



Technical Memorandum

Date: November 6, 2012
To: Dave Brown, Water/Irrigation Division Manager
From: Karyn Johnson, Principal
Subject: City of Yakima Connection Charges

At the City's request, we reviewed the connection charges used by the City of Yakima water system and updated them to reflect current costs and system capacity.

Background

The City's water system has three types of connection charges:

- **Domestic water connection charge** – Recovers a proportionate share of the cost of *general facilities*—those that provide water treatment, transmission, storage, and pumping capacity. Applies to all new connections to the domestic water system.
- **Distribution plant connection charge** – Recovers a proportionate share of the cost of *local facilities*—distribution lines, hydrants, services, and meters—that have not been already paid for through LIDs or developer extensions.
- **Base irrigation charge** – Recovers a proportionate share of treatment, transmission, storage, and pumping capacity costs as they apply to customers who use domestic water for irrigation purposes.

Calculating the first two types of charges requires that water system capacity costs, net of contributed capital, be allocated between general facilities and local facilities. Calculating the base irrigation charge requires that the domestic water connection charge be converted from a “per ERU” basis to a “per square foot” basis.

Any connection charge is the unit cost of the City's investment in the fixed plant needed to serve its customers. The numerator is the applicable cost of the system's fixed plant, minus contributed capital, plus accrued interest. The denominator is either the number of units served by that plant (demand) or able to be served by that plant (capacity). In this study we continue the City's past practice of using capacity as the denominator rather than demand.

Basic Components for Connection Charge Calculation

We will explain first the basic components of the connection charge calculation: *existing costs*, *future costs*, and existing and future *capacity*. Except for the allocation between general and local facilities, these components are the same for all three types of connection charges, so we will discuss them together.

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Cost Basis for Existing Facilities

The cost basis is the starting point in calculating a connection charge, and it has two components: the cost of existing facilities and the cost of future facilities. The cost basis for existing facilities is discussed first.

The following page contains three exhibits that together show different elements of the cost basis for existing facilities.

Exhibit 1 summarizes the cost of existing facilities by the year the assets were placed in service. The age of existing assets is important because state law allows the connection charge to include in its cost basis up to ten years of accrued interest, using for each asset the interest rate prevailing at the date it was placed in service. The total asset cost for the Yakima water system is \$54.1 million.

Exhibit 2 allocates the \$54.1 million cost between general and local facilities, then subtracts contributed capital and adds the accrued interest. Contributed capital totals \$22.1 million; it is assumed to apply 100% to the distribution system, or local facilities, because most contributed capital results from the extension of local distribution lines by either developers or Local Improvement District projects. (Contributed capital is also referred to as “Contributions in Aid of Construction,” abbreviated as “CIAC.”)

Exhibit 3 adds construction work in progress (CWIP) as of the end of 2011, allocating it between general and local facilities in proportion to the total original cost net of CIAC.

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Exhibit 1: Summary of Existing Plant in Service by Year

Account	Asset Description	2003 and Prior	2004	2005	2006	2007	2008	2009	2010	2011	Total
900	Intangible Plant-Water	\$ 221,830	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 221,830
901	Source of Supply - Water	2,242,541	-	-	-	-	-	-	-	-	2,242,541
902	Storage	1,899,066	-	-	-	-	-	1,464,474	-	-	3,363,540
903	Pumping Plant-Water	1,280,515	-	-	-	-	-	-	-	-	1,280,515
904	Water Treatment Plant	2,931,970	1,838,431	39,054	4,768,805	37,511	33,058	-	-	5,170	9,653,999
905	Transmission Plant-Water	2,804,147	-	-	-	-	-	-	-	-	2,804,147
906	Distribution Plant-Water	25,238,726	1,240,137	540,272	831,099	1,010,954	764,044	667,721	705,855	950,770	31,949,579
907	General Water Plant	2,528,630	14,526	5,323	-	6,070	-	14,950	-	11,703	2,581,202
		\$39,147,424	\$ 3,093,095	\$ 584,649	\$ 5,599,904	\$ 1,054,535	\$ 797,103	\$ 2,147,144	\$ 705,855	\$ 967,643	\$54,097,352

Note: Reservoirs and standpipes reclassified from 906-Distribution Plant to 902-Storage.

Exhibit 2: Existing Plant in Service minus Contributions plus Interest, Allocated between General and Local Facilities

Account	Asset Description	Total			General Facilities			Local Facilities		
		Original Cost	Contributed Capital	Allocable Interest Cost	Original Cost	Contributed Capital	Allocable Interest Cost	Original Cost	Contributed Capital	Allocable Interest Cost
900	Intangible Plant-Water	\$ 221,830	\$ -	\$ 137,091	\$ 221,830	\$ -	\$ 137,091	\$ -	\$ -	\$ -
901	Source of Supply - Water	2,242,541	-	1,332,779	2,242,541	-	1,332,779	-	-	-
902	Storage	3,363,540	-	1,373,889	3,363,540	-	1,373,889	-	-	-
903	Pumping Plant-Water	1,280,515	-	720,233	1,280,515	-	720,233	-	-	-
904	Water Treatment Plant	9,653,999	-	3,724,432	9,653,999	-	3,724,432	-	-	-
905	Transmission Plant-Water	2,804,147	-	1,732,813	2,804,147	-	1,732,813	-	-	-
906	Distribution Plant-Water	31,949,579	15,917,567	9,934,403	-	-	-	31,949,579	15,917,567	9,934,403
907	General Water Plant	2,581,202	-	1,598,670	2,581,202	-	1,598,670	-	-	-
	Total Fixed Assets	\$54,097,352	\$15,917,567	\$20,554,311	\$22,147,773	\$ -	\$10,619,908	\$31,949,579	\$15,917,567	\$ 9,934,403
	Original Cost less Contributed Capital		\$38,179,785			\$22,147,773			\$16,032,012	
			100.0%			58.0%			42.0%	

Exhibit 3: 2011 Construction Work in Progress – Allocation between General and Local Facilities

Construction Work in Progress	2011 Total Balance	General Facilities	Local Facilities
Water Construction Work In Progress	\$ 3,346,876	\$ 1,941,495	\$ 1,405,381

Allocate to Local Facilities in proportion to Original Cost net of Contributed Capital.

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Exhibit 4 shows the final component of the existing cost basis: the Water Fund cash and debt. Outstanding debt principal is subtracted from the cost basis because when there is outstanding debt that was used for pay for certain assets, today’s ratepayers haven’t paid for those assets yet, even though the assets are in service. A newly connecting customer becomes a ratepayer and therefore will help pay for those assets through future rates.

However, today’s ratepayers have helped accumulate cash in the Water Fund. This cash offsets the amount that future ratepayers will have to pay to retire outstanding debt. For that reason, the calculation of the existing cost basis subtracts “net debt principal,” which is the outstanding debt principal minus fund cash. (If cash is greater than outstanding debt, net debt principal is zero.)

EXHIBIT 4: 2011 Cash and Debt Summaries

	Total Water	General Facilities	Local Facilities	Allocation Basis
2011 Year-end Outstanding Debt		58.0%	42.0%	
Revenue Bonds	\$ 1,385,000			
PWTF Loans	\$ 4,212,816			
SIED Loans	\$ 10,400			
Total Outstanding Debt	\$ 5,608,216	\$ 3,253,279	\$ 2,354,937	In proportion to Assets net of CIAC
<i>Source: Debt-to-Maturity schedule as of 12/31/11</i>				
2011 Year-end Cash Balances		58.0%	42.0%	
Operating Fund Cash	\$ 1,214,008	\$ 704,236	\$ 509,772	In proportion to Assets net of CIAC
Revenue Bond Reserve Account Cash	\$ 347,968	\$ 201,853	\$ 146,115	In proportion to outstanding debt
Revenue Bond Redemption Account Cash	\$ 14,281	\$ 8,284	\$ 5,997	In proportion to outstanding debt
Total	\$ 1,576,257	\$ 914,373	\$ 661,884	
<i>Source: 2011 Financial Statements - Comparative Statements of Cash Flows</i>				

Exhibit 5 shows how the existing cost basis is calculated, using all the above components. For general facilities, the total is \$32.4 million; for local facilities, the total is \$25.7 million.

Exhibit 5: Calculation of Cost Basis for Existing Facilities

Existing Cost Basis	Total	General Facilities	Local Facilities
PLANT-IN-SERVICE			
Utility Capital Assets	\$ 54,097,352	\$ 22,147,773	\$ 31,949,579
plus: Construction Work in Progress	3,346,876	1,941,495	1,405,381
less: Contributed Capital	(15,917,567)	-	(15,917,567)
plus: Interest on Non-Contributed Plant	20,554,311	10,619,908	9,934,403
Existing Cash Balances	\$ 1,576,257	914,373	661,884
less: Debt Principal Outstanding	(5,608,216)	(3,253,279)	(2,354,937)
less: Net Debt Principal Outstanding	\$ (4,031,959)	\$ (2,338,906)	\$ (1,693,053)
TOTAL EXISTING COST BASIS	\$ 58,049,013	\$ 32,370,270	\$ 25,678,743

Cost Basis for Future Facilities

Exhibit 6 on the following page shows the water utility’s 2012-16 Capital Improvement Plan (CIP), which is the source for the future cost basis.

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Exhibit 6: Capital Improvement Plan 2012-2016

Description	2010 Dollars						2012 Dollars (including Inflation)					
	2012	2013	2014	2015	2016	Total Costs 2012-2016	General Facilities	Local Facilities	R&R	Upgrade	Expansion	Total Costs 2012-2016
<u>Source of Supply</u>						-	-	-	-	-	-	-
Leak Detection		20,000	20,000		20,000	60,000	60,000	-	-	63,499	-	63,499
<u>Water Treatment Plant</u>						-	-	-	-	-	-	-
WTP PLC Replacement		250,000				250,000	250,000	-	264,581	-	-	264,581
WTP Lagoons / electrical service	400,000	3,114,800				3,514,800	3,514,800	-	-	3,719,797	-	3,719,797
Intake Flood Repair		1,000,000				1,000,000	1,000,000	-	1,058,324	-	-	1,058,324
						-	-	-	-	-	-	-
<u>Distribution</u>						-	-	-	-	-	-	-
Automated Metering Infrastructure	1,500,000	6,500,000				8,000,000	-	8,000,000	-	8,466,591	-	8,466,591
Open Gear Valve Replacement	25,000	25,000	25,000	25,000	25,000	125,000	-	125,000	132,290	-	-	132,290
Private Water Main Replacement	175,000	175,000	175,000	175,000	175,000	875,000	-	875,000	926,033	-	-	926,033
Lead-Oakum Joint Line Replacement			2,000,000	2,000,000	2,000,000	6,000,000	-	6,000,000	6,349,943	-	-	6,349,943
Total Capital Projects in 2010 Dollars	2,100,000	11,084,800	2,220,000	2,200,000	2,220,000	19,824,800	4,824,800	15,000,000				
Total Projects in 2012 Dollars	2,222,480	11,731,308	2,349,479	2,328,312	2,349,479	20,981,058	5,106,201	15,874,858				20,981,058
Repair & Replacement Project Costs	211,665	1,534,570	2,328,312	2,328,312	2,328,312	8,731,172	1,322,905	7,408,267	8,731,172			8,731,172
Upgrade Project Costs	2,010,815	10,196,739	21,166	-	21,166	12,249,887	3,783,296	8,466,591		12,249,887		12,249,887
Expansion Project Costs	-	-	-	-	-	-	-	-			-	-

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The 2011 Water Master Plan expressed its project cost estimates in 2010 dollars, so Exhibit 6 uses the ENR Construction Cost Index to convert the estimates into 2012 dollars. It also separates the projects between those that improve general facilities versus those that improve local facilities. Finally, Exhibit 6 classifies the projects into one of three categories: repair & replacement (R&R) projects, upgrade projects, and expansion projects. This classification determines whether a particular project can be included in the future cost basis for the connection charge. Expansion projects are always eligible to be included; R&R projects are generally ineligible. For upgrade projects, it depends on the particular methodology used for the connection charge.

Exhibit 7 summarizes the future cost basis for the connection charges, assuming the “integrated methodology” that we are recommending for the connection charges. With this methodology, upgrade projects can be included in the future cost basis.

Exhibit 7: Summary of Cost Basis for Future Facilities

Future Cost Basis	Total	General Facilities	Local Facilities
CAPITAL IMPROVEMENT PLAN			
Total Future Projects (2012 CIP net of CIAC)	\$ 20,981,058	\$ 5,106,201	\$ 15,874,858
less: Repair & Replacement Portion of Projects	(8,731,172)	(1,322,905)	(7,408,267)
TOTAL FUTURE COST BASIS	\$ 12,249,887	\$ 3,783,296	\$ 8,466,591

Capacity

After the existing and future costs are determined, the final component of the connection charge calculation is the denominator—the system capacity, expressed in equivalent residential units (ERUs).

Exhibit 8 shows the 2010 and projected 2020 total water system capacity in million gallons per day (mgd), according to the 2011 Water Master Plan. Because the CIP goes out only to 2016, we interpolated on a straight-line basis to estimate 2016 figures. Exhibit 8 shows that in 2010, maximum day demand (MDD) was at 90% of total system capacity.

Exhibit 8: Capacity and 2010-2016 Projected Demand (million gallons per day)

Capacity and Projected Demand (mgd)	Interpolation		
<i>Source: 2011 Water Master Plan, Table 3-22.</i>	2010	2020	2016
Total System Capacity - Non-Drought Year (mgd)	25.00	25.00	25.00
Maximum Daily Demand (MDD) (mgd)	22.40	24.70	23.78
Unused Capacity (mgd)	2.60	0.30	1.22
% Unused Capacity	10%	1%	5%

Exhibit 9 shows the conversion of the system capacity figure from mgd to ERUs. According to City staff, the average water consumption per ERU is 270 gallons per day. Assuming a peaking factor of 1.75 (from Table 2-33 of the 2011 Water Master Plan), the maximum-day water consumption per ERU is 473 gpd, which implies a total capacity of 52,910 ERUs. Since the CIP does not contain any capacity-enhancing projects through 2016, this capacity figure applies to 2016 as well as the present.

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Exhibit 9: Capacity and 2010-2016 Projected Demand (ERUs)

Capacity and Projected Demand in ERUs	2010	2020	Interpolation 2016
	Total System Capacity - Non-Drought Year (mgd)	25.00	25.00
Equivalent Residential Unit (ERU):			
Average Usage per ERU (gpd)	270	270	270
Peaking Factor	1.75	1.75	1.75
Peak Usage per ERU (gpd)	473	473	473
<i>Sources: Dave Brown & 2011 Water Master Plan, Table 2-33</i>			
Total System Capacity - Non-Drought Year (ERUs)	52,910	52,910	52,910
Maximum Daily Demand (MDD) (ERUs)	47,407	52,275	50,328

This capacity figure is an overall system constraint, so we are treating it as applicable to both general facilities and local facilities.

Calculation of Domestic and Distribution Plant Connection Charges

Exhibit 10 shows the calculation of both the domestic water connection charge and the distribution plant connection charge, assuming an “integrated” methodology, in which the total existing plus future cost basis is divided by the total projected capacity. This approach provides a simple, easily replicated methodology that takes into account a broad range of existing and future costs and still tends to be stable over time. It yields a domestic connection charge of \$683 per ERU, which is an increase over today’s \$474 per ERU. For the distribution plant connection charge, the increase is greater: \$645 per ERU, compared with the current charge of \$120 per ERU.

Exhibit 10: Connection Charge Calculation

Connection Charge Calculation	Total	Domestic Charge	Distribution Charge
Existing Cost Basis	\$ 58,049,013	\$ 32,370,270	\$ 25,678,743
Future Cost Basis (including upgrade projects)	12,249,887	3,783,296	8,466,591
Total Cost Basis	\$ 70,298,900	\$ 36,153,566	\$ 34,145,334
Total Projected Capacity (ERUs)	52,910	52,910	52,910
Total Charge per ERU	\$ 1,329	\$ 683	\$ 645
<i>Assumes integrated methodology - total existing plus future costs divided by total projected capacity.</i>			
<i>Includes Upgrade projects from CIP.</i>			

Exhibit 11 provides a schedule of charges for various meter sizes, based on the “per ERU” amounts shown in Exhibit 10. For meters larger than 4”, we recommend that the connection charges be determined on a case-by-case basis, based on the projected water demand of the particular building in relation to the “per ERU” charges shown in Exhibit 10.

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Exhibit 11: Domestic and Distribution Plant Connection Charges by Meter Size

Schedule of Charges					
Meter Size	Meter Equivalence Factors	Domestic Charge		Distribution Charge	
		Existing	Calculated	Existing	Calculated
3/4-inch	1.00	\$ 474	\$ 683	\$ 120	\$ 645
1-inch	1.67	\$ 790	\$ 1,139	\$ 199	\$ 1,076
1 1/2-inch	3.33	\$ 1,580	\$ 2,278	\$ 398	\$ 2,151
2-inch	5.33	\$ 2,528	\$ 3,644	\$ 638	\$ 3,442
3-inch	10.67	\$ 4,740	\$ 7,289	\$ 1,195	\$ 6,884
4-inch	16.67	\$ 7,900	\$ 11,388	\$ 1,992	\$ 10,756

Base Irrigation Charge

The base irrigation charge applies to properties that will be relying on the domestic water system for irrigation purposes, either because they are newly connecting to domestic service (but not irrigation service) or because their irrigation service has been discontinued. This charge is based on the cost of the domestic system, not the irrigation system. In effect, it is an additional increment of domestic system capacity that must be committed because a particular property uses domestic water for both purposes.

In the 2008 update to the connection charges, the amount of the base irrigation charge for one ERU was equivalent to the amount of the domestic connection charge. In other words, someone connecting a property to the domestic water system for both domestic and irrigation purposes was assumed to be requiring, on average, twice as much water during the peak season as someone who connects only for domestic purposes.

However, according to the 2011 Water Master Plan, the relationship between the maximum daily demand and average daily demand is 1.75, which implies that the additional requirement created by using a domestic water connection for irrigation purposes is equivalent to only .75 times the requirement for domestic purposes. Given the recommended domestic connection charge of \$683 per ERU, the assumed equivalent amount for irrigation purposes alone is \$683 multiplied by .75, or \$512 per ERU.

The base irrigation charge is expressed in “per square foot” terms rather than “per ERU” terms, reflecting the relationship between irrigation demands and lot size. For single-family and duplex lots, the charge is based on total square feet. For other lots, the charge is calculated (at the owner’s option) based on either total square feet or permeable square feet, with permeable square feet assumed to average 60% of total square feet.

We continued the assumption from the prior study that a typical single-family lot would be 7,000 total square feet. For a 7,000 square foot lot, \$512 per ERU is equivalent to \$.073 per square foot. Assuming an average of 60% coverage with permeable surface, \$512 per ERU is equivalent to \$.122 per permeable square foot. These results are summarized in Exhibit 12.

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Exhibit 12: Calculation of Irrigation Base Charges

Domestic System Unit Cost (\$/ERU)	\$	683
Peaking factor		1.75
Incremental requirement due to irrigation service	\$	512
Assumed square footage		7,000
Irrigation Connection Charge (\$/square foot)	\$	0.073
Assumed % permeable square feet per lot		60%
Irrigation Connection Charge (\$/permeable s.f.)	\$	0.1220