September 2022

City of Arvada, Colorado

Water and Sewer System Development Charge Analysis

Technical Memorandum

Prepared for the
City of Arvada
By LSA Advisors, LLC

Table of Contents

Table of Figures and Tables

Executive Summary

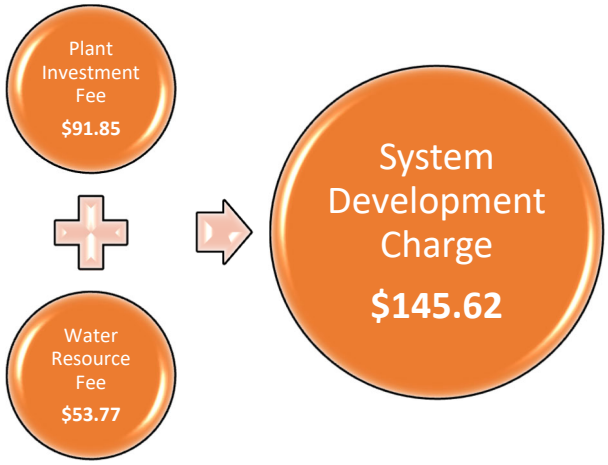
Water System Development Charge

LSA advisors, LLC (LSA Advisors), has completed an analysis of the existing and future capacity of the City of Arvada's Water system that will be available and used to serve growth in new water connections between now and buildout. LSA Advisors calculated the costs of that capacity in order to recommend an appropriate system development charge (SDC). Our analysis is based on current information, but the recommendations are for the 2023 fiscal year. Based on our analysis, we find that the appropriate charge for new capacity to the water system is:

$145.62 per gallons per day

How the charge is calculated

The charge includes two major components: a plant investment fee, and a water resource fee. The plant-investment fee is calculated to recover the City's cost of providing capacity in infrastructure like storage reservoirs, pipelines, pumps, and treatment facilities while the water resource fee is calculated to recover the cost of acquiring a proportional amount of new water supplies for each new connection to the system.



Plant Investment Fee

The City has already, at various times in the past, incurred some of the costs for providing capacity for growth. As such, historical investments make up a portion of the plant investment fee. In addition to what the City has already acquired, there are plans in place to construct additional infrastructure to provide even more capacity based on a projection of the City's population between now and buildout. These future investments from 2023 through buildout are listed on the Arvada Water Capital Improvements Plan (CIP) that was provided to LSA Advisors. Although all the capital improvements are beneficial to new customers as the City grows, only the costs incurred to provide capacity for growth (i.e. expansion of the system) are considered as part of the basis for the system development charge. Other costs of the capital improvements are recovered through rates.

Water Resource Fee

Providing raw water supplies is one of Arvada's most expensive costs. The basis for the water resource fee is based on preliminary cost of an acre-foot of the Denver Water Moffat Project participation, which is currently projected at $40,000 per acre feet. This translates into $44.81 per gallons per day which is adjusted by 20% to account for water losses in the system. After the adjustment, the water resource fee totals $53.77 per gallons per day.

Total Water System Development Charge

The total water system development charge is the sum of the plant investment fee component and the water resource fee component. The total charge of $145.62 gallons per day would apply to all customers equally based on their projected annual demand. We proposed estimating the annual demand differently depending on the customer class and based on historical usage patterns. Table 1 summarizes the existing and proposed system development charges by class.

Table 1 : Proposed Water System Development Charge Schedule by Class

Class	Proposed	Existing	Difference
Single Family Residential	$37,600	$19,275	$18,325
Duplex	$28,200	14,460	$13,740
Multifamily (per unit)	$18,800	$9,640	$9,160
Irrigation			
High Use Turf (sq. ft.)	$6.96	$1.48	$5.48
Low Use Turf (sq. ft.)	$3.73	$0.74	$2.99
Non-Residential			
5/8"	$37,600	$19,275	$18,325
3/4"	$56,400	$28,910	$27,490
1"	$94,000	$48,190	$45,810
1 ½"	$188,000	$96,380	$91,620
2"	$300,800	$154,200	$146,600
3"	$639,200	$327,680	$311,520
4"	$1,128,000	$578,250	$549,750
6"	$2,350,000	$1,204,688	$1,145,312

Single Family Residential

The demand for a single family residential customer averaged 94,348 gallons per year per account which translates into 258.48 gallons per day.

Duplex

The City assesses Duplexes at 75% of the single family residential system development charge. We maintained this policy in the assessment and did not have enough data to propose a change in the fee for Duplex.

Multifamily

The demand for multifamily customers averaged 52,111 gallons per year per dwelling units which translate to 142.77 gallons per day per multifamily unit. This represents 55% of the single family residential demand. This amount is close to the existing fee differential between the single and multifamily residential fee, which is 50%. The assessment maintains the 50% relationship for the multifamily class.

Irrigation

The irrigation system development charge is calculated by multiplying the system development charge of $145.62 by the demand per day of the type of grass and the irrigation area. The annual water demand for irrigation was assumed as 28 inches of water per sq. ft. for high use turf and 15 inches of water per sq. ft. for low use turf. LSA Advisors recommends that the irrigation system development charge should be assessed not only to irrigation only developments, but multifamily, commercial, or mixed-use development that plan to have irrigation areas.

Non-residential Customers

The assessment of the non-residential system development charge is calculated by multiplying the average residential usage of 258.48 gallons per day by the equivalency of the meter and the system development charge of $145.62. Our analysis determined that the average usage per meter size maintains the same relationship as the existing meter equivalency capacity the city has through the 6-inch meter.

Sewer System Development Charge

LSA Advisors completed an analysis of the existing and future capacity of the City of Arvada's Sewer Collection System that will be available and used to serve growth in new sewer connections between now and buildout and has calculated the costs of that capacity in order to recommend an appropriate system development charge (SDC). Our analysis is based on current information, but the recommendations are for the 2023 fiscal year. Based on our analysis, we find that the appropriate fee to charge for new capacity to the sewer collection system is:

$10,400 per single family equivalent unit

How the Charge is calculated

The Charge includes two major components: a plant investment fee, and a carrying cost adjustment. The plant investment fee is calculated to recover the City's cost of providing capacity in sewer collection infrastructure while the carrying cost adjustment is a provision for the financing costs incurred by Arvada to acquire new assets to expand the collection system for growth. Such financing costs are also referred to frequently as financial carrying costs.

Plant Investment Fee

In the case of sewer, the plant investment fee only includes the plans in place to construct additional infrastructure to provide additional capacity since the existing sewer system does not have enough available capacity to serve new growth. These future investments from 2023 through buildout are listed on Arvada's sewer capital improvements plan that was provided to LSA Advisors. Although all the capital improvements are beneficial to new customers as the City grows, only the costs incurred to provide

capacity for growth (i.e. expansion of the system) are considered as part of the basis for the system development charge. Other costs of the capital improvements are recovered through rates.

Adjustment for Carrying Cost

Carrying costs occur whenever the cash outflows in growth-related capital projects exceed the cash inflows from system development charges. As a rule, Arvada must invest in new capacity before it can accommodate growth in the system; the investment is front-loaded, and the recovery of those costs takes place over a long period of time. Thus, Arvada essentially finances the growth-related improvements, and part of the full cost of growth is the fair return to ratepayers (equity) and bondholders for the money used for the financing.

Total Sewer System Development Charge

The total sewer system development charge is the sum of the plant investment fee component and the carrying cost adjustment. The total fee of $10,400 per equivalent residential unit.

Table 2: Proposed Sewer System Development Charge Schedule by Class

Class	Proposed	Existing	Difference
Single Family Residential	$10,400	$1,579	$8,821
Duplex	$7,278	$1,105	$6,173
Multifamily (per unit)	$7,278	$1,105	$6,173
Non-Residential			
5/8”	$10,400	$1,579	$8,821
3/4”	$20,800	$2,369	$18,431
1”	$49,920	$3,948	$45,972
1 ½”	$114,400	$7,896	$106,504
2”	$208,000	$12,634	$195,366
3”	$447,200	$26,846	$420,354
4”	$894,400	$47,376	$847,024

Background Information

The City of Arvada has charged water and sewer tap fees (also known system development charges) as a condition of receiving utility service for new customers connecting to the utility systems for the first time. The fee has historically attempted to recover some portion of the historical and projected costs incurred by the City of Arvada to provide the capacity needed to serve its service area.

This report documents our findings, recommendations, assumptions, and limiting conditions in calculating an update for the water system development charge for implementation in 2023.

Report Date

The Report Date is September 22nd, 2022 and the findings and recommendations herein apply to the information and analysis conducted up to that date only. Any changes to the critical inputs, information, or plans of the City of Arvada taking place after September 22nd, 2022 have not been considered. Our report is further limited by availability of information. The report documents key reports and information used, along with the date that information was provided and/or published by the City of Arvada. In every instance, we have used the referenced information and we are unaware of any changes to those reports, documents, or information as of the Report Date.

Intended Purpose of the Report

This report is intended to provide a comprehensive documentation of our efforts to calculate a water and sewer system development charge based on the information available to us up to the Report Date. The report provides our findings and recommendations relative to the calculation of the water and sewer system development charge for the City of Arvada, Colorado and no other purpose or use is intended or implied.

The City of Arvada, as the owner of the report, is authorized to use this report for any of the intended purposes outlined above.

Assumptions and Limiting Conditions

This report and the recommendations provided herein are subject to the following significant assumptions and limiting conditions.

1. Engineering analyses. The analytical work performed by LSA Advisors assumes the quality of all engineering analysis provided and we have made no independent effort to verify the same, nor do we accept any responsibility for the accuracy of said engineering analysis, which includes, among other things, estimates of future costs for expanding the water and sewer utility systems and the allocation of project costs between growth (development) and system improvements.
2. Financial records and data. LSA Advisors was provided with financial records and data from the City of Arvada's accounting and billing systems and we have relied on that information in forming our recommendations. We have made no independent effort to verify the accuracy of said financial information.
3. Planning information. LSA Advisors has relied on certain planning information provided by the City of Arvada, including but not limited to a Capital Improvements Plan, asset inventory and asset replacement data. We have used the information provided in these and related documents to form a substantial basis for our recommendations. As of the report date, we are not aware of

any substantial revisions to these plans, but such changes could materially alter the recommendations provided in this report.

4. Legal issues. We have assumed that the City of Arvada has no outstanding legal issues, including pending or contingent legal action that would alter our recommendations. If such legal issues/actions exist, then they have not been disclosed to us as of the report date. We have attempted to ensure compliance with Colorado Law in our recommendation relative to the water system development charge. However, our attempts to ensure compliance are only based on our own understanding of the appropriate statute (CRS 29-20-104.5) and on our experience in setting such fees in Colorado. LSA Advisors is not licensed to provide legal advice of any kind and we offer no legal opinion whatsoever with respect to our work or to the recommendations contained in this report.
5. Unintended use of the report. This report is prepared with the purpose and use as specified in the section entitled "Intended Purpose and Use of Report." No other purpose or use is intended or implied and LSA Advisors accepts no responsibility whatsoever for any unauthorized usage of this report.

Standards and Methodologies

Available Standards

The American Water Works Association (AWWA) publishes recommended standards for calculating fees like Arvada's system development charge; the Water Environment Federation (WEF) publishes similar standards for development of wastewater fees. The two organizations both describe three general approaches:

- The equity method
- The incremental-cost method
- A combined approach that includes elements of both above

Equity Method

The equity method derives a fee based on the amount of money invested in the existing Plant in Service. Under the equity method, new customers pay a proportional amount that is equivalent to that the existing customers have already paid for the plant in service (sometimes called "buying-in"). A rational basis exists for charging new customers for past investment if the existing plant in service still contains enough capacity to provide new customers with the services they require.

The major steps involved in the equity method are: a) determine the available capacity in existing facilities; b) calculate the value of that existing capacity either at its original cost (OC), net book value (NBV), current value (CV), or current value less depreciation (CVLD); c) adjusting the value of the capacity for outstanding debt and/or contributed assets ; and d) calculating unit costs based on average-day (AD), max-day (MD), max-hour (MH), and customer related demands. When followed properly, this process results in a fee for each equivalent unit that reimburses the City for its past investments in facilities that are available now to provide capacity to new connections.

The equity buy-in approach is most applicable in instances where the system already has enough surplus capacity to provide service to the existing customers and to any foreseeable new connections.

Incremental-Cost Method

The incremental cost method is based on the costs the utility expects to incur in order to provide additional capacity for new customers. With the incremental cost method, new customers pay a proportionate share of the future costs to expand the utility system. A rational basis exists for charging customers for proposed new capacity when the capacity in the existing system is inadequate to provide for the new customers' needs and the costs to expand the utility system are known and measurable.

The major steps involved in the incremental-cost method are: a) determine proposed cost of growth/expansion projects from all other projects; b) adjust the cost for expected financial carrying costs and expected contributions of assets; c) determine the total capacity that each project will add to the system in terms of equivalent units; d) calculate unit costs for each type of facility based on customer demands. The result of the above process is to produce a proportional fee for each equivalent unit that recovers the planned investments in growth-related capital projects.

The incremental-cost approach applies best when the existing system is not capable of providing service for new connections, and new infrastructure and natural resources are needed in order to expand the system.

Combined Approach

In many cases, new customers will use both the existing (or, reserve) capacity and will also require new capacity. The combined approach takes both the equity and incremental cost methods into consideration to derive a single proportional fee that averages the costs of existing and proposed capacity over all new connections.

Methodology Used for Water and Sewer System Development Charges

We used the combined approach for the purposes of the water system development charge study for Arvada Water. Our decision is based on our analysis of the water system that shows measurable reserve capacity in the existing system as well as substantial future costs for system expansion to serve new customers.

Colorado Legal Guidelines

In addition to the industry accepted standards, there are various legal guidelines in Colorado that apply to development charges. Colorado Revised Statute 29-20-104.5 and the Colorado Supreme Court decision in Krupp v. Breckenridge Sanitation District both provide a certain set of guidelines and constraints.

CRS 29-20-104.5

Arvada's water system development charge is a particular utility fee that falls under the category of impact fees as described in the Colorado Revised Statutes, CRS 29-20-104.5. The statute is applicable to entities that fall under Title 29 of the Colorado Constitution, and includes most all cities and counties in the state.

The Colorado law describes such fees as ones that fund ". . .expenditures by. . .local government on capital facilities needed to serve new development." The law further requires that local governments – which generally include all cities, towns, and counties in Colorado – may not impose an impact fee unless the fee is: (1) legislatively adopted, (2) generally applicable to a broad class of property, and (3) intended to defray the projected impacts on capital facilities caused by proposed development. The level of the fee, under the statute, is bound to the quantifiable and reasonable impacts of proposed development and cannot be set at a level greater than what is necessary to defray those impacts.

Krupp v. Breckenridge Sanitation District

The Colorado statute is consistent with the 2001 Colorado Supreme Court decision in Krupp v. Breckenridge Sanitation District even though the statute contains some additional constraints that were not discussed in the Court's ruling. Specifically, the Krupp decision provides guidelines in establishing impact fees which, when followed, distinguish the fees from other types of development contributions known as takings. Those guidelines state that the impact fee must be:

- Reasonably related to the cost of service
- Rationally based

- Fairly calculated
- Applied in a rational and consistent manner
- Applicable to all similarly situated applicants

When the above guidelines are followed, the Court ruled the resulting fee is a service fee and is not subject to the takings analyses required under the Nollan/Dolan tests established by the U.S. Supreme Court.

LSA Advisors has made every effort to follow the Colorado statutes as well as the Krupp v. Breckenridge guidelines discussed above. The approach used in calculating the recommended fee is, we believe, consistent with the legal requirements and guidelines based on our expertise and experience in setting such fees in Colorado.

Section 1 – Water System Development Charges

Growth Projections and Characteristic

There is a rational basis for the water system development charges: as new customers connect to the system, Arvada incurs costs to expand its capacity in order to serve those new connections.

The key ingredient to the rationality of the system development charge is growth. Absent growth, Arvada would incur less (far less) capital costs than it currently expects. For example, absent growth, Arvada would not have to build additional water treatment capacity for that growth, and it would not have to invest in the water and sewer pipelines and pumps necessary to move the water to every faucet and fixture located in Arvada service area. Instead, without growth, the City of Arvada could focus on maintaining its existing facilities and infrastructure with lower capital investment overall.

As it is, the City of Arvada expects growth to continue as evidenced by the City's own population projections.

Population Projections

The City provided its own population projections from the City Planning Department. The projections in the buildout model show a total increase of 13,108 households through buildout which is expected in 25 to 30 years. After discussion with City staff they mentioned this growth will be mainly single family residential and the average growth will be about 350 units in the next couple of years. We assumed after 10 years growth will increased to 500 units annually through buildout which will occur around 2050.

Evaluation of Existing Utility Plant in Service

Arvada has two kinds of capacity that is available for new customers to use: the capacity it has already installed, and the capacity that it will install in the future. Based on our examination of the existing capacity in the system, we determined that a portion of the existing facilities do indeed contain enough capacity to provide for some of the future capacity requirements as discussed in the previous section. This as-of-yet unused capacity was installed at a cost to Arvada, and that cost should be recovered through the system development charge as new customers connect to the system.

For simplification purposes, in order to analyze the capacity in the system we combined all the plant categories into one of the following categories, including:

- **Source of supply** – these assets includes the pipelines, pumps, and storage facilities required to move the raw water supplies from their source to a water treatment facility.
- **Treatment -** this includes all water treatment facilities.
- **Transmission** - this includes the large pipelines used to move water from the treatment facilities to the smaller pipelines that make up the distribution system.
- **Pumping** - this includes transmission system pumping; any pumps that are required to move water through the transmission system.

Valuation of Plant in Service

There are four methods available under generally accepted practices for assigning a value to the existing Plant in Service: the net book value method (NBV); the original cost method (OC); the replacement value

less depreciation method (RVLD); and the replacement value method (RV). Each method has the potential to produce a different system development charge with the NBV method always producing the lowest fee and the RV method always producing the highest. The reason for the differences in valuation relate to two variables: the impact of inflation, and the impact of depreciation.

The original cost and net book value of the assets is known and recorded on the asset registers. We evaluated the plant values under the RVLD and RV methods using an engineering analysis provided by City Staff and compared to the fixed asset register.

For the purposes of this study, we selected the RVLD method to value the existing plant in service. We made our selection based on the reasoning that indexing the historical assets for the effects of inflation puts new and historical investment in the system roughly on par in terms of real dollar value, and therefore provides a more equitable basis from which to calculate a system development charge; we also reasoned that new customers do not receive the benefit of a brand new asset when connecting to the existing system and allowing for depreciation to be deducted from the assets' values is a reasonable way to acknowledge this fact. Table 3 provides a summary of the water fixed asset by category under the replacement and replacement value less depreciation

Table 3: Fixed Asset Summary

Plant Category	Replacement Value	Replacement Value less Depreciation
Source of Supply	$59,127,858	$33,336,277
Treatment	103,265,744	26,489,466
Transmission and Distribution	740,796,775	371,526,615
Pumping	60,149,723	11,420,054
Total Treatment/Transmission	**$963,340,100**	**$442,772,411**

Adjustment for Contributed Assets

Contributed assets are those facilities that were literally given to Arvada, usually as a condition of land development. When assets are contributed, it means that the utility and its ratepayers did not have pay for those assets. Accordingly, since no investment has been made by the ratepayers, it would not fall within the concept of rationality and/or reasonableness to then recover the costs of those contributed assets through a system development charge (or any other fee).

Although the contributed assets were not directly specified in the engineering analysis used for the valuation of the assets, we evaluated Arvada's asset records, which indicate the level of historically contributed assets and determined that 27.40% of the total asset based was contributed. We adjusted the value by that amount to account for contributed asset.

Adjustment for Outstanding Debt

When new customers connect to the system, they become ratepayers who are responsible for repayment of any outstanding debts of the utility. If the outstanding debt is not deducted from the value of the Plant in Service, then new customers end up being charged twice for that debt, once when they

pay the system development charge, and again when they start paying their normal rates (the debt service is recovered through the rates). In the case of Arvada, no outstanding debt in the water system currently exists so no adjustment for debt is necessary.

Value of Existing Plant

The total plant value recoverable from the system development charges is the RVLD plant in service since no additional adjustment is necessary.

Table 4 provides a summary of the net plant value recoverable from the system development charges.

Table 4: Net Recoverable Plant in Service using RCVD Method of Asset Valuation

Description	Total
Value of Plant in Service	**$442,772,411**
(less) Contributed Assets (27.40%)	($121,318,611)
(less) Outstanding Debt	0
Net Recoverable Plant value	**$321,453,801**

Capacity of Existing Plant

At this point we have determined the value of the existing Plant in Service that could potentially be recovered from a system development charge, but we must also establish that a rational basis exists in order to actually recover those amounts from a fee. A rational basis exists for recovery of the existing plant values if and when two conditions exist:

a. the existing plant has a positive recoverable value after deducting for contributions and debt, and
b. the existing plant has some amount of capacity that is available – a reserve capacity - for providing service to those new customers connecting to the system.

We have already established that the existing plant has a value after deducting for debt. We further evaluated the existing reserve capacity as described below.

We evaluated the water system reserve capacity on the basis of water treatment capacity. The City of Arvada currently operates two water treatment facilities: Ralston Plant and Arvada Plant. Ralston water treatment plant has a max-day design rating of 36 MGD, and Arvada water treatment plant under most conditions has max day rating of 12 MGD for a total of 48 MGD of existing treatment capacity.

Based on the existing max-day demands in the system of 40 MGD, we concluded that the treatment plants hold an available capacity of 8 MGD; this indicates a reserve capacity level of approximately 16.7%.

Fee Basis for Existing Plant in Service

We concluded from our analysis of the existing plant capacities and the current demands placed on those facilities that the existing plant does indeed have some capacity available to serve new connections. As such, the value of the remaining Plant in Service is recoverable in the system development charge in proportion to the amount of remaining capacity.

Table 5 summarizes the value of the existing plant that we determined should be recovered from the system development charges at this time. This value is sometimes called "buy-in plant value" because it refers to new customers "buying in" to the existing facilities. We refer to it as such for the remainder of the report.

Table 5: Summary of the Value of Existing Plant Recoverable from the System Development Charges Using RVLD Method for Valuation of Assets

Description	Total
Value of Plant in Service	$442,772,411
(less) Contributed Assets (27.40%)	($121,318,611)
(less) Outstanding Debt	0
Net Recoverable Plant value	**$321,453,801**
% Available Plant Capacity	16.7%
Buy-in Plant Value	**$53,575,633**

Evaluation of Proposed Additions to Water Plant in Service

The City of Arvada cannot meet the water demand needs projected in the future with the existing Plant in Service alone. Instead, additional facilities will be needed. Arvada's CIP calls for various additions to the existing water system over time in order to meet projected future demands. This section of the report discusses our evaluation of the CIP, the capacity additions contained in the CIP, and amount of the CIP that should be recovered in the system development charge.

Summary of Capital Improvement Projects

The CIP provided at the Appendix is a listing of all capital improvement projects that Arvada intends to construct between now and 2030. Some of the projects in the CIP are required for the expansion of the system in order to serve new demands caused by growth, while other projects are planned in order to address replacement and refurbishment of existing assets.

Only the portion of the CIP required for expansion of the system is included in the system development charge calculations.

As with the existing Plant in Service in the previous section, we worked with Arvada's staff to separate the CIP projects into one of four categories: source of supply, treatment, transmission & distribution, and pumping. The definition of these categories is the same as provided in the previous section.

Each project in the CIP was evaluated by Arvada staff to determine whether it added capacity to any of the four asset categories. Projects that did not add capacity were identified as System Improvements – meaning that they would be excluded from the system development charge calculation. In many cases, projects provided for both replacement and refurbishment of existing assets in addition to expanded capacity. In these cases, Arvada staff allocated the project costs between system improvement and expansion.

A detailed listing of capital projects included in the system development charge calculations is provided at the appendix.

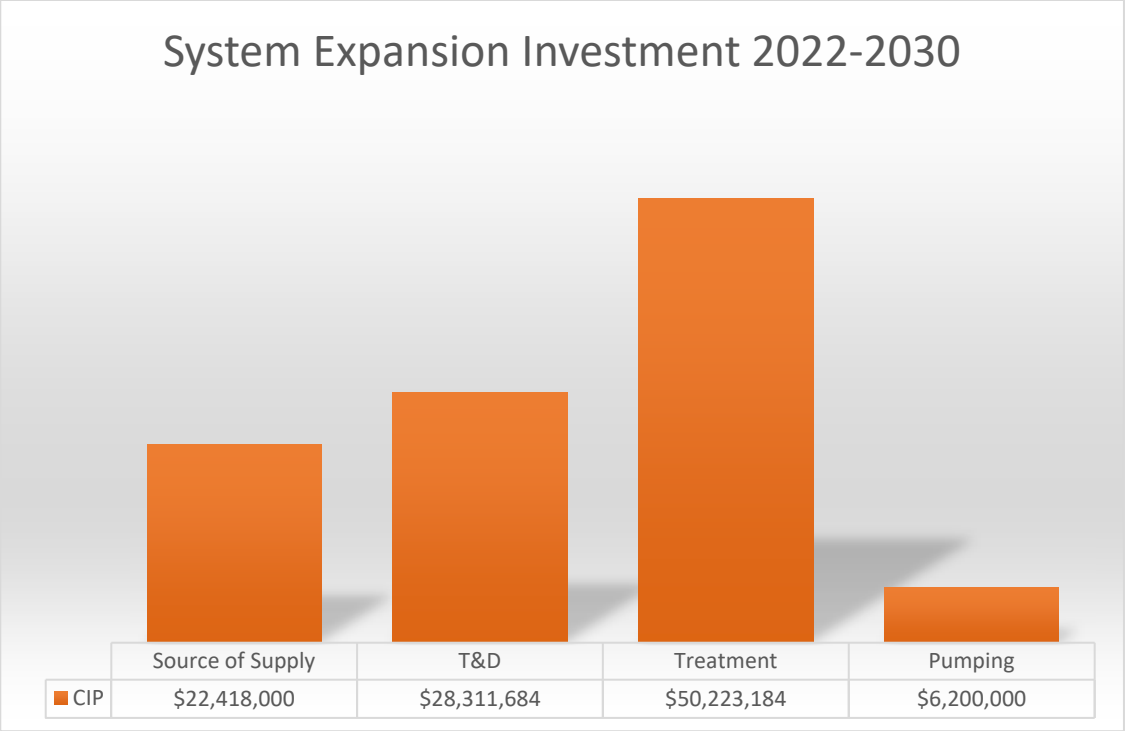


Figure 1: Summary of Water CIP Expansion Projects

Water Resources Required for Growth

The CIP also includes a plan for acquiring raw water supplies that will be needed to serve new customers in the future. The cost of providing raw water supplies is one of Arvada's most expensive costs. There are approximately $117 million in water resource acquisitions projected in the CIP. This amount is part of a project with Denver Water that will provide additional raw water capacity in Gross Reservoir. We will include water resources as a separate fee component equal to the average cost of acquiring water rights. Our recommendations include the addition of such a fee component, which will be described more fully in the next section of the report. What's important to know now is that the costs of raw water acquisitions will be accounted for and recovered separately from other capital improvement costs. Therefore, the cost of raw water acquisitions is not included in the below discussion of the CIP.

Capacity Added by Capital Improvements

We evaluated the capacity added by the capital improvements identified by Arvada staff as expansion-related projects. We based our evaluations on interviews with Arvada staff. We evaluated the capacity additions in the treatment category consistent with the approach used to evaluate the capacity in the existing facilities discussed in the previous section of the report.

There is limited capacity in the system and the projection of about 13,000 new additional equivalent units to be added. The existing CIP calls for an additional increase in treatment capacity of about 6 MGD.

The total existing and planned source of supply, treatment, transmission & distribution, and pumping capacity available is equal to 52 MGD of which 48 MGD are of existing capacity and 6 MGD of planned additions.

Project Cost Recoverable from System Development Charges

The CIP costs that are recoverable from the system development charges are the costs related only to system expansion. It is those costs that are included in our calculation of the water system development charge.

Adjustment for Carrying Cost

One of the components we use in the calculation of the system development charges is a provision for the financing costs incurred by Arvada to acquire new assets to expand system capacity for growth. Such financing costs are also referred to frequently as financial carrying costs.

Carrying costs occur whenever the cash outflows in growth-related capital projects exceed the cash inflows from system development charges. As a rule, Arvada has to invest in new capacity before it can accommodate growth in the water system; the investment is front-loaded and the recovery of those costs takes place over a long period of time. Thus, Arvada essentially finances the growth-related improvements, and part of the full cost of growth is the fair return to ratepayers (equity) and bondholders for the money used for the financing. The total calculated carrying cost is $52.3M.

Summary of all Growth-Related Cost

The total growth-related costs are equal to the value of the assets making up the existing reserve capacity, the total growth-related CIP costs, and the financial carrying costs.

Table 6: Summary of Total Growth-Related Costs for Water Utility

Description	Treatment and Transmission
Replacement Cost less Depreciation of Existing available Capacity	$53,575,633
Growth Related Capital Improvements	107,152,868
Net Recoverable Plant Value	**$160,728,502**
Financial Carrying Costs (present value)	52,321,772
Total Recoverable Plant	**$213,050,274**

Water System Development Charge Recommendation

How the System Development Charge is Calculated

The system development charge is a unit cost equal to cost per gallons per day. The fee is an average unit cost, meaning that both the costs of the existing facilities as well as the CIP costs are averaged against the total capacity available at the completion of the CIP projects through 2030. In this way, new connections pay for a proportionate share of both the existing capacity as well as the new capacity. The fee calculation can be expressed as:

$$SDC = \frac{\$Value\ Existing\ Capacity + \$Value\ New\ Capacity}{Total\ Capacity\ Available}$$

Our recommendations include separating the system development charge into two components: a plant investment fee, and a water resource fee. The plant investment fee (PIF) is meant to recover the costs of the physical assets like treatment plants, pipelines, pumps, and buildings. The water resource fee is meant to recover the costs of acquiring new raw water supplies. The two components are added together to produce the total system development charge.

Water Resource Fee

Acquisition of water supplies is one of the most expensive undertakings of the City of Arvada. As new customers connect to the system, they require the capacity to provide them with service at all points in the future and the ability to provide any service at all is contingent on Arvada's success in obtaining raw water supplies adequate for the need.

Up to this point in the discussion, we have evaluated the value of the existing plant, and the cost of the proposed CIP without regard to the raw water resources. We have intentionally left those costs and the capacity of those supplies out of the analysis because of our recommended approach to separate raw water supply costs into a separate component of the water system development charge.

Under our recommended approach, each new connection to the water system will pay an amount that Arvada can use to acquire an appropriate amount of raw water supply to serve that connection. In order to develop such a fee component, we must know the average cost that Arvada pays for its water supplies.

Arvada currently is in the process to acquire 3,000 acre-feet of yield from Denver Water as part of participation in the Gross Reservoir Expansion Project. The cost of those supplies can vary but preliminary projections put the cost of that participation around $40,000 per acre feet. An acre foot is equal to 325,851 gallons; this translates into 893 gallons per day.

Given the above inputs, the water resource fee per gallons per day is $44.81 ($40,000 per acre foot/ 893 gallons per day)

Plant Investment Fee

The plant investment fee can be calculated from the existing plant in service costs and the CIP costs as determined in the previous two sections of the report. We divide these costs by the total service capacity projected to arrive at a unit cost for each.

Table 7: Summary Water Plant Investment Fee Calculation

Description	Total
Replacement Cost less Depreciation of Existing available Capacity ($ million)	$53.6
Growth Related Capital Improvements	107.2
Net Recoverable Plant Value	**$160,7**
Financial Carrying Costs (present value)	$52.3
Total Recoverable Plant	**$213.0**
Total Reserve and Future Capacity units (MGD)	14.0
Treatment and Transmission Fee ($/gallons per day)	$11.48
Carrying Cost Fee ($/gallons per day)	$79.80
Plant Investment Fee Before water losses Adjustments ($/gallons per day)	**$91.28**

Adjustment for Water Losses

Each of the fees calculated above were presented in a gallons per day basis. The assessment of the fee will be based on projected metered average usage per day. For each metered gallon per day of usage Arvada needs more than one gallon of raw water in order to have enough left after accounting for losses due to absorption, leakage, and/or evaporation –to serve the actual metered gallon. The fees calculated above were adjusted to account for water losses at the different part of the system. The water loss adjustment is 20% for the water resource fee and 5% for the treatment and transmission portion of the system. The table below summarizes the water loss adjustment and the total proposed system development charge.

Table 8: Proposed System Development Chart

Description	Water Resource Fee	Treatment and Transmission Fee	Carrying Cost	Total
Charge	$44.81	$11.48	$79.80	136.02
Percent Water Losses	20%	5%		
Water Losses Cost	$8.96	$0.57		$9.60
Total System Development Charge	**$53.77**	**$12.05**	**$79.80**	**$145.62**

Once the water losses adjustment is incorporated the total water resource fee results in $57.77 per gallons per day and the plant investment fee results in $91.85 gallons per day which is the sum of the treatment and transmission fee ($12.05) and the carrying cost fee ($79.80).

Water System Development Charge Assessment

Up to this point, we have calculated a system development charge applicable for one gallon per day only. The fee needs to be scaled proportionately based on the projected demand for each customer. We developed an assessment based on Arvada's existing system development charge schedule. We updated the projected demand for the single family residential and multifamily based on an analysis of Arvada's

billing database from 2020 and 2022 and historical usage summaries from 2001 through 2021 to determine the right assessment for the residential and multifamily class. For the non-residential class our recommendation is based on the existing fee schedule.

Table 9: Proposed Water System Development Charge Schedule

Class	Proposed	Existing	Difference
Single Family Residential	$37,600	$19,275	$18,325
Duplex	$28,200	$14,460	$13,740
Multifamily (per unit)	$18,800	$9,640	$9,160
Irrigation			
High Use Turf (sq. ft.)	$6.96	$1.48	$5.48
Low Use Turf (sq. ft.)	$3.73	$0.74	$2.99
Non-Residential			
5/8”	$37,600	$19,275	$18,325
3/4”	$56,400	$28,910	$27,490
1”	$94,000	$48,190	$45,810
1 ½”	$188,000	$96,380	$91,620
2”	$300,800	$154,200	$146,600
3”	$639,200	$327,680	$311,520
4”	$1,128,000	$578,250	$549,750
6”	$2,350,000	$1,204,688	$1,145,313

Single Family Residential

The demand for a single family residential customer averaged 94,348 gallons per year per account which translates into 258.48 gallons per day.

Duplex

The City assesses Duplexes at 75% of the single family residential system development charges. We maintained the policy in the assessment and did not have enough data to propose a change in the fee for Duplex.

Multifamily

The demand for multifamily customers averaged 52,111 gallons per year per dwelling units which translate to 142.77 gallons per day per multifamily unit. This represents 55% of the single family residential demand which is close to the existing fee differential between the single and multifamily residential fee which is 50%. The assessment maintains the 50% relationship for the multifamily class.

Irrigation

The irrigation system development charge is calculated by multiplying the development charge of $145.62 by the demand per day of the type of grass and the irrigation area. The annual water demand for irrigation was assumed as 28 inches of water per sq. ft. for high use turf and 15 inches of water per sq. ft. for low use turf. LSA Advisors recommends that the irrigation system development charge should be

assessed not only to irrigation only developments, but multifamily, commercial, or mixed-use development that plan to have an irrigation area.

Non-residential Customers

The assessment of the Non-residential system development charge is calculated by multiplying the average residential usage of 258.48 gallons per day by the equivalency of the meter and the system development charge of $145.62. Our analysis determined that the average usage per meter size maintains the same relationship as the existing meter equivalency capacity the city has through the 4 inch meter.

Contractual Agreements

The City of Arvada has several existing agreements with Developments that contributed either water rights or infrastructure and therefore they have a special system development charge assessment published on the City Code of Ordinance. In the future the City of Arvada may require developers to contribute to projects included in the CIP that was used to calculate the fees, in that case, a credit for the CIP portion would have to be made to those developers.

We prepared different assessment based on the types of contributions a developer could make or have made. If a development contributed water, they would not be subject to the water resource fee portion and the system development charge would be based on $91.85 per gallons per day and the assessment by class would be this.

Table 10: System Development Charge for Developments that Contributed Water Rights

Class	Proposed	Existing	Difference
Single Family Residential	$23,700	$7,325	$16,375
Duplex	$17,800	$5,490	$12,310
Multifamily (per unit)	$11,900	$3,660	$8,240
Irrigation			
High Use Turf (sq. ft.)	$4.39	$0.56	$3.83
Low Use Turf (sq. ft.)	$2.35	$0.28	$2.07
Non-Residential			
5/8”	$23,700	$7,325	$16,375
3/4”	$35,550	$10,990	$24,560
1”	$59,250	$18,310	$40,940
1 ½”	$118,500	$36,620	$81,880
2”	$189,600	$58,600	$131,000
3”	$402,900	$124,520	$278,380
4”	$711,000	$219,730	$491,270
6”	$1,481,250	$457,780	$1,023,470

If a development contributed facilities or infrastructure, they would not be subject to the portion of the treatment and transmission that accounts for the existing capacity in the system. The fee would be based on a $141.60 gallon per day basis and the assessment by class would be this.

Table 11: System Development Charge for Developments that Contributed Existing Facilities

Class	Proposed	Existing	Difference
Single Family Residential	$36,600	$14,840	$21,760
Duplex	$27,500	$11,140	$16,360
Multifamily (per unit)	$18,300	$7,430	$10,870
Irrigation			
High Use Turf (sq. ft.)	$6.77	$1.14	$5.63
Low Use Turf (sq. ft.)	$3.63	$0.57	$3.06
Non-Residential			
5/8”	$36,600	$14,840	$21,760
3/4”	$54,900	$22,260	$32,640
1”	$91,500	$37,110	$54,390
1 ½”	$183,000	$74,220	$108,780
2”	$292,800	$118,730	$174,070
3”	$622,200	$252,310	$369,890
4”	$1,098,000	$445,260	$652,740
6”	$2,287,500	$927,610	$1,359,890

In the future the City of Arvada may require developers to contribute to projects included in the CIP used to calculate the fees, In that case, they would not be subject for the portion of the treatment and transmission that account for the future capacity in the system. Currently this scenario is not contained within the City’s fee schedule but per conversations with City staff is a future possibility. The fee would be based on a $137.59 gallons per day basis and the assessment by class would be this:

Table 12: SDC for Developers that will contribute future infrastructure from the CIP

Class	Proposed	Existing
Single Family Residential	$35,600	N/A
Duplex	$26,700	N/A
Multifamily (per unit)	$17,800	N/A
Irrigation		
High Use Turf (sq. ft.)	$6.58	N/A
Low Use Turf (sq. ft.)	$2.25	N/A
Non-Residential		
5/8”	$35,600	N/A
3/4”	$34,050	N/A
1”	$56,750	N/A
1 ½”	$113,500	N/A
2”	$181,600	N/A
3”	$385,900	N/A
4”	$681,000	N/A
6”	$1,418,750	N/A

Those three possible contribution scenarios could be combined in four different possible permutations presented below.

If a development contributes both water and existing facilities, they would not be subject to water resource portion and the portion of the treatment and transmission that accounts for the existing capacity in the system. The fee would be based on a $87.83 gallon per day basis and the assessment by class would be this.

Table 13: System Development Charge for Developments that Contributed Water and Existing Facilities

Class	Proposed	Existing	Difference
Single Family Residential	$22,700	$2,890	$19,810
Duplex	$17,000	$2,170	$14,830
Multifamily (per unit)	$11,400	$1,450	$9,950
Irrigation			
High Use Turf (sq. ft.)	$4.20	$0.22	$3.98
Low Use Turf (sq. ft.)	$2.25	$0.11	$2.14
Non-Residential			
5/8”	$22,700	$2,890	$19,810
3/4”	$34,050	$4,340	$29,710
1”	$56,750	$7,230	$49,520
1 ½”	$113,500	$14,460	$99,040
2”	$181,600	$23,130	$158,470
3”	$385,900	$49,150	$336,750
4”	$681,000	$86,740	$594,260
6”	$1,418,750	$180,700	$1,238,050

If a development contributes both water and future facilities from the projects in the CIP, they would not be subject to water resource portion and the portion of the treatment and transmission that accounts for the future capacity in the system. Currently this scenario is not contained within the City's fee schedule but per conversations with City staff is a future possibility. The fee would be based on a $83.82 gallon per day basis and the assessment by class would be this.

Table 14: System Development Charge for Developments that Contributed Water and Future Facilities

Class	Proposed	Existing
Single Family Residential	$21,700	N/A
Duplex	$16,300	N/A
Multifamily (per unit)	$10,800	N/A
Irrigation		
High Use Turf (sq. ft.)	$4.01	N/A
Low Use Turf (sq. ft.)	$2.15	N/A
Non-Residential		
5/8"	$21,700	N/A
3/4"	$32,550	N/A
1"	$54,250	N/A
1 ½"	$108,500	N/A
2"	$173,600	N/A
3"	$368,900	N/A
4"	$651,000	N/A
6"	$1,356,250	N/A

If a development contributes both existing and future facilities from the projects in the CIP, they would not be subject to the treatment and transmission that accounts for the existing and future capacity in the system. The fee would be based on a $137.59 gallon per day basis and the assessment by class would be this.

Table 15: System Development Charge for Developments that Contributed Existing and Future Facilities

Class	Proposed	Existing	Difference
Single Family Residential	$35,600	$2,890	$32,710
Duplex	$26,700	$2,170	$24,530
Multifamily (per unit)	$17,800	$1,450	$16,350
Irrigation			
High Use Turf (sq. ft.)	$6.58	$0.22	$6.36
Low Use Turf (sq. ft.)	$3.52	$0.11	$3.41
Non-Residential			
5/8”	$35,600	$2,890	$32,710
3/4”	$53,400	$4,340	$49,060
1”	$89,000	$7,230	$81,770
1 ½”	$178,000	$14,460	$163,540
2”	$284,800	$23,130	$261,670
3”	$605,200	$49,150	$556,050
4”	$1,068,000	$86,740	$981,260
6”	$2,225,000	$180,700	$2,044,300

If a development contributes water; as well as both existing and future facilities from the projects in the CIP, they would not be subject to water resource portion and the treatment and transmission that accounts for the existing and future capacity in the system. The fee would be based only on carrying costs and would be $79.80 gallon per day basis and the assessment by class would be this.

Table 16: System Development Charge for Developments that Contributed Water, Existing, and Future Facilities

Class	Proposed	Existing
Single Family Residential	$20,600	N/A
Duplex	$15,500	N/A
Multifamily (per unit)	$10,300	N/A
Irrigation		
High Use Turf (sq. ft.)	$3.82	N/A
Low Use Turf (sq. ft.)	$2.04	N/A
Non-Residential		
5/8”	$20,600	N/A
3/4”	$30,900	N/A
1”	$51,500	N/A
1 ½”	$103,000	N/A
2”	$164,800	N/A
3”	$350,200	N/A
4”	$618,000	N/A
6”	$1,287,500	N/A

Section 2 – Sewer System Development Charges

Evaluation of Existing Utility Plant in Service

As with water, Arvada has two kinds of capacity that is available for new customers to use: the capacity it has already installed, and the capacity that it will install in the future. Based on our examination of the existing capacity in the system and after interviews with Arvada's staff, it was determined that the existing facilities do not contain enough capacity to provide for new customers. Because of this the buy-in component of the fee will not be evaluated in the sewer system development charges.

Evaluation of Proposed Additions to Sewer Plant in Service

The City of Arvada cannot meet the sewer demand needs projected in the future with the existing collection and interceptors in service alone. Instead, additional facilities will be needed. Arvada's sewer capital improvement plan calls for various additions to the existing sewer system over time in order to meet projected future demands. This section of the report discusses our evaluation of the CIP and amount of the CIP that should be recovered in the system development charge.

Summary of Capital Improvement Projects

The CIP provided at the Appendix is a listing of all capital improvement projects that Arvada intends to construct between now and 2030. Some of the projects in the CIP are required for the expansion of the system in order to serve new demands caused by growth, while other projects are planned in order to address replacement and refurbishment of existing assets.

Only the portion of the CIP required for expansion of the system is included in the system development charge calculations.

Each project in the CIP was evaluated by Arvada's staff to determine whether it added capacity. Projects that did not add capacity were identified as System Improvements – meaning that they would be excluded from the system development charge calculation. In many cases, projects provided for both replacement and refurbishment of existing assets in addition to expanded capacity. In these cases, Arvada staff allocated the project costs between system improvement and expansion. The total sewer growth related capital improvement planned from 2022 through 2030 is **$61,546,581.**

A detailed listing of capital projects included in the system development charge calculations is provided at the appendix.

Sewer System Development Charge Recommendation

How the System Development charge is Calculated

The sewer development charge represents the proportionate share each growth capacity unit is required to pay to cover the capacity-related CIP from 2022 through 2030. The two components of the fee calculations are the capacity-related CIP, and the projection of growth capacity units.

$$Fee = \frac{\$New\ Capacity\ From\ CIP}{Total\ Growth\ Capacity\ Units}$$

Our recommendations include separating the system development charge into two components: a plant investment fee, and an adjustment for carrying cost. The plant investment fee (PIF) is meant to recover the costs of the physical assets. The carrying cost adjustment is meat for the financing costs of paying for the project before the growth occur. The two components are added together to produce the total sewer system development charge.

Sewer Plant Investment Fee

The plant investment fee can be calculated from the CIP costs as determined in the previous section of the report. We divide these costs by the total projected growth capacity units to arrive at fee per equivalent residential unit. The growth capacity unit was discussed in previous sections of this report.

$$Fee = \frac{\$61{,}546{,}581}{13{,}108} = \$4{,}695$$

Sewer Adjustment for Carrying Cost

One of the components we use in the calculation of the system development charges is a provision for the financing costs incurred by Arvada to acquire new assets to expand system capacity for growth. Such financing costs are also referred to frequently as financial carrying costs.

Carrying costs occur whenever the cash outflows in growth-related capital projects exceed the cash inflows from system development charges. As a rule, Arvada has to invest in new capacity before it can accommodate growth in the water system; the investment is front-loaded and the recovery of those costs takes place over a long period of time. Thus, Arvada essentially finances the growth-related improvements, and part of the full cost of growth is the fair return to ratepayers (equity) and bondholders for the money used for the financing. The total calculated carrying cost is $74,946,703. This results in a carrying cost adjustment per equivalent unit of $5,718.

The total sewer system development charge is the sum of the plant investment fee and the carrying cost adjustment which results in a fee per equivalent residential unit of $10,413 rounded for simplicity to $10,400.

Sewer System Development Charge Assessment

The assessment of the sewer system development charge is consistent with Arvada's existing schedule. We recommend using Metro's meter equivalency schedule non-residential meter assessment and maintain the same relation with Metro's system development charges.

Table 17: Proposed Sewer System Development Charges Schedule

Class	Proposed	Existing	Difference
Single Family Residential	$10,400	$1,579.00	$8,821
Duplex	$7,278	$1,105.00	$6,173
Multifamily (per unit)	$7,278	$1,105.00	$6,173
Non-Residential			
5/8”	$10,400	$1,579.00	$8,821
3/4”	$20,800	$2,369.00	$18,431
1”	$49,920	$3,948.00	$45,972
1 ½”	$114,400	$7,896.00	$106,504
2”	$208,000	$12,634.00	$195,366
3”	$447,200	$26,846.00	$420,354
4”	$894,400	$47,376.00	$847,024

Appendix