

Water Demand Calculator Study



EXECUTIVE SUMMARY

Stantec Architecture Inc. was commissioned by IAPMO to develop a prototype Single Family Residence plumbing plan, a 6-Unit Family Residence plumbing plan, and a 45 – Unit Family Residence plumbing plan in order to compare the cold and hot water sizing criteria associated with IAPMO’s – Water Demand Calculator (WDC) to the sizing methods contained within the Uniform Plumbing Code (UPC) the International Plumbing Code (IPC) and the International Residential Code (IRC).

The plumbing industry has long recognized that building potable water systems in today’s buildings are oversized. This presents a growing health and safety concern, as problems associated with declining water quality, such as Legionella, have been steadily increasing in recent years and are strongly correlated to water aging due to longer water residence times in plumbing systems.

Responding to this need, IAPMO initiated a project to develop the WDC to provide a new water supply sizing method that takes modern water usage patterns into account. It represents the first statistically based sizing method since the 1940’s and is a product of a multi-year research project between IAPMO, the American Society of Plumbing Engineers (ASPE), the Water Quality Research Foundation (WQ-RF) and the University of Cincinnati.

The impetus behind the development of the WDC is multi-faceted. Most importantly, and consistent with IAPMO’s imperative to address health and safety concerns as a priority, the WDC works to accurately predict water use patterns in residential buildings so that water pipes are properly sized, significantly reducing water aging in buildings. Use of the WDC also provides for faster hot water delivery times throughout the hot water systems. As such, it will also save energy, water, and reduce utility bills for the entire life of the plumbing system.

The WDC provides the above benefits while also working to reduce residential construction costs. This study provides estimates of probable cost for copper water piping and PEX water piping that were developed for each prototype. Estimates of probable costs were calculated for prototypes in the high cost New York City market, the medium cost Pittsburgh, PA market and the lower cost Oklahoma City, OK construction markets.

The results of the study indicate when the Water Demand Calculator is used, there are notable construction cost savings associated with each of the three residential prototype water service entrances, interior cold water mains / branches, interior hot water mains / branches, fittings, labor, and appurtenances.

UNIFORM PLUMBING CODE



The Uniform Plumbing Code (UPC) is a model code developed by the International Association of Plumbing and Mechanical Officials (IAPMO) to govern the installation and inspection of plumbing systems as a means of promoting the public's health, safety and welfare.

The UPC is developed as American National Standards using consensus development procedures accredited by the American National Standards Institute (ANSI). This process brings together volunteers representing a variety of viewpoints and interests to achieve consensus on plumbing practices.

The UPC applies to all building types and includes potable water, building supply, and distribution pipes; all plumbing fixtures and traps; all drainage and vent pipes; all building drains, and building sewers, including their respective joints and connections, devices, receptors, and appurtenances within the premises property lines. This includes potable water piping, potable water treating or using equipment, medical gas and medical vacuum systems, liquid and fuel gas piping, water heaters and vents for same. Appendix M, which details the use of the Water Demand Calculator, was approved by the UPC's Technical Committee for the 2018 edition of the UPC.



IAPMO's Water Efficiency and Sanitation Standard (WE•Stand) is also published as an American National Standard and replaced the Green Plumbing and Mechanical Code Supplement. The publication of WE•Stand is noteworthy, as it is the first-ever ANSI standard that focuses solely on achieving safe and efficient water use in all building types, including single and multi-family dwellings.

The 2017 WE•Stand Technical Committee was comprised of 29 leading industry experts. The provisions contained in the standard reflect centuries of collective experience and knowledge which included; representation from code officials, manufacturers, plumbing engineers, contractors, the plumbing trades, water-efficiency proponents, water utilities, landscape irrigation experts, representatives of other associations and academia. The 2017 WE•Stand contains the latest comprehensive provisions aimed at achieving safe and reliable water efficiencies in and around buildings and includes the Water Demand Calculator in the Appendices.

WATER DEMAND CALCULATOR

Water Demand Calculator (WDC v2.0)

PROJECT NAME: Total Number of Apartments in the Building: Wednesday, June 01, 2020 11:01 PM

Click for Drop-down Menu: Total Apartments in this Calculation:

FIXTURE GROUPS	FIXTURE	ENTER TOTAL NUMBER OF FIXTURES	PROBABILITY OF USE (%)	ENTER FIXTURE FLOW RATE (GPM)	MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
Bathroom Fixtures	1 Bathroom (no Shower)	0	0.75	5.5	5.5
	2 Sinks	0	0.67	2.0	2.0
	3 Combination Bath/Shower	10	2.83	5.5	5.5
	4 Faucet, Laundry	20	2.83	1.5	1.5
	5 Shower, per head (no Bathtubs)	10	1.50	2.0	2.0
Kitchen Fixtures	6 SINKS, DISHWASHER, LUB. SPT. SPRAY (AKA)	10	0.50	6.0	6.0
	7 Dishwasher	8	0.42	1.5	1.5
Laundry Room Fixtures	8 Faucet, Kitchen Sink	8	1.67	2.2	2.2
	9 Clothes Washer	8	2.83	5.5	5.5
Bath/Toilet Fixtures	10 Faucet, Laundry	4	1.67	2.0	2.0
	11 Faucet, Bathtub	0	1.67	1.5	1.5
	12 Fixture 1	0	1.50	5.5	6.0
Other Fixtures	13 Fixture 2	0	0.50	0.0	6.0
	14 Fixture 3	0	0.50	0.0	6.0

COMPUTED RESULTS FOR PEAK PERIOD CONDITIONS

Total No. of Fixtures in Calculation: **n = 128**

99th Percentile Demand Flow: **Q₉₉ = 38.8 GPM**

Hourly Number: **HR₉₉ = 2.00**

Stagnation Probability: **Pr(Zero Demand) = 13%**

Select Units for Water Demand

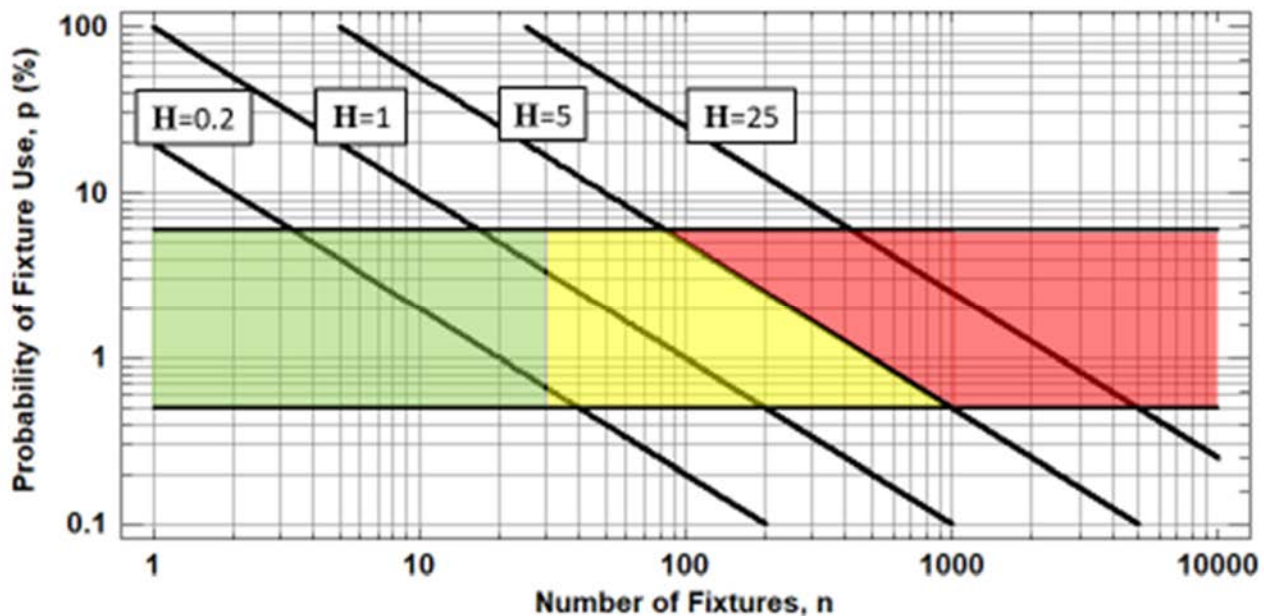
The Water Demand Calculator is a new computational model that predicts peak water demand for single- and multi-family dwellings. It replaces the Hunter method by directly calculating the peak demand without the use of fixture units and a curve. It does this by using three different algorithms depending upon the size of the building as shown in Table 1 - Methods to estimate peak demands in residential buildings with efficient fixtures. As the

number of fixtures increase, the WDC shifts to the appropriate algorithm as shown in of Figure 1- Flow of Algorithms. Both the UPC and WE•Stand contain detailed provisions on how to use the WDC for estimating water demand and pipe sizing.

Table 1
Methods to estimate peak demands in residential buildings with efficient fixtures.

Region in Figure 4-10	Building Size	Algorithm in Water Demand Calculator	Boundary Criteria	Probability of Peak Period Stagnation, P_0
Green ●	Small	Exhaustive Enumeration [ExEn]	$n \leq 30$	Very High
Yellow ●	Medium	Modified Wistort Method [MWM]	$n > 30$ $H < 5$	Moderate
Red ●	Large	Wistort Method [WM]	$H \geq 5$	Very Low

Figure 1
Flow of Algorithms



The Water Demand Calculator includes several features to assist in properly sizing a cold and hot water system. The most significant feature is a drop-down menu that offers a building type. The multi-family option activates two selections between a single and multi-family residence with additional input boxes that require the user to specify the total number of residential units that are (a) in the building and (b) in the calculation. The latter entry is dynamically linked to the probability of fixture use column in the calculator, gradually reducing the percentage as the number of residential units increase in a building. This calibrated feature assures accurate predictions of peak water demand in large multi-family dwellings.

Another feature of the Water Demand Calculator is the display of additional computed information pertaining to the peak conditions. Besides providing the total fixture count and the 99th percentile demand flow, the Water Demand Calculator provides the average number of simultaneous use fixtures at any instant during the peak period (called the Hunter Number) and the probability of no flow (stagnation).

Water Demand Calculator (WDC v2.0)

PROJECT NAME: **Test Case for WDC**
 Multi-Family Building

Total Number of Apartments in the Building: 10
 Total Apartments in this Calculation: 8

COMPUTED RESULTS FOR PEAK PERIOD CONDITIONS:

- Total No. of Fixtures in Calculation: n = 128
- 99th Percentile Demand Flow: Q = 18.8 GPM
- Hunter Number: H(n,p) = 2.00
- Stagnation Probability: Pr(Zero Demand) = 13%

FIXTURE GROUPS	FIXTURE	ENTER TOTAL NUMBER OF FIXTURES	PROBABILITY OF USE (%)	ENTER FIXTURE FLOW RATE (GPM)	MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
Bathroom Fixtures	1. Bathroom (no Shower)	0	0.71	5.5	5.5
	2. Bidet	0	0.65	2.0	2.0
	3. Combination Bath/Shower	16	2.83	5.5	5.5
	4. Faucet, Lavatory	32	1.61	1.5	1.5
	5. Shower, per head (no Bathroom)	16	1.98	2.0	2.0
	6. Water Closet, 1.28 GPF Gravity Tank	32	0.65	3.0	3.0
Kitchen Fixtures	7. Dishwasher	0	0.41	1.3	1.3
	8. Faucet, Kitchen Sink	8	1.61	2.2	2.2
Laundry Room Fixtures	9. Clothes Washer	8	2.80	3.5	3.5
	10. Faucet, Laundry	8	1.61	2.0	2.0
Bar/Prep Fixtures	11. Faucet, Bar Sink	0	1.61	1.5	1.5
Other Fixtures	12. Utility Sink	4	1.50	5.5	6.0
	13. Fixture 2	0	0.00	0.0	6.0
	14. Fixture 3	0	0.00	0.0	6.0

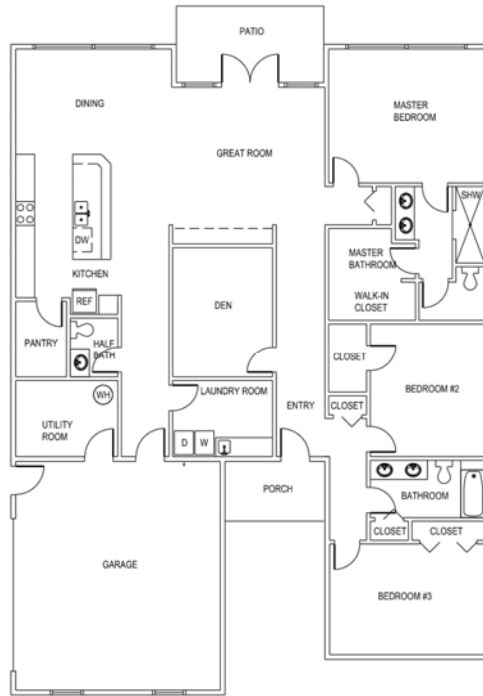
Annotations include: 'White cells accept input values.', 'NOTE: Active cells are highlighted in yellow.', 'Click to Select Building Type', 'Click for Drop-down Menu', 'Enter Total Number of Apartments in the Building (Integer ≥1)', 'Enter Number of Apartments Considered in this Calculation. (Integer ≥1)', 'Sum of fixtures entered in the calculator.', 'Demand flow in the selected units of measurement.', 'Average number of fixtures in use at any instant.', 'Probability of no fixtures in use at any instant.', 'Enter "Other Fixture" Probability of use (0.1 - 6%) in [Column C]', 'Enter "Other Fixture" flow rate in [Column D]', 'Downloads the current result to a file named WDCResults-DDMMYY-hhmmss.txt in the "Downloads" folder.', 'CLICK BUTTON', 'If visible, fixture combination has changed. Therefore run water demand calculator for a new result.', 'If visible, there is an entry for "Other fixture". Enter appropriate fixture p-value and flow rate (GPM, LPM, or LPS).', 'Select Units for Water Demand: GPM, LPM, LPS', 'RUN WDC', 'Click to reset number of fixtures', 'Select from these units of measurement: GPM - Gallons per minute, LPM - Liters per minute, LPS - Liters per second.'

SCOPE OF STUDY

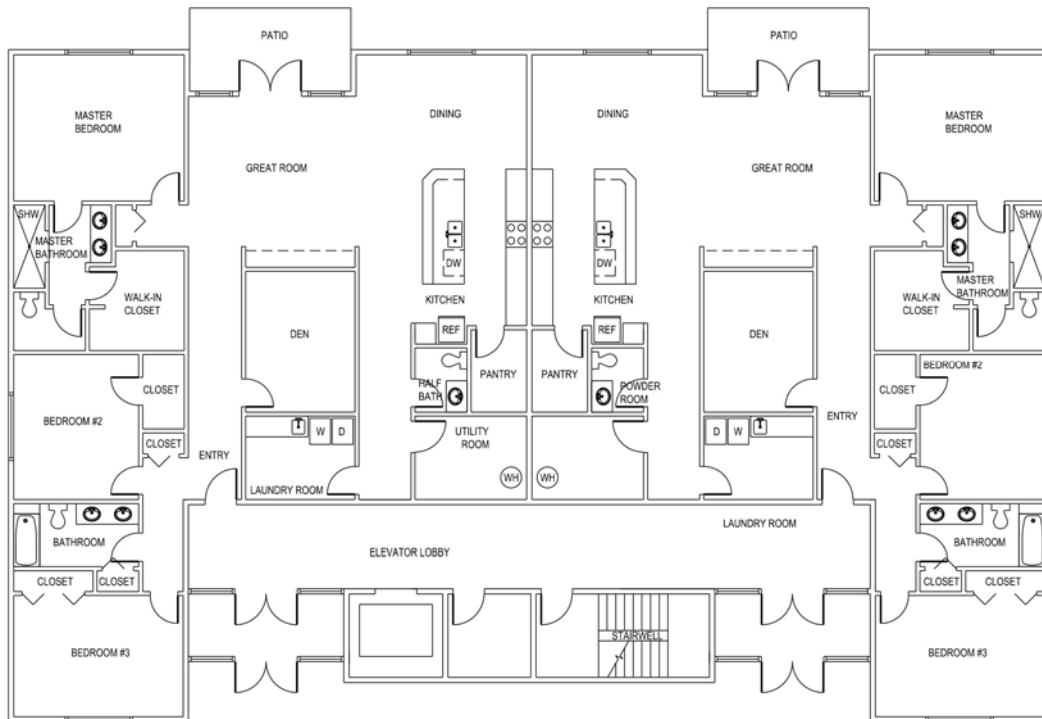
The water piping design associated with each residence was based on the minimum water requirements of the UPC Appendix M – Peak Water Demand Calculator, the UPC, IPC and IRC. The same basis of design, pipe configuration, and flow velocities were applied to each prototype. NOTE: To ensure a fair comparison, the most economic design options offered in the entirety of the UPC, IPC, and IRC were investigated and applied, including the application of the code appendices.

A. PROTOTYPES

1. The Single Family Residence prototype represents an average single floor home that is approximately 2,379 square feet (excluding garage). Primary spaces include a: Great Room, Dining Room, Kitchen, Den, Master Bedroom, Master Bathroom, Bedroom #1, Bedroom #2, Bathroom, Half Bath, Laundry Room, and Utility Room.



- The 6 Unit Multi-Family Residence prototype represents a three story building with two large residential units on each floor. Each residential unit is approximate 2,379 square feet. Primary spaces include a: Great Room, Dining Room, Kitchen, Den, Master Bedroom, Master Bathroom, Bedroom #1, Bedroom #2, Bathroom, Half Bath, Laundry Room, and Utility Room.



- The 45 Unit Multi-Family Residence prototype represents a five story building with nine average size residential units on each floor. Each residential unit has is approximately 1,002 square feet. Primary spaces include a: Great Room, Kitchen, Master Bedroom, Master Bathroom, Bedroom #1, Bathroom, and Utility / Laundry Room.



B. PLUMBING CALCULATIONS

- Plumbing fixture water sizing associated with the UPC - Water Demand Calculator was based on: Appendix M – Peak Water Demand Calculator which provides the method for estimating the water demand associated with Single Family and Multi-Family residences using water conserving plumbing fixtures and appliances typically installed in residential buildings. It should be noted that the cost of the plumbing fixtures and appliances are not included in the material cost calculations as are they are identical in the WDC, UPC, IPC and IRC model calculations.

a) Single Family Residence

Water Demand Calculator (WDC v2.0)

PROJECT NAME : IAPMO Water Calculator Report
 Click for Drop-down Menu → Single-Family Residence

Tuesday, November 17, 2020
6:45 PM

FIXTURE GROUPS	FIXTURE	ENTER TOTAL NUMBER OF FIXTURES	PROBABILITY OF USE (%)	ENTER FIXTURE FLOW RATE (GPM)	MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
Bathroom Fixtures	1 Bathtub (no Shower)	0	1.00	5.5	5.5
	2 Bidet	0	1.00	2.0	2.0
	3 Combination Bath/Shower	1	5.50	5.5	5.5
	4 Faucet, Lavatory	5	2.00	1.5	1.5
	5 Shower, per head (no Bathtub)	1	4.50	2.0	2.0
	6 Water Closet, 1.28 GPF Gravity Tank	3	1.00	3.0	3.0
Kitchen Fixtures	7 Dishwasher	1	0.50	1.3	1.3
	8 Faucet, Kitchen Sink	1	2.00	2.2	2.2
Laundry Room Fixtures	9 Clothes Washer	1	5.50	3.5	3.5
	10 Faucet, Laundry	1	2.00	2.0	2.0
Bar/Prep Fixtures	11 Faucet, Bar Sink	0	2.00	1.5	1.5
Other Fixtures	12 Fixture 1	0	0.00	0.0	6.0
	13 Fixture 2	0	0.00	0.0	6.0
	14 Fixture 3	0	0.00	0.0	6.0

COMPUTED RESULTS FOR PEAK PERIOD CONDITIONS

Total No. of Fixtures in Calculation
n = 14

99th Percentile Demand Flow
Q = 9.0 GPM

Hunter Number
H(n,p) = 0.33

Stagnation Probability
Pr[Zero Demand] = 71%

DOWNLOAD RESULT RESET WDC Select Units for Water Demand RUN WDC
 GPM LPM LPS

Single Family Residence Water Entrance Size – Based on a 9.0 GPM + 1 Hose Bibb @ 2.5 GPM = 11.5 GPM. Based on a maximum flow rate of 8 FPS = 3/4" NOTE: Refer to UPC Section M.102.5 – Continuous Supply Demand for how to include a hose bibb in to the WDC calculation.

b) 6 Unit Multi-Family Residence

Water Demand Calculator (WDC v2.0)

PROJECT NAME : IAPMO Water Calculator Report
 Click for Drop-down Menu → Multi-Family Building

Total Number of Apartments in the Building → 6
 Total Apartments in this Calculation → 6
 Monday, October 26, 2020
3:57 PM

FIXTURE GROUPS	FIXTURE	ENTER TOTAL NUMBER OF FIXTURES	PROBABILITY OF USE (%)	ENTER FIXTURE FLOW RATE (GPM)	MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
Bathroom Fixtures	1 Bathtub (no Shower)	0	0.77	5.5	5.5
	2 Bidet	0	0.66	2.0	2.0
	3 Combination Bath/Shower	6	3.06	5.5	5.5
	4 Faucet, Lavatory	30	1.68	1.5	1.5
	5 Shower, per head (no Bathtub)	6	2.16	2.0	2.0
	6 Water Closet, 1.28 GPF Gravity Tank	18	0.66	3.0	3.0
Kitchen Fixtures	7 Dishwasher	6	0.42	1.3	1.3
	8 Faucet, Kitchen Sink	6	1.68	2.2	2.2
Laundry Room Fixtures	9 Clothes Washer	6	3.05	3.5	3.5
	10 Faucet, Laundry	6	1.68	2.0	2.0
Bar/Prep Fixtures	11 Faucet, Bar Sink	0	1.68	1.5	1.5
Other Fixtures	12 Fixture 1	0	0.00	0.0	6.0
	13 Fixture 2	0	0.00	0.0	6.0
	14 Fixture 3	0	0.00	0.0	6.0

COMPUTED RESULTS FOR PEAK PERIOD CONDITIONS

Total No. of Fixtures in Calculation
n = 84

99th Percentile Demand Flow
Q = 13.6 GPM

Hunter Number
H(n,p) = 1.35

Stagnation Probability
Pr[Zero Demand] = 26%

DOWNLOAD RESULT RESET WDC Select Units for Water Demand RUN WDC
 GPM LPM LPS

6 Unit Multi-Family Residence Water Entrance Size – Based on a maximum flow rate of 8 FPS = 1"

c) 45 Unit Multi-Family Residence

Water Demand Calculator (WDC v2.0)

PROJECT NAME : IAPMO Water Calculator Report Total Number of Apartments in the Building → 45
Click for Drop-down Menu → Multi-Family Building Total Apartments in this Calculation → 45 Monday, October 26, 2020
3:59 PM

FIXTURE GROUPS	FIXTURE	ENTER TOTAL NUMBER OF FIXTURES	PROBABILITY OF USE (%)	ENTER FIXTURE FLOW RATE (GPM)	MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
Bathroom Fixtures	1 Bathtub (no Shower)	0	0.46	5.5	5.5
	2 Bidet	0	0.57	2.0	2.0
	3 Combination Bath/Shower	45	1.74	5.5	5.5
	4 Faucet, Lavatory	135	1.24	1.5	1.5
	5 Shower, per head (no Bathtub)	45	1.18	2.0	2.0
Kitchen Fixtures	6 Water Closet, 1.28 GPF Gravity Tank	90	0.57	3.0	3.0
	7 Dishwasher	45	0.34	1.3	1.3
Laundry Room Fixtures	8 Faucet, Kitchen Sink	45	1.24	2.2	2.2
	9 Clothes Washer	45	1.67	3.5	3.5
Bar/Prep Fixtures	10 Faucet, Laundry	45	1.24	2.0	2.0
	11 Faucet, Bar Sink	0	1.24	1.5	1.5
Other Fixtures	12 Fixture 1	0	0.00	0.0	6.0
	13 Fixture 2	0	0.00	0.0	6.0
	14 Fixture 3	0	0.00	0.0	6.0

COMPUTED RESULTS FOR PEAK PERIOD CONDITIONS

Total No. of Fixtures in Calculation
n = 495

99th Percentile Demand Flow
Q = 30.7 GPM

Hunter Number
H(n,p) = 5.5

Stagnation Probability
Pr[Zero Demand] = 0%

DOWNLOAD RESULT
RESET WDC
↓ Select Units for Water Demand ↓
GPM
LPM
LPS
RUN WDC


45 Unit Multi-Family Residence Water Entrance Size – Based on a maximum flow rate of 8 FPS = 1-1/4"

- Plumbing fixture water sizing associated with the UPC was based on: Appendix A – Table A103.1, Water supply Fixture Units (WSFU) and Minimum Fixture Branch Pipe Size.


a) Single Family Residence

Project Name: IAPMO Water Calculator Project		Stantec									
Project Number: 218011611											
Subject: Non-Bathroom Group Water Sizing											
Engineer: CLG											
Date: 11/30/2020											
Plumbing Code Version:	Uniform Plumbing Code 2018	Plumbing Section:	Appendix A - Table A 103.1 (WSFU)								
System type:	Flush Tank										
Single Family Residence											
Fixture	Note	Occupancy	Water Supply Fixture Unit				Fixture Quantity	Cold	Hot	Total	
			Cold	Minimum Fixture Branch Pipe	Hot	Minimum Fixture Branch Pipe					
Combination Bath / Shower		Private	3	1/2"	3	1/2"	4	1	3	3	4
Clothes Washer		Private	3	1/2"	3	1/2"	4	1	3	3	4
Dishwasher		Private			1.5	1/2"	1.5	1	0	1.5	1.5
Hose Bibb	First Hose Bibb	Private	2.5	1/2"			2.5	1	2.5	0	2.5
	Additional Hose Bibbs	Private	1	1/2"			1	1	1	0	1
Lavatory		Private	0.75	1/2"	0.75	1/2"	1	5	3.75	3.75	5
Sinks	Kitchen Domestic	Private	1.125	1/2"	1.125	1/2"	1.5	1	1.125	1.125	1.5
	Laundry	Private	1.125	1/2"	1.125	1/2"	1.5	1	1.125	1.125	1.5
Shower Head		Private	1.5	1/2"	1.5	1/2"	2	1	1.5	1.5	2
Water Closet	1.6 GPF Gravity Tank	Private	2.5	1/2"			2.5	3	7.5	0	7.5
FIXTURE TOTAL FIXTURE UNITS:									24.5	15	30.5
Total Flow Based on Hunter's Curve:									17.0	11.2	20.2
Single Family Residence Water Entrance Size - Based on a maximum flow rate of 8 FPS = 1"											

b) 6 Unit Multi-Family Residence

Project Name		IAPMO Water Calculator Project									
Project Number		218011611									
Subject		Non-Bathroom Group Water Sizing									
Engineer		CLG									
Date		11/30/2020									
Plumbing Code Version:		Uniform Plumbing Code 2018		Plumbing Section:							
System type:		Flush Tank		Appendix A - Table A 103.1 (WSFU)							
6 Unit Multi - Family Residence											
Fixture	Note	Occupancy	Water Supply Fixture Unit				Fixture Quantity	Cold	Hot	Total	
			Cold	Minimum Fixture Branch Pipe	Hot	Minimum Fixture Branch Pipe					
Combination Bath / Shower		Private	3	1/2"	3	1/2"	4	6	18	18	24
Clothes Washer		Private	3	1/2"	3	1/2"	4	6	18	18	24
Dishwasher		Private			1.5	1/2"	1.5	6	0	9	9
Hose Bibb	First Hose Bibb	Private	2.5	1/2"			2.5	0	0	0	0
	Additional Hose Bibbs	Private	1	1/2"			1	0	0	0	0
Lavatory		Private	0.75	1/2"	0.75	1/2"	1	30	22.5	22.5	30
Sinks	Kitchen Domestic	Private	1.125	1/2"	1.125	1/2"	1.5	6	6.75	6.75	9
	Laundry	Private	1.125	1/2"	1.125	1/2"	1.5	6	6.75	6.75	9
Shower Head		Private	1.5	1/2"	1.5	1/2"	2	6	9	9	12
Water Closet	1.6 GPF Gravity Tank	Private	2.5	1/2"			2.5	18	45	0	45
FIXTURE TOTAL FIXTURE UNITS:								126	90	162	
Total Flow Based on Hunter's Curve:								48.6	40.5	56.7	
6 Unit Multi Family Residence Water Entrance Size - Based on a maximum flow rate of 8 FPS = 2"											


c) 45 Unit Multi-Family Residence

Project Name		IAPMO Water Calculator Project									
Project Number		218011611									
Subject		Non-Bathroom Group Water Sizing									
Engineer		CLG									
Date		11/30/2020									
Plumbing Code Version:		Uniform Plumbing Code 2018		Plumbing Section:							
System type:		Flush Tank		Appendix A - Table A 103.1 (WSFU)							
45 Unit Multi - Family Residence											
Fixture	Note	Occupancy	Water Supply Fixture Unit				Fixture Quantity	Cold	Hot	Total	
			Cold	Minimum Fixture Branch Pipe	Hot	Minimum Fixture Branch Pipe					
Combination Bath / Shower		Private	3	1/2"	3	1/2"	4	45	135	135	180
Clothes Washer		Private	3	1/2"	3	1/2"	4	45	135	135	180
Dishwasher		Private			1.5	1/2"	1.5	45	0	67.5	67.5
Hose Bibb	First Hose Bibb	Private	2.5	1/2"			2.5	0	0	0	0
	Additional Hose Bibbs	Private	1	1/2"			1	0	0	0	0
Lavatory		Private	0.75	1/2"	0.75	1/2"	1	135	101.25	101.25	135
Sinks	Kitchen Domestic	Private	1.125	1/2"	1.125	1/2"	1.5	45	50.625	50.625	67.5
	Laundry	Private	1.125	1/2"	1.125	1/2"	1.5	45	50.625	50.625	67.5
Shower Head		Private	1.5	1/2"	1.5	1/2"	2	45	67.5	67.5	90
Water Closet	1.6 GPF Gravity Tank	Private	2.5	1/2"			2.5	90	225	0	225
FIXTURE TOTAL FIXTURE UNITS:								765	607.5	1012.5	
Total Flow Based on Hunter's Curve:								170.2	144.2	207.2	
45 Unit Multi Family Residence Water Entrance Size - Based on a maximum flow rate of 8 FPS = 3-1/2"											


3. Plumbing fixture water sizing associated with the IRC (Single Family Residence) was based on: Table E, Load P2903.6 Water Supply Fixture-Unit Values For Various Plumbing Fixtures And Fixture Groups. Plumbing fixture water sizing associated with the IPC (6 Unit Multi-Family

Residence and the 45 Unit Multi-Family Residence) was based: Appendix E – Table E103.3(2) Load Values Assigned to Fixtures.


a) **Single Family Residence**

Project Name		IAPMO Water Calculator Project									
Project Number		218011611									
Subject		Bathroom Group Water Sizing									
Engineer		CLG									
Date		11/30/2020									
Plumbing Code Version:		International Residential Code 2018		Plumbing Code Section		Table P2903.6					
System type:		Flush Tank									
Single Family Residence											
Fixture	Note	Occupancy	Water Supply Fixture Unit					Fixture Quantity			
			Cold	Minimum Fixture Branch Pipe	Hot	Minimum Fixture Branch Pipe	Total		Cold	Hot	Total
Full Bathroom Group	Water Closet, Lavatory, & Tub / Shw	Private	2.7	1/2"	1.5	1/2"	3.6	2	5.4	3	7.2
Half Bathroom Group	Water Closet & Lavatory	Private	2.5	1/2"	0.5	1/2"	2.6	1	2.5	0.5	2.6
Laundry Group	Clothes Washer & Laundry Tub	Private	1.8	1/2"	1.8	1/2"	2.5	1	1.8	1.8	2.5
Kitchen Group	Sink & Dishwasher	Private	1	1/2"	1.9	1/2"	2.5	1	1	1.9	2.5
Hose Bibb		Private	2.5	1/2"			2.5	2	5	0	5
Lavatory		Private	0.5	3/8"	0.5	3/8"	0.7	2	1	1	1.4
FIXTURE TOTAL FIXTURE UNITS:									16.7	8.2	21.2
Total Flow Based on Hunter's Curve:									18.3	13.0	20.1
Single Family Residence Water Entrance Size - Based on a maximum flow rate of 8 FPS = 1"											

b) **6 Unit Multi-Family Residence**

Project Name		IAPMO Water Calculator Report									
Project Number		218011611									
Subject		Bathroom Group Water Sizing									
Engineer		CLG									
Date		11/30/2020									
Plumbing Code Version:		International Plumbing Code 2018		Plumbing Code Section		Appendix E, Table E103.3 (3)					
System type:		Flush Tank									
6 Unit Multi - Family Residence											
Fixture	Fixture type	Occupancy	Water Supply Fixture Unit					Fixture Quantity			
			Cold	Minimum Fixture Branch Pipe	Hot	Minimum Fixture Branch Pipe	Total		Cold	Hot	Total
Bathroom Group		Private	2.7	1/2"	1.5	1/2"	3.6	12	32.4	18	43.2
Clothes Washer		Private	1	1/2"	1	1/2"	1.4	6	6	6	8.4
Dishwasher		Private			1.4	1/2"	1.4	6	0	8.4	8.4
Hose Bibb	First Hose Bibb	Private	2.5	1/2"			0	0	0	0	0
	Additional Hose Bibbs	Private	2.5	1/2"			0	0	0	0	0
Lavatory		Private	0.5	3/8"	0.5	3/8"	0.7	18	9	9	12.6
Sinks	Kitchen Domestic	Private	1	1/2"	1	1/2"	1.4	6	6	6	8.4
	Laundry	Private	1	1/2"	1	1/2"	1.4	6	6	6	8.4
Shower Head		Private	1	1/2"	1	1/2"	1.4	0	0	0	0
Water Closet	1.6 GPF Gravity Tank	Private	2.2	3/8"			2.2	6	13.2	0	13.2
FIXTURE TOTAL FIXTURE UNITS:									72.6	53.4	102.6
Total Flow Based on Hunter's Curve:									35.8	30.1	44.1
6 Unit Multi Family Residence Water Entrance Size - Based on a maximum flow rate of 8 FPS = 1-1/2"											

c) **45 Unit Multi-Family Residence**

Project Name		IAPMO Water Calculator Report									
Project Number		218011611									
Subject		Bathroom Group Sizing									
Engineer		CLG									
Date		11/30/2020									
Plumbing Code Version:		International Plumbing Code 2018		Plumbing Code Section		Appendix E, Table E103.3(3)					
System type:		Flush Tank									
45 Unit Multi - Family Residence											
Fixture	Fixture type	Occupancy	Water Supply Fixture Unit					Fixture Quantity	Cold	Hot	Total
			Cold	Minimum Fixture Branch Pipe	Hot		Total				
Bathroom Group		Private	2.7	1/2"	1.5	1/2"	3.6	90	243	135	324
Clothes Washer		Private	1	1/2"	1	1/2"	1.4	45	45	45	63
Dishwasher		Private			1.4	1/2"	1.4	45	0	63	63
Hose Bibb	First Hose Bibb	Private	2.5	1/2"			0	0	0	0	0
	Additional Hose Bibbs	Private	2.5	1/2"			0	0	0	0	0
Lavatory		Private	0.5	3/8"	0.5	3/8"	0.7	45	22.5	22.5	31.5
Sinks	Kitchen Domestic	Private	1	1/2"	1	1/2"	1.4	45	45	45	63
	Laundry	Private	1	1/2"	1	1/2"	1.4	45	45	45	63
Shower Head		Private	1	1/2"	1	1/2"	1.4	0	0	0	0
Water Closet	1.6 GPF Gravity Tank	Private	2.2	3/8"			2.2	0	0	0	0
FIXTURE TOTAL FIXTURE UNITS:									400.5	355.5	607.5
Total Flow Based on Hunter's Curve:									105.1	96.1	143.8
45 Unit Residence Water Entrance Size - Based on a maximum flow rate of 8 FPS = 3"											

C. **PIPE SIZING**

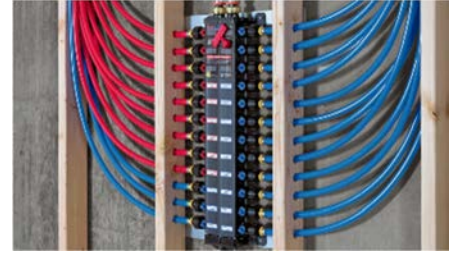
1. Cold water pipe sizing was based on a maximum flow rate of 8 feet per second
2. Hot water pipe sizing was based on a maximum flow rate of 5 feet per second

D. **PIPE MATERIALS**

1. Copper Piping Systems: Cold water and hot water risers, mains, branches, and fittings – Type L copper with lead free soldered joints. (Images are examples of system components)



2. PEX Piping Systems: Cold water and hot water mains and branches (2-inches and smaller) PEX pipe with mechanical joints (Images are example of system components). Cold water and hot water risers and fittings (2-1/2 inches and larger) – Type L copper with lead free soldered joints.



E. RESULTS: ESTIMATES OF PROBABLE COST (US Dollars)

1. Estimate of probable cost of construction for each prototype were developed for (a) New York City, (b) Pittsburgh, Pa., and (c) Oklahoma City based on RS Means.

a) **New York City**

Single Family Residence	Estimate of Probable Cost (Cold / Hot Water) Based on Type L copper with soldered joints	Estimate of Probable Cost (Cold / Hot Water) Based on PEX with insert crimp ring fittings
UPC – Water Demand Calculator	\$23,912	\$21,116
UPC	\$24,313	\$21,213
IRC	\$25,038	\$21,197

Note: Estimate of probable costs have been rounded to the nearest dollar, refer to Appendix for estimate of probable cost breakdown.

6 Unit Multi-Family Residence	Estimate of Probable Cost (Cold / Hot Water) Based on Type L copper with soldered joints	Estimate of Probable Cost (Cold / Hot Water) Based on PEX with insert crimp ring fittings
UPC – Water Demand Calculator	\$133,381	\$106,062
UPC	\$137,376	\$115,544
IPC	\$140,983	\$115,074

Note: Estimate of probable costs have been rounded to the nearest dollar, refer to Appendix for estimate of probable cost breakdown.

45 Unit Multi-Family Residence	Estimate of Probable Cost (Cold / Hot Water) Based on Type L copper with soldered joints	Estimate of Probable Cost (Cold / Hot Water) Based on PEX with insert crimp ring fittings
UPC – Water Demand Calculator	\$614,283	\$577,627
UPC	\$666,692	\$610,781
IPC	\$673,160	\$604,121

Note: Estimate of probable costs have been rounded to the nearest dollar, refer to Appendix for estimate of probable cost breakdown.

b) Pittsburgh, Pa.

Single Family Residence	Estimate of Probable Cost (Cold / Hot Water) Based on Type L copper with soldered joints	Estimate of Probable Cost (Cold / Hot Water) Based on PEX with insert crimp ring fittings
UPC – Water Demand Calculator	\$14,385	\$12,803
UPC	\$14,684	\$12,890
IRC	\$15,242	\$12,875

Note: Estimate of probable costs have been rounded to the nearest dollar, refer to Appendix for estimate of probable cost breakdown.

6 Unit Multi - Family Residence	Estimate of Probable Cost (Cold / Hot Water) Based on Type L copper with soldered joints	Estimate of Probable Cost (Cold / Hot Water) Based on PEX with insert crimp ring fittings
UPC – Water Demand Calculator	\$80,096	\$62,193
UPC	\$83,246	\$70,702
IPC	\$86,252	\$70,405

Note: Estimate of probable costs have been rounded to the nearest dollar, refer to Appendix for estimate of probable cost breakdown.

45 Unit Multi - Family Residence	Estimate of Probable Cost (Cold / Hot Water) Based on Type L copper with soldered joints	Estimate of Probable Cost (Cold / Hot Water) Based on PEX with insert crimp ring fittings
UPC – Water Demand Calculator	\$367,529	\$346,850
UPC	\$408,215	\$375,076
IPC	\$412,516	\$369,385

Note: Estimate of probable costs have been rounded to the nearest dollar, refer to Appendix for estimate of probable cost breakdown.

c) Oklahoma City

Single Family Residence	Estimate of Probable Cost (Cold / Hot Water) Based on Type L copper with soldered joints	Estimate of Probable Cost (Cold / Hot Water) Based on PEX with insert crimp ring fittings
UPC – Water Demand Calculator	\$11,036	\$9,839
UPC	\$11,313	\$10,168
IRC	\$11,980	\$9,913

Note: Estimate of probable costs have been rounded to the nearest dollar, refer to Appendix for estimate of probable cost breakdown.

6 Unit Multi-Family Residence	Estimate of Probable Cost (Cold / Hot Water) Based on Type L copper with soldered joints	Estimate of Probable Cost (Cold / Hot Water) Based on PEX with insert crimp ring fittings
UPC – Water Demand Calculator	\$61,327	\$45,962
UPC	\$64,364	\$53,783
IPC	\$67,360	\$54,630

Note: Estimate of probable costs have been rounded to the nearest dollar, refer to Appendix for estimate of probable cost breakdown.

45 Unit Multi - Family Residence	Estimate of Probable Cost (Cold / Hot Water) Based on Type L copper with soldered joints	Estimate of Probable Cost (Cold / Hot Water) Based on PEX with insert crimp ring fittings
UPC – Water Demand Calculator	\$280,292	\$263,352
UPC	\$319,092	\$291,872
IPC	\$322,733	\$286,113

Note: Estimate of probable costs have been rounded to the nearest dollar, refer to Appendix for estimate of probable cost breakdown.

F. RESULTS: ESTIMATES OF PROBABLE COST (US Dollars / Percent Savings)

- The tables below show the construction costs savings of the WDC based on a US dollar / percentage basis compared to both the UPC, IPC, and IRC. These values may be useful for readers of this study to understand the cost savings that can be expected when applying the Water Demand Calculator.

New York City		
Single Family		
Savings \$ / %		
Savings	Copper	PEX
UPC (\$)	\$401	\$97
UPC (%)	2%	0.50%
IRC (\$)	\$1,126	\$81
IRC (%)	5%	0.50%

Pittsburgh		
Single Family		
Savings \$ / %		
Savings	Copper	PEX
UPC (\$)	\$299	\$87
UPC (%)	2%	1%
IRC (\$)	\$857	\$72
IRC (%)	6%	1%

Oklahoma City		
Single Family		
Savings \$ / %		
Savings	Copper	PEX
UPC (\$)	\$277	\$329
UPC (%)	2%	3%
IRC (\$)	\$944	\$74
IRC (%)	8%	1%

New York City		
6-Unit Multi-Family		
Savings \$ / %		
Savings	Copper	PEX
UPC (\$)	\$3,995	\$9,482
UPC (%)	3%	8%
IPC (\$)	\$7,062	\$9,012
IPC (%)	5%	8%

Pittsburgh		
6 Unit Multi-Family		
Savings \$ / %		
Savings	Copper	PEX
UPC (\$)	\$3,150	\$8,509
UPC (%)	4%	12%
IPC (\$)	\$6,156	\$8,212
IPC (%)	7%	12%

Oklahoma City		
6 Unit Multi-Family		
Savings \$ / %		
Savings	Copper	PEX
UPC (\$)	\$3,037	\$7,821
UPC (%)	5%	15%
IPC (\$)	\$6,033	\$8,668
IPC (%)	9%	16%

New York City		
45-Unit Multi-Family		
Savings \$ / %		
Savings	Copper	PEX
UPC (\$)	\$52,409	\$33,154
UPC (%)	8%	5%
IPC (\$)	\$58,877	\$26,494
IPC (%)	9%	4%

Pittsburgh		
45-Unit Multi-Family		
Savings \$ / %		
Savings	Copper	PEX
UPC (\$)	40,686	\$28,226
UPC (%)	10%	8%
IPC (\$)	\$44,851	\$28,226
IPC (%)	11%	8%

Oklahoma City		
45-Unit Multi-Family		
Savings \$ / %		
Savings	Copper	PEX
UPC (\$)	38,800	\$28,520
UPC (%)	12%	10%
IPC (\$)	\$42,441	\$22,761
IPC (%)	13%	8%

G. FINDINGS

1. Due to reduced GPM requirements, the application of IAPMO’s Water Demand Calculator resulted in notable construction cost savings associated with each of the three residential prototypes. The primary cost savings are associated with reduced diameter water service entrances, interior cold water mains / branches, interior hot water mains / branches, fittings, labor, and appurtenances.
2. The Water Demand Calculator is a Uniform Plumbing Code alternative to Hunter’s Curve for estimating water supply demand for residential buildings. This represents the first practical application of an improved method since the 1940’s that does not result in excessive over design and oversizing pipes.
3. The Water Demand Calculator works in conjunction with commonly accepted rules and procedures for sizing cold and hot water systems.
4. Utilizing the Water Demand Calculator for sizing of residential cold and hot water mains, branches and risers will result in:
 - a) Shorter water dwell times in residential plumbing systems will improve water quality and thus, most importantly, improve public health and safety.
 - b) Reduced water service entrance, interior cold water mains / branches, interior hot water mains / branches, fittings, labor, and appurtenances.
 - c) Faster hot water delivery times throughout the hot water systems, will also save energy, water, and reduce utility bills for the entire life of the plumbing system.

H. APPENDIX – Copper Piping System

Water Demand Calculator													
Single Family Residence (Copper Piping System)													
New York City													
Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	444.00	0.1	\$11.59	\$5,145.96	\$3.89	\$1,727.16	\$6,873.12	\$17.43	\$7,738.92	\$4.28	\$1,900.32	\$9,639.24	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	84.00	0.11	\$12.41	\$1,042.44	\$4.98	\$418.32	\$1,460.76	\$18.52	\$1,555.68	\$5.50	\$462.00	\$2,017.68	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	25.00	0.12	\$13.87	\$346.75	\$8.04	\$201.00	\$547.75	\$20.71	\$517.75	\$8.83	\$220.75	\$738.50	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	102.00	0.4	\$47.45	\$4,839.90	\$1.33	\$135.66	\$4,975.56	\$70.26	\$7,166.52	\$1.47	\$149.94	\$7,316.46	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	0.00	0.42	\$49.28	\$0.00	\$2.84	\$0.00	\$0.00	\$73.91	\$0.00	\$3.12	\$0.00	\$0.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	8.00	0.5	\$58.40	\$467.20	\$7.46	\$59.68	\$526.88	\$87.60	\$700.80	\$8.20	\$65.60	\$766.40	
Tee, copper, wrought, copper x copper, 1/2"	12.00	0.62	\$72.09	\$865.08	\$2.58	\$30.96	\$896.04	\$108.59	\$1303.08	\$2.84	\$34.08	\$1,337.16	
Tee, copper, wrought, copper x copper, 3/4"	10.00	0.67	\$78.48	\$784.80	\$6.40	\$64.00	\$848.80	\$117.71	\$1,177.10	\$7.04	\$70.40	\$1,247.50	
Tee, copper, wrought, copper x copper, 1"	3.00	0.8	\$93.99	\$281.97	\$18.04	\$54.12	\$336.09	\$140.53	\$421.59	\$19.84	\$59.52	\$481.11	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 3/4" pipe size, includes valves and four test cocks	1.00	0.5	\$58.40	\$58.40	\$254.98	\$254.98	\$313.38	\$87.60	\$87.60	\$280.37	\$280.37	\$367.97	
				\$13,832.50		\$2,945.88	\$16,778.38		\$20,669.04		\$3,242.98	\$23,912.02	\$23,912.02

Note: Costs indicated in the above were determined based on RS Means

Uniform Plumbing Code													
Single Family Residence (Copper Piping System)													
New York City													
Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	444.00	0.10	\$11.59	\$5,145.96	\$3.89	\$1,727.16	\$6,873.12	\$17.43	\$7,738.92	\$4.28	\$1,900.32	\$9,639.24	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	47.00	0.11	\$12.41	\$583.27	\$4.98	\$234.06	\$817.33	\$18.52	\$870.44	\$5.50	\$258.50	\$1,128.94	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	62.00	0.12	\$13.87	\$859.94	\$8.04	\$498.48	\$1,358.42	\$20.71	\$1,284.02	\$8.83	\$547.46	\$1,831.48	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	102.00	0.40	\$47.45	\$4,839.90	\$1.33	\$135.66	\$4,975.56	\$70.26	\$7,166.52	\$1.47	\$149.94	\$7,316.46	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	8.00	0.50	\$58.40	\$467.20	\$7.46	\$59.68	\$526.88	\$87.60	\$700.80	\$8.20	\$65.60	\$766.40	
Tee, copper, wrought, copper x copper, 1/2"	10.00	0.62	\$72.09	\$720.90	\$2.58	\$25.80	\$746.70	\$108.59	\$1,085.90	\$2.84	\$28.40	\$1,114.30	
Tee, copper, wrought, copper x copper, 3/4"	8.00	0.67	\$78.48	\$627.84	\$6.40	\$51.20	\$679.04	\$117.71	\$941.68	\$7.04	\$56.32	\$998.00	
Tee, copper, wrought, copper x copper, 1"	7.00	0.80	\$93.99	\$657.93	\$18.04	\$126.28	\$784.21	\$140.53	\$983.71	\$19.84	\$138.88	\$1,122.59	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$67.53	\$67.53	\$267.67	\$267.67	\$335.20	\$100.38	\$100.38	\$295.18	\$295.18	\$395.56	
				\$13,970.47		\$3,125.99	\$17,096.46		\$20,872.37		\$3,440.60	\$24,312.97	\$24,312.97

Note: Costs indicated in the above were determined based on RS Means

**International Residential Code
Single Family Residence (Copper Piping System)**

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 3/8" diameter, type L, includes coupling & clevis hanger assembly 10' OC	130.00	0.10	\$11.22	\$1,458.60	\$3.53	\$458.90	\$1,917.50	\$16.79	\$2,182.70	\$3.88	\$504.40	\$2,687.10	
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	229.00	0.10	\$11.59	\$2,654.11	\$3.89	\$890.81	\$3,544.92	\$17.43	\$3,991.47	\$4.28	\$980.12	\$4,971.59	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	96.00	0.11	\$12.41	\$1,191.36	\$4.98	\$478.08	\$1,669.44	\$18.52	\$1,777.92	\$5.50	\$528.00	\$2,305.92	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	88.00	0.12	\$13.87	\$1,220.56	\$8.04	\$707.52	\$1,928.08	\$20.71	\$1,822.48	\$8.83	\$777.04	\$2,599.52	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	10.00	0.14	\$16.24	\$162.40	\$12.70	\$127.00	\$289.40	\$24.27	\$242.70	\$13.97	\$139.70	\$382.40	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/8"	10.00	0.36	\$42.89	\$428.90	\$4.39	\$43.90	\$472.80	\$63.88	\$638.80	\$4.84	\$48.40	\$687.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	82.00	0.40	\$47.45	\$3,890.90	\$1.33	\$109.06	\$3,999.96	\$70.26	\$5,761.32	\$1.47	\$120.54	\$5,881.86	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	10.00	0.42	\$49.28	\$492.80	\$2.84	\$28.40	\$521.20	\$73.91	\$739.10	\$3.12	\$31.20	\$770.30	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	6.00	0.50	\$58.40	\$350.40	\$7.46	\$44.76	\$395.16	\$87.60	\$525.60	\$8.20	\$49.20	\$574.80	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	2.00	0.53	\$62.96	\$125.92	\$12.33	\$24.66	\$150.58	\$93.99	\$187.98	\$13.60	\$27.20	\$215.18	
Tee, copper, wrought, copper x copper, 1/2"	3.00	0.62	\$72.09	\$216.27	\$2.58	\$7.74	\$224.01	\$108.59	\$325.77	\$2.84	\$8.52	\$334.29	
Tee, copper, wrought, copper x copper, 3/4"	9.00	0.67	\$78.48	\$706.32	\$6.40	\$57.60	\$763.92	\$117.71	\$1,059.39	\$7.04	\$63.36	\$1,122.75	
Tee, copper, wrought, copper x copper, 1"	12.00	0.80	\$93.99	\$1,127.88	\$18.04	\$216.48	\$1,344.36	\$140.53	\$1,686.36	\$19.84	\$238.08	\$1,924.44	
Tee, copper, wrought, copper x copper, 1-1/4"	1.00	0.89	\$104.94	\$104.94	\$25.92	\$25.92	\$130.86	\$156.04	\$156.04	\$28.57	\$28.57	\$184.61	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$67.53	\$67.53	\$267.67	\$267.67	\$335.20	\$100.38	\$100.38	\$295.18	\$295.18	\$395.56	
				\$14,198.89		\$3,488.50	\$17,687.39		\$21,198.01		\$3,839.51	\$25,037.52	\$25,037.52

Note: Costs indicated in the above were determined based on RS Means

Water Demand Calculator 6 Unit Multi - Family Residence (Copper Piping System)

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,194.00	0.10	\$11.59	\$25,428.46	\$3.89	\$8,534.66	\$33,963.12	\$17.43	\$38,241.42	\$4.28	\$9,390.32	\$47,631.74	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	643.00	0.11	\$12.41	\$7,979.63	\$4.98	\$3,202.14	\$11,181.77	\$18.52	\$11,908.36	\$5.50	\$3,536.50	\$15,444.86	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	210.00	0.12	\$13.87	\$2,912.70	\$8.04	\$1,688.40	\$4,601.10	\$20.71	\$4,349.10	\$8.83	\$1,854.30	\$6,203.40	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	564.00	0.40	\$47.45	\$26,761.80	\$1.33	\$750.12	\$27,511.92	\$70.26	\$39,626.64	\$1.47	\$829.08	\$40,455.72	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	7.00	0.42	\$49.28	\$344.96	\$2.84	\$19.88	\$364.84	\$73.91	\$517.37	\$3.12	\$21.84	\$539.21	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	38.00	0.50	\$58.40	\$2,219.20	\$7.46	\$283.48	\$2,502.68	\$87.60	\$3,328.80	\$8.20	\$311.60	\$3,640.40	
Tee, copper, wrought, copper x copper, 1/2"	60.00	0.62	\$72.09	\$4,325.40	\$2.58	\$154.80	\$4,480.20	\$108.59	\$6,515.40	\$2.84	\$170.40	\$6,685.80	
Tee, copper, wrought, copper x copper, 3/4"	63.00	0.67	\$78.48	\$4,944.24	\$6.40	\$403.20	\$5,347.44	\$117.71	\$7,415.73	\$7.04	\$443.52	\$7,859.25	
Tee, copper, wrought, copper x copper, 1"	26.00	0.80	\$93.99	\$2,443.74	\$18.04	\$469.04	\$2,912.78	\$140.53	\$3,653.78	\$19.84	\$515.84	\$4,169.62	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$67.53	\$67.53	\$592.48	\$592.48	\$660.01	\$100.38	\$100.38	\$650.67	\$650.67	\$751.05	
				\$77,427.66		\$16,098.20	\$93,525.86		\$115,656.98		\$17,724.07	\$133,381.05	\$133,381.05

Note: Costs indicated in the above were determined based on RS Means

**Uniform Plumbing Code
6 Unit Multi - Family Residence (Copper Piping System)**

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,348.00	0.1	\$11.59	\$27,213.32	\$3.89	\$9,133.72	\$36,347.04	\$17.43	\$40,925.64	\$4.28	\$10,049.44	\$50,975.08	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	270.00	0.11	\$12.41	\$3,350.70	\$4.98	\$1,344.60	\$4,695.30	\$18.52	\$5,000.40	\$5.50	\$1,485.00	\$6,488.10	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	367.00	0.12	\$13.87	\$5,090.29	\$8.04	\$2,950.68	\$8,040.97	\$20.71	\$7,600.57	\$8.83	\$3,240.61	\$10,844.85	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	34.00	0.14	\$16.24	\$552.16	\$12.70	\$431.80	\$983.96	\$24.27	\$825.18	\$13.97	\$474.98	\$1,300.16	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	28.00	0.19	\$22.45	\$628.60	\$19.94	\$558.32	\$1,186.92	\$33.49	\$937.72	\$22.22	\$622.16	\$1,559.88	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	564.00	0.4	\$47.45	\$26,761.80	\$1.33	\$750.12	\$27,511.92	\$70.26	\$39,626.64	\$1.47	\$829.08	\$40,455.72	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	42.00	0.5	\$58.40	\$2,452.80	\$7.46	\$313.32	\$2,766.12	\$87.60	\$3,679.20	\$8.20	\$344.40	\$4,023.60	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	1.00	0.53	\$62.96	\$62.96	\$12.33	\$12.33	\$75.29	\$93.99	\$93.99	\$13.60	\$13.60	\$107.58	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	2.00	0.73	\$85.78	\$171.56	\$31.21	\$62.42	\$233.98	\$127.75	\$255.50	\$34.39	\$68.78	\$324.28	
Tee, copper, wrought, copper x copper, 1/2"	60.00	0.62	\$72.09	\$4,325.40	\$2.58	\$154.80	\$4,480.20	\$108.59	\$6,515.40	\$2.84	\$170.40	\$6,685.20	
Tee, copper, wrought, copper x copper, 3/4"	48.00	0.67	\$78.48	\$3,767.04	\$6.40	\$307.20	\$4,074.24	\$117.71	\$5,650.08	\$7.04	\$337.92	\$5,988.00	
Tee, copper, wrought, copper x copper, 1"	36.00	0.8	\$93.99	\$3,383.64	\$18.04	\$649.44	\$4,033.08	\$140.53	\$5,059.08	\$19.84	\$714.24	\$5,772.96	
Tee, copper, wrought, copper x copper, 1-1/4"	3.00	0.89	\$104.94	\$314.82	\$25.92	\$77.76	\$392.58	\$156.04	\$468.12	\$28.57	\$85.71	\$553.80	
Tee, copper, wrought, copper x copper, 2"	2.00	1.14	\$134.14	\$268.28	\$61.36	\$122.72	\$391.00	\$200.75	\$401.50	\$67.18	\$134.36	\$535.86	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 2" pipe size, includes valves and four test cocks	1.00	1.14	\$134.14	\$134.14	\$1,401.85	\$1,401.85	\$1,535.99	\$200.75	\$200.75	\$1,560.55	\$1,560.55	\$1,761.30	
				\$78,477.51		\$18,271.08	\$96,748.59		\$117,239.77		\$20,131.23	\$137,376.37	\$137,376.37

Note: Costs indicated in the above were determined based on RS Means

**International Plumbing Code
6 Unit Multi - Family Residence (Copper Piping System)**

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 3/8" diameter, type L, includes coupling & clevis hanger assembly 10' OC	691.00	0.1	\$11.22	\$7,753.02	\$3.53	\$2,439.23	\$10,199.16	\$16.79	\$11,601.89	\$3.88	\$2,681.08	\$14,282.97	
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	1,178.00	0.1	\$11.59	\$13,653.02	\$3.89	\$4,582.42	\$18,235.44	\$17.43	\$20,532.54	\$4.28	\$5,041.84	\$25,574.38	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	672.00	0.11	\$12.41	\$8,339.52	\$4.98	\$3,346.56	\$11,686.08	\$18.52	\$12,445.44	\$5.50	\$3,696.00	\$16,148.16	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	264.00	0.12	\$13.87	\$3,661.68	\$8.04	\$2,122.56	\$5,784.24	\$20.71	\$5,467.44	\$8.83	\$2,331.12	\$7,801.20	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	213.00	0.14	\$16.24	\$3,459.12	\$12.70	\$2,705.10	\$6,164.22	\$24.27	\$5,169.51	\$13.97	\$2,975.61	\$8,145.12	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	29.00	0.15	\$18.07	\$524.03	\$12.27	\$355.83	\$879.86	\$27.10	\$785.90	\$13.49	\$391.21	\$1,177.11	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/8"	192.00	0.36	\$42.89	\$8,234.88	\$4.39	\$842.88	\$9,077.76	\$63.88	\$12,264.96	\$4.84	\$929.28	\$13,192.32	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	318.00	0.4	\$47.45	\$15,089.10	\$1.33	\$422.94	\$15,512.04	\$70.26	\$22,342.68	\$1.47	\$467.46	\$22,810.14	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	54.00	0.42	\$49.28	\$2,661.12	\$2.84	\$153.36	\$2,813.94	\$73.91	\$3,991.14	\$3.12	\$168.48	\$4,159.62	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	43.00	0.53	\$62.96	\$2,707.28	\$12.33	\$530.19	\$3,237.47	\$93.99	\$4,041.57	\$13.60	\$584.80	\$4,625.94	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/2"	2.00	0.62	\$72.09	\$144.18	\$17.03	\$34.06	\$178.24	\$108.59	\$217.18	\$18.73	\$37.46	\$254.64	
Tee, copper, wrought, copper x copper, 1/2"	18.00	0.62	\$72.09	\$1,297.62	\$2.58	\$46.44	\$1,344.06	\$108.59	\$1,954.62	\$2.84	\$51.12	\$2,005.56	
Tee, copper, wrought, copper x copper, 3/4"	66.00	0.67	\$78.48	\$5,179.68	\$6.40	\$422.40	\$5,602.08	\$117.71	\$7,768.86	\$7.04	\$464.64	\$8,233.50	
Tee, copper, wrought, copper x copper, 1"	42.00	0.8	\$93.99	\$3,947.58	\$18.04	\$757.68	\$4,705.26	\$140.53	\$5,902.26	\$19.84	\$833.28	\$6,735.12	
Tee, copper, wrought, copper x copper, 1-1/4"	20.00	0.89	\$104.94	\$2,098.80	\$25.92	\$518.40	\$2,617.20	\$156.04	\$3,120.80	\$28.57	\$571.40	\$3,692.20	
Tee, copper, wrought, copper x copper, 1-1/2"	3.00	1	\$117.71	\$353.13	\$38.62	\$115.86	\$468.99	\$176.11	\$528.33	\$42.32	\$126.96	\$655.29	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1-1/2" pipe size, includes valves and four test cocks	1.00	0.80	\$93.99	\$93.99	\$1,216.70	\$1,216.70	\$1,310.69	\$140.53	\$140.53	\$1,348.95	\$1,348.95	\$1,489.48	
				\$79,197.75		\$20,612.61	\$99,816.73		\$118,275.65		\$22,700.69	\$140,982.75	\$140,982.75

Note: Costs indicated in the above were determined based on RS Means

Water Demand Calculator 45 Unit Multi - Family Residence (Copper Piping System)

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	10,205.00	0.10	\$11.59	\$118,275.95	\$3.89	\$39,697.45	\$157,973.40	\$17.43	\$177,873.15	\$4.28	\$43,677.40	\$221,550.55	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	3,212.00	0.11	\$12.41	\$39,860.92	\$4.98	\$15,995.76	\$55,856.68	\$18.52	\$59,486.24	\$5.50	\$17,666.00	\$77,152.24	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	372.00	0.12	\$13.87	\$5,159.64	\$8.04	\$2,990.88	\$8,150.52	\$20.71	\$7,704.12	\$8.83	\$3,284.76	\$10,988.88	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	43.00	0.14	\$16.24	\$698.32	\$12.70	\$546.10	\$1,244.42	\$24.27	\$1,043.61	\$13.97	\$600.71	\$1,644.32	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	2,385.00	0.40	\$47.45	\$113,168.25	\$1.33	\$3,172.05	\$116,340.30	\$70.26	\$167,570.10	\$1.47	\$3,505.95	\$171,076.05	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	466.00	0.42	\$49.28	\$22,964.48	\$2.84	\$1,323.44	\$24,287.92	\$73.91	\$34,442.06	\$3.12	\$1,453.92	\$35,895.98	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	1.00	0.50	\$58.40	\$58.40	\$7.46	\$7.46	\$65.86	\$87.60	\$87.60	\$8.20	\$8.20	\$95.80	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	2.00	0.53	\$62.96	\$125.92	\$12.33	\$24.66	\$150.58	\$93.99	\$187.98	\$13.60	\$27.20	\$215.18	
Tee, copper, wrought, copper x copper, 1/2"	135.00	0.62	\$72.09	\$9,732.15	\$2.58	\$348.30	\$10,080.45	\$108.59	\$14,659.65	\$2.84	\$383.40	\$15,043.05	
Tee, copper, wrought, copper x copper, 3/4"	415.00	0.67	\$78.48	\$32,569.20	\$6.40	\$2,656.00	\$35,225.20	\$117.71	\$48,849.65	\$7.04	\$2,921.60	\$51,771.25	
Tee, copper, wrought, copper x copper, 1"	166.00	0.80	\$93.99	\$15,602.34	\$18.04	\$2,994.64	\$18,596.98	\$140.53	\$23,327.98	\$19.84	\$3,293.44	\$26,621.42	
Tee, copper, wrought, copper x copper, 1-1/4"	4.00	0.89	\$104.94	\$419.76	\$25.92	\$103.68	\$523.44	\$156.04	\$624.16	\$28.57	\$114.28	\$738.44	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1-1/2" pipe size, includes valves and four test cocks	1.00	0.80	\$93.99	\$93.99	\$1,216.70	\$1,216.70	\$1,310.69	\$140.53	\$140.53	\$1,348.95	\$1,348.95	\$1,489.48	
				\$358,729.32		\$71,077.12	\$429,806.44		\$535,996.83		\$78,285.81	\$614,282.64	\$614,282.64

Note: Costs indicated in the above were determined based on RS Means

**Uniform Plumbing Code
45 Unit Multi - Family Residence (Copper Piping System)**

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	10,170.00	0.1	\$11.59	\$117,870.30	\$3.89	\$39,561.30	\$157,431.60	\$17.43	\$177,263.10	\$4.28	\$43,527.60	\$220,790.70	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	945.00	0.11	\$12.41	\$11,727.45	\$4.98	\$4,706.10	\$16,433.55	\$18.52	\$17,501.40	\$5.50	\$5,197.50	\$22,708.35	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	1,991.00	0.12	\$13.87	\$27,615.17	\$8.04	\$16,007.64	\$43,622.81	\$20.71	\$41,233.61	\$8.83	\$17,580.53	\$58,834.05	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	312.00	0.14	\$16.24	\$5,066.88	\$12.70	\$3,962.40	\$9,029.28	\$24.27	\$7,572.24	\$13.97	\$4,358.64	\$11,930.88	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	259.00	0.15	\$18.07	\$4,680.13	\$12.27	\$3,177.93	\$7,858.06	\$27.10	\$7,018.90	\$13.49	\$3,493.91	\$10,512.81	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	83.00	0.19	\$22.45	\$1,863.35	\$19.94	\$1,655.02	\$3,518.37	\$33.49	\$2,779.67	\$22.22	\$1,844.26	\$4,623.93	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$27.28	\$300.08	\$31.74	\$349.14	\$649.22	\$41.06	\$451.66	\$34.91	\$384.01	\$835.78	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.29	\$30.20	\$332.20	\$49.20	\$541.20	\$873.40	\$45.63	\$501.93	\$53.96	\$593.56	\$1,095.38	
Pipe, copper, tubing, solder, 3-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	50.00	0.37	\$39.24	\$1,962.00	\$63.48	\$3,174.00	\$5,136.00	\$59.31	\$2,965.50	\$69.83	\$3,491.50	\$6,457.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	2,385.00	0.4	\$47.45	\$113,168.25	\$1.33	\$3,172.05	\$116,340.30	\$70.26	\$167,570.10	\$1.47	\$3,505.95	\$171,076.05	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	90.00	0.42	\$49.28	\$4,435.20	\$2.84	\$255.60	\$4,689.90	\$73.91	\$6,651.90	\$3.12	\$280.80	\$6,932.70	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	375.00	0.5	\$58.40	\$21,900.00	\$7.46	\$2,797.50	\$24,697.50	\$87.60	\$32,850.00	\$8.20	\$3,075.00	\$35,925.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$85.78	\$85.78	\$31.21	\$31.21	\$116.99	\$127.75	\$127.75	\$34.39	\$34.39	\$162.14	
Elbow, 90 Deg., copper, wrought, copper x copper, 3-1/2"	3.00	1.6	\$169.73	\$509.19	\$297.30	\$891.90	\$1,401.06	\$253.68	\$761.04	\$327.98	\$983.94	\$1,744.98	
Tee, copper, wrought, copper x copper, 1/2"	135.00	0.62	\$72.09	\$9,732.15	\$2.58	\$348.30	\$10,080.45	\$108.59	\$14,659.65	\$2.84	\$383.40	\$15,041.70	
Tee, copper, wrought, copper x copper, 3/4"	315.00	0.67	\$78.48	\$24,721.20	\$6.40	\$2,016.00	\$26,737.20	\$117.71	\$37,078.65	\$7.04	\$2,217.60	\$39,296.25	
Tee, copper, wrought, copper x copper, 1"	225.00	0.8	\$93.99	\$21,147.75	\$18.04	\$4,059.00	\$25,206.75	\$140.53	\$31,619.25	\$19.84	\$4,464.00	\$36,081.00	
Tee, copper, wrought, copper x copper, 1-1/4"	10.00	0.89	\$104.94	\$1,049.40	\$25.92	\$259.20	\$1,308.60	\$156.04	\$1,560.40	\$28.57	\$285.70	\$1,846.00	
Tee, copper, wrought, copper x copper, 1-1/2"	20.00	1	\$117.71	\$2,354.20	\$38.62	\$772.40	\$3,126.60	\$176.11	\$3,522.20	\$42.32	\$846.40	\$4,368.60	
Tee, copper, wrought, copper x copper, 2"	10.00	1.14	\$134.14	\$1,341.40	\$61.36	\$613.60	\$1,955.00	\$200.75	\$2,007.50	\$67.18	\$671.80	\$2,679.30	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2	\$211.70	\$211.70	\$117.44	\$117.44	\$329.14	\$317.55	\$317.55	\$129.08	\$129.08	\$446.63	
Tee, copper, wrought, copper x copper, 3"	1.00	2.29	\$242.73	\$242.73	\$167.16	\$167.16	\$409.89	\$361.35	\$361.35	\$184.09	\$184.09	\$545.44	
Tee, copper, wrought, copper x copper, 3-1/2"	3.00	2.67	\$282.88	\$848.64	\$502.55	\$1,507.65	\$2,356.29	\$421.58	\$1,264.74	\$550.16	\$1,650.48	\$2,915.22	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 4" pipe size, includes valves and four test cocks	1.00	5.33	\$565.75	\$565.75	\$8,173.05	\$8,173.05	\$8,738.80	\$848.63	\$848.63	\$8,993.00	\$8,993.00	\$9,841.63	
				\$373,730.90		\$98,316.79	\$472,046.76		\$558,488.72		\$108,177.14	\$666,691.52	\$666,691.52

Note: Costs indicated in the above were determined based on RS Means

**International Plumbing Code
45 Unit Multi - Family Residence (Copper Piping System)**

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 3/8" diameter, type L, includes coupling & clevis hanger assembly 10' OC	450.00	0.1	\$11.22	\$5,049.00	\$3.53	\$1,588.50	\$6,642.00	\$16.79	\$7,555.50	\$3.88	\$1,746.00	\$9,301.50	
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	7,468.00	0.1	\$11.59	\$86,554.12	\$3.89	\$29,050.52	\$115,604.64	\$17.43	\$130,167.24	\$4.28	\$31,963.04	\$162,130.28	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,835.00	0.11	\$12.41	\$35,182.35	\$4.98	\$14,118.30	\$49,300.65	\$18.52	\$52,504.20	\$5.50	\$15,592.50	\$68,125.05	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,352.00	0.12	\$13.87	\$32,622.24	\$8.04	\$18,910.08	\$51,532.32	\$20.71	\$48,709.92	\$8.83	\$20,768.16	\$69,501.60	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	572.00	0.14	\$16.24	\$9,289.28	\$12.70	\$7,264.40	\$16,553.68	\$24.27	\$13,882.44	\$13.97	\$7,990.84	\$21,873.28	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	58.00	0.15	\$18.07	\$1,048.06	\$12.27	\$711.66	\$1,759.72	\$27.10	\$1,571.80	\$13.49	\$782.42	\$2,354.22	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	36.00	0.19	\$22.45	\$808.20	\$19.94	\$717.84	\$1,526.04	\$33.49	\$1,205.64	\$22.22	\$799.92	\$2,005.56	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$27.28	\$300.08	\$31.74	\$349.14	\$649.22	\$41.06	\$451.66	\$34.91	\$384.01	\$835.78	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	50.00	0.29	\$30.20	\$1,510.00	\$49.20	\$2,460.00	\$3,970.00	\$45.63	\$2,281.50	\$53.96	\$2,698.00	\$4,979.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/8"	135.00	0.36	\$42.89	\$5,790.15	\$4.39	\$592.65	\$6,382.80	\$63.88	\$8,623.80	\$4.84	\$653.40	\$9,275.85	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	1,845.00	0.4	\$47.45	\$87,545.25	\$1.33	\$2,453.85	\$89,999.10	\$70.26	\$129,629.70	\$1.47	\$2,712.15	\$132,341.85	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	450.00	0.42	\$49.28	\$22,176.00	\$2.84	\$1,278.00	\$23,449.50	\$73.91	\$33,259.50	\$3.12	\$1,404.00	\$34,663.50	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	420.00	0.5	\$58.40	\$24,528.00	\$7.46	\$3,133.20	\$27,661.20	\$87.60	\$36,792.00	\$8.20	\$3,444.00	\$40,236.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$85.78	\$85.78	\$31.21	\$31.21	\$116.99	\$127.75	\$127.75	\$34.39	\$34.39	\$162.14	
Elbow, 90 Deg., copper, wrought, copper x copper, 3"	3.00	1.45	\$154.21	\$462.63	\$91.52	\$274.56	\$737.19	\$229.95	\$689.85	\$100.51	\$301.53	\$991.38	
Tee, copper, wrought, copper x copper, 1/2"	90.00	0.62	\$72.09	\$6,488.10	\$2.58	\$232.20	\$6,720.30	\$108.59	\$9,773.10	\$2.84	\$255.60	\$10,027.80	
Tee, copper, wrought, copper x copper, 3/4"	225.00	0.67	\$78.48	\$17,658.00	\$6.40	\$1,440.00	\$19,098.00	\$117.71	\$26,484.75	\$7.04	\$1,584.00	\$28,068.75	
Tee, copper, wrought, copper x copper, 1"	360.00	0.8	\$93.99	\$33,836.40	\$18.04	\$6,494.40	\$40,330.80	\$140.53	\$50,590.80	\$19.84	\$7,142.40	\$57,729.60	
Tee, copper, wrought, copper x copper, 1-1/4"	30.00	0.89	\$104.94	\$3,148.20	\$25.92	\$777.60	\$3,925.80	\$156.04	\$4,681.20	\$28.57	\$857.10	\$5,538.00	
Tee, copper, wrought, copper x copper, 1-1/2"	5.00	1	\$117.71	\$588.55	\$38.62	\$193.10	\$781.65	\$176.11	\$880.55	\$42.32	\$211.60	\$1,092.15	
Tee, copper, wrought, copper x copper, 2"	6.00	1.14	\$134.14	\$804.84	\$61.36	\$368.16	\$1,173.00	\$200.75	\$1,204.50	\$67.18	\$403.08	\$1,607.58	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2	\$211.70	\$211.70	\$117.44	\$117.44	\$329.14	\$317.55	\$317.55	\$129.08	\$129.08	\$446.63	
Tee, copper, wrought, copper x copper, 3"	3.00	2.29	\$242.73	\$728.19	\$167.16	\$501.48	\$1,229.67	\$361.35	\$1,084.05	\$184.09	\$552.27	\$1,636.32	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 3" pipe size, includes valves and four test cocks	1.00	3.56	\$375.95	\$375.95	\$6,982.80	\$6,982.80	\$7,358.75	\$565.75	\$565.75	\$7,670.50	\$7,670.50	\$8,236.25	
				\$376,791.07		\$100,041.09	\$476,832.16		\$563,034.75		\$110,079.99	\$673,160.07	\$673,160.07

Note: Costs indicated in the above were determined based on RS Means

Water Demand Calculator Single Family Residence (Copper Piping System)

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	444.00	0.1	\$6.34	\$2,814.96	\$3.70	\$1,642.80	\$4,457.76	\$9.53	\$4,231.32	\$4.07	\$1,807.08	\$6,038.40	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	84.00	0.11	\$6.79	\$570.36	\$4.73	\$397.32	\$967.68	\$10.13	\$850.92	\$5.23	\$439.32	\$1,290.24	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	25.00	0.12	\$7.58	\$189.50	\$7.64	\$191.00	\$380.50	\$11.33	\$283.25	\$8.39	\$209.75	\$493.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	102.00	0.4	\$25.95	\$2,646.90	\$1.27	\$129.54	\$2,776.44	\$38.42	\$3,918.84	\$1.40	\$142.80	\$4,061.64	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	8.00	0.5	\$31.94	\$255.52	\$7.09	\$56.72	\$312.24	\$47.90	\$383.20	\$7.79	\$62.32	\$445.52	
Tee, copper, wrought, copper x copper, 1/2"	12.00	0.62	\$39.42	\$473.04	\$2.45	\$29.40	\$502.44	\$59.38	\$712.56	\$2.69	\$32.28	\$744.84	
Tee, copper, wrought, copper x copper, 3/4"	10.00	0.67	\$42.91	\$429.10	\$6.08	\$60.80	\$489.90	\$64.37	\$643.70	\$6.68	\$66.80	\$710.50	
Tee, copper, wrought, copper x copper, 1"	3.00	0.8	\$51.40	\$154.20	\$17.14	\$51.42	\$205.62	\$76.85	\$230.55	\$18.84	\$56.52	\$287.07	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 3/4" pipe size, includes valves and four test cocks	1.00	0.5	\$31.94	\$31.94	\$242.21	\$242.21	\$274.15	\$47.90	\$47.90	\$266.33	\$266.33	\$314.23	
				\$7,565.52		\$2,801.21	\$10,366.73		\$11,124.10		\$3,075.13	\$14,385.44	\$14,385.44

Note: Costs indicated in the above were determined based on RS Means

Uniform Plumbing Code Single Family Residence (Copper Piping System)

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	444.00	0.10	\$6.34	\$2,814.96	\$3.70	\$1,642.80	\$4,457.76	\$9.53	\$4,231.32	\$4.07	\$1,807.08	\$6,038.40	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	47.00	0.11	\$6.79	\$319.13	\$4.73	\$222.31	\$541.44	\$10.13	\$476.11	\$5.23	\$245.81	\$721.92	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	62.00	0.12	\$7.58	\$469.96	\$7.64	\$473.68	\$943.64	\$11.33	\$702.46	\$8.39	\$520.18	\$1,222.64	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	102.00	0.40	\$25.95	\$2,646.90	\$1.27	\$129.54	\$2,776.44	\$38.42	\$3,918.84	\$1.40	\$142.80	\$4,061.64	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	8.00	0.50	\$31.94	\$255.52	\$7.09	\$56.72	\$312.24	\$47.90	\$383.20	\$7.79	\$62.32	\$445.52	
Tee, copper, wrought, copper x copper, 1/2"	10.00	0.62	\$39.42	\$394.20	\$2.45	\$24.50	\$418.70	\$59.38	\$593.80	\$2.69	\$26.90	\$620.70	
Tee, copper, wrought, copper x copper, 3/4"	8.00	0.67	\$42.91	\$343.28	\$6.08	\$48.64	\$391.92	\$64.37	\$514.96	\$6.68	\$53.44	\$568.40	
Tee, copper, wrought, copper x copper, 1"	7.00	0.80	\$51.40	\$359.80	\$17.14	\$119.98	\$479.78	\$76.85	\$537.95	\$18.84	\$131.88	\$669.83	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$36.93	\$36.93	\$254.27	\$254.27	\$291.19	\$54.89	\$54.89	\$280.40	\$280.40	\$335.29	
				\$7,640.68		\$2,972.44	\$10,613.11		\$11,413.53		\$3,270.81	\$14,684.34	\$14,684.34

Note: Costs indicated in the above were determined based on RS Means

**International Residential Code
Single Family Residence (Copper Piping System)**

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 3/8" diameter, type L, includes coupling & clevis hanger assembly 10' OC	130.00	0.10	\$6.14	\$798.20	\$3.36	\$436.80	\$1,235.00	\$9.18	\$1,193.40	\$3.69	\$479.70	\$1,673.10	
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	229.00	0.10	\$6.34	\$1,451.86	\$3.70	\$847.30	\$2,299.16	\$9.53	\$2,182.37	\$4.07	\$932.03	\$3,114.40	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	96.00	0.11	\$6.79	\$651.84	\$4.73	\$454.08	\$1,105.92	\$10.13	\$972.48	\$5.23	\$502.08	\$1,474.56	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	88.00	0.12	\$7.58	\$667.04	\$7.64	\$672.32	\$1,339.36	\$11.33	\$997.04	\$8.39	\$738.32	\$1,735.36	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	10.00	0.14	\$8.88	\$88.80	\$12.06	\$120.60	\$209.40	\$13.27	\$132.70	\$13.27	\$132.70	\$265.40	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/8"	10.00	0.36	\$23.45	\$234.50	\$4.17	\$41.70	\$276.20	\$34.93	\$349.30	\$4.59	\$45.90	\$395.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	82.00	0.40	\$25.95	\$2,127.90	\$1.27	\$104.14	\$2,232.04	\$38.42	\$3,150.44	\$1.40	\$114.80	\$3,265.24	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	10.00	0.42	\$26.95	\$269.50	\$2.69	\$26.90	\$296.40	\$40.42	\$404.20	\$2.96	\$29.60	\$433.80	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	6.00	0.50	\$31.94	\$191.64	\$7.09	\$42.54	\$234.18	\$47.90	\$287.40	\$7.79	\$46.74	\$334.14	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	2.00	0.53	\$34.43	\$68.86	\$11.71	\$23.42	\$92.28	\$51.40	\$102.80	\$12.91	\$25.82	\$128.62	
Tee, copper, wrought, copper x copper, 1/2"	3.00	0.62	\$39.42	\$118.26	\$2.45	\$7.35	\$125.61	\$59.38	\$178.14	\$2.69	\$8.07	\$186.21	
Tee, copper, wrought, copper x copper, 3/4"	9.00	0.67	\$42.91	\$386.19	\$6.08	\$54.72	\$440.91	\$64.37	\$579.33	\$6.68	\$60.12	\$639.45	
Tee, copper, wrought, copper x copper, 1"	12.00	0.80	\$51.40	\$616.80	\$17.14	\$205.68	\$822.48	\$76.85	\$922.20	\$18.84	\$226.08	\$1,148.28	
Tee, copper, wrought, copper x copper, 1-1/4"	1.00	0.89	\$57.39	\$57.39	\$24.62	\$24.62	\$82.01	\$85.33	\$85.33	\$27.14	\$27.14	\$112.47	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$36.93	\$36.93	\$254.27	\$254.27	\$291.20	\$54.89	\$54.89	\$280.40	\$280.40	\$335.29	
				\$7,765.71		\$3,316.44	\$11,082.15		\$11,592.02		\$3,649.50	\$15,241.52	\$15,241.52

Note: Costs indicated in the above were determined based on RS Means

Water Demand Calculator 6 Unit Multi - Family Residence (Copper Piping System)

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,194.00	0.10	\$6.34	\$13,909.96	\$3.70	\$8,117.80	\$22,027.76	\$9.53	\$20,908.82	\$4.07	\$8,929.58	\$29,838.40	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	643.00	0.11	\$6.79	\$4,365.97	\$4.73	\$3,041.39	\$7,407.36	\$10.13	\$6,513.59	\$5.23	\$3,362.89	\$9,876.48	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	210.00	0.12	\$7.58	\$1,591.80	\$7.64	\$1,604.40	\$3,196.20	\$11.33	\$2,379.30	\$8.39	\$1,761.90	\$4,141.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	564.00	0.40	\$25.95	\$14,635.80	\$1.27	\$716.28	\$15,352.08	\$38.42	\$21,668.88	\$1.40	\$789.60	\$22,458.48	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	7.00	0.42	\$26.95	\$188.65	\$2.69	\$18.83	\$207.48	\$40.42	\$282.94	\$2.96	\$20.72	\$303.66	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	38.00	0.50	\$31.94	\$1,213.72	\$7.09	\$269.42	\$1,483.14	\$47.90	\$1,820.20	\$7.79	\$296.02	\$2,116.22	
Tee, copper, wrought, copper x copper, 1/2"	60.00	0.62	\$39.42	\$2,365.20	\$2.45	\$147.00	\$2,512.20	\$59.38	\$3,562.80	\$2.69	\$161.40	\$3,724.20	
Tee, copper, wrought, copper x copper, 3/4"	63.00	0.67	\$42.91	\$2,703.33	\$6.08	\$383.04	\$3,086.37	\$64.37	\$4,055.31	\$6.68	\$420.84	\$4,476.15	
Tee, copper, wrought, copper x copper, 1"	26.00	0.80	\$51.40	\$1,336.40	\$17.14	\$445.64	\$1,782.04	\$76.85	\$1,998.10	\$18.84	\$489.84	\$2,487.94	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$36.93	\$36.93	\$562.80	\$562.80	\$599.73	\$54.89	\$54.89	\$618.08	\$618.08	\$672.97	
				\$42,347.76		\$15,306.60	\$57,654.36		\$63,244.83		\$16,850.87	\$80,095.70	\$80,095.70

Note: Costs indicated in the above were determined based on RS Means

**Uniform Plumbing Code
6 Unit Multi - Family Residence (Copper Piping System)**

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,348.00	0.1	\$6.34	\$14,886.32	\$3.70	\$8,687.60	\$23,573.92	\$9.53	\$22,376.44	\$4.07	\$9,556.36	\$31,932.80	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	270.00	0.11	\$6.79	\$1,833.30	\$4.73	\$1,277.10	\$3,110.40	\$10.13	\$2,735.10	\$5.23	\$1,412.10	\$4,147.20	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	367.00	0.12	\$7.58	\$2,781.86	\$7.64	\$2,803.88	\$5,585.74	\$11.33	\$4,158.11	\$8.39	\$3,079.13	\$7,237.24	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	34.00	0.14	\$8.88	\$301.92	\$12.06	\$410.04	\$711.96	\$13.27	\$451.18	\$13.27	\$451.18	\$902.36	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	28.00	0.19	\$12.28	\$343.84	\$18.94	\$530.32	\$874.16	\$18.31	\$512.68	\$21.11	\$591.08	\$1,103.76	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	564.00	0.4	\$25.95	\$14,635.80	\$1.27	\$716.28	\$15,346.44	\$38.42	\$21,668.88	\$1.40	\$789.60	\$22,458.48	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	42.00	0.5	\$31.94	\$1,341.48	\$7.09	\$297.78	\$1,638.84	\$47.90	\$2,011.80	\$7.79	\$327.18	\$2,338.98	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	1.00	0.53	\$34.43	\$34.43	\$11.71	\$11.71	\$46.14	\$51.40	\$51.40	\$12.91	\$12.91	\$64.31	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	2.00	0.73	\$46.91	\$93.82	\$29.65	\$59.30	\$153.10	\$69.86	\$139.72	\$32.66	\$65.32	\$205.04	
Tee, copper, wrought, copper x copper, 1/2"	60.00	0.62	\$39.42	\$2,365.20	\$2.45	\$147.00	\$2,512.20	\$59.38	\$3,562.80	\$2.69	\$161.40	\$3,724.20	
Tee, copper, wrought, copper x copper, 3/4"	48.00	0.67	\$42.91	\$2,059.68	\$6.08	\$291.84	\$2,351.52	\$64.37	\$3,089.76	\$6.68	\$320.64	\$3,410.40	
Tee, copper, wrought, copper x copper, 1"	36.00	0.8	\$51.40	\$1,850.40	\$17.14	\$617.04	\$2,467.08	\$76.85	\$2,766.60	\$18.84	\$678.24	\$3,444.84	
Tee, copper, wrought, copper x copper, 1-1/4"	3.00	0.89	\$57.39	\$172.17	\$24.62	\$73.86	\$246.03	\$85.33	\$255.99	\$27.14	\$81.42	\$337.38	
Tee, copper, wrought, copper x copper, 2"	2.00	1.14	\$73.35	\$146.70	\$58.29	\$116.58	\$263.28	\$109.78	\$219.56	\$63.82	\$127.64	\$347.20	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 2" pipe size, includes valves and four test cocks	1.00	1.14	\$73.35	\$73.35	\$1,331.63	\$1,331.63	\$1,404.98	\$109.78	\$109.78	\$1,482.38	\$1,482.38	\$1,592.16	
				\$42,920.27		\$17,371.96	\$60,285.79		\$64,109.80		\$19,136.58	\$83,246.35	\$83,246.35

Note: Costs indicated in the above were determined based on RS Means

**International Plumbing Code
6 Unit Multi - Family Residence (Copper Piping System)**

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 3/8" diameter, type L, includes coupling & clevis hanger assembly 10' OC	691.00	0.1	\$6.14	\$4,242.74	\$3.36	\$2,321.76	\$6,557.59	\$9.18	\$6,343.38	\$3.69	\$2,549.79	\$8,893.17	
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	1,178.00	0.1	\$6.34	\$7,468.52	\$3.70	\$4,358.60	\$11,827.12	\$9.53	\$11,226.34	\$4.07	\$4,794.46	\$16,020.80	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	672.00	0.11	\$6.79	\$4,562.88	\$4.73	\$3,178.56	\$7,741.44	\$10.13	\$6,807.36	\$5.23	\$3,514.56	\$10,321.92	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	264.00	0.12	\$7.58	\$2,001.12	\$7.64	\$2,016.96	\$4,018.08	\$11.33	\$2,991.12	\$8.39	\$2,214.96	\$5,206.08	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	213.00	0.14	\$8.88	\$1,891.44	\$12.06	\$2,568.78	\$4,460.22	\$13.27	\$2,826.51	\$13.27	\$2,826.51	\$5,653.02	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	29.00	0.15	\$9.88	\$286.52	\$11.66	\$338.14	\$624.66	\$14.82	\$429.78	\$12.81	\$371.49	\$801.27	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/8"	192.00	0.36	\$23.45	\$4,502.40	\$4.17	\$800.64	\$5,303.04	\$34.93	\$6,706.56	\$4.59	\$881.28	\$7,587.84	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	318.00	0.4	\$25.95	\$8,252.10	\$1.27	\$403.86	\$8,652.78	\$38.42	\$12,217.56	\$1.40	\$445.20	\$12,662.76	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	54.00	0.42	\$26.95	\$1,455.30	\$2.69	\$145.26	\$1,600.56	\$40.42	\$2,182.68	\$2.96	\$159.84	\$2,342.52	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	43.00	0.53	\$34.43	\$1,480.49	\$11.71	\$503.53	\$1,984.02	\$51.40	\$2,210.20	\$12.91	\$555.13	\$2,765.33	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/2"	2.00	0.62	\$39.42	\$78.84	\$16.18	\$32.36	\$111.20	\$59.38	\$118.76	\$17.79	\$35.58	\$154.34	
Tee, copper, wrought, copper x copper, 1/2"	18.00	0.62	\$39.42	\$709.56	\$2.45	\$44.10	\$753.66	\$59.38	\$1,068.84	\$2.69	\$48.42	\$1,117.26	
Tee, copper, wrought, copper x copper, 3/4"	66.00	0.67	\$42.91	\$2,832.06	\$6.08	\$401.28	\$3,233.34	\$64.37	\$4,248.42	\$6.68	\$440.88	\$4,689.30	
Tee, copper, wrought, copper x copper, 1"	42.00	0.8	\$51.40	\$2,158.80	\$17.14	\$719.88	\$2,878.26	\$76.85	\$3,227.70	\$18.84	\$791.28	\$4,018.98	
Tee, copper, wrought, copper x copper, 1-1/4"	20.00	0.89	\$57.39	\$1,147.80	\$24.62	\$492.40	\$1,640.20	\$85.33	\$1,706.60	\$27.14	\$542.80	\$2,249.40	
Tee, copper, wrought, copper x copper, 1-1/2"	3.00	1	\$64.37	\$193.11	\$36.68	\$110.04	\$303.15	\$96.31	\$288.93	\$40.20	\$120.60	\$409.53	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1-1/2" pipe size, includes valves and four test cocks	1.00	0.80	\$51.40	\$51.40	\$1,155.75	\$1,155.75	\$1,207.15	\$76.85	\$76.85	\$1,281.38	\$1,281.38	\$1,358.23	
				\$43,315.08		\$19,591.90	\$62,896.47		\$64,677.59		\$21,574.16	\$86,251.75	\$86,251.75

Note: Costs indicated in the above were determined based on RS Means

Water Demand Calculator 45 Unit Multi - Family Residence (Copper Piping System)

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	10,205.00	0.10	\$6.34	\$64,699.70	\$3.70	\$37,758.50	\$102,458.20	\$9.53	\$97,253.65	\$4.07	\$41,534.35	\$138,788.00	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	3,212.00	0.11	\$6.79	\$21,809.48	\$4.73	\$15,192.76	\$37,002.24	\$10.13	\$32,537.56	\$5.23	\$16,798.76	\$49,336.32	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	372.00	0.12	\$7.58	\$2,819.76	\$7.64	\$2,842.08	\$5,661.84	\$11.33	\$4,214.76	\$8.39	\$3,121.08	\$7,335.84	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	43.00	0.14	\$8.88	\$381.84	\$12.06	\$518.58	\$900.42	\$13.27	\$570.61	\$13.27	\$570.61	\$1,141.22	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	2,385.00	0.40	\$25.95	\$61,890.75	\$1.27	\$3,028.95	\$64,919.70	\$38.42	\$91,631.70	\$1.40	\$3,339.00	\$94,970.70	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	466.00	0.42	\$26.95	\$12,558.70	\$2.69	\$1,253.54	\$13,812.24	\$40.42	\$18,835.72	\$2.96	\$1,379.36	\$20,215.08	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	1.00	0.50	\$31.94	\$31.94	\$7.09	\$7.09	\$39.03	\$47.90	\$47.90	\$7.79	\$7.79	\$55.69	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	2.00	0.53	\$34.43	\$68.86	\$11.71	\$23.42	\$92.28	\$51.40	\$102.80	\$12.91	\$25.82	\$128.62	
Tee, copper, wrought, copper x copper, 1/2"	135.00	0.62	\$39.42	\$5,321.70	\$2.45	\$330.75	\$5,652.45	\$59.38	\$8,016.30	\$2.69	\$363.15	\$8,379.45	
Tee, copper, wrought, copper x copper, 3/4"	415.00	0.67	\$42.91	\$17,807.65	\$6.08	\$2,523.20	\$20,330.85	\$64.37	\$26,713.55	\$6.68	\$2,772.20	\$29,485.75	
Tee, copper, wrought, copper x copper, 1"	166.00	0.80	\$51.40	\$8,532.40	\$17.14	\$2,845.24	\$11,377.64	\$76.85	\$12,757.10	\$18.84	\$3,127.44	\$15,884.54	
Tee, copper, wrought, copper x copper, 1-1/4"	4.00	0.89	\$57.39	\$229.56	\$24.62	\$98.48	\$328.04	\$85.33	\$341.32	\$27.14	\$108.56	\$449.88	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1-1/2" pipe size, includes valves and four test cocks	1.00	0.80	\$51.40	\$51.40	\$1,155.75	\$1,155.75	\$1,207.15	\$76.85	\$76.85	\$1,281.38	\$1,281.38	\$1,358.23	
				\$196,203.74		\$67,578.34	\$263,782.08		\$293,099.82		\$74,429.50	\$367,529.32	\$367,529.32

Note: Costs indicated in the above were determined based on RS Means

**Uniform Plumbing Code
45 Unit Multi - Family Residence (Copper Piping System)**

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	10,170.00	0.1	\$6.34	\$64,477.80	\$3.70	\$37,629.00	\$102,106.80	\$9.53	\$96,920.10	\$4.07	\$41,391.90	\$138,312.00	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	945.00	0.11	\$6.79	\$6,416.55	\$4.73	\$4,469.85	\$10,886.40	\$10.13	\$9,572.85	\$5.23	\$4,942.35	\$14,515.20	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	1,991.00	0.12	\$7.58	\$15,091.78	\$7.64	\$15,211.24	\$30,303.02	\$11.33	\$22,558.03	\$8.39	\$16,704.49	\$39,262.52	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	312.00	0.14	\$8.88	\$2,770.56	\$12.06	\$3,762.72	\$6,533.28	\$13.27	\$4,140.24	\$13.27	\$4,140.24	\$8,280.48	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	259.00	0.15	\$9.88	\$2,558.92	\$11.66	\$3,019.94	\$5,578.86	\$14.82	\$3,838.38	\$12.81	\$3,317.79	\$7,156.17	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	83.00	0.19	\$12.28	\$1,019.24	\$18.94	\$1,572.02	\$2,591.26	\$18.31	\$1,519.73	\$21.11	\$1,752.13	\$3,271.86	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$14.92	\$164.12	\$30.15	\$331.65	\$495.77	\$22.46	\$247.06	\$33.17	\$364.87	\$611.82	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.29	\$16.52	\$181.72	\$46.73	\$514.03	\$695.75	\$24.95	\$274.45	\$51.26	\$563.86	\$838.31	
Pipe, copper, tubing, solder, 3-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	50.00	0.37	\$21.46	\$1,073.00	\$60.30	\$3,015.00	\$4,088.00	\$32.44	\$1,622.00	\$66.33	\$3,316.50	\$4,938.50	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	2,385.00	0.4	\$25.95	\$61,890.75	\$1.27	\$3,028.95	\$64,895.85	\$38.42	\$91,631.70	\$1.40	\$3,339.00	\$94,970.70	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	90.00	0.42	\$26.95	\$2,425.50	\$2.69	\$242.10	\$2,667.60	\$40.42	\$3,637.80	\$2.96	\$266.40	\$3,904.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	375.00	0.5	\$31.94	\$11,977.50	\$7.09	\$2,658.75	\$14,632.50	\$47.90	\$17,962.50	\$7.79	\$2,921.25	\$20,883.75	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$46.91	\$46.91	\$29.65	\$29.65	\$76.55	\$69.86	\$69.86	\$32.66	\$32.66	\$102.52	
Elbow, 90 Deg., copper, wrought, copper x copper, 3-1/2"	3.00	1.6	\$92.81	\$278.43	\$282.41	\$847.23	\$1,125.66	\$138.72	\$416.16	\$311.55	\$934.65	\$1,350.81	
Tee, copper, wrought, copper x copper, 1/2"	135.00	0.62	\$39.42	\$5,321.70	\$2.45	\$330.75	\$5,652.45	\$59.38	\$8,016.30	\$2.69	\$363.15	\$8,379.45	
Tee, copper, wrought, copper x copper, 3/4"	315.00	0.67	\$42.91	\$13,516.65	\$6.08	\$1,915.20	\$15,431.85	\$64.37	\$20,276.55	\$6.68	\$2,104.20	\$22,380.75	
Tee, copper, wrought, copper x copper, 1"	225.00	0.8	\$51.40	\$11,565.00	\$17.14	\$3,856.50	\$15,419.25	\$76.85	\$17,291.25	\$18.84	\$4,239.00	\$21,530.25	
Tee, copper, wrought, copper x copper, 1-1/4"	10.00	0.89	\$57.39	\$573.90	\$24.62	\$246.20	\$820.10	\$85.33	\$853.30	\$27.14	\$271.40	\$1,124.60	
Tee, copper, wrought, copper x copper, 1-1/2"	20.00	1	\$64.37	\$1,287.40	\$36.68	\$733.60	\$2,021.00	\$96.31	\$1,926.20	\$40.20	\$804.00	\$2,730.20	
Tee, copper, wrought, copper x copper, 2"	10.00	1.14	\$73.35	\$733.50	\$58.29	\$582.90	\$1,316.40	\$109.78	\$1,097.80	\$63.82	\$638.20	\$1,736.00	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2	\$115.77	\$115.77	\$111.56	\$111.56	\$227.32	\$173.65	\$173.65	\$122.61	\$122.61	\$296.26	
Tee, copper, wrought, copper x copper, 3"	1.00	2.29	\$132.73	\$132.73	\$158.79	\$158.79	\$291.52	\$197.60	\$197.60	\$174.87	\$174.87	\$372.47	
Tee, copper, wrought, copper x copper, 3-1/2"	3.00	2.67	\$154.69	\$464.07	\$477.38	\$1,432.14	\$1,896.21	\$230.54	\$691.62	\$522.60	\$1,567.80	\$2,259.42	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 4" pipe size, includes valves and four test cocks	1.00	5.33	\$309.38	\$309.38	\$7,763.63	\$7,763.63	\$8,073.01	\$464.07	\$464.07	\$8,542.50	\$8,542.50	\$9,006.57	
				\$204,392.88		\$93,463.40	\$297,826.41		\$305,399.20		\$102,815.82	\$408,214.81	\$408,214.81

Note: Costs indicated in the above were determined based on RS Means

**International Plumbing Code
45 Unit Multi - Family Residence (Copper Piping System)**

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 3/8" diameter, type L, includes coupling & clevis hanger assembly 10' OC	450.00	0.1	\$6.14	\$2,763.00	\$3.36	\$1,512.00	\$4,275.00	\$9.18	\$4,131.00	\$3.69	\$1,660.50	\$5,791.50	
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	7,468.00	0.1	\$6.34	\$47,347.12	\$3.70	\$27,631.60	\$74,978.72	\$9.53	\$71,170.04	\$4.07	\$30,394.76	\$101,564.80	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,835.00	0.11	\$6.79	\$19,249.65	\$4.73	\$13,409.55	\$32,659.20	\$10.13	\$28,718.55	\$5.23	\$14,827.05	\$43,545.60	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,352.00	0.12	\$7.58	\$17,828.16	\$7.64	\$17,969.28	\$35,797.44	\$11.33	\$26,648.16	\$8.39	\$19,733.28	\$46,381.44	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	572.00	0.14	\$8.88	\$5,079.36	\$12.06	\$6,898.32	\$11,977.68	\$13.27	\$7,590.44	\$13.27	\$7,590.44	\$15,180.88	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	58.00	0.15	\$9.88	\$573.04	\$11.66	\$676.28	\$1,249.32	\$14.82	\$859.56	\$12.81	\$742.98	\$1,602.54	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	36.00	0.19	\$12.28	\$442.08	\$18.94	\$681.84	\$1,123.92	\$18.31	\$659.16	\$21.11	\$759.96	\$1,419.12	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$14.92	\$164.12	\$30.15	\$331.65	\$495.77	\$22.46	\$247.06	\$33.17	\$364.87	\$611.82	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	50.00	0.29	\$16.52	\$826.00	\$46.73	\$2,336.50	\$3,162.50	\$24.95	\$1,247.50	\$51.26	\$2,563.00	\$3,810.50	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/8"	135.00	0.36	\$23.45	\$3,165.75	\$4.17	\$562.95	\$3,728.70	\$34.93	\$4,715.55	\$4.59	\$619.65	\$5,335.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	1,845.00	0.4	\$25.95	\$47,877.75	\$1.27	\$2,343.15	\$50,220.45	\$38.42	\$70,884.90	\$1.40	\$2,583.00	\$73,467.90	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	450.00	0.42	\$26.95	\$12,127.50	\$2.69	\$1,210.50	\$13,338.00	\$40.42	\$18,189.00	\$2.96	\$1,332.00	\$19,521.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	420.00	0.5	\$31.94	\$13,414.80	\$7.09	\$2,977.80	\$16,388.40	\$47.90	\$20,118.00	\$7.79	\$3,271.80	\$23,389.80	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$46.91	\$46.91	\$29.65	\$29.65	\$76.55	\$69.86	\$69.86	\$32.66	\$32.66	\$102.52	
Elbow, 90 Deg., copper, wrought, copper x copper, 3"	3.00	1.45	\$84.33	\$252.99	\$86.93	\$260.79	\$513.78	\$125.75	\$377.25	\$95.48	\$286.44	\$663.66	
Tee, copper, wrought, copper x copper, 1/2"	90.00	0.62	\$39.42	\$3,547.80	\$2.45	\$220.50	\$3,768.30	\$59.38	\$5,344.20	\$2.69	\$242.10	\$5,586.30	
Tee, copper, wrought, copper x copper, 3/4"	225.00	0.67	\$42.91	\$9,654.75	\$6.08	\$1,368.00	\$11,022.75	\$64.37	\$14,483.25	\$6.68	\$1,503.00	\$15,986.25	
Tee, copper, wrought, copper x copper, 1"	360.00	0.8	\$51.40	\$18,504.00	\$17.14	\$6,170.40	\$24,674.40	\$76.85	\$27,666.00	\$18.84	\$6,782.40	\$34,448.40	
Tee, copper, wrought, copper x copper, 1-1/4"	30.00	0.89	\$57.39	\$1,721.70	\$24.62	\$738.60	\$2,460.30	\$85.33	\$2,559.90	\$27.14	\$814.20	\$3,373.80	
Tee, copper, wrought, copper x copper, 1-1/2"	5.00	1	\$64.37	\$321.85	\$36.68	\$183.40	\$505.25	\$96.31	\$481.55	\$40.20	\$201.00	\$682.55	
Tee, copper, wrought, copper x copper, 2"	6.00	1.14	\$73.35	\$440.10	\$58.29	\$349.74	\$789.84	\$109.78	\$658.68	\$63.82	\$382.92	\$1,041.60	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2	\$115.77	\$115.77	\$111.56	\$111.56	\$227.32	\$173.65	\$173.65	\$122.61	\$122.61	\$296.26	
Tee, copper, wrought, copper x copper, 3"	3.00	2.29	\$132.73	\$398.19	\$158.79	\$476.37	\$874.56	\$197.60	\$592.80	\$174.87	\$524.61	\$1,117.41	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 3" pipe size, includes valves and four test cocks	1.00	3.56	\$205.59	\$205.59	\$6,633.00	\$6,633.00	\$6,838.59	\$309.38	\$309.38	\$7,286.25	\$7,286.25	\$7,595.63	
				\$206,067.98		\$95,083.43	\$301,120.64		\$307,895.44		\$104,621.48	\$412,516.48	\$412,516.48

Note: Costs indicated in the above were determined based on RS Means

Water Demand Calculator													
Single Family Residence (Copper Piping System)													
Oklahoma City													
Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	444.00	0.1	\$4.34	\$1,926.96	\$3.96	\$1,758.24	\$3,685.20	\$6.52	\$2,894.88	\$4.36	\$1,935.84	\$4,830.72	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	84.00	0.11	\$4.64	\$389.76	\$5.07	\$425.88	\$815.64	\$6.93	\$582.12	\$5.60	\$470.40	\$1,052.52	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	25.00	0.12	\$5.19	\$129.75	\$8.18	\$204.50	\$334.25	\$7.75	\$193.75	\$8.98	\$224.50	\$418.25	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	102.00	0.4	\$17.76	\$1,811.52	\$1.36	\$138.72	\$1,949.22	\$26.30	\$2,682.60	\$1.50	\$153.00	\$2,834.58	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	0.00	0.42	\$18.44	\$0.00	\$2.88	\$0.00	\$0.00	\$27.66	\$0.00	\$3.17	\$0.00	\$0.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	8.00	0.5	\$21.86	\$174.88	\$7.59	\$60.72	\$235.52	\$32.78	\$262.24	\$8.34	\$66.72	\$328.96	
Tee, copper, wrought, copper x copper, 1/2"	12.00	0.62	\$26.98	\$323.76	\$2.63	\$31.56	\$355.32	\$40.64	\$487.68	\$2.88	\$34.56	\$522.24	
Tee, copper, wrought, copper x copper, 3/4"	10.00	0.67	\$29.37	\$293.70	\$6.51	\$65.10	\$358.80	\$44.05	\$440.50	\$7.16	\$71.60	\$512.10	
Tee, copper, wrought, copper x copper, 1"	3.00	0.8	\$35.17	\$105.51	\$18.35	\$55.05	\$160.56	\$52.59	\$157.77	\$20.18	\$60.54	\$218.31	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 3/4" pipe size, includes valves and four test cocks	1.00	0.5	\$21.86	\$21.86	\$259.32	\$259.32	\$281.18	\$32.78	\$32.78	\$285.14	\$285.14	\$317.92	
				\$5,177.70		\$2,999.09	\$8,175.69		\$7,734.32		\$3,302.30	\$11,035.60	\$11,035.60

Note: Costs indicated in the above were determined based on RS Means

Uniform Plumbing Code													
Single Family Residence (Copper Piping System)													
Oklahoma City													
Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	444.00	0.10	\$4.34	\$1,926.96	\$3.96	\$1,758.24	\$3,685.20	\$6.52	\$2,894.88	\$4.36	\$1,935.84	\$4,830.72	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	47.00	0.11	\$4.64	\$218.08	\$5.07	\$238.29	\$456.37	\$6.93	\$325.71	\$5.60	\$263.20	\$588.91	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	62.00	0.12	\$5.19	\$321.78	\$8.18	\$507.16	\$828.94	\$7.75	\$480.50	\$8.98	\$556.76	\$1,037.26	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	102.00	0.40	\$17.76	\$1,811.52	\$1.36	\$138.72	\$1,950.24	\$26.30	\$2,682.60	\$1.50	\$153.00	\$2,835.60	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	8.00	0.50	\$21.86	\$174.88	\$7.59	\$60.72	\$235.60	\$32.78	\$262.24	\$8.34	\$66.72	\$328.96	
Tee, copper, wrought, copper x copper, 1/2"	10.00	0.62	\$26.98	\$269.80	\$2.63	\$26.30	\$296.10	\$40.64	\$406.40	\$2.88	\$28.80	\$435.20	
Tee, copper, wrought, copper x copper, 3/4"	8.00	0.67	\$29.37	\$234.96	\$6.51	\$52.08	\$287.04	\$44.05	\$352.40	\$7.16	\$57.28	\$409.68	
Tee, copper, wrought, copper x copper, 1"	7.00	0.80	\$35.17	\$246.19	\$18.35	\$128.45	\$374.64	\$52.59	\$368.13	\$20.18	\$141.26	\$509.39	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$25.27	\$25.27	\$272.23	\$272.23	\$297.50	\$37.57	\$37.57	\$300.20	\$300.20	\$337.77	
				\$5,229.44		\$3,182.19	\$8,411.63		\$7,810.43		\$3,503.06	\$11,313.49	\$11,313.49

Note: Costs indicated in the above were determined based on RS Means

**International Residential Code
Single Family Residence (Copper Piping System)**

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 3/8" diameter, type L, includes coupling & clevis hanger assembly 10' OC	130.00	0.10	\$4.20	\$546.00	\$3.59	\$466.70	\$1,012.70	\$6.28	\$816.40	\$3.95	\$513.50	\$1,329.90	
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	229.00	0.10	\$4.34	\$993.86	\$3.96	\$906.84	\$1,900.70	\$6.52	\$1,493.08	\$4.36	\$998.44	\$2,491.52	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	96.00	0.11	\$4.64	\$445.44	\$5.07	\$486.72	\$932.16	\$6.93	\$665.28	\$5.60	\$537.60	\$1,202.88	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	88.00	0.12	\$5.19	\$456.72	\$8.18	\$719.84	\$1,176.56	\$7.75	\$682.00	\$8.98	\$790.24	\$1,472.24	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	10.00	0.14	\$6.08	\$60.80	\$12.91	\$129.10	\$189.90	\$9.08	\$90.80	\$14.20	\$142.00	\$232.80	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/8"	10.00	0.36	\$16.05	\$160.50	\$4.47	\$44.70	\$205.20	\$23.91	\$239.10	\$4.92	\$49.20	\$288.30	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	82.00	0.40	\$17.76	\$1,456.32	\$1.36	\$111.52	\$1,567.84	\$26.30	\$2,156.60	\$1.50	\$123.00	\$2,279.60	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	10.00	0.42	\$18.44	\$184.40	\$2.88	\$28.80	\$213.20	\$27.66	\$276.60	\$3.17	\$31.70	\$308.30	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	2.00	0.50	\$21.86	\$43.72	\$7.59	\$15.18	\$58.90	\$32.78	\$65.56	\$8.34	\$16.68	\$82.24	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	2.00	0.53	\$23.56	\$47.12	\$12.54	\$25.08	\$72.20	\$35.17	\$70.34	\$13.83	\$27.66	\$98.00	
Tee, copper, wrought, copper x copper, 1/2"	9.00	0.62	\$26.98	\$242.82	\$2.63	\$23.67	\$266.49	\$40.64	\$365.76	\$2.88	\$25.92	\$391.68	
Tee, copper, wrought, copper x copper, 3/4"	7.00	0.67	\$29.37	\$205.59	\$6.51	\$45.57	\$251.16	\$44.05	\$308.35	\$7.16	\$50.12	\$358.47	
Tee, copper, wrought, copper x copper, 1"	14.00	0.80	\$35.17	\$492.38	\$18.35	\$256.90	\$749.28	\$52.59	\$736.26	\$20.18	\$282.52	\$1,018.78	
Tee, copper, wrought, copper x copper, 1-1/4"	1.00	0.89	\$39.27	\$39.27	\$26.36	\$26.36	\$65.63	\$58.40	\$58.40	\$29.05	\$29.05	\$87.45	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$25.27	\$25.27	\$272.23	\$272.23	\$297.50	\$37.57	\$37.57	\$300.20	\$300.20	\$337.77	
				\$5,400.21		\$3,559.21	\$8,959.42		\$8,062.10		\$3,917.83	\$11,979.93	\$11,979.93

Note: Costs indicated in the above were determined based on RS Means

Water Demand Calculator 6 Unit Multi - Family Residence (Copper Piping System)

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,194.00	0.10	\$4.34	\$9,521.96	\$3.96	\$8,688.24	\$18,210.20	\$6.52	\$14,304.88	\$4.36	\$9,565.84	\$23,870.72	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	643.00	0.11	\$4.64	\$2,983.52	\$5.07	\$3,260.01	\$6,243.53	\$6.93	\$4,455.99	\$5.60	\$3,600.80	\$8,056.79	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	210.00	0.12	\$5.19	\$1,089.90	\$8.18	\$1,717.80	\$2,807.70	\$7.75	\$1,627.50	\$8.98	\$1,885.80	\$3,513.30	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	564.00	0.40	\$17.76	\$10,016.64	\$1.36	\$767.04	\$10,783.68	\$26.30	\$14,833.20	\$1.50	\$846.00	\$15,679.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	7.00	0.42	\$18.44	\$129.08	\$2.88	\$20.16	\$149.24	\$27.66	\$193.62	\$3.17	\$22.19	\$215.81	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	38.00	0.50	\$21.86	\$830.68	\$7.59	\$288.42	\$1,119.10	\$32.78	\$1,245.64	\$8.34	\$316.92	\$1,562.56	
Tee, copper, wrought, copper x copper, 1/2"	60.00	0.62	\$26.98	\$1,618.80	\$2.63	\$157.80	\$1,776.60	\$40.64	\$2,438.40	\$2.88	\$172.80	\$2,611.20	
Tee, copper, wrought, copper x copper, 3/4"	63.00	0.67	\$29.37	\$1,850.31	\$6.51	\$410.13	\$2,260.44	\$44.05	\$2,775.15	\$7.16	\$451.08	\$3,226.23	
Tee, copper, wrought, copper x copper, 1"	26.00	0.80	\$35.17	\$914.42	\$18.35	\$477.10	\$1,391.52	\$52.59	\$1,367.34	\$20.18	\$524.68	\$1,892.02	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$25.27	\$25.27	\$602.56	\$602.56	\$627.83	\$37.57	\$37.57	\$661.74	\$661.74	\$699.31	
				\$28,980.58		\$16,389.26	\$45,369.84		\$43,279.20		\$18,047.85	\$61,327.14	\$61,327.14

Note: Costs indicated in the above were determined based on RS Means

**Uniform Plumbing Code
6 Unit Multi - Family Residence (Copper Piping System)**

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,348.00	0.1	\$4.34	\$10,190.32	\$3.96	\$9,298.08	\$19,488.40	\$6.52	\$15,308.96	\$4.36	\$10,237.28	\$25,546.24	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	270.00	0.11	\$4.64	\$1,252.80	\$5.07	\$1,368.90	\$2,621.70	\$6.93	\$1,871.10	\$5.60	\$1,512.00	\$3,383.10	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	367.00	0.12	\$5.19	\$1,904.73	\$8.18	\$3,002.06	\$4,906.79	\$7.75	\$2,844.25	\$8.98	\$3,295.66	\$6,143.58	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	34.00	0.14	\$6.08	\$206.72	\$12.91	\$438.94	\$645.66	\$9.08	\$308.72	\$14.20	\$482.80	\$791.86	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	28.00	0.19	\$8.40	\$235.20	\$20.28	\$567.84	\$803.04	\$12.53	\$350.84	\$22.60	\$632.80	\$983.64	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	564.00	0.4	\$17.76	\$10,016.64	\$1.36	\$767.04	\$10,778.04	\$26.30	\$14,833.20	\$1.50	\$846.00	\$15,673.56	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	42.00	0.5	\$21.86	\$918.12	\$7.59	\$318.78	\$1,236.48	\$32.78	\$1,376.76	\$8.34	\$350.28	\$1,727.04	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	1.00	0.53	\$23.56	\$23.56	\$12.54	\$12.54	\$36.10	\$35.17	\$35.17	\$13.83	\$13.83	\$49.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	2.00	0.73	\$32.10	\$64.20	\$31.74	\$63.48	\$127.68	\$47.81	\$95.62	\$34.97	\$69.94	\$165.56	
Tee, copper, wrought, copper x copper, 1/2"	60.00	0.62	\$26.98	\$1,618.80	\$2.63	\$157.80	\$1,776.00	\$40.64	\$2,438.40	\$2.88	\$172.80	\$2,611.20	
Tee, copper, wrought, copper x copper, 3/4"	48.00	0.67	\$29.37	\$1,409.76	\$6.51	\$312.48	\$1,722.24	\$44.05	\$2,114.40	\$7.16	\$343.68	\$2,458.08	
Tee, copper, wrought, copper x copper, 1"	36.00	0.8	\$35.17	\$1,266.12	\$18.35	\$660.60	\$1,926.72	\$52.59	\$1,893.24	\$20.18	\$726.48	\$2,619.72	
Tee, copper, wrought, copper x copper, 1-1/4"	3.00	0.89	\$39.27	\$117.81	\$26.36	\$79.08	\$196.89	\$58.40	\$175.20	\$29.05	\$87.15	\$262.35	
Tee, copper, wrought, copper x copper, 2"	2.00	1.14	\$50.20	\$100.40	\$62.41	\$124.82	\$225.22	\$75.13	\$150.26	\$68.33	\$136.66	\$286.92	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 2" pipe size, includes valves and four test cocks	1.00	1.14	\$50.20	\$50.20	\$1,425.70	\$1,425.70	\$1,475.90	\$75.13	\$75.13	\$1,587.10	\$1,587.10	\$1,662.23	
				\$29,375.38		\$18,598.14	\$47,966.86		\$43,871.25		\$20,494.46	\$64,364.08	\$64,364.08

Note: Costs indicated in the above were determined based on RS Means

**International Plumbing Code
6 Unit Multi - Family Residence (Copper Piping System)**

Oklahoma, City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 3/8" diameter, type L, includes coupling & clevis hanger assembly 10' OC	691.00	0.1	\$4.20	\$2,902.20	\$3.59	\$2,480.69	\$5,382.89	\$6.28	\$4,339.48	\$3.95	\$2,729.45	\$7,068.93	
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	1,178.00	0.1	\$4.34	\$5,112.52	\$3.96	\$4,664.88	\$9,777.40	\$6.52	\$7,680.56	\$4.36	\$5,136.08	\$12,816.64	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	672.00	0.11	\$4.64	\$3,118.08	\$5.07	\$3,407.04	\$6,525.12	\$6.93	\$4,656.96	\$5.60	\$3,763.20	\$8,420.16	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	264.00	0.12	\$5.19	\$1,370.16	\$8.18	\$2,159.52	\$3,529.68	\$7.75	\$2,046.00	\$8.98	\$2,370.72	\$4,419.36	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	213.00	0.14	\$6.08	\$1,295.04	\$12.91	\$2,749.83	\$4,044.87	\$9.08	\$1,934.04	\$14.20	\$3,024.60	\$4,960.77	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	29.00	0.15	\$6.76	\$196.04	\$12.48	\$361.92	\$557.96	\$10.14	\$294.06	\$13.72	\$397.88	\$691.94	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/8"	192.00	0.36	\$16.05	\$3,081.60	\$4.47	\$858.24	\$3,939.84	\$23.91	\$4,590.72	\$4.92	\$944.64	\$5,533.44	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	318.00	0.4	\$17.76	\$5,647.68	\$1.36	\$432.48	\$6,076.98	\$26.30	\$8,363.40	\$1.50	\$477.00	\$8,837.22	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	54.00	0.42	\$18.44	\$995.76	\$2.88	\$155.52	\$1,151.28	\$27.66	\$1,493.64	\$3.17	\$171.18	\$1,665.36	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	43.00	0.53	\$23.56	\$1,013.08	\$12.54	\$539.22	\$1,552.30	\$35.17	\$1,512.31	\$13.83	\$594.69	\$2,107.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/2"	2.00	0.61	\$26.98	\$53.96	\$17.32	\$34.64	\$88.60	\$40.64	\$81.28	\$19.05	\$38.10	\$119.38	
Tee, copper, wrought, copper x copper, 1/2"	18.00	0.62	\$26.98	\$485.64	\$2.63	\$47.34	\$532.80	\$40.64	\$731.52	\$2.88	\$51.84	\$783.36	
Tee, copper, wrought, copper x copper, 3/4"	66.00	0.67	\$29.37	\$1,938.42	\$6.51	\$429.66	\$2,368.08	\$44.05	\$2,907.30	\$7.16	\$472.56	\$3,379.86	
Tee, copper, wrought, copper x copper, 1"	42.00	0.8	\$35.17	\$1,477.14	\$18.35	\$770.70	\$2,247.84	\$52.59	\$2,208.78	\$20.18	\$847.56	\$3,056.34	
Tee, copper, wrought, copper x copper, 1-1/4"	20.00	0.89	\$39.27	\$785.40	\$26.36	\$527.20	\$1,312.60	\$58.40	\$1,168.00	\$29.05	\$581.00	\$1,749.00	
Tee, copper, wrought, copper x copper, 1-1/2"	3.00	1	\$44.05	\$132.15	\$39.27	\$117.81	\$249.96	\$65.91	\$197.73	\$43.04	\$129.12	\$326.85	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1-1/2" pipe size, includes valves and four test cocks	1.00	0.80	\$35.17	\$35.17	\$1,237.40	\$1,237.40	\$1,272.57	\$52.59	\$52.59	\$1,371.90	\$1,371.90	\$1,424.49	
				\$29,640.04		\$20,974.09	\$50,610.77		\$44,258.37		\$23,101.52	\$67,360.10	\$67,360.10

Note: Costs indicated in the above were determined based on RS Means

Water Demand Calculator 45 Unit Multi - Family Residence (Copper Piping System)

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	10,205.00	0.10	\$4.34	\$44,289.70	\$3.96	\$40,411.80	\$84,701.50	\$6.52	\$66,536.60	\$4.36	\$44,493.80	\$111,030.40	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	3,212.00	0.11	\$4.64	\$14,903.68	\$5.07	\$16,284.84	\$31,188.42	\$6.93	\$22,259.16	\$5.60	\$17,987.20	\$40,246.36	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	372.00	0.12	\$5.19	\$1,930.68	\$8.18	\$3,042.96	\$4,973.64	\$7.75	\$2,883.00	\$8.98	\$3,340.56	\$6,223.56	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	43.00	0.14	\$6.08	\$261.44	\$12.91	\$555.13	\$816.57	\$9.08	\$390.44	\$14.20	\$610.60	\$1,001.04	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	2,385.00	0.40	\$17.76	\$42,357.60	\$1.36	\$3,243.60	\$45,601.20	\$26.30	\$62,725.50	\$1.50	\$3,577.50	\$66,303.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	466.00	0.42	\$18.44	\$8,593.04	\$2.88	\$1,342.08	\$9,935.12	\$27.66	\$12,889.56	\$3.17	\$1,477.22	\$14,366.78	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	1.00	0.50	\$21.86	\$21.86	\$7.59	\$7.59	\$29.45	\$32.78	\$32.78	\$8.34	\$8.34	\$41.12	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	2.00	0.53	\$23.56	\$47.12	\$12.54	\$25.08	\$72.20	\$35.17	\$70.34	\$13.83	\$27.66	\$98.00	
Tee, copper, wrought, copper x copper, 1/2"	135.00	0.62	\$26.98	\$3,642.30	\$2.63	\$355.05	\$3,997.35	\$40.64	\$5,486.40	\$2.88	\$388.80	\$5,875.20	
Tee, copper, wrought, copper x copper, 3/4"	415.00	0.67	\$29.37	\$12,188.55	\$6.51	\$2,701.65	\$14,890.20	\$44.05	\$18,280.75	\$7.16	\$2,971.40	\$21,252.15	
Tee, copper, wrought, copper x copper, 1"	166.00	0.80	\$35.17	\$5,838.22	\$18.35	\$3,046.10	\$8,884.32	\$52.59	\$8,729.94	\$20.18	\$3,349.88	\$12,079.82	
Tee, copper, wrought, copper x copper, 1-1/4"	4.00	0.89	\$39.27	\$157.08	\$26.36	\$105.44	\$262.52	\$58.40	\$233.60	\$29.05	\$116.20	\$349.80	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1-1/2" pipe size, includes valves and four test cocks	1.00	0.80	\$35.17	\$35.17	\$1,237.40	\$1,237.40	\$1,272.57	\$52.59	\$52.59	\$1,371.90	\$1,371.90	\$1,424.49	
				\$134,266.44		\$72,358.72	\$206,625.06		\$200,570.66		\$79,721.06	\$280,291.72	\$280,291.72

Note: Costs indicated in the above were determined based on RS Means

**Uniform Plumbing Code
45 Unit Multi - Family Residence (Copper Piping System)**

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	10,170.00	0.1	\$4.34	\$44,137.80	\$3.96	\$40,273.20	\$84,411.00	\$6.52	\$66,308.40	\$4.36	\$44,341.20	\$110,649.60	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	945.00	0.11	\$4.64	\$4,384.80	\$5.07	\$4,791.15	\$9,175.95	\$6.93	\$6,548.85	\$5.60	\$5,292.00	\$11,840.85	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	1,991.00	0.12	\$5.19	\$10,333.29	\$8.18	\$16,286.38	\$26,619.67	\$7.75	\$15,430.25	\$8.98	\$17,879.18	\$33,329.34	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	312.00	0.14	\$6.08	\$1,896.96	\$12.91	\$4,027.92	\$5,924.88	\$9.08	\$2,832.96	\$14.20	\$4,430.40	\$7,266.48	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	259.00	0.15	\$6.76	\$1,750.84	\$12.48	\$3,232.32	\$4,983.16	\$10.14	\$2,626.26	\$13.72	\$3,553.48	\$6,179.74	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	83.00	0.19	\$8.40	\$697.20	\$20.28	\$1,683.24	\$2,380.44	\$12.53	\$1,039.99	\$22.60	\$1,875.80	\$2,915.79	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$10.21	\$112.31	\$32.28	\$355.08	\$467.39	\$15.37	\$169.07	\$35.51	\$390.61	\$559.68	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.29	\$11.30	\$124.30	\$50.03	\$550.33	\$674.74	\$17.08	\$187.88	\$54.88	\$603.68	\$791.45	
Pipe, copper, tubing, solder, 3-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	50.00	0.37	\$14.68	\$734.00	\$64.56	\$3,228.00	\$3,962.00	\$22.20	\$1,110.00	\$71.02	\$3,551.00	\$4,660.50	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	2,385.00	0.4	\$17.76	\$42,357.60	\$1.36	\$3,243.60	\$45,577.35	\$26.30	\$62,725.50	\$1.50	\$3,577.50	\$66,279.15	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	90.00	0.42	\$18.44	\$1,659.60	\$2.88	\$259.20	\$1,918.80	\$27.66	\$2,489.40	\$3.17	\$285.30	\$2,775.60	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	375.00	0.5	\$21.86	\$8,197.50	\$7.59	\$2,846.25	\$11,040.00	\$32.78	\$12,292.50	\$8.34	\$3,127.50	\$15,420.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$32.10	\$32.10	\$31.74	\$31.74	\$63.84	\$47.81	\$47.81	\$34.97	\$34.97	\$82.78	
Elbow, 90 Deg., copper, wrought, copper x copper, 3-1/2"	3.00	1.6	\$63.52	\$190.56	\$302.36	\$907.08	\$1,097.64	\$94.94	\$284.82	\$333.56	\$1,000.68	\$1,285.50	
Tee, copper, wrought, copper x copper, 1/2"	135.00	0.62	\$26.98	\$3,642.30	\$2.63	\$355.05	\$3,996.00	\$40.64	\$5,486.40	\$2.88	\$388.80	\$5,875.20	
Tee, copper, wrought, copper x copper, 3/4"	315.00	0.67	\$29.37	\$9,251.55	\$6.51	\$2,050.65	\$11,302.20	\$44.05	\$13,875.75	\$7.16	\$2,255.40	\$16,131.15	
Tee, copper, wrought, copper x copper, 1"	225.00	0.8	\$35.17	\$7,913.25	\$18.35	\$4,128.75	\$12,042.00	\$52.59	\$11,832.75	\$20.18	\$4,540.50	\$16,373.25	
Tee, copper, wrought, copper x copper, 1-1/4"	10.00	0.89	\$39.27	\$392.70	\$26.36	\$263.60	\$656.30	\$58.40	\$584.00	\$29.05	\$290.50	\$874.50	
Tee, copper, wrought, copper x copper, 1-1/2"	20.00	1	\$44.05	\$881.00	\$39.27	\$785.40	\$1,666.60	\$65.91	\$1,318.20	\$43.04	\$860.80	\$2,179.00	
Tee, copper, wrought, copper x copper, 2"	10.00	1.14	\$50.20	\$502.00	\$62.41	\$624.10	\$1,126.10	\$75.13	\$751.30	\$68.33	\$683.30	\$1,434.60	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2	\$79.23	\$79.23	\$119.44	\$119.44	\$198.66	\$118.84	\$118.84	\$131.27	\$131.27	\$250.11	
Tee, copper, wrought, copper x copper, 3"	1.00	2.29	\$90.84	\$90.84	\$170.01	\$170.01	\$260.85	\$135.23	\$135.23	\$187.22	\$187.22	\$322.46	
Tee, copper, wrought, copper x copper, 3-1/2"	3.00	2.67	\$105.87	\$317.61	\$511.10	\$1,533.30	\$1,850.91	\$157.77	\$473.31	\$559.52	\$1,678.56	\$2,151.87	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 4" pipe size, includes valves and four test cocks	1.00	5.33	\$211.73	\$211.73	\$8,312.10	\$8,312.10	\$8,523.83	\$317.60	\$317.60	\$9,146.00	\$9,146.00	\$9,463.60	
				\$139,891.07		\$100,057.89	\$239,920.31		\$208,987.07		\$110,105.65	\$319,092.20	\$319,092.20

Note: Costs indicated in the above were determined based on RS Means

**International Plumbing Code
45 Unit Multi - Family Residence (Copper Piping System)**

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe, copper, tubing, solder, 3/8" diameter, type L, includes coupling & clevis hanger assembly 10' OC	450.00	0.1	\$4.20	\$1,890.00	\$3.59	\$1,615.50	\$3,505.50	\$6.28	\$2,826.00	\$3.95	\$1,777.50	\$4,603.50	
Pipe, copper, tubing, solder, 1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	7,468.00	0.1	\$4.34	\$32,411.12	\$3.96	\$29,573.28	\$61,984.40	\$6.52	\$48,691.36	\$4.36	\$32,560.48	\$81,251.84	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,835.00	0.11	\$4.64	\$13,154.40	\$5.07	\$14,373.45	\$27,527.85	\$6.93	\$19,646.55	\$5.60	\$15,876.00	\$35,522.55	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	2,352.00	0.12	\$5.19	\$12,206.88	\$8.18	\$19,239.36	\$31,446.24	\$7.75	\$18,228.00	\$8.98	\$21,120.96	\$39,372.48	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	572.00	0.14	\$6.08	\$3,477.76	\$12.91	\$7,384.52	\$10,862.28	\$9.08	\$5,193.76	\$14.20	\$8,122.40	\$13,321.88	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	58.00	0.15	\$6.76	\$392.08	\$12.48	\$723.84	\$1,115.92	\$10.14	\$588.12	\$13.72	\$795.76	\$1,383.88	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	36.00	0.19	\$8.40	\$302.40	\$20.28	\$730.08	\$1,032.48	\$12.53	\$451.08	\$22.60	\$813.60	\$1,264.68	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$10.21	\$112.31	\$32.28	\$355.08	\$467.39	\$15.37	\$169.07	\$35.51	\$390.61	\$559.68	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	50.00	0.29	\$11.30	\$565.00	\$50.03	\$2,501.50	\$3,067.00	\$17.08	\$854.00	\$54.88	\$2,744.00	\$3,597.50	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/8"	135.00	0.36	\$16.05	\$2,166.75	\$4.47	\$603.45	\$2,770.20	\$23.91	\$3,227.85	\$4.92	\$664.20	\$3,890.70	
Elbow, 90 Deg., copper, wrought, copper x copper, 1/2"	1,845.00	0.4	\$17.76	\$32,767.20	\$1.36	\$2,509.20	\$35,257.95	\$26.30	\$48,523.50	\$1.50	\$2,767.50	\$51,272.55	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	450.00	0.42	\$18.44	\$8,298.00	\$2.88	\$1,296.00	\$9,594.00	\$27.66	\$12,447.00	\$3.17	\$1,426.50	\$13,878.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	420.00	0.5	\$21.86	\$9,181.20	\$7.59	\$3,187.80	\$12,364.80	\$32.78	\$13,767.60	\$8.34	\$3,502.80	\$17,270.40	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$32.10	\$32.10	\$31.74	\$31.74	\$63.84	\$47.81	\$47.81	\$34.97	\$34.97	\$82.78	
Elbow, 90 Deg., copper, wrought, copper x copper, 3"	3.00	1.45	\$57.71	\$173.13	\$93.07	\$279.21	\$452.37	\$86.06	\$258.18	\$102.22	\$306.66	\$564.84	
Tee, copper, wrought, copper x copper, 1/2"	90.00	0.62	\$26.98	\$2,428.20	\$2.63	\$236.70	\$2,664.00	\$40.64	\$3,657.60	\$2.88	\$259.20	\$3,916.80	
Tee, copper, wrought, copper x copper, 3/4"	225.00	0.67	\$29.37	\$6,608.25	\$6.51	\$1,464.75	\$8,073.00	\$44.05	\$9,911.25	\$7.16	\$1,611.00	\$11,522.25	
Tee, copper, wrought, copper x copper, 1"	360.00	0.8	\$35.17	\$12,661.20	\$18.35	\$6,606.00	\$19,267.20	\$52.59	\$18,932.40	\$20.18	\$7,264.80	\$26,197.20	
Tee, copper, wrought, copper x copper, 1-1/4"	30.00	0.89	\$39.27	\$1,178.10	\$26.36	\$790.80	\$1,968.90	\$58.40	\$1,752.00	\$29.05	\$871.50	\$2,623.50	
Tee, copper, wrought, copper x copper, 1-1/2"	5.00	1	\$44.05	\$220.25	\$39.27	\$196.35	\$416.65	\$65.91	\$329.55	\$43.04	\$215.20	\$544.75	
Tee, copper, wrought, copper x copper, 2"	6.00	1.14	\$50.20	\$301.20	\$62.41	\$374.46	\$675.66	\$75.13	\$450.78	\$68.33	\$409.98	\$860.76	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2	\$79.23	\$79.23	\$119.44	\$119.44	\$198.66	\$118.84	\$118.84	\$131.27	\$131.27	\$250.11	
Tee, copper, wrought, copper x copper, 3"	3.00	2.29	\$90.84	\$272.52	\$170.01	\$510.03	\$782.55	\$135.23	\$405.69	\$187.22	\$561.66	\$967.38	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 3" pipe size, includes valves and four test cocks	1.00	3.56	\$140.70	\$140.70	\$7,101.60	\$7,101.60	\$7,242.30	\$211.73	\$211.73	\$7,801.00	\$7,801.00	\$8,012.73	
				\$141,019.98		\$101,804.14	\$242,801.14		\$210,689.72		\$112,029.55	\$322,732.74	\$322,732.74

Note: Costs indicated in the above were determined based on RS Means

I. APPENDIX – PEX Piping System

Water Demand Calculator													
Single Family Residence (PEX Piping System)													
New York City													
Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	562.00	0.11	\$14.99	\$8,424.38	\$1.99	\$1,118.38	\$9,542.76	\$22.43	\$12,605.66	\$2.18	\$1,225.16	\$13,830.82	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 500', excludes couplings and hangers	498.00	0.00	\$0.00	\$0.00	\$0.78	\$388.44	\$388.44	\$0.00	\$0.00	\$0.86	\$428.28	\$428.28	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	1,000.00	0.00	\$0.00	\$0.00	\$0.76	\$760.00	\$760.00	\$0.00	\$0.00	\$0.84	\$840.00	\$840.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 3/4" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$1.10	\$27.50	\$27.50	\$0.00	\$0.00	\$1.21	\$30.25	\$30.25	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$2.14	\$53.50	\$53.50	\$0.00	\$0.00	\$2.35	\$58.75	\$58.75	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 3/4" pipe size, includes valves and four test cocks	1.00	0.50	\$58.40	\$58.40	\$254.98	\$254.98	\$313.38	\$87.60	\$87.60	\$280.37	\$280.37	\$367.97	
Manifold header	1.00	5.52	\$621.40	\$621.40	\$234.64	\$234.64	\$856.04	\$927.32	\$927.32	\$258.38	\$258.38	\$1,185.70	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	195.00	0.09	\$14.58	\$2,843.10	\$0.51	\$99.45	\$2,942.55	\$21.86	\$4,262.70	\$0.57	\$111.15	\$4,373.85	
				\$11,947.28		\$2,936.89	\$14,884.17		\$17,883.28		\$3,232.34	\$21,115.62	\$21,115.62

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Uniform Plumbing Code													
Single Family Residence (PEX Piping System)													
New York City													
Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	562.00	0.11	\$14.99	\$8,424.38	\$1.99	\$1,118.38	\$9,542.76	\$22.43	\$12,605.66	\$2.18	\$1,225.16	\$13,830.82	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 500', excludes couplings and hangers	498.00	0.00	\$0.00	\$0.00	\$0.78	\$388.44	\$388.44	\$0.00	\$0.00	\$0.86	\$428.28	\$428.28	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	1,000.00	0.00	\$0.00	\$0.00	\$0.76	\$760.00	\$760.00	\$0.00	\$0.00	\$0.84	\$840.00	\$840.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$2.14	\$53.50	\$53.50	\$0.00	\$0.00	\$2.35	\$58.75	\$58.75	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1-1/4" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$3.64	\$91.00	\$91.00	\$0.00	\$0.00	\$4.00	\$100.00	\$100.00	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$67.53	\$67.53	\$267.67	\$267.67	\$335.20	\$100.38	\$100.38	\$295.18	\$295.18	\$395.56	
Manifold header	1.00	5.52	\$621.40	\$621.40	\$234.64	\$234.64	\$856.04	\$927.32	\$927.32	\$258.38	\$258.38	\$1,185.70	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	195.00	0.09	\$14.58	\$2,843.10	\$0.51	\$99.45	\$2,942.55	\$21.86	\$4,262.70	\$0.57	\$111.15	\$4,373.85	
				\$11,956.41		\$3,013.08	\$14,969.49		\$17,896.06		\$3,316.90	\$21,212.96	\$21,212.96

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

International Residential Code Single Family Residence (PEX Piping System)

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size, type number 26 per MSS-SP58	562.00	0.11	\$14.99	\$8,424.38	\$1.99	\$1,118.38	\$9,542.76	\$22.43	\$12,605.66	\$2.18	\$1,225.16	\$13,830.82	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 500', excludes couplings and hangers	498.00	0.00	\$0.00	\$0.00	\$0.78	\$388.44	\$388.44	\$0.00	\$0.00	\$0.86	\$428.28	\$428.28	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	1,000.00	0.00	\$0.00	\$0.00	\$0.76	\$760.00	\$760.00	\$0.00	\$0.00	\$0.84	\$840.00	\$840.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 300', excludes couplings and hangers	35.00	0.00	\$0.00	\$0.00	\$2.14	\$74.90	\$74.90	\$0.00	\$0.00	\$2.35	\$82.25	\$82.25	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1-1/4" diameter x 100', excludes couplings and hangers	15.00	0.00	\$0.00	\$0.00	\$3.64	\$54.60	\$54.60	\$0.00	\$0.00	\$4.00	\$60.00	\$60.00	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$67.53	\$67.53	\$267.67	\$267.67	\$335.20	\$100.38	\$100.38	\$295.18	\$295.18	\$395.56	
Radiant floor heating, manifold header, copper, (cut to size), 12 circuit, 2" header, 3/4" sweat outlets	1.00	5.52	\$621.40	\$621.40	\$234.64	\$234.64	\$856.04	\$927.32	\$927.32	\$258.38	\$258.38	\$1,185.70	
Radiant floor heating, PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	195.00	0.09	\$14.58	\$2,843.10	\$0.51	\$99.45	\$2,942.55	\$21.86	\$4,262.70	\$0.57	\$111.15	\$4,373.85	
				\$11,956.41		\$2,998.08	\$14,954.49		\$17,896.06		\$3,300.40	\$21,196.46	\$21,196.46

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Water Demand Calculator 6 Unit Multi - Family Residence (PEX Piping System)

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	2,825.00	0.11	\$14.99	\$42,346.75	\$1.99	\$5,621.75	\$47,968.50	\$22.43	\$63,364.75	\$2.18	\$6,158.50	\$69,523.25	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	75.00	0.11	\$12.41	\$930.75	\$4.98	\$373.50	\$1,304.25	\$18.52	\$1,389.00	\$5.50	\$412.50	\$1,801.50	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	30.00	0.12	\$13.87	\$416.10	\$8.04	\$241.20	\$657.30	\$20.71	\$621.30	\$8.83	\$264.90	\$886.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	4.00	0.50	\$58.40	\$233.60	\$7.46	\$29.84	\$263.44	\$87.60	\$350.40	\$8.20	\$32.80	\$383.20	
Tee, copper, wrought, copper x copper, 1"	5.00	0.80	\$93.99	\$469.95	\$18.04	\$90.20	\$560.15	\$140.53	\$702.65	\$19.84	\$99.20	\$801.85	
Ball valve, copper x copper, 1", press-joint	1.00	0.44	\$52.01	\$52.01	\$67.18	\$67.18	\$119.19	\$77.56	\$77.56	\$74.06	\$74.06	\$151.62	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	530.00	0.00	\$0.00	\$0.00	\$0.80	\$424.00	\$424.00	\$0.00	\$0.00	\$0.89	\$471.70	\$471.70	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	226.00	0.00	\$0.00	\$0.00	\$0.76	\$171.76	\$171.76	\$0.00	\$0.00	\$0.84	\$189.84	\$189.84	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 3/4" diameter x 100', excludes couplings and hangers	360.00	0.00	\$0.00	\$0.00	\$1.10	\$396.00	\$396.00	\$0.00	\$0.00	\$1.21	\$435.60	\$435.60	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$67.53	\$67.53	\$592.48	\$592.48	\$660.01	\$100.38	\$100.38	\$650.67	\$650.67	\$751.05	
Manifold header	6.00	5.52	\$621.40	\$3728.40	\$234.64	\$1407.84	\$5136.24	\$927.32	\$5563.92	\$258.38	\$1550.28	\$7,114.20	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	1,050.00	0.09	\$14.58	\$15,309.00	\$0.51	\$535.50	\$15,844.50	\$21.86	\$22,953.00	\$0.57	\$598.50	\$23,551.50	
				\$63,554.09		\$9,951.25	\$73,505.34		\$95,122.96		\$10,938.55	\$106,061.51	\$106,061.51

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**Uniform Plumbing Code
6 Unit Multi - Family Residence (PEX Piping System)**

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	2,825.00	0.11	\$14.99	\$42,346.75	\$1.99	\$5,621.75	\$47,968.50	\$22.43	\$63,364.75	\$2.18	\$6,158.50	\$69,523.25	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	42.00	0.12	\$13.87	\$582.54	\$8.04	\$337.68	\$920.22	\$20.71	\$869.82	\$8.83	\$370.86	\$1,240.68	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	34.00	0.14	\$16.24	\$552.16	\$12.70	\$431.80	\$983.96	\$24.27	\$825.18	\$13.97	\$474.98	\$1,300.16	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	29.00	0.19	\$22.45	\$651.05	\$19.94	\$578.26	\$1,229.31	\$33.49	\$971.21	\$22.22	\$644.38	\$1,615.59	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	1.00	0.53	\$62.96	\$62.96	\$12.33	\$12.33	\$75.29	\$93.99	\$93.99	\$13.60	\$13.60	\$107.59	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	3.00	0.73	\$85.78	\$257.34	\$31.21	\$93.63	\$350.97	\$127.75	\$383.25	\$34.39	\$103.17	\$486.42	
Tee, copper, wrought, copper x copper, 1-1/4"	3.00	0.89	\$104.94	\$314.82	\$25.92	\$77.76	\$392.58	\$156.04	\$468.12	\$28.57	\$85.71	\$553.83	
Tee, copper, wrought, copper x copper, 2"	2.00	1.14	\$134.14	\$268.28	\$61.36	\$122.72	\$391.00	\$200.75	\$401.50	\$67.18	\$134.36	\$535.86	
Ball valve, copper x copper, 2", press-joint	1.00	0.73	\$85.78	\$85.78	\$386.17	\$386.17	\$471.95	\$127.75	\$127.75	\$428.49	\$428.49	\$556.24	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	530.00	0.00	\$0.00	\$0.00	\$0.80	\$424.00	\$424.00	\$0.00	\$0.00	\$0.89	\$471.70	\$471.70	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	7,000.00	0.00	\$0.00	\$0.00	\$0.76	\$5,320.00	\$5,320.00	\$0.00	\$0.00	\$0.84	\$5,880.00	\$5,880.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	360.00	0.00	\$0.00	\$0.00	\$2.14	\$770.40	\$770.40	\$0.00	\$0.00	\$2.35	\$846.00	\$846.00	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 2" pipe size, includes valves and four test cocks	1.00	1.14	\$134.14	\$134.14	\$1,401.85	\$1,401.85	\$1,535.99	\$200.75	\$200.75	\$1,560.55	\$1,560.55	\$1,761.30	
Manifold header	6.00	5.52	\$621.40	\$3728.40	\$234.64	\$1407.84	\$5136.24	\$927.32	\$5563.92	\$258.38	\$1550.28	\$7,114.20	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	1,050.00	0.09	\$14.58	\$15,309.00	\$0.51	\$535.50	\$15,844.50	\$21.86	\$22,953.00	\$0.57	\$598.50	\$23,551.50	
				\$64,293.22		\$17,521.69	\$81,814.91		\$96,223.24		\$19,321.08	\$115,544.32	\$115,544.32

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**International Plumbing Code
6 Unit Multi - Family Residence (PEX Piping System)**

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	2,825.00	0.11	\$14.99	\$42,346.75	\$1.99	\$5,621.75	\$47,968.50	\$22.43	\$63,364.75	\$2.18	\$6,158.50	\$69,523.25	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	42.00	0.12	\$13.87	\$582.54	\$8.04	\$337.68	\$920.22	\$20.71	\$869.82	\$8.83	\$370.86	\$1,240.68	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	34.00	0.14	\$16.24	\$552.16	\$12.70	\$431.80	\$983.96	\$24.27	\$825.18	\$13.97	\$474.98	\$1,300.16	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	29.00	0.15	\$18.07	\$524.03	\$12.27	\$355.83	\$879.86	\$27.10	\$785.90	\$13.49	\$391.21	\$1,177.11	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	1.00	0.53	\$62.96	\$62.96	\$12.33	\$12.33	\$75.29	\$93.99	\$93.99	\$13.60	\$13.60	\$107.59	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/2"	3.00	0.62	\$72.09	\$216.27	\$17.03	\$51.09	\$267.36	\$108.59	\$325.77	\$18.73	\$56.19	\$381.96	
Tee, copper, wrought, copper x copper, 1-1/4"	3.00	0.89	\$104.94	\$314.82	\$25.92	\$77.76	\$392.58	\$156.04	\$468.12	\$28.57	\$85.71	\$553.83	
Tee, copper, wrought, copper x copper, 1-1/2"	2.00	1.00	\$117.71	\$235.42	\$38.62	\$77.24	\$312.66	\$176.11	\$352.22	\$42.32	\$84.64	\$436.86	
Ball valve, copper x copper, 1-1/2", press-joint	1.00	0.63	\$73.91	\$73.91	\$268.73	\$268.73	\$342.64	\$110.41	\$110.41	\$295.18	\$295.18	\$405.59	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	530.00	0.00	\$0.00	\$0.00	\$0.80	\$424.00	\$424.00	\$0.00	\$0.00	\$0.89	\$471.70	\$471.70	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	7,000.00	0.00	\$0.00	\$0.00	\$0.76	\$5,320.00	\$5,320.00	\$0.00	\$0.00	\$0.84	\$5,880.00	\$5,880.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1-1/4" diameter x 100', excludes couplings and hangers	360.00	0.00	\$0.00	\$0.00	\$3.64	\$1,310.40	\$1,310.40	\$0.00	\$0.00	\$4.00	\$1,440.00	\$1,440.00	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1-1/2" pipe size, includes valves and four test cocks	1.00	0.80	\$93.99	\$93.99	\$1,216.70	\$1,216.70	\$1,310.69	\$140.53	\$140.53	\$1,348.95	\$1,348.95	\$1,489.48	
Manifold header	6.00	5.52	\$621.40	\$3728.40	\$234.64	\$1407.84	\$5136.24	\$927.32	\$5563.92	\$258.38	\$1550.28	\$7,114.20	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	1,050.00	0.09	\$14.58	\$15,309.00	\$0.51	\$535.50	\$15,844.50	\$21.86	\$22,953.00	\$0.57	\$598.50	\$23,551.50	
				\$64,040.25		\$17,448.65	\$81,488.90		\$95,853.61		\$19,220.30	\$115,073.91	\$115,073.91

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Water Demand Calculator 45 Unit Multi - Family Residence (PEX Piping System)

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	12,135.00	0.11	\$14.99	\$181,903.65	\$1.99	\$24,148.65	\$206,052.30	\$22.43	\$272,188.05	\$2.18	\$26,454.30	\$298,642.35	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	870.00	0.11	\$12.41	\$10,796.70	\$4.98	\$4,332.60	\$15,129.30	\$18.52	\$16,112.40	\$5.50	\$4,785.00	\$20,897.40	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	372.00	0.12	\$13.87	\$5,159.64	\$8.04	\$2,990.88	\$8,150.52	\$20.71	\$7,704.12	\$8.83	\$3,284.76	\$10,988.88	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	43.00	0.14	\$16.24	\$698.32	\$12.70	\$546.10	\$1,244.42	\$24.27	\$1,043.61	\$13.97	\$600.71	\$1,644.32	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	60.00	0.42	\$49.28	\$2,956.80	\$2.84	\$170.40	\$3,127.20	\$73.91	\$4,434.60	\$3.12	\$187.20	\$4,621.80	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	60.00	0.50	\$58.40	\$3,504.00	\$7.46	\$447.60	\$3,951.60	\$87.60	\$5,256.00	\$8.20	\$492.00	\$5,748.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	2.00	0.53	\$62.96	\$125.92	\$12.33	\$24.66	\$150.58	\$93.99	\$187.98	\$13.60	\$27.20	\$215.18	
Tee, copper, wrought, copper x copper, 3/4"	10.00	0.67	\$78.48	\$784.80	\$6.40	\$64.00	\$848.80	\$117.71	\$1,177.10	\$7.04	\$70.40	\$1,247.50	
Tee, copper, wrought, copper x copper, 1"	31.00	0.80	\$93.99	\$2,913.69	\$18.04	\$559.24	\$3,472.93	\$140.53	\$4,356.43	\$19.84	\$615.04	\$4,971.47	
Tee, copper, wrought, copper x copper, 1-1/4"	4.00	0.89	\$104.94	\$419.76	\$25.92	\$103.68	\$523.44	\$156.04	\$624.16	\$28.57	\$114.28	\$738.44	
Ball valve, copper x copper, 2", press-joint	1.00	0.73	\$85.78	\$85.78	\$386.17	\$386.17	\$471.95	\$127.75	\$127.75	\$428.49	\$428.49	\$556.24	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	465.00	0.00	\$0.00	\$0.00	\$0.80	\$372.00	\$372.00	\$0.00	\$0.00	\$0.89	\$413.85	\$413.85	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	30,000.00	0.00	\$0.00	\$0.00	\$0.76	\$22,800.00	\$22,800.00	\$0.00	\$0.00	\$0.84	\$25,200.00	\$25,200.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 3/4" diameter x 100', excludes couplings and hangers	1,890.00	0.00	\$0.00	\$0.00	\$1.10	\$2,079.00	\$2,079.00	\$0.00	\$0.00	\$1.21	\$2,286.90	\$2,286.90	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 2" pipe size, includes valves and four test cocks	1.00	1.14	\$134.14	\$134.14	\$1,401.85	\$1,401.85	\$1,535.99	\$200.75	\$200.75	\$1,560.55	\$1,560.55	\$1,761.30	
Manifold header	45.00	5.52	\$621.40	\$27963.00	\$234.64	\$10558.80	\$38521.80	\$927.32	\$41729.40	\$258.38	\$11627.10	\$53,356.50	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	6,435.00	0.09	\$14.58	\$93,822.30	\$0.51	\$3,281.85	\$97,104.15	\$21.86	\$140,669.10	\$0.57	\$3,667.95	\$144,337.05	
				\$331,268.50		\$74,267.48	\$405,535.98		\$495,811.45		\$81,815.73	\$577,627.18	\$577,627.18

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**Uniform Plumbing Code
45 Unit Multi - Family Residence (PEX Piping System)**

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	12,135.00	0.11	\$14.99	\$181,903.65	\$1.99	\$24,148.65	\$206,052.30	\$22.43	\$272,188.05	\$2.18	\$26,454.30	\$298,642.35	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	557.00	0.12	\$13.87	\$7,725.59	\$8.04	\$4,478.28	\$12,203.87	\$20.71	\$11,535.47	\$8.83	\$4,918.31	\$16,453.78	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	313.00	0.14	\$16.24	\$5,083.12	\$12.70	\$3,975.10	\$9,058.22	\$24.27	\$7,596.51	\$13.97	\$4,372.61	\$11,969.12	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	259.00	0.15	\$18.07	\$4,680.13	\$12.27	\$3,177.93	\$7,858.06	\$27.10	\$7,018.90	\$13.49	\$3,493.91	\$10,512.81	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	83.00	0.19	\$22.45	\$1,863.35	\$19.94	\$1,655.02	\$3,518.37	\$33.49	\$2,779.67	\$22.22	\$1,844.26	\$4,623.93	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$27.28	\$300.08	\$31.74	\$349.14	\$649.22	\$41.06	\$451.66	\$34.91	\$384.01	\$835.67	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.29	\$30.20	\$332.20	\$49.20	\$541.20	\$873.40	\$45.63	\$501.93	\$53.96	\$593.56	\$1,095.49	
Pipe, copper, tubing, solder, 3-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	51.00	0.37	\$39.24	\$2,001.24	\$63.48	\$3,237.48	\$5,238.72	\$59.31	\$3,024.81	\$69.83	\$3,561.33	\$6,586.14	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	60.00	0.50	\$58.40	\$3,504.00	\$7.46	\$447.60	\$3,951.60	\$87.60	\$5,256.00	\$8.20	\$492.00	\$5,748.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$85.78	\$85.78	\$31.21	\$31.21	\$116.99	\$127.75	\$127.75	\$34.39	\$34.39	\$162.14	
Elbow, 90 Deg., copper, wrought, copper x copper, 3-1/2"	4.00	1.60	\$169.73	\$678.92	\$297.30	\$1,189.20	\$1,868.12	\$253.68	\$1,014.72	\$327.98	\$1,311.92	\$2,326.64	
Tee, copper, wrought, copper x copper, 1-1/4"	10.00	0.89	\$104.94	\$1,049.40	\$25.92	\$259.20	\$1,308.60	\$156.04	\$1,560.40	\$28.57	\$285.70	\$1,846.10	
Tee, copper, wrought, copper x copper, 1-1/2"	20.00	1.00	\$117.71	\$2,354.20	\$38.62	\$772.40	\$3,126.60	\$176.11	\$3,522.20	\$42.32	\$846.40	\$4,368.60	
Tee, copper, wrought, copper x copper, 2"	10.00	1.14	\$134.14	\$1,341.40	\$61.36	\$613.60	\$1,955.00	\$200.75	\$2,007.50	\$67.18	\$671.80	\$2,679.30	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2.00	\$211.70	\$211.70	\$117.44	\$117.44	\$329.14	\$317.55	\$317.55	\$129.08	\$129.08	\$446.63	
Tee, copper, wrought, copper x copper, 3"	1.00	2.29	\$242.73	\$242.73	\$167.16	\$167.16	\$409.89	\$361.35	\$361.35	\$184.09	\$184.09	\$545.44	
Tee, copper, wrought, copper x copper, 3-1/2"	3.00	2.67	\$282.88	\$848.64	\$502.55	\$1,507.65	\$2,356.29	\$421.58	\$1,264.74	\$550.16	\$1,650.48	\$2,915.22	
Pipe, fittings & valves, valve, ball, carbon steel trim, grooved joint, 4" pipe size, add 1 coupling (material only) per joint for installed price, incl handle, excl joint coupling material	1.00	0.70	\$73.91	\$73.91	\$1,190.25	\$1,190.25	\$1,264.16	\$110.41	\$110.41	\$1,322.50	\$1,322.50	\$1,432.91	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	465.00	0.00	\$0.00	\$0.00	\$0.80	\$372.00	\$372.00	\$0.00	\$0.00	\$0.89	\$413.85	\$413.85	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	30,000.00	0.00	\$0.00	\$0.00	\$0.76	\$22,800.00	\$22,800.00	\$0.00	\$0.00	\$0.84	\$25,200.00	\$25,200.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	1,890.00	0.00	\$0.00	\$0.00	\$2.14	\$4,044.60	\$4,044.60	\$0.00	\$0.00	\$2.35	\$4,441.50	\$4,441.50	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 4" pipe size, includes valves and four test cocks	1.00	5.33	\$565.75	\$565.75	\$8,173.05	\$8,173.05	\$8,738.80	\$848.63	\$848.63	\$8,993.00	\$8,993.00	\$9,841.63	
Manifold header	45.00	5.52	\$621.40	\$27963.00	\$234.64	\$10558.80	\$38521.80	\$927.32	\$41729.40	\$258.38	\$11627.10	\$53,356.50	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	6,435.00	0.09	\$14.58	\$93,822.30	\$0.51	\$3,281.85	\$97,104.15	\$21.86	\$140,669.10	\$0.57	\$3,667.95	\$144,337.05	
				\$336,631.09		\$97,088.81	\$433,719.90		\$503,886.75		\$106,894.05	\$610,780.80	\$610,780.80

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**International Plumbing Code
45 Unit Multi - Family Residence (PEX Piping System)**

New York City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	12,135.00	0.11	\$14.99	\$181,903.65	\$1.99	\$24,148.65	\$206,052.30	\$22.43	\$272,188.05	\$2.18	\$26,454.30	\$298,642.35	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	557.00	0.12	\$13.87	\$7,725.59	\$8.04	\$4,478.28	\$12,203.87	\$20.71	\$11,535.47	\$8.83	\$4,918.31	\$16,453.78	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	313.00	0.14	\$16.24	\$5,083.12	\$12.70	\$3,975.10	\$9,058.22	\$24.27	\$7,596.51	\$13.97	\$4,372.61	\$11,969.12	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	259.00	0.15	\$18.07	\$4,680.13	\$12.27	\$3,177.93	\$7,858.06	\$27.10	\$7,018.90	\$13.49	\$3,493.91	\$10,512.81	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	94.00	0.19	\$22.45	\$2,110.30	\$19.94	\$1,874.36	\$3,984.66	\$33.49	\$3,148.06	\$22.22	\$2,088.68	\$5,236.74	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$27.28	\$300.08	\$31.74	\$349.14	\$649.22	\$41.06	\$451.66	\$34.91	\$384.01	\$835.67	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	51.00	0.29	\$30.20	\$1,540.20	\$49.20	\$2,509.20	\$4,049.40	\$45.63	\$2,327.13	\$53.96	\$2,751.96	\$5,079.09	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	60.00	0.50	\$58.40	\$3,504.00	\$7.46	\$447.60	\$3,951.60	\$87.60	\$5,256.00	\$8.20	\$492.00	\$5,748.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$85.78	\$85.78	\$31.21	\$31.21	\$116.99	\$127.75	\$127.75	\$34.39	\$34.39	\$162.14	
Elbow, 90 Deg., copper, wrought, copper x copper, 3"	4.00	1.45	\$154.21	\$616.84	\$91.52	\$366.08	\$982.92	\$229.95	\$919.80	\$100.51	\$402.04	\$1,321.84	
Tee, copper, wrought, copper x copper, 1-1/4"	10.00	0.89	\$104.94	\$1,049.40	\$25.92	\$259.20	\$1,308.60	\$156.04	\$1,560.40	\$28.57	\$285.70	\$1,846.10	
Tee, copper, wrought, copper x copper, 1-1/2"	20.00	1.00	\$117.71	\$2,354.20	\$38.62	\$772.40	\$3,126.60	\$176.11	\$3,522.20	\$42.32	\$846.40	\$4,368.60	
Tee, copper, wrought, copper x copper, 2"	11.00	1.14	\$134.14	\$1,475.54	\$61.36	\$674.96	\$2,150.50	\$200.75	\$2,208.25	\$67.18	\$738.98	\$2,947.23	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2.00	\$211.70	\$211.70	\$117.44	\$117.44	\$329.14	\$317.55	\$317.55	\$129.08	\$129.08	\$446.63	
Tee, copper, wrought, copper x copper, 3"	3.00	2.29	\$242.73	\$728.19	\$167.16	\$501.48	\$1,229.67	\$361.35	\$1,084.05	\$184.09	\$552.27	\$1,636.32	
Pipe, fittings & valves, valve, ball, carbon steel trim, grooved joint, 3" pipe size, add 1 coupling (material only) per joint for installed price, incl handle, excl joint coupling material	1.00	0.52	\$54.75	\$54.75	\$772.34	\$772.34	\$827.09	\$82.13	\$82.13	\$846.40	\$846.40	\$928.53	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	465.00	0.00	\$0.00	\$0.00	\$0.80	\$372.00	\$372.00	\$0.00	\$0.00	\$0.89	\$413.85	\$413.85	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	30,000.00	0.00	\$0.00	\$0.00	\$0.76	\$22,800.00	\$22,800.00	\$0.00	\$0.00	\$0.84	\$25,200.00	\$25,200.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	1,890.00	0.00	\$0.00	\$0.00	\$2.14	\$4,044.60	\$4,044.60	\$0.00	\$0.00	\$2.35	\$4,441.50	\$4,441.50	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 3" pipe size, includes valves and four test cocks	1.00	3.56	\$375.95	\$375.95	\$6,982.80	\$6,982.80	\$7,358.75	\$565.75	\$565.75	\$7,670.50	\$7,670.50	\$8,236.25	
Manifold header	45.00	5.52	\$621.40	\$27963.00	\$234.64	\$10558.80	\$38521.80	\$927.32	\$41729.40	\$258.38	\$11627.10	\$53,356.50	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	6,435.00	0.09	\$14.58	\$93,822.30	\$0.51	\$3,281.85	\$97,104.15	\$21.86	\$140,699.10	\$0.57	\$3,667.95	\$144,337.50	
				\$335,584.72		\$92,495.42	\$428,080.14		\$502,338.16		\$101,811.94	\$604,120.55	\$604,120.55

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Water Demand Calculator Single Family Residence (PEX Piping System)

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	562.00	0.11	\$8.23	\$4,625.26	\$1.92	\$1,079.04	\$5,704.30	\$12.31	\$6,918.22	\$2.11	\$1,185.82	\$8,104.04	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 500', excludes couplings and hangers	498.00	0.00	\$0.00	\$0.00	\$0.74	\$368.52	\$368.52	\$0.00	\$0.00	\$0.81	\$403.38	\$403.38	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	1,000.00	0.00	\$0.00	\$0.00	\$0.72	\$720.00	\$720.00	\$0.00	\$0.00	\$0.79	\$790.00	\$790.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 3/4" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$1.05	\$26.25	\$26.25	\$0.00	\$0.00	\$1.15	\$28.75	\$28.75	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$2.03	\$50.75	\$50.75	\$0.00	\$0.00	\$2.23	\$55.75	\$55.75	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 3/4" pipe size, includes valves and four test cocks	1.00	0.50	\$31.94	\$31.94	\$242.21	\$242.21	\$274.15	\$47.90	\$47.90	\$266.33	\$266.33	\$314.23	
Manifold header	1.00	5.52	\$327.60	\$327.60	\$234.64	\$234.64	\$562.24	\$488.88	\$488.88	\$258.38	\$258.38	\$747.26	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	195.00	0.09	\$7.69	\$1,499.55	\$0.51	\$99.45	\$1,599.00	\$11.53	\$2,248.35	\$0.57	\$111.15	\$2,359.50	
				\$6,484.35		\$2,820.86	\$9,305.21		\$9,703.35		\$3,099.56	\$12,802.91	\$12,802.91

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Uniform Plumbing Code Single Family Residence (PEX Piping System)

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	562.00	0.11	\$8.23	\$4,625.26	\$1.92	\$1,079.04	\$5,704.30	\$12.31	\$6,918.22	\$2.11	\$1,185.82	\$8,104.04	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 500', excludes couplings and hangers	498.00	0.00	\$0.00	\$0.00	\$0.74	\$368.52	\$368.52	\$0.00	\$0.00	\$0.81	\$403.38	\$403.38	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	1,000.00	0.00	\$0.00	\$0.00	\$0.72	\$720.00	\$720.00	\$0.00	\$0.00	\$0.79	\$790.00	\$790.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$2.03	\$50.75	\$50.75	\$0.00	\$0.00	\$2.23	\$55.75	\$55.75	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1-1/4" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$3.46	\$86.50	\$86.50	\$0.00	\$0.00	\$3.80	\$95.00	\$95.00	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$36.93	\$36.93	\$254.27	\$254.27	\$291.19	\$54.89	\$54.89	\$280.40	\$280.40	\$335.29	
Manifold header	1.00	5.52	\$327.60	\$327.60	\$234.64	\$234.64	\$562.24	\$488.88	\$488.88	\$258.38	\$258.38	\$747.26	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	195.00	0.09	\$7.69	\$1,499.55	\$0.51	\$99.45	\$1,599.00	\$11.53	\$2,248.35	\$0.57	\$111.15	\$2,359.50	
				\$6,489.34		\$2,893.17	\$9,382.50		\$9,710.34		\$3,179.88	\$12,890.22	\$12,890.22

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

International Residential Code Single Family Residence (PEX Piping System)

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size, type number 26 per MSS-SP58	562.00	0.11	\$8.23	\$4,625.26	\$1.92	\$1,079.04	\$5,704.30	\$12.31	\$6,918.22	\$2.11	\$1,185.82	\$8,104.04	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 500', excludes couplings and hangers	498.00	0.00	\$0.00	\$0.00	\$0.74	\$368.52	\$368.52	\$0.00	\$0.00	\$0.81	\$403.38	\$403.38	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	1,000.00	0.00	\$0.00	\$0.00	\$0.72	\$720.00	\$720.00	\$0.00	\$0.00	\$0.79	\$790.00	\$790.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 300', excludes couplings and hangers	35.00	0.00	\$0.00	\$0.00	\$2.03	\$71.05	\$71.05	\$0.00	\$0.00	\$2.23	\$78.05	\$78.05	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1-1/4" diameter x 100', excludes couplings and hangers	15.00	0.00	\$0.00	\$0.00	\$3.46	\$51.90	\$51.90	\$0.00	\$0.00	\$3.80	\$57.00	\$57.00	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$36.93	\$36.93	\$254.27	\$254.27	\$291.20	\$54.89	\$54.89	\$280.40	\$280.40	\$335.29	
Radiant floor heating, manifold header, copper, (cut to size), 12 circuit, 2" header, 3/4" sweat outlets	1.00	5.52	\$327.60	\$327.60	\$234.64	\$234.64	\$562.24	\$488.88	\$488.88	\$258.38	\$258.38	\$747.26	
Radiant floor heating, PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	195.00	0.09	\$7.69	\$1,499.55	\$0.51	\$99.45	\$1,599.00	\$11.53	\$2,248.35	\$0.57	\$111.15	\$2,359.50	
				\$6,489.34		\$2,878.87	\$9,368.21		\$9,710.34		\$3,164.18	\$12,874.52	\$12,874.52

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Water Demand Calculator 6 Unit Multi - Family Residence (PEX Piping System)

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	2,825.00	0.11	\$8.23	\$23,249.75	\$1.92	\$5,424.00	\$28,673.75	\$12.31	\$34,775.75	\$2.11	\$5,960.75	\$40,736.50	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	75.00	0.11	\$6.79	\$509.25	\$4.73	\$354.75	\$864.00	\$10.13	\$759.75	\$5.23	\$392.25	\$1,152.00	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	30.00	0.12	\$7.58	\$227.40	\$7.64	\$229.20	\$456.60	\$11.33	\$339.90	\$8.39	\$251.70	\$591.60	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	4.00	0.50	\$31.94	\$127.76	\$7.09	\$28.36	\$156.12	\$47.90	\$191.60	\$7.79	\$31.16	\$222.76	
Tee, copper, wrought, copper x copper, 1"	5.00	0.80	\$51.40	\$257.00	\$17.14	\$85.70	\$342.70	\$76.85	\$384.25	\$18.84	\$94.20	\$478.45	
Ball valve, copper x copper, 1", press-joint	1.00	0.44	\$28.44	\$28.44	\$63.82	\$63.82	\$92.26	\$42.42	\$42.42	\$70.35	\$70.35	\$112.77	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	530.00	0.00	\$0.00	\$0.00	\$0.76	\$402.80	\$402.80	\$0.00	\$0.00	\$0.84	\$445.20	\$445.20	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	226.00	0.00	\$0.00	\$0.00	\$0.72	\$162.72	\$162.72	\$0.00	\$0.00	\$0.79	\$178.54	\$178.54	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 3/4" diameter x 100', excludes couplings and hangers	360.00	0.00	\$0.00	\$0.00	\$1.05	\$378.00	\$378.00	\$0.00	\$0.00	\$1.15	\$414.00	\$414.00	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$36.93	\$36.93	\$562.80	\$562.80	\$599.73	\$54.89	\$54.89	\$618.08	\$618.08	\$672.97	
Manifold header	6.00	5.52	\$327.60	\$1965.60	\$234.64	\$1407.60	\$3373.20	\$488.88	\$2933.28	\$258.38	\$1550.28	\$4483.56	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	1,050.00	0.09	\$7.69	\$8,074.50	\$0.51	\$535.50	\$8,610.00	\$11.53	\$12,106.50	\$0.57	\$598.50	\$12,705.00	
				\$34,476.63		\$9,635.25	\$44,111.88		\$51,588.34		\$10,605.01	\$62,193.35	\$62,193.35

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**Uniform Plumbing Code
6 Unit Multi - Family Residence (PEX Piping System)**

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	2,825.00	0.11	\$8.23	\$23,249.75	\$1.92	\$5,424.00	\$28,673.75	\$12.31	\$34,775.75	\$2.11	\$5,960.75	\$40,736.50	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	42.00	0.12	\$7.58	\$318.36	\$7.64	\$320.88	\$639.24	\$11.33	\$475.86	\$8.39	\$352.38	\$828.24	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	34.00	0.14	\$8.88	\$301.92	\$12.06	\$410.04	\$711.96	\$13.27	\$451.18	\$13.27	\$451.18	\$902.36	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	29.00	0.19	\$12.28	\$356.12	\$18.94	\$549.26	\$905.38	\$18.31	\$530.99	\$21.11	\$612.19	\$1,143.18	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	1.00	0.53	\$34.43	\$34.43	\$11.71	\$11.71	\$46.14	\$51.40	\$51.40	\$12.91	\$12.91	\$64.31	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	3.00	0.73	\$46.91	\$140.73	\$29.65	\$88.95	\$229.68	\$69.86	\$209.58	\$32.66	\$97.98	\$307.56	
Tee, copper, wrought, copper x copper, 1-1/4"	3.00	0.89	\$57.39	\$172.17	\$24.62	\$73.86	\$246.03	\$85.33	\$255.99	\$27.14	\$81.42	\$337.41	
Tee, copper, wrought, copper x copper, 2"	2.00	1.14	\$73.35	\$146.70	\$58.29	\$116.58	\$263.28	\$109.78	\$219.56	\$63.82	\$127.64	\$347.20	
Ball valve, copper x copper, 2", press-joint	1.00	0.73	\$46.91	\$46.91	\$366.83	\$366.83	\$413.74	\$69.86	\$69.86	\$407.03	\$407.03	\$476.89	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	530.00	0.00	\$0.00	\$0.00	\$0.76	\$402.80	\$402.80	\$0.00	\$0.00	\$0.84	\$445.20	\$445.20	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	7,000.00	0.00	\$0.00	\$0.00	\$0.72	\$5,040.00	\$5,040.00	\$0.00	\$0.00	\$0.79	\$5,530.00	\$5,530.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	360.00	0.00	\$0.00	\$0.00	\$2.03	\$730.80	\$730.80	\$0.00	\$0.00	\$2.23	\$802.80	\$802.80	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 2" pipe size, includes valves and four test cocks	1.00	1.14	\$73.35	\$73.35	\$1,331.63	\$1,331.63	\$1,404.98	\$109.78	\$109.78	\$1,482.38	\$1,482.38	\$1,592.16	
Manifold header	6.00	5.52	\$327.60	\$1965.60	\$234.64	\$1407.60	\$3373.20	\$488.88	\$2933.28	\$258.38	\$1550.28	\$4483.56	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	1,050.00	0.09	\$7.69	\$8,074.50	\$0.51	\$535.50	\$8,610.00	\$11.53	\$12,106.50	\$0.57	\$598.50	\$12,705.00	
				\$34,880.54		\$16,810.44	\$51,690.98		\$52,189.73		\$18,512.64	\$70,702.37	\$70,702.37

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**International Plumbing Code
6 Unit Multi - Family Residence (PEX Piping System)**

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	2,825.00	0.11	\$8.23	\$23,249.75	\$1.92	\$5,424.00	\$28,673.75	\$12.31	\$34,775.75	\$2.11	\$5,960.75	\$40,736.50	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	42.00	0.12	\$7.58	\$318.36	\$7.64	\$320.88	\$639.24	\$11.33	\$475.86	\$8.39	\$352.38	\$828.24	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	34.00	0.14	\$8.88	\$301.92	\$12.06	\$410.04	\$711.96	\$13.27	\$451.18	\$13.27	\$451.18	\$902.36	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	29.00	0.15	\$9.88	\$286.52	\$11.66	\$338.14	\$624.66	\$14.82	\$429.78	\$12.81	\$371.49	\$801.27	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	1.00	0.53	\$34.43	\$34.43	\$11.71	\$11.71	\$46.14	\$51.40	\$51.40	\$12.91	\$12.91	\$64.31	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/2"	3.00	0.62	\$39.42	\$118.26	\$16.18	\$48.54	\$166.80	\$59.38	\$178.14	\$17.79	\$53.37	\$231.51	
Tea, copper, wrought, copper x copper, 1-1/4"	3.00	0.89	\$57.39	\$172.17	\$24.62	\$73.86	\$246.03	\$85.33	\$255.99	\$27.14	\$81.42	\$337.41	
Tea, copper, wrought, copper x copper, 1-1/2"	2.00	1.00	\$64.37	\$128.74	\$36.68	\$73.36	\$202.10	\$96.31	\$192.62	\$40.20	\$80.40	\$273.02	
Ball valve, copper x copper, 1-1/2", press-joint	1.00	0.63	\$40.42	\$40.42	\$255.27	\$255.27	\$295.69	\$60.38	\$60.38	\$280.40	\$280.40	\$340.78	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	530.00	0.00	\$0.00	\$0.00	\$0.76	\$402.80	\$402.80	\$0.00	\$0.00	\$0.84	\$445.20	\$445.20	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	7,000.00	0.00	\$0.00	\$0.00	\$0.72	\$5,040.00	\$5,040.00	\$0.00	\$0.00	\$0.79	\$5,530.00	\$5,530.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1-1/4" diameter x 100', excludes couplings and hangers	360.00	0.00	\$0.00	\$0.00	\$3.46	\$1,245.60	\$1,245.60	\$0.00	\$0.00	\$3.80	\$1,368.00	\$1,368.00	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1-1/2" pipe size, includes valves and four test cocks	1.00	0.80	\$51.40	\$51.40	\$1,155.75	\$1,155.75	\$1,207.15	\$76.85	\$76.85	\$1,281.38	\$1,281.38	\$1,358.23	
Manifold header	6.00	5.52	\$327.60	\$1965.60	\$234.64	\$1407.60	\$3373.20	\$488.88	\$2933.28	\$258.38	\$1550.28	\$4483.56	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	1,050.00	0.09	\$7.69	\$8,074.50	\$0.51	\$535.50	\$8,610.00	\$11.53	\$12,106.50	\$0.57	\$598.50	\$12,705.00	
				\$34,742.07		\$16,743.05	\$51,485.12		\$51,987.73		\$18,417.66	\$70,405.39	\$70,405.39

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Water Demand Calculator 45 Unit Multi - Family Residence (PEX Piping System)

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	12,135.00	0.11	\$8.23	\$99,871.05	\$1.92	\$23,299.20	\$123,170.25	\$12.31	\$149,381.85	\$2.11	\$25,604.85	\$174,986.70	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	870.00	0.11	\$6.79	\$5,907.30	\$4.73	\$4,115.10	\$10,022.40	\$10.13	\$8,813.10	\$5.23	\$4,550.10	\$13,363.20	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	372.00	0.12	\$7.58	\$2,819.76	\$7.64	\$2,842.08	\$5,661.84	\$11.33	\$4,214.76	\$8.39	\$3,121.08	\$7,335.84	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	43.00	0.14	\$8.88	\$381.84	\$12.06	\$518.58	\$900.42	\$13.27	\$570.61	\$13.27	\$570.61	\$1,141.22	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	60.00	0.42	\$26.95	\$1,617.00	\$2.69	\$161.40	\$1,778.40	\$40.42	\$2,425.20	\$2.96	\$177.60	\$2,602.80	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	60.00	0.50	\$31.94	\$1,916.40	\$7.09	\$425.40	\$2,341.80	\$47.90	\$2,874.00	\$7.79	\$467.40	\$3,341.40	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	2.00	0.53	\$34.43	\$68.86	\$11.71	\$23.42	\$92.28	\$51.40	\$102.80	\$12.91	\$25.82	\$128.62	
Tee, copper, wrought, copper x copper, 3/4"	10.00	0.67	\$42.91	\$429.10	\$6.08	\$60.80	\$489.90	\$64.37	\$643.70	\$6.68	\$66.80	\$710.50	
Tee, copper, wrought, copper x copper, 1"	31.00	0.80	\$51.40	\$1,593.40	\$17.14	\$531.34	\$2,124.74	\$76.85	\$2,382.35	\$18.84	\$584.04	\$2,966.39	
Tee, copper, wrought, copper x copper, 1-1/4"	4.00	0.89	\$57.39	\$229.56	\$24.62	\$98.48	\$328.04	\$85.33	\$341.32	\$27.14	\$108.56	\$449.88	
Ball valve, copper x copper, 2", press-joint	1.00	0.73	\$46.91	\$46.91	\$366.83	\$366.83	\$413.74	\$69.86	\$69.86	\$407.03	\$407.03	\$476.89	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	465.00	0.00	\$0.00	\$0.00	\$0.76	\$353.40	\$353.40	\$0.00	\$0.00	\$0.84	\$390.60	\$390.60	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	30,000.00	0.00	\$0.00	\$0.00	\$0.72	\$21,600.00	\$21,600.00	\$0.00	\$0.00	\$0.79	\$23,700.00	\$23,700.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 3/4" diameter x 100', excludes couplings and hangers	1,890.00	0.00	\$0.00	\$0.00	\$1.05	\$1,984.50	\$1,984.50	\$0.00	\$0.00	\$1.15	\$2,173.50	\$2,173.50	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 2" pipe size, includes valves and four test cocks	1.00	1.14	\$73.35	\$73.35	\$1,331.63	\$1,331.63	\$1,404.98	\$109.78	\$109.78	\$1,482.38	\$1,482.38	\$1,592.16	
Manifold header	45.00	5.52	\$327.60	\$14,742.00	\$234.64	\$10,558.80	\$25,300.80	\$488.88	\$21,999.60	\$258.38	\$11,627.10	\$33,626.70	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	6,435.00	0.09	\$7.69	\$49,485.15	\$0.51	\$3,281.85	\$52,767.00	\$11.53	\$74,195.55	\$0.57	\$3,667.95	\$77,863.50	
				\$179,181.68		\$71,552.81	\$250,734.49		\$268,124.48		\$78,725.42	\$346,849.90	\$346,849.90

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**Uniform Plumbing Code
45 Unit Multi - Family Residence (PEX Piping System)**

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	12,135.00	0.11	\$8.23	\$99,871.05	\$1.92	\$23,299.20	\$123,170.25	\$12.31	\$149,381.85	\$2.11	\$25,604.85	\$174,986.70	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	557.00	0.12	\$7.58	\$4,222.06	\$7.64	\$4,255.48	\$8,477.54	\$11.33	\$6,310.81	\$8.39	\$4,673.23	\$10,984.04	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	313.00	0.14	\$8.88	\$2,779.44	\$12.06	\$3,774.78	\$6,554.22	\$13.27	\$4,153.51	\$13.27	\$4,153.51	\$8,307.02	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	259.00	0.15	\$9.88	\$2,558.92	\$11.66	\$3,019.94	\$5,578.86	\$14.82	\$3,838.38	\$12.81	\$3,317.79	\$7,156.17	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	83.00	0.19	\$12.28	\$1,019.24	\$18.94	\$1,572.02	\$2,591.26	\$18.31	\$1,519.73	\$21.11	\$1,752.13	\$3,271.86	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$14.92	\$164.12	\$30.15	\$331.65	\$495.77	\$22.46	\$247.06	\$33.17	\$364.87	\$611.93	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.29	\$16.52	\$181.72	\$46.73	\$514.03	\$695.75	\$24.95	\$274.45	\$51.26	\$563.86	\$838.31	
Pipe, copper, tubing, solder, 3-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	51.00	0.37	\$21.46	\$1,094.46	\$60.30	\$3,075.30	\$4,169.76	\$32.44	\$1,654.44	\$66.33	\$3,382.83	\$5,037.27	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	60.00	0.50	\$31.94	\$1,916.40	\$7.09	\$425.40	\$2,341.80	\$47.90	\$2,874.00	\$7.79	\$467.40	\$3,341.40	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$46.91	\$46.91	\$29.65	\$29.65	\$76.56	\$69.86	\$69.86	\$32.66	\$32.66	\$102.52	
Elbow, 90 Deg., copper, wrought, copper x copper, 3-1/2"	4.00	1.60	\$92.81	\$371.24	\$282.41	\$1,129.64	\$1,500.88	\$138.72	\$554.88	\$311.55	\$1,246.20	\$1,801.08	
Tee, copper, wrought, copper x copper, 1-1/4"	10.00	0.89	\$57.39	\$573.90	\$24.62	\$246.20	\$820.10	\$85.33	\$853.30	\$27.14	\$271.40	\$1,124.70	
Tee, copper, wrought, copper x copper, 1-1/2"	20.00	1.00	\$64.37	\$1,287.40	\$36.68	\$733.60	\$2,021.00	\$96.31	\$1,926.20	\$40.20	\$804.00	\$2,730.20	
Tee, copper, wrought, copper x copper, 2"	10.00	1.14	\$73.35	\$733.50	\$58.29	\$582.90	\$1,316.40	\$109.78	\$1,097.80	\$63.82	\$638.20	\$1,736.00	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2.00	\$115.77	\$115.77	\$111.56	\$111.56	\$227.33	\$173.65	\$173.65	\$122.61	\$122.61	\$296.26	
Tee, copper, wrought, copper x copper, 3"	1.00	2.29	\$132.73	\$132.73	\$158.79	\$158.79	\$291.52	\$197.60	\$197.60	\$174.87	\$174.87	\$372.47	
Tee, copper, wrought, copper x copper, 3-1/2"	3.00	2.67	\$154.69	\$464.07	\$477.38	\$1,432.14	\$1,896.21	\$230.54	\$691.62	\$522.60	\$1,567.80	\$2,259.42	
Pipe, fittings & valves, valve, ball, carbon steel trim, grooved joint, 4" pipe size, add 1 coupling (material only) per joint for installed price, incl handle, excl joint coupling material	1.00	0.70	\$40.42	\$40.42	\$1,130.63	\$1,130.63	\$1,171.05	\$60.38	\$60.38	\$1,256.25	\$1,256.25	\$1,316.63	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100 ', excludes couplings and hangers	465.00	0.00	\$0.00	\$0.00	\$0.76	\$353.40	\$353.40	\$0.00	\$0.00	\$0.84	\$390.60	\$390.60	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000 ', excludes couplings and hangers	30,000.00	0.00	\$0.00	\$0.00	\$0.72	\$21,600.00	\$21,600.00	\$0.00	\$0.00	\$0.79	\$23,700.00	\$23,700.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100 ', excludes couplings and hangers	1,890.00	0.00	\$0.00	\$0.00	\$2.03	\$3,836.70	\$3,836.70	\$0.00	\$0.00	\$2.23	\$4,214.70	\$4,214.70	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 4" pipe size, includes valves and four test cocks	1.00	5.33	\$309.38	\$309.38	\$7,763.63	\$7,763.63	\$8,073.01	\$464.07	\$464.07	\$8,542.50	\$8,542.50	\$9,006.57	
Manifold header	45.00	5.52	\$327.60	\$14742.00	\$234.64	\$10,558.80	\$25,300.80	\$488.88	\$21999.60	\$258.38	\$11,627.10	\$33,626.70	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	6,435.00	0.09	\$7.69	\$49,485.15	\$0.51	\$3,281.85	\$52,767.00	\$11.53	\$74,195.55	\$0.57	\$3,667.95	\$77,863.50	
				\$182,109.88		\$93,217.29	\$275,327.17		\$272,538.74		\$102,537.31	\$375,076.05	\$375,076.05

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**International Plumbing Code
45 Unit Multi - Family Residence (PEX Piping System)**

Pittsburgh, Pa.

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	12,135.00	0.11	\$8.23	\$99,871.05	\$1.92	\$23,299.20	\$123,170.25	\$12.31	\$149,381.85	\$2.11	\$25,604.85	\$174,986.70	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	557.00	0.12	\$7.58	\$4,222.06	\$7.64	\$4,255.48	\$8,477.54	\$11.33	\$6,310.81	\$8.39	\$4,673.23	\$10,984.04	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	313.00	0.14	\$8.88	\$2,779.44	\$12.06	\$3,774.78	\$6,554.22	\$13.27	\$4,153.51	\$13.27	\$4,153.51	\$8,307.02	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	259.00	0.15	\$9.88	\$2,558.92	\$11.66	\$3,019.94	\$5,578.86	\$14.82	\$3,838.38	\$12.81	\$3,317.79	\$7,156.17	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	94.00	0.19	\$12.28	\$1,154.32	\$18.94	\$1,780.36	\$2,934.68	\$18.31	\$1,721.14	\$21.11	\$1,984.34	\$3,705.48	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$14.92	\$164.12	\$30.15	\$331.65	\$495.77	\$22.46	\$247.06	\$33.17	\$364.87	\$611.93	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	51.00	0.29	\$16.52	\$842.52	\$46.73	\$2,383.23	\$3,225.75	\$24.95	\$1,272.45	\$51.26	\$2,614.26	\$3,886.71	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	60.00	0.50	\$31.94	\$1,916.40	\$7.09	\$425.40	\$2,341.80	\$47.90	\$2,874.00	\$7.79	\$467.40	\$3,341.40	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$46.91	\$46.91	\$29.65	\$29.65	\$76.56	\$69.86	\$69.86	\$32.66	\$32.66	\$102.52	
Elbow, 90 Deg., copper, wrought, copper x copper, 3"	4.00	1.45	\$84.33	\$337.32	\$86.93	\$347.72	\$685.04	\$125.75	\$503.00	\$95.48	\$381.92	\$884.92	
Tee, copper, wrought, copper x copper, 1-1/4"	10.00	0.89	\$57.39	\$573.90	\$24.62	\$246.20	\$820.10	\$85.33	\$853.30	\$27.14	\$271.40	\$1,124.70	
Tee, copper, wrought, copper x copper, 1-1/2"	20.00	1.00	\$64.37	\$1,287.40	\$36.68	\$733.60	\$2,021.00	\$96.31	\$1,926.20	\$40.20	\$804.00	\$2,730.20	
Tee, copper, wrought, copper x copper, 2"	11.00	1.14	\$73.35	\$806.85	\$58.29	\$641.19	\$1,448.04	\$109.78	\$1,207.58	\$63.82	\$702.02	\$1,909.60	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2.00	\$115.77	\$115.77	\$111.56	\$111.56	\$227.33	\$173.65	\$173.65	\$122.61	\$122.61	\$296.26	
Tee, copper, wrought, copper x copper, 3"	3.00	2.29	\$132.73	\$398.19	\$158.79	\$476.37	\$874.56	\$197.60	\$592.80	\$174.87	\$524.61	\$1,117.41	
Pipe, fittings & valves, valve, ball, carbon steel trim, grooved joint, 3" pipe size, add 1 coupling (material only) per joint for installed price, incl handle, excl joint coupling material	1.00	0.52	\$29.94	\$29.94	\$733.65	\$733.65	\$763.59	\$44.91	\$44.91	\$804.00	\$804.00	\$848.91	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	465.00	0.00	\$0.00	\$0.00	\$0.76	\$353.40	\$353.40	\$0.00	\$0.00	\$0.84	\$390.60	\$390.60	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	30,000.00	0.00	\$0.00	\$0.00	\$0.72	\$21,600.00	\$21,600.00	\$0.00	\$0.00	\$0.79	\$23,700.00	\$23,700.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	1,890.00	0.00	\$0.00	\$0.00	\$2.03	\$3,836.70	\$3,836.70	\$0.00	\$0.00	\$2.23	\$4,214.70	\$4,214.70	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 3" pipe size, includes valves and four test cocks	1.00	3.56	\$205.59	\$205.59	\$6,633.00	\$6,633.00	\$6,838.59	\$309.38	\$309.38	\$7,286.25	\$7,286.25	\$7,595.63	
Manifold header	45.00	5.52	\$327.60	\$14,742.00	\$234.64	\$10,558.80	\$25,300.80	\$488.88	\$21,999.60	\$258.38	\$11,627.10	\$33,626.70	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	6,435.00	0.09	\$7.69	\$49,485.15	\$0.51	\$3,281.85	\$52,767.85	\$11.53	\$74,195.55	\$0.57	\$3,667.95	\$77,863.50	
				\$181,537.85		\$88,853.73	\$270,392.43		\$271,675.03		\$97,710.07	\$369,385.10	\$369,385.10

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Water Demand Calculator Single Family Residence (PEX Piping System)

Oklahoma, City													
Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	562.00	0.11	\$5.66	\$3,180.92	\$2.01	\$1,129.62	\$4,310.54	\$8.48	\$4,765.76	\$2.20	\$1,236.40	\$6,002.16	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 500', excludes couplings and hangers	498.00	0.00	\$0.00	\$0.00	\$0.80	\$398.40	\$398.40	\$0.00	\$0.00	\$0.87	\$433.26	\$433.26	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	1,000.00	0.00	\$0.00	\$0.00	\$0.77	\$770.00	\$770.00	\$0.00	\$0.00	\$0.85	\$850.00	\$850.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 3/4" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$1.12	\$28.00	\$28.00	\$0.00	\$0.00	\$1.23	\$30.75	\$30.75	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$2.17	\$54.25	\$54.25	\$0.00	\$0.00	\$2.39	\$59.75	\$59.75	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 3/4" pipe size, includes valves and four test cocks	1.00	0.50	\$21.86	\$21.86	\$259.32	\$259.32	\$281.18	\$32.78	\$32.78	\$285.14	\$285.14	\$317.92	
Manifold header	1.00	5.52	\$212.55	\$212.55	\$234.64	\$234.64	\$447.19	\$317.19	\$317.19	\$258.38	\$258.38	\$575.57	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	195.00	0.09	\$4.99	\$973.05	\$0.51	\$99.45	\$1,072.50	\$7.48	\$1,458.60	\$0.57	\$111.15	\$1,569.75	
				\$4,388.38		\$2,973.68	\$7,362.06		\$6,574.33		\$3,264.83	\$9,839.16	\$9,839.16

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Uniform Plumbing Code Single Family Residence (PEX Piping System)

Oklahoma City													
Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	562.00	0.11	\$5.66	\$3,180.92	\$2.01	\$1,129.62	\$4,310.54	\$8.48	\$4,765.76	\$2.20	\$1,236.40	\$6,002.16	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 500', excludes couplings and hangers	498.00	0.00	\$0.00	\$0.00	\$0.80	\$398.40	\$398.40	\$0.00	\$0.00	\$0.87	\$433.26	\$433.26	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	1,000.00	0.00	\$0.00	\$0.00	\$0.77	\$770.00	\$770.00	\$0.00	\$0.00	\$0.85	\$850.00	\$850.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$2.17	\$54.25	\$54.25	\$0.00	\$0.00	\$2.39	\$59.75	\$59.75	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1-1/4" diameter x 100', excludes couplings and hangers	25.00	0.00	\$0.00	\$0.00	\$3.70	\$92.50	\$92.50	\$0.00	\$0.00	\$4.07	\$101.75	\$101.75	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$25.27	\$25.27	\$272.23	\$272.23	\$297.50	\$37.57	\$37.57	\$258.38	\$258.38	\$575.57	
Manifold header	1.00	5.52	\$212.55	\$212.55	\$234.64	\$234.64	\$447.19	\$317.19	\$317.19	\$258.38	\$258.38	\$575.57	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	195.00	0.09	\$4.99	\$973.05	\$0.51	\$99.45	\$1,072.50	\$7.48	\$1,458.60	\$0.57	\$111.15	\$1,569.75	
				\$4,391.79		\$3,051.09	\$7,442.88		\$6,579.12		\$3,309.07	\$10,167.81	\$10,167.81

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

International Residential Code Single Family Residence (PEX Piping System)

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size, type number 26 per MSS-SP58	562.00	0.11	\$5.66	\$3,180.92	\$2.01	\$1,129.62	\$4,310.54	\$8.48	\$4,765.76	\$2.20	\$1,236.40	\$6,002.16	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 500', excludes couplings and hangers	498.00	0.00	\$0.00	\$0.00	\$0.80	\$398.40	\$398.40	\$0.00	\$0.00	\$0.87	\$433.26	\$433.26	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	1,000.00	0.00	\$0.00	\$0.00	\$0.77	\$770.00	\$770.00	\$0.00	\$0.00	\$0.85	\$850.00	\$850.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 300', excludes couplings and hangers	35.00	0.00	\$0.00	\$0.00	\$2.17	\$75.95	\$75.95	\$0.00	\$0.00	\$2.39	\$83.65	\$83.65	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1-1/4" diameter x 100', excludes couplings and hangers	15.00	0.00	\$0.00	\$0.00	\$3.70	\$55.50	\$55.50	\$0.00	\$0.00	\$4.07	\$61.05	\$61.05	
Backflow preventer, double check principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$25.27	\$25.27	\$272.23	\$272.23	\$297.50	\$37.57	\$37.57	\$300.20	\$300.20	\$337.77	
Radiant floor heating, manifold header, copper, (cut to size), 12 circuit, 2" header, 3/4" sweat outlets	1.00	5.52	\$212.55	\$212.55	\$234.64	\$234.64	\$447.19	\$317.19	\$317.19	\$258.38	\$258.38	\$575.57	
Radiant floor heating, PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	195.00	0.09	\$4.99	\$973.05	\$0.51	\$99.45	\$1,072.50	\$7.48	\$1,458.60	\$0.57	\$111.15	\$1,569.75	
				\$4,391.79		\$3,035.79	\$7,427.58		\$6,579.12		\$3,334.09	\$9,913.21	\$9,913.21

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Water Demand Calculator 6 Unit Multi - Family Residence (PEX Piping System)

Oklahoma, City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	2,825.00	0.11	\$5.66	\$15,989.50	\$2.01	\$5,678.25	\$21,667.75	\$8.48	\$23,956.00	\$2.20	\$6,215.00	\$30,171.00	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	75.00	0.10	\$4.64	\$348.00	\$5.07	\$380.25	\$728.25	\$6.93	\$519.75	\$5.60	\$420.00	\$939.75	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	30.00	0.12	\$5.19	\$155.70	\$8.18	\$245.40	\$401.10	\$7.75	\$232.50	\$8.98	\$269.40	\$501.90	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	4.00	0.50	\$21.86	\$87.44	\$7.59	\$30.36	\$117.80	\$32.78	\$131.12	\$8.34	\$33.36	\$164.48	
Tee, copper, wrought, copper x copper, 1"	5.00	0.80	\$35.17	\$175.85	\$18.35	\$91.75	\$267.60	\$52.59	\$262.95	\$20.18	\$100.90	\$363.85	
Ball valve, copper x copper, 1", press-joint	1.00	0.44	\$19.47	\$19.47	\$68.33	\$68.33	\$87.80	\$29.03	\$29.03	\$75.32	\$75.32	\$104.35	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	530.00	0.00	\$0.00	\$0.00	\$0.82	\$434.60	\$434.60	\$0.00	\$0.00	\$0.90	\$477.00	\$477.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	226.00	0.00	\$0.00	\$0.00	\$0.77	\$174.02	\$174.02	\$0.00	\$0.00	\$0.85	\$192.10	\$192.10	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 3/4" diameter x 100', excludes couplings and hangers	360.00	0.00	\$0.00	\$0.00	\$1.12	\$403.20	\$403.20	\$0.00	\$0.00	\$1.23	\$442.80	\$442.80	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1" pipe size, includes valves and four test cocks	1.00	0.57	\$25.27	\$25.27	\$602.56	\$602.56	\$627.83	\$37.57	\$37.57	\$661.74	\$661.74	\$699.31	
Manifold header	6.00	5.52	\$212.55	\$1275.30	\$234.64	\$1407.84	\$2683.14	\$317.19	\$1903.14	\$258.38	\$1550.28	\$3453.42	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	1,050.00	0.09	\$4.99	\$5,239.50	\$0.51	\$535.50	\$5,775.00	\$7.48	\$7,854.00	\$0.57	\$598.50	\$8,452.50	
				\$23,316.03		\$10,052.06	\$33,368.09		\$34,926.06		\$11,036.40	\$45,962.46	\$45,962.46

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**Uniform Plumbing Code
6 Unit Multi - Family Residence (PEX Piping System)**

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	2,825.00	0.11	\$5.66	\$15,989.50	\$2.01	\$5,678.25	\$21,667.75	\$8.48	\$23,956.00	\$2.20	\$6,215.00	\$30,171.00	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	42.00	0.12	\$5.19	\$217.98	\$8.18	\$343.56	\$561.54	\$7.75	\$325.50	\$8.98	\$377.16	\$702.66	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	34.00	0.14	\$6.08	\$206.72	\$12.91	\$438.94	\$645.66	\$9.08	\$308.72	\$14.20	\$482.80	\$791.52	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	29.00	0.19	\$8.40	\$243.60	\$20.28	\$588.12	\$831.72	\$12.53	\$363.37	\$22.60	\$655.40	\$1,018.77	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	1.00	0.53	\$23.56	\$23.56	\$12.54	\$12.54	\$36.10	\$35.17	\$35.17	\$13.83	\$13.83	\$49.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	3.00	0.73	\$32.10	\$96.30	\$31.74	\$95.22	\$191.52	\$47.81	\$143.43	\$34.97	\$104.91	\$248.34	
Tee, copper, wrought, copper x copper, 1-1/4"	3.00	0.89	\$39.27	\$117.81	\$26.36	\$79.08	\$196.89	\$58.40	\$175.20	\$29.05	\$87.15	\$262.35	
Tee, copper, wrought, copper x copper, 2"	2.00	1.14	\$50.20	\$100.40	\$62.41	\$124.82	\$225.22	\$75.13	\$150.26	\$68.33	\$136.66	\$286.92	
Ball valve, copper x copper, 2", press-joint	1.00	0.73	\$32.10	\$32.10	\$392.74	\$392.74	\$424.84	\$47.81	\$47.81	\$435.78	\$435.78	\$483.59	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	530.00	0.00	\$0.00	\$0.00	\$0.82	\$434.60	\$434.60	\$0.00	\$0.00	\$0.90	\$477.00	\$477.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	7,000.00	0.00	\$0.00	\$0.00	\$0.77	\$5,390.00	\$5,390.00	\$0.00	\$0.00	\$0.85	\$5,950.00	\$5,950.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	360.00	0.00	\$0.00	\$0.00	\$2.17	\$781.20	\$781.20	\$0.00	\$0.00	\$2.39	\$860.40	\$860.40	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 2" pipe size, includes valves and four test cocks	6.00	5.52	\$212.55	\$1275.30	\$234.64	\$1407.84	\$2683.14	\$317.19	\$1903.14	\$258.38	\$1550.28	\$3453.42	
Manifold header	6.00	5.52	\$212.55	\$1275.30	\$234.64	\$234.64	\$447.19	\$317.19	\$317.19	\$258.38	\$258.38	\$575.57	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	1,050.00	0.09	\$4.99	\$5,239.50	\$0.51	\$535.50	\$5,775.00	\$7.48	\$7,854.00	\$0.57	\$598.50	\$8,452.50	
				\$24,818.07		\$16,537.05	\$40,292.37		\$35,579.79		\$18,203.25	\$53,783.04	\$53,783.04

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**International Plumbing Code
6 Unit Multi - Family Residence (PEX Piping System)**

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	2,825.00	0.11	\$5.66	\$15,989.50	\$2.01	\$5,678.25	\$21,667.75	\$8.48	\$23,956.00	\$2.20	\$6,215.00	\$30,171.00	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	42.00	0.12	\$5.19	\$217.98	\$8.18	\$343.56	\$561.54	\$7.75	\$325.50	\$8.98	\$377.16	\$702.66	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	34.00	0.14	\$6.08	\$206.72	\$12.91	\$438.94	\$645.66	\$9.08	\$308.72	\$14.20	\$482.80	\$791.52	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	29.00	0.15	\$6.76	\$196.04	\$12.48	\$361.92	\$557.96	\$10.14	\$294.06	\$13.72	\$397.88	\$691.94	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	1.00	0.53	\$23.56	\$23.56	\$12.54	\$12.54	\$36.10	\$35.17	\$35.17	\$13.83	\$13.83	\$49.00	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/2"	3.00	0.61	\$26.98	\$80.94	\$17.32	\$51.96	\$132.90	\$40.64	\$121.92	\$19.05	\$57.15	\$179.07	
Tee, copper, wrought, copper x copper, 1-1/4"	3.00	0.89	\$39.27	\$117.81	\$26.36	\$79.08	\$196.89	\$58.40	\$175.20	\$29.05	\$87.15	\$262.35	
Tee, copper, wrought, copper x copper, 1-1/2"	2.00	1.00	\$44.05	\$88.10	\$39.27	\$78.54	\$166.64	\$65.91	\$131.82	\$43.04	\$86.08	\$217.90	
Ball valve, copper x copper, 1-1/2", press-joint	1.00	0.63	\$27.66	\$27.66	\$273.30	\$273.30	\$300.96	\$41.32	\$41.32	\$300.20	\$300.20	\$341.52	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	530.00	0.00	\$0.00	\$0.00	\$0.82	\$434.60	\$434.60	\$0.00	\$0.00	\$0.90	\$477.00	\$477.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	7,000.00	0.00	\$0.00	\$0.00	\$0.77	\$5,390.00	\$5,390.00	\$0.00	\$0.00	\$0.85	\$5,950.00	\$5,950.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1-1/4" diameter x 100', excludes couplings and hangers	360.00	0.00	\$0.00	\$0.00	\$3.70	\$1,332.00	\$1,332.00	\$0.00	\$0.00	\$4.07	\$1,465.20	\$1,465.20	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 1-1/2" pipe size, includes valves and four test cocks	1.00	0.80	\$35.17	\$35.17	\$1,237.40	\$1,237.40	\$1,272.57	\$52.59	\$52.59	\$1,371.90	\$1,371.90	\$1,424.49	
Manifold header	6.00	5.52	\$212.55	\$1275.30	\$234.64	\$1407.84	\$2683.14	\$317.19	\$1903.14	\$258.38	\$1550.28	\$3453.42	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	1,050.00	0.09	\$4.99	\$5,239.50	\$0.51	\$535.50	\$5,775.00	\$7.48	\$7,854.00	\$0.57	\$598.50	\$8,452.50	
				\$23,498.28		\$17,655.43	\$41,153.71		\$35,199.44		\$19,430.13	\$54,629.57	\$54,629.57

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Water Demand Calculator 45 Unit Multi - Family Residence (PEX Piping System)

Oklahoma, City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	12,135.00	0.11	\$5.66	\$68,684.10	\$2.01	\$24,391.35	\$93,075.45	\$8.48	\$102,904.80	\$2.20	\$26,697.00	\$129,601.80	
Pipe, copper, tubing, solder, 3/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	870.00	0.11	\$4.64	\$4,036.80	\$5.07	\$4,410.90	\$8,447.70	\$6.93	\$6,029.10	\$5.60	\$4,872.00	\$10,901.10	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	372.00	0.12	\$5.19	\$1,930.68	\$8.18	\$3,042.96	\$4,973.64	\$7.75	\$2,883.00	\$8.98	\$3,340.56	\$6,223.56	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	43.00	0.14	\$6.08	\$261.44	\$12.91	\$555.13	\$816.57	\$9.08	\$390.44	\$14.20	\$610.60	\$1,001.04	
Elbow, 90 Deg., copper, wrought, copper x copper, 3/4"	60.00	0.42	\$18.44	\$1,106.40	\$2.88	\$172.80	\$1,279.20	\$27.66	\$1,659.60	\$3.17	\$190.20	\$1,849.80	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	60.00	0.50	\$21.86	\$1,311.60	\$7.59	\$455.40	\$1,767.00	\$32.78	\$1,966.80	\$8.34	\$500.40	\$2,467.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 1-1/4"	2.00	0.53	\$23.56	\$47.12	\$12.54	\$25.08	\$72.20	\$35.17	\$70.34	\$13.83	\$27.66	\$98.00	
Tee, copper, wrought, copper x copper, 3/4"	10.00	0.67	\$29.37	\$293.70	\$6.51	\$65.10	\$358.80	\$44.05	\$440.50	\$7.16	\$71.60	\$512.10	
Tee, copper, wrought, copper x copper, 1"	31.00	0.80	\$35.17	\$1,090.27	\$18.35	\$568.85	\$1,659.12	\$52.59	\$1,630.29	\$20.18	\$625.58	\$2,255.87	
Tee, copper, wrought, copper x copper, 1-1/4"	4.00	0.89	\$39.27	\$157.08	\$26.36	\$105.44	\$262.52	\$58.40	\$233.60	\$29.05	\$116.20	\$349.80	
Ball valve, copper x copper, 2", press-joint	1.00	0.73	\$32.10	\$32.10	\$392.74	\$392.74	\$424.84	\$47.81	\$47.81	\$435.78	\$435.78	\$483.59	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	465.00	0.00	\$0.00	\$0.00	\$0.82	\$381.30	\$381.30	\$0.00	\$0.00	\$0.90	\$418.50	\$418.50	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	30,000.00	0.00	\$0.00	\$0.00	\$0.77	\$23,100.00	\$23,100.00	\$0.00	\$0.00	\$0.85	\$25,500.00	\$25,500.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 3/4" diameter x 100', excludes couplings and hangers	1,890.00	0.00	\$0.00	\$0.00	\$1.12	\$2,116.80	\$2,116.80	\$0.00	\$0.00	\$1.23	\$2,324.70	\$2,324.70	
Backflow preventer, reduced pressure principle, corrosion resistant, automatic operation, ball valves, threaded, 2" pipe size, includes valves and four test cocks	1.00	1.14	\$50.20	\$50.20	\$1,425.70	\$1,425.70	\$1,475.90	\$75.13	\$75.13	\$1,587.10	\$1,587.10	\$1,662.23	
Manifold header	45.00	5.52	\$212.55	\$9,564.75	\$234.64	\$10,558.80	\$20,123.55	\$317.19	\$14,273.55	\$258.38	\$11,627.10	\$25,900.65	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	6,435.00	0.09	\$4.99	\$32,110.65	\$0.51	\$3,281.85	\$35,392.50	\$7.48	\$48,133.80	\$0.57	\$3,667.95	\$51,801.75	
				\$120,676.89		\$75,050.20	\$195,727.09		\$180,738.76		\$82,612.93	\$263,351.69	\$263,351.69

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

Uniform Plumbing Code
45 Unit Multi - Family Residence (PEX Piping System)

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	12,135.00	0.11	\$5.66	\$68,684.10	\$2.01	\$24,391.35	\$93,075.45	\$8.48	\$102,904.80	\$2.20	\$26,697.00	\$129,601.80	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	557.00	0.12	\$5.19	\$2,890.83	\$8.18	\$4,556.26	\$7,447.09	\$7.75	\$4,316.75	\$8.98	\$5,001.86	\$9,318.61	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	313.00	0.14	\$6.08	\$1,903.04	\$12.91	\$4,040.83	\$5,943.87	\$9.08	\$2,842.04	\$14.20	\$4,444.60	\$7,286.64	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	259.00	0.15	\$6.76	\$1,750.84	\$12.48	\$3,232.32	\$4,983.16	\$10.14	\$2,626.26	\$13.72	\$3,553.48	\$6,179.74	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	83.00	0.19	\$8.40	\$697.20	\$20.28	\$1,683.24	\$2,380.44	\$12.53	\$1,039.99	\$22.60	\$1,875.80	\$2,915.79	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$10.21	\$112.31	\$32.28	\$355.08	\$467.39	\$15.37	\$169.07	\$35.51	\$390.61	\$559.68	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.29	\$11.30	\$124.30	\$50.03	\$550.33	\$674.63	\$17.08	\$187.88	\$54.88	\$603.68	\$791.56	
Pipe, copper, tubing, solder, 3-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	51.00	0.37	\$14.68	\$748.68	\$64.56	\$3,292.56	\$4,041.24	\$22.20	\$1,132.20	\$71.02	\$3,622.02	\$4,754.22	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	60.00	0.50	\$21.86	\$1,311.60	\$7.59	\$455.40	\$1,767.00	\$32.78	\$1,966.80	\$8.34	\$500.40	\$2,467.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$32.10	\$32.10	\$31.74	\$31.74	\$63.84	\$47.81	\$47.81	\$34.97	\$34.97	\$82.78	
Elbow, 90 Deg., copper, wrought, copper x copper, 3-1/2"	4.00	1.60	\$63.52	\$254.08	\$302.36	\$1,209.44	\$1,463.52	\$94.94	\$379.76	\$333.56	\$1,334.24	\$1,714.00	
Tee, copper, wrought, copper x copper, 1-1/4"	10.00	0.89	\$39.27	\$392.70	\$26.36	\$263.60	\$656.30	\$58.40	\$584.00	\$29.05	\$290.50	\$874.50	
Tee, copper, wrought, copper x copper, 1-1/2"	20.00	1.00	\$44.05	\$881.00	\$39.27	\$785.40	\$1,666.40	\$65.91	\$1,318.20	\$43.04	\$860.80	\$2,179.00	
Tee, copper, wrought, copper x copper, 2"	10.00	1.14	\$50.20	\$502.00	\$62.41	\$624.10	\$1,126.10	\$75.13	\$751.30	\$68.33	\$683.30	\$1,434.60	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2.00	\$79.23	\$79.23	\$119.44	\$119.44	\$198.67	\$118.84	\$118.84	\$131.27	\$131.27	\$250.11	
Tee, copper, wrought, copper x copper, 3"	1.00	2.29	\$90.84	\$90.84	\$170.01	\$170.01	\$260.85	\$135.23	\$135.23	\$187.22	\$187.22	\$322.45	
Tee, copper, wrought, copper x copper, 3-1/2"	3.00	2.67	\$105.87	\$317.61	\$511.10	\$1,533.30	\$1,850.91	\$157.77	\$473.31	\$559.52	\$1,678.56	\$2,151.87	
Pipe, fittings & valves, valve, ball, carbon steel trim, grooved joint, 4" pipe size, add 1 coupling (material only) per joint for installed price, incl handle, excl joint coupling material	1.00	0.70	\$27.66	\$27.66	\$1,210.50	\$1,210.50	\$1,238.16	\$41.32	\$41.32	\$1,345.00	\$1,345.00	\$1,386.32	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	465.00	0.00	\$0.00	\$0.00	\$0.82	\$381.30	\$381.30	\$0.00	\$0.00	\$0.90	\$418.50	\$418.50	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	30,000.00	0.00	\$0.00	\$0.00	\$0.77	\$23,100.00	\$23,100.00	\$0.00	\$0.00	\$0.85	\$25,500.00	\$25,500.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	1,890.00	0.00	\$0.00	\$0.00	\$2.17	\$4,101.30	\$4,101.30	\$0.00	\$0.00	\$2.39	\$4,517.10	\$4,517.10	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 4" pipe size, includes valves and four test cocks	1.00	5.33	\$211.73	\$211.73	\$8,312.10	\$8,312.10	\$8,523.83	\$317.60	\$317.60	\$9,146.00	\$9,146.00	\$9,463.60	
Manifold header	45.00	5.52	\$212.55	\$9564.75	\$234.64	\$10558.80	\$20123.55	\$317.19	\$14273.55	\$258.38	\$11627.10	\$25900.65	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	6,435.00	0.09	\$4.99	\$32,110.65	\$0.51	\$3,281.85	\$35,392.50	\$7.48	\$48,133.80	\$0.57	\$3,667.95	\$51,801.75	
				\$122,687.25		\$98,240.25	\$220,927.50		\$183,760.51		\$108,111.96	\$291,872.47	\$291,872.47

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)

**International Plumbing Code
45 Unit Multi - Family Residence (PEX Piping System)**

Oklahoma City

Description	Quantity	Labor Hours	Labor	Extended Labor	Material	Extended Material	Extended Total	Labor OP	Extended Labor OP	Material OP	Extended Material OP	Extended Total OP	Residence Grand Total
Pipe hanger / support, strap, 1/2" pipe size	12,135.00	0.11	\$5.66	\$68,684.10	\$2.01	\$24,391.35	\$93,075.45	\$8.48	\$102,904.80	\$2.20	\$26,697.00	\$129,601.80	
Pipe, copper, tubing, solder, 1" diameter, type L, includes coupling & clevis hanger assembly 10' OC	557.00	0.12	\$5.19	\$2,890.83	\$8.18	\$4,556.26	\$7,447.09	\$7.75	\$4,316.75	\$8.98	\$5,001.86	\$9,318.61	
Pipe, copper, tubing, solder, 1-1/4" diameter, type L, includes coupling & clevis hanger assembly 10' OC	313.00	0.14	\$6.08	\$1,903.04	\$12.91	\$4,040.83	\$5,943.87	\$9.08	\$2,842.04	\$14.20	\$4,444.60	\$7,286.64	
Pipe, copper, tubing, solder, 1-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	259.00	0.15	\$6.76	\$1,750.84	\$12.48	\$3,232.32	\$4,983.16	\$10.14	\$2,626.26	\$13.72	\$3,553.48	\$6,179.74	
Pipe, copper, tubing, solder, 2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	94.00	0.19	\$8.40	\$789.60	\$20.28	\$1,906.32	\$2,695.92	\$12.53	\$1,177.82	\$22.60	\$2,124.40	\$3,302.22	
Pipe, copper, tubing, solder, 2-1/2" diameter, type L, includes coupling & clevis hanger assembly 10' OC	11.00	0.26	\$10.21	\$112.31	\$32.28	\$355.08	\$467.39	\$15.37	\$169.07	\$35.51	\$390.61	\$559.68	
Pipe, copper, tubing, solder, 3" diameter, type L, includes coupling & clevis hanger assembly 10' OC	51.00	0.29	\$11.30	\$576.30	\$50.03	\$2,551.53	\$3,127.83	\$17.08	\$871.08	\$54.88	\$2,798.88	\$3,669.96	
Elbow, 90 Deg., copper, wrought, copper x copper, 1"	60.00	0.50	\$21.86	\$1,311.60	\$7.59	\$455.40	\$1,767.00	\$32.78	\$1,966.80	\$8.34	\$500.40	\$2,467.20	
Elbow, 90 Deg., copper, wrought, copper x copper, 2"	1.00	0.73	\$32.10	\$32.10	\$31.74	\$31.74	\$63.84	\$47.81	\$47.81	\$34.97	\$34.97	\$82.78	
Elbow, 90 Deg., copper, wrought, copper x copper, 3"	4.00	1.45	\$57.71	\$230.84	\$93.07	\$372.28	\$603.12	\$86.06	\$344.24	\$102.22	\$408.88	\$753.12	
Tee, copper, wrought, copper x copper, 1-1/4"	10.00	0.89	\$39.27	\$392.70	\$26.36	\$263.60	\$656.30	\$58.40	\$584.00	\$29.05	\$290.50	\$874.50	
Tee, copper, wrought, copper x copper, 1-1/2"	20.00	1.00	\$44.05	\$881.00	\$39.27	\$785.40	\$1,666.40	\$65.91	\$1,318.20	\$43.04	\$860.80	\$2,179.00	
Tee, copper, wrought, copper x copper, 2"	11.00	1.14	\$50.20	\$552.20	\$62.41	\$686.51	\$1,238.71	\$75.13	\$826.43	\$68.33	\$751.63	\$1,578.06	
Tee, copper, wrought, copper x copper, 2-1/2"	1.00	2.00	\$79.23	\$79.23	\$119.44	\$119.44	\$198.67	\$118.84	\$118.84	\$131.27	\$131.27	\$250.11	
Tee, copper, wrought, copper x copper, 3"	3.00	2.29	\$90.84	\$272.52	\$170.01	\$510.03	\$782.55	\$135.23	\$405.69	\$187.22	\$561.66	\$967.35	
Pipe, fittings & valves, valve, ball, carbon steel trim, grooved joint, 3" pipe size, add 1 coupling (material only) per joint for installed price, incl handle, excl joint coupling material	1.00	0.52	\$20.49	\$20.49	\$785.48	\$785.48	\$805.97	\$30.74	\$30.74	\$860.80	\$860.80	\$891.54	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 100', excludes couplings and hangers	465.00	0.00	\$0.00	\$0.00	\$0.82	\$381.30	\$381.30	\$0.00	\$0.00	\$0.90	\$418.50	\$418.50	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1/2" diameter x 1000', excludes couplings and hangers	30,000.00	0.00	\$0.00	\$0.00	\$0.77	\$23,100.00	\$23,100.00	\$0.00	\$0.00	\$0.85	\$25,500.00	\$25,500.00	
Pipe, plastic, PEX, flexible, non-barrier type, white, hot/cold tubing rolls, 1" diameter x 100', excludes couplings and hangers	1,890.00	0.00	\$0.00	\$0.00	\$2.17	\$4,101.30	\$4,101.30	\$0.00	\$0.00	\$2.39	\$4,517.10	\$4,517.10	
Backflow preventer, reduced pressure principle, bronze, automatic operation, OS&Y valves, flanged, 3" pipe size, includes valves and four test cocks	1.00	3.56	\$140.70	\$140.70	\$7,101.60	\$7,101.60	\$7,242.30	\$211.73	\$211.73	\$7,801.00	\$7,801.00	\$8,012.73	
Manifold header	45.00	5.52	\$212.55	\$9564.75	\$234.64	\$10558.80	\$20123.55	\$317.19	\$14273.55	\$258.38	\$11627.10	\$25900.65	
PEX tubing fittings, insert type, PEX stainless crimp ring, 1/2" x 1/2"	6,435.00	0.09	\$4.99	\$32,110.65	\$0.51	\$3,281.85	\$35,392.50	\$7.48	\$48,133.80	\$0.57	\$3,667.95	\$51,801.75	
				\$122,295.80		\$93,568.42	\$215,864.22		\$183,169.65		\$102,943.39	\$286,113.04	\$286,113.04

Note: Costs indicated in the above were determined based on RS Means (PEX pipe labor costs are included within PEX fittings and stainless steel crimp rings)