIP, are summarized below. It should be noted that it may be desirable for these projects to be implemented sooner in order improve the resiliency of the system.

- 36-inch Transfer Main from Vine Street Reservoir to “A” Street Reservoir (LT-1). The addition of another transfer main from Vine Street Reservoir to the “A” Street Reservoir is an improvement recommended in the previous master plan which the City requested Black & Veatch specifically analyze. Operational cost analyses performed by LWS have determined that water can be delivered more efficiently to “A” Street from Vine Street Reservoir, as opposed to being conveyed with the transfer pumps at 51st Street Pumping Station. The cost programmed into the previous master plan was over \$16 million. Based on energy use, it would be very difficult to justify implementation of this project. If it is determined that the 36-inch from 51st Street to Vine is compromised, it may be justified from a redundancy standpoint. This improvement is proposed for Year 2033.
- Horizontal Collector Well No. 5 – Site 7 (LT-2). As noted in Chapter 4, additional raw water supply is needed no later than Year 2035. It may be desirable to advance this improvement in the CIP to provide greater drought resilience to the system. This improvement is proposed for Year 2033.
- Water Treatment Plant Expansion – Ozone and East Filters (LT-3). A comparison of expansion between the East Water Treatment Plant and West Water Treatment Plant was performed and summarized in Appendix D. Based upon this comparison, it is recommended that an expansion of 30 mgd to the East Water Treatment Plant be completed by Year 2037. This improvement should proceed by Year 2034.
- Horizontal Collector Well No. 6 – South Site (LT-4). Construction of the sixth horizontal collector well is recommended no later than Year 2048. Again, if greater drought resiliency is desired, this project should be advanced in the CIP.

- Long-Term Water Supply. As recommended in the *2014 Master Plan*, the City continues to set aside funding for their next source of water supply which will be necessary no later than Year 2048 based upon current supply and demand projects.
- Lead Service Line Replacement Program. LWS has been developing a LSL inventory as part of their LSL Identification Program. Through these efforts, LWS has identified approximately 4,000 potential LSLs for replacement. LWS is developing a proactive LSL replacement plan in advance of the proposed LCR revisions. The City currently has \$24,500,000 budgeted for their LSL Replacement Program.

Table 8-2 Recommended Improvements – Phase I and Phase II

Recommended Improvements - Phase I and Phase II							
Year	CIP Tag	Description	Improvement Type	Construction Cost	Contingency	Engineering, Legal, Admin (ELA)	Total Capital Cost (FY 2020)
Phase I – Immediate Improvements							
2020	IM-1	Valve Replacement and Automation at 51st Street PS	Facility	\$263,889	\$52,778	\$63,333	\$380,000
2020	IM-2	NW 12th Street Pumping Station	Pumping	\$3,200,000	\$640,000	\$768,000	\$4,608,000
2020	IM-3	Vine Street Pumping Station East - Add Pump No. 8 w/ AFD	Pumping	\$1,637,000	\$327,400	\$392,880	\$2,357,000
2020	IM-4	Innovation Campus - Phase 1 - 16-inch Main	Distribution	\$814,044	\$162,809	\$195,371	\$1,172,000
2021	IM-5	I-80 & 56th Street Pumping Station - Supply Main and PS	Pumping	\$4,000,000	\$800,000	\$960,000	\$5,760,000
2021	IM-6	I-80 & 56th Street Pumping Station - Belmont Loop	Distribution	\$3,894,000	\$778,800	\$934,560	\$5,607,000
2021	IM-7	Arsenic/Atrazine Study and Preliminary Design	Treatment	\$0	\$0	\$250,000	\$250,000
2022	IM-8	Distribution Water Quality Improvements - Phase 1	Distribution	\$2,092,390	\$418,478	\$502,174	\$3,013,000
2022	IM-9	16-inch Main on NW 56th Street, "O" St. to Partridge Lane	Distribution	\$996,600	\$199,920	\$239,904	\$1,439,000
2022	IM-10	Decommission Merrill Street Pumping Station	Pumping	\$212,739	\$42,548	\$51,057	\$306,000
2022	IM-11	Rehabilitate Eddy Current Drive - Northeast #6	Pumping	\$84,267	\$16,853	\$20,224	\$121,000
2022	IM-12	West Water Treatment Plant Rehabilitation	Treatment	\$1,587,040	\$317,408	\$380,890	\$2,285,000

Recommended Improvements - Phase I and Phase II							
Year	CIP Tag	Description	Improvement Type	Construction Cost	Contingency	Engineering, Legal, Admin (ELA)	Total Capital Cost (FY 2020)
2023	IM-13	31st and Randolph Valve Vault Relocation to "A" street	Facility	\$237,999	\$47,600	\$57,120	\$343,000
2023	IM-14	Add 20.9 mgd WTP South Pumping Station Pump No. 13	Pumping	\$1,254,000	\$250,800	\$300,960	\$1,806,000
2023	IM-15	2023 Master Plan	System	\$0	\$0	\$1,000,000	\$1,000,000
2024	IM-16	Add AFD's at Pioneers Pumping Station	Pumping	\$163,645	\$32,729	\$39,275	\$236,000
2024	IM-17	Pressure Monitoring Stations	Distribution	\$114,629	\$22,926	\$27,511	\$165,000
2024	IM-18	East Plant Overall Rehab	Treatment	\$464,800	\$92,960	\$111,552	\$669,000
2024	IM-19	Decommission South 56th Street PS	Pumping	\$208,333	\$41,667	\$50,000	\$300,000
2024	IM-20	Condition Assessment of 36-inch Cast Iron from 51st to A Street	Condition	\$155,000	\$31,000	\$37,200	\$223,000
2024	IM-21	Condition Assessment of 48-inch PCCP from Ashland to NE	Condition	\$215,000	\$43,000	\$51,600	\$310,000
2024	IM-22	Condition Assessment of 54-inch PCCP from Northeast to Vine	Condition	\$327,000	\$65,400	\$78,480	\$471,000
2025	IM-23	Arsenic Treatment - Adsorber	Treatment	\$28,267,008	\$5,653,402	\$6,784,082	\$40,704,000
Phase II – Short-Term Improvements							
2026	ST-1	Northwest Reservoir (2 MG) and Pipeline	Storage	\$4,109,920	\$821,984	\$986,381	\$5,918,000
2026	ST-2	Belmont to Low PRV Station ("O" Street and N 12th Street)	Distribution	\$125,000	\$25,000	\$30,000	\$180,000
2027	ST-3	Decommission NW 12th Street Pumping Station	Pumping	\$222,430	\$44,486	\$53,383	\$320,000

Recommended Improvements - Phase I and Phase II							
Year	CIP Tag	Description	Improvement Type	Construction Cost	Contingency	Engineering, Legal, Admin (ELA)	Total Capital Cost (FY 2020)
2027	ST-4	Decommission Cheney Pumping Station	Pumping	\$217,186	\$43,437	\$52,125	\$313,000
2027	ST-5	Yankee Hill Pumping Station - Add 6 mgd Pump	Pumping	\$360,000	\$72,000	\$86,400	\$518,000
2027	ST-6	PRV Southeast SL to High SL - Vault near Southeast PS	Distribution	\$125,000	\$25,000	\$30,000	\$180,000
2027	ST-7	Innovation Campus - Phase 2 - 12-inch Main	Distribution	\$506,000	\$101,200	\$121,440	\$729,000
2028	ST-8	Distribution Water Quality Improvements - Phase 2 (Pioneers WQ)	Distribution	\$960,000	\$192,000	\$230,400	\$1,382,000
2030	ST-9	Adams Street Reservoir and Pipelines for HSL (5 MG)	Storage	\$8,322,600	\$1,664,520	\$1,997,424	\$11,985,000
2032	ST-10	54-inch Main from Northeast PS to 88th and Holdrege	Transmission	\$18,538,000	\$3,707,600	\$4,449,120	\$26,695,000
Long-term Improvements							
2033	LT-1	36-inch Transfer Main from Vine Street Reservoir to A Street Reser	Transmission	\$12,165,429	\$2,433,086	\$2,919,703	\$17,518,000
2033	LT-2	Horizontal Collector Well No. 5 - Site 7	Supply	\$8,427,500	\$1,685,500	\$2,022,600	\$12,136,000
2034	LT-3	Water Treatment Plant Expansion - Ozone and East Filters	Treatment	\$17,225,040	\$3,445,008	\$4,134,010	\$24,804,000
2041	LT-4	Horizontal Collector Well No. 6 - South Site	Supply	\$8,278,688	\$1,655,738	\$1,986,885	\$11,921,000

Recommended Improvements - Phase I and Phase II							
Year	CIP Tag	Description	Improvement Type	Construction Cost	Contingency	Engineering, Legal, Admin (ELA)	Total Capital Cost (FY 2020)
		New Source of Supply Reserve Fund	Supply	\$22,000,000	\$0	\$0	\$22,000,000
		Lead Service Line Replacement Program	Distribution	\$24,500,000	\$4,900,000	\$5,880,000	\$35,280,000
Subtotal Construction Cost				\$176,275,568	Total Capital Cost		\$245,405,000

Table 8-3 Immediate Fire Flow Improvements

Fire Flow Improvements - Immediate						
CIP Tag	Description	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
FF-1	Connection on Normal Blvd between S 62nd St and Park Crest Ct	Southeast	300	8	\$152	\$45,600
FF-2	Connection between Calvert St and S 58th St	High	500	8	\$152	\$76,000
FF-3	Connection on Kearney Ave between N 70th St and N 71st St	Low	400	8	\$152	\$60,800
FF-4	Connection on N 68th St between Seward Ave and Colfax Ave	Low	400	8	\$152	\$60,800
FF-5	Connection on N 66th St between Colfax Ave and Freemont St	Low	700	8	\$152	\$106,400
FF-6	Connection on N 38th St between Cleveland Ave and Madison	Low	400	8	\$152	\$60,800
FF-7	Connection on S 16th St between Woodsvie St and Calvert St	High	2,100	8	\$152	\$319,200
FF-8	Connection on N 29th St between Q St and O St	Low	800	8	\$152	\$121,600
FF-9	Connection on N 31st St between P St and O St	Low	400	8	\$152	\$60,800
FF-10	Connection on NW 57th St between W Thatcher Ln and W Aurora St	Belmont	800	8	\$152	\$121,600
FF-11	Looping on 53rd, North of Huntington	Low	500	8	\$152	\$76,000
Total Capital Costs						\$1,110,000

Table 8-4 Distribution Main Extensions – Immediate

Distribution Main Extensions - Immediate							
CIP Tag	LWS Tag	Description	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
ExtI-1	P-1877	Holdrege St, N 98th St to Cessna Ln	Low	2,800	16	\$211	\$590,800
ExtI-2	FP-117	N 98th St, O St to the north	Belmont	300	16	\$211	\$63,300
ExtI-3	FP-196	Alvo Rd, N 48th St to the east	Northwest	500	12	\$158	\$79,000
ExtI-4	P-1967	Alvo Rd, N 14th St to N 16th St	High	1,100	12	\$158	\$173,800
ExtI-5	FP-133	Rokeby Rd, S 40th St to the east	Belmont	2,400	16	\$211	\$506,400
ExtI-6	FP-143	Rokeby Rd, S 27th St to the east	Belmont	1,700	16	\$211	\$358,700
ExtI-7	FP-173	S 1st St towards W Folsom	High	800	12	\$158	\$126,400
ExtI-8	P-2104	Arbor Rd, N 40th St to N 56th St	Belmont	4,200	24	\$317	\$1,331,400
ExtI-9	P-1996	NW 48th St, W Fletcher Ave to W Cuming St	High	2,900	16	\$211	\$611,900
ExtI-10	P-1997	W Cuming St extended past NW 53rd St	Low	700	16	\$211	\$147,700
ExtI-11	P-1998	W Superior St extended north	Belmont	2,200	16	\$211	\$464,200
ExtI-12	P-2034	W Pleasant Hill Rd (extended), SW 12th St to S Folsom St	Southeast	2,700	12	\$158	\$426,600
ExtI-13	P-2037	W Denton Rd, S Folsom St to S 1st St	High	2,000	16	\$211	\$422,000
ExtI-14	P-2102	N 48th St (extended)	Belmont	1,300	12	\$158	\$205,400
ExtI-15	FP-116	O St, N 98th to the east	Belmont	2,600	24	\$317	\$824,200
ExtI-16	FP-120	E Avon Ln, N 86th St to Linwood Ln	Belmont	2,700	12	\$158	\$426,600
ExtI-17	FP-157	S 1st St	Low	1,900	12	\$158	\$300,200
ExtI-18	FP-187	W Alvo Rd, east to NW 12th St	High	2,600	12	\$158	\$410,800
ExtI-19	FP-188	W Alvo Rd, east to N 14th St	Belmont	1,500	12	\$158	\$237,000
ExtI-20	FP-211	W Dan Dorn St, SW 33rd ST to S Coddington Ave	Belmont	5,500	16	\$211	\$1,160,500

Distribution Main Extensions - Immediate							
CIP Tag	LWS Tag	Description	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
ExtI-21	FP-213	Havelock Ave, N 70th St to N 84th St	Belmont	5,300	16	\$211	\$1,118,300
ExtI-22	FP-219	SW 33rd St, south to W Van Dorn St	Low	2,700	12	\$158	\$426,600
ExtI-23	FP-245	E Avon Ln, to Sunny Slope Rd	Belmont	800	12	\$158	\$126,400
ExtI-24	FP-247	E Avon Ln, N 98th to the east	High	1,100	12	\$158	\$173,800
ExtI-25	FP-286	Wilderness Hills from existing 12" east of 40th to FP-287/FP-288	High	1,600	12	\$158	\$252,800
ExtI-26	FP-287	Yankee Hill Rd to the south	Southeast	2,500	12	\$158	\$395,000
ExtI-27	FP-288	FP-287 continued to Rokeby Rd	Southeast	2,700	12	\$158	\$426,600
ExtI-28	P100814	E Avon Ln to Anthony Ln	Southeast	1,900	12	\$158	\$300,200
ExtI-29	FP-242	Linwood Ln, Holdrege St to E Avon Ln	High	2,100	12	\$158	\$331,800
ExtI-30	FP-258	Leighton Ave to N 91st St	High	800	12	\$158	\$126,400
ExtI-31	FP-280	Rokeby Rd to Current 12" no street	High	1,200	12	\$158	\$189,600
ExtI-32	FP-283	Wilderness Hill Blvd to Whispering Wind Rd (Wilderness Hills to El Dorado)	Southeast	1,000	12	\$158	\$158,000
ExtI-33	FP-284	Whispering Wind Rd to S 40th St (Connection Point to Connection Point)	Southeast	2,600	16	\$211	\$548,600
ExtI-34	FP-285	Wilderness Hill Blvd to Rokeby Rd	Southeast	5,200	12	\$158	\$821,600
Total Capital Costs							\$14,263,000

Table 8-5 Distribution Main Extensions - Phase I

Distribution Main Extensions - Phase I							
CIP Tag	LWS Tag	Description	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
Ext6-1	FP-308	N 40th St, Bluff Rd to the south	Belmont	2,900	16	\$211	\$611,900
Ext6-2	FP-310	N 40th to the east	Belmont	3,900	12	\$158	\$616,200
Ext6-3	P-2111	N 40th St, Superior St to the north	Belmont	3,200	16	\$211	\$675,200
Ext6-4	P-2112	Bluff Rd, N 0th St to Hwy 77	Belmont	3,900	16	\$211	\$822,900
Ext6-5	FP-309/P-2176	North of I-80 to Bluff Road	Belmont	6,100	16	\$211	\$1,287,100
Ext6-6	P-2000	W Holdrege St, NW 56th St to NW 48th St	Belmont	2,400	16	\$211	\$506,400
Ext6-7	FP-181	W Holdrege St and NW 40th St, NW 48th St to W Cavalry Ct	Belmont	1,300	12	\$158	\$205,400
Ext6-8	FP-136	S 70th St, Pine Lake Rd to Yankee Hill Rd	Southeast	5,200	16	\$211	\$1,097,200
Ext6-9	FP-206	S 98th St, Yankee Hill Rd to the north	Cheney	1,300	24	\$317	\$412,100
Ext6-10	FP-234	W Denton Rd, S Coddington Ave to SW 12th St	Belmont	2,600	16	\$211	\$548,600
Ext6-11	FP-238	Holdrege St, N 112th St to the west	High	2,500	16	\$211	\$527,500
Ext6-12	FP-243	S. 98th St, O St. to Sandalwood Dr.	High	2,100	16	\$211	\$443,100
Ext6-13	FP-248	N. 105th St, O Street to Vine St. (to Shorefront 12")	High	1,600	12	\$158	\$252,800
Ext6-14	FP-256	S. 105th St, Randolph St. to O Street	High	2,000	12	\$158	\$316,000
Ext6-15	FP-257	Leighton Ave, N 98th St to the west	High	1,000	12	\$158	\$158,000
Ext6-16	FP-264	Jerome & Betty Warner Expy, S 91st St to Yanke Hill Rd	Cheney	3,000	12	\$158	\$474,000

Distribution Main Extensions - Phase I							
CIP Tag	LWS Tag	Description	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
Ext6-17	FP-282	Rokeby Rd, S 56th St to the west	Southeast	2,700	16	\$211	\$569,700
Ext6-18	FP-290	S 40th St, Rokeby Rd to the south	Southeast	2,300	16	\$211	\$485,300
Ext6-19	FP-292	S 40th St to Cromwell Dr	Southeast	2,600	12	\$158	\$410,800
Ext6-20	FP-311	Abbott Sports Complex, N 70th St to the west	Low	2,700	12	\$158	\$426,600
Ext6-21	FP-312	Abbott Sports Complex to Arbor Rd	Low	4,000	12	\$158	\$632,000
Ext6-22	P-1868	N 98th St, Leighton Ave to Adams St	High	2,600	16	\$211	\$548,600
Ext6-23	P-1869	N 98th St, Holdrege St to Leighton Ave	High	2,600	16	\$211	\$548,600
Ext6-24	P-1940	S 56th St, Rokeby Rd to Yanke Hill Rd	Southeast	5,200	16	\$211	\$1,097,200
Ext6-25	P-1941	Rokeby Rd, S 56th St to S 70th St	Southeast	5,300	16	\$211	\$1,118,300
Ext6-26	P-1958	S 98th St, Yankee Hill Rd to Breagan Rd	Cheney	2,300	24	\$317	\$729,100
Ext6-27	P-1970	N 7th St, Alvo Rd to Humphrey Ave	Belmont	1,300	16	\$211	\$274,300
Ext6-28	P-1971	N 7th St, Humphrey Ave to Fletcher Ave	Belmont	2,600	16	\$211	\$548,600
Ext6-29	P-2002	I-80, NW 56th St to the west	Belmont	5,200	16	\$211	\$1,097,200
Ext6-30	P-2035	W Denton Rd, SW 12th St to S Folsom St	Belmont	2,600	16	\$211	\$548,600
Ext6-31	P-2036	SW 12th St, W Pleasant Hill Rd to W Denton Rd	Belmont	2,700	12	\$158	\$426,600
Ext6-32	P-2107	Arbor Rd, N 70th St to east	Low	2,100	12	\$158	\$331,800
Ext6-33	FP-144	Approx. S. 36th St, 880ft South of Rokeby Rd to 1/2 mile south of Rokeby Rd (Rokeby to no street name)	High	2,600	16	\$211	\$548,600

Distribution Main Extensions - Phase I							
CIP Tag	LWS Tag	Description	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
Ext6-34	FP-246	E Avon Ln, Linwood Ln to N 98th (Eastview from Linwood to 98th stub out)	High	1,400	12	\$158	\$221,200
Ext6-35	FP-249	N. 105th St, Vine St. to Holdrege St. (Shorefront to 12" south of Holdrege at Cessna)	High	3,000	12	\$158	\$474,000
Ext6-36	FP-251	E Hillcrest Dr, O St to Anthony Ln (to west of tennis courts)	High	4,600	12	\$158	\$726,800
Ext6-37	FP-252	Randolph St, S. 92nd & E. Hillcrest Dr. to S. 98th St. (From FP-251 to FP-243/253)	High	4,700	12	\$158	\$742,600
Ext6-38	FP-253	Randolph St, S. 98th to S. 105th St. (from FP-256 to 243/252)	High	2,700	12	\$158	\$426,600
Ext6-39	FP-259	N 91st St to Holdrege St	High	1,700	12	\$158	\$268,600
Ext6-40	FP-268	Rokeby Rd, S 84th St to the west	Cheney	1,700	16	\$211	\$358,700
Ext6-41	FP-271	Mohave Dr, Boone Trail to Yankee Hill Rd	Cheney	2,600	12	\$158	\$410,800
Ext6-42	FP-273	Boone to Renatta	Cheney	600	12	\$158	\$94,800
Ext6-43	FP-275	S 78th Rd to S 84th St	Cheney	1,300	12	\$158	\$205,400
Ext6-44	FP-276	Unnamed Street, 1/2 mile south of Yankee Hill Rd.; from S. 84th St. to S. 92nd. St.	Cheney	3,600	12	\$158	\$568,800
Ext6-45	FP-277	S. 92nd St, Rokeby Rd. to Unnamed Street 1/2 mile south of Yankee Hill Rd. close to Breagan Rd.	Cheney	2,700	12	\$158	\$426,600
Ext6-46	FP-278	Unnamed Street from Breagan Rd. and Showers St. to Breagan Rd. for 1785ft SW to S. 92nd Street.	Cheney	1,300	12	\$158	\$205,400

Distribution Main Extensions - Phase I							
CIP Tag	LWS Tag	Description	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
Ext6-47	FP-279	Rokeby extension east from 30th	High	1,500	16	\$211	\$316,500
Ext6-48	FP-289	S. 48th St from Rokeby Rd to 1/2 mile South of Rokeby Rd.	Southeast	2,600	12	\$158	\$410,800
Ext6-49	FP-297	S 27th St to the east	High	3,200	12	\$158	\$505,600
Ext6-50	FP-299	Unnamed Street 1/2 mile south of Rokeby Rd.; from S 33rd St. to S 36th St Pipe FP-144.	High	2,000	12	\$158	\$316,000
Ext6-51	FP-305	Folkways Cir to the NE	Low	1,900	12	\$158	\$300,200
Ext6-52	P100936	S 70th St, Yankee Hill to Rokeby Rd	Southeast	5,400	12	\$158	\$853,200
Ext6-53	P-1915	Sandalwood Dr to E Hillcrest Dr	Southeast	2,500	12	\$158	\$395,000
Ext6-54	P-2097	N 40th St, Superior St to the north	Low	2,800	12	\$158	\$442,400
Total Capital Costs							\$27,966,000

Table 8-6 Distribution Main Extensions - Phase II

Distribution Main Extensions - Phase II							
CIP Tag	LWS Tag	Item	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
Ext12-1	P-1895	N 112th St, Holdrege to the south	High	2,600	16	\$211	\$548,600
Ext12-2	P-1896	O St, N112th St to S 120th St	High	2,300	16	\$211	\$485,300
Ext12-3	P-1898	S 120th St, O St to A St	High	5,300	16	\$211	\$1,118,300
Ext12-4	P-1899	S 120th St, A St to Seabiscuit Dr	High	2,800	16	\$211	\$590,800
Ext12-5	P-1900	S 112th St, A St to Secretariat Dr	High	2,900	16	\$211	\$611,900
Ext12-6	P-1901	A St, S 112th St to S 120th St	High	2,400	16	\$211	\$506,400
Ext12-7	P-1902	Secretariat Dr, S 112th St to S 120th St	High	3,000	16	\$211	\$633,000
Ext12-8	P-1903	A St, S 98th St to S 105th St	High	2,700	16	\$211	\$569,700
Ext12-9	P-1904	A St, S 105th St to S 112th St	High	2,600	16	\$211	\$548,600
Ext12-10	P-1905	S 105th St, A St to the south	High	1,900	16	\$211	\$400,900
Ext12-11	P-1912	S 112th St, O St to the south	High	2,500	16	\$211	\$527,500
Ext12-12	P-1922	Calvert St, Firethron Ln to S 98th St	Southeast	600	12	\$158	\$94,800
Ext12-13	P-1923	S 98th St, Calvert St to Pioneers Blvd	Southeast	2,700	16	\$211	\$569,700
Ext12-14	P-1942	S 70th St, Rokeby Rd to Saltillo Rd	Southeast	5,300	24	\$317	\$1,680,100
Ext12-15	P-1943	Saltillo Rd, S 68th St to S 70th St	Southeast	1,100	24	\$317	\$348,700
Ext12-16	P-1944	S 56th St, Rokeby Rd to Saltillo Rd	Southeast	4,300	16	\$211	\$907,300
Ext12-17	P-1945	S 56th St, Southdale Ln to Saltillo Rd	Southeast	1,000	16	\$211	\$211,000
Ext12-18	P-1946	Saltillo Rd, S 54th St to S 56th St	Southeast	1,100	24	\$317	\$348,700

Distribution Main Extensions - Phase II							
CIP Tag	LWS Tag	Item	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
Ext12-19	P-1948	Saltillo Rd, S 56th St to the east	Southeast	700	24	\$317	\$221,900
Ext12-20	P-1962	Saltillo Rd, S 27th St to the east	High	1,900	24	\$317	\$602,300
Ext12-21	P-1973	NW 27th St, W Alvo Rd to O St	Belmont	2,200	12	\$158	\$347,600
Ext12-22	P-2013	SW 40th St, W A St to W Peach St	Belmont	1,800	16	\$211	\$379,800
Ext12-23	P-2014	SW 40th St, W Peach St to W Van Dorn St	Belmont	3,500	16	\$211	\$738,500
Ext12-24	P-2027	W Calvert St, S Coddington Ave to SW 15th St	Belmont	2,000	12	\$158	\$316,000
Ext12-25	P-2030	SW 12th St, W Claire Ave to W Old Cheney Rd	Belmont	2,700	12	\$158	\$426,600
Ext12-26	P-2031	W Old Cheney Rd, SW 12th St to the east	Belmont	1,400	16	\$211	\$295,400
Ext12-27	P-2033	W Old Cheney Rd, S Folsom St to the west	Belmont	1,300	16	\$211	\$274,300
Ext12-28	P-2047	SW 12th St, W Old Cheney Rd to W Pleasant Hill Rd	Belmont	2,700	12	\$158	\$426,600
Ext12-29	P-2093	Pioneers Blvd, S 1st St to S 8th St	Belmont	3,000	12	\$158	\$474,000
Ext12-30	P-2095	S 1st St, Pioneers Blvd to the south	Belmont	2,500	12	\$158	\$395,000
Ext12-31	P-2096	N 48th St, Fletcher Ave to Morton St	Low	2,800	12	\$158	\$442,400
Ext12-32	P-2098	N. 48th St. & Fletcher Ave. SW 1/2 mile to N. 36th St. & Folkways Blvd.	Low	3,000	12	\$158	\$474,000
Ext12-33	P-2101	N 40th St to Alvo Rd	Low	2,600	12	\$158	\$410,800
Ext12-34	P-2103	N 40th St, Arbor Rd to the south	Low	2,600	16	\$211	\$548,600
Ext12-35	P-2147	W Holdrege St, NW 56th St to the west	Belmont	2,600	12	\$158	\$410,800
Ext12-36	P-2192	S. 98th St, A St. to 300 ft South of South St.	High	2,900	16	\$211	\$611,900

Distribution Main Extensions - Phase II							
CIP Tag	LWS Tag	Item	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
Ext12-37	FP-129	S 120th St, Seabiscuit Dr to Van Dorn St	High	2,400	16	\$211	\$506,400
Ext12-38	FP-134	Saltillo Rd, S 54th St to the west	Southeast	1,600	16	\$211	\$337,600
Ext12-39	FP-135	S 40th St, Saltillo Rd to the north	Southeast	2,900	16	\$211	\$611,900
Ext12-40	FP-138	Van Dorn St, S 91st St to S 98th St	Southeast	2,300	16	\$211	\$485,300
Ext12-41	FP-139	S 98th St, Van Dorn St to Calvert St	Southeast	2,600	16	\$211	\$548,600
Ext12-42	FP-142	S 98th St, A St to the north	High	2,700	16	\$211	\$569,700
Ext12-43	FP-152	Homestead Expy, W Old Cheney Rd to Warlick Blvd	Belmont	3,600	12	\$158	\$568,800
Ext12-44	FP-174	Old Cheney Rd, Hunt Drive to S. Folsom St	Belmont	4,900	12	\$158	\$774,200
Ext12-45	FP-198	South St to S 98th St	High	5,900	24	\$317	\$1,870,300
Ext12-46	FP-199	S 98th St, Van Dorn St to the north	High	2,300	16	\$211	\$485,300
Ext12-47	FP-200	Van Dorn St, S 98th St to S 112th St	High	5,300	16	\$211	\$1,118,300
Ext12-48	FP-201	S 112th St, Secretariat Dr to Van Dorn St	High	2,300	16	\$211	\$485,300
Ext12-49	FP-202	Van Dorn St, S 112th St to S 120th St	High	2,500	16	\$211	\$527,500
Ext12-50	FP-208	W Calvert St, SW 15th St to Lincoln Regional Center	Belmont	2,800	12	\$158	\$442,400
Ext12-51	FP-209	SW 12th St, W Burnham St to the south	Belmont	1,400	12	\$158	\$221,200
Ext12-52	FP-210	SW 15th St, W Calvert to W Burnham St & SW 12th St	Belmont	1,900	12	\$158	\$300,200
Ext12-53	FP-218	W Van Dorn, SW 40th St to Pioneers Golf Course	Belmont	2,500	16	\$211	\$527,500

Distribution Main Extensions - Phase II							
CIP Tag	LWS Tag	Item	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
Ext12-54	FP-224	SW 12th St, W Claire Ave to the north	Belmont	2,600	12	\$158	\$410,800
Ext12-55	FP-226	W Pioneers Blvd, SW 12th St to S Folsom St	Belmont	2,600	16	\$211	\$548,600
Ext12-56	FP-227	S 1st St, Old Cheney Rd to the north	Belmont	2,800	12	\$158	\$442,400
Ext12-57	FP-228	W Claire Ave, SW 12th St to S Folsom St	Belmont	2,700	12	\$158	\$426,600
Ext12-58	FP-229	S 1st St to Radcliff St	Belmont	4,700	12	\$158	\$742,600
Ext12-59	FP-237	S 98th St, A St to Van Dorn St	Southeast	7,100	16	\$211	\$1,498,100
Ext12-60	FP-239	N 112th St, O St to the north	High	2,800	16	\$211	\$590,800
Ext12-61	FP-240	O St, N 112th to the west	High	2,600	24	\$317	\$824,200
Ext12-62	FP-244	S 112th St, A St to the north	High	2,700	16	\$211	\$569,700
Ext12-63	FP-250	Vine St, N. 105th St. to N. 112th. St.	High	2,600	12	\$158	\$410,800
Ext12-64	FP-254	S 105th St, A St to the north	High	2,900	12	\$158	\$458,200
Ext12-65	FP-255	Randolph St, S. 105th to S. 112th St.	High	2,700	12	\$158	\$426,600
Ext12-66	FP-291	Saltillo Rd, S 40st St to the east	Southeast	2,600	16	\$211	\$548,600
Ext12-67	FP-293	S. 48th St from Saltillo Rd to 1/2 mile South of Rokeby Rd.	Southeast	2,600	12	\$158	\$410,800
Ext12-68	FP-294	S 27th St, Saltillo Rd to the north	High	2,800	24	\$317	\$887,600
Ext12-69	FP-295	S 38th St, Saltillo Rd to the north	High	2,700	16	\$211	\$569,700
Ext12-70	FP-296	Saltillo Rd, S 38 to the west	High	1,800	24	\$317	\$570,600
Ext12-71	FP-300	S. 33rd St from Saltillo Rd to 1/2 mile North of Saltillo Rd.	High	2,700	12	\$158	\$426,600

Distribution Main Extensions - Phase II							
CIP Tag	LWS Tag	Item	Service Level	Length	Diameter	Unit Cost (\$/ft)	Total Capital Costs
Ext12-72	FP-301	Pioneers Blvd, Thorn Ct to S 98th St	Southeast	400	16	\$211	\$84,400
Ext12-73	FP-349	Saltillo Rd, S 56th St to S 68th St	Southeast	3,500	24	\$317	\$1,109,500
Ext12-74	FP-186	O St to W Alvo Rd	Belmont	2,400	12	\$158	\$379,200
Total Capital Costs							\$41,215,000

Figure 8-1 Recommended Phased Improvements for the Distribution System