City of Ironwood

Water Treatment Plant Preliminary Engineering Report

Christopher Larson, SEH

June 22, 2020

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Coleman Engineering Company

Civil Engineering • Environmental Engineering
Geotechnical Engineering • Surveying

Existing Water System

- 6 Wells
  - Spring Creek Wellfield
  - Big Springs Wellfield
  - Add polyphosphate at each well
- Clearwell
- Pumping Station
  - Add chlorine, pump into distribution system
  - Historic Structure, constructed in 1920

Water Quality

	Manganese (ug/L)			
Well No.	July 2019	October 2019	February 2020	EPA Advisory Level
101	**710**	**430**	**450**	300
104	1.2	2.4	0.65	300
204	**310**	**310**	**340**	300
201	**520**	**770**	**510**	300
202	**450**	**410**	**460**	300
203	**370**	**370**	**400**	300

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Aging Infrastructure

- Pump Station
  - 100 years old
    - Pumps, piping
    - Old fuel oil furnace
  - Chlorine room doesn't meet current safety standards
- 140,000 gallon clearwell
  - Constructed in 1940, some structural issues identified
  - No redundancy or ability to take out of service

Options Considered

- Manganese Removal – Water Treatment Plant
  - Alternative 1 – Concrete Gravity Filter Water Treatment Plant
  - Alternative 2 – Steel Gravity Filter Water Treatment Plant
  - Pressure Filters
- New Wells
- Connect to Gogebic Range Water Authority (GWRA)

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Design Criteria

- Capacity – 2 million gallons per day
- Pilot Study
- Detention Tank
- Filters
- Chemical Feed Systems
- Clearwell – 500,000 gallon capacity
- High Service Pumps
- Backwash Water – Infiltration Basin
- Independent Review

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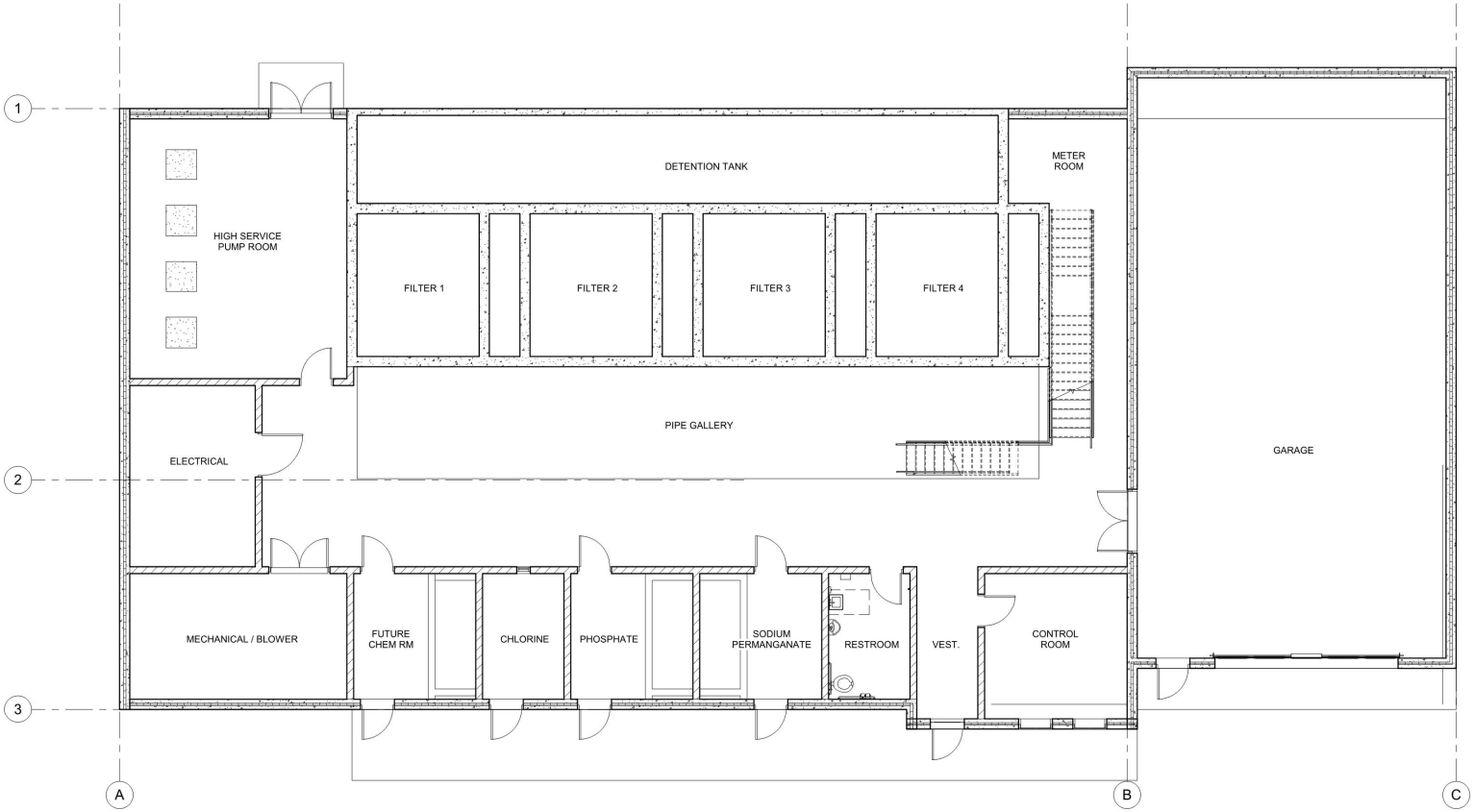
Concrete Gravity WTP



NORTH

1 P101 FIRST LEVEL FLOOR PLAN

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Project Owner

IRONWOOD CONCRETE GRAVITY LAYOUT

WATER TREATMENT PLANT ALTERNATIVE #1

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SEH Project	IRCTV 154251
Checked By	CTL
Drawn By	KAK
Project Status	Issue Date
PRELIMINARY	10/9/2020

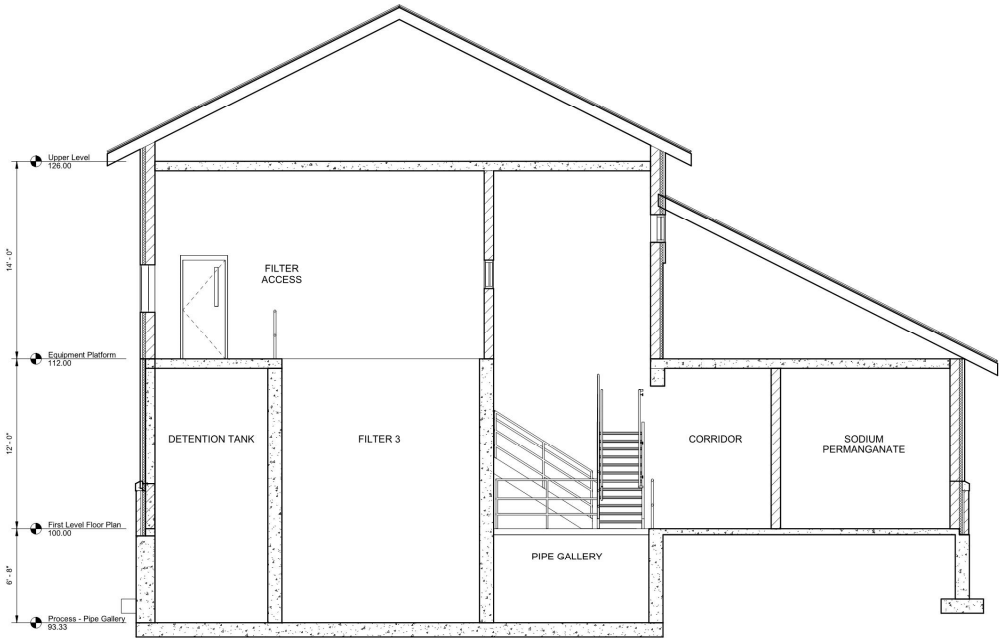
Revision Issue

Rev. #	Description	Date

PLAN VIEW

P101

Concrete Gravity WTP - Section



1 P301 BUILDING SECTION

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IRONWOOD CONCRETE GRAVITY LAYOUT
WATER TREATMENT PLANT
ALTERNATIVE #1
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Project Number

Project Status PRELIMINARY

Issue Date 10/9/2020

Revision Issue

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SECTIONS

P301

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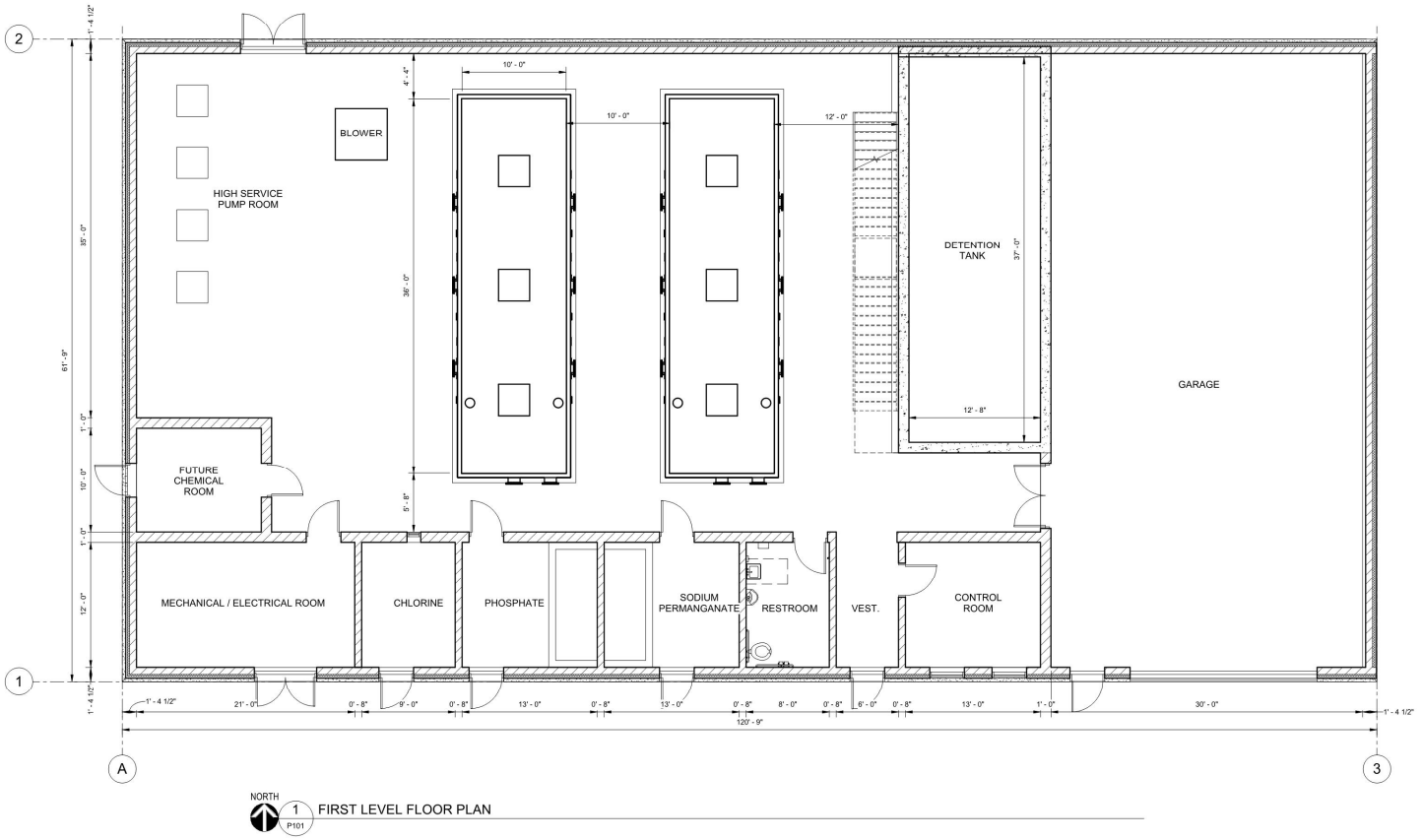
Steel Gravity WTP



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1 P101 FIRST LEVEL FLOOR PLAN

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IRONWOOD CONCRETE GRAVITY LAYOUT
WATER TREATMENT PLANT
ALTERNATIVE #2
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SEH Project	Project Number
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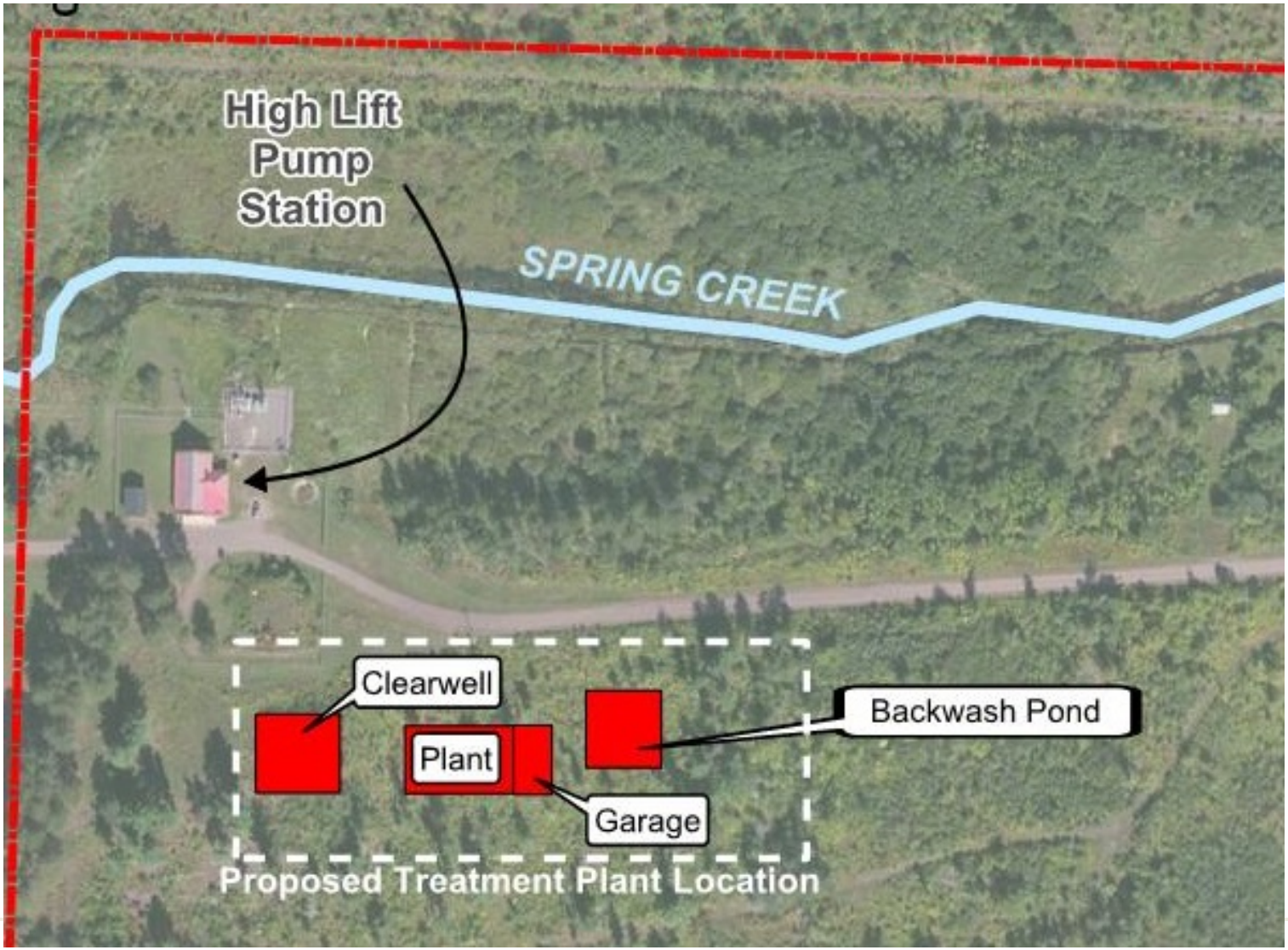
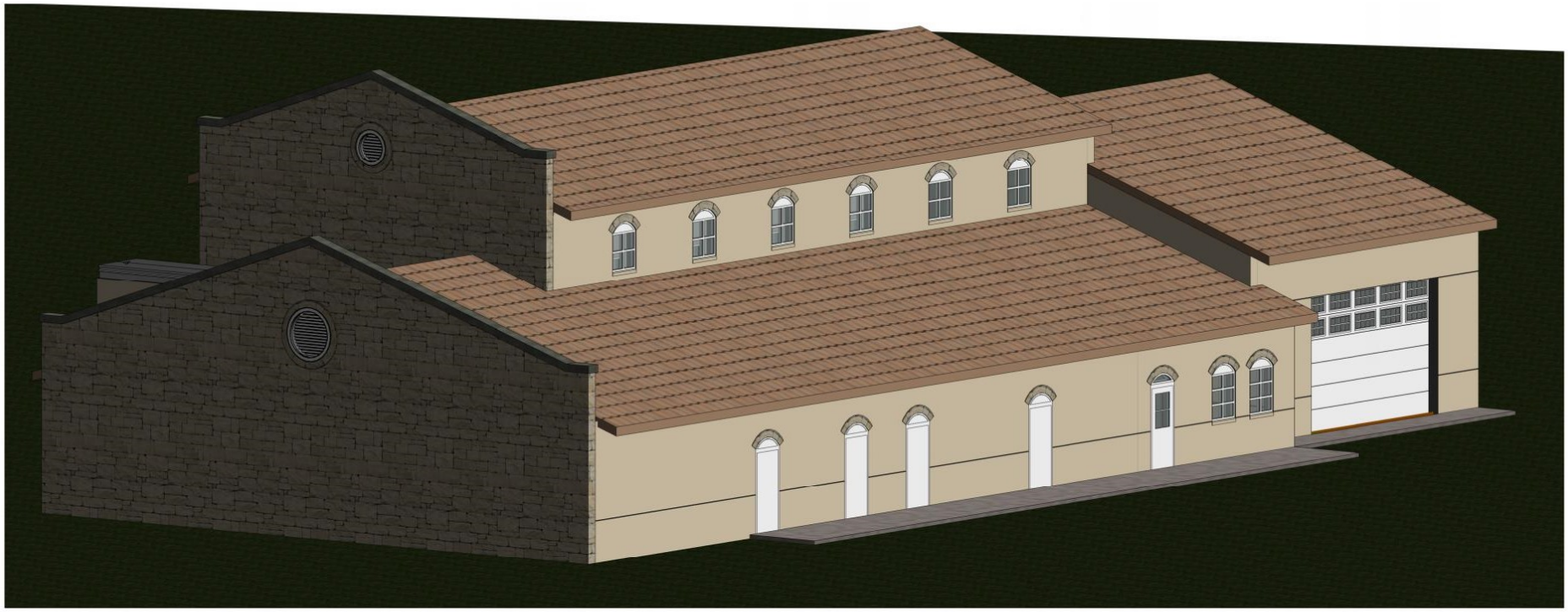
FIRST LEVEL FLOOR PLAN

P101

Site Plan


High Lift
Pump
Station
SPRING CREEK
Clearwell
Plant
Garage
Backwash Pond
Proposed Treatment Plant Location

Rendering



Concrete Gravity WTP Project Costs

Item	Cost
Water Treatment Plant Construction Cost	**$7,657,000**
Contingency (10%)	$766,000
Engineering/Construction Admin (15%)	$1,148,000
Admin/Legal (2%)	$153,000
Total Estimated Project Cost:	**$9,724,000**

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Steel Gravity WTP Project Costs

Item	Cost
Water Treatment Plant Construction Cost	**$8,291,000**
Contingency (10%)	$829,000
Engineering/Construction Admin (15%)	$1,243,000
Admin/Legal (2%)	$166,000
Total Estimated Project Cost:	**$10,529,000**

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Concrete Gravity WTP
50 Year Life Cycle Costs

Item	50-Year Life Cycle Cost	Annual Cost
Capital Project Costs	$9,724,000	$355,000
Equipment Replacement	$2,896,470	$92,000
Labor	$4,719,000	$80,000
Gas	$590,000	$10,000
Chemicals	$2,949,000	$50,000
Insurance	$590,000	$10,000
Electricity	$6,488,000	$110,000
Equipment Repair	$2,713,000	$46,000
Total 50 Year Life Cycle Cost	**$30,970,000**	

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Steel Gravity WTP
50 Year Life Cycle Costs

Item	50-Year Life Cycle Cost	Annual Cost
Capital Project Costs	$10,529,000	$385,000
Equipment Replacement	$3,963,000	$126,000
Labor	$4,719,000	$80,000
Gas	$590,000	$10,000
Chemicals	$2,949,000	$50,000
Insurance	$590,000	$10,000
Electricity	$6,488,000	$110,000
Equipment Repair	$3,126,000	$53,000
Total 50 Year Life Cycle Cost	**$32,950,000**	

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Alternative Evaluation

- The capital cost of a concrete gravity filter treatment plant (Alternative 1) is less than the steel gravity filter treatment (Alternative 2) plant ($9.72 million versus $10.53 million).
- Life cycle cost of the concrete gravity filter treatment plant is less than the steel gravity filter treatment plant ($30.67 million versus $32.95 million).
- Concrete gravity filter treatment plant has other operational advantages.
- Alternative 1 – Concrete Gravity Filter Water Treatment Plant is recommended alternative.

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Water Rates

TABLE 13 - WATER BUDGET SUMMARY

IRONWOOD WATER TREATMENT PLANT

	GRANT %	0%	25%	50%	75%
	LOAN AMOUNT - NEW	**$9,724,000**	**$7,293,000**	**$4,862,000**	**$2,431,000**
DESCRIPTION					
Loan Payment - New Construction		$340,069	$255,051	$170,034	$85,017
Reserve - New Construction		$34,007	$25,505	$17,003	$8,502
Loan Payment - RD Series 2010 C		$46,420	$46,420	$46,420	$46,420
Reserve - RD Series 2010 C Bond		$5,050	$5,050	$5,050	$5,050
Loan Payment - RD Series 2014 A, B, and C Bond		$210,140	$210,140	$210,140	$210,140
Reserve - RD Series 2014 A, B, and C Bond		$21,160	$21,160	$21,160	$21,160
Loan Payment - RD Series 2017 Bond		$92,398	$92,398	$92,398	$92,398
Reserve - RD Series 2017 Bond		$9,300	$9,300	$9,300	$9,300
Annual Operation & Maintenance		$1,203,200	$1,203,200	$1,203,200	$1,203,200
Short-Lived Depreciation		$40,317	$40,317	$40,317	$40,317
Subtotal Expenses (Ironwood & Hurley Shared)		$2,002,061	$1,908,542	$1,815,023	$1,721,504
Hurley Expenses		$188,194	$179,403	$170,612	$161,821
Lead Service Line Replacement		$146,685	$146,685	$146,685	$146,685
Total Estimated Annual Expenses (IWD Only)		**$1,960,552**	**$1,875,824**	**$1,791,096**	**$1,706,368**
Total Estimated Monthly Expenses (IWD Only)		**$163,379**	**$156,319**	**$149,258**	**$142,197**
Effective Monthly Rate Per EDU		$45.26	$43.30	$41.35	$39.39

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Schedule

Item	Completion Date
Preparation of Plans	October 2020 – January 2021
Ad for Bid	February 2021
Bid Opening	March 2021
Construction Start	May 2021
Construction Complete	September 2022

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Questions?